
MARKING SCHEME

2009

CLASS XII
SCIENCE SUBJECTS



CENTRAL BOARD OF SECONDARY EDUCATION
DELHI

MARKING SCHEME

2009

CLASS XII
SCIENCE SUBJECTS



CENTRAL BOARD OF SECONDARY EDUCATION
DELHI

CBSE, Delhi-110301

October, 2009 : 200 Copies

Price : Rs.

Manuscript as such highlights the main value points and does not represent a complete ideal answer.
Manuscript may vary from time to time and year to year.

Published by Shri Vineet Joshi, Secretary, C.B.S.E. 'Shiksha Kendra', 2, Community Centre,
Preet Vihar, Delhi - 110301. Laser typesetting and Printed by Akashdeep Printers, Daryaganj,
New Delhi - 110002

PREFACE

CBSE as a pace setting national Board has constantly been striving to design its evaluation process in a manner that it is used as a powerful means of influencing the quality of teaching and learning in the classroom situation. Also, it has to be so designed that it provides constant feedback regarding the effectiveness of the course content, classroom processes and the growth of individual learners besides the appropriateness of evaluation procedures.

As a move in this direction, CBSE started the practice of publishing the Marking Schemes with twin objectives in mind-(i) making the system more transparent and at the same time, (ii) ensuring high degree of reliability in scoring procedure.

Who are the markers of answer scripts? How do they mark the answer scripts? How can it be ensured that marking is fair, objective and reliable? Questions of these types naturally arise in the minds of candidates appearing in the public examination. These questions are equally pertinent to the teachers who are not adequately exposed to the CBSE system of marking.

Answer Scripts marking is a specialised job. It is assigned to teachers-PGTs for Class XII and TGTs for Class X who are in direct touch with the subject and have a minimum of 3 years experience of teaching the subject at that level. Appointment of examiners is made in accordance with the well-defined norms. Markers examine scripts with the help of detailed guidelines called the 'Marking Schemes'.

It is this tool (Marking Scheme) alongwith the extensive supervisory checks and counter-checks through which CBSE tries to ensure objective and fair marking. The present publication is being brought out with a view to serving the following objectives :

- (i) To give an opportunity to the teachers and students to look into the Marking Schemes that were developed by the Board and supplied to the evaluators in 2009 main examination in some selected main subjects.
- (ii) To receive feedback and suggestions from institutions/subject teachers on the utility and further improvement of Marking Schemes.
- (iii) To encourage institutions to undertake similar exercise of developing marking schemes for classes other than those covered by the Board's examination with a view to increasing teachers' responsiveness to them as the essential tools of evaluation.

HOW TO USE

Teachers and the students preparing for Class XII examination of the Board constitute the primary interest-group of this publication. Marking Schemes of Question Papers in the subjects of English Core, Functional English, Mathematics, Physics, Chemistry, Biology, Bio-Technology, Informatics Practices, Computer Science and Engineering Drawing administered in Delhi and Outside Delhi during the 2009 main examination have been included in this document. Some tips on their usage are given below :

(a) To Teachers :

- Go through the syllabus and the weightage distribution for the subject carefully.
- Read the question paper to find out how far the question paper set subscribes to the prescribed design. Grade every question by difficulty level for students who have taken the main Board examination.
- Consult the 'Marking Scheme' for each question, with reference to steps into which answers and awards have been divided.
- Work out concrete suggestions for the Board.

(b) To Students :

- Study each question carefully, comprehend them and write down the main points of the answer and note down their difficulties for clarification.
- Examine a question in conjunction with the Marking Scheme and find out the proximity of the answer to that suggested in the Marking Scheme.
- We will feel motivated if this publication is commented upon by practitioners in the context of its impact on their teaching learning strategies. Contribution of the experts and the officials of the Board in bringing out this document is gratefully acknowledged.

We urge the teachers to encourage their students to make use of this publication and at the same time to enrich us with their free and frank reactions.

M.C. SHARMA
CONTROLLER OF EXAMINATIONS

भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक ' [सम्पूर्ण प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य] बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,
विचार, अभिव्यक्ति, विश्वास, धर्म

और उपासना की स्वतंत्रता,
प्रतिष्ठा और अवसर की समता

प्राप्त कराने के लिए,
तथा उन सब में,

व्यक्ति की गरिमा और ² [राष्ट्र की एकता
और अखण्डता] सुनिश्चित करने वाली बंधुता

बढ़ाने के लिए

दृढसंकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949. ई० को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

-
1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से "प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य" के स्थान पर प्रतिस्थापित।
 2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से), "राष्ट्र की एकता" के स्थान पर प्रतिस्थापित।
-

भाग 4 क

मूल कर्तव्य

51 क. मूल कर्तव्य - भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह -

- (क) संविधान का पालन करें और उसके आदर्शों, संस्थाओं, राष्ट्र ध्वज और राष्ट्र गान का आदर करें;
- (ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखें और उनका पालन करें;
- (ग) भारत की प्रभुता, एकता और अखंडता की रक्षा करें और उसे अक्षुण्ण रखें;
- (घ) देश की रक्षा करें और आह्वान किए जाने पर राष्ट्र की सेवा करें;
- (ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करें जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करें जो स्त्रियों के सम्मान के विरुद्ध हैं;
- (च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्व समझें और उसका परिरक्षण करें;
- (छ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करें और उसका संवर्धन करें तथा प्राणि मात्र के प्रति दयाभाव रखें;
- (ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करें;
- (झ) सार्वजनिक संपत्ति को सुरक्षित रखें और हिंसा से दूर रहें;
- (ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करें जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई ऊंचाईयों को छू लें।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹ **[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the ² [unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "Sovereign Democratic Republic (w.e.f. 3.1.1977)
2. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "unity of the Nation (w.e.f. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV A

Fundamental Duties

ARTICLE 51A

Fundamental Duties - It shall be the duty of every citizen of India-

- (a) to abide the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement.

CONTENTS

Senior School Certificate Examination (XII)

Marking Scheme

	Page No.
1. English Core	1-40
2. Functional English	41-87
3. Mathematics	88-123
4. Physics	124-176
5. Chemistry	177-206
6. Biology	207-242
7. Bio-technology	243-259
8. Informatics Practices	260-309
9. Computer Science	310-401
10. Engineering Drawing	402-422

**LIST OF COORDINATORS/SUBJECT EXPERTS/REPRESENTATIVES
OF THE REGIONS FOR UPDATION/FINALISATION OF THE
MARKING SCHEME FOR THE SENIOR SCHOOL CERTIFICATE
EXAMINATION, 2008**

<i>S.No. Name of the Coordinator/Subject Experts</i>	<i>S.No. Name of the Coordinator/Subject Experts</i>
ENGLISH CORE	
1. Mrs. Usha Ram Principal Laxman Public School Hauz Khas, New Delhi	7. Mrs. Kiran Bisht PGT India International School Mansarwar, Jaipur
2. Sh. J.K. Gangal H- 196, Rama Krishna Vihar Patparganj Society Delhi	8. Smt. P. Dastidar, Principal Army School Narangi, P.O. Satgaon, Guwahati Assam
3. Dr. Opkar Singh Retd. Prof. 121, Sahyog Appartments Mayur Vihar Phase-I Delhi	9. Mr. K. Uhni Krishnan Principal Airport School Calicut Airport Post, Halappuram Distt. Kerala
4. Mrs. Lata Mathew Principal Hamdard Public School Sangam Vihar New Delhi	10. Mr. S.P. Chand Vice Principal Sutluj Public School Sec.- 4, Panchkula
5. Smt. Vandana Kapoor Principal S.L.S. DAV Public School Mausam Vihar Delhi	11. Mrs. Neena Sehgal Principal Delhi Public School Sec.30 Noida, Gautam Budh Nagar Uttar Pradesh
6. Smt. Kiran Khanna Principal Vivekanand School D- Block, Anand Vihar Delhi	12. Mr. D.N.Tiwari PGT Laxman Public School Hauz Khas New Delhi
	13. Mrs. Bela Batheja, PGT G.D.Goenka School Vasant Kunj, New Delhi

S.No. Name of the Coordinator/Subject Experts

14. Mrs. Harpreet Sahi
PGT
Delhi Public School
Meerut Road,
Ghaziabad, U.P.
15. Mr. Naveen Sharma
PGT
Laxman Public School
Hauz Khas Enclave
New Delhi

FUNCTIONAL ENGLISH

1. Mrs. Annie Koshy
Principal
St. Mary's School
B-II, Block Safdarjung Enclave
New Delhi
2. Mrs. Usha Ram
Principal
Laxman Public School
Hauz Khas, New Delhi
3. Shri P.J. Peter
PGT
Laxman Public School
Hauz Khas, New Delhi
4. Mrs. Malini Khatri
HOD
Modern School
Barakhamba Road
New Delhi
5. Mr. Shailja Jaiswal
PGT
Delhi Public School
Meerut Road
Ghaziabad, U.P.

S.No. Name of the Coordinator/Subject Experts

6. Mrs. Lakshmi Srinivasan
Principal
P.S. Senior Sec. School
Mylapore, Chennai
Tamil Nadu
7. Ms. Alakananda Lahiri,
PGT
St. Mary's School
B-II Safdarjung Enclave
New Delhi

MATHEMATICS

1. Mrs. Anita Sharma
Principal
S.D. Public School
BU Block, Pitampura,
Delhi
2. Dr. V.P. Gupta
Professor
NCERT, Sri Autobindo Marg
New Delhi
3. Sh. G. D. Dhall
K-171, LIC Colony
Syed Nangloi Village
Delhi
4. Sh. S.N. Chibber
Principal (Retd.)
B-330, Saraswati Vihar
Delhi
5. Sh. V.P. Singh
Retired Principal
2610 A, Street No.9 Bihari Colony
Shahdara, Delhi

S.No. Name of the Coordinator/Subject Experts

6. Sh. J.C. Nijhawan
Rtd. Vice Principal
C-51 Maharana Pratap Enclave
Delhi
7. Sh. M. Narasimhan
Principal
BHEL Vikram Sr. Sec. School
Piplani, BHEL, Bhopal
M.P.
8. Sh. S.C. Goel
Retd. Principal
Air Force Bal Bharti Public School
Lodi Road
New Delhi
9. Mr. C. Sathyamurthy
Principal
Chinmaya Vidyalaya
9-B, Taylore Road
Kilpauk Chennai
10. Shri Vizay Singla
PGT
Govt. Model Sr. Sec School
Sector-33, Chandigarh
11. Sh. R.N. Chaubey
Principal
JLN Model Sr. Sec. School
Digwadih No. 12,
P.O. Pathardih, Dhanbad,
Jharkhand
12. Mrs. Sangita Chopra
PGT, Delhi Public School,
Rohini, Delhi

S.No. Name of the Coordinator/Subject Experts

13. Sh. M.N. Chaturvedi
Principal
Vivekanand Kendra Vidyalaya
Tinsukia
Assam
14. Sh. Ajay Marwaha
S.D. Public School
BU Block
Pitampura, Delhi
15. Sh. J.P. Singh
Kendriya Vidyalaya
AGCR Colony
Delhi

PHYSICS

1. Sh. Suraj Prakash
Principal
CRPF Pub. School
Sec.XIV, Rohini, Delhi
2. Sh. Anil Kumar Tyagi
Principal
Kendriya Vidyalaya, Punjab Lines
Meerut Cantt., Meerut, (U.P.)
3. Prof. V.S. Bhasin
B4/46 Paschim Vihar,
New Delhi
4. Sh. N.K. Sehgal
Department of Physics
Hans Raj College
Delhi University,
Delhi
5. Sh. G. Giri
Head Master
Modern School
Barakhamba Road
New Delhi

S.No. Name of the Coordinator/Subject Experts

6. Shri M.D. Gupta
Principal
Sanatan Dharam Pub. School
Road No.10, East Punjabi Bagh,
New Delhi
7. Sh. R.S. Thakur
Vice-Principal
H.E. Vikram Hr. Sec. School
BHEL, Piplani
Bhopal (M.P.)
8. Sh. A.K. Mishra
Principal
Delhi Public School
Dhaligaon, Dist. Chirang,
Assam
9. Mr. P. Neelakanta Pillai,
Principal
Kola Peru mal Chetty Vaishnav
Sr. Sec. School
815, EVR Periyar High Road,
Arumbakkam
Chennai, Tamil Nadu
10. Ms. Kanta Manchanda
H. No. 577, Sector-11 B
Chandigarh
11. Sh. Surjan Singh
KG-II/136, Vikaspuri
New Delhi

CHEMISTRY

1. Sh.S.K.Munjal
Principal
St. Margaret Pub. School
D-Block Prashant Vihar
Delhi

S.No. Name of the Coordinator/Subject Experts

2. Dr. K.N.Uppadhyay,
326 SFS Flats
Ashok Vihar Phase-IV
Delhi
3. Prof. R.D. Shukla,
40, Delux Apptt.
B-5, Vasundhara Enclave
Delhi
4. Dr. (Mrs) Sangeeta Bhatia
Principal
New State Academy
Sr Sec School
Pitampura Near Club,
Delhi
5. Sh.B.N.Mehrota
A-32 Nanda Road,
Adarsh Nagar,
Delhi
6. Shri N.P. Dhaka
Principal
Dr. Rajendra Prasad
Govt. Sarvodaya Vidyalaya
President's Estate,
New Delhi
7. Sh. Deshbir Singh
St. Paul's Hr. Sec. School
Boundery Road, Indore
M.P.
8. Ms. S. Sitalakshmi
Principal
Kendriya Vidyalaya
CLRI Campus, Adyar
Chennai, Tamil Nadu

S.No. Name of the Coordinator/Subject Experts

9. Sh. Avinash Kumar Vohra
PGT
Govt. Model Sr. Sec. School
Sector-23, Chandigarh

10. Dr. D.R. Singh
Principal
DA V Jawahar Vidya Mandir
H.S.L Colony, Shyamli
P.O. Doranda
Ranchi, Jharkhand

11. Sh. Rakesh Dhawan
PGT
St. Margaret Public School
D-Block, Prashant Vihar
Delhi

BIOLOGY

1. Sh. Vinay Kumar
Principal
Delhi Public School
Sector C Pocket 5, Vasant Kunj
New Delhi

2. Sh. Y.P. Purang
Retd. ADE
C2/113, Janakpuri, New Delhi

3. Mrs. Rita Talwar
Retd. Principal
54, Khan Market
New Delhi

4. Sh. Sheo Raj Singh
Ex D.E.O.
B-27, Shankar Garden
New Delhi

S.No. Name of the Coordinator/Subject Experts

5. Smt. Neeta Rastogi
Principal
Sadhu Vaswani Int. School for Girls
2nd Street, Shanti Niketan
New Delhi

6. Mrs. Margarette Davidraj
Principal
Bakthavatasalam Vidyashram
14, 31st Street, TNHB Colony
Periyaar Nagar, Korattur, Chennai,
Tamil Nadu

7. Mrs. Chitra Agarwal
Principal
Kendriya Vidyalaya
Sikh Lines, Meerut Cantt.
Meerut (U.P.)

8. Sh. S. K. Joshi
Principal
Vidya Sagar School
Bicholi Mardana
Indore, Madhya Pradesh

9. Sh. Virendra Srivastava
B-3B/95 B Janakpuri
New Delhi

10. Ms. Bandana R.P. Lazarus,
Delhi Public School,
Vasant Kunj,
New Delhi

11. Sh. A.K. Verma
Principal
Kendriya Vidyalaya
Narangi Guwahati

***S.No. Name of the Coordinator/Subject
Experts***

12. Ms. Shivani Goswami,
Mothers International School,
Arobindo Marg,
New Delhi

13. Mrs. Rachna Gupta,
Delhi Public School
Vasant Kunj, New Delhi

14. Ms. S.K. Sharma
Vice-Principal
Govt. Model Sr. Sec. School
Chandigarh

15. Mrs. Anuradha Ray
PGT
Delhi Public School
Vasant Kunj, New Delhi

BIO-TECHNOLOGY

1. Dr. K. Nirmala
Reader
Department of Bio-Chemistry
Daulat Ram College
University of Delhi
Delhi

2. Dr. Ashwani Pareek
401, School of Life Science
Jawaharlal Nehru University
New Delhi

3. Dr. J.S. Viridi
Department of Microbiology
University of Delhi
South Campus
Benito Juarez Road
New Delhi

4. Mr. Sonia Varghese
PGT
Bio-Technology, Ramjas School
R.K. Puram, Sector-4
New Delhi

***S.No. Name of the Coordinator/Subject
Experts***

5. Smt. Madhumati Bhaskarwar
PGT
G.D. Goenka Public School
Sector 3, Pocket - 8 & 9
Vasant Kunj, New Delhi

6. Prof. M.V. Rajam
Dept. of Genetics
University of Delhi,
South Campus, New Delhi

INFORMATICS PRACTICE

1. Sh. Mukesh Kumar
PGT
Delhi Public School
Sec-XII, R.K. Puram,
New Delhi

2. Sh.M.P.S. Bhatia
NSIT, Dwarka
B-2/7C, Lawrence Road
New Delhi

3. Mr. K.V. Krishna Kumar
PGT
P.S. Sr. Sec. School
33, Almelmangapura, Mylapore
Chennai, Tamil Nadu

4. Mrs. Nancy Sehgal
PGT
Mata Jai Kaur Public School
Ashok Vihar
New Delhi

5. Mrs. Bharti Arora
PGT
S.D. Public School
Sector-32 Chandigarh

<i>S.No. Name of the Coordinator/Subject Experts</i>	<i>S.No. Name of the Coordinator/Subject Experts</i>
6. Mr. Rajendra Joshi PGT St. Xavier's Sr. Sec. School Bhagwan Dass Road Jaipur, Rajasthan	3. Sh. Gautam Sarkar PGT Modern School Barakhamba Road New Delhi
7. Sh. Gautam Sarkar PGT Modern School Barakhamba Road New Delhi	4. Sh. R.K. Tiwari PGT Vivekanand School D Block, Anand Vihar Delhi
8. Sh. R.K. Tiwari PGT Vivekanand School D Block, Anand Vihar Delhi	5. Sh. S. Sriram HOD Mayo College Ajmer, Rajasthan
9. Dr. Richa Verma A-5, Harsh Appts. Sunder Vihar New Delhi	6. Mrs. Manjeet Johar PGT, Vivek High School Sec- 38, Chandigarh
10. Sh. Narendra Singh PGT Delhi Public School Sec. Gamma-II, Greater Noida City Gautam Budh Nagar, U.P.	7. Mrs. M. Aparna PGT Kolaperamal Chetty Vaishnav Sr. School 815 EVR Periyar High Road Arumbakkam, Chennai
COMPUTER SCIENCE	
1. Sh.Mukesh Kumar PGT Delhi Public School See-XII, R.K.Puram New Delhi	8. Sh. Om Prakash Tyagi PGT Delhi Publi School NTPC Dadri, PO Vidyut Nagar Gautam Budh Nagar Uttar Pradesh
2. Sh. M.P.S. Bhatia NSIT Dwarka Delhi B-2/7C, Lawrence Road New Delhi	9. Sh. Mohitendra Dey Delhi Public School RK Puram, Sector-12 New Delhi

S.No. Name of the Coordinator/Subject Experts

10. Mrs. Susheela Mohandas
PGT
Sardar Patel Vidyalaya
Lodhi Estate
New Delhi

ENGINEERING DRAWING

1. Dr. S.M. Kapoor
Vice Principal
Mukherjee Memorial Sr. Sec. School
GT Road, Shahdara
Delhi

2. Sh. Arvind Kumar Singh Chauhan
Modern School
Vasant Vihar
New Delhi

3. Prof. N. L. Sachdeva
Rtd. Prof. from DCE
52-D, BW Block
Shalimar Bagh
Delhi

S.No. Name of the Coordinator/Subject Experts

4. Sh.R.P Chaurasiya
Vice Principal (Retd.)
61/B-7, Sector-04, Rohini

5. Mrs. Neelam Talwar
DL DA V Model School,
ND Block, Pitampura,
Delhi

6. Ms. G.M. Prema
799, LIG Flats
Hastsal, Uttam Nagar
New Delhi

7. Sh. Prem Narain
PGT
Mukherjee Memorial Sr. Sec. School
G.T. Road, Shahdara
Delhi

8. Sh. Anil Kumar
Mukherjee Memorial Sr. Sec. School
G.T. Road, Shahdara
Delhi

ENGLISH (Core)

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

- (i) *This paper is divided into three Sections: A, B and C. All the sections are compulsory.*
- (ii) *Separate instructions are given with each section and question, wherever necessary. Read these instructions very carefully and follow them faithfully.*
- (iii) *Do not exceed the prescribed word limit while answering the questions.*

QUESTION PAPER CODE 1/1/1

SECTION A : READING

20 Marks

1. Read the passage given below and answer the questions that follow: 12 marks

1. The role friends play in our lives has become significantly greater than at any other time in our history. Today many of us live and work great distances from where we were born or grew up and are separated from our original families. The pain we feel when we are away from our families can be significant.
2. The happiness of the individual relies on friendships which form a necessary human connection. It is perfectly normal to need and want friends and depression is more prevalent among those who lack friends. They lack the intimacy and richness friends can bring into our lives. Frequently friends reflect similar values to us. Yet these values are often different from the ones we grew up with; they are the values we created for ourselves in our adult lives.
3. Communication skills are fundamental in all friendships. The more friends and acquaintances one has, the greater are one's communication skills. Some call these, people skills.
4. Like watering a plant, we grow our friendships (and all our relationships) by nurturing them. Friendships need the same attention as other relationships if they are to continue. These relationships can be delightfully non-judgemental, supportive, understanding and fun.
5. Sometimes a friendship can bring out the positive side that you never show in any other relationship. This may be because the pressure of playing a 'role' (daughter, partner or child) is removed. With a friend you are to be yourself and free to change. Of course you are free to do this in all other relationships

as well but in friendships you get to have lots of rehearsals and discussion about changes as you experience them. It is an unconditional experience where you receive as much as you give. You can explain yourself to a friend openly without the fear of hurting a family member. How do friendships grow? The answer is simple. By revealing yourself; being attentive; remembering what is most important to your friend and asking them about it; putting yourself in their position; showing empathy; seeing the world through the eyes of your friend, you will understand the value of friendship. All this means learning to accept a person from a completely different family to your own or perhaps someone from a completely different cultural background. This is the way we learn tolerance. In turn we gain tolerance and acceptance for our own differences.

6. Friendships are made by being considerate which means all the communication skills come into play: active listening skills, questioning skills, negotiation skills, reflecting content skills, reflecting emotion skills, and editing yourself.
 7. Friendships offer a great opportunity to learn about yourself because a friend can reflect back to you 'how you come across in the world'. They also allow you to practice skills in dealing with 'personal boundaries' by looking after yourself as well as your friend. They help you develop resilience in relation to the wider social world beyond your family.
 - (a)
 - (i) Why do friends play a more significant role today than ever before? 2
 - (ii) Why is friendship considered an essential human need? 2
 - (iii) How is friendship different from other relationships? 2
 - (iv) Mention two essential human values that help friendship to grow. 1
 - (v) Which communication skills help in building friendship? 2
 - (b) Pick out words from the passage which mean the same as each of the following: 1 x 3 = 3
 - (i) basic / essential (para 3)
 - (ii) mutual discussion to reach an agreement (para 6)
 - (iii) chance (para 7)
2. Read the passage given below and answer the questions that follow: **8 marks**

Effective speaking depends on effective listening. It takes energy to concentrate on hearing and concentrate on understanding what has been heard.

Incompetent listeners fail in a number of ways. First, they may drift. Their attention drifts from what the speaker is saying. Second, they may counter. They find counter arguments to whatever a speaker may be saying. Third, they compete. Then, they filter. They exclude from their understanding those parts of the message which do not readily fit with their own frame of reference. Finally they react. They let personal feelings about speaker or subject override the significance of the message which is being sent.

What can a listener do to be more effective? The first key to effective listening is the art of concentration. If a listener positively wishes to concentrate on receiving a message his chances of success are high. It may need determination. Some speakers are difficult to follow, either because of voice problems, or because of the form in which they send a message. There is then particular need for the determination of a listener to concentrate on what is being said.

Concentration is helped by alertness. Mental alertness is helped by physical alertness. It is not simply physical fitness, but also positioning of the body, the limbs and the head. Some people also find it helpful to their concentration if they hold the head slightly to one side. One useful way for achieving this is intensive note-taking, by trying to capture the critical headings and sub-headings the speaker is referring to.

Note-taking has been recommended as an aid to the listener. It also helps the speaker. It gives him confidence when he sees that listeners are sufficiently interested to take notes; the patterns of eye-contact when the note-taker looks up can be very positive; and the speaker's timing is aided - he can see when a note-taker is writing hard and can then make effective use of pauses.

Posture too is important. Consider the impact made by a less competent listener who pushes his chair backwards and slouches. An upright posture helps a listener's concentration. At the same time it is seen by the speaker to be a positive feature amongst his listeners. Effective listening skills have an impact on both the listener and the speaker.

- (a) On the basis of your reading of the above passage make notes on it using headings and sub-headings. Use recognizable abbreviations wherever necessary. 5
- (b) Write a summary of the passage in not more than 80 words using the notes made and also suggest a suitable title. 3

SECTION B : ADVANCED WRITING SKILLS

35 Marks

- 3. Samta Public School in Delhi requires cricket and hockey coaches. Draft a suitable advertisement in not more than 50 words for the 'Situations Vacant' column of the 'Daily Herald', stating your requirements regarding age, qualification, experience etc. You are Principal of the School. **5 marks**

OR

As Librarian of Crescent International School, Gwalior, draft a notice in not more than 50 words asking all students and teachers to return the library books they have borrowed, two days before the commencement of the examination.

4. You are Naren, a class XI student of Preet Public School, Chennai. You attended a week-long training programme organized by The Debating Society, Chennai to develop debating skills. Mentioning the number of participants, speakers and the skills taught such as listening, concentration, effective speaking etc., write a report in 100 - 125 words for your school magazine.

10 marks

OR

Write a factual description of the new library-cum-reading room in your school for the primary class students in 100 - 125 words. Include details of the layout, display facility, seating arrangement etc.

5. SAF Public School, Chandigarh is planning to take a group of 40 senior students to Shimla on an excursion during the summer vacation. Mr. Mohan Das, the teacher in-charge of 'Excursions & Field Trips' writes a letter to JJ Tours & Travels, Chandigarh asking them to organize the tour. Write this letter giving details of preference such as dates of journey, transport, accommodation etc.

10 marks

OR

You are Navneet of 65, P.H. Road, Mangalore. Recently you bought a mobile phone from 'The Phone Point', 83, Mount Road, Mangalore. The phone instrument developed a problem within a month of purchase. Write a letter to the dealer giving details of the nature of the problem and asking him/her to rectify the defect or replace the set.

6. Teenage is commonly perceived as the most joyful period of an individual's life. Vidya who represents the teenagers of today feels that the pressure of the competitive world they live in has made teen years less exciting and expresses her ideas in an article entitled, 'On Being a Teenager' for the 'Youth Times'. Write the article in 150 - 200 words.

10 marks

OR

Every activity that man indulges in creates waste of some kind. Some of the waste can be recycled or reused. In fact the need of the hour is to conserve the earth's resources in all possible ways. Write an article on the topic 'Conservation, Need of the Hour' in 150 - 200 words. You are Brinda, a keen environmentalist.

SECTION C : LITERATURE

45 Marks

7. (a) Read the extract given below and answer the questions that follow: **4 marks**

Therefore, on every morrow, are we wreathing
A flowery band to bind us to the earth,
Spite of despondence, of the inhuman dearth
Of noble natures, of the gloomy days,
Of all the unhealthy and o'er-darkened ways
Made for our searching :

- (i) What are the flowery bands that bind us to the earth? **2**
(ii) What message do the above lines convey? **2**

OR

.....and felt that old
familiar ache, my childhood's fear,
but all I said was, see you soon, Amma,
all I did was smile and smile and smile...

- (i) What was the childhood fear that now troubled the poet? **1**
(ii) What do the poet's parting words suggest? **2**
(iii) Why did the poet smile and smile? **1**

- (b) Answer any **three** of the following questions in 30 - 40 words each: **2 x 3 = 6 marks**

- (i) Why does Stephen Spender say that the pictures and maps in the elementary school classroom are meaningless?
(ii) What is the exotic moment the poet Pablo Neruda wishes for?
(iii) Describe the tigers created by Aunt Jennifer.
(iv) Why does Robert Frost sympathise with the rural poor?

8. Answer the following questions in 30 - 40 words each: **2 x 5 = 10 marks**

- (a) What was the mood in the classroom when M. Hamel gave his last French lesson?
(b) What does the writer mean when she says, 'Saheb is no longer his own master' ?
(c) Why did Gandhi agree to the planters' offer of a 25% refund to the farmers?
(d) How did Douglas finally get rid of the fear he had of water?
(e) What were the positive qualities of Subbu that the writer admired?

9. Answer the following in 125 - 150 words: **10 marks**

Describe how the story, 'The Rattrap' shows that basic human goodness can be brought out by understanding and love.

OR

Contrast Sophie's real world with her fantasies.

10. Answer the following in 125 - 150 words: **7 marks**

How did Dr. Sadao rise above narrow prejudices of race and country to help a human being in need?

OR

Why did Jo disapprove of Jack's ending of the story of Roger Skunk? How did she want it to end?

11. Answer the following questions in 30 - 40 words each: **2 x 4 = 8 marks**

- (a) How did the tiger king acquire his name?
- (b) What was the objective of the 'Students on Ice Programme' ?
- (c) What clues did the answer sheet of Evans provide to the Governor?
- (d) When did Bama first come to know of the social discrimination faced by the people of her community?

QUESTION PAPER CODE 1/1

SECTION A : READING

20 Marks

1. Read the passage given below and answer the questions that follow: **12 marks**

1. The role friends play in our lives has become significantly greater than at any other time in our history. Today many of us live and work at great distances from where we were born or we grew up and are separated from our original families. The pain we feel when we are away from our families can be significant.
2. The happiness of the individual relies on friendships which form a necessary human connection. It is perfectly normal to need and want friends and depression is more prevalent among those who lack friends. They lack the intimacy and richness friends can bring into our lives. Frequently friends reflect similar values to us. Yet these values are often different from the ones we grew up with; they are the values we created for ourselves in our adult lives.

3. Communication skills are fundamental in all friendships. The more friends and acquaintances one has, the greater are one's communication skills. Some call these, people skills.
4. Like watering a plant, we grow our friendships (and all our relationships) by nurturing them. Friendships need the same attention as other relationships, if they are to continue. These relationships''' can be delightfully non-judgemental, supportive, understanding and fun.
5. Sometimes a friendship can bring out the positive side that you never show in any other relationship. This may be because the pressure of playing a 'role' (daughter, partner or child) is removed. With a friend you can be yourself and are free to change. Of course you are free to do this in all other relationships as well, but in friendships you get to have lots of rehearsals and discussion about changes as you experience them. It is an unconditional experience where you receive as much as you give. You can explain yourself to a friend openly without the fear of hurting a family member. How do friendships grow? The answer is simple. By revealing yourself; being attentive; remembering what is most important to your friend and asking them about it; putting yourself in their position; showing empathy; seeing the world through the eyes of your friend, you will understand the value of friendship. All this means learning to accept a person from a completely different family to your own or perhaps someone from a completely different cultural background. This is the way we learn tolerance. In turn we gain tolerance and acceptance for our own differences.
6. Friendships are made by being considerate which means all the communication skills come into play: active listening skills, questioning skills, negotiation skills, reflecting content skills, reflecting emotion skills, and editing yourself.
7. Friendships offer a great opportunity to learn about yourself because a friend can reflect back to you 'how you come across in the world'. They also allow you to practice skills in dealing with 'personal boundaries' by looking after yourself as well as your friend. They help you develop resilience in relation to the wider social world beyond your family.
 - (a) (i) Why do friends play a more significant role today than ever before? 2
 - (ii) Why is friendship considered an essential human need? 2
 - (iii) How is friendship different from other relationships? 2
 - (iv) Mention two essential human values that help friendship to grow. 1
 - (v) Which communication skills help in building friendship? 2

(b) Pick out words from the passage which mean the same as each of the following:

1x3 = 3

(i) basic essential (para 3)

(ii) mutual discussion to reach an agreement (para 6)

(iii) chance (para 7)

2. Read the passage given below and answer the questions that follow:

8 marks

Effective speaking depends on effective listening. It takes energy to concentrate on hearing and to concentrate on understanding what has been heard. Incompetent listeners fail in a number of ways. First, they may drift. Their attention drifts from what the speaker is saying. Second, they may counter. They find counter arguments to whatever a speaker may be saying. Third, they compete. Then, they filter. They exclude from their understanding those parts of the 'message which do not readily fit with their own frame of reference. Finally they react. They let personal feelings about speaker or subject override the significance of the message which is being sent.

What can a listener do to be more effective. The first key to effective listening is the art of concentration. If a listener positively wishes to concentrate on receiving a message his chances of success are high.

It may need determination. Some speakers are difficult to follow, either because of voice problems, or because of the form in which they send a message. There is then a particular need for the determination of a listener to concentrate on what is being said.

Concentration is helped by alertness. Mental alertness is helped by physical alertness. It is not simply physical fitness, but also positioning of the body, the limbs and the head. Some people also find it helpful to their concentration if they hold the head slightly to one side. One useful way for achieving this is intensive note-taking, by trying to capture the critical headings and sub-headings the speaker is referring to.

Note-taking has been recommended as an aid to the listener. It also helps the speaker. It gives him confidence when he sees that listeners are sufficiently interested to take notes; the patterns of eye-contact when the note-taker looks up can be very positive; and the speaker's timing is aided - he can see when a note-taker is writing hard and can then make effective use of pauses.

Posture too is important. Consider the impact made by a less competent listener who pushes his chair backwards and slouches. An upright posture helps a listener's concentration. At the same time it is seen by the speaker to be a positive feature amongst his listeners. Effective listening skills have an impact on both the listener and the speaker.

- (a) On the basis of your reading of the above passage make notes on it using headings and sub-headings. Use recognizable abbreviations, wherever necessary. 5
- (b) Write a summary of the passage in not more than 80 words using the notes made and also suggest a suitable title. 3

SECTION B : ADVANCED WRITING SKILLS

35 Marks

3. You want to sell your newly built flat. Draft a suitable advertisement in not more than 50 words to be inserted in the classified columns of 'The Hindu' giving all necessary details. You are Nirranjan, 247, J.P. Nagar, Bangalore. 5 marks

OR

As Secretary of the 'Eco Club' of St. Anne's School, Ahmedabad, draft a notice in not more than 50 words informing the club members about the screening of Al Gore's film, 'Inconvenient Truth' in the school's audio visual room.

4. Alpha School recently organized a course in First Aid for students of senior classes. Vivek of Class XII writes a report on the programme giving necessary details for the school magazine. Write a report in 100 - 125 words. 10 marks

OR

Write a factual description of the multi-storeyed shopping mall in your locality in 100 - 125 words. Include details of layout, special facilities like ATM, restaurants, escalators etc.

5. Sheela, a Class XII student of 15, M.G. Road, Bangalore desires to be a fashion designer. She writes to the National Institute of Fashion Technology, Ahmedabad seeking information about their courses, admission procedure, eligibility criteria, fee structure, placement opportunities etc. Write her letter. 10 marks

OR

As Mr. R. Singh, HOD Chemistry, Cambridge High School, Pune, you had placed an order with Messrs. Scientific Equipments, Dadar, Mumbai for test tubes and jars for the lab. When the parcel was received you observed that markings on the test tubes were not clear and some of the jars were damaged. Write a letter of complaint seeking immediate replacement.

6. Children living in cities are rarely seen playing outdoors in the neighbourhood. Being busy with other attractions like the television and computer games, they miss the joy of outdoor play. Write an article in 150 - 200 words for the magazine, 'Kids Talk' highlighting the need and value of outdoor games. You are Vidya / Vinod. 10 marks

OR

Today the 24-hour television news channels give us instant news from every nook and corner of the world. But the fact remains that the importance of the newspaper remains intact. Write an article in 150 - 200 words expressing your views on 'The Relevance of Newspapers'. You are Sunil / Sunita.

SECTION C : LITERATURE

45 Marks

7. (a) Read the extract given below and answer the questions that follow: **4 marks**

The little old house was out with a little new shed
In front at the edge of the road where the traffic sped,
A roadside stand that too pathetically pled,
It would not be fair to say for a dole of bread,
But for some of the money, the cash, whose flow supports
The flower of cities from sinking and withering faint.

- (i) Where was the new shed put up ? What was its purpose? **2**
(ii) Why does the poet use the word 'pathetic' ? **1**
(iii) Who are referred to as 'the flower of cities' ? **1**

OR

Now we will count to twelve
and we will all keep still.
For once on the face of the Earth
let's not speak in any language,
let's stop for one second,
and not move our arms so much.

- (i) How long does the poet want to stay still ? **1**
(ii) What does he hope to achieve by keeping quiet? **2**
(iii) What does the poet mean by 'not move our arms so much' ? **1**

- (b) Answer any three of the following questions in 30 - 40 words each: **2x3=6 marks**

- (i) How does the world depicted on the classroom walls differ from the world of the slum children?
(ii) According to Keats, what makes man love life in spite of all its problems and miseries?
(iii) Why did Aunt Jennifer choose to embroider tigers on the panel?
(iv) What do the poet's parting words to her mother signify?

8. Answer the following questions in 30 - 40 words each: **2x5 = 10 marks**

- (a) How did the incident at the Y.M.C.A. pool affect Douglas?
- (b) How was Gandhiji able to influence the lawyers at Champaran ?
- (c) Why did the peddler sign himself as Captain von Stahle?
- (d) Is it possible for Mukesh to realize his dream? Justify your answer.
- (e) Account for Subbu's importance in Gemini Studios.

9. Answer the following question in 125 - 150 words: **10 marks**

Jansie is just as old as Sophie but she is very different from her. Bring out the contrast between the two friends citing relevant instances from the story, 'Going Places'.

OR

What did the French teacher tell his students in his last French lesson? What impact did it have on them? Why ?

10. Answer the following question in 125 - 150 words: **7 marks**

What are the similarities in the lives of Bama and Zitkala though they belong to different cultures?

OR

How did the Tiger King meet his end? What is ironical about his fate?

11. Answer the following questions in 30 - 40 words each: **2x4 = 8 marks**

- (a) Why is Antarctica and its understanding important for the survival of the world?
- (b) Why did the General spare the American soldier?
- (c) What qualities of Mr. Lamb attracted Derry to him?
- (d) How did the wizard help Roger Skunk?

Marking Scheme — English Core

General Instructions :

1. Evaluation is to be done as per instructions provided in the Marking Scheme.
2. The Marking Scheme provides suggested guidelines and not the complete answers.
3. Answer scripts should not be given to the evaluators for evaluation till the given Marking Scheme has been thoroughly discussed with them in groups or individually.
4. On the first day of marking, the Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the Marking Scheme only. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant deviation from the Marking Scheme.
5. If a question has parts, please award marks on the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written on the left hand margin and circled.
6. If a question does not have any parts, marks must be awarded on the left-hand margin.
7. Where marks are allotted separately for content and expression as per the Marking Scheme, they have to be reflected separately and then totalled up.. This is a mandatory requirement.
8. A slash (/) in the Marking Scheme indicates alternative answers to a question. If a student writes an answer which is not given in the Marking Scheme but which seems to be equally acceptable, marks should be awarded only in consultation with the Head-Examiner.
9. If a child has attempted an extra-question, answer of the question deserving more marks should be retained and the other answer scored out.
10. Q1 under Section A (reading skills) and Q7 (a) under Section C (Literature) have been designed to test students' ability to comprehend the given passage / extract so the examinees need not be unnecessarily penalised for language errors.
11. Where questions have been designed to test the writing skills of students, the expression (grammatical accuracy, appropriate use of words, style, spelling, organization and presentation of relevant matter in a coherent and logical way) is important.

12. Identify major mistakes and weaknesses before awarding marks.
13. Wherever the word limit is given, no marks be deducted for exceeding the word limit. However, due credit should be given for precise answers.
14. If a student, in response to a short-answer-type question, writes a single word answer which constitutes the core of the answer. It may be accepted and awarded marks.
15. If a student literally lifts a portion of the given passage / extract from the question paper as an answer to a question, no mark(s) be deducted as long as it is relevant and indicative of the desired understanding on the part of the student [reference questions under Q1 and Q7(a)].
16. A full scale of marks - 0 to 100 is to be used. In case of an answer book deserving 95 marks and above, marks be awarded in consultation with the Head Examiner only.

QUESTION PAPER CODE 1/1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: READING

20 Marks

1 COMPREHENSION PASSAGE

12 marks

(a) NOTE: No mark(s) should be deducted for mistakes of grammar, spelling, or word limit. Full marks may be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

(i) live and work great distances from native places / separated from original families / company of friends reduces the pain 2 marks

(ii) brings happiness, intimacy and richness 2 marks
saves from depression
reflects the value system we developed in our adult life
value system different from the one that we grew up with
(any two)

(iii) brings out the positive side 2 marks
you explain yourself openly to a friend
no fear of hurting any family member
it is an unconditional experience
non judgemental
supportive
understanding and fun
(any two)

(iv) tolerance 1 mark
acceptance
empathy
attentiveness
seeing the world through the eyes of your friend
(any two)

(v) active listening skills 2 marks
questioning skills

negotiation skills
 reflecting content skills
 reflecting emotion skills and editing yourself
 (any two)

- (b) (i) fundamental 1 mark
 (ii) negotiation 1 mark
 (iii) opportunity 1 mark

2 Note 8 marks

- **If a student has attempted only summary or only notes, due credit should be given.**
- **1 mark allotted for title be given if the student has written the title either in Q2(a) or Q2(b)**
- **Min. 3 main headings and 3 sub-headings to form content**

The notes provided below are only guidelines. Any other title, main points and sub-points should be accepted if they are indicative of the candidate's understanding of the given passage, and the notes include the main points, with suitable and recognizable abbreviations. Complete sentences are not to be accepted as notes. (In such cases ½ -1 mark may be deducted from marks allotted to content)

Numbering of points can be indicated in different ways, and these should be accepted as long as a consistent pattern is followed.

(a) **NOTE MAKING**

Distribution of Marks

Abbreviations / Symbols (with/without key) - any four 1 mark

Title 1 mark

Content (minimum 3 sub-headings, with proper indentation and notes) 3 marks

Suggested Notes

Title: Effective Listening Skills / Listening Skills / Competent Listeners / Effective Communication / any other suitable title)

- 1 Effective speaking
 1.1 depends on eff. list'ng

- 1.2 takes energy to conc. on hearing
- 1.3 conc. on underst'ng
- 2 Incompetent listeners
 - 2.1 fail in a no. of ways
 - 2.2 attention drifts
 - 2.3 find counter argum'ts
 - 2.4 filter message to suit own frame of ref.
 - 2.5 react
- 3 How can a listener be more effective
 - 3.1 art of conc.
 - i) helped by alert'ess
 - ii) alert'ess helped by phy. fitn's & posit'ng of body
 - 3.2 intensive note-taking
 - i) aid to listen'r
 - ii) helps the spk'r by eye contact
 - iii) spkr's timing is aided
 - 3.3 posture
 - i) upright postur' helps in conc.
 - ii) +ve feature of listn'rs

(b) **Summary**

The summary should include all the important points given in the notes.

Content 2 marks

Expression 1 mark

SECTION B: ADVANCED WRITING SKILLS **35 Marks**

NOTE: The objective of the section on Advanced Writing Skills is to test a candidate's writing ability. Hence, expression assumes as much importance as the content of the answer.

- 3 **ADVERTISEMENT** 5 marks
 - Content** 3 marks
 - Expression** 2 marks

Suggested value points

(SITUATIONS VACANT - CRICKET AND HOCKEY COACHES REQUIRED)

- Qualities essential: young, active, agile, good communication skills, pleasing personality
 - Qualifications: degree or diploma from recognised institute of sports, experience of training (mention period)
 - Apply: within specified period
 - remuneration
 - contact details
 - any other relevant details
- (due credit should be given for economy of words used)

OR

NOTICE 5 marks

Format 1 mark

The format should include: NOTICE / TITLE, DATE, and WRITER'S NAME WITH DESIGNATION. The candidate should not be penalized if he has used capital letters for writing a notice within or without a box.

Content 2 marks

Expression 2 marks

Suggested value points

(RETURN OF LIBRARY BOOKS)

- to return library books
- last date for return of the books
- fine for late submission and damaged books
- any other relevant details

4 REPORT WRITING 10 marks

Format

1. title, reporter's name 1 mark

Content 4 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Suggested value points:

(DEBATING SKILLS ENHANCEMENT PROGRAMME/ ENHANCING DEBATING SKILLS / any other suitable heading)

- week long training programme for students
- organised by Debating Society, Chennai
- participants
- eminent speakers / resource persons
- presentations
- programme
- skills taught
- students' participation
- any other relevant points

OR

FACTUAL DESCRIPTION

10 marks

Title

1 mark

Content

4 marks

Expression

5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Suggested value points

(NEW LIBRARY CUM READING ROOM)

what

- a library cum reading room where one can sit, browse through books, read for fun and knowledge
- location - in the school building

description

- size
- general ambience

- seating arrangements
- seating capacity, comfortable chairs, tables, benches
- number and variety of books
- well planned, well lit, well ventilated, well equipped
- tastefully decorated, display boards with latest book covers
- computer catalogues, internet facility
- librarian to see to the smooth running
- any other relevant details

(min 4)

5 LETTER WRITING

10 marks

[Note: - No marks are to be awarded if only the format is given. Credit should be given to the candidate's creativity in presentation of ideas. Use of both the traditional and the new format is permitted.]

Format

2 marks

1. sender's address, 2. date, 3. receiver's address, 4. subject heading, 5. salutation, 6. complimentary close.

Content

4 marks

Expression

4 marks

- grammatical accuracy, appropriate words and spelling [2]
- coherence and relevance of ideas and style [2]

(SCHOOL EXCURSION)

Suggested Value Points

- size of group
- date and duration
- transport, accommodation, facilities required - sightseeing
- charges
- concession
- any other relevant details

(any 4)

OR

(COMPLAINT ABOUT FAULTY MOBILE PHONE)

Suggested Value Points

- details of purchase - date, receipt no.
- nature of defect
- warranty
- request to rectify / replace

6 ARTICLE WRITING 10 marks

Format: (Title and writer's name) 1 mark

Content 4 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Suggested Value Points

(ON BEING A TEENAGER / any other suitable title)

- teenage best phase in one's life (maximum enjoyment, fewer responsibilities)
- turned into complicated stage due to immense pressure of competition
- pressure from parents to perform better for future admission
- physical and emotional changes
- any other relevant point

suggestions (if any) for making less stressful

- need a lot of emotional support, guidance, patience, understanding and counselling
- parents to spend quality time with teenagers

(min 4)

OR

Suggested Value Points

(CONSERVATION, NEED OF THE HOUR/ CONSERVING THE EARTH'S RESOURCES / any other suitable title)

- why conserve
- to avoid waste

- balance between natural resources and population
- for future generations
- role of students, govt., community
- water conservation (rainwater harvesting)
- waste to be recycled / reused

(min 4)

Solutions (optional)

- creating awareness
- alternative sources of energy like wind, sun, rivers should be tapped
- govt initiatives in promoting alternative resources
- conservation essentials for human life and progress
- any other relevant point

SECTION C: LITERATURE

45 Marks

NOTE: The objective of the section on Literature is to test a candidate’s ability to understand and interpret the prescribed text through short answer and long answer type questions. Hence both content and expression in answer to the given questions deserve equal importance while awarding marks.

7 [This question has been designed to test the students’ understanding of the text and their ability to interpret, evaluate and respond to the questions based on the given stanza. In other words, it attempts to test their reading comprehension ONLY.] 10 marks

(a) **Value points:** 4 marks

- (i) the beautiful objects of nature / beautiful sights and sounds of nature (sun, moon, blooming flowers and plants that lift our spirits) 2
- (ii) beautiful things dispel sadness and darkness from our lives / man is inspired by beautiful things on earth to live happily / a thing of beauty is a joy forever 2

OR

- (i) fear of separation from her mother due to death / one day she would lose her mother / the fear of growing old 1

- (ii) words of assurance that they would meet again / life must go on / comforting herself as well as her mother / parting on an optimistic note 2
- (iii) does not want to show her agony and fear to her mother / her outer smile hides her inner pain of separation / comforts her mother / wants to part from her mother on a pleasant note 1

(b) **Short answer type questions (poetry)** 2x3= 6 marks

Distribution of marks:

Content: 1 mark

Expression 1 mark

(deduct ½ mark for two or more grammatical/spelling mistakes)

Value points:

- (i) students cannot connect themselves with the pictures and maps / do not derive any inspiration / on the map they see beautiful cities but not their slum / these pictures are different from their real world 2

(any two)

- (ii) – total silence 2
 – all cruel activities to come to an end
 – break from all activities
 – all humanity in togetherness

(any two)

- (iii) exactly the opposite to aunt's life / bright topaz denizens of a world of green / unafraid / proud / chivalric / bright eyed / prancing 2

(any two)

- (iv) – feels sorry for the miserable lives of the poor people 2
 – no city bred stops to buy things from them
 – poor people wait like children for the customers to come
 – know the rich have money but not the desire to help

(any two)

8 Short answer type questions (Prose) 2x5= 10 marks

Questions are to be answered in 30-40 words.

Distribution of marks:

Content: 1 mark

Expression 1 mark

(deduct ½ mark for two or more grammatical/spelling mistakes)

Value points:

- (a) - students were all quiet / sad 2 marks
- no hustle and bustle
- even the village elders were sitting on the back benches
- there was total attention given by the students
- Hamel himself was very emotional
(any two)
- (b) - had started working in the tea stall / earlier a self employed rag picker 2 marks
- earns rupees eight hundred
- became a worker under the tea stall owner
- lost the joy on his face
- lost his freedom
(any two)
- (c) - amount of the refund not important 2 marks
- moral victory for Gandhiji and the peasants
- landlords were forced to surrender a part of their money and part of their prestige
(any two)
- (d) - learnt swimming under the guidance of an instructor 2 marks
- the instructor played a very positive role
- taught swimming to Douglas in parts
- challenged himself by practising to cross many water bodies
- (e) - many sided genius, a poet and a trouble shooter 2 marks
- didn't have formal education but a lot of exposure to situations and people
- sense of loyalty / genuine love for everybody

- used all his creativity and energy in his work
- charitable and cheerful
- amazing actor - performed better than main players
- hospitable to dozens of near and far relations

(any two)

Q 9 & 10 [These questions have been set to test the students' understanding of the text and their ability to interpret, evaluate and respond to the issues raised therein. Hence no particular answer can be accepted as the only correct answer. All presentations may be accepted as equally correct provided they have been duly supported by the facts drawn from the text. The important thing is that the student should be able to justify his or her viewpoint.]

9 Distribution of marks: 10 marks

Content 5 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Value points:

- act of kindness really changed the peddler
- in the beginning he was dejected, disillusioned
- had no positive experiences of life and considered the whole world a rattrap
- the crofter treated him well - shared with him all his secrets
- the ironmaster's daughter treated him with respect and showed compassion and understanding
- gave him a grand treat on the Christmas day
- persuaded the ironmaster not to send the man away even when the true identity of the peddler was revealed
- accorded him the respect due to a captain
- compassion, love and understanding shown by the daughter brought about the change

(any five points)

OR

- Sophie a day dreamer (lost in a world of fantasy)
- aspires to have a boutique
- wants to become a manager or actress
- imagines meeting Danny Casey in the arcade
- wants to see the vast world

real world

- belongs to poor middle class family
- is earmarked for biscuit factory after schooling
- no one believes her fanciful stories
- refuses to come to terms with reality

(any five points)

10 Distribution of marks: 7 marks

Content: 4 marks

Expression 3 marks

grammatical accuracy, appropriate words and spelling [1½]

coherence and relevance of ideas and style [1½]

Value Points:

- in the beginning faces a dilemma - whether to help the POW or to assert loyalty to his country
- finally gives in to the call of humanity
- inspite of all opposition brings the POW inside his house
- servants consider him a traitor
- his role as a doctor - treats him and saves his life
- risks his life and reputation
- does not hand over the prisoner to the police
- helps the soldier to escape - gives him his boat and food
- considers humanity above narrow prejudices of race and country

(any four points)

OR

Jo did not approve of the ending

- was disturbed
- thought about lonely Roger without his friends
- Jack behaved in a very insensitive manner
- Jo upset with Skunk's mother and called her stupid

(any two points)

Jo wanted a different ending

- wanted the wizard to punish the mother / wanted the rose smell for the skunk
- was not convinced by the father's version of the story

11 Distribution of marks: 2x4=8 marks

Content: 1 mark

Expression 1 mark

(deduct ½ mark for two or more grammatical/spelling mistakes)

Value points:

- (a) - prediction at the time of his birth 2 marks
- killed 99 tigers
 - was killed by the 100th tiger
 - was obsessed with the killing of tigers
- (any two)

- (b) - make the students realise the reality of global warming 2 marks
- provide opportunities to foster new understanding
 - develop respect for the earth
 - they are future policymakers and can make a big difference
 - future generation has a life changing experience - to absorb, learn and act
- (any two)

- (c) - how the plan for escape from prison conveyed to Evans in German text 2 marks
- a photocopied sheet had been superimposed on the last blank page of the question paper
 - a correction slip carried index no. 313 and centre no. 271 which helped the Governor to know about his whereabouts
- (any two)

- (d) - one day, while coming from school, she saw an elderly man of her community carrying vadai packet by a string 2 marks
- the man took care not to touch the packet
 - narrated the amusing incident to her brother
 - brother told her about the plight of the people in their community and attitude of the upper caste people towards people of lower caste
- (any two)

QUESTION PAPER CODE 1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: READING

20 Marks

1 COMPREHENSION PASSAGE

12 marks

- (a) **NOTE:** No mark(s) should be deducted for mistakes of grammar, spelling, or word limit. Full marks may be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

- (i) - live and work great distances from native places / separated from original families / company of friends reduces the pain 2 marks

- (ii) - brings happiness, intimacy and richness 2 marks
- saves from depression
 - reflects the value system we developed in our adult life
 - value system different from the one that we grew up with
- (any two)

- (iii) - brings out the positive side 2 marks
- you explain yourself openly to a friend
 - no fear of hurting any family member
 - it is an unconditional experience
 - non judgemental
 - supportive
 - understanding and fun
- (any two)

- (iv) - tolerance 1 mark
- acceptance
- empathy
- attentiveness
- seeing the world through the eyes of your friend
(any two)

- (v) - active listening skills 2 marks
- questioning skills
- negotiation skills
- reflecting content skills
- reflecting emotion skills and editing yourself
(any two)

- (b) (i) fundamental 1 mark
(ii) negotiation 1 mark
(iii) opportunity 1 mark

2 **Note** 8 marks

- **If a student has attempted only summary or only notes, due credit should be given.**
- **1 mark allotted for title be given if the student has written the title either in Q2(a) or Q2(b)**
- **Min. 3 main headings and 3 sub-headings to form content**

The notes provided below are only guidelines. Any other title, main points and sub-points should be accepted if they are indicative of the candidate's understanding of the given passage, and the notes include the main points, with suitable and recognizable abbreviations. Complete sentences are not to be accepted as notes. (In such cases ½ -1 mark may be deducted from marks allotted to content)

Numbering of points can be indicated in different ways, and these should be accepted as long as a consistent pattern is followed.

(a) **NOTE MAKING**

Distribution of Marks

Abbreviations / Symbols (with/without key) - any four 1 mark

Title 1 mark

Content (minimum 3 sub-headings, with proper indentation and notes) 3 marks

Suggested Notes

Title: Effective Listening Skills / Listening Skills / Competent Listeners /
Effective Communication / any other suitable title)

- 1 Effective speaking
 - 1.1 depends on eff. list'ng
 - 1.2 takes energy to conc. on hearing
 - 1.3 conc. on underst'ng
- 2 Incompetent listeners
 - 2.1 fail in a no. of ways
 - 2.2 attention drifts
 - 2.3 find counter argum'ts
 - 2.4 filter message to suit own frame of ref.
 - 2.5 react
- 3 How can a listener be more effective
 - 3.1 art of conc.
 - i) helped by alert'ess
 - ii) alert'ess helped by phy. fitn's & posit'ng of body
 - 3.2 intensive note-taking
 - i) aid to listen'r
 - ii) helps the spk'r by eye contact
 - iii) spkr's timing is aided
 - 3.3 posture
 - i) upright postur' helps in conc.
 - ii) +ve feature of listn'rs

(b) **Summary**

The summary should include all the important points given in the notes.

Content	2 marks
Expression	1 mark

SECTION B: ADVANCED WRITING SKILLS **35 Marks**

NOTE: The objective of the section on Advanced Writing Skills is to test a candidate's writing ability. Hence, expression assumes as much importance as the content of the answer.

3	ADVERTISEMENT	5 marks
	Content	3 marks
	Expression	2 marks

Suggested value points

(FOR SALE / HOUSE FOR SALE / PROPERTY FOR SALE / FLAT FOR SALE)

- new house / flat
- no of rooms / physical description / fixtures / fittings
- proximity to important places
- location
- other amenities
- price (optional)
- contact details
- any other relevant details

(any four)

OR

NOTICE	5 marks
---------------	---------

Format	1 mark
---------------	--------

The format should include: NOTICE / TITLE, DATE, and WRITER'S NAME WITH DESIGNATION. The candidate should not be penalized if he has used capital letters for writing a notice within or without a box.

Content	2 marks
----------------	---------

Expression	2 marks
-------------------	---------

Suggested value points

(SCREENING OF AL GORE'S FILM / any other suitable title)

- what
- when
- where
- for whom
- impact
- any other relevant details

4 REPORT WRITING 10 marks

Format

1. title, reporter's name 1 mark

Content 4 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Suggested value points:

(FIRST AID TRAINING FOR SENIORS / any other suitable heading)

- what
- when
- who conducted it
- where
- for whom
- skills learnt / highlights
- response of students
- usefulness of the programme
- any other relevant points.

(any four)

OR

FACTUAL DESCRIPTION 10 marks

Title 1 mark

Content 4 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Suggested value points

(MULTI-STOREYED SHOPPING MALL / any other suitable title)

- what / name
- location
- layout
- special facilities like (ATM, coffee shop, ice cream parlour, restaurants, escalators etc.)
- any other relevant details / specialities

(any four)

5 LETTER WRITING

10 marks

[Note: - No marks are to be awarded if only the format is given. Credit should be given to the candidate's creativity in presentation of ideas. Use of both the traditional and the new format is permitted.]

Format

2 marks

1. sender's address, 2. date, 3. receiver's address, 4. subject heading, 5. salutation, 6. complimentary close.

Content

4 marks

Expression

4 marks

- grammatical accuracy, appropriate words and spelling [2]
- coherence and relevance of ideas and style [2]

(INFORMATION ON FASHION DESIGNING)

Suggested Value Points

- introduction of sender
- details about admission procedures, eligibility criteria, fee structure, duration of course, hostel facilities, placement opportunities
- any other relevant details

OR

(REPLACEMENT OF DAMAGED CONSIGNMENT)

Suggested Value Points

- details of order placed / reference / invoice
- unclear markings on the test tubes
- details of items damaged
- demand for immediate replacement
- any other relevant point

6 ARTICLE WRITING 10 marks

Format: (Title and writer's name) 1 mark

Content 4 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Suggested Value Points

(THE NEED FOR OUTDOOR GAMES / any other suitable title)

Reasons for city children not playing outdoor games

- children in cities - no outdoor activities / not enough space in cities
- all entertainment confined to indoors - TV, computer games, music systems
- pressure of tuitions, coaching, hobby classes

(any two)

The need to play outdoor games

- missing the joy of outdoor play
- improving the health of children
- to develop team spirit
- to extend friend circle

(any two)

OR

Suggested Value Points

(THE RELEVANCE OF NEWSPAPERS / any other suitable title)

Relevance

- source of news
- wider reach

- affordable
- can be preserved for future reference
- can be read leisurely while travelling etc.
- readers can be selective
- promote reading skills
- better credibility
- any other relevant point

(any four)

SECTION C: LITERATURE

45 Marks

NOTE: The objective of the section on Literature is to test a candidate's ability to understand and interpret the prescribed text through short answer and long answer type questions. Hence both content and expression in answer to the given questions deserve equal importance while awarding marks.

- 7 [This question has been designed to test the students' understanding of the text and their ability to interpret, evaluate and respond to the questions based on the given stanza. In other words, it attempts to test their reading comprehension ONLY.] 10 marks

- (a) **Value points:** 4 marks

- | | | | |
|-------|---|--|---|
| (i) | - | in front of the edge of the road / by the roadside | 2 |
| | - | in order to sell their items / earn some money / livelihood | |
| (ii) | - | their condition very poor / miserable / pitiable / nobody stops to buy anything | 1 |
| (iii) | - | the rich people from cities enjoying a lavish lifestyle / city people / urban people | 1 |

OR

- | | | | |
|-------|---|---|---|
| (i) | - | till we count to 12 / for a very short time / for one second | 1 |
| (ii) | - | to stop all harmful activities / to bring about peace / to bring about togetherness / to have an exotic moment / to stop wars / to have an introspection (any two) | 2 |
| (iii) | - | not to harm others / not to be aggressive / to be still / to stop all movement / not to be agitated | 1 |

(b) **Short answer type questions (poetry)** 2x3 = 6 marks

Distribution of marks:

Content: 1

Expression 1

(deduct ½ mark for two or more grammatical/spelling mistakes)

Value points:

(i) World on the classroom wall 2

- clear sky / civilised domes / belled and flowery cities -
indication of richness and happiness

World of slum children

- miserable - foggy future, narrow streets, far from rivers, etc.

(ii) the things of beauty - sun, moon, trees, daffodils, clear rills, the
mid forest brakes, great tales of mighty nobles (any two) 2

(iii) - as an escape from her miserable married life 2

- to compensate for all that she could not be in her life
- creates an alternative world of freedom
- tigers symbol of freedom, chivalry, fearlessness

(any two)

(iv) - her love and concern for her mother 2

- apprehension that she would not meet her again
- to console her by saying that she would return soon
- the hope that she would meet her soon

(any two)

8 Short answer type questions (Prose) 2x5 = 10 marks

Questions are to be answered in 30-40 words.

Distribution of marks:

Content: 1 mark

Expression 1 mark

(deduct ½ mark for two or more grammatical/spelling mistakes)

Value points:

- (a) - never went back to pool 2 marks
- avoided water
- any connection with water brought back the terror
- the haunting fear ruined his enjoyment of fishing / canoeing / boating / swimming

(any two)

- (b) - they were impressed by his sincerity, convincing arguments and logical approach 2 marks
- reprimanded them for overcharging the peasants
- ready to go to prison
- they felt inspired to do the same
- made them understand the need to unite and fight

(any two)

- (c) - peddler's attitude was refined by Edla's understanding and compassion despite her knowing that he was not a real captain 2 marks
- she treated him as a captain so he wished to respond to her in the same way
- wanted to convey that he had resolved to come out of the rattrap

(any two)

- (d) If yes, it is possible 2 marks
- Mukesh wants to become a motor mechanic
- determined to go to a garage and learn
- ready to walk the long distance
- practical minded
- thinks dream within reach

(any two)

If no

- everyone in their community engaged in bangle making
- working for generations
- no body hopes to become anything else
- according to elders god given lineage not to be broken (Karma / destiny)

(any two)

- (e) - close to the boss 2 marks
- had a creative mind with ready solutions
- versatile genius
- was poet actor

(any two)

Q 9 & 10 [These questions have been set to test the students' understanding of the text and their ability to interpret, evaluate and respond to the issues raised therein. Hence no particular answer can be accepted as the only correct answer. All presentations may be accepted as equally correct provided they have been duly supported by the facts drawn from the text. The important thing is that the student should be able to justify his or her viewpoint.]

9 Distribution of marks: 10 marks

Content 5 marks

Expression 5 marks

- grammatical accuracy, appropriate words and spelling [2½]
- coherence and relevance of ideas and style [2½]

Value points:

- Sophie and Jansie, classmates, of same age
- both belong to lower middle class families
- Sophie a dreamer
- Sophie dreams of big and beautiful things
- wishes to open a boutique, wants to become an actress, a fashion designer - all unrealistic dreams
- Sophie considers Jansie 'nosey' who can spread a story in the whole neighbourhood
- develops a fascination for Danny Casey
- Sophie's meeting with Danny Casey
- Her waiting for him at a park
- Jansie is realistic, practical
- knows both earmarked for the biscuit factory

(any five)

OR

- M. Hamel said it would be his last lesson
- orders from Berlin not to teach French
- new master to come the next day
- urged students to be attentive
- blamed parents as well as himself for the poor learning
- said French the most beautiful language in the world - the clearest and most logical
- asked them to guard it and never forget it
- said the language is their key to freedom

(any three points)

Impact

- students became nostalgic / emotional
- regretted their earlier carelessness in being inattentive
- developed a spirit of patriotism and love for language

(anyone point)

Why?

- they realised that it was their last lesson / had lost the opportunity to learn it

10 Distribution of marks:

7 marks

Content:

4 marks

Expression

3 marks

- grammatical accuracy, appropriate words and spelling [1½]
- coherence and relevance of ideas and style [1½]

Value Points:

- both Zitkala Sa and Bama, victims of discrimination
- Zitkala Sa faced racial discrimination (cutting of hair, destroying her cultural identity / the strange rules at the boarding school with regard to dress, food, etc)
- Bama - caste discrimination
- Though both belonged to different cultures, different times, suffered similar humiliation
- both rebelled against the injustice

(any four)

OR

- predicted by the astrologers at the time of his birth that he would be killed by a tiger
- Tiger King strives to disprove the astrologers' predictions
- begins the tiger hunting expedition
- kills up to 99 tigers
- believes that he has killed the 100th tiger too
- the sliver of the toy tiger pierces his hand which develops infection
- the wooden tiger is actually the 100th and causes his death
- ironical that he meets his end through a wooden toy tiger and not by a real tiger
- in a twist of fate the prediction proved right

(any four)

11 Distribution of marks: 2x4 = 8 marks

Content: 1 mark

Expression 1 mark

(deduct ½ mark for two or more grammatical/spelling mistakes)

Value points:

- (a) 2 marks
- Antarctic has a simple eco system
 - lacks in bio diversity
 - gives an insight into the evolution of the earth
 - can predict the future of the planet
 - shows the pristine state of the planet
 - the study of Antarctica tells us how little changes in the environment can have big consequences

(any two)

- (b) 2 marks
- the General critically ill
 - guided by self interest
 - depended totally on Dr Sadao for his health
 - forgot his promise to Sadao to take care of the POW
 - afraid the assassins might harm the doctor and endanger the General's life

(any two)

- (c) - both Derry and Lamb suffer physical impairment 2 marks
- Lamb, the only person to treat Derry as a normal individual
 - Lamb instilled in Derry a positive attitude to life
 - his enthusiasm for life
 - had a friendly cheerful attitude

(any two)

- (d) - with his magical powers changed Roger Skunk's bad smell into sweet 2 marks
smell of roses
- enabled Roger to play with his friends

FUNCTIONAL ENGLISH

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

- (i) *This paper is divided into four Sections: A, B, C and D. All the sections are compulsory.*
- (ii) *Separate instructions are given with each section and question, wherever necessary. Read these instructions very carefully and follow them faithfully.*
- (iii) *Do not exceed the prescribed word limit while answering the questions.*

QUESTION PAPER CODE 212/1

SECTION A : READING

(20 Marks)

1. Read the passage given below and answer the questions that follow:

12 marks

- (1) I was at a camp in Tamil Nadu, where some of those affected by the tsunami are housed. There I met nine-year-old Murugeshwari. On the morning of January 26, 2004, she was on her way to buy tomatoes for her sister. Her mother was outside, cleaning fish. Suddenly Murugeshwari heard a strange sound. She turned and saw the sea rushing towards her. Her first thought was to run and warn her sister and mother, but before that thought could turn into any kind of action she saw the sea swallow them both.
- (2) Today Murugeshwari is at a tsunami camp. Her bright eyes fill with tears as she tells me her story. Some children playing nearby see her wiping her eyes and come running over. "We are her friends, whenever she cries, we try and make her happy," they said.
- (3) "How do you make her happy?" I asked them.
- (4) I thought a present would make her happy. "I gave her this," pointing to a beautiful, black, red and gold bead necklace Murugeshwari was wearing.
- (5) "Where did you buy it?" I asked her.
- (6) "I didn't buy it," she said, "The sea swallowed my mother and my sisters also, so I don't have anyone to ask money from. It was mine; it was round my neck when the tsunami came. I gave it to her," she said.

- (7) Love came so naturally to these children who had lost all that was important to them – their families, homes, and little possessions. While I was with them, I noticed that they were constantly looking out for those who needed some form of care – taking the older people to the bathroom, fetching water for women who were not their mothers, drying someone’s clothes in the sun, or just carrying someone’s baby on their hips as if it was their own brother or sister.
- (8) Contrast the above with this story. Two young women were applying for research grants. Although both were applying for different grants, there seemed to be some rivalry between them. Their boss told them to help each other with the applications and check on the last dates to make sure that they submitted them well on time. One of the girls did not want her colleague to get her grant, so she quietly sabotaged her application. We see this kind of behaviour all around us – mean, selfish, hurtful, and destructive.
- (9) Why does such behaviour come easily to us who have so much? Is it because in our materialistic society we respect things more than people? Is our own personal selfishness, greed for material luxury, and desire to be the sole keepers of anything good, hindering us from being sensitive and caring? How do we turn our behaviour around so that it becomes nurturing and powerful ?
- (10) At the tsunami camp, I learnt that ahimsa and love had to be self-sacrificial to be real and truly meaningful. We need to put away the “I” of the ego, and look beyond at someone else’s well being. Two women were due for a promotion and were short-listed for it. One lady knew that she was qualified, had the right experience and had put in the required number of years in service. She knew too that if chosen, she would perform well. But after a while, she went to her boss and asked that the post be given to the other person. The reason? Her colleague had recently been through a series of personal tragedies and was desperately looking for something that would bring meaning to her life. The woman felt that the promotion would help her friend find stability and fulfillment at a time when so much in her life was painful. (623 words)
- (a) On the basis of your understanding of the passage answer the following in your own words:
- (i) What was the first thought that Murugeshwari had when she saw the sea rushing towards her? Was she able to fulfill her desire? Give reasons for your answer.

- | | |
|---|---|
| (ii) Why did the girl gift the necklace to Murugeshwari ? What does it reveal about the girl’s character? | 2 |
| (iii) List out any two instances of selfless love exhibited by the children at the camp. | 2 |
| (iv) How are the adults of the materialistic world different from these children? | 1 |
| (v) What made the lady in the last incident decide to sacrifice her promotion in favour of her friend? | 1 |
| (b) Pick out a word each from the passage which is similar in meaning to the following: | 4 |
| (i) scholarship (para 8) | |
| (ii) money minded (para 9) | |
| (iii) fostering (para 9) | |
| (iv) co-worker/associate (para 10) | |

2. Read the passage given below and answer the questions that follow:

8 marks

Technological change is one reason for companies to look again at how they manage and develop human resources, and in particular the essential powers of creativity and adaptability. But there is another: the changing demography of world populations and of national work forces. Here again we are faced with an exponential curve of change. The global workforce is changing in size and shape. It took all of human history until the early 1800s for the world’s population to reach the first billion. It took 130 years to reach the second billion in 1930, 30 years to add the third in 1960, 14 years to add the fourth in 1974 and 13 years to add the fifth in 1987. In 1999, the world’s population reached 6 billion. This billion increase in 12 years was the most rapid increase ever. The United Nations medium projections show that another billion people will be added in just 14 years and that world population will be about 9.4 billion by 2050.

Most of the world’s population growth is taking place in less developed countries. Currently, 84 million people are being added every year in less developed countries compared with only about 1.5 million in more developed countries. According to

the UN, today's more developed country populations are projected to remain relatively constant throughout the next century, while less developed country populations are projected to keep growing.

- China is the world's most populous nation with a 1998 population of 1.2 billion. Its population is increasing by 1 % each year, assuming minimal migration. India has fewer inhabitants (989 million) but a higher annual growth rate of about 1.9%. India is likely to surpass China as the world's most populous country by the middle of the 21st century.
- In the 1990s, most of the world's fastest-growing countries were in the Middle East and Africa. Kuwait's 1998 population of 1.9 million grew by about 3.7% a year. At that rate the population will double in 19 years unless there is a significant decline in fertility or increase in emigration. The population of the African continent is growing at 2.5%, yielding a doubling time of only 27 years.
- In contrast many countries are experiencing extremely slow growth and even natural decrease because death rates have risen above birth rates. Deaths exceeded births in 13 European countries including Russia, Germany and the Czech Republic in the late 1990s. In some countries net immigration provides the only population growth.
- The United States is the third most populous nation in the world behind China and India. The US population increased by an estimated 2.5 million people during 1997. Legal and illegal migrants accounted for one quarter of population growth during the 1980s and about one-third of growth during the 1990s. According to the US Census Bureau projections, the US population could reach 394 million by 2050.

The changing patterns and demography of world population will have profound effects on the patterns of economic activity and trade.

- (a) Make notes on the passage given above in any format using recognizable abbreviations. Give a suitable title to the passage.
- (b) Write a summary based on the notes you have made in about 80 words.

5 marks

3 marks

SECTION - B (WRITING)

25 Marks

3. Given below is a letter of invitation. Read it and reply either accepting the invitation or declining it. (50-80 words)

15 Jan, 2009

Cochin.

Dear Raj,

How are you? It gives me great pleasure to inform you that my daughter is getting married on 7th April, 2009 at Taj Residency, Cochin. The engagement ceremony will be held on 5th April at the Grand Hotel, Cochin. Please keep the dates free. We hope to meet you and expect you all to join us in the celebrations.

Your friend,

Lata

5 marks

OR

Your school is celebrating 'Fight Obesity Day'. Design a poster to create awareness on the importance of eating right and exercising regularly. (50-80 words)

4. Read the following headlines:

SAINA WINS WORLD BADMINTON CHAMPIONSHIP

SACHIN HIGHEST RUN GETTER IN THE WORLD

BINDRA WINS OLYMPIC GOLD

VISHWANATHAN ANAND: WORLD CHESS CHAMPION

Write a letter to the editor of a national daily, expressing your happiness at the new emerging faces of Indian sports. Discuss the reasons for this rise and suggest some measures that could further enhance the situation. (125-150 words)

10 marks

OR

Write a letter registering a polite complaint to the President of your Resident Welfare Association (RWA) regarding the extremely high levels of music blaring from

loudspeakers during the festive season. Mention the fact that you are a student and your studies are getting affected by the noise. You are Uma/Umesh. (125-150 words)

5. Read the following poster:

KNOW YOUR RIGHTS

CONSUMER CAUGHT IN THE WEB BECAUSE.....

- Lacks quality consciousness
- Lacks consumer awareness
- Lack of stringent enforcement of laws
- Misleading advertisements
- Corrupt practices of shopkeepers

Issued in Public interest by- Ministry for Consumer Affairs

Reeju Ray attended a seminar where the rights of a consumer were discussed and the above poster was displayed. Taking help from the points raised in the poster and your own ideas write an article for the school magazine on the importance of consumer awareness. Give your article a suitable heading. (200 words)

10 marks

OR

Read the following poster:

Malnutrition: The New Aids?

Why can't we feed our children?

- Almost a third of the world's malnourished children - Indians
- Over last 10 years figures fallen by only 2%
- 125 hunger deaths of children in MP in past 5 months

Some facts on global malnutrition:

40.4% Indian children
28% African
13% West Asian

Rita Roy reads the above poster and is disturbed at the alarming figures quoted above in a country on the path of development. Write a speech she has to deliver on

Children's Day in school stating reasons and giving suggestions on how to deal with this grave problem. (200 words)

SECTION - C (GRAMMAR)

20 Marks

6. Re-arrange the following sentences sequentially to make complete sense:

5 marks

- (a) And like all arts it can be learnt
- (b) You must know who they are and what they want
- (c) Public speaking is an art
- (d) Though everyone feels nervous before a public speaking performance, the trick is to master it
- (e) You also have to focus on your audience

7. Harsh Diwan, a journalist has been asked to interview Dr. Anwar Ali, one of the scientists who was part of the team that sent the rocket Chandrayan I to the moon. Based on the input given below complete the conversation. The first one has been done as an example:

5 marks

- research conducted
- the time taken
- Government aid
- problems encountered and
- how they solved them

Example:

Harsh: Good morning, Sir. Congratulations on the success of the 'Mission Moon'.
There are a few things that our readers would like to know about this 'Mission'

Dr. Ali : Sure! What would you like to know?

8. The following passage has ten errors. Identify the error in each line and write them along with the corrections as shown in the example:

5 marks

Cells are the ultimate multitasker. multitasker-multitaskers

- (a) They could switch on genes and carry
- (b) out their orders, talk to each other, divided

- (c) in two, and much more, all at a same time.
- (d) But they can't do any of these trick without
- (e) a power source of generate movement. The inside
- (f) of a cell bustles with most traffic than on Delhi roads,
- (g) but like all vehicles, the cell's moving parts
- (h) need engines. Physicians and biologists has looked
- (i) under the hood of the cell and lay out the nuts
- (j) and bolts in molecular engines

9. Mr. Ramesh, an official with the Sports Ministry, and a part of the Indian delegation went to Beijing for the Olympic Games. On his return he was asked to give his impression on the various aspects of the organization of the games by the Beijing officials. Frame ten questions that he could be asked on the following issues:

5 marks

- the opening ceremony
- accommodation
- transportation
- practice facilities
- food
- condition of the venues
- leisure time activities of the sportspersons
- arrangement for local sightseeing
- security arrangements
- interaction with locals

SECTION - D (LITERATURE)

35 Marks

10. Choose any one of the following extracts and answer the questions that follow:

7 marks

I know why the caged bird beats his wing
 Till its blood is red on the cruel bars;
 For he must fly back to his perch and cling
 When he fain would be on the bough a-swing;
 And a pain still throbs in the old, old scars.

- (a) Name the poem and the poet. 1
- (b) Why does the narrator use the phrase 'I know' ? 1
- (c) Identify and explain the literary device used in these lines. 1
- (d) What do the 'old' scars refer to? 1
- (e) What would the bird like to do after it breaks free? 1
- (f) What does this poem teach you? 2

OR

Their dreams that drip with murder; and they'll be proud
 Of glorious war that shattered all their pride....
 Men who went out to battle, grim and glad;
 Children, with eyes that hate you, broken and mad.

- (a) Name the poem and the poet. 1
- (b) Who are the 'they' being referred to in these lines? 1
- (c) What do they dream of and why do the 'dreams drip with murder' ? 2
- (d) How have the 'men' changed into 'children' ? 2
- (e) Contrast 'glorious' with 'shattered' in the second line. 1

11. Answer any two of the following in about 50 words each: **2 x 4 = 8 marks**

- (a) 'The narrator truly loves Sally'. Do you agree with this statement?
Give reasons for your answer.
- (b) Discuss any two qualities of a good poem as described in the poem 'Ars Poetica.'
- (c) Bring out the contrast between the mother in her youth and her old age as described in the poem, 'Of Mothers, Among Other Things'.

12. Answer anyone of the following in 80-100 words: **5 marks**

'God-O-God - this is a brutal joke you are playing.

What was the brutal joke and who had played it ? Do you agree with the speaker's point of view? Give reasons for your answer.

OR

What is the Monkey's paw? How do the Whites react to it ?

13. Answer any two of the following in about 50 words each. **2 x 4 = 8 marks**

- (a) Why did the beggar from the lesson, 'What's your Dream ?' stop by to talk to the narrator? What was his advice to the young boy?
- (b) Unable to share his grief with his passengers, Iona turns to others. Who were they and how did they react to him?
- (c) According to Robert Lynd, how can we recapture the lost enchantment of childhood?

14. Answer anyone of the following in 100-120 words: **7 marks**

Mrs. Malik from the lesson, "A Room 10' x 8" writes a letter to her sister describing her daughter-in-law's plans to move into their own house finally. She writes about the daughter-in-law's enthusiasm and contrasts it with her own reactions to the changed circumstances. Write the letter.

OR

On her return from the war front, Lisa writes a diary entry describing her experiences there, her meeting Doronin and the effect this has had on her life. Write the diary entry.

QUESTION PAPER CODE 212

SECTION A : READING

20 Marks

1. Read the following passage and answer the questions that follow:

12 marks

- 1 Some people in the corporate sector believe that the highest job satisfaction is enjoyed by those in least-paying jobs, like in NGOs and social organizations. This sounded ironical but still exciting enough to mull over for those of us in the corporate world who chase a mirage called job satisfaction and often confuse it with high salaries.
- 2 Five years ago, I was posted in Kolkata. This is where I had the soul-stirring experience of meeting Ravikant at Belur Math, the Ramkrishna Mission's headquarters. Away from the city's boisterous roads, Belur is tranquility personified. It had been 18 years since Ravikant and I had passed out from IIT Kanpur, where we spent our days in neighbouring hostel rooms. In the course of lunch that day at Belur, he unfolded his post-IIT story, which marked a turning point for my own view towards life.

- 3 Ravikant Jadhav was ranked second across India in the JEE and completed his B.Tech. in computer science with a perfect 10 CPI. A recipient of the President's gold medal at IIT, he spurned all offers of plum scholarships from top foreign universities. Instead, he went on to do his Ph.D. from IIT, Kanpur. As his neighbour I was familiar with Ravikant's leanings towards Swami Vivekananda and Ramkrishna Paramhans. Often, when I barged into his room for a chat session, I would find him deep into reading their teachings. These had an impact on his day-to-day actions as well. An example of his austerity was the fact that he managed to pass those four years with just a pair of white kurta-pyjamas. He spent a lot of time teaching the mess workers' children besides other poor employees of IIT. Top brain that he was, the toughest assignments were cracked by him in a jiffy.
- 4 His entire family along with many of us, egged him on to study abroad. I occasionally mocked his convictions and told his parents he would eventually succumb to the lure of dollars, just like several of his batch-mates. But, he couldn't be deterred from his single-minded pursuit of serving humanity. He would explain, "Just like Silicon Valley, social sectors too desperately need intelligent people."
- 5 He continues to positively impact the lowest rung of the social ladder. Recently, he helped save the life of 12-year-old Rashmi, who developed a hole in her heart. Her operation in Bangalore cost Rs. 3 lakh and on reading Ravikant's email, I had contributed my bit, but was doubtful if he would meet the target. But, as I recently found out, Rashmi was back home in Kanpur after a successful surgery, making me put my faith in Ravikant's words that, "There are a lot of good people in the world, we just need to reach out to them."
- 6 Unmarried, he has dedicated his entire life towards a social cause. He joined the Ramkrishna Mission after his doctorate and, by now has taught computer science to several thousand students at their university, besides managing various projects spread across the country. He also humbly believes that Belur Math has given him the opportunity to achieve his mission. Yet, his journey continues.
- 7 Ravikant's story is beyond inspiration. When I look around at my batch-mates, many of whom head companies, I consider Ravikant the biggest success story of IIT. His story should be a catalyst for all those who want to bridge the social abyss created by market forces and government inaction. As I write a cheque for Rs. 15,000 for my three-year-old son's quarterly fee, I'm reminded

of an education system gone horrendously wrong. Unlike many of us who keep trodding known paths, Ravikant Maharaj - as he is popularly known in Belur - has clearly found his own path and left a trail.

- *Off the Beaten Track (Times News Network)*

- (a) On the basis of your reading of the passage, answer the following questions:
- (i) Why, according to the author, is job satisfaction a mirage? 1
 - (ii) Mention two interests of Ravikant other than studies. 2
 - (iii) Why did the author mock at Ravikant's convictions? How did Ravikant prove him wrong? 2
 - (iv) What were Ravikant's pursuits after he completed his doctorate? 2
 - (v) Explain - He clearly found his own path and left a trail. 1
- (b) Pick out words/phrases from the passage which are similar in meaning to the following: 4
- (i) noisy and energetic (para 2)
 - (ii) lack of luxuries and comfort (para 3)
 - (iii) to lose the determination to oppose something (para 4)
 - (iv) person that causes great change (para 7)

2. Read the given passage carefully and answer the questions that follow: 8 marks

Technological change is one reason for companies to look again at how they manage and develop human resources, and in particular the essential powers of creativity and adaptability. But there is another: the changing demography of world populations and of national work forces. Here again we are faced with an exponential curve of change. The global workforce is changing in size and shape. It took all of human history until the early 1800s for the world's population to reach the first billion. It took 130 years to reach the second billion in 1930, 30 years to add the third in 1960, 14 years to add the fourth in 1974 and 13 years to add the fifth in 1987. In 1999, the world's population reached 6 billion. This billion increase in 12 years was the most rapid increase ever. The United Nations medium projections show that another billion people will be added in just 14 years and that world population will be about 9.4 billion by 2050.

Most of the world's population growth is taking place in less developed countries. Currently, 84 million people are being added every year in less developed countries

compared with only about 1.5 million in more developed countries. According to the UN, today's more developed country populations are projected to remain relatively constant throughout the next century, while less developed country populations are projected to keep growing.

- China is the world's most populous nation with a 1998 population of 1.2 billion. Its population is increasing by 1% each year, assuming minimal migration. India has fewer inhabitants (989 million) but a higher annual growth rate of about 1.9%. India is likely to surpass China as the world's most populous country by the middle of the 21st century.
- In the 1990s, most of the world's fastest-growing countries were in the Middle East and Africa. Kuwait's 1998 population of 1.9 million grew by about 3.7% a year. At that rate the population will double in 19 years unless there is a significant decline in fertility or increase in emigration. The population of the African continent is growing at 2.5%, yielding a doubling time of only 27 years.
- In contrast many countries are experiencing extremely slow growth and even natural decrease because death rates have risen above birth rates. Deaths exceeded births in 13 European countries including Russia, Germany and the Czech Republic in the late 1990s. In some countries net immigration provides the only population growth.
- The United States is the third most populous nation in the world, behind China and India. The US population increased by an estimated 2.5 million people during 1997. Legal and illegal migrants accounted for one quarter of population growth during the 1980s and about one-third of growth during the 1990s. According to the US Census Bureau projections, the US population could reach 394 million by 2050.

The changing patterns and demography of world population will have profound effects on the patterns of economic activity and trade.

- (a) Make notes on the passage given above in any format using recognizable abbreviations. Give a suitable title to the passage. 5
- (b) Write a summary based on the notes you have made in about 80 words. 3

SECTION B - WRITING

25 Marks

3. Parul / Puneet has lost her/his school bag in a public bus. She/He drafts an advertisement to be put in the newspapers. Draft an advertisement giving the relevant details. (Word limit 50 words)

5 marks

OR

Your school is leading an awareness campaign against Environmental Pollution in the neighbourhood. Design a poster highlighting the dangers of pollution and the measures to be undertaken to fight it. (Word limit 50 - 80 words)

4. Mr. Raj, the Physics Department head wants to place an order for some lab equipment like lenses, galvanometers, prisms, glass cubes, etc. He writes a letter placing the order to M/s Scientific Equipment Ltd., Nai Sarak, Delhi-41. Write this letter. (Word limit 100 words)

10 marks

OR

Read the following headlines:

SAINA WINS WORLD BADMINTON CHAMPIONSHIP

SACHIN HIGHEST RUN GETTER IN THE WORLD

BINDRA WINS OLYMPIC GOLD

VISHWANATHAN ANAND: WORLD CHESS CHAMPION

Write a letter to the editor of a national daily expressing your happiness at the new emerging faces of Indian Sports. Discuss the reasons for this rise and suggest some measures that could further enhance the situation. (Word limit 150 words)

5. Sohini / Sohan reads the following statistics showing the male - female ratio in many of the states in India:

State	Male	Female
Haryana	1000	863
Bihar	1000	756
Kerala	1000	902
Uttar Pradesh	1000	888

She/He is extremely disturbed after reading the above statistics about the condition of the girl child which is still a matter of deep concern. Referring to these figures she/he writes an article for the school magazine discussing the reasons for this imbalance

in the population and the consequences of this trend. She/He also suggests measures that could be taken to combat this problem. As Sohini / Sohan, write the article. (Word limit 200 words)

10 marks

OR

Read the following poster:

<p style="text-align: center;">KNOW YOUR RIGHTS</p> <p style="text-align: center;"><i>CONSUMER CAUGHT IN THE WEB BECAUSE.....</i></p> <ul style="list-style-type: none">- Lacks quality consciousness- Lacks consumer awareness- Misleading advertisements- Corrupt practices of shopkeepers <p style="text-align: center;"><i>Issued in Public interest by - Ministry for Consumer affairs</i></p>

Reeju Ray attended a seminar where the rights of a consumer were discussed and the above poster was displayed. Taking help from the points raised in the poster she prepared a speech to be given on National Consumer Day in school. As Reeju, write the speech. (Word limit 200 words)

SECTION C - GRAMMAR

20 Marks

6. Rearrange the following sentences sequentially to make complete sense:

5 marks

- (a) At the root of this decrease in numbers is the elephant intrusion in villages.
- (b) Though the numbers have officially increased, the population has declined in the southern and north-eastern states.
- (c) The elephant is fighting a grim battle for survival in the wild as well as in captivity.
- (d) Lately they have resorted to poisoning the beasts, killing at least 122 in Assam.
- (e) Elephants are thus killed for fear of attacks.

7. As a member of your School Social Service Club, Rajesh has been asked to interview a flood victim in Bihar. Based on the input given below complete the conversation. The first one has been done as an example.

5 marks

- losses incurred
- saved some cattle

- { ● time taken for help to arrive
- { ● after 24 hours
- { ● food supply
- { ● packets dropped from helicopters
- { ● medical aid
- { ● few doctors and nurses visited
- { ● problems faced in the camps
- { ● unhygienic conditions/inadequate drinking water/insufficient food
- { ● support from state government
- { ● minimal

Example –

Rajesh : Namaste, I would like to express my sympathy at your loss. Were you able to save anything from the floods?

Villager : Well I was a bit luckier than my neighbours. I have managed to save some of my cattle.

8. The following passage has ten errors. Identify the errors in each line and write them along with the corrections as shown in the example:

5 marks

Most people with stable heart disease who is who - which

- (a) monitored and controlled should has no problem
 - (b) travelling. However, travel was not recommended for
 - (c) people by uncontrolled angina, abnormal heart
 - (d) arrhythmia, but uncontrolled congestive heart failure.
 - (e) In general, air travel does not pose great risk to
 - (f) more heart patients. Cardiac “incidents” occur only
 - (g) in one or two patient per million during air travel.
 - (h) However, some patients need to avoid flying, on least
 - (i) temporarily, because of a increased risk posed by
 - (j) being confined with a high-altitude (and therefore low-oxygen) compartment.
9. Anil Kumble retired after a fulfilling career in cricket. As a sports journalist you have been asked to interview him. Frame ten questions you would like to ask him based on the items given below:

5 marks

age started playing - coaching where - debut match - career best - family support - favourite fellow cricketer - any regrets - toughest opponent - favourite playing ground - plans after retirement

SECTION D - LITERATURE

35 Marks

10. Choose anyone of the following extracts and answer the questions that follow: **7 marks**

My cold parchment tongue licks bark
in the mouth when I see her four
still sensible fingers slowly flex
to pick a grain of rice from the kitchen floor.

- (a) Name the poem and the poet. **1**
- (b) What characteristics of the mother are being highlighted in the above lines?
Mention any two. **1**
- (c) Why does the narrator refer to the four fingers still being 'sensible' ? **2**
- (d) What impact does this have on the narrator? **1**
- (e) Identify and explain anyone literary device used in the above lines. **2**

OR

A poem should be motionless in time
As the moon climbs,
Leaving, as the moon releases
Twig by twig the night-entangled trees,

- (a) Name the poem and the poet. **1**
- (b) Explain the contradiction in the first two lines. **2**
- (c) What is being meant by the phrase 'night-entangled tree' ? **1**
- (d) What effect does the moon have on these trees? **1**
- (e) Mention any two characteristics of a good poem as described in the above lines. **2**

11. Answer any two of the following in about 50 words each: **2x4=8 marks**

- (a) How does the title 'Curtain' bring out the central theme of the poem?

- (b) Discuss the statement, 'Autumn is a season of abundance', with reference to the poem 'Ode to Autumn'.
- (c) What are the future plans that the narrator has for himself and Sally in the poem 'Sally in our Alley'? What prompted him to make these plans?

12. Answer anyone of the following in 80 - 100 words:

5 marks

- (a) 'I shall be remembered for not what I am but for what I did.'

What do these lines reveal about Alexander's character? How did this philosophy control his actions throughout his life?

OR

- (b) 'As I wished it twisted in my hand like a snake.'

(i) What does 'it' refer to?

1

(ii) Did it really twist in the speaker's hand? Give reasons for your answer.

2

(iii) How did his family members react to his statement?

2

13. Answer any two of the following in about 50 words each:

2x4=8 marks

- (a) How does Mrs. Malik respond to the sketch of the woman drawn by the architect? How does it prove to be ironic later on in the story, 'A Room 10' x 8'?
- (b) Discuss the role of ambition in motivating students as explained in the lesson, 'On Education'. Comment on both its positive as well as negative aspects.
- (c) What influence did Doronin have on Lisa's life?

14. Answer any one of the following in 100 -120 words:

7 marks

Suzanne is tired of warding off the proposals from the two comedians. She writes to her friend Janette expressing her feelings for both the suitors and how she is going to deal with the problem without hurting their feelings.

OR

After the war of Kalinga, Asoka is deeply moved by the magnitude of the death and destruction caused by him. He writes a diary entry recording his feelings about his change of heart and planning the changes he was going to bring about in his method of ruling his kingdom.

Marking Scheme — Functional English

General Instructions :

1. The Marking Scheme carries only suggested value points for the answers. These are only guidelines and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the marks be awarded accordingly.
2. Answer scripts should not be given to the evaluators for evaluation until and unless the given Marking Scheme has been thoroughly discussed with them in a group or individually on the first day of evaluation.
3. The Head Examiner must go through the first five answer scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the Marking Scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. However the Marking Scheme carries only suggested value points and does not constitute the complete answer.
5. If a question has parts please award marks on the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
6. If a question does not have any parts, marks must be awarded in the left-hand margin.
7. Where marks are allotted separately for content and expression as per the Marking Scheme they have to be reflected separately and then totalled. **This is a mandatory requirement.**
8. A slash (/) in the Marking Scheme indicates alternative answers. If a student writes an answer which is not given in the Marking Scheme but which is equally acceptable, marks should be awarded only in consultation with the Head Examiner.
9. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
10. If a student writes a single word in response to a short answer type question and it constitutes the core of the answer it should be accepted and awarded full marks.

11. If a student literally lifts a portion of the given passage as an answer to a question no marks should be deducted for this so long as it is relevant and indicative of the desired understanding on the part of the student especially in Q.1 (Section A) and Q.10 (Section D).
12. Some of the questions may relate to Higher Order Thinking Skills. These, questions are to be evaluated carefully and the student's understanding/analytical ability may be judged.
13. Wherever the word limit is given, no marks are to be deducted for exceeding the word limit. However, due credit should be given for precise answers.

QUESTION PAPER CODE 212/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING) 20 Marks

Q1. READING

TSUNAMI

TOTAL MARKS: 12

Under Section A, Reading (Q1) question has been designed to test a student's understanding of the passage and his/her ability to interpret, evaluate and respond to the given passage. As such, content assumes more importance than expression in the answers to these questions. Please do not hesitate to award full marks if the answer deserves it.

Objective : To identify and understand main parts of the text.

Marking : As marked in the question paper. No penalty for spelling and grammar.

Accept any other word equivalent in meaning to the answers given below.

Answers : a)

- | | | | |
|------|---|--|------------|
| i. | ● | Wanted to run and warn mother and sister | 1 mark |
| | ● | No, sea swallowed them before she could react | ½ + ½ mark |
| ii. | ● | To make Murugeshwari happy | 1 mark |
| | ● | She was generous/large hearted/loving/caring/selfless | 1 mark |
| iii. | ● | Taking old people to bathrooms/fetching water/drying clothes/carrying babies (Any two) | 2 marks |
| iv. | ● | They are materialistic/hurtful/selfish/destructive/greedy (Any two) | ½ + ½ Mark |

- v ● She felt it would bring stability and fulfillment to her friend/
her friend had been through a series of personal tragedies/
to bring some meaning to her painful life. 1 mark

Q1 (b) VOCABULARY

Objective : To deduce the meanings of unfamiliar lexical items.

Marking : 1 mark each (4 marks)

- Answers :** i) grant
ii) materialistic
iii) nurturing
iv) colleague

Q 2. Note making and Summarizing

Total Marks: 8

Objective : To develop the skill of taking down notes

To develop the extracted ideas into a sustained piece of writing.

Marking : Note making

5 marks

Heading 1 mark

Abbreviations / Symbols 1 mark
(with or without key)
(minimum four)

Content 3 marks
(minimum three sub headings)

Important instructions:

The notes provided below are only guidelines. Any other title, main points and sub points should be accepted if they are indicative of the students understanding of the given passage and the notes include the main points with suitable and recognizable abbreviations.

Complete sentence should not be accepted as notes. Half a mark should be deducted from the total if the student writes complete sentences.

Numbering of points can be indicated in different ways and these should be accepted as long as it follows a consistent pattern.

Q 2. a Note making

Note: If the student has attempted only the summary or only the notes, due credit should be given.

Suggested Notes :

**Title : World population and changing demography / world population/
Global work force/ Managing human resource**

1. Challenges faced
 - a. Tech. changes
 - i. managing human resources
 - ii. devng. creativity & adaptability
2. Work force
 - a. Changing size and shape
 - i. 1800 – 1st billion
 - ii. 1930-2nd billion
 - iii. 1999 – 6th billion
 - b. Projn. for 2050- 9.4 billion
3. Population growth in different countries
 - a. Likely to remain constant in developed countries
 - b. Higher growth rate in less dev. countries –
 - i. China – most populous
 - ii. India – likely to surpass China
 - iii. Fastest Growing countries in 1990's
 - a. Africa
 - b. Middle East
4. Contrasting Trends
 - a. European countries
 - i. Slow Growth
 - ii. Reasons-increasing death rates
5. USA – 3rd most populous nation
 - a. Increased by 2.5 mill. during 1997
 - b. Reasons – leg. and illegal migrants

Key

1. Projn. – projection
2. Dev. – developed
3. Mill. – million
4. Leg. – Legal
5. Devng – developing
6. & – and
7. Tech. – technological

Note: 1. Any abbreviations done by the students should be accepted.

2. No student to be penalized if they have not given a key to abbreviations separately.

Q2. b. SUMMARY

- Objective:**
- 1) To expand notes (headings and sub-headings) into a summary
 - 2) To test ability of expression

- Marking:**
- | | |
|------------|---------|
| Content | 2 marks |
| Expression | 1 mark |

Note: Considering the numerous facts mentioned in the notes about the population growth, due consideration should be given to the students if they do not cover all the points in the summary which is expected to be concise. The summary should cover the essential details only.

SECTION B (WRITING)**TOTAL - 25 MARKS**

In Section B, where questions have been designed to test the writing skills of the students, expression (grammatical accuracy, appropriate vocabulary and style, spellings, organization and presentation of relevant matter in a coherent and logical way) is important.

Q.3. OPTION-1**ACCEPTING /DECLINING INVITATION****TOTAL – 5 MARKS**

Objective : To use an appropriate style to draft an informal invitation

- Marking :** Content 3 marks
- (To include writer's address and date.
Salutation and complementary close optional)

Suggested Value Points

- Accepting
1. Acknowledge invitation
 2. Confirm acceptance
- Declining
1. Acknowledge invitation
 2. Decline
 3. State reasons
 4. Greetings and good wishes

Expression

(Coherence and relevance of ideas, accuracy and style)

2 marks

Option-2

POSTER

FIGHT OBESITY/ OBESITY DAY

TOTAL – 5 MARKS

Objective : To write in an appropriate style of a poster (blurbs, bullets, different font size etc. may be considered)

Marking : Content

(to include heading and issuing authority)

3 marks

Expression

(Coherence and relevance of ideas and style)

2 marks

Suggested Value points - Create awareness about:

1. eating right
2. regular exercise

- appropriate slogans

Q.4. Option -1

LETTER TO THE EDITOR - SPORTS

TOTAL -10 MARKS

Objectives: To use an appropriate style to write a formal letter.

To plan, organize and present ideas coherently

Marking: Format

1. Sender's address
2. date
3. address of the addressee
4. salutation
5. subject
6. complimentary close
7. sender's signature/name

2 marks

Content

4 marks

Suggested value points

- Mention famous Indian sports persons
- State reasons for the rise
 - a. Increased awareness due to exposure to mass media
 - b. Support from government / sponsors
 - c. Better opportunities for identifying talents and training/ improvement in infrastructure
 - d. Promoting sports as a career
 - e. Any relevant suggestions for enhancement

Expression:

4 marks

- Grammatical accuracy, appropriate words and spellings 2 marks
- Coherence and relevance of ideas and style 2 marks

Or

Option -2

LETTER OF COMPLAINT

TOTAL -10 MARKS

Objectives: To use an appropriate style to write a formal letter.
To plan, organize and present ideas coherently

Marking: Format

2 marks

1. Sender's address 2. date
3. address of the addressee
4. salutation 5. subject
6. complimentary close
7. sender's signature/name

Content

4 marks

Suggested value points

- Introduction
- The purpose of letter
- Details
 - Studies affected
 - Disturbed sleep / peace of mind

- Headaches
- Affects hearing
- Suggest suitable measures to control it

Expression

4 marks

- Grammatical accuracy, appropriate words and spellings 2 marks
- Coherence and relevance of ideas and style 2 marks

Q.5. Option -1

ARTICLE – CONSUMER AWARENESS

Objective: To write in a style appropriate to the given situation.

To plan, organize and present ideas coherently.

Marking: Format

1 mark

(heading and writer's name)

Content

4 marks

Expression

5 marks

- Grammatical accuracy, appropriate words and spellings 2½marks
- Coherence and relevance of ideas and style 2½marks)

Suggested value points

- Rights of a consumer
- Exploitation of consumer
- Reasons
 - o Lack of quality consciousness
 - o Lack of consumer awareness
 - o Lack of stringent enforcement of laws
 - o Misleading advertisements
 - o Corrupt practices of shopkeepers
- Imp. of consumer education
- Measures to safeguard the right of consumers

Or

Option - 2

SPEECH – MALNUTRITION

TOTAL – 10 MARKS

Objective: To write in a style appropriate to the given situation.

To plan, organize and present ideas coherently.

Marking: Content

5 mark

(to include greetings and thanks)

Suggested Value Points

- Statistics on malnutrition(based on the given input)
- State reasons –
 - Overpopulation
 - Poverty
 - Unemployment
 - Illiteracy / lack of awareness
 - Natural calamities
 - Poor government policies
- Suggestions to deal with the problem

Expression

5 marks

- Grammatical accuracy, appropriate words and spellings 2½ marks
- Coherence and relevance of ideas and style (2½marks)

SECTION C (GRAMMAR)

20 MARKS

In Section C care should be taken not to award marks to any inaccurate answer carrying errors in grammar and punctuation.

Q6. REARRANGING

TOTAL: 5 MARKS

Objectives: To be able to present ideas in grammatically logical sequence

Marking: 1 mark for every correct answer

5 marks

Answer

1. Public speaking is an art
2. And like all arts it can be learned

3. Though everyone feels nervous before a public speaking performance, the trick is to master it
4. You also have to focus on your audience
5. You must know who they are and what they want

Q7. DIALOGUE WRITING

TOTAL-5 MARKS

Objectives: To be able to extend a situation into a meaningful dialogue.

Marking: 1 mark each for every correct exchange provided it is accurately and appropriately expressed. No marks should be awarded if there is any inaccuracy. This includes inaccuracies in grammar, spelling or punctuation.

5 marks

Note: The dialogues given below are merely suggestive. Any other exchange which is equally correct is acceptable and deserves full credit.

Sample Answers

1. H: Did you have to conduct a lot of research?
Dr: Yes, it is the result of a lot of research and experiments that culminated in “mission moon”
2. H: How much of time did you take in planning the mission?
Dr: Well, it took about a decade of planning for execution.
3. H: Did you receive any aid from the government?
Dr: Yes, we got all the support we needed from the government agencies.
4. H: Did you encounter any problem during the planning and the execution?
Dr: Not really, just a few
5. H: How did you tackle them?
Dr: We would meet and brainstorm and find the solutions to the problem.

Q.8. EDITING

TOTAL: 5 MARKS

Objectives: To use grammatical items appropriately

Marking: ½ mark each

If the candidate copies the sentence and replaces the incorrect word with the correct answer marks should be awarded. However no marks are to be deducted if the candidate has given only the correct words.

	<u>Incorrect</u>		<u>Correct</u>
a)	could	-	can
b)	divided	-	divide
c)	a	-	the
d)	trick	-	tricks
e)	of	-	to
f)	most	-	more
g)	but	-	and
h)	has	-	have
i)	lay	-	laid
j)	in	-	of

Q9. FRAMING QUESTIONS

TOTAL-5 MARKS

Objectives: To understand the context and frame relevant and appropriate questions.

Marking: ½ mark each for every accurate question framed

Note: No marks to be awarded if there is any inaccuracy. The ten questions should cover at least any of the two areas specified for the interview in the given question. Any other suitable questions may be acceptable

Sample questions:

- a) Can you tell us something about the opening ceremony of Beijing Olympic Games?
- b) Were you satisfied with the accommodation provided to you?
- c) Was the transport facility adequate?
- d) Did the athletes have adequate facilities for practice?
- e) Did you get Indian food there?
- f) Were you impressed with the venues where the various events were held?
- g) Were there any arrangements for leisure time activities for the sports persons?

- h) Did they have any provision for local sight seeing?
- i) Were the security arrangements for the sports persons good/adequate?
- j) Did you get any opportunity to interact with the locals?

SECTION D: LITERATURE

TOTAL -35 MARKS

Q10. REFERENCE TO CONTEXT

TOTAL- 7 MARKS

Under Section D, (Q10) question has been designed to test a student's understanding of the passage and his/her ability to interpret, evaluate and respond to the given passage. As such, content assumes more importance than expression in the answers to these questions. Please do not hesitate to award full marks if the answer deserves it especially in the long answers.

Objective: To test students' comprehension of poetry- local, global, interpretative, inferential and evaluative

Marking:

7 marks

Answers:

OPTION (1) SYMPATHY

- a) "Sympathy" by Paul Laurence Dunbar 1
- b) To show his complete identification with the pain of the bird
He had probably suffered/or known about a similar pain in the past 1/2 + 1/2
- c) Cruel bars; transferred epithet / Inanimate object 'bars' personified as living creature/cruelty of man transferred to the bars
(Any one) 1
- d) The scars that have been formed by the bird beating its wings on the bars of the cage 1
- e) It would like to swing on the boughs of the tree / fly back to his perch and cling 1
- f) freedom / freedom priceless / not to curb the freedom of others to fight against all forms of oppression/ exploitation 2

OPTION (2) SURVIVORS

- a) Survivors by Siegfried Sassoon 1/2 + 1/2

- b) The soldiers who have survived a war/survivors. 1
- c) - dream of their dead comrades/scenes from the battle field/they see the scenes of death and destruction at the battle field 1+1
- they spend sleepless nights and they are haunted by the ghosts of their friends killed in war.
- d) They have been reduced to the helpless stage of children after the trauma of the war; broken physically mentally and emotionally e.g. like children learning to walk again. 1 + 1
- e) The glory of war shattered by the reality / illusion of war started by technology/ propaganda promoted by politicians and war mongers shattered by war 1

Q11. POETRY

TOTAL 4X2=8 MARKS

Objectives: To test students' comprehension of poetry – local and global

Marking: Content: 3 marks

Expression: 1 mark

- a) Yes, because he is ready to give all that he has to Sally and wait till he is a free man to marry her. He faces the cruel beating from his master for her sake/ calls her the prettiest lady of he land/ the darling of his heart/ any other
- b) Explain any two relevant examples from the poem
- c) Mother in her youth – beautiful/elegant/active/agile/caring/well dressed/ healthy. Mother in her old age – bent/slowed down/ frail/less agile/still concerned/meticulous

(Any two)

Q12. PLAY

TOTAL-5 MARKS

Objectives: To test the students' ability to comprehend plays, understand characters etc.

Marking: Content: 3 marks

Expression: 2 marks

OPTION (1) AN ADVENTURE STORY

- Master of the world dying of a mere chill at such a young age
- Played by god / destiny / fate / his ambition unquenchable
- Yes / No

OR

OPTION (2) MONKEY'S PAW

- It is a dried paw of a monkey given by a Fakir to Morrison, who had cast a spell on it
- Mr. White – excited – not fully convinced/wanted to test its magical power
- Mrs. White – apprehensive – wants to have nothing to do with it
- Herbert – mocks and ridicules it – has a lot of fun at its expense

Q13. FICTION

TOTAL 4X2=8 MARKS

Objective: To test student's ability to comprehend, interpret and evaluate prose texts

Marking: Content:

3 marks

Expression:

1 mark

- a) The narrator was all alone on the litchi tree /unusual/ not the litchi season/ the boy seemed to be a dreamer

Advice – have a dream ; follow it; work for it diligently; do not take any one else's dream; do not take it for granted / do not expect too much too soon / discard all those things that come in the way of finding it

- b) Approaches a hall porter who ignored him, a fellow cab driver at the stable – turns around and falls asleep, horse – listens to him in silence
- c) - by going back to nature, recollecting simple pleasures of our childhood
- to cultivate the innocent attitude of a child to look upon the world as a toy

Q14. LONG ANSWERS - FICTION

Total 7 marks

Objectives: To test students' ability to comprehend prose texts globally, interpret and evaluate them.

Marking: Content

4 marks

Expression

3 marks

Option -1 ROOM 10 × 8 (LETTER)

Note: Marks should be awarded for the student's creativity

Suggested Value Points:

- Daughter-in-law excited, getting new furniture, house painted, decides to shift
- Mrs. Malik – lacks enthusiasm, realizes she has lost her position as the mistress of the house, husband dead, feels ignored / a state of resignation / recollects the difficulties she faced in the construction of the house / remembers her plans to cultivate friends

Option- 2 THE ACTRESS (DIARY ENTRY)

Suggested Value Points:

- Traumatic experiences – first hand experience of war – mutilated corpses, burnt houses etc.
- Undergoes tremendous change in her understanding of human life
- Meets Doronin, falls in love, ready to give up acting for the sake of love
- Lot of optimism and hope for the future
- First time she feels she has seriously fallen in love with someone
- Matures as an actress

QUESTION PAPER CODE 212

EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING) 20 Marks

Q1. READING

OFF THE BEATEN TRACK

TOTAL MARKS: 12

Under Section A, Reading (Q1) question has been designed to test a student's understanding of the passage and his/her ability to interpret, evaluate and respond to the given passage. As such, content assumes more importance than expression in the answers to these questions. Please do not hesitate to award full marks if the answer deserves it.

Objective : To identify and understand the main parts of the text.

Marking : As marked in the question paper. No penalty for spelling and grammar.

Accept any other answer equivalent in meaning to the answers given below.

Answers : (a) i. Job satisfaction often confused with high salaries / certain jobs appear to offer satisfaction but in reality not enjoyable

1

- | | | |
|------|---|--------|
| ii. | - Reading the teachings of Swami Vivekananda and Ramkrishna Paramhans
- Teaching the children of mess workers and poor employees of IIT. | 1+1 |
| iii. | - the author mocked at Ravikant saying that he would finally succumb to the lure of dollars
- couldn't be deterred from his goal/ joined Ramakrishna Mission/ dedicated his life to serve humanity | 1+1 |
| iv. | - Joined the Ramkrishna Mission and taught computer science to several thousand students
- Managed various projects | 1+1 |
| v. | Ravikant chosee the untrodden path, left a mark / made an impact on others to follow | 1 mark |

Q1. (b) VOCABULARY

1x4 = 4 marks

Objective : To deduce the meanings of unfamiliar lexical items.

Marking : 1 mark each (4 marks)

Answers : i. boisterous
ii. austerity
ii. succumb
iv. catalyst

Q 2. Note making and Summarizing

Total Marks: 8

Objective: To develop the skill of taking down notes

To develop the extracted ideas into a sustained piece of writing.

Marking : Note making

5 marks

Heading

1 mark

Abbreviations / Symbols

1 mark

(with or without key)

(minimum four)

Content

3 marks

(minimum three sub headings)

Important instructions:

The notes provided below are only guidelines. Any other title, main points and sub points should be accepted if they are indicative of the student's understanding of the given passage and the notes include the main points with suitable and recognizable abbreviations.

Complete sentence should not be accepted as notes. Half a mark should be deducted from the total if the student writes complete sentences.

Numbering of points can be indicated in different ways and these should be accepted as long as it follows a consistent pattern.

Q 2. a Note making

Note: If the student has attempted only the summary or only the notes, due credit should be given.

Suggested Notes

Title : World population and changing demography / world population/ Global work force/ Managing human resource

1. Challenges faced
 - a Tech. changes
 - i. managing human resources
 - ii. devng. creativity & adaptability
2. Work force
 - a Changing size and shape
 - i. 1800 – 1st billion
 - ii. 1930-2nd billion
 - iii. 1999 – 6th billion
 - b Projn. for 2050- 9.4 billion
3. Population growth in different countries
 - a Likely to remain constant in developed countries
 - b Higher growth rate in less dev. countries –
 - i. China – most populous
 - ii. India – likely to surpass China
 - iii. Fastest Growing countries in 1990's

- a. Africa
 - b. Middle East
- 4 Contrasting Trends
- a European countries
 - i. Slow Growth
 - ii. Reasons-increasing death rates
- 5 US – 3rd most populous nation
- a Increased by 2.5 mill. during 1997
 - b Reasons – leg. and illegal migrants

Key

- 1. Projn. – projection
- 2. Dev. – developed
- 3. Mill. – million
- 4. Leg. – Legal
- 5. Devng – developing
- 6. & - and
- 7. Tech. - technological

- Note:**
- 1. Any other suitable abbreviations done by the students may be accepted.
 - 2. No student to be penalized if they have not given a key to abbreviations separately.

Q2. b. SUMMARY

- Objective:**
- 1) To expand notes (headings and sub-headings) into a summary
 - 2) To test ability of expression

- Marking:**
- | | |
|------------|---------|
| Content | 2 marks |
| Expression | 1 mark |

Note: Considering the numerous facts mentioned in the notes about the population growth, due consideration should be given to the students if they do not cover all the points in the summary which is expected to be concise. The summary should cover the essential details only.

SECTION B (WRITING)**TOTAL - 25 MARKS**

In Section B, where questions have been designed to test the writing skills of the students, expression (grammatical accuracy, appropriate vocabulary and style, spellings, organization and presentation of relevant matter in a coherent and logical way) is important.

Q.3. OPTION 1**ADVERTISEMENT****TOTAL – 5 MARKS**

Objective: To draft an advertisement using an appropriate style

Marking :

Content 3 marks

(to include title and contact address)

Suggested Value Points

- what (details for identification)
- Where
- When

Expression 2 marks

Coherence and relevance of ideas and style

OPTION 2**POSTER****ENVIRONMENTAL POLLUTION****TOTAL – 5 MARKS**

Objective: To write in an appropriate style of a poster (blurbs, bullets, different font size etc. may be considered)

Marking : Content 3 marks

(to include heading and issuing authority)

Suggested Value points

- Causes
- Dangers / hazards
- Measures to be taken
- Appropriate slogans

Expression 2 marks

(Coherence and relevance of ideas and style)

Q.4. LETTER

TOTAL -10 MARKS

OPTION (1) LETTER PLACING AN ORDER

Objectives: To use an appropriate style to write a formal letter.
To plan, organize and present ideas coherently

Marking: Format 2 marks

1. Sender's address 2. date
3. address of the addressee
4. salutation 5. subject
6. complimentary close
7. sender's signature/name

Content 4 marks

Suggested value points

- State purpose of letter
- Include list of items required with specifications i.e number, size, brand
- Mode of payment
- Due date of delivery
- Discount if any

Expression 4 marks

- (Grammatical accuracy, appropriate words and spellings) 2 marks
- Coherence and relevance of ideas and style 2 marks

Or

OPTION – 2

LETTER TO THE EDITOR - SPORTS

TOTAL -10 MARKS

Objectives: To use an appropriate style to write a formal letter.
To plan, organize and present ideas coherently

Marking: Format 2 marks

1. Sender's address 2. date
3. address of the addressee
4. salutation 5. subject

- 6. complimentary close
- 7. sender's signature/name

Content

4 marks

Suggested value points

- Mention famous Indian sports persons
- State reasons for the rise
 - a. Increased awareness due to exposure to mass media
 - b. Support from government / sponsors
 - c. Better opportunities for identifying talents and training/improvement in infrastructure
 - d. Promoting sports as a career
 - e. Any relevant suggestions for enhancement

Expression:

4 marks

- Grammatical accuracy, appropriate words and spellings 2 marks
- Coherence and relevance of ideas and style 2 marks

Q.5. ARTICLE – GIRL CHILD

Objective: To write in a style appropriate to the given situation.
To plan, organize and present ideas coherently.

Marking: Format

1 mark

(heading and writer's name)

Content

4 marks

Expression

5 marks

- Grammatical accuracy, appropriate words and spellings 2½marks
- Coherence and relevance of ideas and style 2½marks

Suggested value points

- Refer / interpret the statistics given in the input
- Current status of girl child
- Reasons for gender imbalance

- Consequences
- Corrective measures

Suggestions

- any suitable suggestions

Or

OPTION - 2

SPEECH – CONSUMER RIGHTS/NATIONAL CONSUMER DAY

TOTAL – 10 MARKS

Objective: To write in a style appropriate to the given situation.
To plan, organize and present ideas coherently.

Marking:

Content 5 marks
(to include greetings and thanks)

Suggested value points

- Rights of a consumer
- Exploitation of consumer
- Reasons :
 - o Lack of quality consciousness
 - o Lack of consumer awareness
 - o Lack of stringent enforcement of laws
 - o Misleading advertisements
 - o Corrupt practices of shopkeepers
- Imp. of consumer education
- Measures to safeguard the right of consumers

Expression 5 marks
(Grammatical accuracy, spellings 2½marks
Coherence and relevance of ideas and style) 2½marks

SECTION C (GRAMMAR)

20 MARKS

In Section C care should be taken not to award marks to any inaccurate answer carrying errors in grammar and punctuation.

Q6. REARRANGING**TOTAL: 5 MARKS**

Objectives: To be able to present ideas in grammatically logical sequence

Marking: 1 mark for every correct answer

5 marks

Answer**Sequence : c, b, a, d, e**

- a. The elephant is fighting a grim battle for survival in the wild as well as in captivity
- b. Though the numbers have officially increased, the population has declined in the southern and north - eastern states.
- c. At the root of this decrease in numbers is the elephant intrusion in Villages
- d. Lately they have resorted to poisoning the beasts, killing atleast 122 in Assam
- e. Elephants are thus killed for fear of attacks

Q7. DIALOGUE WRITING**TOTAL-5 MARKS**

Objectives: To be able to extend a situation into a meaningful dialogue.

Marking: 1 mark each for every correct dialogue provided it is accurately and appropriately expressed. No marks should be awarded if there is any inaccuracy. This includes inaccuracies in grammar, spelling or punctuation.

5 marks

Sample Answers:

1. Rajesh: When did help arrive? / How long did it take for help to arrive?
Villager: Help arrived after 24 hours / It took 24 hrs for help to arrive
2. R: How was food supplied?
V: Packets were dropped from helicopters.
3. R: Did you get medical aid? / Was medical aid provided?
V: Yes. A few doctors and nurses visited the camps.
4. R: What problems did you face in the camps? / What were the problems faced in the camps?

V: Unhygienic conditions prevailed / We didn't get adequate drinking water / food supply was insufficient.

5. R: Did you get any support from the state government?

V: Help was minimal.

(Any other suitable exchange may be accepted)

Q.8. EDITING

TOTAL: 5 MARKS

Objectives: To use grammatical items appropriately

Marking: ½ mark each

If the candidate copies the sentence and replaces the incorrect word with the correct answer, marks should be awarded. However, if only the correct words are given marks are to be awarded.

<u>Incorrect</u>		<u>Correct</u>
a) <u>has</u>	-	have
b) was	-	is
c) by	-	with
d) but	-	or
e) no error	-	(award half a mark if attempted)
f) more	-	most
g) patient	-	patients
h) on	-	at
i) a	-	an / the
j) with	-	to/within

Q9. FRAMING QUESTIONS

TOTAL-5 MARKS

Objectives: To understand the context and frame relevant and appropriate questions.

Marking: ½ mark each for every accurate question framed

Note: No marks to be awarded if there is any inaccuracy. The ten questions should cover at least any of the two areas specified for the interview in the given question.

Sample questions:

- a) When did you start playing cricket? At what age did you start Playing cricket?

- b) Where were you coached? / Where did you get your coaching from?
 - c) Where was your debut match? / Against which team did you play your debut match? How old were you when you played your debut match?
 - d) Which according to you is your career best performance?
 - e) Was your family supportive? / Did your family support you?
 - f) Who is your favourite fellow cricketer?
 - g) Do you have any regrets?
 - h) Who was your toughest opponent?
 - i) Which was your favourite playground?
 - j) What are your plans after retirement?
- (any other suitable questions may be accepted)

SECTION D: LITERATURE

TOTAL -35 MARKS

Under Section D, (Q10) question has been designed to test a students understanding of the passage and his/her ability to interpret, evaluate and respond to the given passage. As such, content assumes more importance than expression in the answers to these question. Please do not hesitate to award full marks if the answer deserves it especially in the long answers.

Q10. REFERENCE TO CONTEXT

TOTAL- 7 MARKS

Objective: To test students' comprehension of poetry- local, global, interpretative, inferential and evaluative

Marking:

7 marks

Answers:

OPTION (1) OF MOTHERS, AMONG OTHER THINGS

- a) Of Mothers among other things ; A.K. Ramanujan - ½ + ½
- b) frugal, runs the house meticulously ,industrious, active inspite of her age (any two) - ½ + ½
- c) Had lost the use of one finger while laying a mouse trap but her other four fingers are functional / flexible / sensible/one finger crippled - 2
- d) Sad, tongue goes dry, overwhelmed with emotion, expresses the intensity of his grief (Any one) - 1

- e) Parchment tongue – metaphor (explain)
 Still sensible – alliteration (explain)
 Note: identification of phrase / word - 1
 Naming the literary device - 1

OPTION (2) ARS-POETICA

- a) Ars Poetica - Archibald MacLeish - ½ + ½
 b) Contradiction – Motionless in time as the moon climbs - 1
 Explanation - 1
 c) Trees shrouded in darkness of the night / ignorance - 1
 d) Lights up the tree twig by twig / removes the darkness gradually - 1
 e) Motionless in time / timeless appeal / gradual in its impact/ enlightens the reader
 (Any two) 2

Q11. POETRY ANSWERS

TOTAL 4X2=8 MARKS

Objectives: To test students' comprehension of poetry – local and global

Marking: Content: 2 marks
 Expression: 1 mark

- a) Theme of separation compared to the drawing of a curtain to be explained – in the context of the separation between two lovers
- b) Explain the images in the poem that picturizes autumn as a season of abundance
- Load and bless the vines
 - Bend cottage trees with apples
 - Fill fruits with ripeness to the core
 - Swell the gourd, plump the hazelnuts
 - Set more flowers budding
 - Reaping the harvest
 - Storing the grains
 - Gleaner with large bundle crossing the brook
- (Any 3 points)

- c) ● He plans to marry Sally after 7 years when he will be free, not in the alley
- He was under a contract
- He loves her dearly
- People in the alley mock him

Q12. DRAMA

TOTAL-5 MARKS

Objectives: To test the students' ability to comprehend plays, understand character etc.

Marking: Content: 3 marks

Expression: 2 marks

OPTION (1) THE ADVENTURE STORY

Spirit of adventure – lust for power/ambitious/man of action/impulsive/ wanted to be the master of the world (any two)

Relevant incidents – embarks on his conquest of India despite warning, refused to name his successor

Undeterred by Queen Mother's /pythia's warning (he would face a bitter end)

OR

OPTION (2) THE MONKEY'S PAW

(i) The Monkey's paw 1

(ii) Yes – supernatural power of the paw 2

No – figment of his imagination

(any one)

(iii) Reaction of Mr. White's family. Herbert called it a nonsense. Mrs. White thought it was his fancy. 1 + 1

Q13. PROSE

TOTAL 4X2=8 MARKS

Objective: To test the student's ability to comprehend, interpret and evaluate prose texts

Marking: Content: 3 marks

Expression: 1 mark

- a) - Earlier – identified herself with the sketch of the woman – her sense of ownership and pride about the house
- Later – Ironical she was no more the lady of the house – wondered whether the architect had mocked at her because in the changed circumstances the sketch resembled her daughter-in-law, maroon was not her preference.
- b) - Ambition / aiming at recognition as a form of motivation lies firmly in the human mind. Both constructive and destructive desire. Excessive desire to outdo others is injurious to both the individual and society.
- c) - Lisa met Doronin at the battle front – fell in love –was willing to give up acting for the sake of love / Lisa underwent emotional changes
- Doronin’s death made her understand the true meaning of love, realizes the immortality of love
- grows into a mature actress

Q14. PROSE (LONG ANSWERS)

Total 7 marks

Objectives: To test the students’ ability to comprehend prose texts globally, interpret and evaluate them.

Marking: Content - 4 marks

Expression - 3 marks

OPTION (1) THE JUDGEMENT OF PARIS (LETTER)

Note: Marks should be awarded for the student’s creativity

Suggested Value Points:

- Flirted with both equally – liked both – admired their acting ability – not keen to marry either – didn’t want to hurt their feelings. Writes about her plan to throw a challenge to marry the better actor of the two – to be judged by the people of paris – an impossible thing to do because each one was as good as the other – she would not be compelled to marry either of the two

OPTION (2) ASOKA (DIARY ENTRY)

Suggested Value Points:

- Change of heart – expresses regret/remorse – publically apologises – newly found convictions – becomes a Buddhist monk – stops slaughter of animals – law of piety and right living – practises what he preaches – works for public benefit – renounces violence

(Any four of the above)

MATHEMATICS

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 29 questions divided into three sections, A, B and C. Section A comprises of 10 questions of one mark each, Section B comprises of 12 questions of four marks each and Section C comprises of 7 questions of six marks each.
3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. There is no overall choice. However, internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

QUESTION PAPER CODE 65/1/1

SECTION A

Question numbers 1 to 10 carry one mark each.

1. Find the projection of \vec{a} on \vec{b} if $\vec{a} \cdot \vec{b} = 8$ and $\vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$.
2. Write a unit vector in the direction of $\vec{a} = 2\hat{i} - 6\hat{j} + 3\hat{k}$.
3. Write the value of p for which $\vec{a} = 3\hat{i} + 2\hat{j} + 9\hat{k}$ and $\vec{b} = \hat{i} + p\hat{j} + 3\hat{k}$ are parallel vectors.
4. If matrix $A = \begin{pmatrix} 1 & 2 & 3 \end{pmatrix}$, write AA' , where A' is the transpose of matrix A.
5. Write the value of the determinant $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$

6. Using principal value, evaluate the following:

$$\sin^{-1}\left(\sin \frac{3\pi}{5}\right)$$

7. Evaluate: $\int \frac{\sec^2 x}{3 + \tan x} dx$

8. If $\int_0^1 (3x^2 + 2x + k) dx = 0$, find the value of k.

9. If the binary operation * on the set of integers Z, is defined by $a * b = a + 3b^2$, then find the value of $2 * 4$.

10. If A is an invertible matrix of order 3 and $|A| = 5$, then find $|\text{adj. } A|$.

SECTION B

Question numbers 11 to 22 carry 4 mark each.

11. If $\vec{a} \times \vec{b} = \vec{c} \times \vec{d}$ and $\vec{a} \times \vec{c} = \vec{b} \times \vec{d}$, show that $\vec{a} - \vec{d}$ is parallel to $\vec{b} - \vec{c}$, where $\vec{a} \neq \vec{d}$ and $\vec{b} \neq \vec{c}$.

12. Prove that: $\sin^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right) + \sin^{-1}\left(\frac{16}{65}\right) = \frac{\pi}{2}$

OR

$$\text{Solve for } x: \tan^{-1} 3x + \tan^{-1} 2x = \frac{\pi}{4}$$

13. Find the value of λ so that the lines

$$\frac{1-x}{3} = \frac{7y-14}{2\lambda} = \frac{5z-10}{11} \text{ and } \frac{7-7x}{3\lambda} = \frac{y-5}{1} = \frac{6-z}{5}$$

are perpendicular to each other.

14. Solve the following differential equation:

$$+ y = \cos x - \sin x.$$

15. Find the particular solution, satisfying the given condition, for the following differential equation:

$$\frac{dy}{dx} - \frac{y}{x} + \operatorname{cosec}\left(\frac{y}{x}\right) = 0; y = 0 \text{ when } x = 1.$$

16. By using properties of determinants, prove the following:

$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x+4)(4-x)^2.$$

17. A die is thrown again and again until three sixes are obtained. Find the probability of obtaining the third six in the sixth throw of the die.

18. Differentiate the following function w.r.t. x : $\frac{dy}{dx}$

$$x^{\sin x} + (\sin x)^{\cos x}$$

19. Evaluate: $\int \frac{e^x}{\sqrt{5-4e^x-e^{2x}}} dx$

OR

Evaluate: $\int \frac{(x-4)e^x}{(x-2)^3} dx$

20. Prove that the relation R in the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a - b| \text{ is even}\}$, is an equivalence relation.

21. Find $\frac{dy}{dx}$ if $(x^2 + y^2)^2 = xy$.

OR

If $y = 3 \cos (\log x) + 4 \sin (\log x)$, then show that $x^2 \cdot \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = 0$

22. Find the equation of the tangent to the curve $y = \sqrt{3x - 2}$ which is parallel to the line $4x - 2y + 5 = 0$.

OR

Find the intervals in which the function f given by $f(x) = x^3 + \frac{1}{x^3}$, $x \neq 0$ is

(i) increasing (ii) decreasing.

SECTION - C

Question number 23 to 29 carry 6 marks each.

23. Find the volume of the largest cylinder that can be inscribed in a sphere of radius r .

OR

A tank with rectangular base and rectangular sides, open at the top is to be constructed so that its depth is 2 m and volume is 8 m^3 . If building of tank costs Rs. 70 per sq. metre for the base and Rs. 45 per sq. metre for sides, what is the cost of least expensive tank?

24. A diet is to contain at least 80 units of Vitamin A and 100 units of minerals. Two foods F_1 and F_2 are available. Food F_1 costs Rs. 4 per unit and F_2 costs Rs. 6 per unit. One unit of food F_1 contains 3 units of Vitamin A and 4 units of minerals. One unit of food F_2 contains 6 units of Vitamin A and 3 units of minerals. Formulate this as a linear programming problem and find graphically the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements.

25. Three bags contain balls as shown in the table below:

Bag	Number of White balls	Number of Black balls	Number of Red balls
I	1	2	3
II	2	1	1
III	4	3	2

A bag is chosen at random and two balls are drawn from it. They happen to be white and red. What is the probability that they came from the III bag?

26. Using matrices, solve the following system of equations:

$$2x - 3y + 5z = 11$$

$$3x + 2y - 4z = -5$$

$$x + y - 2z = -3$$

27. Evaluate: $\int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx$

OR

Evaluate: $\int_0^{\pi/2} (2 \log \sin x - \log \sin 2x) dx$

28. Using the method of integration, find the area of the region bounded by the lines $2x + y = 4$, $3x - 2y = 6$ and $x - 3y + 5 = 0$

29. Find the equation of the plane passing through the point $(-1, 3, 2)$ and perpendicular to each of the planes $x + 2y + 3z = 5$ and $3x + 3y + z = 0$.

QUESTION PAPER CODE 65/1

SECTION A

Questions number 1 to 10 carry 1 mark each.

1. Find the value of x , if

$$\begin{pmatrix} 3x + y & -y \\ 2y - x & 3 \end{pmatrix} = \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix}$$

2. Let $*$ be a binary operation on N given by $a * b = \text{HCF}(a, b)$, $a, b \in N$. Write the value of $22 * 4$.

3. Evaluate: $\int_0^{1/\sqrt{2}} \frac{1}{\sqrt{1-x^2}} dx$

4. Evaluate: $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$

5. Write the principal value of $\cos^{-1} \left(\cos \frac{7\pi}{6} \right)$

6. Write the value of the following determinant:

$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$$

7. Find the value of x from the following:

$$\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$$

8. Find the value of p if

$$(2\hat{i} + 6\hat{j} + 27\hat{k}) \times (\hat{i} + 3\hat{j} + p\hat{k}) = \vec{0}.$$

9. Write the direction cosines of a line equally inclined to the three coordinate axes.

10. If \vec{p} is a unit vector and $(\vec{x} - \vec{p}) \cdot (\vec{x} + \vec{p}) = 80$, then find $|\vec{x}|$.

SECTION B

Questions number 11 to 22 carry 4 marks each.

11. The length x of a rectangle is decreasing at the rate of 5 cm/minute and the width y is increasing at the rate of 4 cm/minute. When x = 8 cm and y = 6 cm, find the rate of change of (a) the perimeter, (b) the area of the rectangle.

OR

Find the intervals in which the function f given by

$$f(x) = \sin x + \cos x, \quad 0 \leq x \leq 2\pi.$$

is strictly increasing or strictly decreasing.

12. If $\sin y = x \sin (a + y)$, prove that $\frac{dy}{dx} = \frac{\sin^2 (a + y)}{\sin a}$.

OR

If $(\cos x)^y = (\sin y)^x$, find $\frac{dy}{dx}$.

13. Let $f: \mathbb{N} \rightarrow \mathbb{N}$ be defined by

$$f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases} \quad \text{for all } n \in \mathbb{N}$$

Find whether the function f is bijective.

14. Evaluate: $\int \frac{dx}{\sqrt{5-4x-2x^2}}$

OR

Evaluate: $\int x \sin^{-1} x \, dx$

15. If $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$ show that

$$(1-x^2) \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} - y = 0$$

16. On a multiple choice examination with three possible answers (out of which only one is correct) for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing?

17. Using properties of determinants, prove the following:

$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} = 1$$

18. Solve the following differential equation:

$$x \frac{dy}{dx} = y - x \tan\left(\frac{y}{x}\right)$$

19. Solve the following differential equation:

$$\cos^2 x \frac{dy}{dx} + y = \tan x$$

20. Find the shortest distance between the following two lines:

$$\vec{r} = (1 + \lambda) \hat{i} + (2 - \lambda) \hat{j} + (\lambda + 1) \hat{k};$$

$$\vec{r} = (2 \hat{i} - \hat{j} - \hat{k}) + \mu (2 \hat{i} + \hat{j} + 2 \hat{k}).$$

21. Prove the following:

$$\cot^{-1} \left(\frac{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}} \right) = \frac{x}{2}, \quad x \in \left(0, \frac{\pi}{4} \right)$$

OR

Solve for x :

$$2 \tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$$

22. The scalar product of the vector $\hat{i} + \hat{j} + \hat{k}$ with the unit vector along the sum of vectors $2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\lambda\hat{i} + 2\hat{j} + 3\hat{k}$ is equal to one. Find the value of λ .

SECTION C

Questions number 23 to 29 carry six marks each.

23. Find the equation of the plane determined by the points A (3, -1, 2), B (5, 2, 4) and C (-1, -1, 6). Also find the distance of the point P (6, 5, 9) from the plane.

24. Find the area of the region included between the parabola $y^2 = x$ and the line $x + y = 2$.

25. Evaluate: $\int_0^{\pi} \frac{x \, dx}{a^2 \cos^2 x + b^2 \sin^2 x}$

26. Using matrices, solve the following system of equations:

$$x + y + z = 6$$

$$x + 2z = 7$$

$$3x + y + z = 12$$

OR

Obtain the Inverse of the following matrix using elementary operations:

$$A = \begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix}$$

27. Coloured balls are distributed in three bags as shown in the following table:

Bag	Colour of the ball		
	Black	White	Red
I	1	2	3
II	2	4	1
III	4	5	3

A bag is selected at random and then two balls are randomly drawn from the selected bag. They happen to be black and red. What is the probability that they came from bag I ?

28. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5,760 to invest and has a space for at most 20 items. A fan costs him Rs. 360 and a sewing machine Rs. 240. His expectation is that he can sell a fan at a profit of Rs. 22 and a sewing machine at a profit of Rs. 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order

to maximise the profit? Formulate this as a linear programming problem and solve it graphically.

29. If the sum of the lengths of the hypotenuse and a side of a right-angled triangle is given, show that the area of the triangle is maximum when the angle between them is

$$\frac{\pi}{3}.$$

OR

A manufacturer can sell x items at a price of Rs. $\left(5 - \frac{x}{100}\right)$ each. The cost price of

x items is Rs. $\left(\frac{x}{5} + 500\right)$. Find the number of items he should sell to earn maximum profit.

Marking Scheme — Mathematics

General Instructions :

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the meaning, such answers should be given full weightage.
2. Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration — Marking Scheme should be strictly adhered to and religiously followed.
3. Alternative methods are accepted. Proportional marks are to be awarded.
4. In question(s) on differential equations, constant of integration has to be written.
5. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
6. A full scale of marks - 0 to 100 has to be used. Please do not hesitate to award full marks if the answer deserves it.

12. Getting $\sin^{-1}\left(\frac{4}{5}\right) = \tan^{-1}\left(\frac{4}{3}\right)$, $\sin^{-1}\left(\frac{5}{13}\right) = \tan^{-1}\left(\frac{5}{12}\right)$, $\sin^{-1}\left(\frac{16}{65}\right) = \tan^{-1}\left(\frac{16}{63}\right)$ 1½ m

$$\text{LHS} = \tan^{-1}\left(\frac{4}{3}\right) + \tan^{-1}\left(\frac{5}{12}\right) + \tan^{-1}\left(\frac{16}{63}\right) = \tan^{-1}\left(\frac{\frac{4}{3} + \frac{5}{12}}{1 - \frac{4}{3} \cdot \frac{5}{12}}\right) + \tan^{-1}\left(\frac{16}{63}\right) \quad 1 \text{ m}$$

$$= \tan^{-1}\left(\frac{63}{16}\right) + \cot^{-1}\left(\frac{63}{16}\right) \quad 1 \text{ m}$$

$$= \frac{\pi}{2} \quad \frac{1}{2} \text{ m}$$

OR

$$\tan^{-1} 3x + \tan^{-1} 2x = \frac{\pi}{4} \Rightarrow \tan^{-1}\left(\frac{5x}{1-6x^2}\right) = \frac{\pi}{4} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow \frac{5x}{1-6x^2} = 1 \Rightarrow 6x^2 + 5x - 1 = 0 \quad \frac{1}{2} + \frac{1}{2} = 1 \text{ m}$$

$$\text{Solving to get } x = -1, x = \frac{1}{6} \quad 1 \text{ m}$$

$$x = -1 \text{ does not satisfy the equation, } \therefore x = \frac{1}{6} \text{ is the solution} \quad \frac{1}{2} \text{ m}$$

13. Getting direction ratios of two lines as

$$(a_1, b_1, c_1) = \left(-3, \frac{2\lambda}{7}, \frac{11}{5}\right) \text{ and } (a_2, b_2, c_2) = \left(-\frac{3\lambda}{7}, 1, -5\right) \quad 1+1 \text{ m}$$

$$\text{Two lines are perpendicular then } a_1a_2 + b_1b_2 + c_1c_2 = 0 \quad 1 \text{ m}$$

$$\Rightarrow \frac{9\lambda}{7} + \frac{2\lambda}{7} - 11 = 0 \Rightarrow \frac{11\lambda}{7} = 11 \Rightarrow \lambda = 7 \quad 1 \text{ m}$$

14. Getting integrating factor = $e^{\int dx} = e^x$ 1 m

\therefore Solution is $y \cdot e^x = \int (\cos x - \sin x) e^x dx$ 1 m

Using $\int [f(x) + f'(x)] e^x dx = f(x) \cdot e^x + c$ we get $\frac{1}{2} m$

$$y \cdot e^x = \cos x e^x + c \quad 1\frac{1}{2} m$$

$$\text{or } y = \cos x + c e^{-x}$$

15. Putting $\frac{y}{x} = v \Rightarrow y = vx \Rightarrow \frac{dy}{dx} = v + x \frac{dv}{dx}$ 1 m

$$\therefore \text{ we get } v + x \frac{dv}{dx} - v + \operatorname{cosec} v = 0$$

$$\Rightarrow \sin v dv + \frac{dx}{x} = 0 \quad 1 m$$

$$\Rightarrow -\cos v + \log |x| = c_1 \text{ or } \cos \frac{y}{x} = \log |x| + c \quad 1 m$$

$$\text{When } x=1, y=0 \Rightarrow c=1 \quad \frac{1}{2} m$$

$$\text{Hence the solution is } \cos \frac{y}{x} = 1 + \log |x| \quad \frac{1}{2} m$$

16. $C_1 \rightarrow C_1 + C_2 + C_3$ gives $\text{Det} = (5x+4) \begin{vmatrix} 1 & 2x & 2x \\ 1 & x+4 & 2x \\ 1 & 2x & x+4 \end{vmatrix}$ 2 m

$$\begin{array}{l} R_2 \rightarrow R_2 - R_1 \\ R_3 \rightarrow R_3 - R_1 \end{array} \Rightarrow \text{Det} = (5x+4) \begin{vmatrix} 1 & 2x & 2x \\ 0 & 4-x & 0 \\ 0 & 0 & 4-x \end{vmatrix} \quad \begin{array}{l} [3 \text{ marks for} \\ 3 \text{ correct operations}] \end{array} \quad 1 m$$

$$\text{Expanding by } C_1 \text{ to get } \text{Det.} = (5x+4)(4-x)^2 \quad 1 m$$

17. Probability of success $(p) = \frac{1}{6}$, Prob. of failure $(q) = \frac{5}{6}$. 1 m

Third six in sixth throw \Rightarrow two successes in first five throws 1 m

\therefore P(Two sixes in first five throws and third six in sixth throw)

$$= {}_5C_2 \cdot \left(\frac{1}{6}\right)^2 \cdot \left(\frac{5}{6}\right)^3 \cdot \frac{1}{6} \quad 1 \text{ m}$$

$$= 10 \frac{5^3 \cdot 1}{6^5 \cdot 6} = \frac{625}{23328} \quad 1 \text{ m}$$

18. Let $x^{\sin x} = u$, and $(\sin x)^{\cos x} = v \therefore y = u + v \Rightarrow \frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx}$ $\frac{1}{2} \text{ m}$

Getting $\frac{du}{dx} = x^{\sin x} \left[\frac{\sin x}{x} + \log x \cdot \cos x \right]$ $1\frac{1}{2} \text{ m}$

and $\frac{dv}{dx} = (\sin x)^{\cos x} [\cos x \cdot \cot x - \sin x \log \sin x]$ $1\frac{1}{2} \text{ m}$

$\therefore \frac{dy}{dx} = x^{\sin x} \left[\frac{\sin x}{x} + \log x \cdot \cos x \right] + (\sin x)^{\cos x} [\cos x \cdot \cot x - \sin x \log \sin x]$ $\frac{1}{2} \text{ m}$

19. Getting $I = \int \frac{dt}{\sqrt{5-4t-t^2}}$ where $t = e^x$ 1 m

$$= \int \frac{dt}{\sqrt{(3)^2 - (t+2)^2}} \quad 1\frac{1}{2} \text{ m}$$

$$= \sin^{-1} \frac{t+2}{3} + c \quad 1 \text{ m}$$

$$= \sin^{-1} \frac{e^x + 2}{3} + c \quad \frac{1}{2} \text{ m}$$

OR

$$I = \int \frac{[(x-2)-2]}{(x-2)^3} e^x dx \quad 1\frac{1}{2} m$$

$$I = \int \left[\frac{1}{(x-2)^2} - \frac{2}{(x-2)^3} \right] e^x dx \quad 1\frac{1}{2} m$$

$$\text{Using } \int [f(x) + f'(x)] e^x dx = f(x) \cdot e^x + c \quad \frac{1}{2} m$$

$$I = \frac{1}{(x-2)^2} \cdot e^x + c \quad \frac{1}{2} m$$

20. (i) for all $a \in A, (a, a) \in R \because |a-a| = 0$ is even
 $\therefore R$ is reflexive in A 1 m
- (ii) for all $a, b \in A, (a, b) \in R \Rightarrow (b, a) \in R \because$ if $|a-b|$ is even
then $|b-a|$ is also even $\Rightarrow R$ is symmetric in A 1 m
- (iii) for all $a, b, c \in A$
 $(a, b) \in R$ and $(b, c) \in R$ then $(a, c) \in R$
 $\because |a-b|$ is even, $|b-c|$ is even, then $|a-c|$ will also be even 1\frac{1}{2} m
Hence, R is an equivalence relation in A \frac{1}{2} m

21. $(x^2 + y^2)^2 = xy \Rightarrow 2(x^2 + y^2) \left(2x + 2y \frac{dy}{dx} \right) = x \frac{dy}{dx} + y$ 2 m

$$\Rightarrow 4y \frac{dy}{dx} (x^2 + y^2) - x \frac{dy}{dx} = y - 4x(x^2 + y^2) \quad 1 m$$

$$\therefore \frac{dy}{dx} = \frac{y - 4x(x^2 + y^2)}{4y(x^2 + y^2) - x} \quad 1 m$$

OR

$$y = 3 \cos(\log x) + 4 \sin(\log x) \Rightarrow \frac{dy}{dx} = -\frac{3 \sin(\log x)}{x} + \frac{4 \cos(\log x)}{x} \quad 1\frac{1}{2} \text{ m}$$

$$x \frac{dy}{dx} = -3 \sin(\log x) + 4 \cos(\log x) \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow x \frac{d^2y}{dx^2} + \frac{dy}{dx} = -\frac{3 \cos(\log x)}{x} - \frac{4 \sin(\log x)}{x} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} = -[3 \cos(\log x) + 4 \sin(\log x)] = -y \quad \frac{1}{2} \text{ m}$$

$$\text{or } x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = 0$$

22. Tangent is parallel to the line $4x - 2y + 5 = 0$

$$\therefore \text{ Slope of tangent} = 2 \quad 1$$

$$y = \sqrt{3x-2} \Rightarrow \frac{dy}{dx} = \frac{3}{2\sqrt{3x-2}} \quad \frac{1}{2} \text{ m}$$

$$\therefore \frac{3}{2\sqrt{3x-2}} = 2 \Rightarrow 4\sqrt{3x-2} = 3 \Rightarrow x = \frac{41}{48} \quad 1 \text{ m}$$

$$\text{substituting to get } y = \frac{3}{4} \quad \frac{1}{2} \text{ m}$$

$$\therefore \text{ Equation of tangent is } y - \frac{3}{4} = 2 \left(x - \frac{41}{48} \right) \quad 1 \text{ m}$$

$$\text{or } 48x - 24y = 23.$$

OR

$$f'(x) = 3x^2 - \frac{3}{x^4} = \frac{3(x^6 - 1)}{x^4} \quad \frac{1}{2}$$

$$f'(x) = 0 \Rightarrow x = \pm 1, \quad 1 \text{ m}$$

\therefore Possible intervals are $(-\infty, -1), (-1, 0), (0, 1), (1, \infty)$ 1 m

$f(x)$ is increasing in $(-\infty, -1) \cup (1, \infty)$ 1 m

and decreasing in $(-1, 0) \cup (0, 1)$ $\frac{1}{2}$ m

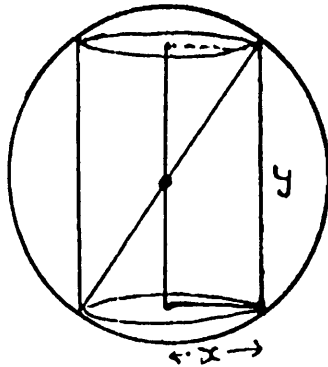
Note : As $x \neq 0$, in case the candidate takes intervals as $(-\infty, -1), (-1, 1), (1, \infty)$ it may be accepted

SECTION - C

23.

Correct figure

1 m



Let a cylinder of radius x and height y be the largest cylinder inscribed in a sphere of radius r .

$$\therefore (2x)^2 + y^2 = (2r)^2 \quad \frac{1}{2} \text{ m}$$

$$\text{Volume of cylinder } v = \pi x^2 \cdot y \quad \frac{1}{2} \text{ m}$$

$$v = \pi y \left(\frac{4r^2 - y^2}{4} \right) = \frac{\pi}{4} (4r^2 y - y^3) \quad 1 \text{ m}$$

$$\frac{dv}{dy} = \frac{\pi}{4} [4r^2 - 3y^2] \therefore \frac{dv}{dy} = 0 \Rightarrow y = \frac{2}{\sqrt{3}} r \quad 1 \text{ m}$$

$$\frac{d^2v}{dy^2} = \frac{\pi}{4} (-6y) < 0 \therefore \text{for maximum volume, } y = \frac{2}{\sqrt{3}} r \quad 1 \text{ m}$$

$$\Rightarrow \text{Maximum Volume} = \frac{\pi}{4} \left[4r^2 \cdot \frac{2}{\sqrt{3}} r - \frac{8}{3\sqrt{3}} r^3 \right] = \frac{4\sqrt{3}}{9} \pi r^3 \text{ cu. units.} \quad 1 \text{ m}$$

OR

Let the length of tank be x m and breadth be y m.

$$\therefore x \cdot y \cdot 2 = 8 \Rightarrow xy = 4 \text{ or } y = \frac{4}{x} \quad 1 \text{ m}$$

$$\text{cost } C = 70(xy) + 45[4(x+y)] \quad 1 \text{ m}$$

$$= 70(4) + 180(x+y) = 280 + 180\left(x + \frac{4}{x}\right) \quad 1 \text{ m}$$

$$\frac{dC}{dx} = 0 \Rightarrow 180\left(1 - \frac{4}{x^2}\right) = 0 \Rightarrow x = 2 \text{ m} \quad 1 \text{ m}$$

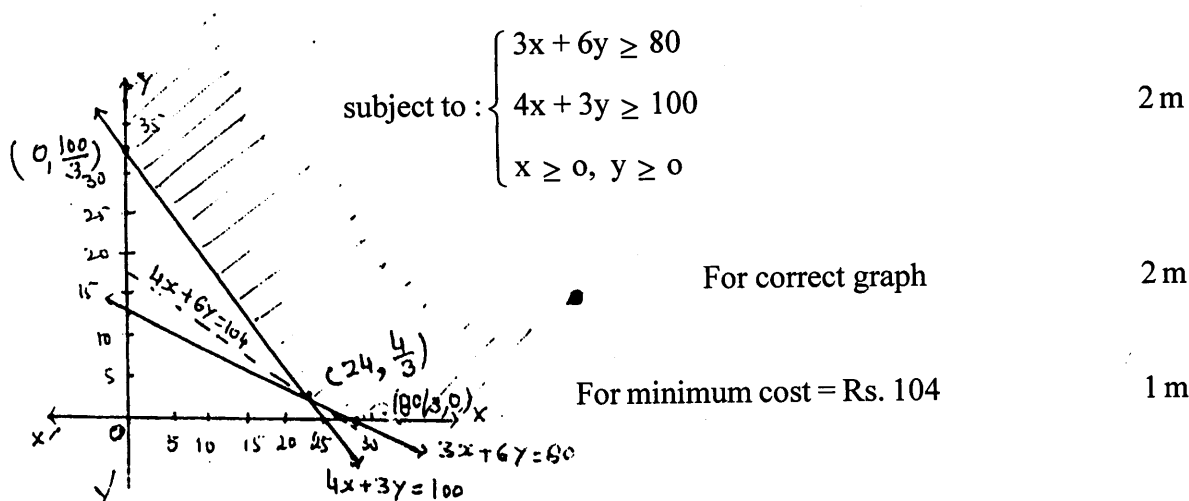
$$\frac{d^2C}{dx^2} = 180\left(+\frac{8}{x^3}\right) > 0 \Rightarrow \text{for } x = 2 \text{ m, cost is least.} \quad 1 \text{ m}$$

$$\text{Least cost} = 280 + 180\left(2 + \frac{4}{2}\right) = 280 + 720 = \text{Rs. } 1000 \quad 1 \text{ m}$$

24.

Let food I = x units and food II = y units are mixed

$$\therefore \text{L.P.P. is minimise } C = 4x + 6y \quad 1 \text{ m}$$



25. Events are : E_1 : Choosing bag I

E_2 : Choosing bag II

1 m

E_3 : Choosing bag III

A : Getting a white and a red ball

$$\therefore P(E_1) = P(E_2) = P(E_3) = \frac{1}{3}$$

$\frac{1}{2}$ m

$$P\left(\frac{A}{E_1}\right) = \frac{1 \cdot 3}{6c_2} = \frac{1}{5}, P\left(\frac{A}{E_2}\right) = \frac{2 \cdot 1}{4c_2} = \frac{1}{3}, P\left(\frac{A}{E_3}\right) = \frac{4 \cdot 2}{9c_2} = \frac{2}{9}$$

$1 + \frac{1}{2} + \frac{1}{2}$ m

$$P\left(\frac{E_3}{A}\right) = \frac{P(E_3)P\left(\frac{A}{E_3}\right)}{\sum_1^3 P(E_i) \cdot P\left(\frac{A}{E_i}\right)}$$

$\frac{1}{2}$ m

$$= \frac{\frac{1}{3} \cdot \frac{2}{9}}{\frac{1}{3} \cdot \frac{1}{5} + \frac{1}{3} \cdot \frac{1}{3} + \frac{1}{3} \cdot \frac{2}{9}} = \frac{5}{17}$$

1+1 m

26. Writing as $\begin{pmatrix} 2 & -3 & 5 \\ 5 & 2 & -4 \\ 1 & 1 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 11 \\ -5 \\ -3 \end{pmatrix}$ i.e. $AX=B$

1 m

$$|A| = 2(0) + 3(-2) + 5(1) = -1 \therefore X = A^{-1}B$$

1 m

$$A_{11} = 0 \quad A_{12} = 2 \quad A_{13} = 1$$

$$A_{21} = -1 \quad A_{22} = -9 \quad A_{23} = -5$$

$$A_{31} = 2 \quad A_{32} = 23 \quad A_{33} = 13$$

[1 mark for every 4 correct cofactors]

2 m

$$A^{-1} = \frac{1}{-1} \begin{pmatrix} 0 & -1 & 2 \\ 2 & -9 & 23 \\ 1 & -5 & 13 \end{pmatrix}$$

$\frac{1}{2}$ m

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = - \begin{pmatrix} 0 & -1 & 2 \\ 2 & -9 & 23 \\ 1 & -5 & 13 \end{pmatrix} \begin{pmatrix} 11 \\ -5 \\ -3 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \quad 1 \text{ m}$$

$$x = 1, y = 2, z = 3 \quad \frac{1}{2} \text{ m}$$

$$27. \quad I = \int_0^\pi \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx = \int_0^\pi \frac{e^{\cos(\pi-x)}}{e^{\cos(\pi-x)} + e^{-\cos(\pi-x)}} dx \quad 2 \text{ m}$$

$$= \int_0^\pi \frac{e^{-\cos x}}{e^{-\cos x} + e^{\cos x}} dx \quad 1 \text{ m}$$

$$2I = \int_0^\pi 1 \cdot dx = [x]_0^\pi \quad 1+1 \text{ m}$$

$$= \pi$$

$$I = \frac{\pi}{2} \quad 1 \text{ m}$$

OR

$$I = \int_0^{\pi/2} (2 \log \sin x - \log \sin 2x) dx = \int_0^{\pi/2} \log \left(\frac{\sin^2 x}{2 \sin x \cos x} \right) dx \quad 1 \text{ m}$$

$$= \int_0^{\pi/2} \log \tan x dx - \int_0^{\pi/2} \log 2 \cdot dx = I_1 - I_2 \quad 1 \text{ m}$$

$$I_1 = \int_0^{\pi/2} \log \tan x dx = \int_0^{\pi/2} \log \tan \left(\frac{\pi}{2} - x \right) dx = \int_0^{\pi/2} \log \cot x dx \quad 1 \text{ m}$$

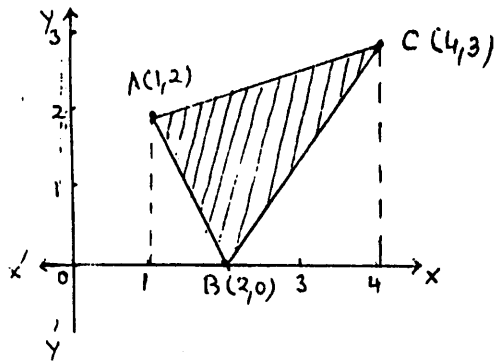
$$\Rightarrow 2I_1 = 0 \Rightarrow I_1 = 0 \quad 1 \text{ m}$$

$$I_2 = \log 2 \cdot [x]_0^{\pi/2} = \frac{\pi}{2} \cdot \log 2 \quad 1 \text{ m}$$

$$\therefore I = - \frac{\pi}{2} \cdot \log 2 \quad 1 \text{ m}$$

28. Getting the points of intersection, as (2,0), (4,3) and (1,2)

1½ m



Correct Figure

1 m

Equation of AB is $2x + y = 4$

Equation of AC is $x - 3y + 5 = 0$

Equation of BC is $3x - 2y = 6$

$$\text{ar } \Delta ABC = \int_1^4 \frac{1}{3}(x+5) dx - \int_1^2 (4-2x) dx - \int_2^4 \frac{1}{2}(3x-6) dx$$

1½ m

$$= \frac{1}{3} \left[\frac{(x+5)^2}{2} \right]_1^4 + \left[(2-x)^2 \right]_1^2 - \frac{3}{2} \left[\frac{(x-2)^2}{2} \right]_2^4$$

1½ m

$$= \frac{15}{2} - 1 - 3 = \frac{7}{2} \text{ sq. U.}$$

½ m

29. Let $\vec{a} = -\hat{i} + 3\hat{j} + 2\hat{k}$

Plane is perpendicular to the planes $x + 2y + 3z = 5$ and $3x + 3y + z = 0$

\therefore normal to the plane is $(\hat{i} + 2\hat{j} + 3\hat{k}) \times (3\hat{i} + 3\hat{j} + \hat{k})$

2 m

$$= -7\hat{i} + 8\hat{j} - 3\hat{k} \text{ or } 7\hat{i} - 8\hat{j} + 3\hat{k}$$

2 m

\therefore Equation of plane is

$$\vec{r} \cdot (7\hat{i} - 8\hat{j} + 3\hat{k}) = (-\hat{i} + 3\hat{j} + 2\hat{k}) \cdot (7\hat{i} - 8\hat{j} + 3\hat{k}) = -25$$

2 m

or $7x - 8y + 3z + 25 = 0$

QUESTION PAPER CODE 65/1

EXPECTED ANSWERS/VALUE POINTS

SECTION - A

						Marks
1-10.	1. $x = 1,$	2. 2	3. $\frac{\pi}{4}$	4. $2 \sin \sqrt{x} + c$	5. $\frac{5\pi}{6}$	1x10 = 10
	7. ± 2	8. $\frac{27}{2}$	9. $\left[\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right]$	10. 9		

SECTION - B

11.	$\frac{dx}{dt} = -5 \text{ cm/min}, \frac{dy}{dt} = 4 \text{ cm/min}$	$\frac{1}{2} + \frac{1}{2} \text{ m}$
-----	---	---------------------------------------

(a) Perimeter P is given by $P = 2(x + y)$

$$\Rightarrow \frac{dP}{dt} = 2 \left(\frac{dx}{dt} + \frac{dy}{dt} \right) = 2(-5 + 4) \text{ cm/min} = -2 \text{ cm/min} \quad 1 + \frac{1}{2} \text{ m}$$

(b) Area A is given by $A = xy$ $\frac{f'}{\Rightarrow} x = \frac{\pi}{4}, \frac{5\pi}{4}$

$$\therefore \frac{dA}{dt} = y \frac{dx}{dt} + x \frac{dy}{dt} = [6(-5) + 8(4)] \text{ cm}^2 / \text{min} \quad 1 \text{ m}$$

$$= 2 \text{ cm}^2 / \text{min} \quad \frac{1}{2} \text{ m}$$

OR

$$f'(x) = \cos x - \sin x \quad \frac{1}{2} \text{ m}$$

$$(x) = 0 \quad 1 \text{ m}$$

$$\therefore \text{Intervals are } \left(0, \frac{\pi}{4} \right), \left(\frac{\pi}{4}, \frac{5\pi}{4} \right), \left(\frac{5\pi}{4}, 2\pi \right) \quad 1 \text{ m}$$

$$\text{Getting } f(x) \text{ strictly increasing in } \left(0, \frac{\pi}{4} \right) \cup \left(\frac{5\pi}{4}, 2\pi \right) \quad 1 \text{ m}$$

$$\text{and strictly decreasing in } \left(\frac{\pi}{4}, \frac{5\pi}{4} \right) \quad \frac{1}{2} \text{ m}$$

12. $\sin y = x \sin (a + y) \Rightarrow \cos y \frac{dy}{dx} = \sin (a + y) + x \cos (a + y) \frac{dy}{dx} \dots\dots\dots(i)$ 1 m

$$\Rightarrow \frac{dy}{dx} = \frac{\sin (a + y)}{\cos y - x \cos (a + y)}$$
 ½ m

From (i), $x = \frac{\sin y}{\sin (a + y)} \Rightarrow \frac{dy}{dx} = \frac{\sin (a + y)}{\cos y - \frac{\sin y}{\sin (a + y)} \cdot \cos (a + y)}$ 1+½ m

$$\Rightarrow \frac{dy}{dx} = \frac{\sin^2 (a + y)}{\sin (a + y - y)} = \frac{\sin^2 (a + y)}{\sin a}$$
 1 m

OR

$$(\cos x)^y = (\sin y)^x$$

$$\Rightarrow y \log \cos x = x \log \sin y$$
 1 m

$$\therefore \log (\cos x) \cdot \frac{dy}{dx} - y \cdot \tan x = \log \sin y + x \cot y \cdot \frac{dy}{dx}$$
 1½ m

$$\therefore \frac{dy}{dx} (\log \cos x - x \cot y) = \log \sin y + y \tan x$$
 ½ m

$$\therefore \frac{dy}{dx} = \frac{\log \sin y + y \tan x}{\log \cos x - x \cdot \cot y}$$
 1 m

13. Showing that the function is not one - one 3 m

$\therefore f$ is not bijective 1 m

Note : If a candidate has only proved that function is onto, one mark may be given

$$14. \int \frac{dx}{\sqrt{5-4x-2x^2}} = \frac{1}{\sqrt{2}} \int \frac{dx}{\sqrt{\frac{5}{2}-2x-x^2}} = \frac{1}{\sqrt{2}} \int \frac{dx}{\sqrt{\left(\frac{\sqrt{7}}{2}\right)^2 - (x+1)^2}} \quad 1+1 \text{ m}$$

$$= \frac{1}{\sqrt{2}} \cdot \sin^{-1} \left(\frac{x+1}{\frac{\sqrt{7}}{2}} \right) + c \quad 2 \text{ m}$$

$$\text{or } \frac{1}{\sqrt{2}} \sin^{-1} \left(\sqrt{\frac{2}{7}} \cdot (x+1) \right) + c$$

OR

$$\int x \sin^{-1} x \, dx = \sin^{-1} x \cdot \frac{x^2}{2} - \int \frac{x^2}{2} \cdot \frac{1}{\sqrt{1-x^2}} \, dx \quad (\text{Int. by parts}) \quad 1 \text{ m}$$

$$= \frac{x^2}{2} \sin^{-1} x + \frac{1}{2} \int \frac{1-x^2-1}{\sqrt{1-x^2}} \, dx \quad \frac{1}{2} \text{ m}$$

$$= \frac{x^2}{2} \sin^{-1} x + \frac{1}{2} \int \sqrt{1-x^2} \, dx - \frac{1}{2} \int \frac{dx}{\sqrt{1-x^2}} \quad \frac{1}{2} \text{ m}$$

$$= \frac{x^2}{2} \sin^{-1} x + \frac{1}{2} \left[\frac{x}{2} \sqrt{1-x^2} + \frac{1}{2} \sin^{-1} x \right] - \frac{1}{2} \sin^{-1} x + c \quad 1\frac{1}{2} \text{ m}$$

$$= \sin^{-1} x \cdot x \cdot \left[\frac{x^2}{2} + \frac{1}{4} - \frac{1}{2} \right] + \frac{1}{4} x \sqrt{1-x^2} + c \quad \left. \vphantom{\int} \right\} \frac{1}{2} \text{ m}$$

$$\text{or, } \frac{2x^2-1}{4} \cdot \sin^{-1} x + \frac{1}{4} x \sqrt{1-x^2} + c$$

15. $\sqrt{1-x^2} y = \sin^{-1} x$ ½ m

$$\sqrt{1-x^2} \frac{dy}{dx} - \frac{xy}{\sqrt{1-x^2}} = \frac{1}{\sqrt{1-x^2}}$$
1½ m

$$\Rightarrow (1-x^2) \frac{dy}{dx} - xy = 1$$
½ m

$$\Rightarrow (1-x^2) \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - x \frac{dy}{dx} - y = 0$$
1 m

$$\Rightarrow (1-x^2) \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} - y = 0$$
½ m

16. Here $p = \frac{1}{3}$, $q = \frac{2}{3}$, $n = 5$ 1 m

Let x denote the number of successes

∴ Probability of r successes is given by

$$P(x=r) = nC_r (p)^r (q)^{n-r}, r=1, 2, 3.$$

$$\therefore P(x=4, 5) = 5C_4 \left(\frac{1}{3}\right)^4 \left(\frac{2}{3}\right) + 5C_5 \left(\frac{1}{3}\right)^5$$
1 m

$$= \frac{10}{243} + \frac{1}{243} = \frac{11}{243}$$
1 m

17. $\Delta = \begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix}$

$$R_2 \rightarrow R_2 - 2R_1$$

$$\Delta = \begin{vmatrix} 1 & 1+p & 1+p+q \\ 0 & 1 & p-1 \\ 3 & 6+3p & 1+6p+3q \end{vmatrix}$$
1½ m

$$R_3 \rightarrow R_3 - 3R_1$$

$$\Delta = \begin{vmatrix} 1 & 1+p & 1+p+q \\ 0 & 1 & p-1 \\ 0 & 3 & 3p-2 \end{vmatrix}$$

$$= 1 [(3p-2) - 3(p-1)]$$

$$= 3p-2 - 3p+3 = 1 = \text{RHS}$$

18. $\frac{dy}{dx} = \frac{y}{x} - \tan\left(\frac{y}{x}\right)$ (i)

Let $y = vx \Rightarrow \frac{dy}{dx} = v + x \frac{dv}{dx}$

\therefore (i) becomes $v + x \frac{dv}{dx} = v - \tan v$

$$\Rightarrow -\cot v \, dv = \frac{dx}{x}$$

$$\log |\operatorname{cosec} v| = \log |cx|$$

$$\Rightarrow cx = \operatorname{cosec}\left(\frac{y}{x}\right)$$

or $\left(x \sin\left(\frac{y}{x}\right) = c\right)$

19. The given differential equation can be written as

$$\frac{dy}{dx} + \sec^2 x \cdot y = \tan x \cdot \sec^2 x$$

$$\therefore \text{I.F} = e^{\int \sec^2 x \, dx} = e^{\tan x}$$

\therefore The solution is

$$y \cdot e^{\tan x} = \int e^{\tan x} \cdot \tan x \cdot \sec^2 x \, dx$$

For R.H.S., Let $\tan x = t$, $\sec^2 x dx = dt$

$$\begin{aligned} \therefore \text{RHS} &= \int t e^t dt = t \cdot e^t - \int e^t dt \\ &= e^t (t-1) + c \end{aligned} \quad \left. \vphantom{\int t e^t dt} \right\} \quad 1\frac{1}{2} \text{ m}$$

$$\therefore y \cdot e^{\tan x} = e^{\tan x} (\tan x - 1) + c$$

$$\text{or } y = (\tan x - 1) + c e^{-\tan x}$$

20. Here $\vec{a}_1 = \hat{i} + 2\hat{j} + \hat{k}$, $\vec{b}_1 = \hat{i} - \hat{j} + \hat{k}$ } 1 m

$\vec{a}_2 = 2\hat{i} - \hat{j} - \hat{k}$, $\vec{b}_2 = 2\hat{i} + \hat{j} + 2\hat{k}$

$$\vec{a}_2 - \vec{a}_1 = \hat{i} - 3\hat{j} - 2\hat{k} \quad \frac{1}{2} \text{ m}$$

$$\vec{b}_1 \times \vec{b}_2 = -3\hat{i} + 3\hat{k} \quad 1 \text{ m}$$

$$\text{Shortest distance (d)} = \left| \frac{(\vec{b}_1 \times \vec{b}_2) \cdot (\vec{a}_2 - \vec{a}_1)}{|\vec{b}_1 \times \vec{b}_2|} \right| \quad \frac{1}{2} \text{ m}$$

$$= \left| \frac{(-3\hat{i} + 3\hat{k}) \cdot (\hat{i} - 3\hat{j} - 2\hat{k})}{\sqrt{9+9}} \right| \quad \frac{1}{2} \text{ m}$$

$$= \frac{9}{3\sqrt{2}} \text{ or } \frac{3\sqrt{2}}{2} \quad \frac{1}{2} \text{ m}$$

$$21. \quad \sqrt{1 + \sin x} = \cos \frac{x}{2} + \sin \frac{x}{2}, \quad \sqrt{1 - \sin x} = \cos \frac{x}{2} - \sin \frac{x}{2} \quad \frac{1}{2} + 1 \text{ m}$$

LHS of given expression becomes

$$\cot^{-1} \left(\frac{\cos \frac{x}{2} + \sin \frac{x}{2} + \cos \frac{x}{2} - \sin \frac{x}{2}}{\cos \frac{x}{2} + \sin \frac{x}{2} - \cos \frac{x}{2} + \sin \frac{x}{2}} \right) \quad 1\frac{1}{2} \text{ m}$$

$$\cot^{-1} \left(\cot \frac{x}{2} \right) = \frac{x}{2} = \text{RHS} \quad 1 \text{ m}$$

OR

$$2 \tan^{-1} (\cos x) = \tan^{-1} \left(\frac{2 \cos x}{1 - \cos^2 x} \right) \quad 1 \text{ m}$$

$$= \tan^{-1} \left(\frac{2 \cos x}{\sin^2 x} \right) \quad \frac{1}{2} \text{ m}$$

$$\therefore \tan^{-1} \left(\frac{2 \cos x}{\sin^2 x} \right) = \tan^{-1} (2 \operatorname{cosec} x) \quad 1 \text{ m}$$

$$\Rightarrow \frac{2 \cos x}{\sin^2 x} = \frac{2}{\sin x} \Rightarrow \sin x = \cos x \quad 1 \text{ m}$$

$$\Rightarrow x = \frac{\pi}{4} \quad \frac{1}{2} \text{ m}$$

$$22. \quad \left(\hat{i} + 4\hat{j} - 5\hat{k} \right) + \left(\lambda \hat{i} + 2\hat{j} + 3\hat{k} \right)$$

$$= (2 + \lambda)\hat{i} + 6\hat{j} - 2\hat{k} \dots\dots\dots(i) \quad 1 \text{ m}$$

A unit vector along (i) is

$$\frac{(2 + \lambda)\hat{i} + 6\hat{j} - 2\hat{k}}{\sqrt{(2 + \lambda)^2 + 36 + 4}} = \frac{(2 + \lambda)\hat{i} + 6\hat{j} - 2\hat{k}}{\sqrt{\lambda^2 + 4\lambda + 44}} \quad 1 \text{ m}$$

$$\Rightarrow \frac{\left[(2+\lambda)\hat{i} + 6\hat{j} - 2\hat{k} \right] \cdot \left[\hat{i} + \hat{j} + \hat{k} \right]}{\sqrt{\lambda^2 + 4\lambda + 44}} = 1$$

$$\therefore (2+\lambda) + 6 - 2 = \sqrt{\lambda^2 + 4\lambda + 44}$$

$$\text{Squaring} \Rightarrow \lambda^2 + 12\lambda + 36 = \lambda^2 + 4\lambda + 44$$

$$\Rightarrow \lambda = 1$$

SECTION - C

23. Equation of plane through (3, -1, 2) is

$$a(x - 3) + b(y + 1) + c(z - 2) = 0 \dots\dots\dots(i)$$

(i) passes through (5, 2, 4) and (-1, -1, 6)

$$\Rightarrow 2a + 3b + 2c = 0$$

$$\text{and } -4a + 0b + 4c = 0$$

$$\Rightarrow \frac{a}{3} = \frac{b}{-4} = \frac{c}{3}$$

$$\Rightarrow \text{Equation of plane is } 3(x - 3) - 4(y + 1) + 3(z - 2) = 0$$

$$3x - 4y + 3z - 19 = 0 \dots\dots\dots(ii)$$

Distance of (6, 5, 9) from plane (ii) is

$$\left| \frac{18 - 20 + 27 - 19}{\sqrt{9 + 16 + 9}} \right| = \frac{6}{\sqrt{34}}$$

24.

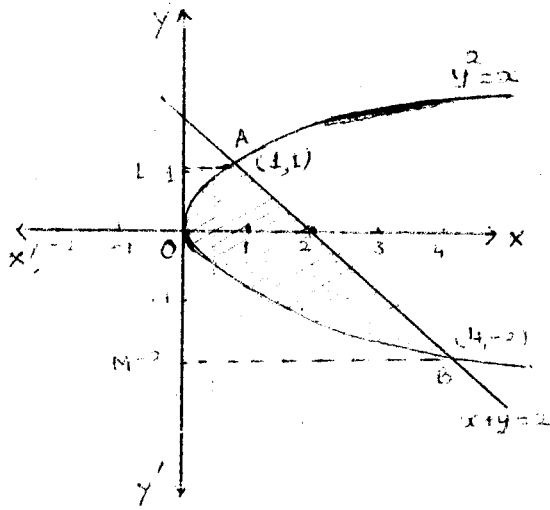
Correct figure

1 m

Finding points of intersection correctly

as $(y = 1, y = -2)$

1 m



Required area

$$\int_{-2}^1 (2-y) dy - \int_{-2}^1 y^2 dy$$

2 m

$$= \left[2y - \frac{y^2}{2} \right]_{-2}^1 - \left[\frac{y^3}{3} \right]_{-2}^1$$

1 m

$$= \left[\left(2 - \frac{1}{2} \right) - (-4 - 2) \right] - \left[\frac{1}{3} + \frac{8}{3} \right]$$

1 m

$$= \left(6 + \frac{3}{2} - 3 \right) = \frac{9}{2} \text{ sq. units}$$

25.

$$I = \int_0^{\pi} \frac{x dx}{a^2 \cos^2 x + b^2 \sin^2 x} = \int_0^{\pi} \frac{(\pi - x) dx}{a^2 \cos^2 x + b^2 \sin^2 x}$$

1 m

$$\therefore 2I = \pi \int_0^{\pi} \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x} = 2\pi \int_0^{\pi/2} \frac{\sec^2 x}{a^2 + b^2 \tan^2 x} dx,$$

1+1 m

$$= 2\pi \int_0^{\infty} \frac{dt}{a^2 + b^2 t^2} = \frac{2\pi}{ab} \left[\tan^{-1} \frac{bt}{a} \right]_0^{\infty} \text{ where } \tan x = t$$

1+1 m

$$2I = \frac{2\pi}{ab} \cdot \frac{\pi}{2} = \frac{\pi^2}{ab}$$

1 m

$$\Rightarrow I = \frac{\pi^2}{2ab}$$

26. Writing as $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 2 \\ 3 & 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 6 \\ 7 \\ 12 \end{pmatrix}$ or $AX = B$ 1 m

$|A| = 1(-2) - 1(-5) + 1 = 4 \Rightarrow X = A^{-1}B$ 1 m

$A_{11} = -2$ $A_{12} = 5$ $A_{13} = 1$
 $A_{21} = 0$ $A_{22} = -2$ $A_{23} = 2$ [1 mark for every 4 correct cofactors] 2 m
 $A_{31} = 2$ $A_{32} = -1$ $A_{33} = -1$

$A^{-1} = \frac{1}{4} \begin{pmatrix} -2 & 0 & 2 \\ 5 & -2 & -1 \\ 1 & 2 & -1 \end{pmatrix}$ ½ m

$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \frac{1}{4} \begin{pmatrix} -2 & 0 & 2 \\ 5 & -2 & -1 \\ 1 & 2 & -1 \end{pmatrix} \begin{pmatrix} 6 \\ 7 \\ 12 \end{pmatrix} = \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix}$ 1 m

$x = 3, y = 1, z = 2$ ½ m

OR

$\begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} A$ 1 m

$R_1 \rightarrow R_1 - R_2: \begin{bmatrix} 1 & -3 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} A$ 1 m

$R_2 \rightarrow R_2 - 2R_1: \begin{bmatrix} 1 & -3 & -1 \\ 0 & 9 & 2 \\ 0 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix} A$ 1 m

$$R_1 \rightarrow R_1 + R_3: \begin{bmatrix} 1 & 1 & 0 \\ 0 & 9 & 2 \\ 0 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 1 \\ -2 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix} A \quad 1 \text{ m}$$

$$R_2 \rightarrow R_2 - 2R_3: \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 1 \\ -2 & 3 & -2 \\ 0 & 0 & 1 \end{bmatrix} A \quad \frac{1}{2} \text{ m}$$

$$R_1 \rightarrow R_1 - R_2: \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 3 & -4 & 3 \\ -2 & 3 & -2 \\ 0 & 0 & 1 \end{bmatrix} A \quad \frac{1}{2} \text{ m}$$

$$R_3 \rightarrow R_3 - 4R_2: \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 & -4 & 3 \\ -2 & 3 & -2 \\ 8 & -12 & 9 \end{bmatrix} A \quad \frac{1}{2} \text{ m}$$

$$\therefore A^{-1} = \begin{bmatrix} 3 & -4 & 3 \\ -2 & 3 & -2 \\ 8 & -12 & 9 \end{bmatrix} \quad \frac{1}{2} \text{ m}$$

27. E_1 : The event that bag I is selected

E_2 : The event that bag II is selected 1 m

E_3 : The event that bag III is selected

A : The event that a black ball and a red ball have occurred

$$\therefore P(E_1) = P(E_2) = P(E_3) = \frac{1}{3} \quad \frac{1}{2} \text{ m}$$

$$\left. \begin{aligned} P\left(\frac{A}{E_1}\right) &= \frac{1 \times 3}{6C_2}, P\left(\frac{A}{E_2}\right) = \frac{2 \times 1}{7C_2}, P\left(\frac{A}{E_3}\right) = \frac{4 \times 3}{12C_2} \\ &= \frac{1}{5} \qquad \qquad \qquad = \frac{2}{21} \qquad \qquad \qquad = \frac{2}{11} \end{aligned} \right\} \quad 1 + \frac{1}{2} + \frac{1}{2} \text{ m}$$

$$\therefore P\left(\frac{E_1}{A}\right) = \frac{P\left(\frac{A}{E_1}\right) \cdot P(E_1)}{\sum_{i=1}^3 P\left(\frac{A}{E_i}\right) \cdot P(E_i)}$$

1/2 m

$$= \frac{\frac{1}{3} \times \frac{1}{5}}{\frac{1}{3} \times \frac{1}{5} + \frac{1}{3} \times \frac{2}{21} + \frac{1}{3} \times \frac{2}{11}} = \frac{231}{551}$$

1+1 m

28.

Let x fans and y sewing machines be bought. Writing the optimisation function as

$$P = 22x + 18y$$

1 m

Writing the constraints as

$$360x + 240y \leq 5760$$

$$\Rightarrow 3x + 2y \leq 48$$

$$x + y \leq 20$$

$$x \geq 0, y \geq 0$$

2 m

Drawing Correct Graph

Getting the corners of feasible region

as A (0, 20), B (8, 12)

C (16, 0)

2 m

1/2 m

$$P(A) = 18 \times 20 = 360$$

$$P(B) = 22 \times 8 + 18 \times 12$$

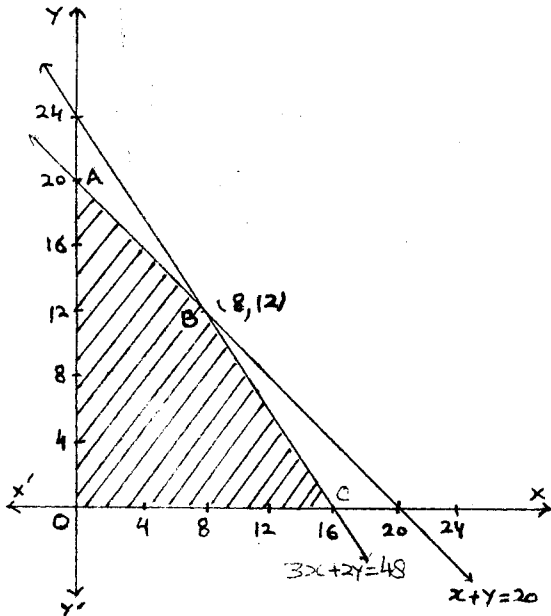
$$= 176 + 216 = 392$$

$$P(C) = 22 \times 16 = 352$$

Maximum

1/2 m

\therefore Profit is maximum at $x = 8, y = 12$



Let $BC = x, AC = y$

$$\therefore x + y = k$$

1/2 m

$$AC = \sqrt{y^2 - x^2}$$

1/2 m

Area of ΔABC

$$A = \frac{1}{2} x \sqrt{y^2 - x^2}$$

$$\text{Let } s = A^2 = \frac{x^2}{4} (y^2 - x^2) = \frac{x^2}{4} [(k-x)^2 - x^2]$$

$$s = \frac{k^2 x^2 - 2k x^3}{4}$$

1 m

$$\therefore \frac{ds}{dx} = \frac{1}{4} [2k^2 x - 6k x^2]$$

1 m

$$\frac{ds}{dx} = 0 \Rightarrow k^2 x = 3k x^2 \Rightarrow x = \frac{k}{3}$$

1 m

$$\text{Showing } \frac{d^2s}{dx^2} = \frac{-k^2}{2} < 0$$

$$\therefore A \text{ is maximum when } x = \frac{k}{3}$$

1 m

$$\text{when } x = \frac{k}{3}, y = \frac{2k}{3}$$

$$\text{Now } \cos \theta = \frac{x}{y} = \frac{1}{2} \Rightarrow \theta = \frac{\pi}{3}$$

1 m

OR

$$\text{S.P.} = x \left[5 - \frac{x}{100} \right] = 5x - \frac{x^2}{100}$$

1 m

$$\text{C.P.} = \left(\frac{x}{5} + 500 \right)$$

$$\therefore \text{Profit } P = \text{S. P.} - \text{C. P.} = \left(5x - \frac{x^2}{100} - \frac{x}{5} - 500 \right)$$

$$= \left(\frac{24}{5}x - \frac{x^2}{100} - 500 \right)$$

$$\therefore \frac{dP}{dx} = \frac{24}{5} - \frac{x}{50}$$

$$\Rightarrow \frac{dP}{dx} = 0 \text{ gives } x = 50 \times \frac{24}{5}$$

$$= 240$$

$$\frac{d^2P}{dx^2} = -\frac{1}{50} < 0 \Rightarrow \text{Maximum}$$

Number of items to be sold for
maximum profit = 240

PHYSICS (Theory)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) *All questions are compulsory.*
- (ii) *There are 30 questions in total. Questions 1 to 8 carry one mark each, questions 9 to 18 carry two marks each, questions 19 to 27 carry three marks each and questions 28 to 30 carry five marks each.*
- (iii) *There is no over all choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the given choice in such questions.*
- (iv) *Use of calculators is not permitted.*
- (v) *You may use the following values of physical constants wherever necessary:*

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$e = 1.602 \times 10^{-19} \text{ C}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ T mA}^{-1}$$

$$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$$

$$\text{Mass of electron } m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$\text{Mass of neutron } m_n = 1.675 \times 10^{-27} \text{ kg}$$

$$\text{Boltzmann's constant } k = 1.381 \times 10^{-23} \text{ JK}^{-1}$$

$$\text{Avogadro's number } N_A = 6.022 \times 10^{23} / \text{mol}^{-1}$$

$$\text{Radius of earth} = 6400 \text{ km}$$

QUESTION PAPER CODE 51/1/1

1. What is sky wave propagation? 1

2. Write the following radiations in ascending order in respect of their frequencies: 1
X-rays, microwaves, UV rays and radio waves.

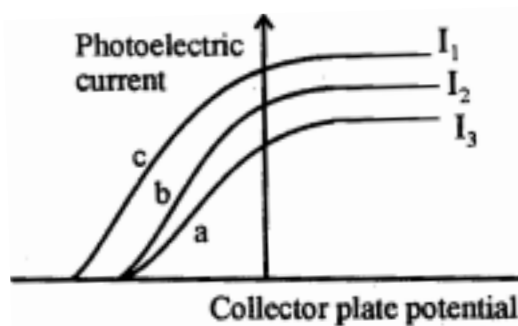
3. Magnetic field lines can be entirely confined within the core of a toroid, but not within a straight solenoid. Why? 1

4. You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope? 1

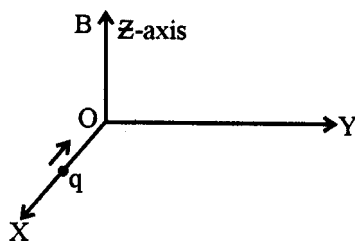
Lenses	Power (P)	Aperture (A)
L_1	3 D	8 cm
L_2	6 D	1 cm
L_3	10 D	1 cm

5. If the angle between the pass axis of polarizer and the analyser is 45° , write the ratio of the intensities of original light and the transmitted light after passing through the analyser. 1

6. The figure shows a plot of three curves a, b, c showing the variation of photocurrent vs collector plate potential for three different intensities I_1, I_2 and I_3 having frequencies $\sqrt{1}, \sqrt{2}$ and $\sqrt{3}$ respectively incident on a photosensitive surface.
Point out the two curves for which the incident radiations have same frequency but different intensities. 1

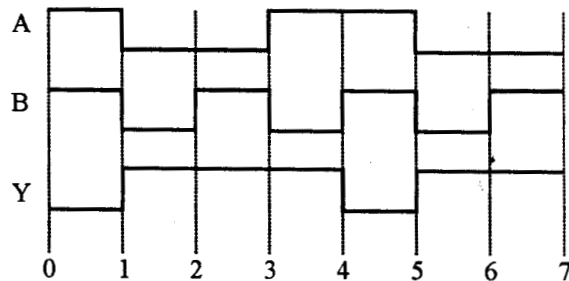


7. What type of wavefront will emerge from a (i) point source, and (ii) distant light source? 1
8. Two nuclei have mass numbers in the ratio 1 : 2. What is the ratio of their nuclear densities? 1
9. A cell of emf 'E' and internal resistance 'r' is connected across a variable resistor 'R'. Plot a graph showing the variation of terminal potential 'V' with resistance R. Predict from the graph the condition under which 'V' becomes equal to 'E'. 2
10. (i) Can two equi-potential surfaces intersect each other? Give reasons. 2
- (ii) Two charges $-q$ and $+q$ are located at points A (0, 0, $-a$) and B (0, 0, $+a$) respectively. How much work is done in moving a test charge from point P (7, 0, 0) to Q (-3 , 0, 0)?
11. By what percentage will the transmission range of a TV tower be affected when the height of the tower is increased by 21 % ? 2
12. Derive an expression for drift velocity of free electrons in a conductor in terms of relaxation time. 2
13. How does a charge q oscillating at certain frequency produce electromagnetic waves? 2
- Sketch a schematic diagram depicting electric and magnetic fields for an electromagnetic wave propagating along the Z-direction.
14. A charge ' q ' moving along the X-axis with a velocity \vec{v} is subjected to a uniform magnetic field B acting along the Z-axis as it crosses the origin O. 2



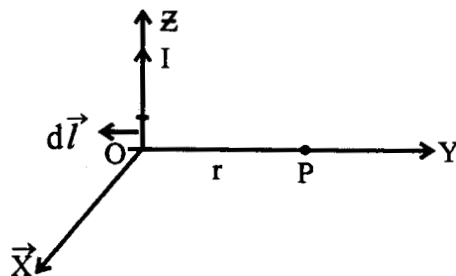
- (i) Trace its trajectory.
- (ii) Does the charge gain kinetic energy as it enters the magnetic field? Justify your answer.

15. The following figure shows the input waveforms (A, B) and the output waveform (Y) of a gate. Identify the gate, write its truth table and draw its logic symbol. 2



16. State Biot-Savart law. 2

A current I flows in a conductor placed perpendicular to the plane of the paper. Indicate the direction of the magnetic field due to a small element $d\vec{l}$ at point P situated at a distance r from the element as shown in the figure.

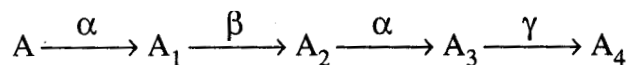


17. Why are high frequency carrier waves used for transmission? 2

OR

What is meant by term 'modulation'? Draw a block diagram of a simple modulator for obtaining an AM signal.

18. A radioactive nucleus 'A' undergoes a series of decays according to the following scheme: 2



The mass number and atomic number of A are 180 and 72 respectively. What are these numbers for A_4 ?

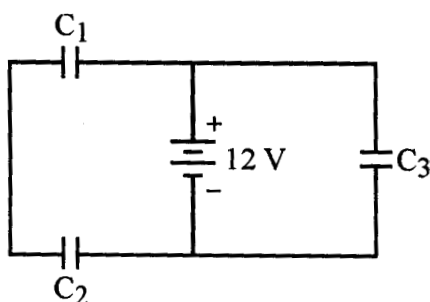
19. A thin conducting spherical shell of radius R has charge Q spread uniformly over its surface. Using Gauss's law, derive an expression for an electric field at a point outside the shell.

3

Draw a graph of electric field $E(r)$ with distance r from the centre of the shell for $0 \leq r \leq \infty$.

20. Three identical capacitors C_1 , C_2 and C_3 of capacitance $6 \mu\text{F}$ each are connected to a 12 V battery as shown.

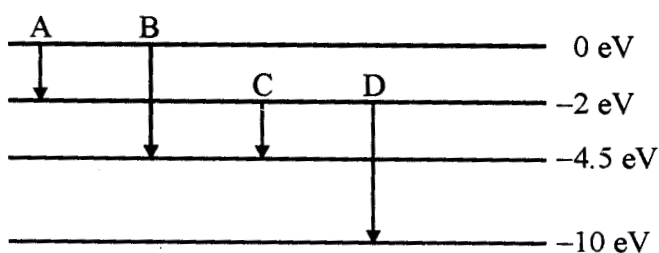
3



Find

- (i) charge on each capacitor
 - (ii) equivalent capacitance of the network
 - (iii) energy stored in the network of capacitors
21. (a) The energy levels of an atom are as shown below. Which of them will result in the transition of a photon of wavelength 275 nm ?

3



- (b) Which transition corresponds to emission of radiation of maximum wavelength?
22. A proton and an alpha particle are accelerated through the same potential. Which one of the two has (i) greater value of de-Broglie wavelength associated with it, and (ii) less kinetic energy? Justify your answers.

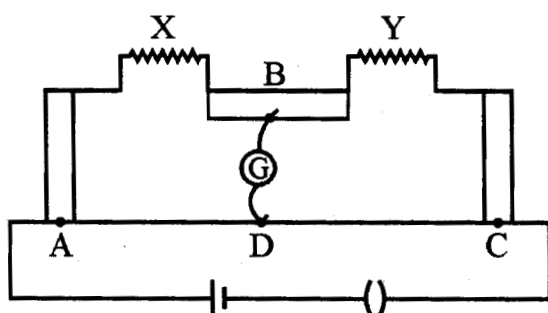
3

23. In a single slit diffraction experiment, when a tiny circular obstacle is placed in the path of light from a distant source, a bright spot is seen at the centre of the shadow of the obstacle. Explain why? 3

State two points of difference between the interference pattern obtained in Young's double slit experiment and the diffraction pattern due to a single slit.

24. (a) Define self inductance. Write its S.I. units.
 (b) Derive an expression for self inductance of a long, solenoid of length l , cross sectional area A having N number of turns. 3

25.



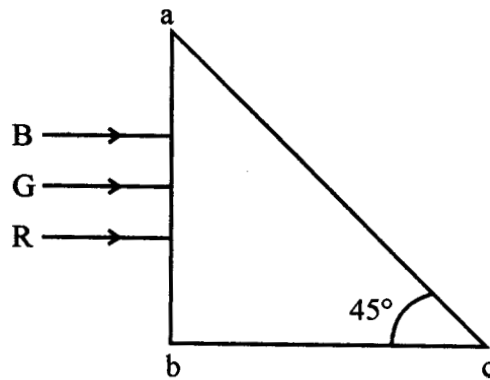
The figure shows experimental set up of a meter bridge. When the two unknown resistances X and Y are inserted, the null point D is obtained 40 cm from the end A . When a resistance of $10\ \Omega$ is connected in series with X , the null point shifts by 10 cm. Find the position of the null point when the $10\ \Omega$ resistance is instead connected in series with resistance ' Y '. Determine the values of the resistances X and Y . 3

26. Derive the expression for force per unit length between two long straight parallel current carrying conductors. Hence define one ampere. 3

OR

Explain the principle and working of a cyclotron with the help of a schematic diagram. Write the expression for cyclotron frequency.

27. Three light rays red (R), green (G) and blue (B) are incident on a right angled prism 'abc' at face 'ab'. The refractive indices of the material of the prism for red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. Out of the three which colour ray will emerge out of face 'ac'? Justify your answer. Trace the path of these rays after passing through face 'ab'. 3



28. (a) Derive an expression for the average power consumed in a series LCR circuit connected to a.c. source in which the phase difference between the voltage and the current in the circuit is ϕ . 5
- (b) Define the quality factor in an a.c. circuit. Why should the quality factor have high value in receiving circuits? Name the factors on which it depends.

OR

- (a) Derive the relationship between the peak and the rms value of current in an a.c. circuit.
- (b) Describe briefly, with the help of a labelled diagram, working of a step-up transformer.
- A step-up transformer converts a low voltage into high voltage. Does it not violate the principle of conservation of energy? Explain.
29. (i) Draw a circuit diagram to study the input and output characteristics of an n-p-n transistor in its common emitter configuration. Draw the typical input and output characteristics. 5
- (ii) Explain, with the help of a circuit diagram, the working of n-p-n transistor as a common emitter amplifier.

OR

How is a zener diode fabricated so as to make it a special purpose diode? Draw I-V characteristics of zener diode and explain the significance of breakdown voltage.

Explain briefly, with the help of a circuit diagram, how a p-n junction diode works as a half wave rectifier.

30. Trace the rays of light showing the formation of an image due to a point object placed on the axis of a spherical surface separating the two media of refractive indices n_1 and n_2 . Establish the relation between the distances of the object, the image and the radius of curvature from the central point of the spherical surface.

Hence derive the expression of the lens maker's formula.

5

OR

Draw the labelled ray diagram for the formation of image by a compound microscope.

Derive the expression for the total magnification of a compound microscope. Explain why both the objective and the eyepiece of a compound microscope must have short focal lengths.

QUESTION PAPER CODE 51/1

1. What is the electrostatic potential due to an electric dipole at an equatorial point? 1
2. Name the EM waves used for studying crystal structure of solids. What is its frequency range? 1
3. An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of the magnetic field? 1
4. How would the angular separation of interference fringes in Young's double slit experiment change when the distance between the slits and screen is doubled? 1
5. Two thin lenses of power + 6 D and - 2 D are in contact. What is the focal length of the combination? 1
6. The stopping potential in an experiment on photoelectric effect is 1.5 V. What is the maximum kinetic energy of the photoelectrons emitted? 1
7. Two nuclei have mass numbers in the ratio 1 : 8. What is the ratio of their nuclear radii? 1
8. Give the logic symbol of NOR gate. 1
9. Draw 3 equipotential surfaces corresponding to a field that uniformly increases in magnitude but remains constant along Z-direction. How are these surfaces different from that of a constant electric field along Z-direction ? 2

10. Define electric flux. Write its S.I. unit.

A charge q is enclosed by a spherical surface of radius R . If the radius is reduced to half, how would the electric flux through the surface change?

2

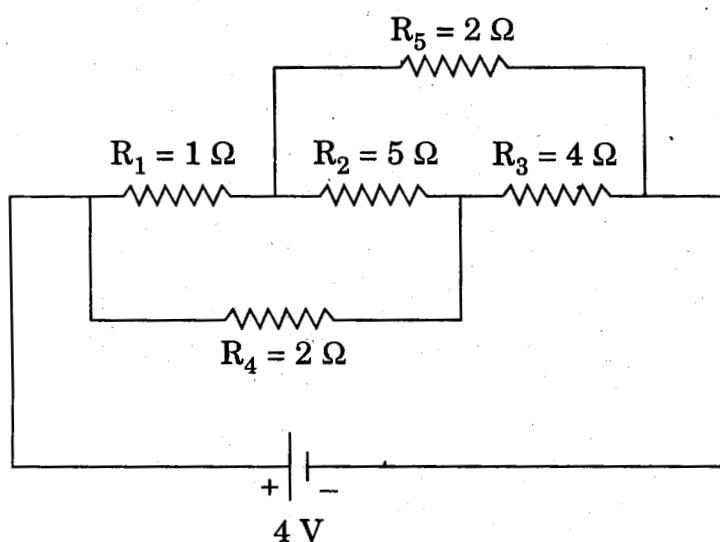
11. Define refractive index of a transparent medium.

A ray of light passes through a triangular prism. Plot a graph showing the variation of the angle of deviation with the angle of incidence.

2

12. Calculate the current drawn from the battery in the given network.

2



13. Answer the following questions:

2

- (a) Optical and radio telescopes are built on the ground while X-ray astronomy is possible only from satellites orbiting the Earth. Why?
- (b) The small ozone layer on top of the stratosphere is crucial for human survival. Why?

14. Define current sensitivity and voltage sensitivity of a galvanometer.

Increasing the current sensitivity may not necessarily increase the voltage sensitivity of a galvanometer. Justify.

2

15. Define the term 'linearly polarised light'.

When does the intensity of transmitted light become maximum, when a polaroid sheet is rotated between two crossed polaroids?

2

16. A wire of $15\ \Omega$ resistance is gradually stretched to double its original length. It is then cut into two equal parts. These parts are then connected in parallel across a 3.0 volt battery. Find the current drawn from the battery. 2

17. (a) The mass of a nucleus in its ground state is always less than the total mass of its constituents - neutrons and protons. Explain. 2

(b) Plot a graph showing the variation of potential energy of a pair of nucleons as a function of their separation. 2

18. Write the function of (i) Transducer and (ii) Repeater in the context of communication system. 2

OR

Write two factors justifying the need of modulation for transmission of a signal. 2

19. A positive point charge (+q) is kept in the vicinity of an uncharged conducting plate. Sketch electric field lines originating from the point on to the surface of the plate. 3

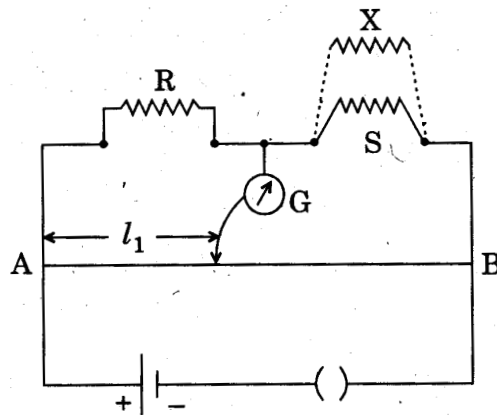
Derive the expression for the electric field at the surface of a charged conductor. 3

OR

A parallel plate capacitor is charged by a battery. After some time the battery is disconnected and a dielectric slab of dielectric constant K is inserted between the plates. How would (i) the capacitance, (ii) the electric field between the plates and (iii) the energy stored in the capacitor, be affected? Justify your answer. 3

20. (i) State the principle of working of a meter bridge. 3

(ii) In a meter bridge balance point is found at a distance l_1 with resistances R and S as shown in the figure.



- When an unknown resistance X is connected in parallel with the resistance S, the balance point shifts to a distance l_2 . Find the expression for X in terms of l_1 , l_2 and S. 3
21. (i) State Faraday's law of electromagnetic induction.
- (ii) A jet plane is travelling towards west at a speed of 1800 km/h. What is the voltage difference developed between the ends of the wing having a span of 25 m, if the Earth's magnetic field at the location has a magnitude of 5×10^{-4} T and the dip angle is 30° ? 3
22. In Young's double slit experiment, monochromatic light of wavelength 630 nm illuminates the pair of slits and produces an interference pattern in which two consecutive bright fringes are separated by 8.1 mm. Another source of monochromatic light produces the interference pattern in which the two consecutive bright fringes are separated by 7.2 mm. Find the wavelength of light from the second source.
- What is the effect on the interference fringes if the monochromatic source is replaced by a source of white light? 3
23. Draw a schematic arrangement of the Geiger - Marsden experiment. How did the scattering of α -particles by a thin foil of gold provide an important way to determine an upper limit on the size of the nucleus? Explain briefly. 3
24. Distinguish between sky wave and space wave propagation. Give a brief description with the help of suitable diagrams indicating how these waves are propagated. 3
25. With the help of a suitable diagram, explain the formation of depletion region in a p-n junction. How does its width change when the junction is (i) forward biased, and (ii) reverse biased? 3
26. Give a circuit diagram of a common emitter amplifier using an n-p-n transistor. Draw the input and output waveforms of the signal. Write the expression for its voltage gain. 3
27. Draw a plot showing the variation of binding energy per nucleon versus the mass number A. Explain with the help of this plot the release of energy in the processes of nuclear fission and fusion. 3
28. Draw a schematic sketch of a cyclotron. Explain briefly how it works and how it is

used to accelerate the charged particles.

- (i) Show that time period of ions in a cyclotron is independent of both the speed and radius of circular path.
- (ii) What is resonance condition? How is it used to accelerate the charged particles?

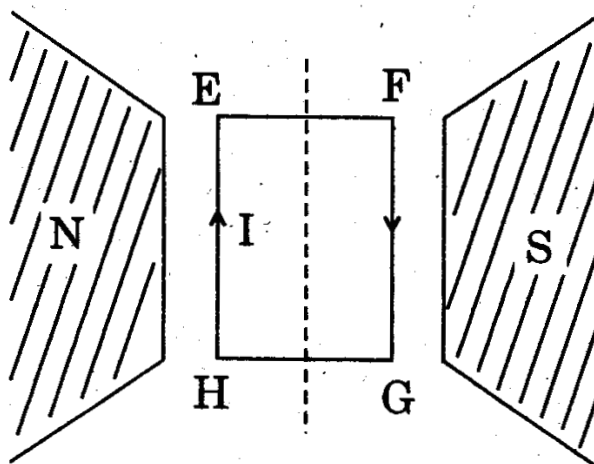
5

OR

- (a) Two straight long parallel conductors carry currents I_1 and I_2 in the same direction. Deduce the expression for the force per unit length between them.

Depict the pattern of magnetic field lines, around them.

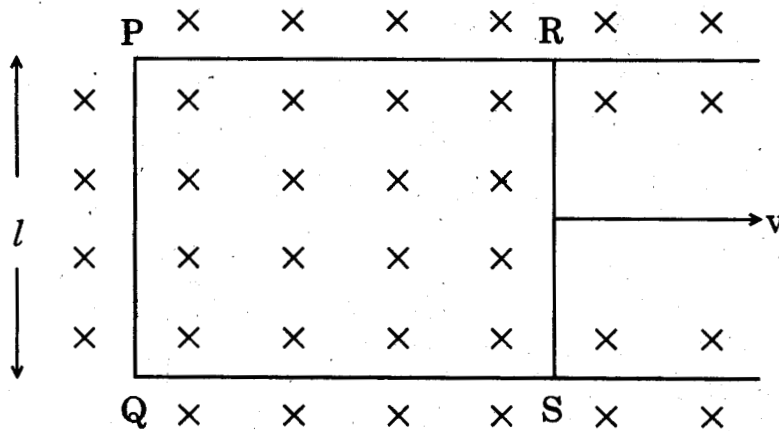
- (b) A rectangular current carrying loop EFGH is kept in a uniform magnetic field as shown in the figure.



- (i) What is the direction of the magnetic moment of the current loop?
- (ii) When is the torque acting on the loop (A) maximum, (B) zero?

5

- 29. (a) What are eddy currents? Write their two applications.
- (b) Figure shows a rectangular conducting loop PQSR in which arm RS of length ' l ' is movable. The loop is kept in a uniform magnetic field ' B ' directed downward perpendicular to the plane of the loop. The arm RS is moved with a uniform speed ' v '.



Deduce an expression for

- (i) the emf induced across the arm 'RS',
- (ii) the external force required to move the arm, and
- (iii) the power dissipated as heat.

5

OR

- (a) State Lenz's law. Give one example to illustrate this law. "The Lenz's law is a consequence of the principle of conservation of energy." Justify this statement.
- (b) Deduce an expression for the mutual inductance of two long coaxial solenoids but having different radii and different number of turns.

5

30. (a) (i) Draw a labelled ray diagram to show the formation of image in an astronomical telescope for a distant object.
- (ii) Write three distinct advantages of a reflecting type telescope over a refracting type telescope.
- (b) A convex lens of focal length 10 cm is placed coaxially 5 cm away from a concave lens of focal length 10 cm. If an object is placed 30 cm in front of the convex lens, find the position of the final image formed by the combined system.

OR

- (a) With the help of a suitable ray diagram, derive the mirror formula for a concave mirror.
- (b) The near point of a hypermetropic person is 50 cm from the eye. What is the power of the lens required to enable the person to read clearly a book held at 25 cm from the eye?

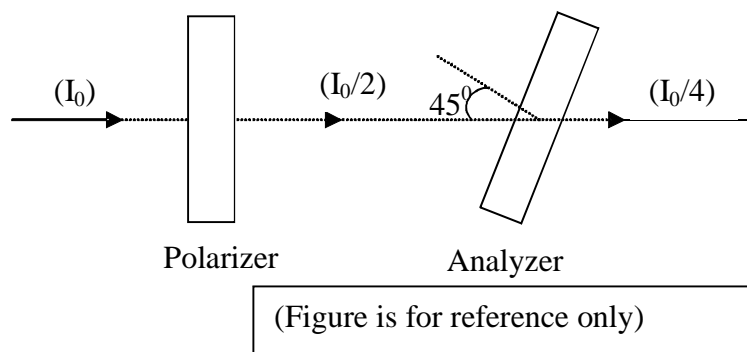
Marking Scheme — Physics (Theory)

General Instructions :

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the marking scheme are suggested answers. The content is thus indicative. If a student has given any other answer, which is different from the one given in the Marking Scheme, but conveys the meaning correctly, such answers should be given full weightage.
2. Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed.
3. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different part of the question should then be totalled up and written in the left hand margin and circled.
4. If a question does not have any parts, marks are be awarded in the left hand margin only.
5. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
6. No marks are to be deducted for the cumulative effect of an error. The student should be penalized only once.
7. Deduct $\frac{1}{2}$ mark for writing wrong units, or missing units, in the final answer to numerical problems.
8. Formula can be taken as implied from the calculations even if not explicitly written.
9. In short answer type questions, asking for two features/ characteristics/ properties, if a candidate writes three features/ characteristics/ properties or more, only the correct two should be evaluated.
10. Full marks should be awarded to a candidate if his/her answer in a numerical problem, is close to the value given in this scheme.

QUESTION PAPER CODE 55/1/1

Q. No.	Expected Answer/value Points	Marks	Total Marks
1.	It is a mode of propagation in which communication of radio waves takes place due to reflection from the ionosphere.	1	1
2.	Radio waves, Microwaves, UV Rays, X-Rays.	1	1
3.	The magnetic fields lines get confined within a toroid because it has 'no ends'	1	1
4.	L ₃ – Eyepiece L ₁ – objective or L ₂ – Eyepiece L ₁ – objective	½ ½	1
5.			



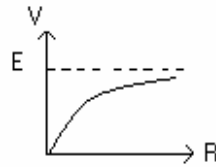
$$I = I_0 \cos^2 \theta$$

$$\frac{I_{\text{before polarizer}}}{I_{\text{before analyzer}}} = \frac{4}{1}$$

6.	Curves a and b.	1	1
7.	Wavefront from point source - Spherical	½	
	Wavefront from distant light source - Plane	½	1
8.	Ratio of nuclear density equals 1:1	1	1

9.	Plot	1 ½
	Prediction	½

$$V = IR = \frac{ER}{R+r} = \frac{E}{\frac{r}{R} + 1} \quad \frac{1}{2}$$



1

When R approaches infinity (or for $R \rightarrow \infty$) V becomes equal to E .

½

2

10.	(i) Correct answer	½
	Reason	½
	(ii) Calculation of work done	1

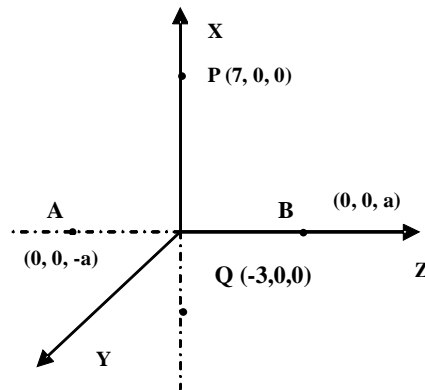
(i) No ½

Reason : At the point of intersection, there will then be two values of electric potential which is not possible.

Alternatively

Electric field at the same point will point in two different directions which is not possible. ½

(ii)



½

Test charge is moved along the equatorial line of the dipole. Hence workdone in moving this charge is zero.

½

2

(Give full 1 mark if the student arrives at the correct result by doing calculations.)

11.	Formula	½
	Calculation of percentage change	1½

Transmission range of TV Tower

$$d = \sqrt{2hR} \quad \frac{1}{2}$$

$$h' = h + 21\% \text{ of } h = (1.21) h$$

$$d' = \sqrt{2h'R} = \sqrt{2(1.21)hR} = \sqrt{1.21} d$$

$$\therefore \frac{d'}{d} = \sqrt{1.21} = 1.1 \quad 1$$

$$\therefore \left(\frac{d' - d}{d} \times 100 \right) = 10\% \quad \frac{1}{2} \quad 2$$

12.	Derivation	2
-----	------------	---

$$\vec{a} = \frac{-e\vec{E}}{m} \quad \frac{1}{2}$$

From $\vec{v} = \vec{u} + \vec{a}t$

$$\therefore \vec{v}_d = \vec{u}_{AV} + \vec{a}t_{AV} \quad \frac{1}{2}$$

$$= 0 + \frac{-e\vec{E}}{m} \tau \quad \frac{1}{2}$$

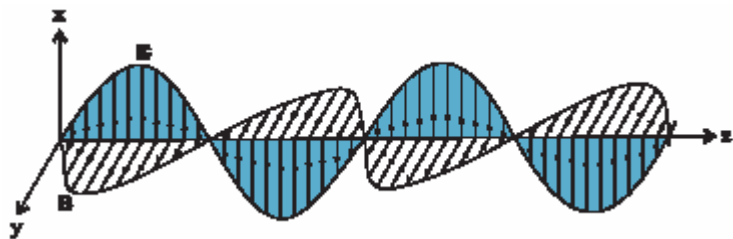
$$\vec{v}_d = \frac{-e\vec{E}}{m} \tau \quad \frac{1}{2} \quad 2$$

13.	Production of em waves	1
	Schematic diagram	1

Oscillating charge produces an oscillating electric field in space, which produces an oscillating magnetic field, which in turn, is a source of oscillating electric field, and so on.

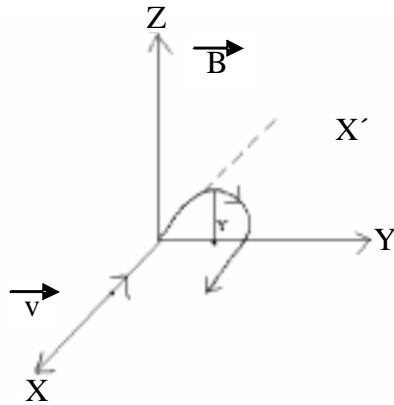
Alternatively

An oscillating electric charge produces self sustaining oscillations of electric and magnetic field in free space or vacuum. 1



1 2

14.	Trajectory of charged particle	½
	Change in KE	1 ½



½

(If the student takes the charge as $-q$ and traces the correct trajectory, give him/her full credit.)

½

(ii) No

Work done by a magnetic force on a charge is always zero.

or

$$\vec{F} = q(\vec{v} \times \vec{B})$$

$$\therefore \vec{F} \perp \vec{v}$$

OR

A magnetic force only changes the direction of motion but does not change the speed of the charge.

1

2

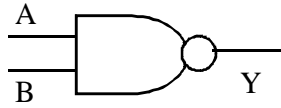
15.	Identification of logic gate	1
	Truth Table	½
	Symbol	½

NAND Gate

1

INPUT		OUTPUT
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

½



1/2 2

(Note: If the student makes a mistake in identifying the gate but gives the (corresponding) truth table and symbol correctly, award 1 mark only.)

16.	Statement	1
	Direction of magnetic field	1

Statement of Biot-Sarvat Law :

$$d\vec{B} \text{ varies as } \frac{I(d\vec{l} \times \vec{r})}{r^3} \quad 1$$

Direction of Magnetic field at point P is along negative x-axis

or

Directed in the plane of page along the negative X direction 1 2

17.	Use of high frequency carrier wave in Transmission	2
-----	--	---

Any two points with brief explanation

1. Size of antenna → height of antenna reduces

$$\text{As } h = \frac{\lambda}{4} \text{ or } \frac{\lambda}{2}$$

2. Effective power radiation – More Power radiated into the space as

$$P \propto v$$

3. Avoids mixing up of signal 1+1

OR

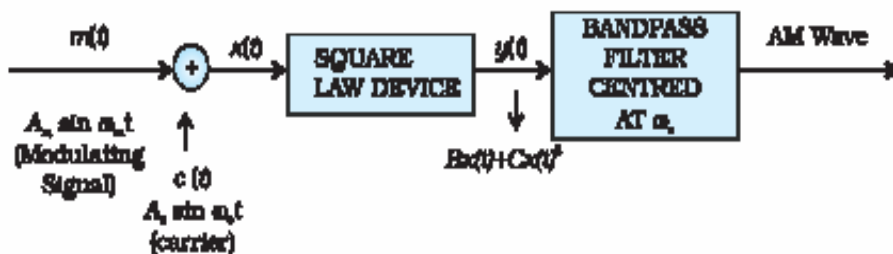
Meaning of Modulation	1
Block Diagram	1

Meaning of Modulation

Modulation: The original low frequency message/information signal cannot be transmitted over long distances. Therefore, at the transmitter end, information, contained in the low frequency message signal, is superimposed on a high frequency wave, which acts as a carrier of the information. This process is known as modulation.

1

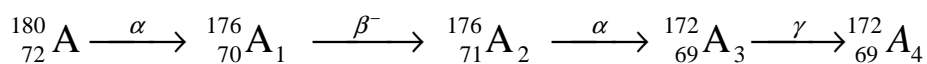
Block Diagram:



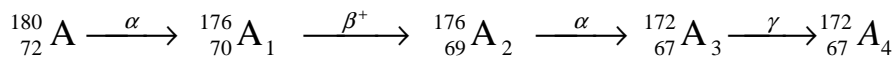
1 2

18. Correct calculation of Mass Number and Atomic Number for each nucleus

$$\frac{1}{2} \times 4 = 2$$



Alternatively



$\frac{1}{2} \times 4$ 2

($\frac{1}{2}$ mark for each step)

19. Derivation 2

Graph 1

$$\oint \vec{E} \cdot d\vec{s} = \frac{q}{\epsilon_0}$$

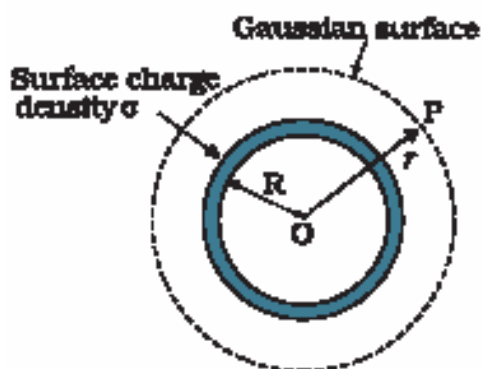
$$E \times 4\pi r^2 = \frac{Q}{\epsilon_0}$$

$\frac{1}{2}$

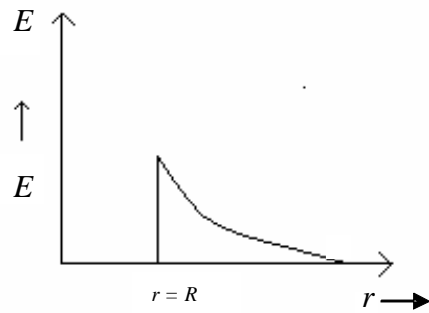
$\frac{1}{2}$

$$E = \frac{1}{4\pi \epsilon_0} \frac{Q}{r^2}$$

$\frac{1}{2}$



$\frac{1}{2}$



1 3

20.

Calculation of	
(i) Charge	1
(ii) Equivalent capacitance	1
(iii) Energy stored	1

(i) Charge on capacitors C_1 and C_2

$$Q_1 = 36\mu\text{C} ; Q_2 = 36\mu\text{C}$$

$\frac{1}{2}$

charge on capacitor C_3

$$Q_3 = 72\mu\text{C}$$

(ii) Equivalent capacitance

$\frac{1}{2}$

$$C = \frac{C_1 C_2}{C_1 + C_2} + C_3$$

$\frac{1}{2}$

$$= \frac{6 \times 6}{6 + 6} + 6 = 9\mu\text{F}$$

$\frac{1}{2}$

iii) Energy stored in Network

$$W = \frac{1}{2} CV^2$$

$$= \frac{1}{2} \times 9 \times 10^{-6} \times (12)^2 \text{ J}$$

$\frac{1}{2}$

$$= 648 \times 10^{-6} \text{ J} = 648\mu\text{J}$$

$$= 6.48 \times 10^{-4} \text{ J}$$

$\frac{1}{2}$

3

21.

a) Formula	$E = \frac{hc}{\lambda}$	$\frac{1}{2}$
	Correct conclusion with necessary calculations	$1\frac{1}{2}$
b)	Transition corresponding to maximum wavelength	1

$\frac{1}{2}$

a) For $\lambda = 275 \text{ nm}$,

$$E = \frac{hc}{\lambda}$$

$$E = \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{275 \times 10^{-9} \times 1.6 \times 10^{-19}} \text{ eV} = 4.5 \text{ eV}$$

1

Also for transition B

$$E = 0 - (-4.5 \text{ eV}) = 4.5 \text{ eV}$$

Therefore, transition B corresponds to the emission of photon of wavelength 275 nm.

1/2

b) For Transition 'A', Energy radiated is minimum. As $E \propto \frac{1}{\lambda}$ transition

A emits radiation of maximum wavelength.

1

3

22.

de-Broglie wavelength comparison	1 1/2
Kinetic energy comparison	1 1/2

de- Broglie wavelength

(i) $\lambda = \frac{h}{\sqrt{2mqV}}$

1/2

$$\lambda_p = \frac{h}{\sqrt{2m_p q_p V}}$$

1/2

$$\lambda_\alpha = \frac{h}{\sqrt{2m_\alpha q_\alpha V}}$$

As $m_\alpha > m_p$ and $q_\alpha > q_p$

1/2

$$\therefore \lambda_p > \lambda_\alpha$$

(ii) Kinetic energy

$$KE = qV$$

1/2

$$KE_p = q_p V$$

1/2

$$KE_\alpha = q_\alpha V$$

1/2

As $q_p < q_\alpha \therefore KE_p < KE_\alpha$

3

23.

Explanation for Bright spot	1
Two points of difference	1+1

Explanation : Waves diffracted at the edge of circular obstacle interfere constructively at the center of the shadow producing a bright spot.

1

Points of Differences

- i) In interference all bright fringes are of equal intensity, while in diffraction intensity of secondary maxima keeps on decreasing. 1
- ii) Width of all fringes are equal in interference pattern but, in diffraction the width of central maximum and the secondary maxima are different. 1 3

24.	a) Definition	1
	SI unit	1/2
	b) Derivation	1 1/2

Self inductance : is defined as the magnetic flux passing through the coil when a unit current flows through it . 1

Alternatively,

It is the emf induced in the coil when the rate of change of current through it is unity. 1/2

SI Unit is **henry**

The magnetic field due to a current I flowing in the solenoid is $B = \mu_0 nI$ 1/2

The total flux linked with the solenoid is NBA , i.e.

$$\phi = (nl)(\mu_0 nI)(A) = \mu_0 n^2 A l I$$

$$L = \frac{\phi}{I} = \mu_0 n^2 A l$$

$$= \frac{\mu_0 N^2 A}{l}$$

25.	Determination of X and Y	1+1
	Finding of position of null point	1

$$\frac{X}{Y} = \frac{40}{60} \Rightarrow X = \frac{2}{3} Y \quad (i) \quad 1/2$$

$$\frac{X+10}{Y} = \frac{50}{50}$$

$$\Rightarrow X+10 = Y \quad (ii) \quad 1/2$$

From (i) and (ii)

$$\frac{2}{3}Y + 10 = Y \quad \Rightarrow Y = 30\Omega \quad \frac{1}{2}$$

$$\text{As } X = \frac{2}{3}Y \quad \Rightarrow 20\Omega \quad \frac{1}{2}$$

When 10Ω resistor is connected in series with resistor Y , we have

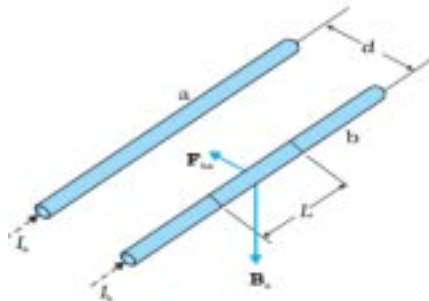
$$\frac{X}{Y+10} = \frac{l}{100-l} \quad \Rightarrow \frac{20}{40} = \frac{l}{100-l} \quad \frac{1}{2}$$

$$\Rightarrow 2l = 100 - l$$

$$3l = 100$$

$$l = \frac{100}{3} = 33.33\text{cm} \quad \frac{1}{2} \quad 3$$

26.	Derivation	2
	Definition	1



$\frac{1}{2}$

Figure shows two long parallel conductors a and b separated by a distance d and carrying (parallel) currents I_a and I_b , respectively. The conductor ' a ' produces, the same magnetic field B_a at all points along the conductor ' b '. The right-hand rule tells us that the direction of this field is downwards (when the conductors are placed horizontally). Its magnitude is given by

$$B_a = \frac{\mu_0 I_a}{2\pi d} \quad \frac{1}{2}$$

The conductor ' b ' carrying a current I_b will experience a sideways force due to the field B_a . The direction of this force is towards the conductor ' a '. We label this force as F_{ba} , the force on a segment L of ' b ' due to ' a '. The magnitude of this force is given by

$$F_{ba} = I_b L B_a = \frac{\mu_0 I_a I_b}{2\pi d} L \quad \frac{1}{2} + \frac{1}{2}$$

Let f_{ba} represent the magnitude of the force F_{ba} per unit length.

$$f_{ba} = \frac{\mu_0 I_a I_b}{2\pi d}$$

One ampere: The *ampere* is the value of that steady current which, when maintained in each of the two very long, straight, parallel conductors of negligible cross-section, and placed one metre apart in vacuum, would produce on each of these conductors a force equal to 2×10^{-7} newton per metre of their length.

½

1 3

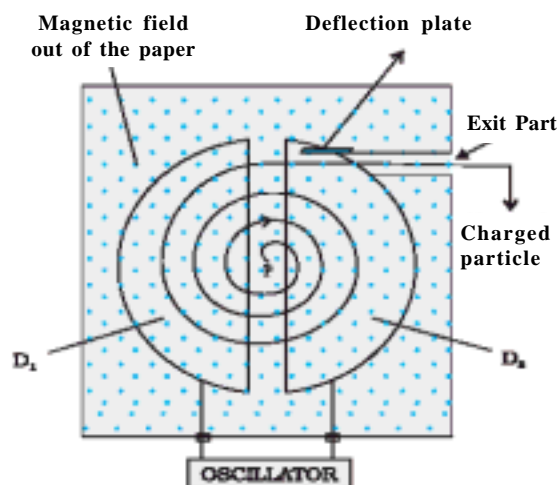
OR

Principle	½
Working and diagram	1+1
Expression for cyclotron frequency	½

Principle : When charged particles are passed through a suitable combination of crossed electric and magnetic fields there energy can increase.

½

Labelled diagram



1

Working: Inside the metal boxes the particle is shielded and is not acted on by the electric field. The magnetic field, however, acts on the particle and makes it go round in a circular path inside a dee. Every time the particle moves from one dee to another it is acted upon by the electric field. The sign of the electric field is changed alternately in tune with the circular motion of the particle.

This ensures that the particle is always accelerated by the electric field. Each time the acceleration increases the energy of the particle.

1

$$T = \frac{1}{v_c} = \frac{2\pi m}{qB}$$

½

3

$$\text{or } v_c = \frac{qB}{2\pi m}$$

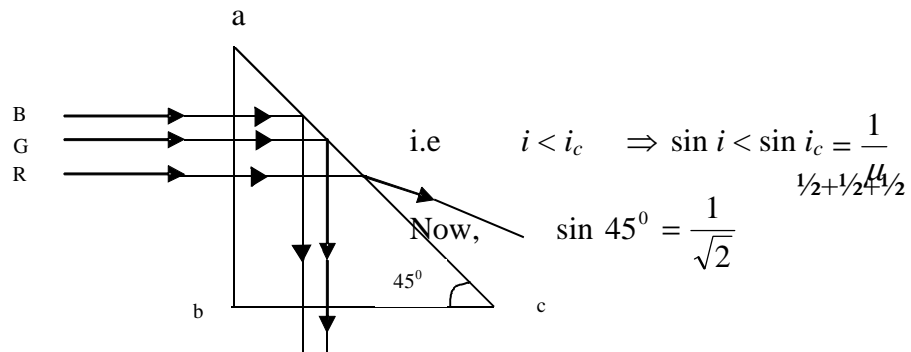
27.	Finding of angle of incidence for each ray	1/2
	Calculation for correct conclusion	1
	Tracing of path (1/2 × 3)	1 1/2

Angle of incidence at face ac for all three colours = 45° 1/2

A ray will get transmitted if the angle of incidence, for it, is less than the critical angle for it.

$\therefore 45^\circ$ is the critical angle for $\mu = 1.414$. 1/2

Hence only the red colour (with critical angle more than 45°) ray will get transmitted ($\mu = 1.39$). The green ($\mu = 1.44$) and blue colour ($\mu = 1.47$) rays will undergo total internal reflection. 1/2



28.	(a) Derivation	2 1/2
	(b) Definition	1
	Reason	1/2
	Factors	1/2 + 1/2

(a) In a series LCR circuit

Voltage $v = v_m \sin \omega t$

Current in the circuit is given by $i = i_m \sin(\omega t + \phi)$ 1/2

Therefore, the instantaneous power p_i supplied by the source is 1/2

$$P_i = vi = (v_m \sin \omega t) \times [i_m \sin(\omega t + \phi)]$$
1/2

$$= \frac{V_m I_m}{2} [\cos \phi - \cos(2\omega t + \phi)] \quad \frac{1}{2}$$

The average power over a cycle is given by the average of the two terms on the R.H.S.. It is only the second term which is time-dependent. Its average over a complete cycle is zero (the positive half of the cosine cancels the negative half). Therefore, 1/2

$$P_{av} = V I \cos \phi$$

- (b) Quality factor : The ratio of the voltage drop (in a series LCR circuit) across the inductor (or capacitor) to the voltage drop across resistor under resonance conditions.

1

Reason: Selectivity (or sharpness of resonance) of the circuit becomes large. 1/2

Factors: depends on inductance , capacitance and resistance. 1

5

OR

(a) Derivation	$Q = \frac{\omega_0 L}{R} = \frac{1}{R} \sqrt{\frac{L}{C}}$
(b) Labelled Diagram	1
Working	1
Explanation of conservation of energy	1

- (a) **Relationship between peak and rms value of alternating current:**

The instantaneous power dissipated in the resistor is

$$p = i^2 R = i_m^2 R \sin^2 \omega t$$

Since, i_m^2 and R are constants, we have 1/2

$$\bar{p} = i_m^2 R \langle \sin^2 \omega t \rangle,$$

Now $\langle \sin^2 \omega t \rangle = \frac{1}{2}$ 1/2

Thus,

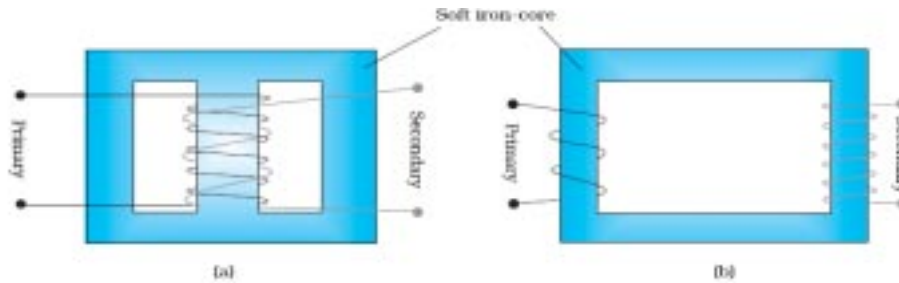
$$\bar{p} = \frac{1}{2} i_m^2 R$$

I_{rms} is defined by 1/2

$$\begin{aligned}
 &= \sqrt{\frac{1}{2}} i_m^2 = \frac{i_m}{\sqrt{2}} \\
 &= 0.707 i_m
 \end{aligned}$$

1/2

(b)



1

When an alternating voltage is applied to the primary, the resulting current produces an alternating magnetic flux which links the secondary and induces an emf in it. The value of this emf depends on the number of turns in the secondary. We consider an ideal transformer in which the primary has negligible resistance and all the flux in the core links both primary and secondary windings. Then the induced emf or voltage, ϵ_s ; in the secondary with N_s turns, is

$$\epsilon_s = -N_s \frac{d\phi}{dt}$$

Also $\epsilon_p = -N_p \frac{d\phi}{dt}$, $\therefore \frac{\epsilon_s}{\epsilon_p} = \frac{N_s}{N_p} I_{rms}$

1

Explanation : In a transformer with (approximately) 100% efficiency, input power = output power .With the increase in output voltage there is an automatic decrease in output current to keep the power to be the same. Hence there is no violation of the law of conservation of energy.

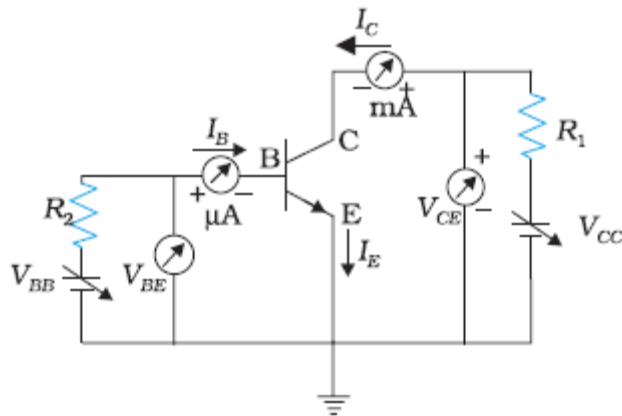
1

5

29.

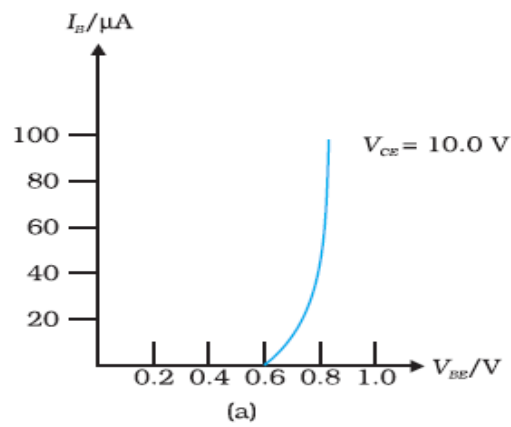
(i)	Circuit diagram of input/output characteristics	1
	Drawing of input/output characteristics	1/2 + 1/2
(ii)	Circuit diagram of amplifier	1
	Working	2

(i) Circuit diagram for input and output characteristics of transistor:

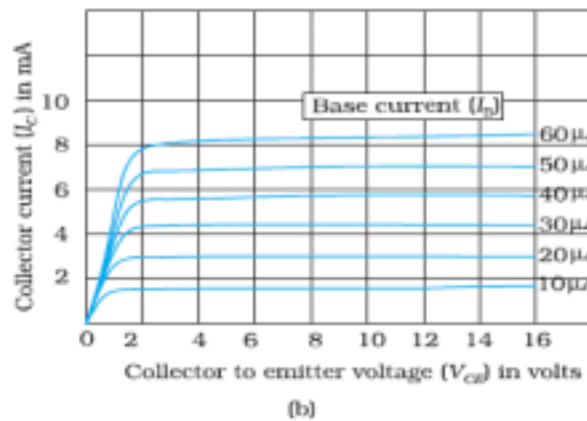


1

Input and Output characteristics:



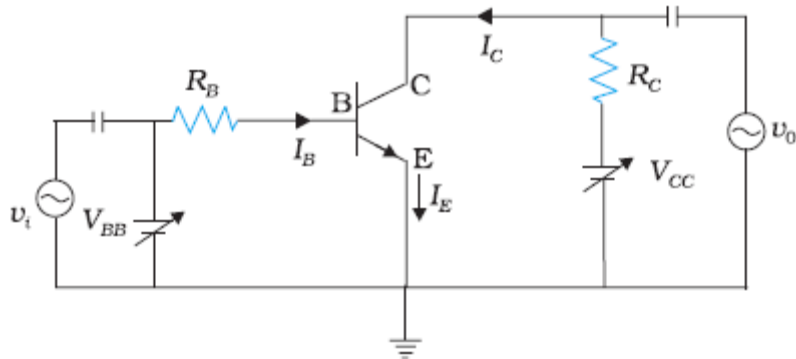
1/2



1/2

(Give this 1/2 mark even if the student draws only one output characteristics.)

(ii) Working of npn transistor as a common emitter amplifier:



1

Working:

If a small sinusoidal voltage, with amplitude v_s , is superposed on the dc base bias (by connecting the source of that signal in series with the V_{BB} supply), then the base current will have sinusoidal variations superimposed on the value of I_B . As a consequence the collector current also will have sinusoidal variations superimposed on the value of I_C , producing, in turn corresponding (amplified) changes in the value of v_o . We can measure the ac variations across the input and output terminals by blocking the dc voltages by large capacitors.

2

5

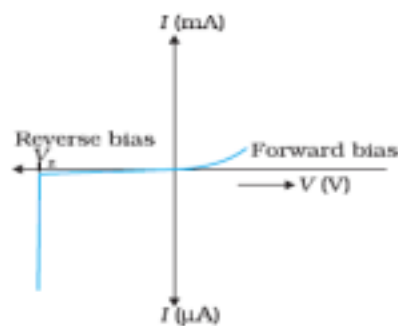
OR

(i) Special fabrication of zener diode	1/2
I - V characteristics (Forward and Reverse bias)	1
Significance of breakdown Voltage	1/2
(ii) Circuit diagram of half wave rectifier	1
Working	1
Input/output waveform	1/2 + 1/2

Zener diode is fabricated by heavily doping both **p**, and **n** sides of the junction. (Due to this, depletion region formed is very thin ($<10^{-6}$ m) and the electric field of the junction is extremely high ($\sim 5 \times 10^6$ V/m) even for a small reverse bias voltage of about 5 V.)

1/2

I - V characteristics:



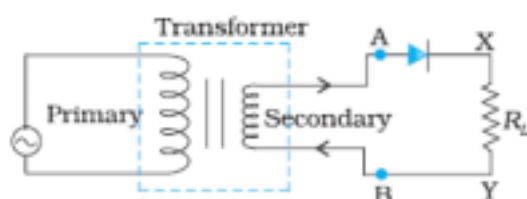
1/2+1/2

Significance of breakdown voltage: After the breakdown voltage V_z , a large change in the current can be produced by almost insignificant change in the reverse bias voltage. (Or, Zener voltage remains constant, even though current through the Zener diode varies over a wide range. This property of the Zener diode is used for regulating supply voltages so that they are constant.)

1/2

Half wave rectifier:

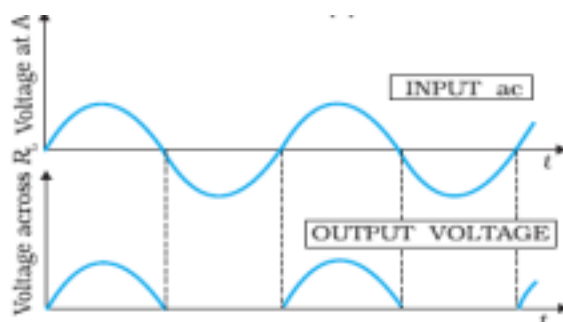
Circuit diagram:



1

Working: An alternating voltage is applied across a diode, in series with a load. When the voltage at A is positive, the diode is forward biased and it conducts. When A is negative, the diode is reverse-biased and it does not conduct. A pulsating voltage will appear across the load only during the half cycles of the ac input during which the diode is forward biased.

1

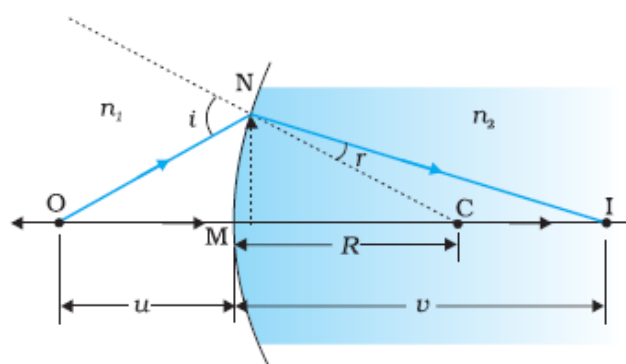


1/2

1/2

5

30.	Diagram (Trace of path of the rays)	1
	Derivation of the relation	2
	Derivation of Lens Maker's formula	2



1

Derivation: (For small angles)

$$\begin{aligned}\tan \angle \text{NOM} &= \frac{\text{MN}}{\text{OM}}, \\ \angle \text{NCM} &\cong \tan \angle \text{NCM} = \frac{\text{MN}}{\text{MC}}, \\ \angle \text{NIM} &\cong \tan \angle \text{NIM} = \frac{\text{MN}}{\text{MI}},\end{aligned}$$

Now, for ΔNOC , i is the exterior angle, Therefore, $i = \angle \text{NOM} + \angle \text{NCM}$

$$i = \frac{\text{MN}}{\text{OM}} + \frac{\text{MN}}{\text{MC}}$$

Similarly,

$$r = \angle \text{NCM} - \angle \text{NIM}, \quad \text{i.e., } r = \frac{\text{MN}}{\text{MC}} - \frac{\text{MN}}{\text{MI}}, \quad \frac{1}{2}$$

Now, by Snell's law

$$n_1 \sin i = n_2 \sin r, \quad \frac{1}{2}$$

or for small angles

$$n_1 i = n_2 r$$

Substituting for i and r , we then get

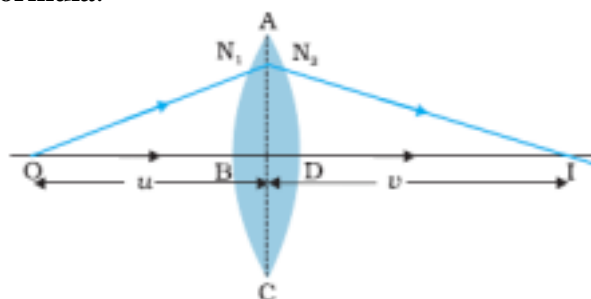
$$\frac{n_1}{\text{OM}} + \frac{n_2}{\text{MI}} = \frac{n_2 - n_1}{\text{MC}}$$

Applying the Cartesian sign convention, $\frac{1}{2}$

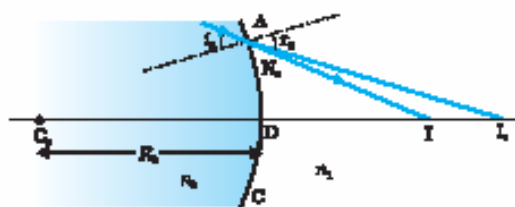
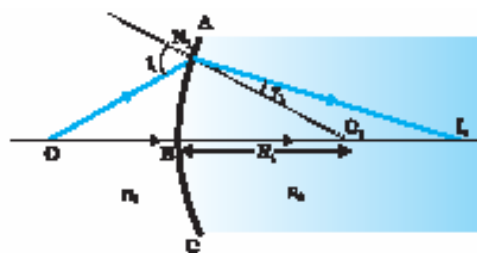
$\text{MO} = -u$, $\text{MI} = +v$, $\text{MC} = +R$, we get $\frac{1}{2}$

$$\frac{n_2}{v} - \frac{n_1}{u} = \frac{n_2 - n_1}{R}$$

Lens Maker's Formula:



1/2



Applying the above result to the first interface ABC, we get,

$$\frac{n_1}{OB} + \frac{n_2}{BI_1} = \frac{n_2 - n_1}{BC_1}$$

A similar procedure applied to the second interface ADC gives,

$$-\frac{n_2}{DI_1} + \frac{n_1}{DI} = \frac{n_1 - n_2}{DC_2}$$

1/2

For a thin lens, $BI_1 = DI_1$. Adding the above two equations, we then get,

$$\frac{n_1}{OB} + \frac{n_1}{DI} = (n_2 - n_1) \left(\frac{1}{BC_1} + \frac{1}{DC_2} \right)$$

1/2

Suppose the object is at infinity. Then

$OB = \infty$ and $DI = f$, and the above equation becomes

$$\frac{n_1}{f} = (n_2 - n_1) \left(\frac{1}{BC_1} + \frac{1}{DC_2} \right)$$

By the sign convention,

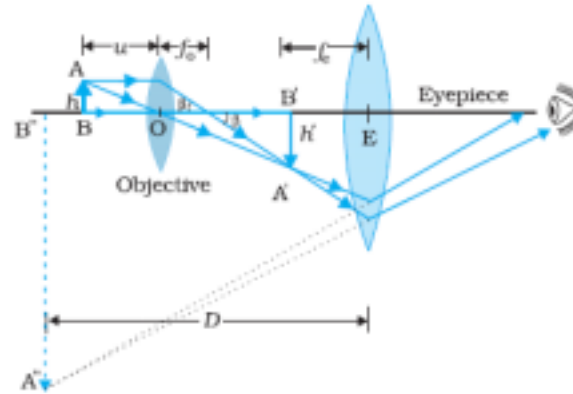
$$\frac{1}{f} = (n_{21} - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \quad \left(\because n_{21} = \frac{n_2}{n_1} \right)$$

1/2

5

OR

Labelled Ray diagram	1½
Derivation	3
Reason	½



1½

(Deduct half mark if objective and or eye piece are not labelled **or** arrows are not shown.)

Expression for total magnification:

The (linear) magnification due to the **objective**, namely h'/h , equals

$$m_o = \frac{h'}{h} = \frac{L}{f_o}$$

where we have used the result

$$\tan \beta = \left(\frac{h}{f_o} \right) = \left(\frac{h'}{L} \right)$$

1

$L \equiv$ Distance between the second focal point of the objective and the first focal point of the eye piece = tube length of the compound microscope.

[When the final image is formed at infinity, the angular magnification due to the eyepiece is

$$m_e = (D/f_e)]$$

Alternatively,

The (angular) magnification m_e , due to eyepiece, when the final image is formed at the near point, is

$$m_e = \left(1 + \frac{D}{f_e} \right)$$

1

The **total magnification** when the image is formed at infinity, is

$$m = m_o m_e = \left(\frac{L}{f_o} \right) \left(\frac{D}{f_e} \right)$$

Alternatively,

The total magnification, when the final image is formed at the near point, is

$$m = m_o m_e = \frac{L}{f_o} \left(1 + \frac{D}{f_e} \right) \quad 1$$

Reason: With short focal lengths of objective and eyepiece the total magnification of the compound microscope increases. ½ 5

QUESTION PAPER CODE 55/1

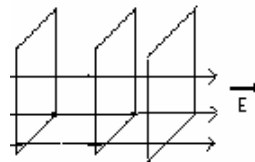
- | | | | |
|----|--|-----|---|
| 1. | Zero | 1 | 1 |
| 2. | X rays, 3×10^{16} Hz to 3×10^{20} Hz | ½+½ | 1 |
| 3. | Magnetic field and motion of electron should be /parallel / anti parallel. | 1 | 1 |
| 4. | Angular separation will not change. | 1 | 1 |
| 5. | Power = + 6D-2D = + 4D | ½ | |

focal length = $\frac{1}{\text{power}} = 25 \text{ cm}$	½	1
---	---	---

- | | | | |
|----|---|---|---|
| 6. | KE _{max} = qV = 1.5eV or 2.4×10^{-19} J | 1 | 1 |
|----|---|---|---|

7. $R = R_0 A^{1/3}$

$$\frac{R_1}{R_2} = \frac{1}{2}$$



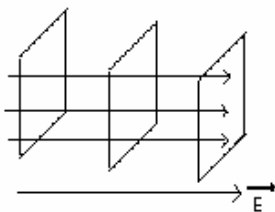
(If students write only the formula, award ½ mark) 1 1

- | | | | |
|----|--|---|---|
| 8. | | 1 | 1 |
|----|--|---|---|

- | | | | |
|----|--|---|--|
| 9. | Drawing of three equipotential surfaces for increasing field | 1 | |
| | Difference | 1 | |

For constant electric field

For increasing electric field



1

For constant electric field, equipotential surfaces are equidistant for same potential difference between these surfaces. For increasing field, separation between these surfaces decreases, in the direction of increasing field, for the same potential difference between them.

1 2

10.	Definition	1
	SI Unit	1/2
	Effect on electric flux	1/2

Electric lines of force passing through the surface normally.

Alternatively,

Electric flux $\Delta\Phi$ through an area element ΔS is defined by

$$\Delta\phi = \mathbf{E} \cdot \Delta\mathbf{S} = E \Delta S \cos\theta \quad 1$$

SI unit : volt-meter or NM^2/C 1/2

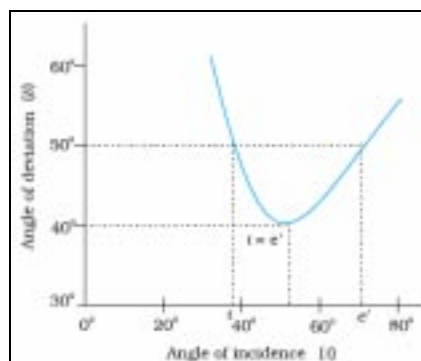
On decreasing the radius of spherical surface to half there will be no effect on the electric flux. 1/2 2

11.	Definition	1
	Graph	1

Refractive index : It is the ratio of speed of light in vacuum to the speed of light in medium.

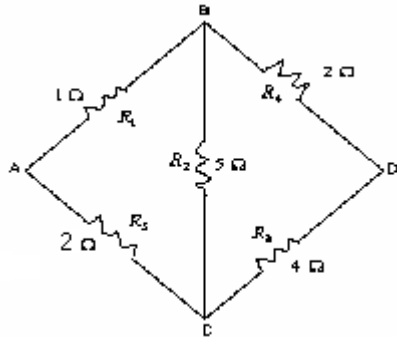
Alternatively,

$$\mu = \frac{\sin i}{\sin r} \quad 1$$



1 2

12.	Calculation of equivalent resistance	1
	Calculation of current	1



1/2

$$R_{\text{equivalent}} = 2\Omega$$

1

$$I = \frac{V}{R} = 2A$$

1

2

(If the student draws the equivalent circuit, and shows $R_{\text{eff}} = 1\Omega$, award one mark.)

13. (a) Atmosphere absorbs X rays, while visible rays can penetrate it. $\frac{\phi}{I} = \frac{NAB}{k}$
- (b) Ozone layer absorbs ultraviolet radiations (harmful radiations) from sun and prevents it from reaching the earth's surface and causing damage to life.

1

1

2

14.	Definition of current sensitivity and voltage sensitivity	$\frac{1}{2} + \frac{1}{2}$
	Justification	1

The current sensitivity of the galvanometer equals the deflection per unit current.

Alternatively

1/2

Voltage sensitivity is the deflection per unit voltage.

Alternatively

$$\frac{\phi}{V} = \left(\frac{NAB}{k}\right) \frac{I}{V} = \left(\frac{NAB}{k}\right) \frac{1}{R}$$

1/2

Justification : Increasing the current sensitivity may not necessarily increase the voltage sensitivity. If $N \rightarrow 2N$, i.e., we double the number of turns, then

$$\frac{\phi}{I} \rightarrow 2 \frac{\phi}{I}$$

Thus, the current sensitivity doubles. However, the resistance of the galvanometer is also likely to double, since it is proportional to the length of the wire. $N \rightarrow 2N$, and $R \rightarrow 2R$, thus the voltage sensitivity, remains unchanged.

1 2

$$\frac{\phi}{V} \rightarrow \frac{\phi}{V}$$

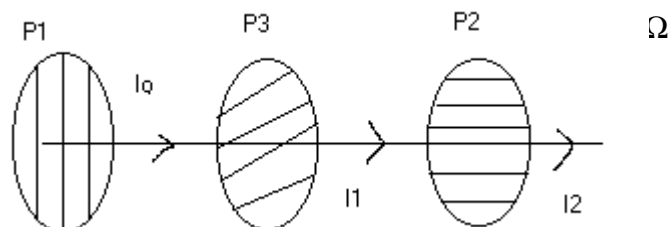
15.	Definition	1
	Condition for maximum intensity	1

When the vibrations of the electric field vector (\vec{E}) are confined to only one direction then light is called linearly polarized light.

1

Intensity of transmitted light is maximum when the Polaroid sheet makes an angle of 45° with the pass axis.

Alternatively



[Award $\frac{1}{2}$ mark only if a student writes $I = I_0 \cos^2 \theta$ without correct answer]

16.	Calculation of resistance	$1\frac{1}{2}$
	Calculation of current	$\frac{1}{2}$

$$R' = n^2 R = 4R$$

$$= 4 \times 15 = 60\Omega$$

$\frac{1}{2}$

$\frac{1}{2}$

Alternatively

$$\begin{aligned}
 R &\propto l \\
 R &\propto \frac{1}{A} \\
 \therefore R' &= \frac{2l}{\frac{A}{2}} \\
 &= 4 \frac{l}{A} \\
 &= 4R
 \end{aligned}$$

$$R_p = \frac{30 \times 30}{30 + 30} = 15\Omega$$

1/2

$$I = \frac{E}{R_1} = \frac{3}{15} = 0.2A$$

1/2

2

[Award one mark if students just state all the formulae, viz

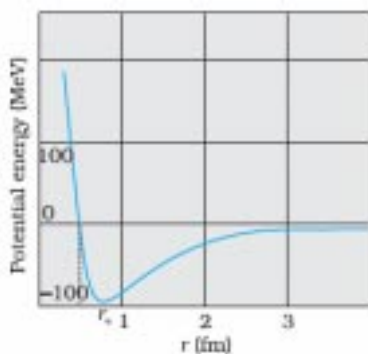
$R = \frac{\rho l}{A}$, $R_p = \frac{R_1 R_2}{R_1 + R_2}$ and $I = \frac{E}{R_p}$ correctly without getting the correct answer.]

17.	Explanation of less mass	1
	Plot of variation of potential energy	1

- (a) The mass of a nucleus in its ground state is always less than total mass of its constituents – neutrons and protons, because this mass difference is converted into energy which holds the nucleons inside the nucleus.

1

- (b) **Plot**



1

2

18.	Function of transducer and repeater in communication system	1+1
-----	---	-----

- (i) **Transducer:** Any device that converts one form of energy into another.
- (ii) **Repeater :** A repeater, picks up the signal from the transmitter, amplifies and retransmits it to the receiver sometimes with a change in carrier frequency.

1

2

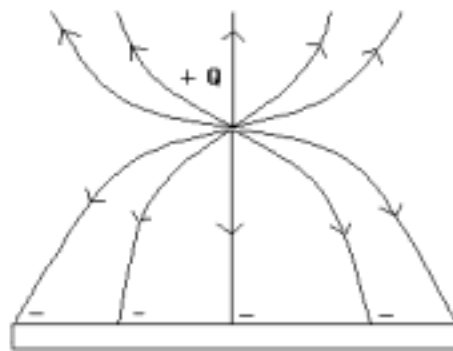
OR

Need of modulation (any two points)

- (i) Managable size of the antenna or aerial
- (ii) More effective power radiated by an antenna
- (iii) Avoiding the mixing up of signals from different transmitters

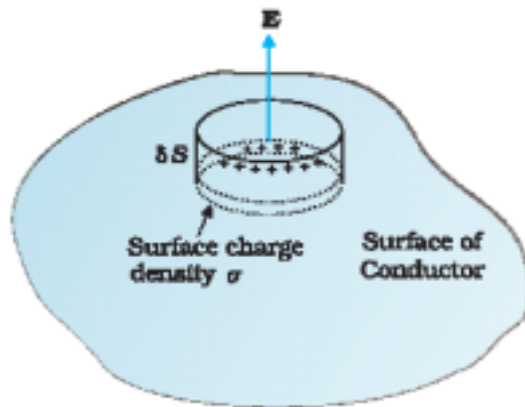
1+1 2

19.	Sketch	1
	Derivation of field expression	2



1

Field at the surface of a charged conductor



1/2

We have, by Gauss's law,

$$E \delta S = \frac{|\sigma| \delta S}{\epsilon_0} \quad 1$$

$$\therefore E = \frac{|\sigma|}{\epsilon_0}$$

[Note : award these two marks even if the student applies Gauss's law to obtain the electric field due to a uniformly charged infinite plane sheet.]

1/2 3

OR

1 mark each for the effect on
 (i) Capacitance (ii) Electric field (iii) Energy

Original capacitance $C_o = \frac{Q}{V_o} = \epsilon_o \frac{A}{d}$

When a dielectric is inserted:

(i) Capacitance
 $\left(= K \epsilon_o \frac{A}{d} \right)$ increases 1/2+1/2

(i) Electric Field
 $= \left(\frac{\sigma - \sigma P}{\epsilon_o} \right)$ decreases 1/2+1/2

(ii) Energy stored
 $\left(W = \frac{1}{2} K C_o \cdot \frac{Q^2}{C_o K^2} = \frac{1}{2} \frac{Q^2}{C_o} \cdot \frac{1}{k} \right)$ decreases 1/2
1/2 3

20.	Principle of working	1
	Resistance in 1 st case	1/2
	Resistance in 2 nd case	1/2
	Result and calculation	1

(i) Metre bridge works on the principle of the Wheatstone bridge. 1

(ii) In first case $\frac{R}{S} = \frac{l_1}{(100 - l_1)}$ 1/2

In second case $\frac{R}{\left(\frac{XS}{X+S} \right)} = \frac{l_2}{100 - l_2}$ 1/2

$\Rightarrow X = S \left[\frac{l_2 \left(\frac{100 - l_1}{100 - l_2} \right) - 1}{l_1} \right]^{-1}$ 1

21.	(i) Faraday law of electromagnetic induction	1
	(ii) Calculation of the potential difference	2

(i) **Faraday's law of electromagnetic induction:** The magnitude of the

induced emf in a circuit is equal to the rate of change of magnetic flux with time through the circuit.

Alternatively

$$\varepsilon = - \frac{d\Phi_B}{dt} \quad 1$$

(ii) We have :

$$B_v = B \sin \theta \quad \frac{1}{2}$$

Also, Induced emf = $\varepsilon = B_v \cdot v\ell$ 1/2

$$\therefore \varepsilon = 5 \times 10^{-4} \cdot (\sin 30^\circ) \times \frac{1800 \times 10^3}{3600} \times 25 \text{V}$$

$$= 3.125 \text{V} \quad 1 \quad 3$$

(Note:- Award 1 mark for numerical if a student calculates $\varepsilon (=6.25 \text{V})$ by taking $B_v = B$ itself.)

22.	Calculation of wavelength of second light source	2
	Effect on interference fringes	1

$$\beta = \frac{\lambda D}{d} \quad \frac{1}{2}$$

$$\therefore \beta_1 / \beta_2 = \lambda_1 / \lambda_2 \quad \frac{1}{2}$$

$$\therefore \lambda_2 = \lambda_1 \beta_2 / \beta_1 \quad 1$$

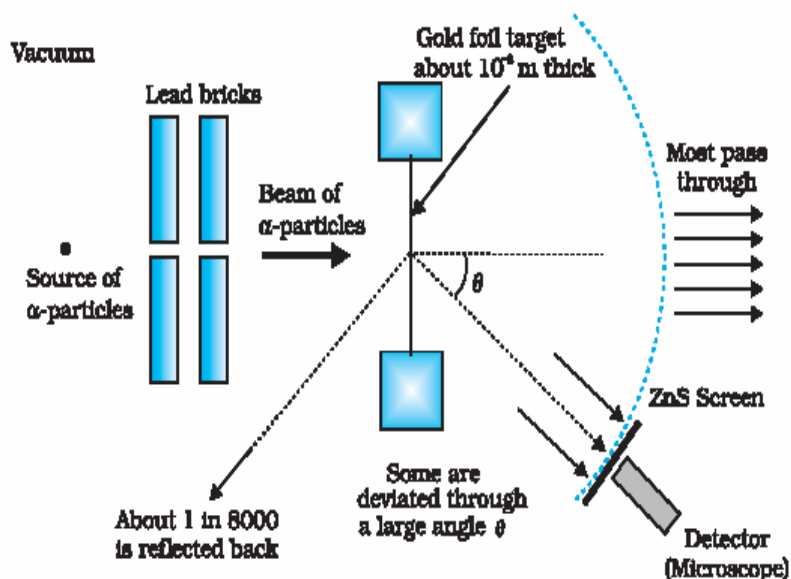
$$= 630 \times 7.2 / 8.1 = 560 \text{ nm}$$

Effect on fringe :

The central fringe is white and there are a few coloured fringes on either side of the central fringe.

1 3

23.	Schematic arrangement of the Geiger - Marsden Experiment	1½
	Explanation of upper limit of the size of the nucleus	1½



1½

Explanation:- Only a small fraction of the number of incident particles rebound back. This shows that the number of α - particles undergoing head on collision is small. This implies that the entire positive charge of the atom is concentrated in a small volume. Therefore, this experiment is a powerful way to determine an upper limit to the size of nucleus.

Alternatively

Explanation: It was observed in this experiment that only about 0.14% of the incident α particles scatter by more than 1° ; and about 1 in 8000 deflect by more than 90° . Rutherford argued that, to deflect the α particle backwards, it must experience a large repulsive force. This force could be provided if the greater part of the mass of the atom and its positive charge were concentrated in a small volume at its centre.

1½

3

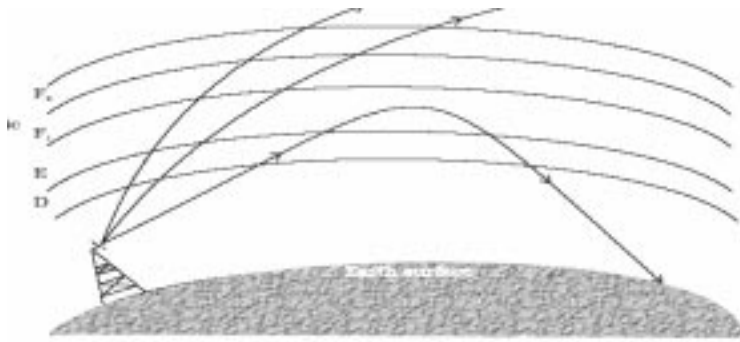
24.

Distinction	1
Sky wave propagation, description + diagram	1
Space wave propagation, description + diagram	1

Sky wave propagation is achieved by ionospheric reflection of radio waves. Space wave propagation, on the other hand, is direct, line of sight, propagation from the transmitter to the receiver.

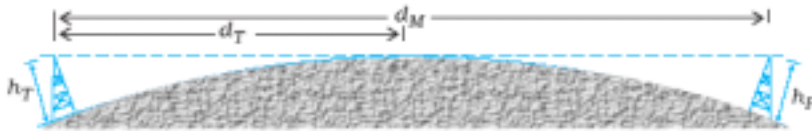
½+½

- (i) **Sky wave propagation:** Here the transmitted radio waves get reflected from the ionosphere and thereby reach the receiving antenna.



1/2+1/2

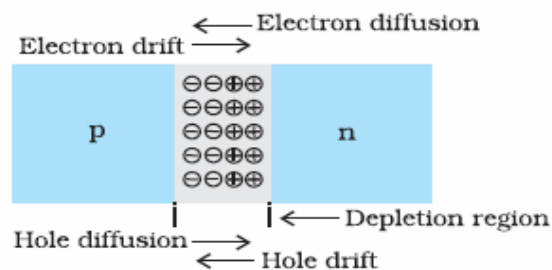
- (ii) **Space wave propagation** : Here the transmitted radio waves reach the receiver through a 'line of sight' straight propagation. The range of such a transmission is limited by the curvature of the earth.



1/2+1/2

3

25.	Diagram + Formation of depletion region	2
	Effect of forward biasing and reverse biasing	1/2 + 1/2



1/2

Formation : During the formation of p-n junction, and due to the concentration gradient across p, and n sides, holes diffuse from p-side to n-side ($p \rightarrow n$) and electrons diffuse from n-side to p-side ($n \rightarrow p$). This motion of charge carriers gives rise to diffusion current across the junction. When an electron diffuses from $n \rightarrow p$, it leaves behind an immobile ionized donor (positive charge) on n-side. As the electrons continue to diffuse from $n \rightarrow p$, a layer of positive charge (or positive space-charge region) on n-side of the junction is developed. Similarly, a layer of negative charge (or negative space-charge region) on the p-side of the junction is developed. This space-charge region, developed on either side of the junction is known as *depletion region* as the electrons and holes taking part in the initial movement across the junction *deplete*, this region of its free charges.

1/2

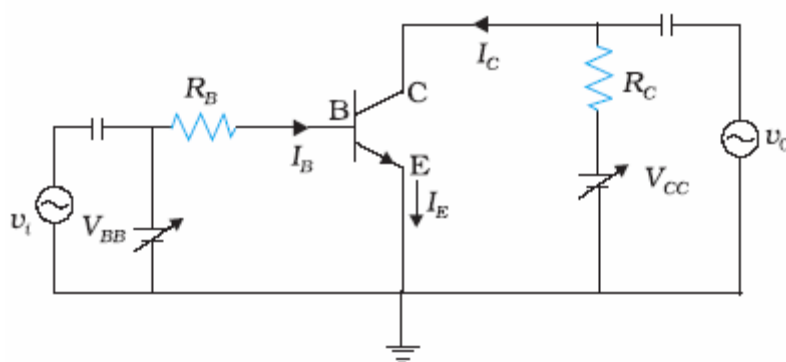
Width of depletion region layer decreases when the junction is forward biased and increases when it is reversed biased.

1/2+1/2

3

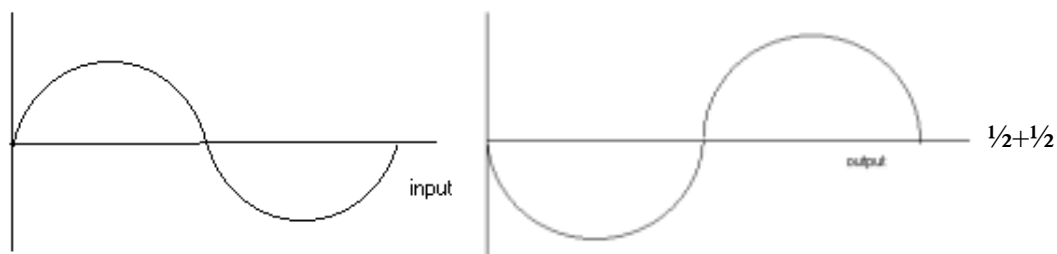
26.	Circuit diagram	1/2
	Sketch of input and output waveforms	1/2 + 1/2
	Expression of voltage gain	1/2

Circuit diagram:



1/2

Input and output waveforms:



1/2+1/2

The voltage gain of the amplifier is

$$A_v = \frac{v_o}{v_i} = \frac{\Delta V_{CE}}{r \Delta I_B}$$

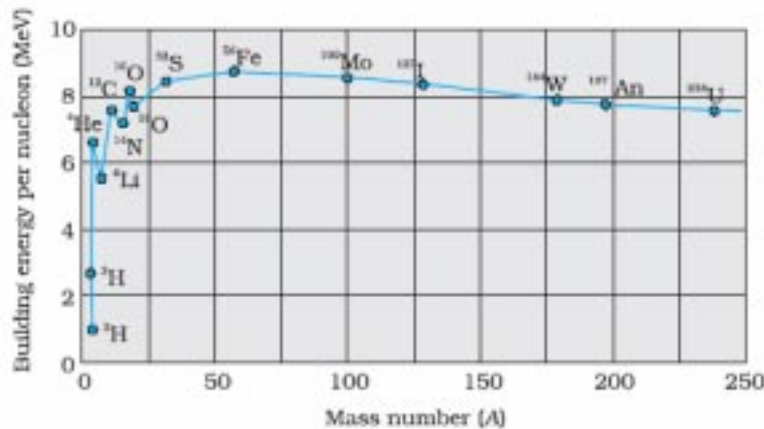
$$= -\frac{\beta_{ac} R_L}{r}$$

1/2

3

27.	Plot of variation of binding energy per nucleon with mass number	2
	Explanation of releases of energy in nuclear fission and fusion	1/2 + 1/2

Plot :



Explanation: A very heavy nucleus, say $A = 240$, has lower binding energy per nucleon compared to that of a nucleus with $A = 120$. Thus if a nucleus $A = 240$ breaks into two $A = 120$ nuclei, nucleons get more tightly bound. This implies energy would be released in the process of fission.

1/2

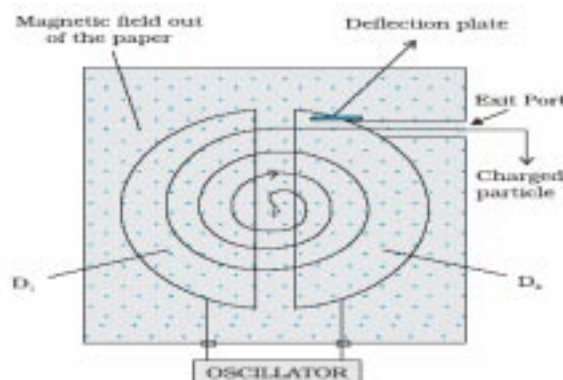
Consider two very light nuclei ($A \leq 10$) joining to form a heavier nucleus. The binding energy per nucleon of the fused heavier nuclei is more than the binding energy per nucleon of the lighter nuclei. This means that the final system is more tightly bound than the initial system. Again energy would be released in such a process of *fusion*.

1/2

3

28.	Labelled diagram of cyclotron	1
	Working	1 1/2
	Derivation of expression of time period	1 1/2
	Resonance condition and its use in acceleration of charged particles	1

Labelled diagram:



1

Working: The cyclotron uses crossed electric and magnetic fields in combination to increase the energy of charged particles. Cyclotron uses the fact that the frequency of revolution of the charged particle in a magnetic field is independent of its energy. The particles move most of the time inside two semicircular disc-like metal containers, D_1 and D_2 , called dees. Inside the metal boxes the particle is shielded and is not acted on by the electric field. The magnetic field, however, acts on the particle and makes it go round in a circular path inside the dee. Every time the particle moves from one dee to another it is acted upon by the electric field. The sign of the electric field is changed alternately in tune with the circular motion of the particle. This ensures that the particle is always accelerated by the electric field. Each time the acceleration increases the energy of the particle.

1½

Expression of time period: The particles move in a semi-circular path in one of the dees and must arrive in the gap between the dees in a time interval $T/2$; where T , their period of revolution, is given by

$$\frac{1}{\nu_c} = T = \frac{2\pi r}{v} \quad \frac{1}{2}$$

$$v \text{ is given by: } \frac{mv^2}{r} = qvB, \text{ i.e. } v = \frac{qBr}{m} \quad \frac{1}{2}$$

$$\therefore T = \frac{2\pi m}{qB} \text{ and } \nu_c = \frac{qB}{2\pi m} \quad \frac{1}{2}$$

Resonance condition and its application in acceleration in charged particle:

Let ν_a be the frequency of the applied alternating voltage source. The requirement $\nu_a = \nu_c$ is called the *resonance condition*.

This ensure that the ions always get accelerated across the gap. Inside the dees the particles travel in a region free of the electric field. The increase in their kinetic energy is qV each time they cross from one dee to another.

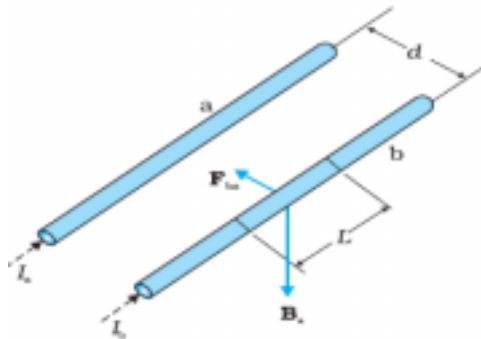
½

5

OR

(a)	Derivation of force per unit length	2
	Magnetic field pattern around them	1
(b)	Direction of magnetic moment	1
	Condition of maximum and minimum torque	½ + ½

Derivation of force per unit length:



1/2

Figure shows two long parallel conductors a and b separated by a distance d and carrying (parallel) currents I_a and I_b , respectively. The conductor 'a' produces, the same magnetic field B_a at all points along the conductor 'b'. The right-hand rule tells us that the direction of this field is downwards (when the conductors are placed horizontally). From Ampere's circuital law, its magnitude is given by

$$B_a = \frac{\mu_0 I_a}{2 \pi d}$$

1/2

The conductor 'b' carrying a current I_b will experience a sideways force due to the field B_a . The direction of this force is towards the conductor 'a'. We label this force as F_{ba} , the force on a segment L of 'b' due to 'a'. The magnitude of this force is given by.

$$F_{ba} = I_b L B_a = \frac{\mu_0 I_a I_b L}{2 \pi d}$$

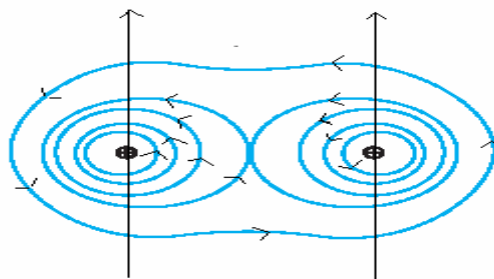
1/2

Let f_{ba} represent the magnitude of the force F_{ba} per unit length. Then, from the above equation

$$f_{ba} = \frac{\mu_0 I_a I_b}{2 \pi d}$$

1/2

Pattern of Magnetic Field lines :



1

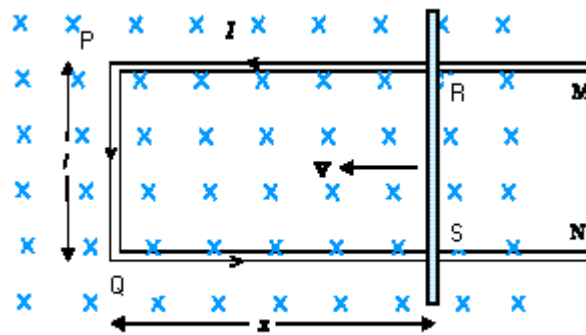
- (b) (i) Direction of magnetic moment \vec{M} of the current loop is perpendicular to the plane of the page and directed downwards. 1
- (ii) (a) Torque acting on the loop is maximum when \vec{M} is perpendicular to \vec{B} . $\frac{1}{2}$
- (b) It is minimum when \vec{M} is parallel to \vec{B} . $\frac{1}{2}$ 5

29.	Definition of eddy currents	1
	Two applications	$\frac{1}{2} + \frac{1}{2}$
	Expression for emf	1
	Expression for external force	1
	Expression for power	1

When bulk pieces of conductors are subjected to changing magnetic flux, induced currents are produced in them. They are known as eddy currents. 1

Application (any two) of the following:

- (i) Electromagnetic braking in trains
- (ii) Electromagnetic damping
- (iii) Induction furnace
- (iv) Electric Power meter
- (v) Induction therapy $\frac{1}{2} + \frac{1}{2}$



- (i) Change in area $dA = lvdt$ $\frac{1}{2}$
- Induced emf $|\mathcal{E}| = \frac{BdA}{dt}$ $\frac{1}{2}$
- $= Blv$
- (ii) Force on the arms RS $\frac{1}{2}$
- $F = BI\ell$

$$= Bl \cdot \frac{\mathcal{E}}{r} = \frac{B^2 l^2 v}{r} \quad (r = \text{resistance}) \quad \frac{1}{2}$$

(iii) Power dissipated as heat

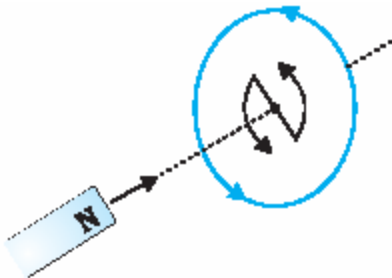
$$P = Fv \quad (\text{or} \quad \frac{\mathcal{E}^2}{r}) \quad \frac{1}{2} \quad 5$$

$$= \frac{B^2 l^2 v^2}{r} \quad \frac{1}{2} \quad 5$$

OR

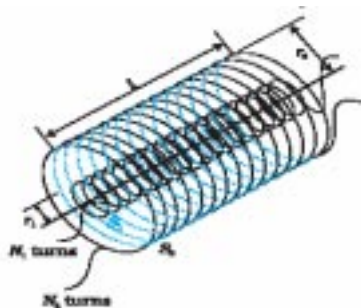
Statement of Lenz's Law	1
Example	1
Justification	1
Derivation of expressions for mutual inductance	2

(a) The polarity of the induced emf is such that it tends to produce a current which opposes the change in magnetic flux that produced it. 1



When the N pole of a magnet is moved towards a coil, the induced current in the coil, causes its front face to acquire a north polarity.

Justification :- Because of the (opposing) polarity developed by the induced current, the external agent has to spend mechanical energy to further move the magnet towards the coil. It is this mechanical energy that gets converted into the (induced) electrical energy. 1



$\frac{1}{2}$

Magnetic field due to current I_2 in $S_2 = B_2 = \mu_0 n_2 I_2$ 1/2

The flux linkage with coil S_1

$$N_1 \phi_1 = (n_1 l) (\mu_0 n_2 I_2) (\pi r_1^2) \quad 1/2$$

$$= (n_1 n_2 \mu_0 \pi r_1^2 l) I_2$$

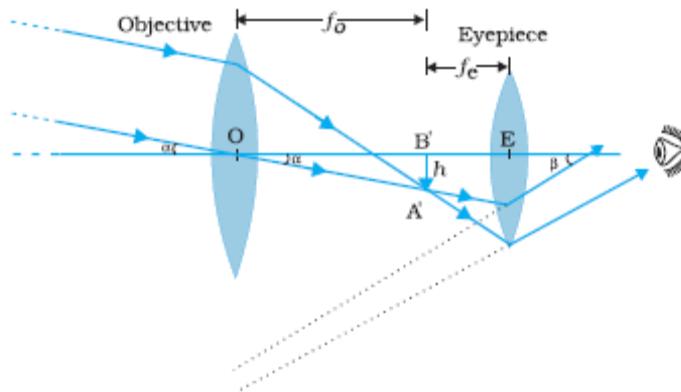
By definition

$$N_1 \phi_1 = M_{12} I_2$$

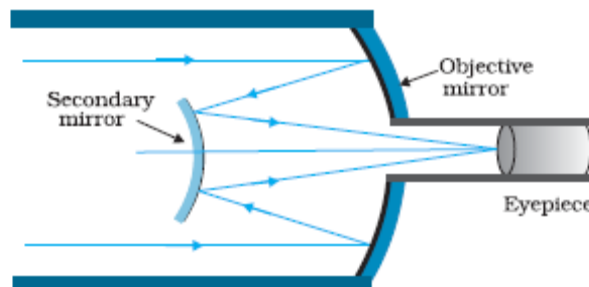
$$\therefore M_{12} = n_1 n_2 \mu_0 \pi r_1^2 l \quad 1/2$$

(Note: If a student derives by assuming the area of the two coils to be same, deduct 1/2 mark.)

30.	Labelled diagram	1 1/2
	Advantages	1/2 + 1/2 + 1/2
	Numerical	
	• Formula	1/2
	• Substitution	1
	• Result	1/2



Alternative figure

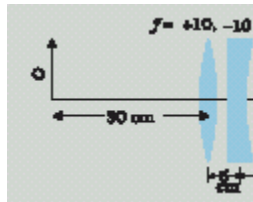


1/2

- (ii) Advantages (any three)
- (a) Less chromatic aberration
 - (b) High resolving power.
 - (c) Large gathering power.
 - (d) Less spherical aberration

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

(b)



$\frac{1}{2}$

The position of the image, formed by the convex lens, is given by

$$\frac{1}{v'} - \frac{1}{30} = \frac{1}{10}$$

$$\therefore v' = 15\text{cm}$$

$\frac{1}{2}$

\therefore For the concave lens, $u = +(15 - 5)\text{cm}$
and $f = -10\text{cm}$

$\frac{1}{2}$

Hence $\frac{1}{v} - \frac{1}{10} = -\frac{1}{10}$

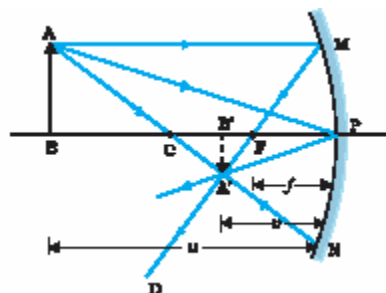
$$\therefore \frac{1}{v} = 0 \text{ or } v \rightarrow \infty$$

$\frac{1}{2}$

OR

(a) Derivation of mirror formula	3
(b) Numerical	2

(a) Derivation



$\frac{1}{2}$

Triangle $A'B'F$ is similar to $\triangle MPF$.

Therefore $\frac{B'A'}{PM} = \frac{B'F}{FP}$

From Fig. $PM = BA$ 1/2

Right angled $\triangle^S A^1B^1P$ and ABP are similar.

$$\frac{B^1A^1}{BA} = \frac{B^1P}{BP} \quad \frac{1}{2}$$

On comparing - $\frac{B^1F}{FP} = \frac{B^1P}{BP}$

$$\frac{-v+f}{-f} = \frac{-v}{-u} \Rightarrow \quad 1$$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \quad \frac{1}{2}$$

(Note : Accept also the derivation done by using the virtual image diagram.)

(b) $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ 1/2

$$\frac{1}{50} + \frac{1}{25} = \frac{1}{f} \quad \frac{1}{2}$$

$$\therefore f = 50 \text{ cm} = 0.5 \text{ m} \quad \frac{1}{2}$$

$$\begin{aligned} \text{Power} &= \frac{1}{f} = \frac{1}{0.5} \text{ D} \\ &= 2\text{D} \quad \frac{1}{2} \end{aligned} \quad 5$$

CHEMISTRY (Theory)

Time allowed : 3 hours






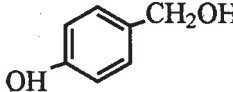
Maximum Marks : 70

General Instructions:

- (i) All questions are compulsory.
- (ii) Marks for each question are indicated against it.
- (ii) Question numbers 1 to 8 are very short-answer questions and carry 1 mark each.
- (iii) Question numbers 9 to 18 are short-answer questions and carry 2 marks each.
- (iv) Question numbers 19 to 27 are also short-answer questions and carry 3 marks each.
- (v) Question numbers 28 to 30 are long-answer questions and carry 5 marks each.
- (vi) Use Log Tables, if necessary, Use of calculators is **not** allowed.

QUESTION PAPER CODE 56/1/1

1. Which point defect in crystals does not alter the density of the relevant solid? 1
2. Define the term 'Tyndall effect'. 1
3. Why is the froth flotation method selected for the concentration of Sulphide ores? 1
4. Why is Bi(v) a stronger oxidant than Sb(v) ? 1
5. Give the IUPAC name of the following compound: 1
$$\begin{array}{c} \text{CH}_3 - \text{C} = \text{C} - \text{CH}_2\text{OH} \\ | \quad | \\ \text{CH}_3 \quad \text{Br} \end{array}$$
6. Write the structure of 3-oxopentanal. 1
7. Why is an alkylamine more basic than ammonia? 1
8. Give an example of elastomers. 1

9. A reaction is of second order with respect to a reactant. How will the rate of reaction be affected if the concentration of this reactant is 2
- doubled,
 - reduced to half?
10. Explain the role of 2
- Cryolite in the electrolytic reduction of alumina.
 - Carbon monoxide in the purification of nickel.
11. Draw the structures of the following molecules: 2
- XeF_4
 - BrF_3
12. Complete the following chemical reaction equations: 2
- $\text{P}_{4(s)} + \text{NaOH}_{(aq)} + \text{H}_2\text{O}_{(l)} \longrightarrow$
 - $\text{I}^-_{(aq)} + \text{H}_2\text{O}_{(l)} + \text{O}_3_{(g)} \longrightarrow$
13. Differentiate between molality and molarity of a solution. What is the effect of change in temperature of a solution on its molality and molarity? 2
14. Which ones in the following pairs of substances undergoes $\text{S}_{\text{N}}2$ substitution reaction faster and why? 2
-  CH_2Cl or  Cl
 -  I or  Cl
15. Complete the following reaction equations: 2
-  $\text{OH} + \text{SOCl}_2 \rightarrow$
 -  $+ \text{HCl} \rightarrow$
16. Explain what is meant by
- a peptide linkage
 - a glycosidic linkage

17. Name two water soluble vitamins, their sources and the diseases caused due to their deficiency in diet. 2
18. Draw the structures of the monomers of the following polymers: 2
- (i) Teflon
- (ii) Polythene

OR

What is the repeating unit in the condensation polymer obtained by combining $\text{HO}_2\text{CCH}_2\text{CH}_2\text{CO}_2\text{H}$ (succinic acid) and $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$ (ethylene diamine).

19. Iron has a body centred cubic unit cell with a cell edge of 286.65 pm. The density of iron is 7.87 g cm^{-3} . Use this information to calculate Avogadro's number (At. mass of Fe = 56 g mol^{-1}). 3
20. 100 mg of a protein is dissolved in just enough water to make 10.0 mL of solution. If this solution has an osmotic pressure of 13.3 mm Hg at 25°C , what is the molar mass of the protein? 3
- ($R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$ and $760 \text{ mm Hg} = 1 \text{ atm}$.)
21. A first order reaction has a rate constant of 0.0051 min^{-1} . If we begin with 0.10 M concentration of the reactant, what concentration of reactant will remain in solution after 3 hours? 3
22. How are the following colloids different from each other in respect of dispersion medium and dispersed phase? Give one example of each type. 3
- (i) An aerosol (ii) A hydrosol (iii) An emulsion
23. Account for the following: 3
- (i) NH_3 is a stronger base than PH_3 .
- (ii) Sulphur has a greater tendency for catenation than oxygen.
- (iii) Bond dissociation energy of F_2 is less than that of Cl_2 .

OR

Explain the following situations:

- (i) In the structure of HNO_3 molecule, the N – O bond (121 pm) is shorter than N – OH bond (140 pm).

- (ii) SF_4 is easily hydrolysed whereas SF_6 is not easily hydrolysed.
- (iii) XeF_2 has a straight linear structure and not a bent angular structure.
24. For the complex $[\text{Fe}(\text{en})_2\text{Cl}_2]\text{Cl}$, (en = ethylene diamine), identify 3
- (i) the oxidation number of iron,
- (ii) the hybrid orbitals and the shape of the complex,
- (iii) the magnetic behaviour of the complex,
- (iv) the number of geometrical isomers,
- (v) whether there is an optical isomer also, and
- (vi) name of the complex. (At. no. of Fe = 26)
25. Explain the mechanism of the following reactions: 3
- (i) Addition of Grignard's reagent to the carbonyl group of a compound forming an adduct followed by hydrolysis.
- (ii) Acid catalysed dehydration of an alcohol forming an alkene.
- (iii) Acid catalysed hydration of an alkene forming an alcohol.
26. Giving an example for each describe the following reactions: 3
- (i) Hofmann's bromamide reaction
- (ii) Gatterman reaction
- (iii) A coupling reaction
27. Explain the following types of substances with one suitable example, for each case: 3
- (i) Cationic detergents.
- (ii) Food preservatives.
- (iii) Analgesics.
28. (a) Define molar conductivity of a substance and describe how for weak and strong electrolytes, molar conductivity changes with concentration of solute. How is such change explained? 5
- (b) A voltaic cell is set up at 25°C with the following half cells:
- $\text{Ag}^+ (0.001 \text{ M}) \mid \text{Ag}$ and $\text{Cu}^{2+} (0.10 \text{ M}) \mid \text{Cu}$

What would be the voltage of this cell? ($E^\circ_{\text{cell}} = 0.46 \text{ V}$)

OR

(a) State the relationship amongst cell constant of a cell, resistance of the solution in the cell and conductivity of the solution. How is molar conductivity of a solute related to conductivity of its solution?

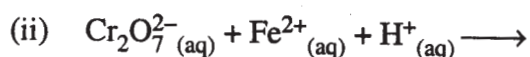
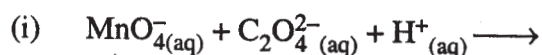
(b) A voltaic cell is set up at 25°C with the following half-cells:



Calculate the cell voltage [$E^\circ_{\text{Ni}^{2+} | \text{Ni}} = -0.25 \text{ V}$, $E^\circ_{\text{Al}^{3+} | \text{Al}} = -1.66 \text{ V}$]

29. (a) Complete the following chemical reaction equations:

5



(b) Explain the following observations about the transition/inner transition elements:

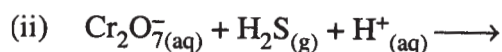
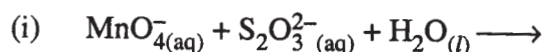
(i) There is in general an increase in density of element from titanium ($Z = 22$) to copper ($Z = 29$).

(ii) There occurs much more frequent metal-metal bonding in compounds of heavy transition elements (3rd series).

(iii) The members in the actinoid series exhibit a larger number of oxidation states than the corresponding members in the lanthanoid series.

OR

(a) Complete the following chemical equations for reactions:



(b) Give an explanation for each of the following observations :

(i) The gradual decrease in size (actinoid contraction) from element to element is greater among the actinoids than that among the lanthanoids (lanthanoid contraction).

(ii) The greatest number of oxidation states are exhibited by the members in the middle of a transition series.

- (iii) With the same d-orbital configuration (d^4) Cr^{2+} ion is a reducing agent but Mn^{3+} ion is an oxidising agent.

30. (a) Illustrate the following name reactions by giving example:

5

- (i) Cannizzaro's reaction
(ii) Clemmensen reduction

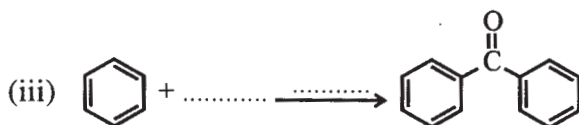
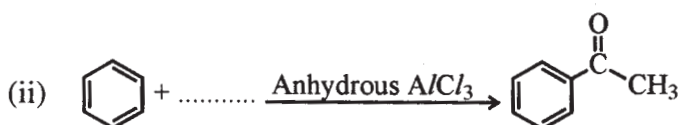
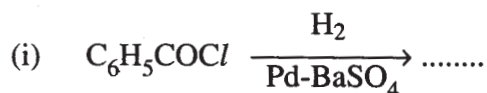
(b) An organic compound A contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and gives positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acids. Derive the possible structure of compound A.

OR

(a) How are the following obtained?

- (i) Benzoic acid from ethyl benzene.
(ii) Benzaldehyde from toluene.

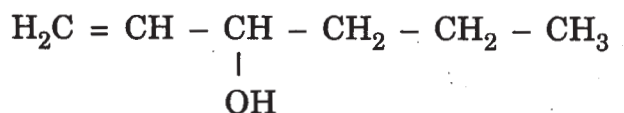
(b) Complete each synthesis by giving the missing material, reagent or products:



QUESTION PAPER CODE 56/1

- | | | |
|----|--|---|
| 1. | How do metallic and ionic substances differ in conducting electricity? | 1 |
| 2. | What is the 'coagulation' process? | 1 |
| 3. | What is meant by the term 'pyrometallurgy'? | 1 |
| 4. | Why is red phosphorus less reactive than white phosphorus? | 1 |

5. Give the IUPAC name of the following compound: 1



6. Write the structural formula of 1-phenylpentan-1-one. 1

7. Arrange the following compounds in an increasing order of basic strengths in their aqueous solutions: 1

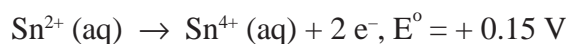


8. What does '6,6' indicate in the name nylon-6,6? 1

9. What type of cell is a lead storage battery? Write the anode and the cathode reactions and the overall cell reaction occurring in the use of a lead storage battery. 2

OR

Two half cell reactions of an electrochemical cell are given below:



Construct the redox equation from the two half cell reactions and predict if this reaction favours formation of reactants or product shown in the equation. 2

10. Define the following : 2

(i) Elementary step in a reaction

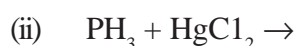
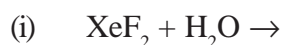
(ii) Rate of a reaction

11. Describe the underlying principle of each of the following metal refining methods: 2

(i) Electrolytic refining of metals

(ii) Vapour phase refining of metals

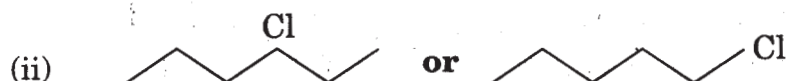
12. Complete the following chemical reaction equations: 2



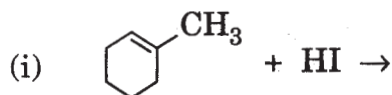
13. Complete the following chemical reaction equations: 2



14. Which one in the following pairs undergoes $\text{S}_{\text{N}}1$ substitution reaction faster and why? 2



15. Complete the following reaction equations: 2



16. Name the four bases present in DNA. Which one of these is not present in RNA? 2

17. Name two fat soluble vitamins, their sources and the diseases caused due to their deficiency in diet. 2

18. Differentiate between molecular structures and behaviours of thermoplastic and thermosetting polymers. Give one example of each type. 2

19. A first order reaction has a rate constant of 0.0051 min^{-1} . If we begin with 0.10 M concentration of the reactant, what concentration of the reactant will be left after 3 hours? 3

20. Silver crystallises with face-centred cubic unit cells. Each side of the unit cell has a length of 409 pm . What is the radius of an atom of silver? (Assume that each face atom is touching the four corner atoms.) 3

21. A copper-silver cell is set up. The copper ion concentration in it is 0.10 M . The concentration of silver ion is not known. The cell potential measured 0.422 V . Determine the concentration of silver ion in the cell.



22. What happens in the following activities and why ? 3
- (i) An electrolyte is added to a hydrated ferric oxide sol in water.
 - (ii) A beam of light is passed through a colloidal solution.
 - (iii) An electric current is passed through a colloidal solution.

23. Giving a suitable example for each, explain the following: 3
- (i) Crystal field splitting
 - (ii) Linkage isomerism
 - (iii) Ambidentate ligand

OR

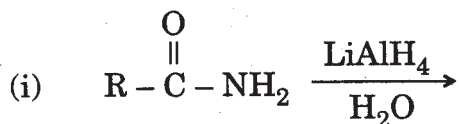
Compare the following complexes with respect to structural shapes of units, magnetic behaviour and hybrid orbitals involved in units: 3

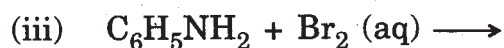


(At. Nos.: Co = 27, Cr = 24, Ni = 28)

24. Explain the following observations: 3
- (i) The boiling point of ethanol is higher than that of methoxymethane.
 - (ii) Phenol is more acidic than ethanol.
 - (iii) o- and p-nitrophenols are more acidic than phenol.
25. How would you account for the following: 3
- (i) Many of the transition elements and their compounds can act as good catalysts.
 - (ii) The metallic radii of the third (5d) series of transition elements are virtually the same as those of the corresponding members of the second series.
 - (iii) There is a greater range of oxidation states among the actinoids than among the lanthanoids.

26. Complete the following reaction equations: 3





27. Describe the following substances with one suitable example of each type: 3

- (i) Non-ionic detergents
- (ii) Food preservatives
- (iii) Disinfectants

28. (a) Define the following terms:

- (i) Mole fraction
 - (ii) Van't Hoff factor
- (b) 100 mg of a protein is dissolved in enough water to make 10.0 mL of a solution. If this solution has an osmotic pressure of 13.3 mm Hg at 25° C, what is the molar mass of protein?
(R = 0.0821 L atm mol⁻¹ K⁻¹ and 760 mm Hg = 1 atm.) 5

OR

(a) What is meant by :

- (i) Colligative properties
 - (ii) Molality of a solution
- (b) What concentration of nitrogen should be present in a glass of water at room temperature? Assume a temperature of 25° C, a total pressure of 1 atmosphere and mole fraction of nitrogen in air of 0.78. [K_H for nitrogen = 8.42×10^{-7} M/mm Hg] 5

29. (a) Draw the structures of the following:

- (i) $\text{H}_2\text{S}_2\text{O}_8$
 - (ii) HClO_4
- (b) How would you account for the following:
- (i) NH_3 is a stronger base than PH_3 .
 - (ii) Sulphur, has a greater tendency for 'catenation' than oxygen.
 - (iii) F_2 is a stronger oxidising agent than Cl_2 . 5

OR

- (a) Draw the structures of the following:
- $\text{H}_2\text{S}_2\text{O}_7$
 - HClO_3
- (b) Explain the following observations:
- In the structure of HNO_3 , the N – O bond (121 pm) is shorter than the N – OH bond (140 pm).
 - All the P – Cl bonds in PCl_5 are not equivalent.
 - ICl is more reactive than I_2 .
- 5
30. (a) Write chemical equations to illustrate the following name bearing reactions:
- Cannizzaro's reaction
 - Hell- Volhard-Zelinsky reaction
- (b) Give chemical tests to distinguish between the following pairs of compounds:
- Propanal and Propanone
 - Acetophenone and Benzophenone
 - Phenol and Benzoic acid
- 5
- OR**
- (a) How will you bring about the following conversions:
- Ethanol to 3-hydroxybutanal
 - Benzaldehyde to Benzophenone
- (b) An organic compound A has the molecular formula $\text{C}_8\text{H}_{16}\text{O}_8$. It gets hydrolysed with dilute sulphuric acid and gives a carboxylic acid B and an alcohol C. Oxidation of C with chromic acid also produced B. C on dehydration reaction gives but-1-ene. Write equations for the reactions involved.
- 5

Marking Scheme — Chemistry

General Instructions

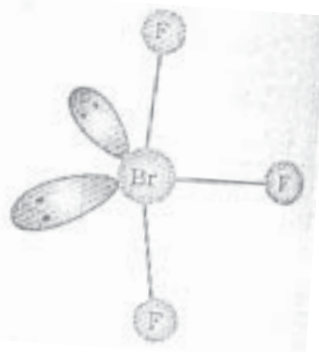
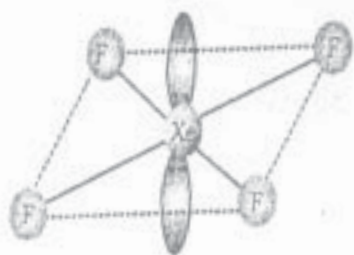
1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the same meaning, such answers should be given full weightage.
2. The Marking Scheme carries only suggested value point for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct the marks will be awarded accordingly.
3. Some of the questions may relate to higher order thinking ability. These questions have been indicated by the mark* and the students understanding/analytical ability may be judged. These questions are to be evaluated carefully.
4. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration - Marking Scheme should be strictly adhered to and religiously followed.
6. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
7. If a question does not have any parts, marks be awarded in the left-hand margin.
8. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
9. No Marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.

QUESTION PAPER CODE 56/1/1

EXPECTED ANSWERS/VALUE POINTS

1. Frenkel defect 1
2. The scattering of light by colloidal particles is called "Tyndall effect". 1
3. Because only particles of sulphide ores are wet by oil. 1
4. Due to "inert pair effect" or because lower oxidation state becomes more stable for Bi than Sb 1
5. 2-Bromo-3-methyl but-2-en-1-ol 1
6.
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{CH}_2 - \text{CHO} \end{array}$$
 1
7. Due to electron donating nature of alkyl group or +I effect 1
8. buna-S, buna-N, neoprene (any one) 1
9. i) 4 times 1
ii) 1/4 times 1
10. 1) Cryolite lowers the melting point of alumina. Or Molten cryolite dissolves alumina 1
2) Carbon monoxide forms a volatile complex with nickel which on heating decomposes to give pure nickel. 1

11.



12. $\text{P}_4 + 3\text{NaOH} + 3\text{H}_2\text{O} \rightarrow \text{PH}_3 + 3\text{NaH}_2\text{PO}_2$ 1
 $2\text{I}^- + \text{H}_2\text{O} + \text{O}_3 \rightarrow 2\text{OH}^- + \text{I}_2 + \text{O}_2$ 1

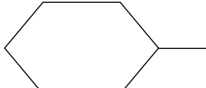
(Note: full marks only for balanced equations and only award ½ mark each for writing correct products)

13. Molality (m) is the number of moles of the solute per kilogram (kg) of the solvent whereas Molarity is the number of moles of solute present in one litre (or one cubic decimeter) of solution. 1

Molality is independent of temperature whereas Molarity is function of temperature because volume depends on temperature and the mass does not or Molarity decreases with increase in temperature ½+½

14.  It is primary halide and therefore undergoes S_N2 reaction faster. 1

 I As iodine is a better leaving group because of its large size. It will be released at a faster rate in the presence of incoming nucleophile. 1

15. i)  Cl + HCl + SO₂ 1

ii)  + H₂O 1

(Note: full credit may be given for writing main product only)

16. i) **Peptide linkage:** A link formed between two amino acids with loss of water.
- CO - NH -
Peptide linkage 1+1

ii) **Glycosidic linkage:** A link in two monosaccharides units through oxygen atom. For ex. in a disaccharide

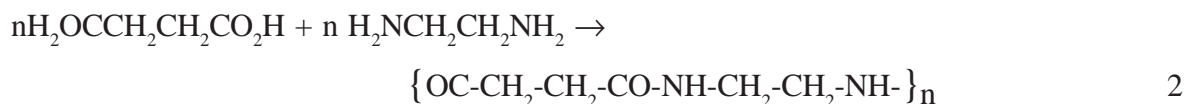
17. Vitamin B and vitamin C are soluble in water. 1

Deficiency diseases due to vitamin B are: Beri Beri , Cheilosis, Convulsions,
Pernicious anaemia (anyone) }
Deficiency diseases due to vitamin C is : Scurvy } ½

Sources of vitamin B: milk / yeast / green vegetables / cereals (anyone) }
Source of vitamin C: citrus fruits. } ½

18. i) $\text{CF}_2 = \text{CF}_2$ 1
 ii) $\text{CH}_2 = \text{CH}_2$ 1

OR



*19. $d = \frac{Z \times M}{a^3 \times N_A}$ 1/2

For bcc lattice $Z = 2$

$$7.87 \text{ g cm}^{-3} = \frac{2 \times 56 \text{ g mol}^{-1}}{(286.65 \times 10^{-10} \text{ cm})^3 \times N_A} \quad 1$$

$$N_A = \frac{2 \times 56 \text{ g mol}^{-1}}{(286.65 \times 10^{-10} \text{ cm})^3 \times 7.87 \text{ g cm}^{-3}} \quad 1/2$$

$$N_A = 6.04 \times 10^{23} \text{ mol}^{-1} \quad 1$$

20. $\pi = CRT$

$$M_2 = \frac{w_2 R T}{\pi V} \quad 1$$

$$M_2 = \frac{100 \times 10^{-3} \text{ g} \times 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1} \times 298 \text{ K} \times 760 \times 1000}{13.3 \text{ atm} \times 10 \text{ L}}$$

$$M_2 = 13980 \text{ g mol}^{-1} \text{ or } 1.4 \times 10^4 \text{ g mol}^{-1} \quad 1$$

21. $t = \frac{2.303 \times \log [A]_0}{k [A]}$ 1/2

$$3 \times 60 \text{ min} = \frac{2.303}{0.0051 \text{ min}^{-1}} \frac{\log 0.10}{[A]} \quad 1/2$$

$$\log \frac{0.10}{[A]} = \frac{180 \times 0.0051}{2.303}$$

$$\log \frac{0.10}{[A]} = 0.399 \quad 2$$

$$[A] = 0.04 \text{ M}$$

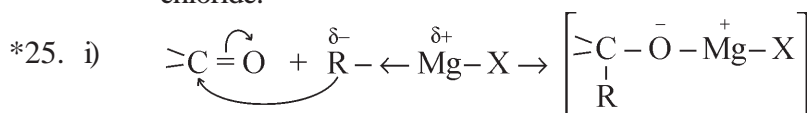
(Note : There should be no emphasis on final value of [A])

22. -An aerosol is a colloidal solution of solid or liquid (dispersed phase) in gas (dispersion medium) eg smoke, dust, fog, mist, cloud (anyone example) 1/2+1/2
- A hydrosol is a colloidal solution of solid (dispersed phase) in water (dispersion medium) eg starch sol, protein sol, biological fluids (anyone example) 1/2+1/2
- An emulsion is a colloidal solution of liquid (dispersed phase) in liquid (dispersion medium) eg milk, cream (anyone example) 1/2+1/2

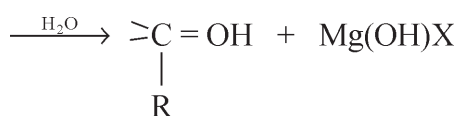
- *23. (i) The lone pair of electrons on N atom in NH_3 is directed and not diffused or delocalized as it is in PH_3 due to larger size of P or due to availability of d-orbitals in P.
- ii) Because S-S bond is stronger than O-O.
- iii) Because of large electron-electron repulsion among the lone pairs in F_2 than that of Cl_2 1x3 = 3

OR

- (i) Due to resonance N-O bond length is the average of single and double bond whereas N.OH bond has purely single bond.
- (ii) Because SF_6 is exceptionally stable due to steric reasons.
- (iii) The presence of 3 lone pairs of electrons in XeF_2 at equidistance is responsible for its linear structure. 1x3 = 3
24. i) Oxidation number: +3
- ii) d^2sp^3 or octahedral
- iii) Paramagnetic
- iv) Two/Cis & trans isomers
- v) Yes
- vi) Dichlorobis (ethylenediamine) iron(III) chloride or Dichlorobis (ethane-1,2 diamine) iron (III) chloride or Dichloridobis (ethane-1,2 diamine) iron (III) chloride. 6x1/2 = 3

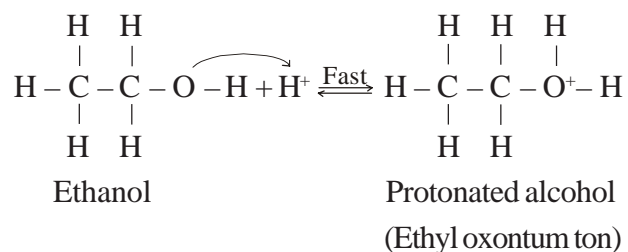


Adduct

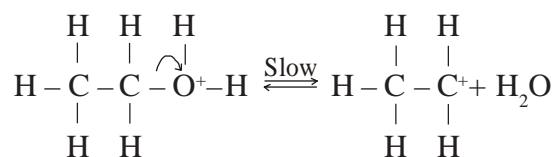


ii) Mechanism

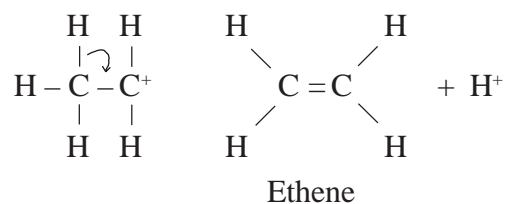
Step 1: Formation of protonated alcohol.



Step 2: formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction.

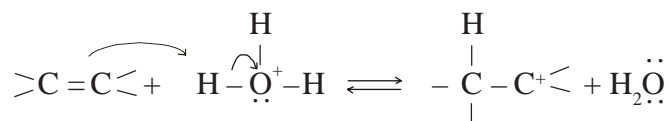
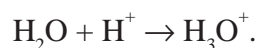


Step 3: Formation of ethene by elimination of a proton.

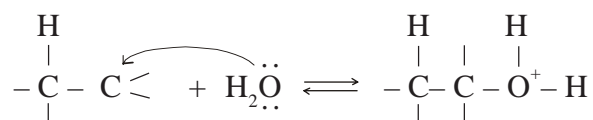


The acid used in step 1 is released in step 3. To drive the equilibrium to the right, ethene is removed as it is formed.

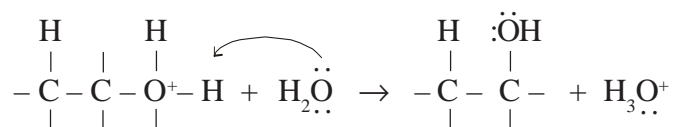
iii) Step 1: Protonation of alkene to form carbocation by electrophilic attack of H_3O^+ .



Step 2: Nucleophilic attack of water on carbocation.



Step 3 : Deprotonation to form an alcohol.



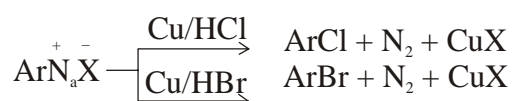
(Note: Full credit to be given for any two correct mechanisms)

1½x2=3

26. (i) Hoffmann Bromamide Reaction

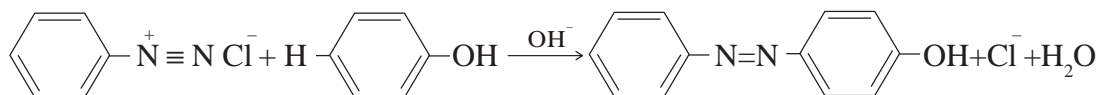


ii) Gatterman reaction

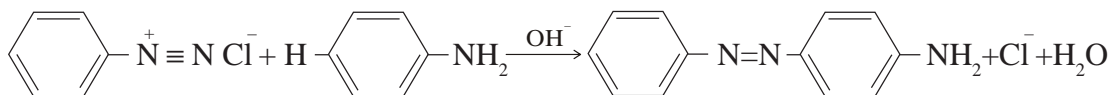


(any one)

iii) Coupling reaction



p-Hydroxyazobenzene (orange dye)



p-Aminoazobenzene (yellow dye)

(any one)

1x3 = 3

27. i) Cationic Detergents: Cationic detergents are quaternary ammonium salts of amines with acetates/chlorides / bromides as anions eg: Cetyltrimethyl ammonium bromide.

½+½

ii) Food preservatives: are the compounds which prevent spoilage of food due to microbial growth. eg: sodium benzoate, vinegar (anyone example)

½+½

iii) Analgesics: reduce or abolish pain without causing impairment of consciousness, mental confusion, incoordination or paralysis or some other disturbances of nervous system eg: aspirin, morphine, codeine (anyone example)

½+½

28. a) **Molar conductivity:** Conductivity of 1 M electrolytic solution placed between two electrodes 1 cm apart and have enough area of cross section to hold the

entire volume is known as molar conductivity or conductivity observed for one molar solution of electrolyte 1

Molar conductivity increases with decrease in concentration of solute. For weak electrolytes, the increase is quite high whereas for strong electrolyte, the increase is not that significant. 1/2

This is because in case of weak electrolyte after dilution the dissociation into ions increases whereas in case of strong electrolyte, dilution has little effect on the increase in number of ions. 1/2

b) The cell reaction: $\text{Cu(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{Ag(s)}$

$$E_{\text{cell}}^{\circ} = 0.46 \text{ V}$$

Nernst equation

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^+]^2} \quad 1$$

$$E_{\text{cell}} = 0.46 \text{ V} - \frac{0.059}{2} \log \frac{(0.10 \text{ M})}{(0.001 \text{ M})^2} \quad 1$$

$$= 0.46 \text{ V} - \frac{0.059}{2} \log (10^5)$$

$$= 0.46 \text{ V} - 0.148 \text{ V} = 0.312 \text{ V} \quad 1$$

OR

a) $\kappa = \frac{1}{RA}$ 1

Where K is conductivity of the solution, R is resistance and 1/A is cell constant of a cell 1

$$\Lambda_m = K / C$$

Where C is concentration of the solution in mol L^{-1}

b) $2\text{Al} + 3\text{Ni}^{2+} \rightarrow 2\text{Al}^{3+} + 3\text{Ni}$

$$E_{\text{cell}}^{\circ} = E_{\text{Cathode}}^{\circ} - E_{\text{anode}}^{\circ} = [-0.25 \text{ V} - (-1.66 \text{ V})] = 1.41 \text{ V} \quad 1$$

$$E_{\text{cell}}^{\circ} = 1.41 \text{ V}$$

Nernst equation

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{n} \log \frac{[\text{Al}^{3+}]^2}{[\text{Ni}^{2+}]^3} \quad 1$$

$$\begin{aligned} E_{\text{cell}} &= 1.41 \text{ V} - \frac{0.059}{6} \log \frac{(0.001 \text{ M})^2}{(0.50 \text{ M})^3} \\ &= 1.41 \text{ V} - \frac{0.059}{6} \log 8 \times 10^{-6} \\ &= 1.41 \text{ V} - (0.01 \times 0.9 \times -6) \text{ V} \\ &= 1.41 \text{ V} + 0.050 \text{ V} = 1.46 \text{ V} \quad 1 \end{aligned}$$

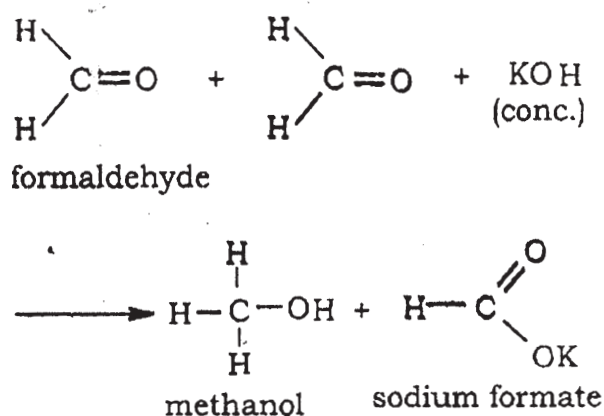
29. a) i) $5\text{C}_2\text{O}_4^{2-} + 2\text{MnO}_4^- + 16\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 8\text{H}_2\text{O} + 10\text{CO}_2$
ii) $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \rightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$ 1+1
- b) i) Because of decrease in atomic size from titanium to copper.
ii) Because of high enthalpies of atomization of heavy transition elements
iii) Because of comparable energies of 5f, 6d and 7s orbitals in the actinoid series. 1x3 = 3

OR

- a) i) $8\text{MnO}_4^- + 3\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \rightarrow 8\text{MnO}_2 + 6\text{SO}_4^{2-} + 2\text{OH}^-$
ii) $\text{Cr}_2\text{O}_7^{2-} + 3\text{H}_2\text{S} + 8\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 3\text{S} + 7\text{H}_2\text{O}$ 2

(Note: award 2 marks for anyone correct equation)

- b) i) Because 5f electrons provide poor shielding from element to element in the actinoid series than 4f electrons in lanthanoid series
ii) Because of the involvement of both (n-1) d and ns electrons in bonding. 1x3 = 3
iii) Cr^{2+} is reducing as its configuration changes from d^4 to d^3 , the latter having a half-filled t_{2g} level. On the other hand the change from Mn^{2+} to Mn^{3+} results in the half-filled (d^5) configuration which has extra stability
30. a) i) Cannizzaro's reaction



(or any other suitable reaction)

ii) Clemmensen reduction



b)

C	69.77/12	5.81	5.81/1.16	5
H	11.63/1	11.63	11.63/1.16	10
O	18.60/16	1.16	1.16/1.16	1

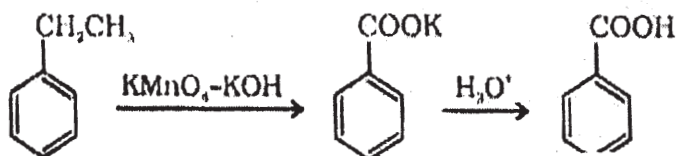
Empirical formula $\text{C}_5\text{H}_{10}\text{O}$, empirical formula mass $60 + 10 + 16 = 86$ Hence
Mol formula $\text{C}_5\text{H}_{10}\text{O}$

It is a ketone as it appears from its reactions which on oxidation gives ethanoic and propanoic acids, hence the compound is

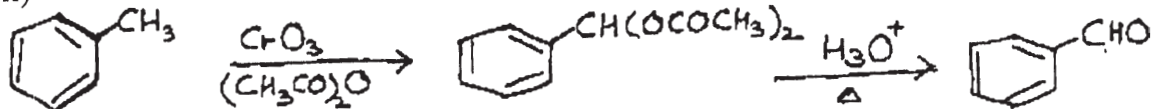


OR

a) i)



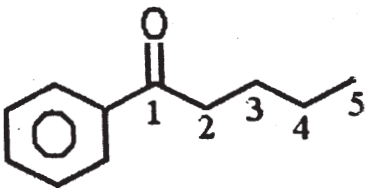
ii)



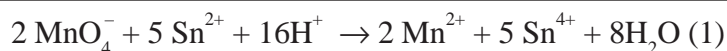
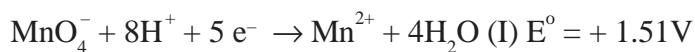
(or any other suitable reaction)

- | | | |
|------|-----------------------|-----------------------------|
| i) | C_6H_5CHO | 1 |
| ii) | CH_3COCl | 1 |
| iii) | $C_6H_5COCl - AlCl_3$ | $\frac{1}{2} + \frac{1}{2}$ |

QUESTION PAPER CODE 56/1

1. Metallic solid conducts electricity in solid state but ionic solids do so only in molten state or in solution or metals conduct electricity through electrons and ionic substances through ions. 1
2. The process of settling of colloidal particles is called coagulation. 1
3. Pyrometallurgy is the method to extract metal by heating metal oxide with a suitable reducing agent or Pyrometallurgy is a thermal process of extracting a metal from its ore. 1
4. Due to its polymeric structure, red phosphorus is much less reactive than white phosphorus or white phosphorus is under strain. 1
5. Hex - 1 - en - 3 - ol 1
6.  1
7. $NH_3 < (CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$ 1
8. The two molecules combine to make nylon-6,6, each contains 6 carbon atoms. 1
9. It is secondary cell $\frac{1}{2}$
Anode Reaction: - $Pb + SO_4^{2-} \rightarrow PbSO_4(s) + 2e^-$ $\frac{1}{2}$
Cathode Reaction: - $PbO_2 + 4H^+ + SO_4^{2-} + 2e^- \rightarrow PbSO_4 + 2H_2O$ $\frac{1}{2}$
Net reaction: - $Pb + PbO_2 + 2SO_4^{2-} + 4H^+ \rightarrow 2PbSO_4 + 2H_2O$ $\frac{1}{2}$

Or



1

This reaction favors formation of products

1

10. Elementary step: Each step of a complex reaction is called an elementary step.

1

Rate of reaction: is the change in concentration of anyone of reactants or products per unit time.

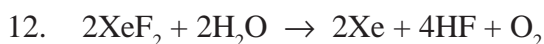
1

11. **Electrolytic refining:** Crude metal is made as anode and pure metal as cathode. When current is passed through electrolyte of same metal ions then pure metal gets deposited at cathode and impurities settle at bottom of anode.

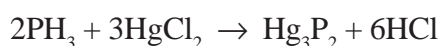
1

Vapour phase refining of metals: Crude metal is freed from impurities by first converting it into a volatile compound which decomposes into a pure metal on heating.

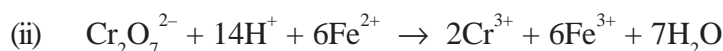
1



1

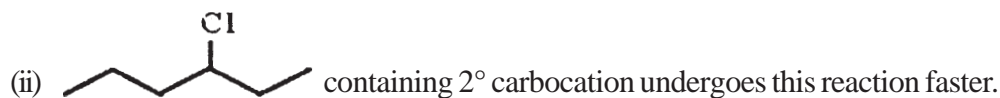
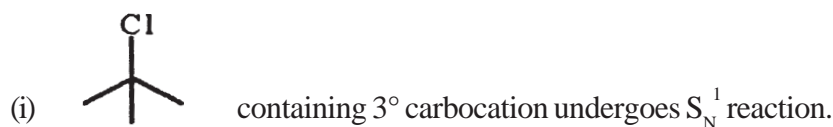


1



1+1

- *14. S_N^1 reaction takes place through the formation of carbocation; greater is the stability of carbocation faster is the rate of S_N^1 reaction, stability of carbocation follows the order $3^\circ > 2^\circ > 1^\circ$, thus:-



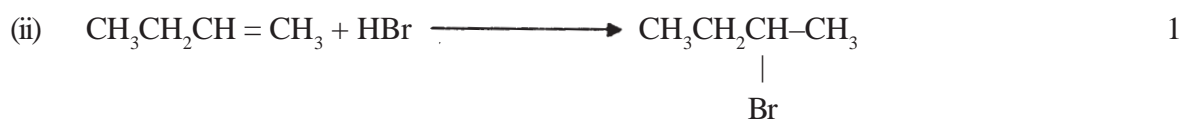
2

(Note: give full marks for attempting correct either i) or ii))

- 15.



1



16. The four bases present in DNA are Adenine, Guanine, Thymine and Cytosine 1
Thymine is not present in RNA 1

17. **Fat soluble; Vitamin A, D, E and K. (any two)** 1

<i>Name</i>	<i>Sources</i>	<i>Deficiency diseases</i>
Vit. A	milk, butter, kidneys, egg yolk, liver, fish oil, etc.	Xerophthalmia-night-blindness
Vit. D	butter, liver, kidneys, egg yolk, fish oil, etc.	Rickets, osteomalacia
Vit. E group	Green vegetables, oil, egg yolk, wheat, animal tissues.	Sterility (impotency) and muscular atrophy.
Vit. K	Carrots, lettuce, cabbage, tomatoes, liver, egg yolk, cheese; synthesized by colon bacteria.	Haemorrhages, excessive bleeding in injury, poor coagulation of blood.

(Note: 1 mark for two vitamins and 1 mark for two sources and two diseases) 1

<p>18. Thermoplastic</p> <p>i) Soften and melt on heating and can be remoulded</p> <p>ii) It is linear</p> <p>e.g polythene / PVC</p>	<p>Thermosetting Plastics</p> <p>i) Do not soften on heating and cannot be remoulded.</p> <p>ii) It has cross-links</p> <p>e.g Bakelite / Terylene</p>
--	---

(anyone difference and anyone example) 1+1

19. $t = \frac{2.303}{k} \times \log \frac{[A]_0}{[A]}$ 1/2

$3 \times 60 \text{ min} = \frac{2.303}{0.0051 \text{ min}^{-1}} \log \frac{0.10}{[A]}$ 1/2

$$\log \frac{0.10}{[A]} = \frac{180 \times 0.0051}{2.303}$$

$$\log \frac{0.10}{[A]} = 0.399$$

$$[A] = 0.04 \text{ M}$$

(Note: There should be no emphasis on the final value of [A])

*20 For fcc unit cell

$$r = \frac{d}{2} = \frac{a}{2\sqrt{2}}$$

Given $a = 409 \text{ pm}$

$$\therefore r = 409 / 2\sqrt{2}$$

$$r = 144.62 \text{ pm}$$

21. The cell reaction: $\text{Cu(s)} + 2 \text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2 \text{Ag(s)}$

$$E_{\text{cell}}^{\circ} = 0.46 \text{ V}$$

Nernst equation

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^+]^2}$$

$$E_{\text{cell}} = (0.80 - 0.34) - \frac{0.059}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^+]^2}$$

$$0.422 \text{ V} = 0.46 \text{ V} - \frac{0.059}{2} \log \frac{0.10}{[\text{Ag}^+]^2}$$

$$\log \frac{0.10}{[\text{Ag}^+]^2} = 1.2881$$

$$[\text{Ag}^+]^2 = 0.0051$$

$$[\text{Ag}^+] = 7.1 \times 10^{-2} \text{ M}$$

(Note: there should be no emphasis on final value of [Ag+])

- 22 (i) Coagulation takes place due to neutralisation of charges 1
 (ii) Tyndall effect will be observed due to scattering of light by colloidal particles. 1
 (iii) Electrophoresis takes place in which sol particles moves towards oppositely charged electrodes due to attraction. 1

- *23 i) Crystal field splitting: The splitting of d-orbitals under the influence of approaching ligand is known as crystal field splitting eg for d^4 , configuration is $t_{2g}^3 e_g^1$ in the presence of weak field ligand. (or any other example)
 ii) Linkage isomerism: Linkage isomers are those isomers which have same molecular formula but differ in the linkage of ligand atom to the central atom e.g.
 $[\text{Co}(\text{NH}_3)_5 \text{NO}_2]\text{Cl}_2$, $[\text{Co}(\text{NH}_3)_5 \text{ONO}]\text{Cl}_2$ 6x½
 iii) Ambident ligand: a unidentate ligand which can co-ordinate to the central metal atom through more than one co-ordinating bond.e.g. NO_2^- , SCN^- 3

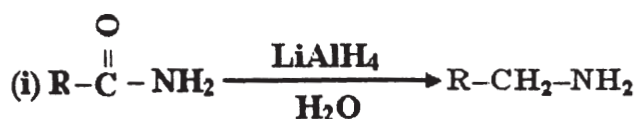
OR

$[\text{Co}(\text{NH}_2)_6]^{3+}$	Octahedral	Diamagnetic	$d^2 sp^3$	
$[\text{Cr}(\text{NH}_3)_6]^{3+}$	Octahedral	Paramagnetic	$d^2 sp^3$	
$[\text{Ni}(\text{CO})_4]$	Tetrahedral	Diamagnetic	sp^3	1½x2=3

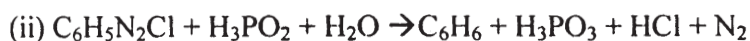
(Note: Full credit to be given for any two complete correct answers)

24. (i) This is due to association of ethanol molecules through H - bonding. 1
 (ii) Due to resonance, phenoxide ion formed is more stable than ethoxide ion formed (or any other relevant answer). 1
 (iii) Due to - R effect or electron withdrawing nature of NO_2 group, the resulting phenolate ion is more stable than phenoxide ion. 1
25. (i) Due to their ability to show multiple oxidation states.
 (ii) Due to lanthanoid contraction.
 (iii) Due to comparable energies of 5f, 6d and 7s orbitals in actinoids. 1x3=3

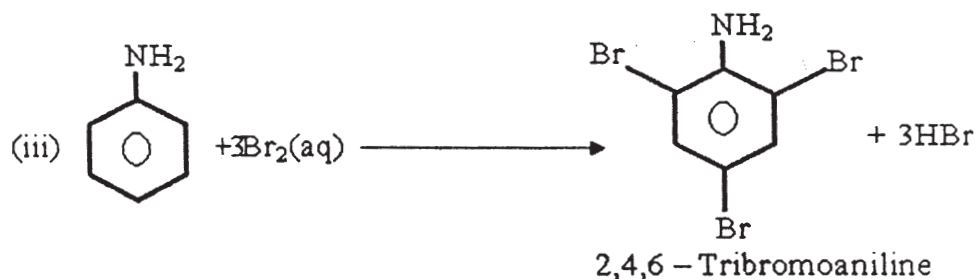
26.



1



1



1

27. i) Non ionic detergents do not contain any ion in their constitution eg: stearic acid + polyethylene glycol
- ii) Food preservatives: are the compounds which prevent spoilage of food due to microbial growth. eg: sodium benzoate, vinegar (any one example)
- iii) Disinfectants: are chemical; compounds which kill microorganisms but are not safe to apply on living organism eg: phenol, chlorine (any one example) 1x3=3

28. (a) (i) Mole fraction is the ratio of number of moles of one component to the total number of moles in a mixture 1

(ii) Van't Hoff factor is expressed as:

$$i = \frac{\text{normal molar mass (} m_1 \text{)}}{\text{abnormal molar mass (} m'_1 \text{) (due to dissociation or association)}}$$

1

(or any other definition)

(b) $\pi = CRT$

$$M_2 = \frac{w_2 RT}{\pi V}$$

1

$$M_2 = \frac{100 \times 10^{-3} \text{ g} \times 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1} \times 298 \text{ K} \times 760 \times 1000}{13.3 \text{ atm} \times 10 \text{ L}}$$

1

$$M_2 = 13980 \text{ g mol}^{-1} \text{ or } 1.4 \times 10^4 \text{ g mol}^{-1}$$

1

Or

(a) i) Properties, whose values depend only on the concentration (number)

of solute particles in solution and not on the nature of the solute, are called colligative properties.

1

- ii) Molality (m) is the Number of moles of solute dissolved in one kg of the solvent.

1

(b) Given $p_{(\text{gas})} = 0.78 \text{ atm} = 0.78 \times 760 \text{ mm} = 592.8 \text{ mm Hg}$

$$K_H = 8.42 \times 10^{-7} \text{ M / mm Hg}$$

$$X_{\text{gas}} = ?$$

$$X_{\text{gas}} = K_H \times P$$

$$X_{\text{gas}} = 8.42 \times 10^{-7} \times 592.8$$

$$= 4991.376 \times 10^{-7} = 0.4991 \times 10^{-3}$$

1

$$X_{\text{N}_2} = \frac{n_{\text{N}_2}}{n_{\text{N}_2} + n_{\text{H}_2\text{O}}}$$

1/2

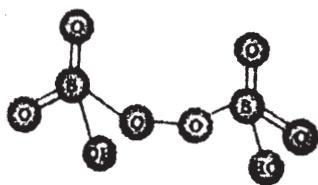
$$0.4991 \times 10^{-3} = \frac{n_{\text{N}_2}}{n_{\text{H}_2\text{O}}}$$

$$0.4991 \times 10^{-3} = \frac{n_{\text{N}_2}}{55.55}$$

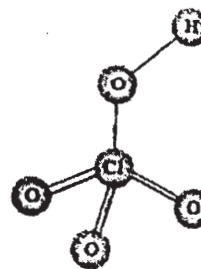
$$n_{\text{N}_2} = 0.4991 \times 10^{-3} \times 55.55 = 2.772 \times 10^{-3} \text{ M}$$

1

29. a)



(i)



(ii)

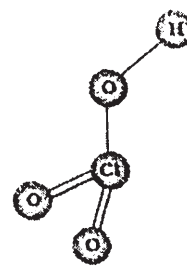
1+1

- b) (i) The lone pair of electrons on N atom in NH_3 is directed and not diffused or delocalized as it is in PH_3 due to larger size of P or due to availability of d-orbitals in P.
- ii) Because S-S single bond is stronger than O-O single bond.
- iii) Because of large electron-electron repulsion among the lone pairs in F_3 than that of Cl_2

1x3=3

OR

a)



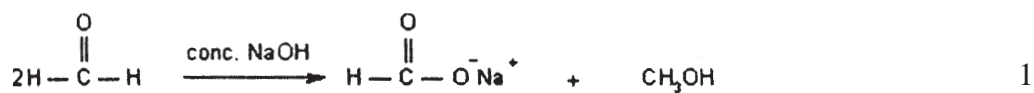
1+1

b) i) Because of resonance, N-O bond length is the average of single and double bond whereas N-OH bond has purely single bond. 1x3=3

ii) Because the three P-Cl bonds are equatorial and two P-Cl bonds are axial.

iii) Because I-Cl bond has lower bond dissociation enthalpy than Cl-Cl bond.

30. (a) (i) **Cannizzaro Reaction.**



Formaldehyde Sodium formate Methyl alcohol

(ii) **Hell-Volhard Zelinsky Reaction.**



Propionic acid α -Bromo propionic acid

(b) (i) **Propanal and Propanone**

Iodoform test. Warm each compound with iodine and sodium hydroxide on a water bath. Propanal ($\text{CH}_3\text{CH}_2\text{CHO}$) No yellow ppt formed 1

Propanone (CH_3COCH_3) Yellow crystals of Iodoform are formed.

(Other relevant test can be accepted)

(ii) **Benzophenone and Acetophenone** 1

Iodoform test. Warm each organic compound with I_2 and NaOH solution.

Acetophenone ($\text{C}_6\text{H}_5\text{COCH}_3$) Yellow precipitates of iodoform are formed Benzophenone Does not respond to this test.

(Other relevant test can be accepted)

(iii) **Phenol and Benzoic acid.**

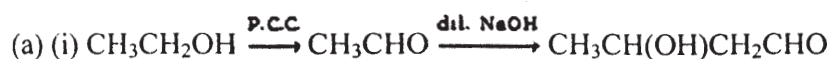
1

FeCl₃ test. Add a few drops of neutral FeCl₃ solution.

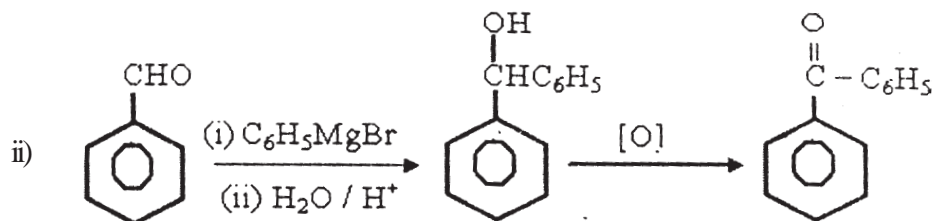
In case of Phenol (C₆H₅OH), violet colour is produced, while in case of Benzoic acid (H₅C₆COOH), a buff coloured ppt. is produced

(Other relevant test can be accepted)

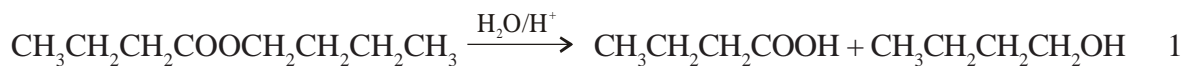
OR



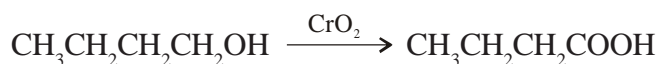
1



1



1



1



1

BIOLOGY (Theory)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

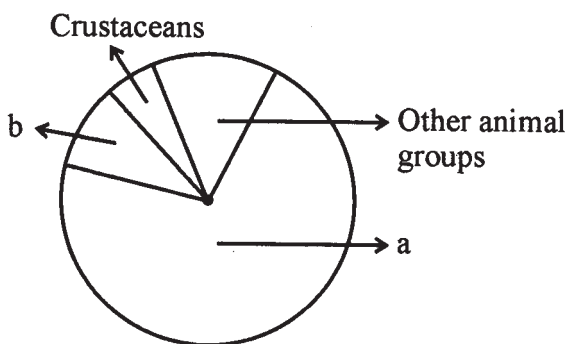
- (i) All questions are compulsory.
- (ii) The question paper consists of four sections A, B, C and D. Section A contains 8 questions of one mark each, Section B is of 10 questions of two marks each, Section C is of 9 questions of three marks each and Section D is of 3 questions of five marks each.
- (iii) There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.
- (iv) Wherever necessary, the diagrams drawn should be neat and properly labelled.

QUESTION PAPER CODE 57/1/1

SECTION A

1. Why hnRNA is required to undergo splicing? 1
2. The microscopic pollen grains of the past are obtained as fossils. Mention the characteristic of the pollen grains that makes it happen. 1
3. How does colostrum provide initial protection against diseases to new born infants? Give one reason. 1

4.

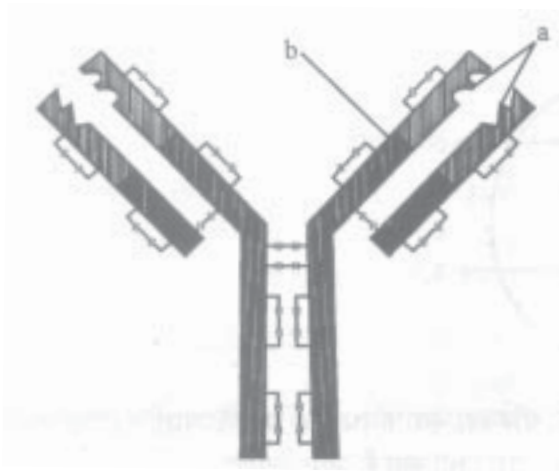


- Name the unlabelled areas 'a' and 'b' of the pie chart (given above) representing the global biodiversity of invertebrates showing their proportionate number of species of major taxa. 1
5. Mention the type of evolution that has brought the similarity as seen in potato tuber and sweet potato. 1
6. Name the group of organisms and the substrate they act on to produce biogas. 1
7. Mention the pollinating agent of an inflorescence of small dull coloured flowers with well exposed stamens and large feathery stigma. Give any one characteristic of pollen grains produced by such flowers. 1
8. Name the organism commercially used for the production of single cell protein. 1

SECTION - B

9. Explain the contribution of *Thermus aquaticus* in the amplification of a gene of interest. 2

10.

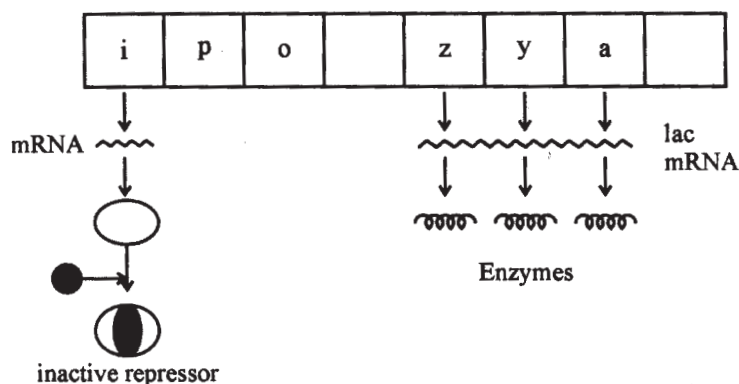


- (i) What does the above diagram illustrate?
- (ii) Name the parts labelled 'a' and 'b'.
- (iii) Name the type of cells that produce this molecule. 2
11. Banana is a parthenocarpic fruit whereas oranges show polyembryony. How are they different from each other with respect to seeds? 2

OR

Where are fimbriae present in a human female reproductive system? Give their function.

12. How is the translation of mRNA terminated? Explain. 2
13. Explain accelerated eutrophication. Mention any two consequences of this phenomenon. 2
14. List the specific symptoms of amoebiasis. Name the causative organism. 2
15. A crane had DDT level as 5 ppm in its body. What would happen to the population of such birds? Explain giving reasons. 2
16. Describe the responsibility of GEAC, set up by the Indian Government. 2
17. During the secondary treatment of the primary effluent how does the significant decrease in BOD occur? 2
18. Study the figure given below and answer the questions: 2

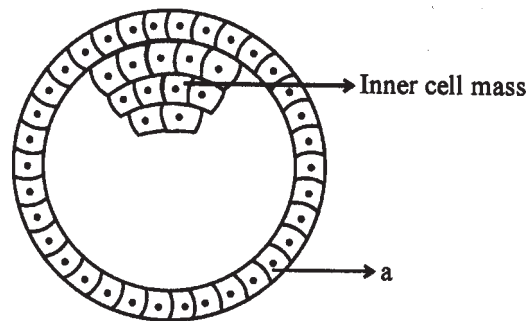


- (a) How does the repressor molecule get inactivated?
- (b) When does the transcription of lac mRNA stop?
- (c) Name the enzyme transcribed by the gene 'Z'.

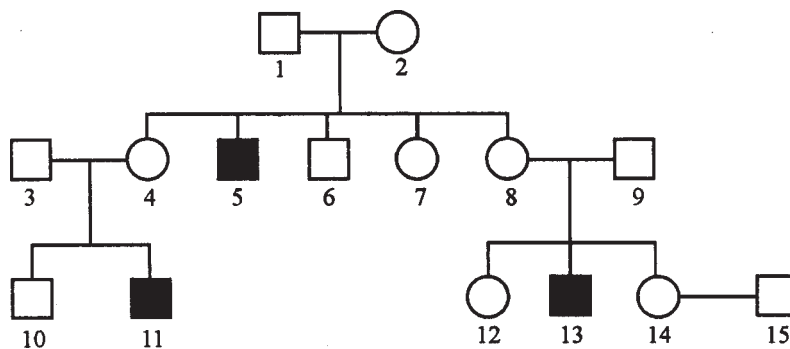
SECTION - C

19. Name the pioneer species on a bare rock. How do they help in establishing the next type of vegetation? Mention the type of climax community that will ultimately get established. 3

20. Study the figure given below and answer the questions that follow:



- (a) Name the stage of human embryo the figure represents.
- (b) Identify 'a' in the figure and mention its function.
- (c) Mention the fate of the inner cell mass after implantation in the uterus.
- (d) Where are the stem cells located in this embryo? 3
21. Give the scientific name of the parasite that causes malignant malaria in humans. At what stage does this parasite enter the human body? Trace its life cycle in human body. 3
22. Draw a labelled schematic sketch of replication fork of DNA. Explain the role of the enzymes involved in DNA replication. 3
23. Explain the causes of global warming. Why is it a warning to mankind?
24. Haemophilia is a sex linked recessive disorder of humans. The pedigree chart given below shows the inheritance of haemophilia in one family. Study the pattern of inheritance and answer the questions given. 2



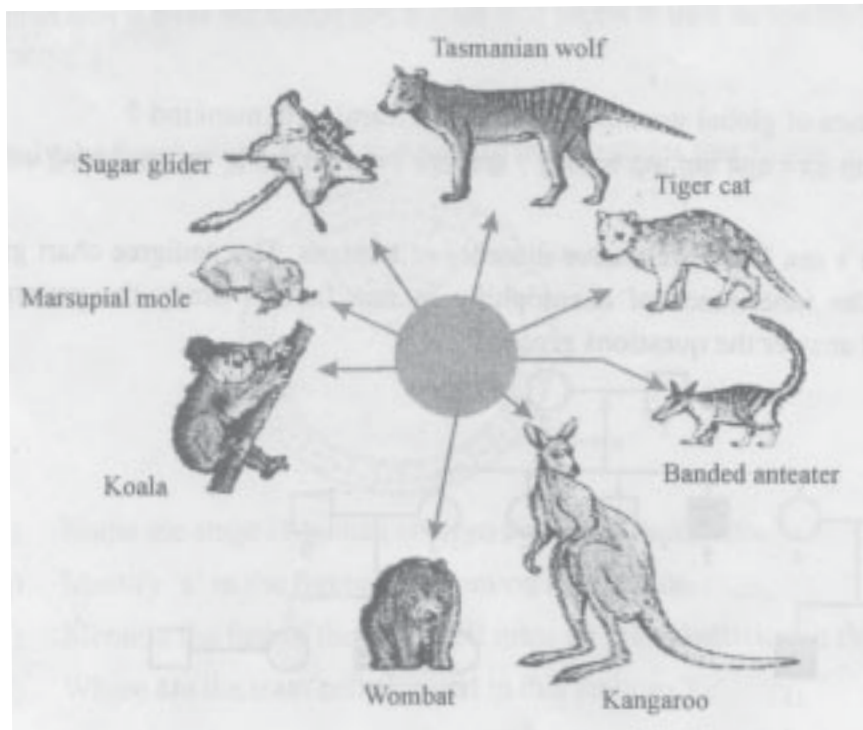
- (a) Give all the possible genotypes of the members 4; 5 and 6 in the pedigree chart.
- (b) A blood test shows that the individual 14 is a carrier of haemophilia. The member numbered 15 has recently married the member numbered 14. What is the probability that their first child will be a haemophilic male?

3

OR

Inheritance pattern of ABO blood groups in humans shows dominance, codominance and multiple allelism. Explain each concept with the help of blood group genotypes.

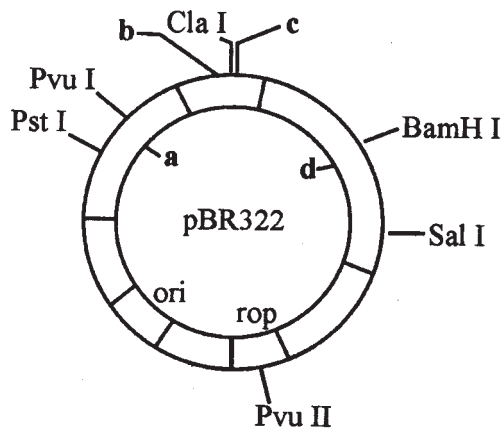
25.



- (a) Mention the specific geographical region where these organisms are found.
- (b) Name and explain the phenomenon that has resulted in the evolution of such diverse species in the region.
- (c) Explain giving reasons the existence of placental wolf and Tasmanian wolf sharing the same habitat.

3

26.



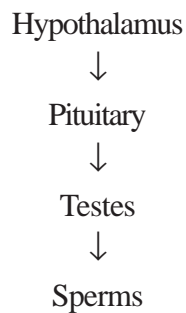
- (a) Identify the selectable markers in the diagram of *E. coli* vector shown above.
- (b) How is the coding sequence of α -galactosidase considered a better marker than the ones identified by you in the diagram? Explain. 3
27. Construct an ideal pyramid of energy when 1,000,000 joules of sunlight is available. Label all its trophic levels. 3

SECTION - D

28. Explain with the help of a diagram the development of a mature embryo sac from a megaspore mother cell in angiosperm. 5

OR

Study the following flow chart. Name the hormones involved at each stage. Explain their functions.



29. (a) Explain the experiment performed by Griffith on *Streptococcus pneumoniae*. What did he conclude from this experiment? 5
- (b) Name the three scientists who followed up Griffith's experiments.
- (c) What did they conclude and how?

OR

Two blood samples A and B picked up from the crime scene were handed over to the forensic department for genetic fingerprinting. Describe how the technique of genetic fingerprinting is carried out. How will it be confirmed whether the samples belonged to the same individual or to two different individuals?

30. One of the main objectives of biotechnology is to minimize the use of insecticides on cultivated crops. Explain with the help of a suitable example how insect resistant crops have been developed using techniques of biotechnology. 5

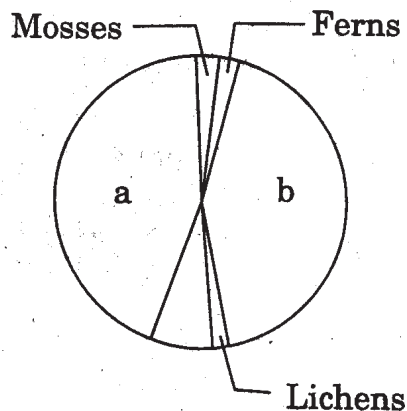
OR

- (a) How is mature insulin different from proinsulin secreted by pancreas in humans?
- (b) Explain how was human functional insulin produced using rDNA technology.
- (c) Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patients?

QUESTION PAPER CODE 57/1

SECTION A

- 1. When and at what end does the 'tailing' of hnRNA take place? 1
- 2. Name the type of flower which favours cross' pollination. 1
- 3. Name the type of cells the AIDS virus enters into after getting in the human body. 1
- 4. Name the unlabelled areas 'a' and 'b' of the pie chart representing the biodiversity of plants showing their proportionate. number of species of major taxa. 1



5. According to Hardy – Weinberg’s principle the allele frequency of a population remains constant. How do you interpret the change of frequency of alleles in a population? 1
6. A boy of ten years had chicken-pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible. 1
7. Which one of the following is the baker’s yeast used in fermentation? 1
Saccharum barberi, *Saccharomyces cerevisiae*, *Sonalika*.
8. Why is bagging of the emasculated flowers essential during hybridization experiments? 1

SECTION B

9. What are recombinant proteins? How do bioreactors help in their production? 2
10. (a) Name the lymphoid organ in humans where all the blood cells are produced.
 (b) Where do the lymphocytes produced by the lymphoid organ mentioned above migrate and how do they affect immunity? 2
11. Draw a vertical section of a maize grain and label (i) pericarp, (ii) scutellum, (iii) coleoptile and (iv) radicle. 2

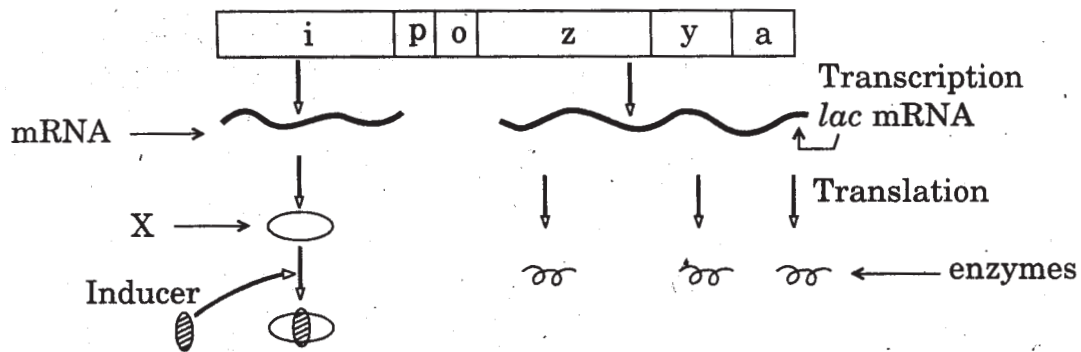
OR

Where are the Leydig cells present? What is their role in reproduction?

12. Explain the dual function of AUG codon. Give the sequence of bases it is transcribed from and its anticodon. 2
13. Explain the cause of algal bloom in a water body. How does it affect an ecosystem? 2
14. List the specific symptoms of typhoid. Name its causative agent.
15. Name the pioneer and the climax species in a water body. Mention the changes observed in the biomass and the biodiversity of the successive seral communities developing in the water body. 2
16. How is DNA isolated in purified form from a bacterial cell? 2

17. Explain metastasis. Why is it fatal? 2

18.



- (a) Name the molecule 'X' synthesised by 'i' gene, How does this' molecule get inactivated?
- (b) Which ,one of the structural genes codes for β -galactosidase ?
- (c) When will the' transcription of this gene stop? 2

SECTION C

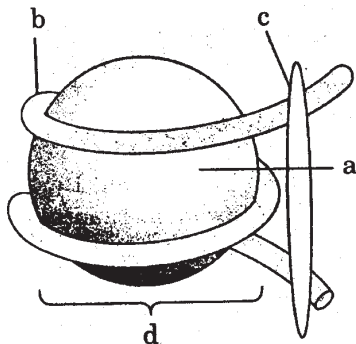
19. Fertilization is essential for production of seed, but in some angiosperms seeds develop without fertilization.

- (i) Give an example of an angiosperm that produces seeds without fertilization. Name the process.
- (ii) Explain the two ways by which seeds develop without fertilization. 3

20. Explain any three measures which will control vehicular air pollution in Indian cities.

- 21. (a) Why do the symptoms of malaria not appear immediately after the entry of sporozoites into the human body when bitten by female *Anopheles*? Explain.
- (b) Give the scientific name of the malarial parasite that causes malignant malaria in humans. 3

22.

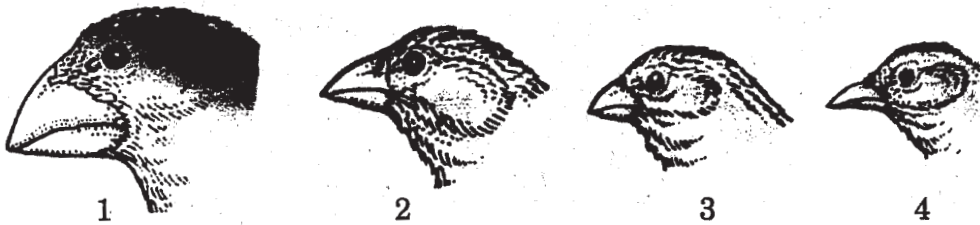


- (a) What is this diagram representing?
- (b) Name the parts a, b and c.
- (c) In the eukaryotes the DNA molecules are organised within the nucleus. How is the DNA molecule organised in a bacterial cell in absence of a nucleus? 3
23. Ornithologists observed decline in the bird population in an area near a lake after the setting of an industrial unit in the same area. Explain the cause responsible for the decline observed. 3
24. Recently a girl baby has been reported to suffer from haemophilia. How is it possible? Explain with the help of a cross. 3

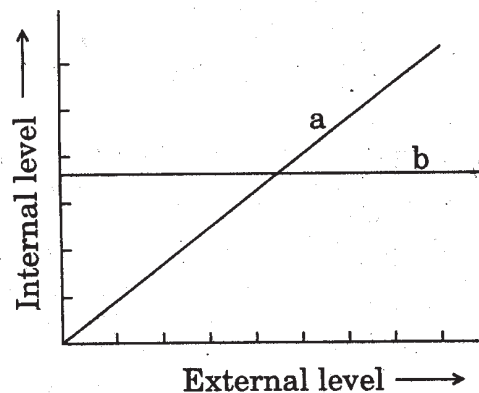
OR

What are satellite DNA in a genome? Explain their role in DNA fingerprinting. 3

25.



- (a) Write your observations on the variations seen in the Darwin's finches shown above.
- (b) How did Darwin explain the existence of different varieties of finches on Galapagos Islands? 3
26. Name and explain the techniques used in the separation and isolation of DNA fragments to be used in recombinant DNA technology. 3
27. The following graph represents the organismic response to certain environmental condition (e.g. temperature) :



- (i) Which one of these, 'a' or 'b', depicts conformers?
- (ii) What does the other line graph depict?
- (iii) How do these organisms differ from each other with reference to homeostasis?
- (iv) Mention the category to which humans belong. 3

SECTION D

28. How did Hershey and Chase prove that DNA is the hereditary material? Explain their experiment with suitable diagrams.

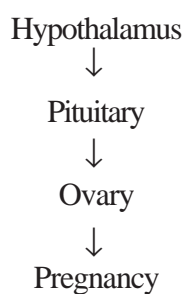
OR

A particular garden pea plant produces only violet flowers.

- (a) Is it homozygous dominant for the trait or heterozygous?
 - (b) How would you ensure its genotype? Explain with the help of crosses. 5
29. How does the pollen mother cell develop into a mature pollen grain? Illustrate the stages with labelled diagrams. 5

OR

Study the flow chart given below. Name the hormones involved at each stage and explain their functions. 5



30. How is a transgenic tobacco plant protected against *Meloidogyne incognitia*? Explain the procedure. 5

OR

- (a) Name the source of Taq polymerase. Explain the advantage of its use in biotechnology.
- (b) Expand the name of the enzyme ADA. Why is this enzyme essential in the human body? Suggest a gene therapy for its deficiency. 5

Marking Scheme — Biology (Theory)

General Instructions :

The Marking Scheme and mechanics of marking

1. In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.
2. Any words/phrases given within brackets do not have marks.
3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.
4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substitute.
5. All awarded marks are to be written in the left hand margin at the end of the question or its part.
6. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place “Half-tick” ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
7. If no marks are awarded to any part or question put a cross (×) at incorrect value portion and mark it zero (in words only).
8. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.
10. If parts have been attempted at different places do the totalling at the end of the part attempted last.
11. If any extra part is attempted or any question is reattempted, score out the last one and write “extra”.
12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
14. Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.

QUESTION PAPER CODE 57/1/1
EXPECTED ANSWERS/VALUE POINTS

SECTION A

Q.Nos. 1 - 8 are of one mark each.

1. Why hnRNA is required to undergo splicing ?

Ans Since hnRNA is non-functional it has to be made functional // removal of introns and joining of exons [1 Mark]

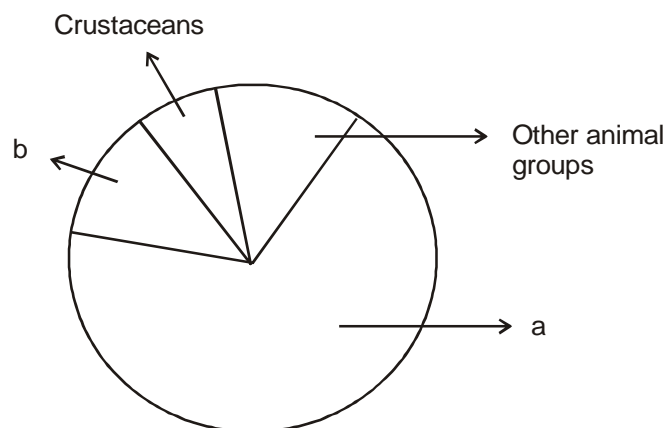
2. The microscopic pollen grains of the past are obtained as fossils. Mention the characteristic of the pollen grains that makes it happen.

Ans Resistant organic material sporopollenin, present in (hard) outer layer / exine = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

3. How does colostrum provide initial protection against diseases to new born infants ? Give one reason.

Ans Colostrum has abundant antibodies/IgA to develop resistance in new born babies [1 Mark]

4.



Name the unlabelled areas 'a' and 'b' of the pie chart (given above) representing the global biodiversity of invertebrates showing their proportionate number of species of major taxa.

Ans a-Insects, b-Molluscs = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

5. Mention the type of evolution that has brought the similarity as seen in potato tuber and sweet potato.

Ans Convergent evolution [1 Mark]

6. Name the group of organisms and the substrate they act on to produce biogas.

Ans Methanogens, substrate is excreta / gobar / cellulose / sludge = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

7. Mention the pollinating agent of an inflorescence of small dull coloured flowers with well exposed stamens and large feathery stigma. Give any one characteristic of pollen grains produced by such flowers.

Ans. Wind, light weight / enormous number / non-sticky = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

8. Name the organism commercially used for the production of single cell protein.

Ans *Spirulina* / *Methylophilus methylotrophus* [1 Mark]

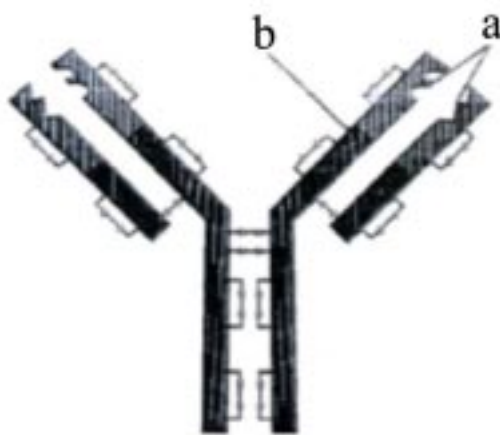
SECTION-B

Q.Nos. 9 - 18 are of two marks each.

9. Explain the contribution of *Thermus aquaticus* in the amplification of a gene of interest.

Ans *Thermus aquaticus* produces a thermostable, DNA polymerase, when DNA is denatured at high temperature, this enzyme remains active = $\frac{1}{2} \times 4$ [2 Mark]

10.



(i) What does the above diagram illustrate ?

(ii) Name the parts labelled 'a' and 'b'.

(iii) Name the type of cells that produce this molecule.

Ans (i) Structure of an antibody molecule = $\frac{1}{2}$

(ii) a- antigen binding site, b- heavy chain = $\frac{1}{2} + \frac{1}{2}$

(iii) B-cells / B-lymphocytes = $\frac{1}{2}$

[$\frac{1}{2} \times 4 = 2$ Marks]

11. Banana is a parthenocarpic fruit whereas oranges show polyembryony. How are they different from each other with respect to seeds ?

Ans Banana fruit is formed without fertilization, it has no seeds (if present not viable), orange has seeds with many embryos, formed without fertilization / apomixis = $\frac{1}{2} \times 4$

[2 Marks]

OR

Where are fimbriae present in a human female reproductive system ? Give their function.

Ans Fimbriae are present at the edge of infundibulum of the fallopian tube , It collects the ovum / secondary oocyte = 1 + 1

[1 + 1 = 2 Marks]

12. How is the translation of mRNA terminated ? Explain.

Ans. When a stop codon UAG / UGA / UAA, presents itself on the mRNA, it has no corresponding tRNA / does not code for any amino acid , release factor binds to the stop codon and translation ends = $\frac{1}{2} \times 4$

[2 Marks]

13. Explain accelerated eutrophication. Mention any two consequences of this phenomenon.

Ans Accelerated eutrophication is addition of effluents from industries and homes that accelerates the ageing of a lake = 1

Consequences are destruction of aquatic life / decreased dissolved oxygen, algal bloom (any two = $\frac{1}{2} + \frac{1}{2}$)

[1 + 1 = 2 Marks]

14. List the specific symptoms of amoebiasis. Name the causative organism.

Ans Constipation / abdominal pain and cramps / stools with excess mucous and blood clots (any two = $\frac{1}{2} + \frac{1}{2}$)

Entamoeba histolytica = 1

[1 + 1 = 2 Marks]

15. A crane had DDT level as 5 ppm in its body. What would happen to the population of such birds ? Explain giving reasons.

Ans Population of birds decreases, DDT can neither be metabolised nor be excreted, interferes with calcium metabolism causing thinning of egg shells, premature breaking of egg shells = $\frac{1}{2} \times 4$

[2 Marks]

16. Describe the responsibility of GEAC, set up by the Indian Government.

Ans (Genetic Engineering Approval Committee) GEAC checks the validity of genetic

engineering research, and checks the safety of introducing any GMO (genetically modified organisms) because sometimes the GMO results could be unpredictable

= 1 + 1

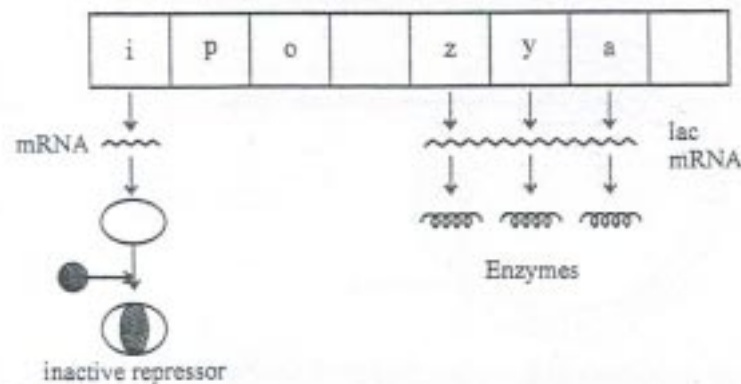
[1 + 1 = 2 Marks]

17. During the secondary treatment of the primary effluent how does the significant decrease in BOD occur?

Ans During the secondary treatment of the primary affluent (Primary effluents are passed into a large aeration tank, where it is constantly agitated, and air is pumped into it) vigorous growth of useful aerobic microbes, into flocs takes place, these microbes use major part of the organic matter and this reduces BOD = $\frac{1}{2} \times 4$

[2 Marks]

18. Study the figure given below and answer the questions :



(a) How does the repressor molecule get inactivated ?

(b) When does the transcription of lac mRNA stop ?

(c) Name the enzyme transcribed by the gene 'Z'.

Ans. (a) Binding of inducer / lactose to the repressor = 1

(b) In the absence of inducer lactose / when repressor binds with the operator = $\frac{1}{2}$

(c) β - galactosidase = $\frac{1}{2}$

[1 + $\frac{1}{2}$ + $\frac{1}{2}$ = 2 Marks]

SECTION - C

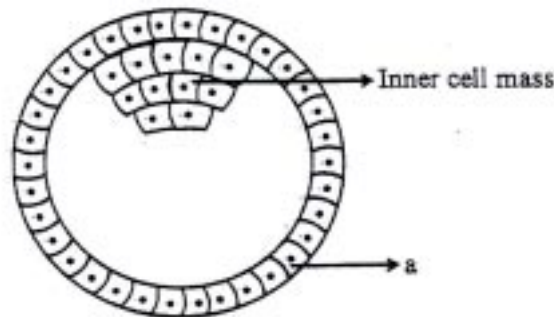
Q.Nos. 19 - 27 are of three marks each.

19. Name the pioneer species on a bare rock. How do they help in establishing the next type of vegetation ? Mention the type of climax community that will ultimately get established.

Ans. Lichens, they secrete acids, to dissolve rocks, which result in weathering and soil forms, leads to growth of bryophytes, forests = $\frac{1}{2} \times 6$

[$\frac{1}{2} \times 6 = 3$ Marks]

20. Study the figure given below and answer the questions that follow :



- Name the stage of human embryo the figure represents.
- Identify 'a' in the figure and mention its function.
- Mention the fate of the inner cell mass after implantation in the uterus.
- Where are the stem cells located in this embryo ?

Ans. (a) Blastocyst / blastula = $\frac{1}{2}$

(b) Trophoblast, helps in attachment of the blastocyst to the uterine wall / endometrium = $\frac{1}{2} + \frac{1}{2}$

(c) The inner cell mass gets differentiated into ectoderm, mesoderm and endoderm = 1

(If only three germinal layers / any two layers named = $\frac{1}{2}$, any one name given = No marks)

(d) Inner cell mass = $\frac{1}{2}$

[$\frac{1}{2} + 1 + 1 + \frac{1}{2} = 3$ Marks]

21. Give the scientific name of the parasite that causes malignant malaria in humans. At what stage does this parasite enter the human body ? Trace its life cycle in human body.

Ans (a) *Plasmodium falciparum* = $\frac{1}{2}$

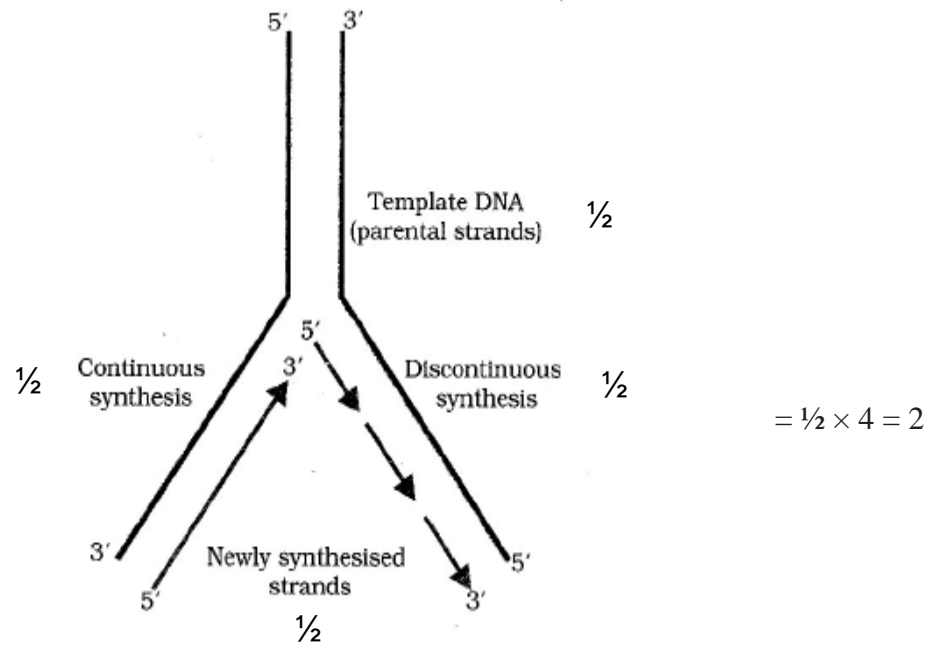
(b) Sporozoite = $\frac{1}{2}$

(c) Sporozoites injected into blood with bite of mosquito , reach liver through blood and reproduce asexually bursting the cells , reproduce asexually in RBCs and bursting of the red blood cells, forms (male and female) gametocytes in RBCs = $\frac{1}{2} \times 4$

[$\frac{1}{2} + \frac{1}{2} + 2 = 3$ Marks]

22. Draw a labelled schematic sketch of replication fork of DNA. Explain the role of the enzymes involved in DNA replication.

(a)

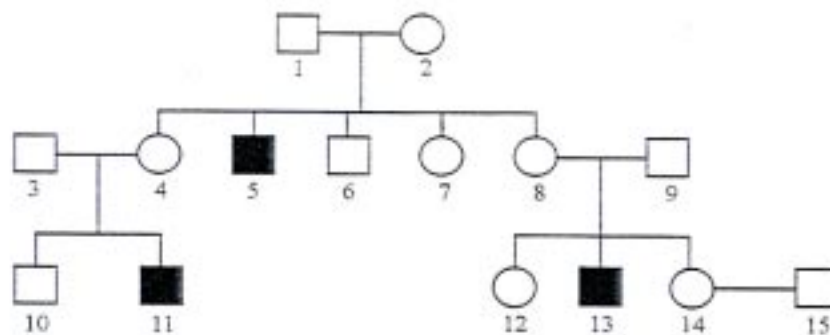


- (b) DNA polymerase catalyses the polymerisation of nucleotides, Ligase joins the fragments of discontinuous synthesis = $\frac{1}{2} + \frac{1}{2}$ [2 + 1 = 3 Marks]

23. Explain the causes of global warming. Why is it a warning to mankind ?

- Ans (a) Emission of green house gases, absorb IR radiation from earth's surface / emit it again to earth, the cycle continues , till the earth's surface has no long wave radiations to emit = $\frac{1}{2} \times 4 = 2$
- (b) Deleterious changes in the environment, odd climatic changes, melting of polar / Himalayan ice caps, rise in sea level, flooding / submerging of coastal areas (any two = $\frac{1}{2} \times 2$) [2 + 1 = 3 Marks]

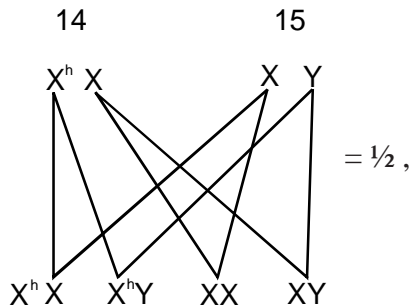
24. Haemophilia is a sex linked recessive disorder of humans. The pedigree chart given below shows the inheritance of haemophilia in one family. Study the pattern of inheritance and answer the questions given.



- (a) Give all the possible genotypes of the members 4, 5 and 6 in the pedigree chart.
- (b) 'A blood test shows that the individual 14 is a carrier of haemophilia. The member numbered 15 has recently married the member numbered 14. What is the probability that their first child will be a haemophilic male ?

Ans (a) (i) 4 – $X X^h$, = $\frac{1}{2}$ X = normal
 5 – $X^h Y$, = $\frac{1}{2}$ X^h = haemophilic
 6 – XY , = $\frac{1}{2}$ $\frac{1}{2} \times 3 = 1 \frac{1}{2}$

(b)



25% chances of haemophilic male, = 1

[$1\frac{1}{2} + \frac{1}{2} + 1 = 3$ Marks]

OR

Inheritance pattern of ABO blood groups in humans shows dominance, codominance and multiple allelism. Explain each concept with the help of blood group genotypes.

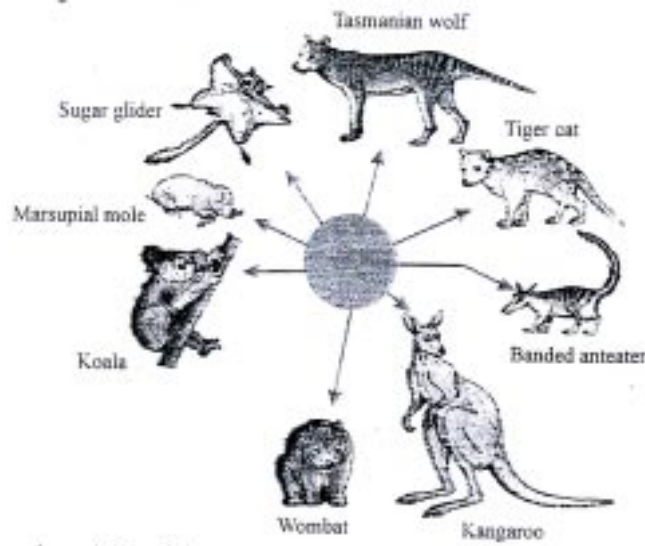
Ans In the first case of inheritance of blood group there are three alleles I^A , I^B and i out of which we inherit any two of them - multiple allelism = 1

In case of AB group the alleles are I^A and I^B and both are expressed. – codominance = 1

In case of $I^A i$ and $I^B i$ which are heterozygous the dominant gene expresses – law of dominance = 1

[1 + 1 + 1 = 3 Marks]

25.



- (a) Mention the specific geographical region where these organisms are found.
- (b) Name and explain the phenomenon that has resulted in the evolution of such diverse, species in the region.
- (c) Explain giving reasons the existence of placental wolf and Tasmanian wolf sharing the same habitat.

Ans (a) Australia = 1/2

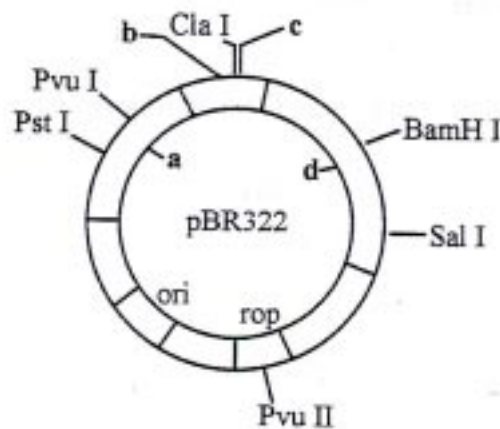
(b) Adaptive Radiation = 1/2

The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitat) is called adaptive radiation = 1

(c) (Convergent evolution / Adaptive Convergence) Organisms coming from different stock, evolved similar features and adapted to same habitat = 1

[1/2 + 1/2 + 1 + 1 = 3 Marks]

26.



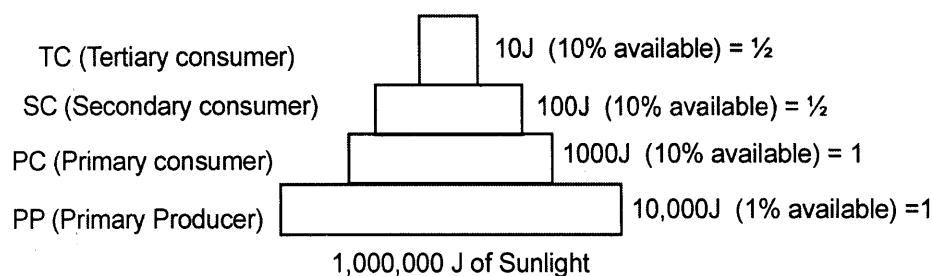
- (a) Identify the selectable markers in the diagram of *E. coli* vector shown above.
- (b) How is the coding sequence of α -galactosidase considered a better marker than the ones identified by you in the diagram ? Explain.

Ans. (a) a = ampicillin, b = EcoR-I, c = Hind - III, d = tetracycline = $\frac{1}{2} \times 4$

- (b) Insertion of alien gene into coding sequence of α -galactosidase, results into inactivation of the enzyme // (insertional inactivation), these colonies do not produce any colour (in presence of chromogenic substrate) hence are identified as recombinant colonies = $\frac{1}{2} + \frac{1}{2}$ [2 + $\frac{1}{2}$ + $\frac{1}{2}$ = 3 Marks]

27. Construct an ideal pyramid of energy when 1,000,000 joules of sunlight is available. Label all its trophic levels.

Ans.



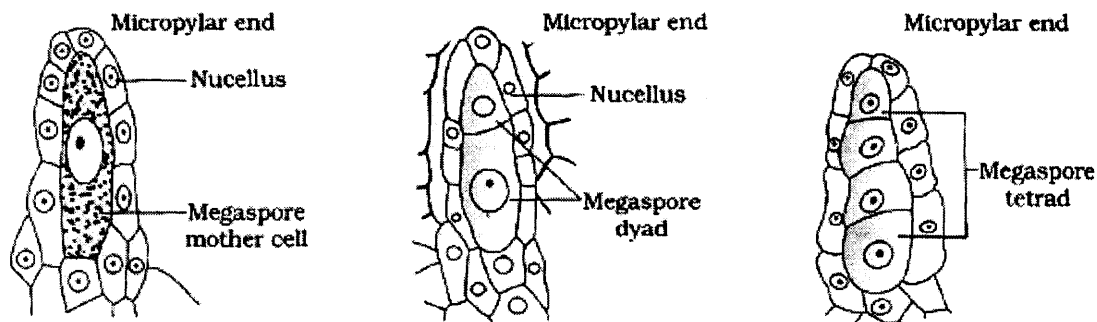
[$\frac{1}{2}$ + $\frac{1}{2}$ + 1 + 1 = 3 Marks]

SECTION -D

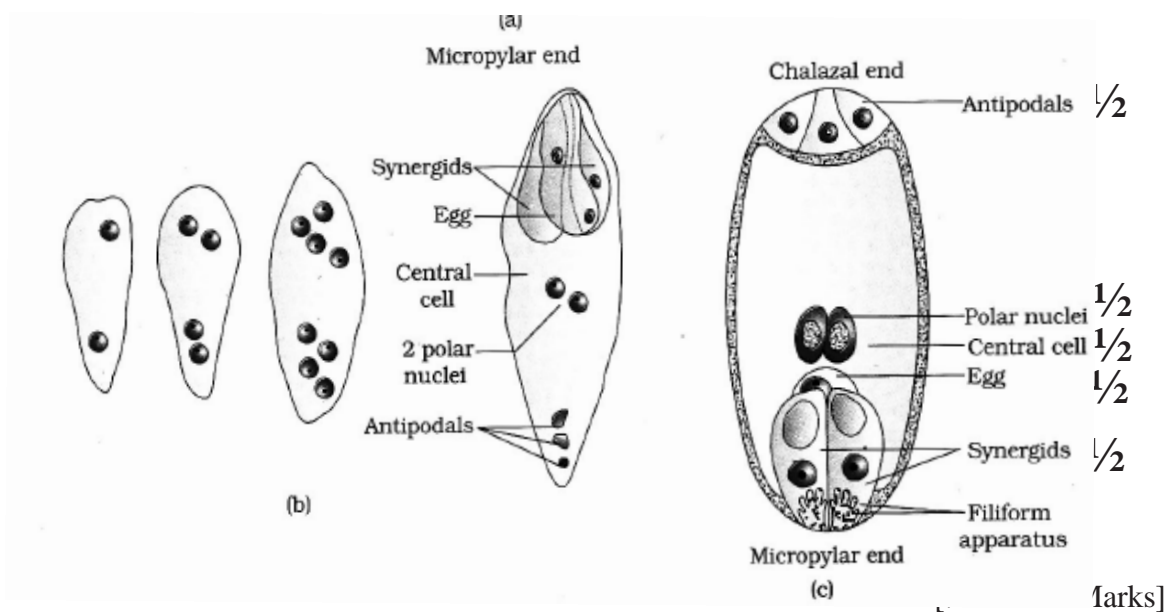
Q.Nos. 28 - 30 are of five marks each.

28. Explain with the help of a diagram the development of a mature embryo sac from a megaspore mother cell in angiosperm.

Ans.



$\frac{1}{2}$



MMC (Megaspore Mother Cell - $2n$)

↓ meiosis = $\frac{1}{2}$

One functional megaspore

↓ mitosis thrice of nucleus = $\frac{1}{2}$

Eight nucleated embryo sac

↓

Mature 7 celled embryo sac [$\frac{1}{2} + \frac{1}{2} = 1$]

[4 + 1 = 5 Marks]

OR

Study the following flow chart. Name the hormones involved at each stage. Explain their functions.

Hypothalamus

↓

Pituitary

↓

Testes

↓

Sperms

Ans Hypothalamus secretes GnRH, stimulates, anterior pituitary, to produce LH and FSH, LH acts on Leydig cells, and stimulates synthesis and secretion of androgens / Testosterone, which in turn stimulates the process of spermatogenesis, FSH acts on the Sertoli cells, and stimulates secretion of some factors, which help in the process of spermiogenesis = $\frac{1}{2} \times 10$

[5 Marks]

29. (a) **Explain the experiment performed by Griffith on *Streptococcus pneumoniae*. What did he conclude from this experiment ?**
- (b) **Name the three scientists who followed up Griffith's experiments.**
- (c) **What did they conclude and how ?**

Ans (a) S strain → Inject into mice → Mice die = $\frac{1}{2}$
R Strain → Inject into mice → Mice live = $\frac{1}{2}$
S Strain (heat-killed) → Inject into mice → Mice live = $\frac{1}{2}$
S Strain (heat-killed)
+ R Strain (live) → Inject into mice → Mice dead = $\frac{1}{2}$

He concluded that R Strain bacteria had somehow been transformed by the heat-killed S Strain bacteria = $\frac{1}{2}$

($\frac{1}{2} \times 5 = 2\frac{1}{2}$)

- (b) Oswald Avery, Colin MacLeod, Maclyn McCarty (if all three mentioned = 1, if two mentioned = $\frac{1}{2}$, if one mentioned = 0)
- (c) They concluded that DNA is the hereditary material = $\frac{1}{2}$

By discovering that protein digesting enzymes (proteases) and / RNA digesting enzymes (RNases) did not affect transformation so the transforming substance was not a protein or RNA, but digestion with DNase did inhibit transformation therefore they concluded that DNA is the hereditary material // by purifying the biochemicals using enzymes like proteases, RNases and DNases = $\frac{1}{2} \times 3$

[$2\frac{1}{2} + 1 + 1\frac{1}{2} = 5$ Marks]

OR

Two blood samples A and B picked up from the crime scene were handed over to the forensic department for genetic fingerprinting. Describe how the technique of genetic fingerprinting is carried out. How will it be confirmed whether the samples belonged to the same individual or to two different individuals ?

Ans Isolation of DNA from blood sample A and B (and its amplification), digestion of DNA by restriction endonucleases, separation of DNA fragments by electrophoresis (denaturation of DNA into single strands), transferring (blotting) of separated DNA fragments to synthetic membrane such as nitrocellulose or nylon, hybridisation using

labelled VNTR probe , detection of hybridised DNA fragments by autoradiography
 $= \frac{1}{2} \times 6$

The two fingerprints are compared =1

If the banding patterns are similar they belong to the same individual A and B, if
 banding patterns are dissimilar then A and B are different individuals $= \frac{1}{2} + \frac{1}{2}$

[3 + 1 + $\frac{1}{2}$ + $\frac{1}{2}$ = 5 Marks]

30. One of the main objectives of biotechnology is to minimize the use of insecticides on cultivated crops. Explain with the help of a suitable example how insect resistant crops have been developed using techniques of biotechnology.

Ans Bt toxin gene is isolated from *Bacillus thuringiensis*, this gene is incorporated in the cotton plant , using a vector , the plant is now a Bt cotton and it produces crystals of protoxin , which is an insecticidal protein , when the insect ball worm infects the cotton plant the toxin is taken in , pH of the gut solubilises these crystals , converts it into active form , which binds to the epithelial cells of the gut, causes swelling , leads to lysis and results in death of insect $= \frac{1}{2} \times 10$

[$\frac{1}{2} \times 10 = 5$ Marks]

OR

- (a) **How is mature insulin different from proinsulin secreted by pancreas in humans ?**
- (b) **Explain how was human functional insulin produced using rDNA technology.**
- (c) **Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patients ?**

Ans (a)

	<u>Proinsulin</u>	<u>Mature Insulin</u>
(i)	It has A, B and C polypeptide strands	It has only A and B polypeptide strands
(ii)	It is non functional	It is functional

$= \frac{1}{2} \times 2 = 1$

- (b) Two DNA sequences corresponding to its A and B chains were prepared, and were introduced in plasmids of *E. coli* , to produce insulin chains, chains A and B were produced separately, extracted, and combined by creating disulphide bonds $= \frac{1}{2} \times 6$,
- (c) Because it does not develop allergy or other type of reactions which was developed by the use of insulin used earlier = 1

[1 + 3 + 1 = 5 Marks]

QUESTION PAPER CODE 57/1
EXPECTED ANSWERS/VALUE POINTS

SECTION A

Q.Nos. 1 - 8 are of one mark each

1. When and at what end does the 'tailing' of hnRNA take place ?

Ans During conversion of hnRNA into functional mRNA , at 3' end = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

2. Name the type of flower which favours cross pollination.

Ans Chasmogamous

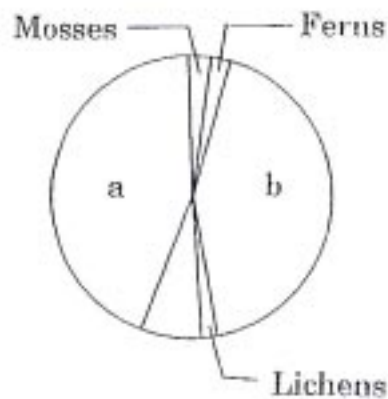
[1 Mark]

3. Name the type of cells the AIDS virus enters into after getting in the human body.

Ans Macrophage / Helper-T-Cells

[1 Mark]

4. Name the unlabelled areas 'a' and 'b' of the pie chart representing the biodiversity of plants showing their proportionate number of species of major taxa.



Ans a = Fungi , b = Angiosperm = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

5. According to Hardy - Weinberg's principle the allele frequency of a population remains constant. How do you interpret the change of frequency of alleles in a population ?

Ans It indicates gene migration / gene flow / genetic drift / mutation / genetic recombination / natural selection leading to evolution.

[1 Mark]

6. A boy of ten years had chicken-pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible.

Ans Antibodies produced during the first infection, result in memory of the first encounter to protect the body in future = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

7. Which one of the following is the baker's yeast used in fermentation ?

Saccharum barberi, *Saccharomyces cerevisiae*, Sonalika.

Ans *Saccharomyces cerevisiae*

[1 Mark]

8. Why is bagging of the emasculated flower essential during hybridization experiments ?

Ans To prevent the entry of unwanted pollen // in order to have desired cross pollination

[1 Mark]

SECTION B

Q.Nos. 9 - 18 are of 2 marks each.

9. What are recombinant proteins? How do bioreactors help in their production ?

Ans Any protein produced by genetically altered gene in a host = 1

Bioreactors can be thought of as vessels in which raw materials are biologically converted into specific products // A bioreactor provides the optimal conditions for achieving the desired product by providing optimum growth conditions (temperature, pH, substrate, salts, vitamins, oxygen) = 1

[1 + 1 = 2 Marks]

10. (a) Name the lymphoid organ in humans where all the blood cells are produced.

(b) Where do the lymphocytes produced by the lymphoid organ mentioned above migrate and how do they affect immunity ?

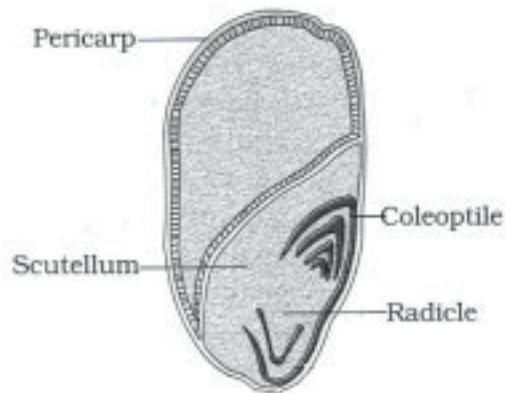
Ans (a) Bone marrow = 1

(b) Secondary lymphoid organs / spleen / lymph nodes / tonsils / Peyer's patches of small intestine / appendix = $\frac{1}{2}$

They trap the microbes / they activate the lymphocytes / they trap the antigens = $\frac{1}{2}$

11. Draw a vertical section of a maize grain and label (i) pericarp, (ii) scutellum, (iii) coleoptile and (iv) radicle

Ans



$$= \frac{1}{2} \times 4 = 2$$

[2 Marks]

OR

Where are the Leydig cells present ? What is their role in reproduction ?

Ans Between / outside the seminiferous tubules // interstitium of the testes = 1

(If only testes given = $\frac{1}{2}$)

Role - stimulates (synthesis) and secretion of androgens = 1

[1 + 1 = 2 Marks]

12. Explain the dual function of AUG codon. Give the sequence of bases it is transcribed from and its anticodon.

Ans Codes for Methionine , and is an initiation codon = $\frac{1}{2} + \frac{1}{2}$

The sequence of bases from which it is transcribed is TAC = $\frac{1}{2}$

Its anticodon is UAC = $\frac{1}{2}$

[2 Marks]

13. Explain the cause of algal bloom in a water body. How does it affect an ecosystem ?

Ans Effluents from home / industries / chemical fertilizers / agriculture / sewage , bring or add nutrients to the water body which enhances algal growth = $\frac{1}{2} + \frac{1}{2}$

Effects - Reduces oxygen content / BOD increases. deterioration of water quality, affects all aquatic life forms, toxicity of water increases (any two) = $\frac{1}{2} + \frac{1}{2}$

[1 + 1 = 2 Marks]

14. List the specific symptoms of typhoid. Name its causative agent.

Ans Sustained high fever (39° to 40° C), weakness, stomach pain, constipation, headache, loss of appetite (any three) = $\frac{1}{2} \times 3$

Causative agent - *Salmonella typhi* = 1/2

[1 1/2 + 1/2 = 2 Marks]

15. Name the pioneer and the climax species in a water body. Mention the changes observed in the biomass and the biodiversity of the successive seral communities developing in the water body.

Ans Pioneer species ; Phytoplanktons = 1/2

Climax species ; Forest / Trees = 1/2

There will be gradual increase in the biomass = 1/2

Free floating angiosperms / rooted hydrophytes / sedges / grasses = 1/2

[1/2 × 4 = 2 Marks]

16. How is DNA isolated in purified form from a bacterial cell ?

Ans Lysozyme added to remove the cell wall , Ribonuclease added to remove RNAs ,
Proteases added to remove proteins , chilled ethanol added to precipitate DNA
= 1/2 × 4

[1/2 × 4 = 2 Marks]

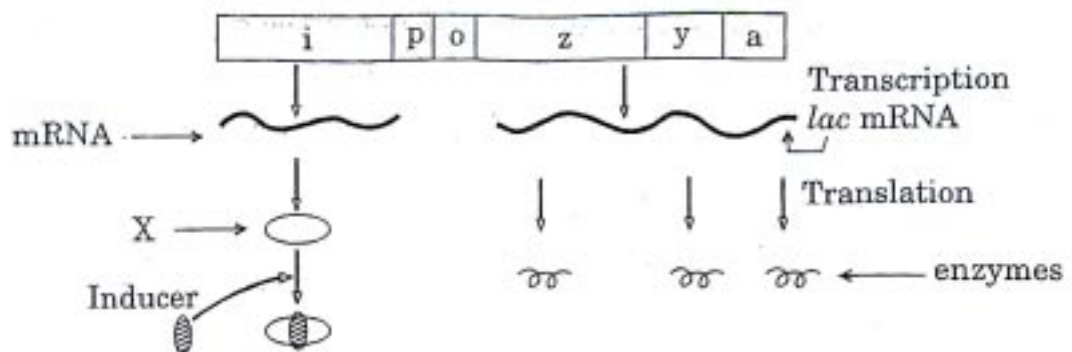
17. Explain metastasis. Why is it fatal ?

Ans Cells sloughed off from tumors reach distant sites through blood , and wherever they
get lodged in the body they start a new tumor there , this property is called metastasis
= 1/2 + 1/2 ,

It is fatal because it causes malignant tumours / cancer = 1

[1 + 1 = 2 Marks]

18.



(a) Name the molecule 'X' synthesised by 'i' gene. How does this molecule get inactivated?

(b) Which one of the structural genes codes for β -galactosidase ?

(c) When will the transcription of this gene stop ?

Ans (a) Repressor = $\frac{1}{2}$,

Lactose (inducer) binds with the repressor molecule = $\frac{1}{2}$,

(b) Z gene = $\frac{1}{2}$,

(c) When all the lactose molecules are consumed / repressor becomes free to bind with operator = $\frac{1}{2}$

[1 + $\frac{1}{2}$ + $\frac{1}{2}$ = 2 Marks]

SECTION C

Q.Nos. 19 - 27 are of 3 marks each.

19. Fertilization is essential for production of seed, but in some angiosperms seeds develop without fertilization.

(i) Give an example of an angiosperm that produces seeds without fertilization. Name the process.

(ii) Explain the two ways by which seeds develop without fertilization.

Ans (i) Members of Asteraceae / grasses / citrus / mango, apomixis = $\frac{1}{2}$ + $\frac{1}{2}$,

(ii) Two ways -

(a) In some species the diploid egg cell is formed without reduction division and develops into embryo without fertilization.

(b) More often, as in many citrus and mango varieties some of the nucellar cells surrounding the embryo sac start dividing, protrude into the embryo sac and develop into the embryos = 1 + 1

[1 + 2 = 3 Marks]

20. Explain any three measures which will control vehicular air pollution in Indian cities.

Ans Use of CNG as the fuel, use of unleaded petrol, low sulphur petrol / diesel, use of catalytic converter in the vehicles, phasing out of old vehicles (any three) = 1 × 3

[3 Marks]

21. (a) Why do the symptoms of malaria not appear immediately after the entry of sporozoites into the human body when bitten by female Anopheles? Explain.

(b) Give the scientific name of the malarial parasite that causes malignant malaria in humans.

Ans The symptom of fever appears only when the RBCs burst, releasing haemozoin

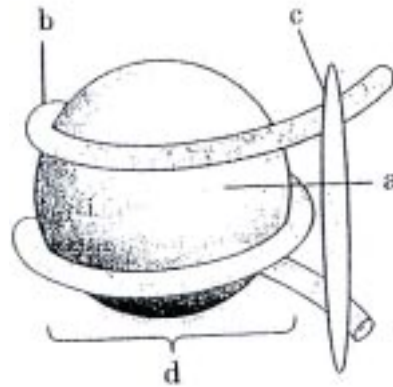
(along with the multiple number of the parasite), but prior to this the parasite has to complete an asexual cycle in liver cells, no symptom appears in the infected person between the period the parasite enters the body till RBCs release haemozoin = $\frac{1}{2} \times 4$

(If only incubation period mentioned, award $\frac{1}{2}$ mark in lieu of the above)

(b) *Plasmodium falciparum* = 1

[2 + 1 = 3 Marks]

22.



- (a) What is this diagram representing ?
- (b) Name the parts a, b and c.
- (c) In the eukaryotes the DNA molecules are organised within the nucleus. How is the DNA molecule organised in a bacterial cell in absence of a nucleus ?

Ans (a) Nucleosomes = $\frac{1}{2}$

(b) a - Histone octamer = $\frac{1}{2}$,

b - DNA = $\frac{1}{2}$,

c- H1 histone = $\frac{1}{2}$

(c) In bacteria DNA in nucleoid, is organised in large loops held by proteins = $\frac{1}{2} + \frac{1}{2}$

[$\frac{1}{2} + \frac{1}{2} + 1 = 3$ Marks]

23. Ornithologists observed decline in the bird population in an area near a lake after the setting of an industrial unit in the same area. Explain the cause responsible for the decline observed.

Ans Toxicants like DDT entered the trophic levels of the food chain , accumulated as it can neither be metabolised nor be excreted , toxicants disturb Ca metabolism, result in thinning of egg shells, premature breaking of eggs, population declined = $\frac{1}{2} \times 6$

[$\frac{1}{2} \times 6 = 3$ Marks]

24. Recently a girl baby has been reported to suffer from haemophilia. How is it possible ? Explain with the help of a cross.

Ans	X^hY	X	XX^h
	Father is		Mother is
	Haemophilic		is carrier
	= 1		= 1
		↓	
		X^hX^h	= 1
		Possibility of the daughter being haemophilic	

[1 + 1 + 1 = 3 Marks]

OR

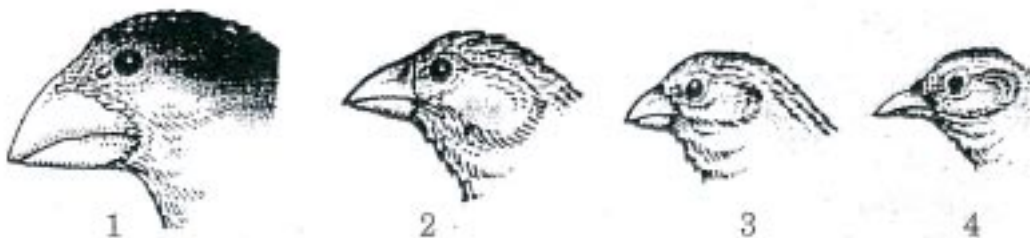
What are satellite DNA in a genome? Explain their role in DNA fingerprinting.

Ans DNA sequences which are repeated many a times, show a high degree of polymorphism , and form a bulk of DNA in a genome , called as satellite DNA = $\frac{1}{2} \times 3$

DNA from every tissue from an individual, shows the same degree of polymorphism and is heritable, hence very useful in DNA finger printing = $\frac{1}{2} \times 3$

[$1\frac{1}{2} + 1\frac{1}{2} = 3$ Marks]

25.



- (a) Write your observations on the variations seen in the Darwin's finches shown above.
- (b) How did Darwin explain the existence of different varieties of finches on Galapagos Islands ?

- Ans (a) From the original seed eating features , many other forms with altered beaks arose , enabling them to become insectivorous and vegetarian finches = $\frac{1}{2} \times 3$
- (b) The process of evolution of different species in a given geographical area starting from one point , and literally radiating to other areas of geography (habitats), is called adaptive radiation = $\frac{1}{2} \times 3$

[$1\frac{1}{2} + 1\frac{1}{2} = 3$ Marks]

26. Name and explain the techniques used in the *separation and isolation of DNA fragments to be used in recombinant DNA technology.*

Ans Gel Electrophoresis = $\frac{1}{2}$

DNA fragments on the agarose gel are negatively charged molecules and they move towards the anode (The fragments separate according to their size) = $\frac{1}{2}$

The separated DNA fragments can be visualised after staining with ethidium bromide = $\frac{1}{2}$

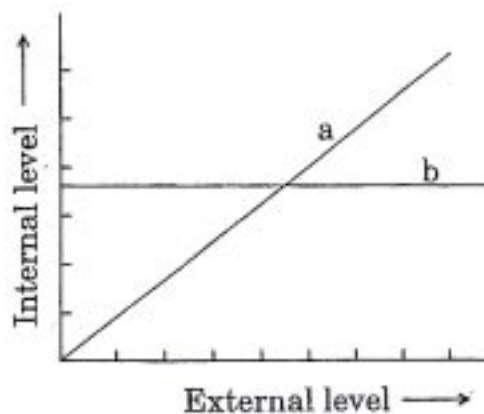
followed by exposure to UV radiation = $\frac{1}{2}$

Separated fragments are extracted from the gel = $\frac{1}{2}$

by elution = $\frac{1}{2}$

[$\frac{1}{2} \times 6 = 3$ Marks]

27. The following graph represents the organismic response to certain environmental condition (e.g. temperature) :



- (i) Which one of these, 'a' or 'b', depicts conformers ?
- (ii) What does the other line graph depict ?

(iii) How do these organisms differ from each other with reference to homeostasis ?

(iv) Mention the category to which humans belong.

Ans (i) a = conformers = $\frac{1}{2}$

(ii) Response of the regulators = $\frac{1}{2}$

(iii) Maintain homeostasis by physiological means, others either migrate, or suspend activities = $\frac{1}{2} \times 3$

(iv) Regulators = $\frac{1}{2}$

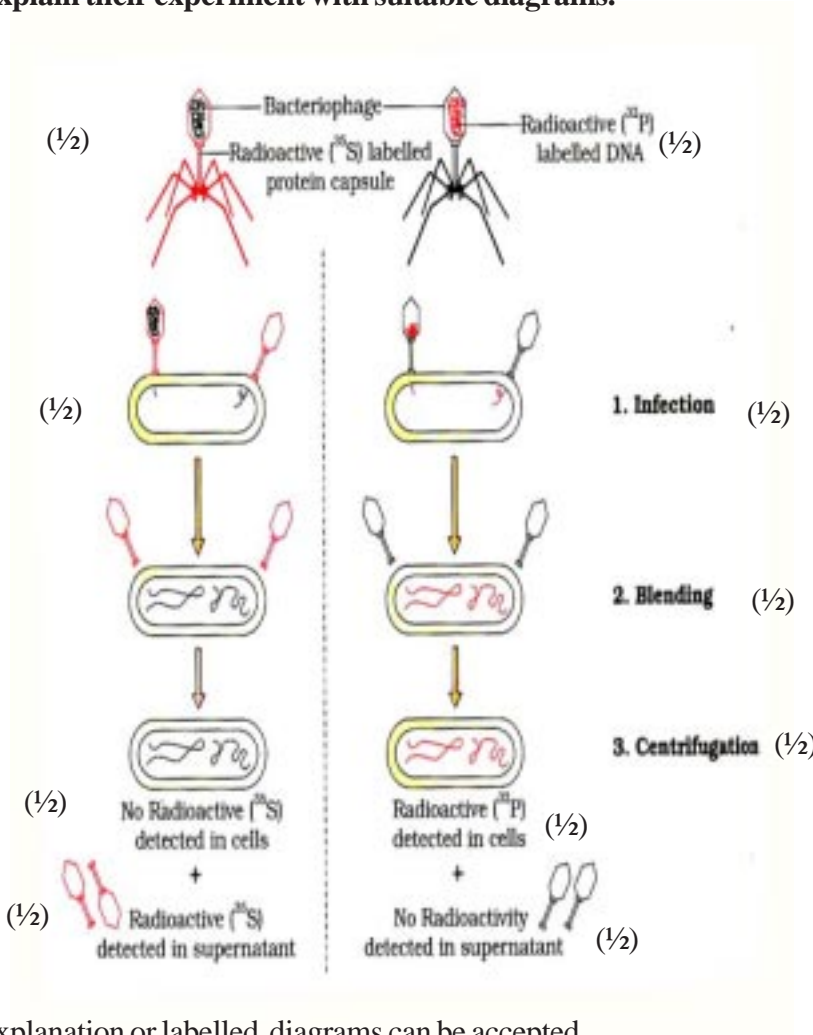
[$\frac{1}{2} + \frac{1}{2} + 1\frac{1}{2} + \frac{1}{2} = 3$ Marks]

SECTION D

Q.Nos. 28 - 30 are of 5 marks each.

28. How did Hershey and Chase prove that DNA is the hereditary material? Explain their experiment with suitable diagrams.

Ans



Explanation or labelled diagrams can be accepted

[$\frac{1}{2} \times 10 = 5$ Marks]

OR

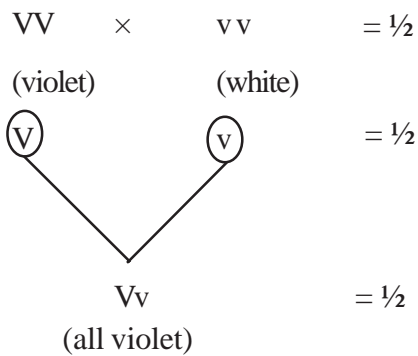
A particular garden pea plant produces only violet flowers.

- (a) Is it homozygous dominant for the trait or heterozygous ?
 (b) How would you ensure its genotype ? Explain with the help of crosses.

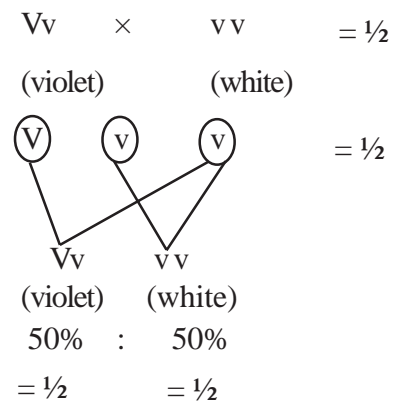
Ans (a) It could be homozygous dominant, heterozygous dominant = $\frac{1}{2} + \frac{1}{2}$

(b) By test cross = $\frac{1}{2}$

If parent homozygous :



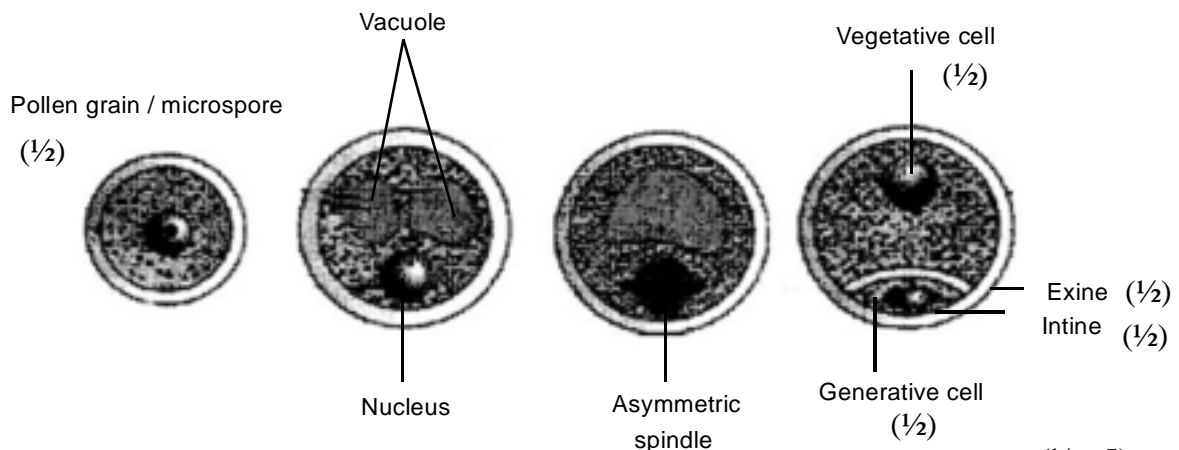
If parent heterozygous



[$\frac{1}{2} \times 10 = 5$ Marks]

29 How does the pollen mother cell develop into a mature pollen grain ? Illustrate the stages with labelled diagrams.

Ans Ans PMC/Microspore mother cell undergoes meiosis, to form microspore tetrad by the process called microsporogenesis, Each microspore develops into pollen grain , each pollen grain undergoes unequal mitotic division, and produces two cells - the vegetative cell and generative cell = $\frac{1}{2} \times 5$



($\frac{1}{2} \times 5$)

[$2\frac{1}{2} + 2\frac{1}{2} = 5$ Marks]

OR

Study the flow chart given below. Name the hormones involved at each stage and explain their functions.

Hypothalamus

↓

Pituitary

↓

Ovary

↓

Pregnancy

Ans Hypothalamus produces Gonadotropins releasing hormone , which induces anterior pituitary , to release LH , and FSH , to effect oogenesis , and ovulation , the graafian follicle after shedding ovum becomes corpus luteum , which secretes progesterone , to maintain endometrium , and implantation of the embryo = $\frac{1}{2} \times 10$

[5 Marks]

30. How is a transgenic tobacco plant protected against *Meloidogyne incognitia* ? Explain the procedure.

Ans Using the technique RNA interference (RNAi) transgenic tobacco plant is protected against *Meloidogyne incognitia* , using *Agrobacterium* , as the vectors , nematode-specific genes were introduced into the host plant (introduction of ds RNA) produces both sense, and anti sense RNA, these 2 RNAs form ds RNA, silences specific mRNA of nematode , no protein synthesis / no translation, hence nematode can not survive in tabacco plant = $\frac{1}{2} \times 10$

[5 Marks]

OR

(a) Name the source of Taq polymerase. Explain the advantage of its use in biotechnology.

(b) Expand the name of the enzyme ADA. Why is this enzyme essential in the human body? Suggest a gene therapy for its deficiency.

Ans (a) *Thermus aquaticus* = 1

It is a thermostable DNA polymerase, does not get denatured and remain active during PCR = $\frac{1}{2} + \frac{1}{2}$

- (b) Adenosine deaminase , this enzyme is essential for immune system to function, its deficiency can be cured by gene therapy , lymphocytes from the patients are extracted and cultured, functional ADA cDNA are introduced into lymphocyte using a vector , lymphocytes are returned to the patient = $\frac{1}{2} \times 6$

[1 + 1 + 3 = 5 Marks]

BIOTECHNOLOGY

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

- (i) *All questions are compulsory.*
- (ii) *There is no overall choice. However, an internal choice has been provided in one question of three marks and two questions of five marks. You have to attempt only one of the choices in such questions. Question paper contains four sections - A, B, C and D.*
- (iii) *Questions number 1 to 5 are very short answer questions, carrying 1 mark each.*
- (iv) *Questions number 6 to 15 are short answer questions, carrying 2 marks each.*
- (v) *Questions number 16 to 25 are also short answer questions, carrying 3 marks each.*
- (vi) *Questions number 26 to 28 are long answer questions, carrying 5 marks each.*
- (vii) *Use of calculators is not permitted. However, you may use log tables, if necessary.*

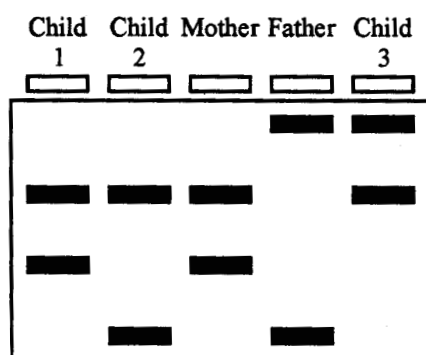
QUESTION PAPER CODE 99/1

SECTION A

1. You have been asked by a fruit grower to find a way to genetically engineer his crop to prevent it from ripening during shipping. What experimental approaches would you suggest? 1
2. Why do we need EPA in the present era? 1
3. What is repopulation assay? 1
4. Why is it generally necessary to improve microbial strains before they can be used for mass production of a useful metabolite? Suggest a way to achieve it. 1
5. Mention two important ingredients for the media which can be used to store animal cells for long periods, under low temperature. 1

SECTION - B

6. Mention one advantage of obtaining male sterile plants. How can one express barmase specifically in tapetal cells of an anther to obtain such plants? Which other enzyme can be used to restore its fertility? 2
7. In a culture of *E. coli*, the cell population increases from 1.5×10^6 cells/ml to 12×10^6 cell/sml in 36 min. What is the generation time of the given culture? 2
8. Name the most commonly used gelling agent in a typical plant nutrient medium. What is its source? Name any two growth regulators used in such media. 2
9. Why is tissue plasminogen activator (tPA) administered after heart attack? Schematically depict the steps to scale up its production. 2
10. Suggest two ways by which sickle cell anaemia can be diagnosed. Why is it called a molecular disease? 2
11. The restriction endonuclease, BamHI is a dimeric (2 subunit) enzyme. Based on how these proteins interact with DNA, do you expect it to be homo - or heterodimeric? Defend your choice. 2
12. (i) What is a 'crown gall' ? Name the organism which causes this phenotype in plants.
(ii) What are the essential steps in regeneration of whole plants using tissue culture techniques? Depict diagrammatically only. 2
13. What would be the effect of an aqueous environment on the bond strength of ionic bonds between amino acid residues in a protein? 2
14. How can a CML (Chronic Myelogenous Leukemia) patient be identified by the FISH technique? 2
15. Results of DNA fingerprint analysis for a man and woman and their three children are shown in the autoradiograph below. Which child is **least** likely to be the biological offspring of this couple, and why? 2



SECTION - C

16. What is the effect of SDS on protein structure? How does it facilitate the determination of molecular mass? How many bands will be observed if hemoglobin ($\alpha_2\beta_2$) is separated on SDS-PAGE ? 3
17. (i) What is downstream processing? 3
(ii) Outline the steps to purify an antibiotic that is secreted into the growth medium. 3
18. (i) Why are thermostable polymerases used in PCR ? 3
(ii) Give two applications of PCR. 3
(iii) How many DNA molecules are generated after 10 cycles of amplification? 3
19. (i) What are the advantages of using biological insecticides instead of chemical insecticides? 3
(ii) Name one such insecticide and an example of a transgenic plant expressing it. 3
20. There is no simple correlation between the intuitive complexity of an organism and the number of genes in its genome. Do you agree with the statement? Justify your answer. 3
21. (i) What is the relevance of fusing an antibody producing B-cell with myeloma cells in hybridoma technology? 3
(ii) Why are monoclonal antibodies preferred over serum antibodies in diagnostics and therapeutics?
(iii) Give an example of a therapeutic use of monoclonal antibodies. 3

22. Detergent manufacturers supplement their product with subtilisin which is inactivated by bleach. Why is the enzyme rendered inactive by bleach and how has this problem been overcome ? 3
23. Give three distinguishing features of BAC and YAC vectors. 3
24. Indicate four main safety concerns regarding the use of microbial processes in biotechnology.

OR

- Why is strain preservation important in microbial cell culture? Give any two methods of strain preservation. 3
25. (i) Differentiate between stem cells and progenitor cells.
(ii) Name two sources of stem cells. 3

SECTION - D

26. Explain how the “charge relay system” operates in chymotrypsin. Differentiate between chymotrypsin and chymotrypsinogen. Why do organophosphates inhibit serine proteases ?

OR

- What are the four hierarchical levels in organisation of protein structure? Discuss the various non-covalent interactions involved in organisation of the protein structure. 5
27. How will you select bacterial cells transformed by a recombinant plasmid? How can E. coli be made competent? Who developed this method? 5
28. Name a technique which can be used to compare amounts of many different mRNA (at genome level) in two cell populations, say normal and cancerous cells. Describe the technique with the help of a suitable diagram.

OR

- It is believed that each person’s genome is 99.8% identical to everyone else’s. Discuss the basis of this 0.2% difference in DNA sequence of individuals. Does it always occur in coding regions of the genome? Suggest the usefulness of studying such variations using two examples. 5

QUESTION PAPER CODE 99

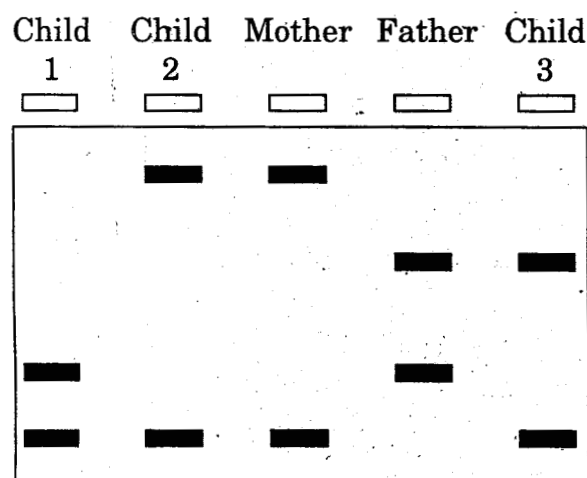
SECTION A

1. You have been asked by an avocado grower to find a way to genetically engineer his crop to prevent it from ripening during shipping. What experimental approaches would you suggest? 1
2. Why is it recommended to work with GRAS organisms? 1
3. What is repopulation assay? 1
4. A soil microorganism produces a novel metabolite in nanomolar (nM) concentration. It is very effective against childhood leukemia. Suggest a way to increase its production in quantities that are economically viable. 1
5. Why is it possible to store animal cells for long periods at very low temperatures in the presence of DMSO and high concentration of Serum? 1

SECTION B

6. What is the principle of barnase-barstar gene system? How have plant breeders exploited this system? 2
7. A bacterial culture has an initial cell density of 0.5×10^3 cells/ml. If the generation time is 20 min, what is the cell density at the end of 1 hr 40 min ? 2
8. Name a medium commonly used for culturing plant parts (explants). What factors dictate choice of media? 2
9. What is the mode of action of tissue plasminogen activator (t-PA) ? Name one medical application of t-PA. 2
10. Indicate two ways by which sickle cell anaemia can be diagnosed. What is the molecular defect in these patients? 2
11. The restriction endonuclease, EcoRI is a dimeric (2 subunit) enzyme. Based on how these proteins interact with DNA, do you expect it to be homo- or hetero-dimeric? Defend your choice. 2

12. (i) Why is *Agrobacterium tumefaciens* regarded as nature's genetic engineer?
(ii) Name an ornamental and a crop plant each where micropropagation has been commercially successful. 2
13. Name two factors that can reduce the bond strength of ionic bonds between amino acid residues in a protein. 2
14. What is the Philadelphia chromosome and how can it be identified by the FISH technique? 2
15. Results of DNA fingerprint analysis for a man and woman and their three children are shown in the autoradiograph below. Which child is least likely to be the biological offspring of this couple and why? 2



SECTION C

16. Name any two techniques for determining the molecular mass of a protein. Elaborate the principle of anyone of them. 3
17. (i) What is downstream processing?
(ii) What strategy would you use to purify a recombinant protein that is secreted into the growth medium? 3
18. What are the basic steps of a Polymerase Chain Reaction (PCR) ? How many DNA molecules are generated after 10 cycles of amplification? 3
19. (i) What are the benefits of developing insect-resistant transgenic plants?
(ii) Why is *Bacillus thuringiensis* (Bt) toxin not toxic to humans? 3

20. Do you think 'in silico' based prediction techniques are accurate in genomics? Support your answer with reasoning. 3
21. (i) Why is the technique for the production of monoclonal antibodies called hybridoma technology?
(ii) Why are monoclonal antibodies preferred over serum antibodies in diagnostics and therapeutics?
(iii) Give an example of a therapeutic use of monoclonal antibody. 3
22. Which reagent is best suited for accomplishing each of the following tasks: 3
(i) Determination of the amino acid sequence of a peptide.
(ii) Identification of the amino terminal residue of a peptide.
(iii) Hydrolysis of the peptide bonds on the carboxyl side of aromatic residues.
23. Give three distinguishing features of pBR322 and pUC19. 3
24. Give three reasons why the use of microbes may be harmful in making products for human use. 3

OR

Why is strain preservation important in microbial cell culture? Give any two methods of strain preservation.

25. (i) Stem cell technology is potentially very exciting. Why ?
(ii) Why do we retain stem cells throughout adult life? 3

SECTION D

26. Explain how the "charge relay system" operates in chymotrypsin. Name two other enzymes that use a similar theme. Why is the broad specificity of chymotrypsin advantageous? 5

OR

The functional properties of a protein are dependent on its 3D structure.

- (i) What are the three main non-covalent interactions that contribute to the folding of a protein into specific shapes?

- (ii) Differentiate between hydrogen bonds and van der Waals forces.
- (iii) What are prions ? Name a disease caused by them.
27. Describe the principle and use of blue-white selection in rDNA technology. Name any two methods of introducing recombinant DNA into host cells. 5
28. Transformed cells often exhibit modified expression of certain genes which are too many to study individually. Suggest a method you would use to compare the expression of such cells with that of normal cells. Describe the method in detail with the help of a suitable diagram. 5

OR

Write a brief note on 'SNPs'. Discuss using two examples why SNP analysis is important.

Marking Scheme — Biotechnology

General Instructions :

The Marking Scheme and mechanics of marking

1. All awarded marks are to be written in the left hand margin at the end of the question or its part.
2. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place “Half-tick” ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
3. If no marks are awarded to any part or question put a cross (×) at incorrect value portion and mark it zero (in words only).
4. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
5. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.
6. If parts have been attempted at different places do the totalling at the end of the part attempted last.
7. If any extra part is attempted or any question is reattempted, score out the last one and write “extra”.
8. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
9. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
10. Some of the questions may relate to higher order thinking ability. These questions will be indicated to you separately by a star mark. These questions are to be evaluated carefully and the students' understanding / analytical ability may be judged.
11. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.

QUESTION PAPER CODE 99/1
EXPECTED ANSWERS/VALUE POINTS

SECTION A

- Q1. By introducing anti sense PG / ACC deaminase/ ACC synthase/ ACC oxidase gene through the inhibition or reducing ethylene production (1)
- Q2. EPA monitors regularly the ecology around the area where modified organisms have been released. (1)
- Q3. This is a technique where we inject bone marrow cells into the femur (previously irradiated) and the repopulation of these cells in the **spleen** is observed as colony forming units (**CFU**) similar to bacterial colonies on Petri dish. (1)
- Q4. (i) The purpose is to increase the synthesis of the metabolite.
(ii) Strain improvement by mutant selection /genetic engineering (1/2 + 1/2)
- Q5. DMSO/ Glycerol/Serum (Any two)

SECTION - B

- Q6. (i) To prevent self pollination.
By introducing barnase using tapetal-specific promoter (TA29)
(iii) Barstar. (1+1/2+1/2)
- Q7. Use formula
 $2.303 \log_{10} X / X_0 = \mu t - t_0$
 $t - t_0 = 36 \text{ min.}$
 $X = 12 \times 10^6$
 $X_0 = 1.5 \times 10^6$
 $2.303 \log_{10} (8) = \mu 36$
 $\mu = 2.303 \times 0.9031/36$
 $\mu = 0.058$
Use formula
 $t = 0.693/\mu$ where t = generation or doubling time
 $t = 0.693/0.058 = 11.95$
t=12min. (2)

- Q8. (i) Agar.
(ii) Red algae / *Gelidium amansii*
(iii) Auxins/ Gibberellins / Cytokinins (Any two). (1/2+1/2+1)
- Q9. (i) To dissolve blood clots.
(ii) Refer to Fig.5 on page 154. (1/2+1/2)
- Q10. (i) Microscopic observation of RBC morphology.
(ii) Peptide mapping/ protein finger printing of hemoglobin and compare it with normal hemoglobin.
(iii) It is due to a defect in the molecule hemoglobin. (1/2+1/2+1)
- Q11. Recognition sequence is **palindromic** (symmetrical).
So the enzyme should be **homodimeric**. (1+1)
- Q12. (i) Unorganized growth of a cell mass; *Agrobacterium tumefaciens*.
(ii) Refer to the diagram given on page 119. (1+1)
- Q13. The bond strength decreases due to the insulating properties/ dielectric strength of Water (1+1)
- Q14. CML lymphocyte smears, hybridize them with fluorescent labeled probes in situ, observe them under the fluorescent microscope and counting cells that appear yellow. (2)
- Q15. (i) Child 1.
(ii) Child 1 has no band corresponding to the father. (1+1)

SECTION - C

- Q16. (i) It denatures the proteins / dissociates subunits.
(ii) It gives a uniform negative charge / charge to mass ratio is constant and proteins separate according to their molecular mass.
(iii) Two (one for alpha and another for the beta subunit) (1+1+1)

- Q17. (i) Methods for recovering a microbially generated product
(ii) Steps (Fig 3, page 111) (1+2)
- Q18. (i) No need to replenish the enzyme during thermocycling.
(ii) Applications (any two from page number 61):
(iii) 2^{10} molecules. (1+½x2+1)
- Q19. (i) Biological insecticides are highly specific/ biodegradable/ do not persist in the environment (consider any two).
(ii) Bt toxin (*Cry* gene) / Bt cotton or any other Bt crop (2+1)
- Q20. (i) Yes.
(ii) **Justification:** Relatively small number of genes in a human genome (approximately 30,000) in comparison to worm (18,000) (1+2)
- Q21. (i) To immortalize B-cells (antibody producing cells)
(ii) Monoclonal antibodies are epitope specific whereas serum antibodies are polyclonal and therefore heterogeneous. The latter may lead to ambiguous results.
(iii) OKT -3 (anti CD3 MoAb)- for preventing graft rejection. (1+1+1)
- Q22. (i) It is inactivated by bleach due to oxidation of methionine at position 222.
(ii) Using site directed mutagenesis / substitution of methionine by alanine gives the best result in terms of activity and stability. (1+2)
- Q23. **BAC:** Effective in bacteria/ it has genes for maintenance and replication of F-factor/ can accommodate up to 300Kb of DNA.
YAC: Effective in yeast/ it has telomeric and centromeric and ARS from yeast chromosome/can be used for cloning DNA fragments up to 1MB in size. (1½+1½)
- Q24. Pathogenicity / toxicity/ allergy/ disposal of spent microbial mass (any three) (1x3)

OR

Strain preservation is important, so that microbial cultures do not lose viability or show decline in the yield of novel metabolites

Methods of strain preservation (any two)

Storage in agar slants/stabs

Liquid nitrogen (cryopreservation)

Lyophilization

Glycerol stocks

(1+2)

Q25. (i) **Stem cells:** Have the capacity to self renew themselves/ can differentiate along multiple lineages in response to signals.

Progenitor cells: Have limited ability to self renew / have committed to differentiate along a given lineage only.

(ii) Hematopoietic stem cells/ embryonic stem cells/ cord blood cells/ or any other (name any two)

(2+1)

SECTION - D

Q26. (i) Charge relay system (Refer to page 13-14/ Fig 5)

(ii) Chymotrypsinogen: inactive precursor/ substrate binding site is blocked. Chymotrypsin: Obtained from Chymotrypsinogen by limited proteolysis (*in situ*)/ catalytically active.

(iii) Organophosphates selectively react with the acidic serine residue thereby knocking off enzyme activity.

(3+1+1)

OR

(i) Primary/ secondary /tertiary/ quaternary.

(ii) Ionic bonds/hydrogen bonds/van der Waals forces/hydrophobic interactions.

For details refer to pages 10-12.

(1+ 4)

Q27. (i) Antibiotic selection / blue white selection.(consult page 59 for details)

(ii) Calcium chloride method.

(iii) Mandel and Higa (1970)

(3+1+1)

Q28. (i) Microarray technique (comparative microarray)

(ii) Refer to Fig 3 / page 85 (major steps)

(1+4)

OR

- (i) Presence of SNPs.
- (ii) No.
- (iii) Give two examples (consult page 80-81) (1+1+3)

QUESTION PAPER CODE 99
EXPECTED ANSWERS/VALUE POINTS
SECTION A

- Q1. By introducing anti sense PG / ACC deaminase ACC synthase ACC oxidase gene through the inhibition or reducing ethylene production (1)
- Q2. GRAS organisms are non-pathogenic/non-toxic, generally do not produce antibiotics. (1)
- Q3. This is a technique where we inject bone marrow cells into the femur (previously irradiated) and the repopulation of these cells in the **spleen** is observed as colony forming units (**CFU**) similar to bacterial colonies on Petri dish. (1)
- Q4. Increase the synthesis of the metabolite by strain improvement using mutant selection/genetic engineering (1)
- Q5. DMSO / Serum prevent formation of ice crystals. (1)

SECTION - B

- Q6. Barnase is a RNase which cleaves RNA specifically in the tapetal cells inhibiting pollen formation. Barstar suppresses Barnase activity restoring male fertility. This system can prevent self pollination without the need for laborious emasculation procedures. (1/2+1/2+1)
- Q7. Determine specific growth rate μ as per equation
 $t = 0.693 / \mu$
 $t = 20\text{min.}$
 $\mu = 0.0346$
 Using equation $2.303 \log_{10} X/X_0 = \mu(t-t_0)$ note $t-t_0 = 100\text{min}$
 $\log X - \log X_0 = 0.0346 \times 100 / 2.303$
 $\log X_0 = 2.6990$
 $\log X = 1.502 + 2.6990 = 4.2010$
 $X = \text{antilog } 4.2010 = \mathbf{1.6 \times 10^4}$ (2)

- Q8. Murashige and Skoog's medium.
Plant species/plant part (explant) to be cultured. (1+1)
- Q9. To dissolve blood clots.
Administered after heart attack. (1+1)
- Q10. Microscopic observation of RBC morphology/peptide mapping of scHb The molecule haemoglobin is affected. (1+1)
- Q11. Recognition sequence is **palindromic** (symmetrical).
So the enzyme should be **homodimeric**. (1+1)
- Q12. (i) *Agrobacterium tumefaciens* has the natural ability to transfer T DNA
(ii) Banana /apple and orchids/eucalyptus. (1+1)
- Q 13. Any two- pH, salt concentration., dielectric constant of medium. (1+1)
- Q14. It results from 9-22 translocation and it is observed in CML patients Explain FISH technique as on page 83 & 84 (1+1)
- Q15. Child 2.
Child 2 has no band corresponding to the father. (1+1)
- SECTION - C**
- Q16. Mass spectrometry/SDS PAGE
Principle on page 25 & 26/18 (1+2)
- Q17. (i) Definition - steps in recovering microbially generated products
(ii) Fig. 3 Page 111 (1+2)
- Q18. Denaturation, primer annealing and extension
 2^{10} (2+1)
- Q19. (i) Ecofriendly, specific and sustainable, and with the benefit of increased yields
(ii) Specific to particular group of insect pests and not to other non-target organisms, including humans (2+1)

Q20. No

Any two of the following reasons:

Experimentally identified genes more reliable

Overlapping genes

Splice variants

(1+2)

Q21. (i) For producing monoclonal antibody, an antibody producing B cell is fused with myeloma cell (immortal) and gives rise to a hybridoma. It is called hybridoma technology

(ii) Monoclonal antibodies are epitope specific whereas serum antibodies are polyclonal and therefore heterogeneous. The latter may lead to ambiguous results.

(iii) OKT-3 (anti CD3 MoAb)- for preventing graft rejection.

(1+1+1)

Q22. (i) Edman's reagent.

(ii) Sanger's reagent

(iii) Chymotrypsin

(1+1+1)

Q23. pBR322 — two antibiotic resistant genes, few restriction sites and it is one of the earliest vector to be constructed

pUC19 — codes for one antibiotic resistant gene and one lacZ gene and has multiple cloning site

(1½+1½)

Q24. Pathogenicity / toxicity / allergenicity / disposal of spent microbial mass / lead to increase in antibiotic resistant microorganisms (any three)

(1x3)

OR

Strain preservation is important, so that microbial cultures do not lose viability or show decline in the yield of novel metabolites

Methods of strain preservation (any two)

Storage in agar slants/stabs

Liquid nitrogen (cryopreservation)

Lyophilization

Glycerol stocks

(1+2)

- Q25. (i) **Stem** cells: These can be differentiated into several useful cell types, which can be used to replace damaged cells/tissues (Cell therapy).
- (ii) Due to their capacity of self renewal and differentiation, they replace worn-out cells throughout life (2+1)

SECTION - D

- Q26. Charge relay system (Refer to page 13-14/ Fig 5)
 Trypsin, Acetylcholinesterase, Thrombin, Subtilisin (Any two)
 Being a digestive enzyme, it needs to cleave a variety of proteins (3+1+1)

OR

- (i) Hydrogen bonds/van der Waals/Ionic bonds/Hydrophobic interactions (Any three)
- (ii) Hydrogen bonds are formed by sharing hydrogen atom between two electro-negative atoms such as N and O. These are weak and directional bonds. van der Waals forces are weak attractions (or repulsions), which occurs at close range. These are proportional to the surface area in contact and are weak (Page 11).
- (iii) Prions are misfolded proteins (rogue proteins). Mad cow disease (1½+2+1½)
- Q27. Insertional inactivation for blue and white colony selection, which is used in the detection of recombinants (For details, refer Page 59) Calcium chloride/ electroporation/biolistics/microinjection/transfection/*Agrobacterium-mediated* transformation (Any two) (3+2)

- Q28. Microarray technique (comparative microarray)
 (Refer to Fig 3/ page 85 (major steps) (1+4)

OR

SNPs are single nucleotide changes in genomic DNA. which vary between individuals of a species. Responsible for 0.2% difference in humans. These affect gene function when they are in coding region.

SNP analysis is useful in DNA fingerprinting, population genetics. response to medicines, and detection of diseases (Discuss any two)

(2+1½+1½)

INFORMATICS PRACTICES

Time allowed : 3 hours

Maximum Marks : 100

Note:

- (i) This question paper is divided into 3 sections.
- (ii) Section A consists of 30 marks.
- (iii) Section B and Section C are of 20 marks each.
- (iv) Answer the questions after carefully reading the text.

**QUESTION PAPER CODE NO. 90/1
SECTION A**

1. Answer the following questions:

- (a) Define (i) Meta Data (ii) Data Warehouse. 2
- (b) Compare Freeware and Free Software. 2
- (c) Name two database tables used to maintain Inventory data. 2
- (d) Explain in brief an entity, relationship and attributes with the help of one example. 2
- (e) Write the significance of the phase “System Review and Maintenance” during System Development Life Cycle. 2

2. Answer the following questions:

- (a) What is the difference between visible and enabled properties of a control? 2
- (b) Name a property common to option button and check box. How many option buttons can be selected from four given option buttons? 2
- (c) Distinguish between Local variables and Global variables with the help of example. 2
- (d) How is Procedure and a Function called? 2
- (e) What is a Data Aware control? Name any two data aware controls. 2

3. Answer the following questions:
- (a) Distinguish between DDL and DML commands and give one example each of both the types of SQL commands. 2
 - (b) Define the following terms: 2
 - (i) Primary key
 - (ii) Database Fragmentation
 - (c) When should anchored variables be used? Explain with the help of example. 2
 - (d) Write one point each of similarity and difference between trigger and procedure. 2
 - (e) How does Fetch statement work with cursor? Explain with the help of example. 2

SECTION - B

4. Read the following case study and answer the questions that follow:

AVON Tools has computerized its billing. The following is the Data Entry screen in Visual Basic used by them:

The screenshot shows a Visual Basic form titled 'Invoice' with a subtitle 'AVON TOOLS'. The form is designed for data entry and includes the following elements:

- Input Fields:** Product ID, Product Description, Quantity, Unit Price, Sub Total, Tax @ 5.50%, Delivery and Handling Charges, and Total.
- Category Selection:** A group box labeled 'Category Of City' containing three radio buttons: A, B, and C.
- Control Buttons:** 'Calculate', 'Clear', and 'Exit' buttons are positioned below the input fields.

The Form details of the above form are given in the following table:

Object Type	Object Name	Description
Form	FrmInvoice	The Main Form Object
Text Box	TxtProd	To enter product ID of a Product
	TxtDesc	To enter Product name
	TxtQty	To enter number of items bought by the customer
	TxtUnitPrice	To enter Unit Price of Product sold
	TxtSubTotal	To display Quantity multiplied by Unit Price.
	TxtTax	To display Tax as 6.50% of Sub Total amount.
	TxtDeliver	To display Delivery and Handling charges on the basis of Category of City where Product is sent.
	TxtTotal	To display Total charges to be paid by the customer as sum of Sub Total, Tax, Delivery and Handling charges.
Option Button	OptA, OptB, OptC	To enter information whether the city where product has to be delivered i A category, B category or C category.
Command button	cmdCalculate	To calculate Sub Total, Tax, Delivery and handling charges, and Total.
	cmdClear	To clear all the values in Text boxes, option button in the form
Command Buttons	cmdExit	To close the application

Write code to implement the following:

- (a) When the user clicks Clear button, all the values stored in text boxes and option button should be cleared.

- (b) Check that in the text box for Quantity, the data entered is numeric only. 2
- (c) Close the application when Exit button is clicked. 2
- (d) When the command button with caption “Calculate” (cmdCalculate) is clicked, Sub Total, Tax (6.50% of Sub Total), Delivery and handling charges and Total amount are computed and displayed. 4

The criterion for calculation of Delivery and handling Charges is as given below:

Category of City	Charges
A	Rs. 2,000
B	Rs. 3,000
C	Rs. 3,500

- Sub Total is calculated by multiplying Quantity with Unit Price.
- Tax is calculated as 6.50% of Sub Total.

5. Answer the following questions:

- (a) Find the output of the following code: 2

```

x =20
DO WHILE (x > = 10)
IF x > 9 THEN
R = 0
ELSE
R=2
END IF
x = x - 4
PRINT x
LOOP
PRINT R

```

- (b) Rewrite the following code using IF statement without effecting the output of the code : 2

Select Case tmarks

Case Is > = 75

category = "A"

Case 50 To 74

category = "B"

Case 33 To 49

category = "C"

Case Else

category = "D"

End Select

- (c) Find the error(s) in the following code and rewrite the correct code after underlining the corrections made: 2

FUNCTION try (P1 AS INTEGER AND P2 AS INTEGER)

IF P1 = P2 THEN

try = 0

OTHERWISE P1 > P2 THEN

try = -1

ELSE

try = 1

FUNCTION END

- (d) Write a Visual Basic function that takes Marks in Written test and Marks in Internal Assessment as arguments, find the Total marks secured (sum of Written test and Internal assessment) and returns whether the student is eligible for Scholarship. To be eligible for Scholarship, a student must secure at least 95 Total marks. 4

SECTION - C

6. Read the questions given below and answer accordingly:

- (a) Write the output produced by the following part of code in PU/SQL: 2

FOR I IN 5 . . 7

LOOP


```

P:= I + 1;
DBMS_OUTPUT.PUT_LINE (I + 2) ;
END LOOP;
DBMS_OUTPUT.PUT_LINE(p) ;

```

- (b) Find the error(s) in the following PUSQL code and rewrite the correct code after underlining the corrections made. 2

```

I = 2;
WHILE (I < = 20) START
LOOP
    DBMS_OUTPUT.PUT_LINE(I) ;
    I + 2 := I;
END OF LOOP;

```

- (c) How many times will the following loop execute? 2

```

num := 3;
cntl := 8;
WHILE (cntl > 5)
    LOOP
        num := num-2;
        cntl := cntl - 1;
        IF (cntl > 4) THEN
            DBMS_OUTPUT.PUT_LINE (cntl);
        END IF;
    END LOOP;

```

- (d) Write a PL/SQL procedure that takes Roll Number of a student as a parameter and increases that Student's total marks by 2% in STUDENT table. STUDENT table has ROLLNO, NAME, TMARKS fields. 4

7. Answer the questions based on the table movie given below:

Table: Movie

Column Name	Data Type	Size	Description	Constraint
Movie_Code	NUMBER	8	Identification Code of Movie	Primary Key
Movie_Name	VARCHAR2	25	Name of the Movie	NOT NULL
Director	VARCHAR2	25	Name of the Director who has directed the movie.	
Movie_Type	VARCHAR2	20	Type of Movie. (It can be Comedy/ Action/Thriller)	
Awards_Won	NUMBER	2	Number of Awards won by Movie.	

- (a) Write the SQL command to create the above table with constraints. 2
- (b) Write SQL command to create a view consisting of Movie code, Name of Movie and Number of awards won by movies that have won more than four awards. 2
- (c) Write SQL command to display name of movie, Director's name, Awards won in descending order of Awards won. 2
- (d) Create a Trigger to display "WOW!! so many awards" if award won entered in the table Movie are more than two. 4

QUESTION PAPER CODE NO. 90

SECTION A

1. Answer the following questions:

- (a) Expand UML. Write its purpose. 2
- (b) Write in brief the purpose of the following software: 2
- (i) Linux
 - (ii) MySQL

- (c) Write an example of a many to many relationship and depict the relationship with an ER diagram. 2
- (d) How does Data Mining help in decision making process? 2
- (e) Write the purpose of “Cost Benefit Analysis” done during System Development Life Cycle. 2
2. Answer the following questions:
- (a) Write the default names given to a command button and Text box. 2
- (b) Name one property of Text box control which is not present in Label control. 2
- (c) What is the use of Call statement? Explain in brief with the help of example. 2
- (d) Define Interface. Name two Interface ‘styles supported by VB. 2
- (e) Write the purpose of a Bound control. Name two Data aware properties of data bound controls. 2
3. Answer the following questions:
- (a) Write one similarity and one difference between Char and Varchar2 data types. 2
- (b) What is the purpose of the following commands: 2
- (i) Commit
- (ii) Rollback
- (c) When are implicit cursors used by PL/SQL ? 2
- (d) Distinguish between Before and After triggers. 2
- (e) Define a cursor. List two statements associated with cursors. 2

SECTION B

4. Read the following case study and answer, the questions that follow:

Get Well Hospital has computerized its billing. The following is the Data Entry screen in Visual Basic used by them:

The Form details of the above form are given in the following table:

Object Type	Object Name	Description
Form	FrmHospital	The Main Form Object
Text Box	TxtPNO	To enter Patient Identification Number
	TxtPName	To enter Patient's name
	TxtDocFee	To enter Doctor's Consultancy Charges
	TxtOTFee	To enter Operation Theatre Charges
	TxtMedicines	To display charge for Medicines given to Patient
	TxtMeal	To enter charges for Meals given to Patient

	TxtDays	To enter number of days for which the patient stayed in the hospital
	TxtSub	To display Total charges to be paid by the patient (before tax is added)
	TxtTax	To display the tax to be paid by the patient
	TxtAdvance	To enter Advance amount paid by the patient
	TxtAmount	To display the net amount to be paid by the patient
Option Button	OptPrivate OptSemi OptGeneral	To enter information whether the patient has opted for Private or Semi Priyate or General Category of Treatment
Command button	cmdCalculate	To calculate Sub Total, Tax and Amount to be paid by the Patient
	cmdClear	To clear all the values in Text boxes and option button in the form
	cmdExit	To close the application

Write code to implement the following:

- (a) When the form loads text boxes for SubTotal (TxtSub), Tax (TxtTax) and Amount to pay (TxtAmount) are disabled. 2
- (b) Check that Number of days of Stay entered is numeric only. 2
- (c) When the user clicks Clear button, Patient Number and Patient Name should be set as blank, other text ,boxes should be set to zero.
- (d) When the command button with caption “Calculate;” (cmdCalculate) is clicked, Sub Total, Tax (12% of Sub Total), Total amount to be paid by the patient are computed and displayed.

The criterion for calculation of Sub Total Charges is as given below:

Category of patient Stay Charges

Private Rs. 2000.00 per day

Semi Private Rs. 1000.00 per day

General Rs. 100.00 per day

- Sub Total is calculated by adding Stay charges, Doctor Consultancy fee, Operation theatre fee, Medicines charges, Meal Charges.

- Tax is levied at 12% of Sub Total.

- Advance paid is entered.

- Amount to Pay is : (Sub Total + Tax) - Advance paid by the Patient. 4

5. Answer the following questions:

(a) Write the output of the following code: 2

```
t = 16
FOR C = 4 TO 1 STEP -1
    x = c * t
    PRINT x
    t = t - 4
NEXT C
```

(b) Rewrite the corrected program after removing syntax errors, underline the corrections: 2

```
x = 20

WHILE x >= 10

    IF x < 12 THEN

        x = 0

    otherwise

        x = x - 2

x = x - 2

PRINT x

END LOOP
```

- (c) Write the value of P after the following code is executed: 2

```
x = 2  
  
SELECT CASE x  
    CASE 1  
        p = 1000 * x  
    CASE 2  
        p = 100 - x  
    CASE 3  
        p = 10 + x  
END SELECT
```

- (d) Write a Visual Basic function that takes age as argument and returns whether the person is eligible to vote. (Assume 18 years is the minimum voting age) 4

SECTION C

6. Read the questions given below and answer accordingly:

- (a) Write the output produced by the following part of code in PL/SQL: 2

```
num := 5;  
  
WHILE num <= 12 LOOP  
    IF mod (num, 3) = 0 AND num > 8 THEN  
        DBMS_OUTPUT.PUT_LINE ('@') ;  
    ELSE  
        DBMS_OUTPUT.PUT_LINE (num) ;  
    END IF;  
  
    num := num + 2 ;  
  
END LOOP;  
  
end;
```

- (b) Find the error(s) in the following PL/SQL code and rewrite the correct code after underlining the corrections made. 2

```
I := 3;  
  
LOOP
```

```

IF I > 8
    DBMS_OUT(I);
    X := 5;
I + 1 := I;
END LOOP;

```

(c) Rewrite the following PUSQL loop using FOR loop:

2

```

c := 10;
WHILE c >= 4 LOOP
    DBMS_OUTPUT.PUT_LINE (c);
    c := c - 1;
END LOOP;

```

(d) Write a PL/SQL function that takes Roll Number of a student as a parameter and returns “Passed” if total marks of that student are at least 33 in STUDENT table otherwise it returns “Not Successful”. STUDENT table has ROLLNO, NAME, TMARKS fields.

4

7. Answer the questions based on the table STUDENT given below:

Table: STUDENT

Column Name	Data Type	Size	Description	Constraint
Roll No	NUMBER	2	Roll number of Student	PRIMARY KEY
Name	VARCHAR2	25	Name of Student	NOT NULL
Stream	VARCHAR2	15	Stream (Medical/Computers/Commerce) opted by student	NOT NULL
TMarks	NUMBER	9,2	Total Marks scored by the Student	

- (a) Write the SQL command to Create the above table with constraints. 2
- (b) Write the SQL command to create a view consisting of roll numbers, names of students who are in “COMPUTERS” stream. 2
- (c) Write the SQL command to display. roll numbers, names and Total marks of students in descending order of total marks. 2
- (d) Create a Trigger to display the message “Work Hard” whenever Total marks (TMARKS) entered in the table are below 250. 4

Marking Scheme — Informatics Practices

Important Note:

- All answers provided in the marking scheme are SUGGESTIVE.
- Examiners are requested to accept all possible alternative correct answers.
- Case sensitivity to be ignored in Visual Basic for commands and identifiers.
- Semicolon termination and case sensitivity to be ignored in SQL statements.

QUESTION PAPER CODE 90/1

EXPECTED ANSWERS

Section - A

Q 1. Answer the following questions:

- (a) Define i) Meta Data ii) Data Warehouse 2

Ans: i) Meta Data is data about data.

- ii) A data warehouse is a repository of an organization's electronically stored data.

(1 mark each for each definition)

- (b) Compare Freeware and Free Software. 2

Ans: Free software is software that is used, studied, modified, copied and distributed in modified or unmodified form either without restriction or with only minimal restrictions to ensure that further recipients are also conferred these rights.

Freeware is computer software that is available for use at no cost or for an optional fee.

Freeware offers users none of the freedoms guaranteed by Free software.

(2 marks for correct comparison)

OR

(1 mark each for individual definitions)

- (c) Name two database tables used to maintain Inventory data. 2

Ans: Item table, Order table, Shipment table, Supplier table, Customer table

(1 mark each for any 2 database tables relevant to Inventory)

- (d) Explain in brief an entity, relationship and attributes with the help of one example. 2

Ans: An entity may be defined as a thing which is recognized as being capable of an independent existence and which can be uniquely identified.

A relationship captures how two or more entities are related to one another.

Attributes are properties of an entity or relationship.

For example, PERSON denotes an entity-set with attributes NAME and AGE, while ASSIGNED denotes the relationship between the entities of entity-sets PERSON and PROJECT.

(2 marks for explanation of each of 3 terms with the help of example)

OR

(1 mark for defining the terms)

OR.

(1 mark if ER diagram drawn and each term is labeled)

- (e) Write the significance of the phase “System Review and Maintenance” during System Development Life Cycle. 2

Ans: ‘System review’ helps in evaluating the system in terms of response time, ease of use and reliability and

‘System maintenance’ helps to keep the system up-to-date concerning the latest modifications and procedures whenever changes take place in System and maintenance is required.

(1 mark for each part)

Q2. Answer the following questions

- (a) What is the difference between visible and enabled properties of a control? 2

Ans: Visible Property determines whether the control is visible or not on a form.

The Enabled property of a control is used to determine whether or not the control receives focus or responds to user-generated events.

(2 marks for correct difference)

OR

(1 mark for each definition)

OR

(2 marks for correct explanation with the help of example)

- (b) Name a property common to option button and check box. How many option buttons can be selected from four given option buttons? 2

Ans: Some properties common to option button and check box are:

- Name
- Alignment
- Appearance
- Backcolor
- Caption
- Enabled
- Font
- Forecolor
- Height
- Picture
- Value
- Visible

Only one option button can be selected from four given option buttons.

(1 mark for anyone correct property)

(1 mark for the correct answer)

- (c) Distinguish between Local variables and Global variables with the help of example. 2

Ans: Example

Dim x as Integer 'x is global variable. Scope of x extends throughout the Form

Public sub proc1()

Dim y as Integer 'y is local to proc1(). Scope of y is restricted to proc1().

End sub

(2 marks for explanation with the help of any valid example)

OR

(1 Mark for explanation of anyone type of variable)

OR

(1 mark if difference explained without example)

(d) How is a Procedure and a Function called?

2

Ans: A Procedure is called by writing Call statement with Procedur's name and arguments (if any).

A Function is called by writing the name of function along with 'arguments (if any) in parenthesis.

Example of Procedure call:

Call exitprogram

Example of Function call:

Print cube ()

(1 mark each for calling procedure and function)

OR

(1 mark each if examples of both the calls given.)

Note: Any valid Function Call and Procedure Call Statement must be accepted

(e) What is a Data Aware control? Name any two data aware controls.

2

Ans: A data aware control is a control that can provide access to a database. Some Data aware controls are:

- Check box Control
- Text Box Control
- Label Control
- Combo box Control
- Picture box Control
- Image Control
- ListBox Control
- DataGrid Control
- FlexGrid Control
- DataCombo Control
- DataList Control

(1 mark for definition of Data Aware control)

(½ mark each for Any 2 Data aware controls)

Q3. Answer the following questions

- (a) Distinguish between DDL and DML commands and give one example each of both the types of SQL commands. 2

Ans: DDL stands for Data Definition language commands. These commands are used for defining the database structure or schema.

DML stands for Data Manipulation Language commands. These commands are used to manage data within schema objects.

Examples of DDL commands - CREATE, ALTER, DROP, TRUNCATE

Examples of DML commands - SELECT, INSERT, UPDATE, DELETE

(1 mark for the correct difference)

(mark each for Anyone DDL and DML commands)

Note: T able/ View must be accepted in place of ‘database structure or schema’

- (b) Define the following terms: 2
- i) Primary key
 - ii) Database Fragmentation

Ans: i) A Primary key is a unique field(column) that uniquely identifies each row of the table.

ii) In a database fragmentation, a database is broken in logical units.

(1 mark each for both definitions)

- (c) When should anchored variables be used? Explain with the help of example. 2

Ans: Anchored variables should be used when the datatype of one variable has to be set to the same data type as another element(for example datatype of a column of a table)

Example 1:

x NUMBER (3) ;

b x % TYPE; -- **b is of the same data type as x.**

Example 2:

mname emp.ename% TYPE; -- **mname is of same data type as ename .**

(2 marks for correct explanation with example)

OR

(1 mark if anchored variable only defined)

OR

(1 mark if only example is given)

- (d) Write one point each of similarity and difference between trigger and procedure: 2

Ans: **Similarity** : Trigger are also procedures that are associated with tables.

Difference: Triggers are automatically invoked whenever a certain event like INSERT, UPDATE, and DELETE occurs bL.t Procedures are not automatically invoked; they are explicitly called.

(1 mark each for similarity and difference)

- (e) How does Fetch statement work with cursor? Explain with the help of example. 2

Ans: When the Fetch statement is executed, data is fetched ie. it is copied to the record or variables.

On every fetch statement, the cursor pointer moves to the next row.

Example:

```
OPEN emp_cur;
```

```
FETCH emp_cur INTO emp_rec;
```

```
.....
```

```
CLOSE emp_cur;
```

(1 mark for explanation, 1 mark for example)

OR

(2 marks for valid explanation with example)

Q4. Read the following case study and answer the questions that follows

AVON Tools has computerized its billing. The following is the Data Entry screen in Visual Basic used by them:

The screenshot shows a Windows-style application window titled "Invoice". The main content area is titled "AVON TOOLS". It features several input fields: "Product ID", "Product Description", "Quantity", and "Unit Price". To the right of these fields is a "Category Of City" dropdown menu with options "A", "B", and "C". Below the input fields are three buttons: "Calculate", "Clear", and "Exit". At the bottom of the form, there are four output fields: "Sub Total", "Tax 6.50%", "Delivery and Handling Charges", and "Total".

The Form details of the above form are given in the following table:

Object Type	Object Name	Description
Form	FrmInvoice	The Main Form Object
Text Box	TxtProd	To enter Product ID of a Product.
	TxtDesc	To enter Product name
	TxtQty	To enter number of items bought by the customer
	TxtUnitPrice	To enter Unit Price of Product sold
	TxtSubTotal	To display Quantity multiplied by Unit Price.
	TxtTax	To display Tax as 6.50% of Sub Total amount.

	TxtDeliver	To display Delivery and Handling charges on the basis of Category of City where Product is sent.
	TxtTotal	To display Total charges to be paid by the customer as sum of Sub Total, Tax, Delivery and handling Charges.
Option Button	OptA,OptB,OptC	To enter information whether the place where product has to be delivered is A category, B Category or C category.
Command button	cmdCalculate	To calculate Sub Total, Tax, Delivery and handling charges, and Total.
	cmdClear	To clear all the values in Text boxes, option button in the form
Command Button	cmdExit	To close the application

Write code to implement the following:

- (a) When the user clicks Clear button, all the values stored in text boxes and option button should be cleared.

2

Ans: `TxtProd.Text = " "` OR `TxtProd = " "`
`TxtDesc.Text = " "` OR `TxtDesc = " "`
`TxtQty.Text = " "` OR `TxtQty = " "`
`TxtUnitPrice.Text = " "` OR `TxtUnitPrice = " "`
`TxtSubTotal.Text = " "` OR `TxtSubTotal = " "`
`TxtTax.Text = " "` OR `TxtTax = " "`
`TxtDeliver.Text = " "` OR `TxtDeliver = " "`
`TxtTotal.Text = " "` OR `TxtTotal = " "`
`OptA.Value = False`
`OptB.Value = False`
`OptC.Value = False`

OR

<code>TxtProd. Text = Empty</code>	OR	<code>TxtProd = VBEEmpty</code>
<code>TxtDesc. Text = Empty</code>	OR	<code>TxtDesc = VBEEmpty</code>
<code>TxtQty. Text = Empty</code>	OR	<code>TxtQty = VBEEmpty</code>
<code>TxtUnitPrice. Text = Empty</code>	OR	<code>TxtUnitPrice = VBEEmpty</code>
<code>TxtSubTotal. Text = Empty</code>	OR	<code>TxtSubTotal = VBEEmpty</code>
<code>TxtTax. Text = Empty</code>	OR	<code>TxtTax = VBEEmpty</code>
<code>TxtDeliver. Text = Empty</code>	OR	<code>TxtDeliver = VBEEmpty</code>
<code>TxtTotal. Text = Empty</code>	OR	<code>TxtTotal = VBEEmpty</code>
<code>optA.Value = False</code>		
<code>optB.Value = False</code>		
<code>optC.Value = False</code>		

(1 mark for clearing Textboxes)

(1 mark for clearing Option buttons)

Note: 0 must be accepted in place of False during assignment to option buttons

(b) Check that in the text box for Quantity, the data entered is numeric only.

2

```
Ans: IF NOT (IsNumeric (TxtQty.Text)) THEN
    MsgBox ("Please enter numbers only")
    TxtQty.text = " "
    TxtQty.setFocus
End If
```

OR

Under the validate event procedure

```
IF IsNumeric(txtQty) THEN
    cancel = False
ELSE
    cancel = True
END IF
```

Note: Restoring focus is not required in the above case.

OR

```
InValidNo = FALSE
FOR I = 1 TO LEN (txtQty.Text)
    Ch = MID(txtQty.Text, I, 1)
    IF NOT (Ch >= '0' AND Ch <= '9') THEN
        InValidNo = TRUE
    END IF
NEXT
Cancel = InValidNo
```

OR

Any other equivalent code

(Check made using lost focus OR keypress event must also be accepted)

(1 Mark for checking whether it is numeric entry)

(1 Mark for restoring focus to the control)

(c) Close the application when Exit button is clicked.

2

Ans: End

(2 marks for correct answer)

(d) When the command button with caption “Calculate” (cmdCalculate) is clicked, Sub Total, Tax (6.50% of Sub Total), Delivery and handling charges and Total amount are computed and displayed.

4

The criterion for calculation of Delivery and handling Charges is as given below:

Category of City	Charges
A	Rs. 2,000
B	Rs. 3,000
C	Rs. 3,500

- Sub Total is calculated by multiplying Quantity with Unit Price.
- Tax is calculated as 6.50% of Sub Total.

```

DIM mAmt,mUnit,mSub,mTax,mCharges AS Single
mAmt = Val (TxtQty)
mUnit = Val (TxtUnitPrice)
mSub = mAmt * mUnit
mTax = (6.50/100)*mSub

IF OptA.Value = True THEN
    mCharges = 2000
ELSEIF OptB.Value = True THEN
    mCharges = 3000
ELSE
    mCharges = 3500
END IF

TxtSubTotal.Text = mSub
TxtTax.Text = mTax
TxtDeliver = mCharges
TxtTotal = mSub+mTax+mCharges

```

OR

Any other equivalent code

(1 mark for checking and assigning appropriate value to Charges)

(½ mark each for calculating SubTotal and Tax)

(½ mark each for assigning the values to correct textboxes)

Note:

Option button value checked against true also to be accepted.

5. Answer the following questions (with respect to Visual Basic)

(a) Find the output of the following code:

2

```

x =20
DO WHILE (x > = 10)
    IF x > 9 THEN

```

```

        R = 0
    ELSE
        R=2
    END IF
    x = x - 4
    PRINT x

LOOP
PRINT R

```

Ans: 16
12
8
0

(½ mark for each line of correct output)

(1½ mark for writing the entire output in one line)

- (b) Rewrite the following code using IF statement without effecting the output of the code :

2

```

Select Case tmarks
Case Is > = 75
    category = "A"
Case 50 To 74
    category = "B"
Case 33 To 49
    category = "C"
Case Else
    category = "D"
End Select

```

Ans: IF tmarks >= 75 THEN
 category = "An"
ELSE IF tmarks >= 50 THEN
 category = "B"

```

ELSE IF tmarks >= 33 THEN
    category = "C"
ELSE
    category = "D"
END IF

```

(½ mark for IF statement)

(½ mark for ELSE/F)

(½ mark for relational expressions)

(½ mark for ELSE)

- (c) Find the error(s) in the following code and rewrite the correct code after underlining the corrections made:

2

```

FUNCTION try (P1 AS INTEGER AND P2 AS INTEGER)
IF P1 = P2 THEN
    try = 0
OTHERWISE P1 > P2 THEN
    try = -1
ELSE
    try = 1
FUNCTION END

```

Ans: FUNCTION try(P1 AS INTEGER _ P2 AS INTEGER) AS INTEGER

```

IF P1 = P2 THEN
    try = 0
ELSEIF P1 > P2 THEN
    try = -1
ELSE
    try = 1
END IF
END FUNCTION

```

(½ Mark each for identifying and correcting ANY four errors)

- (d) Write a Visual Basic function that takes Marks in Written test and Marks in Internal Assessment as arguments, find the Total marks secured (sum of Written test and Internal assessment) and returns whether the student is eligible for Scholarship.. To be eligible for Scholarship, a student must secure at least 95 Total marks.

4

Ans: FUNCTION RESULT (WMARKS AS SINGLE, IAMARKS AS SINGLE)
AS BOOLEAN

```
TOTAL = WMARKS + IAMARKS
IF TOTAL >= 95 THEN
    RESULT = TRUE
ELSE
    RESULT = FALSE
END IF
END FUNCTION
```

OR

PUBLIC FUNCTION RESULT (WMARKS AS SINGLE, IAMARKS
AS SINGLE) as string

```
TOTAL = WMARKS + IAMARKS
IF TOTAL >= 95 THEN
    RESULT = "Eligible for Scholarship"
Else
    RESULT = "Not Eligible for Scholarship"
End if
End Function
```

OR

Any other equivalent code

(1 mark for Function header)

(1 mark for calculating TOTAL)

(1 mark for checking TOTAL >= 95)

(½ mark for Else and End If)

(½ mark for returning the value)

SECTION - C

6. Answer the questions (with respect to SQL and PL/SQL)

(a) Write the output produced by the following part of code in PL/SQL :

2

```
FOR I IN 5 . . 7
LOOP
P:= I + 1;
DBMS_OUTPUT.PUT_LINE (I + 2) ;
END LOOP;
DBMS_OUTPUT.PUT_LINE(p) ;
```

Ans: 7

8

9

8

(½ mark for each line of correct output)

(½ mark to be deducted if output is given in one line)

(b) Find the error(s) in the following PL/SQL code and rewrite the correct code after underlining the corrections made.

2

```
I = 2;
WHILE (I < = 20) START
LOOP
    DBMS_OUTPUT.PUT_LINE(I) ;
    I + 2 := I;
END OF LOOP;
```

Ans: I := 2;

```
WHILE (I < = 20) START
LOOP
    DBMS_OUTPUT.PUT_LINE(I) ;
    I := 1+2;
END LOOP;
```


(½ mark each for identifying and correcting each error out of four errors)

OR

(1 mark for identifying all the errors without making the corrections)

(c) How many times will the following loop execute?

2

```
num := 3;
cntl := 8;
WHILE (cntl > 5)
    LOOP
        num := num-2;
        cntl := cntl - 1;
        IF (cntl > 4) THEN
            DBMS_OUTPUT.PUT_LINE (cntl);
        END IF;
    END LOOP;
```

Ans: 3 Times

(2 marks for the correct answer)

(d) Write a PL/SQL procedure that takes Roll Number of a student as a parameter and increases that Student's total marks by 2% in STUDENT table. STUDENT table has ROLLNO, NAME, TMARKS fields.

4

Ans: CREATE OR REPLACE PROCEDURE Raise_marks(Mrno Student.
ROLLNO%TYPE)

AS

BEGIN

UPDATE Student

```
    SET TMARKS = TMARKS + 0.02 * TMARKS
```

```
    WHERE ROLLNO = Mrno;
```

END;

OR

Any other equivalent code

(1 Mark for Procedure header)

(1 Mark for using UPDATE correctly)

(1 Mark for WHERE clause)

(1 Mark for BEGIN and END)

7. **Answer the questions based on the table movie given below:**

Table: Movie

Column Name	Data Type	Size	Description	Constraint
Movie_Code	NUMBER	8	Identification Code of Movie	Primary Key
Movie_Name	VARCHAR2	25	Name of the Movie	NOT NULL
Director	VARCHAR2	25	Name of the Director who has directed the movie.	
Movie_Type	VARCHAR2	20	Type of Movie. (It can be Comedy/ Action/Thriller)	
Awards_Won	NUMBER	2	Number of Awards won by Movie.	

(a) Write the SQL command to create the above table with constraints.

2

Ans: CREATE TABLE MOVIE

```
(  
    Movie_Code NUMBER (8) PRIMARY KEY,  
    Movie_Name VARCHAR2 (25) NOT NULL,  
    Director VARCHAR2 (25),  
    Movie_Type VARCHAR2 (20),  
    Awards_Won NUMBER (2)  
);
```

(1/2 mark for CREATE TABLE)

(1/2 mark for fields with data types)

(1/2 mark for PRIMARY KEY constraint)

(1/2 mark for NOT NULL constraint)

Note: NOT NULL UNIQUE must also be accepted in place of Primary Key

- (b) Write SQL command to create a view consisting of Movie code, Name of Movie and Number of awards won by movies that have won more than four awards.

2

Ans: CREATE VIEW movie_view AS
SELECT Movie_Code, Movie_Name, Awards_Won
FROM MOVIE
WHERE Awards won > 4;

(1 Mark for Create View command)

(%: Mark for Select)

(% mark for WHERE)

- (c) Write SQL command to display name of movie, Director's name, Awards won in descending order of Awards won.

2

Ans: SELECT Movie_Name, Director, Awards_Won
FROM MOVIE
ORDER BY Awards_won DESC;

(1 Mark for SELECT)

(1 Mark for ORDER BY)

(Deduct ½ mark if DESC is not specified)

Note: ORDER BY clause can also be specified by numeric value i.e. 3

- (d) Create a Trigger to display “Wow!! so many awards” if awards won entered in the table Movie are more than two.

4

Ans: CREATE OR REPLACE TRIGGER Award_Trig
BEFORE UPDATE OR INSERT ON Movie
FOR EACH ROW
BEGIN
IF : New.Awards won > 2 THEN

```
DBMS_OUTPUT. PUT_LINE ('WOW !! So many awards');  
END IF;  
  
END;
```

OR

```
CREATE OR REPLACE TRIGGER Award_Trig  
BEFORE INSERT OR UPDATE  
ON Movie  
FOR EACH ROW  
WHEN (New. Awards_won > 2)  
BEGIN  
DBMS_OUTPUT . PUT_LINE ( 'WOW! ! So many awards' ) ;  
END;
```

(1 mark for Create Trigger)

(½ mark for ROW level)

(1 mark for triggering event and time)

(1 mark for IF/WHEN)

(½ mark for DISPLAYING message)

QUESTION PAPER CODE 90

EXPECTED ANSWERS

Section - A

Q1. Answer the following questions:

(a) Expand UML. Write its purpose.

2

Ans: UML - Unified Modeling Language:

Used for modeling of Data Base Systems based on Object Oriented Concept

(1 Mark for correct expansion)

(1 Mark for specifying purpose)

(b) Write in brief the purpose of the following software:

2

(i) LINUX

(ii) MySql

Ans LINUX: A popular - multitasking, multiuser, multiprogramming open source operating system that runs on a variety of hardware platforms, with minimal hardware requirements, licensed under the GNU General Public License

MySQL: A fast, reliable, and easy to use Relational Data Base Management Software available with an Open Source Software license- MySQL is also used to access databases on the internet due to its connectivity, speed and security

(1 Mark each for mentioning any correct purpose)

(c) Write an example of a Many to Many relationship and depict the relationship with an ER Diagram. 2

Ans Example: A Pupil may be taught by many Tutors and a Tutor may teach many Pupils. The relationship between the entities TUTOR and PUPIL is shown by the following ER Diagram:

(1 Mark for stating any valid example of many to many relationship)



(1 Mark for ER Diagram illustrating many-to-many relationship)

(d) How does data mining help in decision-making process? 2

Ans Data mining is searching through data to identify patterns and establish relationships

OR

Anyone of the following points

- Association looking for patterns where one event is connected to another event
- Sequence or path analysis - looking for patterns where one event leads to another later event
- Classification - looking for new patterns
- Clustering - finding and visually documenting groups of facts not previously known
- Forecasting - discovering patterns in data that can lead to reasonable predictions about the future

OR

Any other point conveying similar meaning

(2 Marks for correct answer)

(e) Write the purpose of “Cost Benefit Analysis” done during System Development life cycle. 2

Ans Cost Benefit analysis is done during SDLC to estimate the total cost of the project in comparison with the benefits. It is done to determine whether it is worthwhile to do the project.

(2 Marks for writing correct purpose)

OR

(Any other valid explanation)

Q2 Answer the following questions:

(a) Write the default names given to a command button and textbox. 2

Ans i) Command1

ii) Text1

(1 Mark for each part)

(b) Name one property of Textbox control, which is not present in Label control. 2

Ans Text Property / Password Character / Max Length

(2 Marks for any one property)

Note: Any other correct property of Textbox control, which is not present in Label control.

(c) What is the use of call statement? Explain in brief with the help of example. 2

Ans Call statement is used to execute a procedure.

Example:

CALL PROC1 (A, B)

OR

PROC1 A, B

(1 Mark for mentioning the correct use)

(1 Mark for example)

(d) Define interface. Name two interface supported by VB. 2

Ans Interface is the visual part which helps user to interact with the application.

Two interfaces supported by VB are:

I. SDI - Single Document Interface

II. MDI - Multi Document Interface

(1 Mark for correct definition)

(1/2 Mark for each interface mentioned)

- (e) Write the purpose of Bound Control. Name two Data Aware Properties of Data Bound Controls. 2

Ans Bound Control also known as data aware control is used to connect database through ADO/RDO/DAO The Data Aware properties are:

DataSource / Datachanged / Datafield

(1 Mark for writing the correct purpose)

(1/2 Mark for each Property)

Q3 Answer the following questions:

- (a) Write one similarity and one difference between Char and Varchar2 datatype. 2

Ans Similarity: Both are Non Numeric Data Type

Difference : Char used for declaration of fixed length field / data item while VARCHAR2 is used for declaration, of Variable length field / Data item

(1 Mark for Similarity)

(1 Mark for Difference)

OR

(Full 2 Marks to be given if same concept is explained with the help of an example)

- (b) What is the purpose of the following command: 2

(i) COMMIT

(ii) ROLLBACK

Ans Commit: Used for saving changes done by DML operations permanently

Rollback: Used to Undo all changes done by DML operations since last COMMIT

(1 Mark for mentioning the correct purpose of each command)

- (c) When are Implicit Cursors used by PL/SQL? 2

Ans Implicit Cursor is used when any Data manipulation statement is carried out. Select' into clause will also generate Implicit Cursor.

(2 Marks for mentioning either of the two points OR both)

(d) Distinguish between BEFORE and AFTER Triggers. 2

Ans BEFORE Triggers are invoked before an event occurs while AFTER Triggers are invoked after occurrence of an event

(2 Marks for the correct difference)

OR

(1 Mark for defining either of the two)

OR

(2 Marks for explaining the difference through examples)

(e) Define a CURSOR. List two statements associated with cursors. 2

Ans Cursor is a named work area that is under the direct control of the programmer. It points to the current tuple being processed.

Two statements associated with cursors are:

OPEN, FETCH, CLOSE

(1 Mark for any valid definition)

(½ mark each for ANY two statements)

OR

(Full 2 marks to be given for Defining a Cursor Statement with CURSOR commands/using FOR)

SECTION B

4. Read the following case study and answer, the questions that follow:

Get Well Hospital has computerized its billing. The following is the Data Entry screen in Visual Basic used by them:

The screenshot shows a Windows application window titled "GetWell" for "GET WELL HOSPITAL". The form is divided into several sections:

- Input Fields:** Patient No., Patient Name, Doctor Consultancy, Operation Theatre Fees, Medicines, and Patient Meals.
- Stay Record:** No. of Days of Stay.
- CATEGORY OF SERVICES:** Radio buttons for PRIVATE, SEMI PRIVATE, and GENERAL.
- Buttons:** Calculate, Clear, and Exit.
- Summary Section:** Sub Total, Tax 12%, Advance, and Amount To Pay.

The Form details of the above form are given in the following table:

Object Type	Object Name	Description
Form	FrmHospital	The Main Form Object
Text Box	TxtPNO	To enter Patient Identification Number
	TxtPName	To enter Patient's name
	TxtDocFee	To enter Doctor's Consultancy Charges
	TxtOTFee	To enter Operation Theatre Charges
	TxtMedicines	To display charge for Medicines given to Patient
	TxtMeal	To enter charges for Meals given to Patient

	TxtDays	To enter number of days for which the patient stayed in the hospital
	TxtSub	To display Total charges to be paid by the patient (before tax is added)
	TxtTax	To display the tax to be paid by the patient
	TxtAdvance	To enter Advance amount paid by the patient
	TxtAmount	To display the net amount to be paid by the patient
Option Button	OptPrivate OptSemi OptGeneral	To enter information whether the patient has opted for Private or Semi Priyate or General Category of Treatment
Command button	cmdCalculate	To calculate Sub Total, Tax and Amount to be paid by the Patient
	cmdClear	To clear all the values in Text boxes and option button in the form
	cmdExit	To close the application

Write code to implement the following:

- (a) **When the form loads text boxes for SubTotal (TxtSub), Tax (TxtTax) and Amount to pay (TxtAmount) are disabled.**

2

Ans `TxtSub.Enabled = False`

`TxtTax.Enabled = False`

`TxtAmount.Enabled = False`

(2 Marks for disabling all the controls)

OR

(½ Mark for identifying the Enabled property and ½ Mark for setting it to false)

(b) **Check that number of days of stay entered is numeric only**

2

```
Ans If Not(IsNumeric(txtDays.Text)) Then
    MsgBox ("Please enter numbers only")
    TxtDays.Text = ""
    TxtDays.setFocus
End If
```

OR

Under the validate event procedure

```
IF IsNumeric (txtDays) THEN
    cancel = False
ELSE
    cancel = True
END IF
```

Note: Restoring focus is not required in the above case.

OR

```
InValidNo = FALSE
FOR I = 1 TO LEN(txtDays.Text)
    CH = MID (txtDays.Text, I, 1)
    IF NOT (CH >= '0' AND CH <= '9') THEN
        InValidNo = TRUE
    END IF
NEXT
Cancel = InValidNo
```

OR

Any other equivalent code

(1 Mark for checking whether it is numeric entry)

(1 Mark for restoring focus to the control)

Note: Check made using lost focus OR keypress event must also be accepted

- (c) When the user clicks Clear button, Patient number and Patient name should be set to blank, other text boxes should be set to zero.

2

Ans TxtPNO. Text = " "
TxtName. Text = " "
TxtDocFee. text = "0"
TxtOTFee.Text = "0"
TxtMedicines. Text = "0"
TxtMeal. Text = "0"
TxtDays.Text = "0"
TxtSub. Text = "0"
TxtTax. Text = "0"
TxtAdvance. text = "0"
TxtAmount. text = "0"

(1 Mark for assigning null string to anyone of the following textboxes :
TxtPNO, TxtName)

(1 Mark for assigning 0 to anyone of the remaining textboxes)

Note: 0 also to be accepted in place of "0"

- (d) When the command button with caption "Calculate;" (cmdCalculate) is clicked, Sub Total, Tax (12% of Sub Total), Total amount to be paid by the patient are computed and displayed.

The criterion for calculation of Sub Total Charges is as given below:

Category of patient	Stay Charges
Private	Rs. 2000.00 per day
Semi Private	Rs. 1000.00 per day
General	Rs. 100.00 per day

- Sub Total is calculated by adding Stay charges, Doctor Consultancy fee, Operation theatre fee, Medicines charges, Meal Charges.
- Tax is levied at 12% of Sub Total.
- Advance paid is entered.
- Amount to Pay is : (Sub Total + Tax) - Advance paid by the Patient.

4

```

Ans PRIVATE SUB cmdCalculate_Click()
  IF optPrivate.value = 1 THEN
    Rate = 2000
  ELSE IF optSemi.value = 1 THEN
    Rate = 1000
  ELSE IF optGeneral.value = 1 THEN
    Rate = 100
  END IF
  txtSub.text=Rate*txtDays + txtDocFee + txtOTFee +
  txtMedicines + txtMeal
  txtTax = val (txtSub.text) * 0.12
  txtAmount = txtSub + txtTax - txtAdvance
END SUB

```

(1½ Mark for checking and assigning appropriate value to Rate)

(1 Mark for computing Sub Total)

(½ Mark for computing tax)

(1 Mark for calculating Amount to Pay)

Note: Option button value checked against true must also be accepted.

5. **Answer the following questions:**

(a) Write the output of the following code:

2

```

t = 16
FOR C = 4 TO 1 STEP -1
  x = c * t
  PRINT x
  t = t - 4
NEXT C

```

Ans Output:

64

36

16

4

(½ Mark each for each line of output)

OR

(1½ mark for writing the entire output in one line)

- (b) Rewrite the corrected program after removing syntax errors, underline the corrections:

2

```
x = 20  
  
    WHILE x >= 10  
        IF x < 12 THEN  
            x = 0  
        otherwise  
            x = x - 2  
        x = x - 2  
        PRINT x  
  
    END LOOP
```

Ans: x = 20

```
DO WHILE x >= 10  
    IF x < 12 THEN  
        x = 0  
  
    ELSE  
        x = x - 2  
  
    END IF  
    x = x - 2  
  
    PRINT x  
  
LOOP
```

(½ Mark each for identifying and correcting each of four errors)

OR

(1 Mark for identifying all the errors without making the corrections)

(c) Write the value of P after the following code is executed:

2

```
x = 2
SELECT CASE x
    CASE 1
        p = 1000 * x
    CASE 2
        p = 100 - x
    CASE 3
        p = 10 + x
END SELECT
```

Ans: 98

(2 Marks for correct output)

(d) Write a Visual Basic function that takes age as argument and returns whether the person is eligible to vote. (Assume 18 years is the minimum voting age)

4

Ans: PUBLIC FUNCTION agecheck (x As Integer) as Boolean

```
IF x >= 18 THEN
```

```
    agecheck = TRUE
```

```
ELSE
```

```
    agecheck = FALSE
```

```
END IF
```

```
END FUNCTION
```

OR

```
PUBLIC FUNCTION Voting_age (Age as integer) as string
```

```
If Age >= 18 then
```

```
    Voting_age = "Eligible to Vote"
```

```
Else
```

```
    Voting_age = "Not Eligible"
```

```
End if,
```

```
End Function
```

OR

Any other equivalent code

(1 mark for Function header)

(1 mark for checking Age)

(1 mark for storing value to be returned)

(1 mark for Else and End If)

Section - C

6. Read the questions given below and answer accordingly:

(a) Write the output produced by the following part of code in PL/SQL :

2

```
num := 5;
WHILE num <= 12 LOOP
    IF mod (num, 3) = 0 AND num > 8 THEN
        DBMS_OUTPUT.PUT_LINE ('@') ;
    ELSE
        DBMS_OUTPUT.PUT_LINE (num) ;
    END IF;
    num := num + 2 ;
END LOOP;
end;
```

Ans Output

5

7

@

11

(½ mark for each line of correct output)

Note: Deduct ½ Mark if output is given in one line

(b) Find the error(s) in the following PL/SQL code and rewrite the correct code after underlining the corrections made.

2

```
I := 3;
```



```

LOOP
    IF I > 8
        DBMS_OUT(I);
        X := 5;
    I + 1 := I;
END LOOP;

```

Ans I := 3;

```

LOOP
    IF I > 8 THEN
        DBMS_OUTPUT.PUT_LINE (I);OR DBMS_OUTPUT.PUT (I) ;
        X := 5;
    END IF;
    I := I + 1;
END LOOP;

```

(½ Mark each for identifying and correcting each error out of four errors)

OR

(1 Mark for identifying all the errors without making the corrections)

(c) Rewrite the following PL/SQL loop using FOR loop:

2

```

c := 10;
WHILE c > = 4 LOOP
    DBMS_OUTPUT.PUT_LINE (c);
    c := c - 1;
END LOOP;

```

Ans FOR c IN REVERSE 4..10

```

LOOP
    DBMS_OUTPUT.PUT_LINE (c) ;
END LOOP;

```

OR

Any other equivalent code using FOR

(2 Mark for correct FOR Statement)

OR

(1/2 Mark for correct decrement of variable c)

(1/2 Mark for displaying output in different lines)

- (d) Write a PL/SQL function that takes Roll Number of a student as a parameter and returns "Passed" if total marks of that student are at least 33 in STUDENT table otherwise it returns "Not Successful". STUDENT table has ROLLNO, NAME, TMARKS fields.

4

Ans CREATE OR REPLACE FUNCTION Find_Result (Rollnum NUMBER)
RETURN VARCHAR2 AS

```
Totmarks Student.Tmarks%TYPE;
```

BEGIN

```
SELECT Tmarks INTO Totmarks
```

```
FROM Student
```

```
WHERE Rollno = Rollnum;
```

```
IF Totmarks >= 33 THEN
```

```
RETURN 'PASSED' ;
```

```
ELSE
```

```
RETURN 'Not Successful' ;
```

```
END IF;
```

END;

OR

CREATE OR REPLACE FUNCTION Result (R NUMf3F.R)
RETURN VARCHAR2 AS

```
Marks Student.Tmarks%TYPE;
```

```
CURSOR C IS
```

```
SELECT Tmarks
```

```
FROM Student
```

```
WHERE Rollno = R;
```

```

BEGIN
    OPEN C;
    FETCH C INTO Marks;
    CLOSE C;
    IF (Marks >= 33) THEN
        RETURN 'Passed' ;
    ELSE
        RETURN 'Not Successful' ;
    END IF;
END;

```

OR

Any other equivalent code

(1 Mark for Function header)

(1 Mark for SELECT)

(1 Mark for IF)

(1 Mark for Returning value)

7. Answer the questions based on the table STUDENT given below:

Table: STUDENT

Column Name	Data Type	Size	Description	Constraint
Roll No	NUMBER	2	Roll number of Student	PRIMARY KEY
Name	VARCHAR2	25	Name of Student	NOT NULL
Stream	VARCHAR2	15	Stream (Medical/Computers/ Commerce) opted by student	NOT NULL
TMarks	NUMBER	9,2	Total Marks scored by the Student	

(a) **Write the SQL command to Create the above table with constraints.**

2

Ans CREATE TABLE STUDENT

```
(
    ROLLNO      NUMBER (2)      PRIMARY KEY,
    NAME        VARCHAR2 (25)   NOT NULL,
    STREAM      VARCHAR2 (15)   NOT NULL,
    TMARKS      NUMBER (9, 2)
) ;
```

(½ Mark for CREATE TABLE;)

(½ Mark for fields with data types)

(½ Mark for PRIMARY KEY constraint)

(½ Mark for NOT NULL constraint)

Note: NOT NULL UNIQUE must also be accepted in place of Primary Key

(b) **Write the SQL command to create a view consisting of roll numbers, names of students who are in “COMPUTERS” stream.**

2

Ans. CREATE VIEW Stu_view AS

```
SELECT Rollno, Name FROM Student
WHERE Stream = 'COMPUTERS';
```

(1 Mark for CREATE VIEW command)

(½ Mark for SELECT)

(½ mark for WHERE)

Note:

- i) Typecase must be ignored in comparing stream
- ii) Double quotes also acceptable for string values

(c) **Write the SQL command to display roll numbers, names and Total marks of students in descending order of total marks.**

2

Ans SELECT ROLLNO, NAME, TMARKS FROM STUDENT ORDER BY TMARKS DESC;

(1 Mark for SELECT)

(1 Mark for ORDER BY)

(Deduct 1/2 mark if DESC is not specified)

Note: ORDER BY clause can also be specified by numeric value i.e. 3

- (d) Create a Trigger to display the message “Work Hard” whenever Total marks (TMARKS) entered in the table are below 250.

4

Ans CREATE OR REPLACE TRIGGER tChkMarks
BEFORE INSERT OR UPDATE
ON Student
FOR EACH ROW
BEGIN
IF (:NEW.Tmarks < 250) THEN
DBMS_OUTPUT . PUT_LINE ('Work Hard') ;
END IF;
END;

OR

CREATE OR REPLACE TRIGGER tChkMarks
BEFORE INSERT OR UPDATE
ON Student
FOR EACH ROW
WHEN (NEW.Tmarks < 250)
BEGIN
DBMS_OUTPUT.PUT_LINE ('Work Hard');
END;

OR

Any other equivalent code

(1 mark for CREATE TRIGGER)

(1/2 mark for ROW level)

(1 mark for triggering event and time)

(1 mark for IF/WHEN)

(1/2 mark for displaying message)

COMPUTER SCIENCE

Time allowed : 3 hours

Maximum Marks : 70

Instructions:

- (i) *All questions are compulsory.*
- (ii) *Programming Language: C++*

QUESTION PAPER CODE 91/1

1. (a) What is the difference between call by value and call by reference? Give an example in C++ to illustrate both. 2
- (b) Write the names of the header files to which the following belong: 1
- (i) puts()
 - (ii) sin()
- (c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```
#include [iostream.h]
#include [stdio.h]
class Employee
{
    int EmpId = 901;
    char EName [20] ;
public
Employee ( ) { }
void Joining ( ) {cin>>EmpId; gets (EName);}
void List ( ) {cout<<EmpId<<" : "<<EName<<endl;}
} ;
void main ( )
{
Employee E ;
```

```

Joining.E ( ) ;
E. List ( )
}

```

(d) Find the output of the following program :

3

```

#include<iostream.h>
void main ( )
{
    int X[ ] = {10, 25, 30, 55, 100};
    int *p = X ;
    while ( *p < 110)
    {
        if (*p%3 != 0)
            *p = *p + 1 ;
        else
            *p = *p + 2 ;
        p++;
    }
    for(int I = 4 ; I>= 1 ; I - -)
    {
        cout << X[I] << "*" ;
        if ( I%3 == 0) cout<<endl ;
    }
    cout<<X[0]*3<<endl ;
}

```

(e) Find the output of the following program :

2

```

#include<iostream.h>
#include<ctype.h>
void Encode (char Info [ ], int N) ;
void main ( )
{

```

```

    char Memo [ ] = "Justnow" ;
    Encode(Memo, 2) ;
    cout<<Memo<<endl ;
}
void Encode(char Info[ ], int N)
{
    for (int I = 0 ; Info[I] != '\0' ; 1++)
        if (1%2= =0)
            Info[I] = Info[I] -N ;
            else if (islower(Info[I]))
                Info[I] = toupper(Info[I]) ;
            else
                Info[I] = Info[I] +N ;
}

```

(f) Study the following program and select the possible output from it :

2

```

#include <iostream.h>
#include <stdlib.h>
const int LIMIT = 4 ;
void main ( )
{
    randomize ( ) ;
    int Points;
    Points = 100 + random(LIMIT) ;
    for (int P=Points ; P>=100 ; P- -)
        cout<<P<<"#" ;
    cout<<endl;
}

```

(i) 103#102#101#100#

(ii) 100#101#102#103#

(iii) 100#101#102#103#104#

(iv) 104#103#102#101#100#

2. (a) What is copy constructor? Give an example in C++ to illustrate copy constructor. 2

(b) Answer the questions (i) and (ii) after going through the following class: 2
class WORK

```
{  
    int WorkId;char WorkType ;  
public:  
    ~WORK ( )                //Function 1  
    { cout<<"Un-Allocated"<<endl ;}  
    void status ( )          //Function 2  
    { cout<<WorkId<<" : "<<WorkType<<endl ;}  
    WORK ( )                 //Function 3  
    { WorkId = 10; WorkType='T' ; }  
    WORK(WORK &W)           //Function 4  
    {  
        WorkId=W. WorkId+12;WorkType=W. WorkType+1  
    }  
} ;
```

(i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class WORK is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

(ii) WORK W ; //Statement 1

WORK Y (W) ; //Statement 2

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class WORK will be called on execution of statement written as statement 2 ? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

(c) Define a class RESORT in C++ with following description: 4

Private Members

- Rno //Data member to store Room No
- Name //Data member to store customer name
- Charges //Data member to store per day charges
- Days //Data member to store number of days of stay
- COMPUTE() //A function to calculate' and return Amount as Days*Charges and if the value of Days*Charges is more than 11000 then as 1.02*Days*Charges

Public Members

- Getinfo() //A function to enter the content Rno, Name, //Charges and Days
- Dispinfo() //A function to display Rno, Name, Charges, //Days and Amount (Amount to be displayed by //calling function COMPUTE ())

(d) Answer the questions (i) to (iv) based on the following:

4

```
class FaceToFace
{
    char CenterCode [10] ;
public:
    void Input ( ) ;
    void Output ( ) ;
} ;
class Online
{
    char website [50] ;
public:
    void SiteIn ( ) ;
    void SiteOut ( ) ;
} ;
class Training: public FaceToFace, private Online
```

```

{
    long Tcode ;
    float charge;
    int period;
public:
    void Register ( ) ;
    void Show ( ) ;
} ;

```

- (i) Which type of Inheritance is shown in the above example?
 - (ii) Write names of all the member functions accessible from Show() function of class Training.
 - (iii) Write name of all the members accessible through an object of class Training.
 - (iv) Is the function Output() accessible inside the function SiteOut() ? Justify your answer.
3. (a) Write a function SORTPOINTS() in C++ to sort an array of structure Game in descending order of Points using Bubble Sort.

3

Note: Assume the following definition of structure Game

```

struct Game
{
    long PNo; //Player Number
    char PName [20] ;
    long Points;
} ;

```

Sample content of the array (before sorting)

PNo	PName	Points
103	Ritika Kapur	3001
104	John Philip	2819
101	Razia Abbas	3451
105	Tarun Kumar	2971

Sample content of the array (after sorting)

PNo	PName	Points
101	Razia Abbas	3451
103	Ri tika Kapur	3001
105	Tarun Kumar	2971
104	John Philip	2819

- (b) An array $S[40][30]$ is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element $S[20][15]$, if an element $S[15][10]$ is stored at the memory location 7200. 4

- (c) Write a function `QUEINS()` in C++ to insert an element in a dynamically allocated Queue containing nodes of the following given structure: 4

```
struct Node
{
    int PId ;    //Product Id
    char Pname [20] ;
    NODE *Next ;
} ;
```

- (d) Define a function `SWAPCOL()` in C++ to swap (interchange) the first column elements with the last column elements, for a two dimensional integer array passed as the argument of the function. 3

Example: If the two dimensional array contains

2	1	4	9
1	3	7	7
5	8	6	3
7	2	1	2

After swapping of the content of 1st column and last column, it should be :

9	1	4	2
7	3	7	1
3	8	6	5
2	2	1	7

- (e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion:

2

$X - Y / (Z + U) * V$

4. (a) Observe the program segment given below carefully and fill in the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.

1

```
#include <fstream.h>

class Stock
{
    long Ino ;    //Item Number
    char Item [20] ;//Item Name
    int Qty ;    //Quantity
public:
    void Get(int) ;//Function to enter the content
    void show ( ) ;//Function to display the content
    void Purchase (int Tqty)
    {
        Qty + = Tqty ;
    } //Function to increment in Qty
    long KnowIno ( ) {return Ino ;}
} ;

void Purchaseitem (long PINo, int PQty)
    //PINo -> Ino of the item purchased
    //PQty -> Number of item purchased
{
    fstream File;
    File.open("ITEMS.DAT", ios :: binarylios ::
inlios :: out);
    int Pos = -1 ;
    Stock S ;
```

```

while (Pos == -1 && File.read((char*) &S, sizeof (S)))
if (S. KnowIno( ) == PINo)
{
    S. Purchase (PQty); //To update the number of Items
    Pos = File.tellg ( ) -sizeof (S) ;
    //Line 1: To place the file pointer to the required
    position;
    //Line 2: To write the object S on to the binary
    file;
}
if (Pos == -1)
    cout<<"No updation done as required Ino not found.." ;
File.close ( ) ;
}

```

- (b) Write a function COUNT_DO() in C++ to count the presence of a word 'do' in a text file "MEMO.TXT"

2

Example:

If the content of the file "MEMO.TXT" is as follows:

<p>I will do it, if you request me to do it. It would have been done much earlier.</p>
--

The function COUNT_DO() will display

<p>Count of -do- in file : 2</p>

Note: In the above example, 'do' occurring as a part of word done is not considered.

- (c) Write a function in C++ to read and display the detail of all the users whose status is 'A' (i.e. Active) from a binary file "USER.DAT". Assuming the binary file "USER.DAT" is containing objects of class USER, which is defined as follows:

3

```

class USER
{
    int Uid ;      //User Id
    char Uname [20]; //User Name
    char Status; //User Type: A Active I Inactive
Public:
    void Register ( ) ; //Function to enter the content
    void show ( ) ;      //Function to display all data
                        members
    char Getstatus ( ) {return Status;}.
} ;

```

5. (a) What are candidate keys in a table? Give a suitable example of candidate keys in a table. 2
- (b) Consider the following tables GARMENT and FABRIC. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

Table: GARMENT

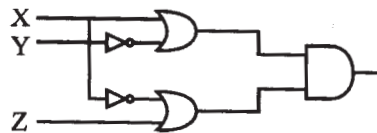
GCODE	DESCRIPTION	PRICE	FCODE	READYDATE
10023	PENCIL SKIRT	1150	F03	19-DEC-08
10001	FORMAL SHIRT	1250	F01	12-JAN-08
10012	INFORMAL SHIRT	1550	F02	06-JUN-08
10024	BABY TOP	750	F03	07-APR-07
10090	TULIP SKIRT	850	F02	31-MAR-07
10019	EVENING GOWN	850	F03	06-JUN-08
10009	INFORMAL PANT	1500	F02	20-OCT-08
10007	FORMAL PANT	1350	F01	09-MAR-08
10020	FROCK	850	F04	09-SEP-07
10089	SLACKS	750	F03	20-OCT-08

Table : FABRIC

FCODE	TYPE
F04	POLYSTER
F02	COTTON
F03	SILK
F01	TERELENE

- (i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE
- (ii) To display the details of all the GARMENTs, which have READYDATE in between 08-DEC-07 and 16-JUN-08(inclusive of both the dates).
- (iii) To display the average PRICE of all the GARMENTs, which are made up of FABRIC with FCODE as F03.
- (iv) To display FABRIC wise highest and lowest price of GARMENTs from GARMENT table. (Display FCODE of each GARMENT along with highest and lowest price)
- (v) SELECT SUM (PRICE) FROM GARMENT WHERE FCODE = 'F01' ;
- (vi) SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC WHERE GARMENT.FCODE = FABRIC.FCODE AND GARMENT. PRICE >= 1260 ;
- (vii) SELECT MAX (FCODE) FROM FABRIC;
- (viii) SELECT COUNT (DISTINCT PRICE) FROM GARMENT ;

6. (a) Verify $X'Y + X.Y' + X'Y' = (X' + Y')$ using truth table. 2
- (b) Write the equivalent Boolean Expression for the following Logic Circuit: 2

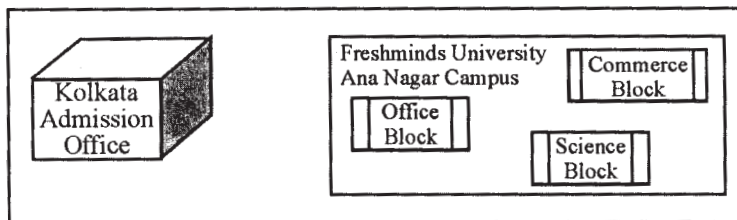


- (c) Write the POS form of a Boolean function H, which is represented in a truth table as follows: 1

A	B	C	H
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

- (d) Reduce the following Boolean Expression using K-Map : 3
 $F(P, Q, R, S) = \Sigma(1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15)$
7. (a) What is difference between Star Topology and Bus Topology of network? 1
- (b) Expand the following abbreviations: 1
- (i) GSM
- (ii) CDMA
- (c) What is protocol? Which protocol is used to search information from internet using an internet browser? 1
- (d) Name two switching techniques used to transfer data between two terminals (computers). 1
- (e) Freshminds University of India is starting its first campus in Ana Nagar of South India with its center admission office in Kolkata. The university has 3 major blocks comprising of Office Block, Science Block and Commerce Block in the 5 KM area Campus.

As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distance and other given parameters.



Expected Wire distances between various locations:

Office Block to Science Block	90 m
Office Block to Commerce Block	80 m
Science Block to Commerce Block	15 m
Kolkata Admission office to Ana Nagar Campus	2450 km

Expected number of Computers to be installed' at various locations in the University are as follows:

Office Block	10
Science Block	140
Commerce Block	30
Kolkata Admission office	8

- (E1) Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks. 1
- (E2) Suggest the most suitable place (i.e. block) to house the server of this university with a suitable reason. 1
- (E3) Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers: 1
- (i) MODEM
 - (ii) SWITCH
 - (iii) GATEWAY
- (E4) Suggest the most suitable. (very high speed) service to provide data connectivity between Admission Office located in Kolkata and the campus located in Ana Nagar from the following options: 1
- Telephone line
 - Fixed-Line Dial-up connection
 - Co-axial Cable Network
 - GSM
 - Leased line
 - Satellite Connection

QUESTION PAPER CODE 91

1. (a) What is the difference between Actual Parameter and Formal Parameter? Give an example in C++ to illustrate both types of parameters. 2
- (b) Write the names of the header files to which the following belong: 1
- (i) `setw()`
 - (ii) `sqrt()`
- (c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2
- ```
include <iostream.h>
include <stdio.h>
class MyStudent
{
```

```

 int StudentId = 1001;
 char Name [20] ;
public
 MyStudent(){ }
 void Register () {cin>>StudentId; gets (Name) ;}
 void Display () {cout<<StudentId<< ":" <<Name<<endl;}
} ;
void main ()
{
 MyStudent MS ;
 Register.MS() ;
 MS.Display() ;
}

```

(d) Find the output of the following program:

3

```

#include<iostream.h>
void main ()
{
 int A[] = {10, 15, 20, 25, 30}
 int *p = A;
 while (*p < 30)
 {
 if (*p%3 != 0)
 *p = *p + 2 ;
 else
 *p = *p + 1;
 p++;
 }
 for (int J = 0; J<=4; J++)
 {
 cout << A[J] << "*" ;
 if (J%3 == 0) cout<<endl;
 }
}

```

```

 }
 Cout<<A[4] * 3<<endl;
}

```

- (e) Find the output of the following program:

2

```

#include <iostream.h>
#include <ctype.h>
void Secret (char Mig [], int N);
void main ()
{
 char SMS[] = "rEPorTmE" ;
 Secret{SMS,2);
 cout<<SMS<<endl;
}
void Secret(char Msg[], int N)
{
 for (int C=0; Msg[C] ! =' \0' ;C++)
 if (C%2==0)
 Msg[C] = Msg[C]+N;
 else if (isupper(Msg[C]))
 Msg[C] = tolower(Msg[C]);
 else
 Msg[C] = Msg[C]-N;
}

```

- (f) Study the following program and select the possible output from it :

2

```

#include <iostream.h>
#include <stdlib.h>
const int MAX=3 ;
void main ()
{
 randomize() ;
 int Number ;
}

```

```

Number = 50 + random{MAX} ;
for (int P=Number; P>=50; P- -)
 cout<<p<< " # " ;
cout<<endl;
}

```

(i) 53#52#51#50#

(ii) 50#51#52#

(iii) 50#51#

(iv) 51#50#

2. (a) What is function overloading? Give an example in C++ to illustrate function overloading. 2

(b) Answer the questions (i) and (ii) after going through the following class: 2

```

class Job
{
 int JobId;char JobType;
public:
 ~Job () //Function 1
 { cout<< "Resigned" <<endl; }
 Job () //Function 2
 { JobId=10 ; JobType ='T' ;}
 void TellMe()//Function 3
 { cout<<JobId<< ": " <<JobType<<endl; }
 Job (Job &J) //Function 4
 {
 JobId=J.JobId+10; JobType=J.JobType+1;
 }
};

```

(i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Job is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

(ii) `Job P ; //Line 1`  
`Job Q(P) ; //Line 2`

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Job will be called on execution of statement written as Line 2 ? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

(c) Define a class HOTEL in C++ with the following description: 4

Private Members:

- `Rno` //Data member to store *Room No*
- `Name` //Data member to store customer name
- `Tariff` //Data member to store per day charges
- `NOD` //Data member to store number of days of stay
- `CALC()` //A function to calculate and return Amount as  $NOD * Tariff$  and if the value of  $NOD * Tariff$  is more than 10000 then as  $1.05 * NOD * Tariff$

Public Members

- `Checkin ()` // A function to enter the content `Rno`, `Name`,  
// `Tariff` and `NOD`
- `Checkout()` // A function to display `Rno`, `Name`, `Tariff`,  
// `NOD` and Amount (Amount to be displayed by  
// calling function `CALC()`)

(d) Answer the questions (i) to (iv) based on the following: 4

```
class Regular
{
 char SchoolCode[10];
```

```

public:
 void InRegular();
 void OutRegular();
} ;
class Distance
{
 char StudyCentreCode ['5'] ;
public:
 void InDistance();
 void OutDistance ();
} ;
class Course: public Regular, private Distance
{
 char Code [5] ;
 float Fees;
 int Duration;
public:
 void InCourse();
 void OutCourse();
} ;

```

- (i) Which type of Inheritance is shown in the above example?
- (ii) Write names of all the member functions accessible from OutCourse function of class Course.
- (iii) Write name of all the members accessible through an object of class Course.
- (iv) Is the function InRegular() accessible inside the function InDistance()? Justify your answer.

3. (a) Write a function SORTSCORE() in C++ to sort an array of structure Examinee in descending order of Score using Bubble Sort.

Note: Assume the following definition of structure Examinee

```

struct Examinee
{
 long RollNo;
 char Name [20] ;
 float Score;
} ;

```

Sample Content of the array (before sorting)

| RollNo | Name          | Score |
|--------|---------------|-------|
| 1001   | Ravyank Kapur | 300   |
| 1005   | Farida Khan   | 289   |
| 1002   | Anika Jain    | 345   |
| 1003   | George Peter  | 297   |

Sample Content of the array (after sorting)

| RollNo | Name          | Score |
|--------|---------------|-------|
| 1002   | Anika Jain    | 345   |
| 1001   | Ravyank Kapur | 300   |
| 1003   | George Peter  | 297   |
| 1005   | Farida Khan   | 289   |

- (b) An array T[50][20] is stored in the memory along the column with each of the elements occupying 4 bytes. Find out the base address and address of element T[30][15], if an element T[25][10] is stored at the memory location 9800. 4
- (c) Write a function QUEDEL() in C++ to display and delete an element from a dynamically allocated Queue containing nodes of the following given structure: 4

```

struct NODE
{

```



```

int Itemno;
char Itemname[20];
NODE *Link;
} ;

```

- (d) Define a function SWAPARR() in C++ to swap (interchange) the first row elements with the last row elements, for a two dimensional integer array passed as the argument of the function.

3

Example: If the two dimensional array contains

|   |   |   |   |
|---|---|---|---|
| 5 | 6 | 3 | 2 |
| 1 | 2 | 4 | 9 |
| 2 | 5 | 8 | 1 |
| 9 | 7 | 5 | 8 |

After swapping of the content of first row and last row, it should be as follows:

|   |   |   |   |
|---|---|---|---|
| 9 | 7 | 5 | 8 |
| 1 | 2 | 4 | 9 |
| 2 | 5 | 8 | 1 |
| 5 | 6 | 3 | 2 |

- (e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion:

2

$$A + B * (C - D) / E$$

4. (a) Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.

1

```

#include <fstream.h>
class Library
{
 long Ano; //Ano - Accession Number of the Book
 char Title[20]; //Title - Title of the Book
 int Qty; //Qty - Number of Books in Library
public:

```

```

void Enter(int); //Function to enter the content
void Display(); //Function to display the content
void Buy(int Tqty)
{
 Qty+=Tqty;
} //Function to increment in Qty
long GetAno() {return Ano;}
} ;
void BuyBook(long BANO,int BQty)
 //BANO → Ano of the book purchased
 //BQty → Number of books purchased
{
 fstream File;
 File.open("STOCK.DAT" ,ios::binary|ios::in|ios::out);
 int position=-1;
 Library L;
 while (Position== -1 && File.read((char*)&L,sizeof(L).))
 if (L. GetAno() ==BANO)
 {
 L.Buy(BQty); //To update the number of Books
 Position = File.tellg()-sizeof(L) ;
//Line 1: To place the file pointer to the required position
 _____;
//Line 2:To write the object L on to the binary file
 _____;
 }
 if (Position== -1)
 cout<< "No updation do:r{e as required Ano not found..";
 File.close();
}

```

- (b) Write a function COUNT\_TO() in C++ to count the presence of a word 'to' in a text file "NOTES.TXT".

Example:

If the content of the file “NOTES.TXT” is as follows:

```
It is very important to know that
smoking is injurious to health.
Let us take initiative to stop it.
```

The function COUNT\_TO() will display the following message:

```
Count of -to- in file: 3
```

Note: In the above example, ‘to’ occurring as a part of word stop is not considered.

- (c) Write a function in C++ to read and display the detail of all the members whose membership type is ‘L’ or ‘M’ from a binary file “CLUB.DAT”. Assume the binary file “CLUB.DAT” contains objects of class CLUB, which is defined as follows:

3

```
class CLUB
{
int Mno; //Member Number
char Mname [20]; //Member Name
char Type;//Member Type:L Life Member M Monthly Member G Guest
public:
 void Register();//Function to enter the content
 void Display(); //Function to display all data
 members char WhatType() {return Type;}.
} ;
```

5. (a) What is the purpose of a key in a table? Give an example of a key in a table.
- (b) Consider the following tables DRESS and MATERIAL. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

2

6

Table: **DRESS**

| DCODE | DESCRIPTION    | PRICE | MCODE | LAUNCHDATE |
|-------|----------------|-------|-------|------------|
| 10001 | FORMAL SHIRT   | 1250  | M001  | 12-JAN-08  |
| 10020 | FROCK          | 750   | M004  | 09-SEP-07  |
| 10012 | INFORMAL SHIRT | 1450  | M002  | 06-JUN-08  |
| 10019 | EVENING GOWN   | 850   | M003  | 06-JUN-08  |
| 10090 | TULIP SKIRT    | 850   | M002  | 31-MAR-07  |
| 10023 | PENCIL SKIRT   | 1250  | M003  | 19-DEC-08  |
| 10089 | SLACKS         | 850   | M003  | 20-OCT-08  |
| 10007 | FORMAL PANT    | 1450  | M001  | 09-MAR-08  |
| 10009 | INFORMAL PANT  | 1400  | M002  | 20-OCT-08  |
| 10024 | BABY TOP       | 650   | M003  | 07-APR-07  |

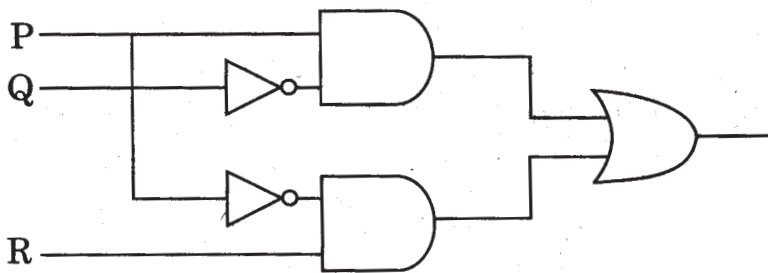
Table: **MATERIAL**

| MCODE | TYPE      |
|-------|-----------|
| MOO1  | TERELENE  |
| MOO2  | COTTON    |
| MOO4  | POLYESTER |
| MOO3  | SILK      |

- (i) To display DCODE and DESCRIPTION of each dress in ascending order of DCODE.
- (ii) To display the details of all the dresses which have LAUNCHDATE in between 05-DEC-07 and 20-JUN-08 (inclusive of both the dates).
- (iii) To display the average PRICE of all the dresses which are made up of material with MCODE as M003.
- (iv) To display materialwise highest and lowest price of dresses from DRESS table. (Display MCODE of each dress along with highest and lowest price)

- (v) SELECT SUM(PRICE) FROM DRESS WHERE MCODE='M001';
- (vi) SELECT DESCRIPTION, TYPE FROM DRESS, MATERIAL WHERE DRESS.DCODE = MATERIAL.MCODE AND DRESS.PRICE>=1250;
- (vii) SELECT MAX(MCODE) FROM MATERIAL;
- (viii) SELECT COUNT(DISTINCT PRICE) FROM DRESS;

6. (a) State and verify absorption law using truth table. 2
- (b) Write the equivalent Boolean Expression for the following Logic Circuit: 2



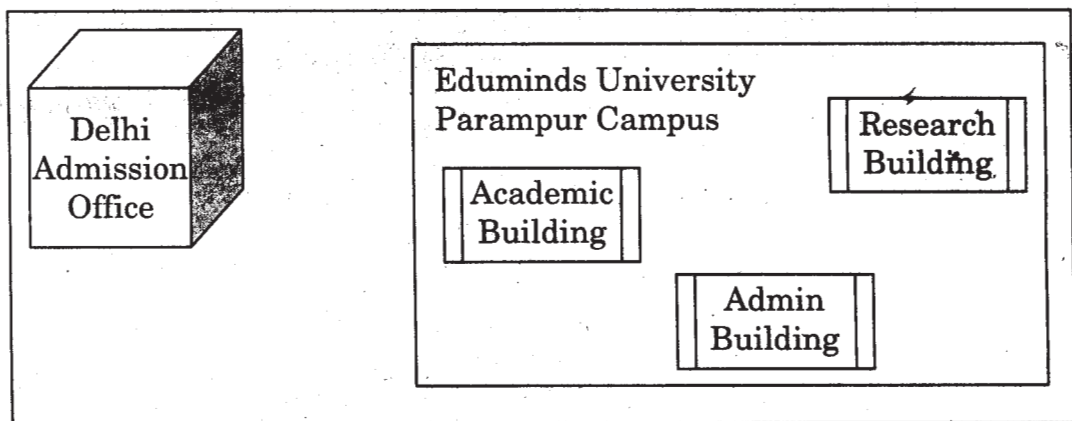
- (c) Write the POS form of a Boolean function G, which is represented in a truth table as follows: 1

| U | V | W | G |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

- (d) Reduce the following Boolean Expression using K-Map : 3
- $$H(U,V,W,Z) = \Sigma(0, 1, 4, 5, 6, 7, 11, 12, 13, 14, 15)$$

7. (a) What is the difference between LAN and WAN? 1
- (b) Expand the following abbreviations: 1
- (i) HTTP
- (ii) ARPANET
- (c) What is protocol? Which protocol is used to copy a file from/to a remotely located server? 1
- (d) Name two switching techniques used to transfer data between two terminals (computers). 1
- (e) Eduminds University of India .is starting its first campus in a small town Parampur of Central India with its center admission office in Delhi. The university has 3 major buildings comprising of Admin Building, Academic Building and Research Building in the 5 KM area Campus.

As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters.



Expected Wire distances between various locations:

|                                           |         |
|-------------------------------------------|---------|
| Research Building to Admin Building       | 90m     |
| Research Building to Academic Building    | 80m     |
| Academic Building to Admin Building       | 15m     |
| Delhi Admission Office to Parampur Campus | 1450 km |

Expected number of computers to be installed at various locations in the university are as follows:

|                        |     |
|------------------------|-----|
| Research Building      | 20  |
| Academic Building      | 150 |
| Admin Building         | 35  |
| Delhi Admission Office | 5   |

- (E1) Suggest to the authorities, the cable layout amongst various buildings inside the university campus for connecting the buildings. 1
- (E2) Suggest the most suitable place (i.e. building) to house the server of this organisation, with a suitable reason. 1
- (E3) Suggest an efficient device from the following to be installed in each of the buildings to connect all the computers : 1
- (i) GATEWAY
  - (ii) MODEM
  - (iii) SWITCH
- (E4) Suggest the most suitable (very high speed) service to provide data connectivity between Admission Building located in Delhi and the campus located in Par am pur from the following options: 1
- Telephone line
  - Fixed-Line Dial-up connection
  - Co-axial Cable Network
  - GSM
  - Leased line
  - Satellite Connection

## Marking Scheme — Computer Science

### **General Instructions :**

1. The answers given in the marking scheme are SUGGESTIVE, Examiners are requested to award marks for all alternative correct Solutions / Answers conveying the similar meaning
2. All programming questions have to be answered with respect to. C++ Language only.
3. In C++, ignore case sensitivity for identifiers  
(Variable/Functions/Structures/Class Names)
4. In SQL related questions - both ways of text/character entries should be acceptable for Example: “AMAR” and ‘amar’ both are correct.
5. In SQL related questions - all date entries should be acceptable for Example: 'DD-Mon-YY', 'DD/MM/YY', 'DD/MM/YY', 'DD/MM/YY', 'MM/DD/YY', 'MM/DD/YY', and {MM/DD/YY} are correct.
6. In SQL related questions - semicolon should be ignored for terminating the SQL statements
7. In SQL related questions, ignore case sensitivity.

QUESTION PAPER CODE 91/1

### **EXPECTED ANSWERS**

1. (a) What is the difference between call by value and call by reference? Give an example in C++ to illustrate both.

2

Ans *Call by value* is used to create a temporary copy of the data coming from the actual parameter into the formal parameter. The changes done in the function in formal parameter are not reflected back in the calling environment. It does not use ‘&’ sign.

*Call by reference* is used to share the same memory location for actual and formal parameters and so changes done in the function are reflected back in the calling environment. It uses ‘&’ sign.

```
void Compute(int A, int &B)
{
 A++;
 B++;
}
```



```

cout<<"In the function"<<endl;
cout<<"A="<<A<<"&"<<"B="<<B<<endl;
}
void main ()
{
int I=50,J=25;
cout<<"Before function call "<<endl;
cout<<"I="<<I<<"&"<<"J="<<J <<endl;
Compute (I,J) ;
cout<<"After function call "<<endl;
cout<<I="<<I<<"&"<<"J="<<J <<endl;
}

```

### OUTPUT

Before function call

I=50&J=25

In the function

A=51&B=26

After function call

I=50&J=26

(½ Mark for each correct explanation of Call by Value and Call by Reference)

(½ Mark for each correct example of Call by Value and Call by Reference)

OR

(Full 2 Marks for correct examples demonstrating the difference between Call by Value and Call by Reference)

OR

(Only 1 Mark to be awarded if Explanation without supporting examples)

Note: Output is optional

(b) Write the names of the header files to which the following belong:

1

(i) puts ()      (ii) sin ()

Ans (i) `stdio.h`      (ii) `math.h`

(½ Mark for writing each correct header file)

- (c) Rewrite the following program after removing the syntactical errors (if any).  
Underline each correction.

2

```
#include [iostream.h]
#include [stdio.h]
class Employee
{
 int EmpId=901;
 char EName [20] ;
public
 Employee(){}
 void Joining() {cin>>EmpId; gets (EName);}
 void List () {cout<<EmpId<<" : "<<EName<<endl;}
};
void main ()
{
 Employee E;
 Joining.E();
 E.List()
}
```

Ans #include <iostream.h>

#include <stdio.h>

class Employee

{ int EmpId;

char EName[20];

public :

Employee() {EmpId=901;}

void Joining() {cin>>EmpId; gets (EName);}

void List () {cout<<EmpId<<": "<<EName<<endl;}

```
};
void main ()
{ Employee E;
 E.Joining ();
 E.List ();
}
```

(½ Mark for writing both header files inside <>)

(½ Mark for removing = 901 from int Empld = 901;)

(½ Mark for writing: after public and; after E.List())

(½ Mark for writing E.Joining (); correctly)

Note: ½ mark for identifying any two errors without valid correction and 1 mark for identifying all five errors without valid correction

(d) Find the output of the following program:

3

```
#include<iostream.h>
void main ()
{
 int X[] = {10,25,30,55,110};
 int *p = X;
 while (*p < 110)
 {
 if (*p%3 != 0)
 *p=*p+1;
 else
 *p = *p + 2;
 p++;
 }
 for(int I = 4; I>=1 ; I--)
 {
 cout << X[I] << "*" ;
 if (I%3 == 0) cout<<endl;
 }
}
```

```

 }
 cout<<X[0] * 3<<endl;
}

```

Ans 1110\*56\*

32\*26\*33

(½ Mark for each correct value)

(½ Mark for all correct endl and \*)

(e) Find the output of the following program :

2

```

#include <iostream.h>
#include <ctype.h>
void Encode (char Info [], int N) ;
void main ()
{
 char Memo [] = "Justnow" ;
 Encode (Memo, 2) ;
 cout<<Memo<<endl ;
}
void Encode (char Info [], int N)
{
 for (int I = 0 ; Info[I] !='\0' ; I++)
 if (I%2== 0)
 Info[I] = Info[I] -N ;
 else if (islower(Info[I]))
 Info[I] = toupper(Info[I]) ;
 else
 Info[I] = Info[I] +N ;
}

```

Ans HuqTIOu

(½ Mark for writing H, U as the first two characters)

(½ Mark for writing q, T as the next two characters)

(½ Mark for writing 1, O as the next two characters)

(½ Mark for writing u as the last character)

- (f) Study the following program and select the possible output from it :

2

```
#include <iostream.h>
#include <stdlib.h>
const int LIMIT = 4 ;
void main ()
{
 randomize() ;
 int Points;
 Points = 100 + random(LIMIT) ;
 for (int P=Points ; P>=100 ; P- -)
 cout<<P<<"# " ;
 cout<<endl;
}
```

- (i) 103#102#101#100#
- (ii) 100#101#102#103#
- (iii) 100#101#102#103#104#
- (iv) 104#103#102#101#100#

Ans (i) 103#102#101#100#

(2 Marks for mentioning correct option)

Note: No Marks to be awarded for any other answer

2. (a) What is copy constructor? Give an example in C++ to illustrate copy constructor.

2

Ans A copy constructor is an overloaded constructor function in which (an) object(s) of the same class is/are passed as a reference parameter(s). It is used when an object's data value is related to or is initialised using another object's data value of the same class. In the example below the values of data

members of object Q are dependent on the values of data members of object P and Data members of object R dependent on Q.

```
//Example of Copy Constructor
class Play
{
 int Count, Number;
public:
 Play(); //constructor
 Play(Play &);//copy constructor
 void Disp();
 void Change(int,int);
};
Play::Play () //constructor
{
 Count=0;
 Number=0;
}
Play:: Play (Play &P) //copy constructor
{
 Count=P.Count+10;
 Number=P.Number+20;
}
void Play::Disp()
{
 cout<<Count;
 cout<<Number<<endl;
}
void Play::Change(int C,int N)
{
 Count=C;
```

```

 Number=N;
 }
void main ()
{
 Play P; //Call for constructor
 P.Disp (); P.Change(90,80) ;
 Play Q(P); //Copy constructor call
 Q.Disp();
 Play R=Q; //Copy constructor call [same as Play R(Q);]
 R. Disp();
}

```

(1 Mark for correct explanation of Copy Constructor)

(1 Mark for a valid example of Copy Constructor)

Note: Member function other than the constructors are optional

- (b) Answer the questions (i) and (ii) after going through the following class:  
class WORK

2

```

{
 int WorkId;char WorkType ;
public:
 -WORK () //Function 1
 { cout<<"Un-Allocated"<<endl ;}
 void status () //Function 2
 { cout<<WorkId<<": "<<WorkType<<endl ;}
 WORK () //Function 3
 { WorkId = 10; WorkType='T' ; }
 WORK(WORK &W) //Function 4
 {
 WorkId=W. WorkId+12;WorkType=W. WorkType+1
 }
} ;

```

- (i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class WORK is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

Ans Function 1

Destructor.

(½ Mark for naming Function 1 correctly)

(½ Mark for naming it as Destructor,

- (ii) `WORK W; // Statement 1`

`WORK Y(W); // Statement 2`

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class WORK will be called on execution of statement written as statement 2 ? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

Ans Function 4

Copy Constructor.

(½ Mark for naming Function 4 correctly)

(½ Mark for naming it as Copy Constructor)

- (c) Define a class RESORT in C++ with following description:

4

Private Members

- Rno //Data member to store Room No
- Name //Data member to store customer name
- Charges //Data member to store per day charges
- Days //Data member to store number of days of stay
- COMPUTE() //A function to calculate' and return Amount as Days\*Charges and if the value of Days\*Charges is more than 11000 then as 1.02\*Days\*Charges

Public Members

- Getinfo () //A function to enter the content Rno, Name, //Charges and Days



- `Dispinfo()` //A function to display Rno, Name, Charges,  
//Days and Amount (Amount to be displayed by  
//calling function COMPUTE())

```

Ans class RESORT
{
 int Rno;
 char Name [20];
 float Charges;
 int Days;
 float COMPUTE();
public:
 void Getinfo() ;
 void Dispinfo();
};
void RESORT::Getinfo()
{
 cin>>Rno;
 gets (Name);
 cin>>Charges;
 cin>>Days;
}
void RESORT::Dispinfo()
{
 cout<<Rno<<" "<<Name<<" "<<Charges<<" "<<Days<<
 COMPUTE()<<endl;
}
float RESORT::COMPUTE()
{
 float Amount = Charges*Days;
 if (Amount>11000)

```

```

 Amount = 1.02*Days*Charges;
 return Amount;
}

```

(½ Mark for correct syntax for class header)

(½ Mark for correct declaration of data members)

(1 Mark for correct definition of COMPUTE()).

(1 Mark for correct definition of Dispinfo() with proper invocation of COMPUTEO function)

(1 Mark for correct definition of Getinfo())

NOTE: Deduct ½ Mark if COMPUTE() is not invoked properly inside Dispinfo() function

(d) Answer the questions (i) to (iv) based on the following:

4

```

class FaceToFace
{
 char CenterCode [10] ;
public:
 void Input () ;
 void Output () ;
} ;
class Online
{
 char website [50] ;
public:
 void SiteIn () ;
 void SiteOut () ;
} ;
class Training: public FaceToFace, private Online
{
 long Tcode ;
 float charge;
} ;

```

```

 int period;
public:
 void Register () ;
 void Show () ;
} ;

```

(i) Which type of Inheritance is shown in the above example?

Ans Multiple Inheritance

(1 Mark for mentioning correct inheritance type)

ii) Write names of all the member functions accessible from Show() function of class Training.

Ans Register()

SiteIn(). SiteOut().

Input(), Output()

(1 Mark for correct answer)

Note: No marks to be awarded for any other alternative answer

iii) Write name of all the members accessible through an object of class Training.

Ans Register(), Show(),

Input(), Output()

(1 Mark for correct answer)

Note: No marks to be awarded for any other alternative answer

iv) Is the function Output() accessible inside the function SiteOut()? Justify your answer.

Ans No, function Output() is not accessible inside the function SiteOut(), because Output() is a member of class FaceToFace and SiteOut() is a member of class Online. and the classes FaceToFace and Online are two independent classes.

(½ Mark for mentioning NOT ACCESSIBLE correctly)

(½ Mark for correct justification)

OR

(1 Mark if YES is supported with valid justification that the function InRegular())

is accessible inside the function InDistance() ONLY for an object of the derived class OR in context of Inheritance)

NOTE: No mark to be awarded if only YES is written without any justification.

3. (a) Write a function SORTPOINTS() in C++ to sort an array of structure Game in descending order of Points using Bubble Sort.

3

Note: Assume the following definition of structure Game

```
struct Game
{
 long PNo; //Player Number
 char PName [20] ;
 long Points;
} ;
```

Sample content of the array (before sorting)

| PNo | PName        | Points |
|-----|--------------|--------|
| 103 | Ritika Kapur | 3001   |
| 104 | John Philip  | 2819   |
| 101 | Razia Abbas  | 3451   |
| 105 | Tarun Kumar  | 2971   |

Sample content of the array (after sorting)

| PNo | PName         | Points |
|-----|---------------|--------|
| 101 | Razia Abbas   | 3451   |
| 103 | Ri tika Kapur | 3001   |
| 105 | Tarun Kumar   | 2971   |
| 104 | John Philip   | 2819   |

Ans void SORTPOINTS(Game G[], int N)

```
{
 Game Temp;
```

```

for (int I = 0; I<N-1; I++)
 for (int J = 0; J<N-I-1; J++)
 if(G[J].Points < G[J+1].Points)
 {
 Temp = G[J];
 G[J] = G[J+1];
 G[J+1] = Temp;
 }

```

OR

Any other correct equivalent function definition

(½ Mark for correct Function Header)

(½ Mark for each correct loop)

(1 Mark for correct comparison of adjacent elements)

(½ Mark for swapping the values correctly)

Note:

Deduct ½ Mark if sorted in ascending order instead of descending order

Deduct ½ Mark if only Points is swapped instead of the whole Structure

Deduct ½ Mark if Temp is not declared with correct data type

- (b) An array S[40][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element S[20][15], if an element S[15][10] is stored at the memory location 7200.

4

$$\begin{aligned}
 \text{Ans } \text{Loc}(S[I][J]) &= \text{Base}(S) + W(I+J*N) \\
 \text{Loc}(S[15][10]) &= \text{Base}(S) + 4(15+10*40) \\
 \text{Base}(S) &= 7200 - 4*415 \\
 \text{Base}(S) &= 7200 - 1660 \\
 \text{Base}(S) &= 5540 \\
 \text{Loc}(S[20][15]) &= \text{Base}(S) + 4(20+15*40) \\
 \text{Loc}(S[20][15]) &= 5540 + 4(20+15*40) \\
 &= 5540 + 4(20+600)
 \end{aligned}$$

$$\begin{aligned}
&= 5540 + 4 \times 620 \\
&= 5540 + 2480 \\
&= 8020
\end{aligned}$$

OR

Address of  $S[i][j] = \text{BaseAddress} + W[(i-L_1) + (j-L_2) * M]$

Address of  $S[15][10] = \text{BaseAddress} + 4[(15-0) + (10-0) * 40]$

$$7200 = \text{Base Address} + 4 [415]$$

$$\text{Base Address} = 7200 - 4 * 415$$

$$= 7200 - 1660$$

$$= 5540$$

Address of  $S[20][15] = 5540 + 4 [(20-0) + (15-0) * 40]$

$$= 5540 + 4 * 620$$

$$= 5540 + 2480$$

$$= 8020$$

OR

Address of  $S[i][j]$  along the column =

$\text{Base Address} + W [(i-L_1) + (j-L_2) * M]$

Address of  $S[15][10] = \text{BaseAddress} + 4[(15-1) + (10-1) * 40]$

$$7200 = \text{Base Address} + 4 [374]$$

$$\text{Base Address} = 7200 - 4 * 374$$

$$= 7200 - 1496$$

$$= 5704$$

Address of  $S[20][15] = 5704 + 4 [(20-1) + (15-1) * 40]$

$$= 5704 + 4 * 579$$

$$= 5704 + 2316$$

$$= 8020$$

(1 Mark for writing correct formula (for column major) OR substituting formula with correct values for calculating correct Base Address)

(1 Mark for calculating correct Base Address)

(1 Mark for writing correct formula/correct substituted values, for column major properly, for calculating Address of 5[20][15])

(1 Mark for calculating correct address of 5[20][15])

- (c) Write a function QUEINS() in C++ to insert an element in a dynamically allocated Queue containing nodes of the following given structure:

4

```
struct Node
{
 int PId ; //Product Id
 char Pname [20] ;
 NODE *Next ;
} ;
```

Ans class Queue

```
{
 Node *Front, *Rear;
public:
 QUEUE() //Constructor to initialize Front and Rear
 {
 Front = NULL;
 Rear = NULL;
 }
 void QUEINS(); //Function to insert a node
 void QUEDEL(); //Function to delete a node
 void QUEDISP(); //Function to display nodes
 ~Queue(); //Destructor to delete all nodes
} ;

void Queue::QUEINS()
{
 Node *Temp;
 Temp = new Node;
 cin>>Temp->PId;
```

```

gets(Temp->Pname); //Or cin>>Temp->Pname;
 //cin.getline(Temp->Pname);

Temp->Next = NULL;
if (Rear == NULL)
{
 Front = Temp;
 Rear = Temp;
}
else
{
 Rear->Next = Temp;
 Rear = Temp;
}
}

```

OR

```

void QUEINS (Node *&Front, Node *&Rear)
{
 Node *Temp = new Node;
 cin>>Temp->PID;
 gets (Temp->Pname); //or cin>>Temp->Pname;
 //cin.getline(Temp->Pname);

 Temp->Next = NULL;
 if(Rear == NULL)
 Front = Temp;
 else
 Rear -> Next = Temp;
 Rear = Temp;
}

```

(1 Mark for creating Node dynamcally)

(½ Mark for input/ assigning Pld, Pname)



(½ Mark for assigning NULL to Temp->Next)

(½ Mark for checking Empty Queue)

(½ Mark for assigning Front with Temp in case of empty queue)

(½ Mark for assigning Rear ->Next with Temp when queue is not empty)

(½ Mark for assigning Rear with Temp)

- (d) Define a function SWAPCOL() in C++ to swap (interchange) the first column elements with the last column elements, for a two dimensional integer array passed as the argument of the function.

3

Example: If the two dimensional array contains

|   |   |   |   |
|---|---|---|---|
| 2 | 1 | 4 | 9 |
| 1 | 3 | 7 | 7 |
| 5 | 8 | 6 | 3 |
| 7 | 2 | 1 | 2 |

After swapping of the content of 1st column and last column, it should be :

|   |   |   |   |
|---|---|---|---|
| 9 | 1 | 4 | 2 |
| 7 | 3 | 7 | 1 |
| 3 | 8 | 6 | 5 |
| 2 | 2 | 1 | 7 |

Ans void SWAPCOL(int A[][100], int M, int N)

```
{
 int Temp, I;
 for(I=0; I<M; I++)
 {
 Temp = A [I][0] ;
 A[I][0] = A[I][N-1];
 A[I][N-1] = Temp;
 }
}
```

OR

```
void SWAPCOL(int A[4][4])
{
 int Temp, I;
 for(I=0; I<4; I++)
 {
 Temp = A[I][0];
 A[I][0] = A[I][3];
 A[I][3] = Temp;
 }
}
```

OR

Any other correct equivalent function definition.

(1 Mark for correct function header)

(1 Mark for correct loop)

(1 Mark for swapping the first column with last column correctly)

- (e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion:

$X - Y / (Z + U) * V$

Ans  $X - Y / (Z + U) * v$

$= (X - ((Y / (Z + U)) * v))$

| Element Scanned | Stack | Postfix |
|-----------------|-------|---------|
| (               |       |         |
| X               |       | X       |
| -               | -     |         |
| (               |       |         |
| (               |       |         |
| Y               |       | XY      |
| /               | -/    |         |
| (               |       |         |

2

|   |     |            |
|---|-----|------------|
| Z |     | XYZ        |
| + | -/+ |            |
| U |     | XYZU       |
| ) | -/  | XYZU+      |
| ) | -   | XYZU+ /    |
| * | -*  |            |
| V |     | XYZU+ /V   |
| ) | -   | XYZU+ /V*  |
| ) |     | XYZU+ /V*- |

OR

| Element Scanned | Stack | Postfix    |
|-----------------|-------|------------|
| (               | (     |            |
| X               | (     | X          |
| -               | (-    | X          |
| Y               | (-    | XY         |
| /               | (-/   | XY         |
| (               | (-/(  | XY         |
| Z               | (-/(  | XYZ        |
| +               | (-/(+ | XYZ        |
| U               | (-/(+ | XYZU       |
| )               | (-/   | XYZU+      |
| *               | (-*   | XYZU+ /    |
| V               | (-*   | XYZU+ /V   |
| )               |       | XYZU+ /V*- |

OR

Any other method for converting the given infix expression to its equivalent postfix expression showing the Stack Status.

(½ Mark for correctly converting expression up to each operator

(1 Mark only to be given for writing correct answer without showing the Stack Status)

4. (a) Observe the program segment given below carefully and fill in the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.

```

#include <fstream.h>
class Stock
{
 long Ino ; //Item Number
 char Item [20] ;//Item Name
 int Qty ; //Quantity
public:
 void Get(int) ;//Function to enter the content
 void show () ;//Function to display the content
 void Purchase (int Tqty)
 {
 Qty + = Tqty ;
 } //Function to increment in Qty
 long KnowIno () {return Ino ;}
} ;

void Purchaseitem (long PINo, int PQty)
 //PINo -> Ino of the item purchased
 //PQty -> Number of item purchased
{
 fstream File;
 File.open("ITEMS.DAT", ios :: binarylios ::
inlios :: out);
 int Pos = -1 ;
 Stock S ;
 while (Pos = = -1 && File.read((char*) &S, sizeof (S)))
 if (S. KnowIno() ==PINo)
 {
 S. Purchase (PQty); //To update the number of Items
 Pos = File.tellg () -sizeof (S) ;
 }
}

```

```

//Line 1: To place the file pointer to the required
position
_____ ;

//Line 2: To write the object S on to the binary
file
_____ ;

}

if (Pos == -1)
 cout<<"No updation done as required Ino not found.." ;
File.close () ;
}

```

Ans Statement 1:

```

File.seekp(Pos);
 OR
File.seekp(-sizeof(A), ios:: cur);
 OR
File.seekg(Pos); //Not advisable
 OR
File.seekg(-sizeof (A), ios:: cur); //Not advisable
 OR

```

Any equivalent correct method

Statement 2:

```

File.write((char*)&S, sizeof(S));
 OR
File.write((char*)&S, sizeof(Stock));
 OR

```

Any equivalent correct method

(½ Mark for each correct Statement)

- (b) Write a function COUNT\_DO() in C++ to count the presence of a word 'do' in a text file "MEMO.TXT"

Example:

If the content of the file "MEMO.TXT" is as follows:

I will do it, if you  
request me to do it.

It would have been done much earlier.

The function COUNT\_DO () will display the following message:

Count of -do- in file : 2

Note: In the above example, 'do' occurring as a part of word done is not considered.

Ans void COUNT\_DO ()

```
{
 ifstream Fil;
 Fil.open("MEMO.TXT");
 char Word[80];
 int Count =0;
 while(!Fil.eof())
 {
 Fil>>Word;
 if (strcmp (Word, "do") ==0)
 Count++;
 }
 cout<<"Count of -do- in file:"<<Count;
 Fil.close(); //Ignore
}
```

|                              |
|------------------------------|
| OR ifstream Fil("MEMO.TXT"); |
|------------------------------|

OR

void COUNT\_TO ()

```
{
 ifstream Fil("MEMO.TXT");
 //OR fstream Fil;
```

```

//Fil.open ("NOTES. TXT", ios::in);
char. STR[10];
int c=0;
while(Fil.getline(STR,10, ' '))
{
 if (strcmpi (STR, "to") =0)
 c++;
}
Fil.close();//Ignore
cout<<"Count of -to- in file : "<<c<<endl;
}

```

OR

```

void COUNT_DO ()
{
 ifstream Fil;
 Fil.open("MEMO.TXT");
 char Word[80],Ch;
 int Count =0, I=0;
 while(Fil.get(Ch))
 {
 if (Ch! = ' ')
 Word[I++] = Ch;
 else
 {
 Word[I] = '\0';
 if (strcmp (Word, "do") ==0)
 Count++;
 I=0;
 }
 }
}

```

OR ifstream Fil("MEMO.TXT");

```

 cout<<"Count of -do- in file:"<<Count;
 Fil.close(); //Ignore
 }

```

OR

Any other correct function definition

(½ Mark for opening MEMO. TXT correctly)

(½ Mark for reading each word (Whichever method adopted) from the file)

(½ Mark for comparing the word with 'do' and incrementing counter)

(½ Mark for displaying the number of 'do' with/without the Text Message)

- (c) Write a function in C++ to read and display the detail of all the users whose status is 'A' (i.e. Active) from a binary file "USER.DAT". Assuming the binary file "USER.DAT" is containing objects of class USER, which is defined as follows:

3

```

class USER
{
 int Uid ; //User Id
 char Uname [20]; //User Name
 char Status; //User Type: A Active I Inactive
public:
 void Register () ; //Function to enter the content
 void show () ; //Function to display all data
 members
 char Getstatus () {return Status;}.
} ;

```

Ans void DisplayActive ( )

```

{
 USER U;
 ifstream fin;
 fin.open ("USER.DAT", ios::binary);

```

OR

```

ifstream fin ("USER.DAT", ios::binary);

```



```

while(fin.read((char*)&U, sizeof(U)))
{
 if(U.Getstatus()=='A')
 U.show();
}
fin.close(); //Ignore
}

```

OR

```

void DisplayActive()

```

```

{
 USER U;
 ifstream fin;
 fin.open ("USER.DAT", ios::binary);

```

OR

```

 ifstream fin ("USER.DAT", ios::binary);

```

```

if (fin)
{
 fin.read((char*)&U, sizeof(U));
 while(!fin.eof())
 {
 if (U.Getstatus()=='A')
 U.show() ;
 fin.read((char*)&U, sizeof(U))
 }
 fin.close(); //Ignore
}

```

(½ Mark for opening USER.DAT correctly)

(½ Mark for reading each record from USER.DAT)

(½ Mark for correct loop / checking end of file)

(1 Mark for comparing value returned by Getstatus() with 'A')

(½ Mark for displaying the matching record)

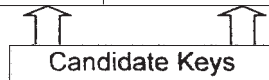
5. (a) What are candidate keys in a table? Give a suitable example of candidate keys in a table.

2

Ans A table may have more than one such attribute/group of attribute that identifies a tuple uniquely, all such attribute(s) are known as Candidate Keys.

**Table:Item**

| Ino | Item   | Qty |
|-----|--------|-----|
| I01 | Pen    | 560 |
| I02 | Pencil | 780 |
| I04 | CD     | 450 |
| I09 | Floppy | 700 |
| I05 | Eraser | 300 |
| I03 | Duster | 200 |



(1 Mark for writing correct definition of Candidate Key)

(1 Mark for giving suitable example)

OR

(2 Marks for illustrating Candidate Key with/without showing it as a part of a Table)

- (b) Consider the following tables GARMENT and FABRIC. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii)

6

**Table: GARMENT**

| GCODE | DESCRIPTION    | PRICE | FCODE | READYDATE |
|-------|----------------|-------|-------|-----------|
| 10023 | PENCIL SKIRT   | 1150  | F03   | 19-DEC-08 |
| 10001 | FORMAL SHIRT   | 1250  | F01   | 12-JAN-08 |
| 10012 | INFORMAL SHIRT | 1550  | F02   | 06-JUN-08 |
| 10024 | BABY TOP       | 750   | F03   | 07-APR-07 |
| 10090 | TULIP SKIRT    | 850   | F02   | 31-MAR-07 |
| 10019 | EVENING GOWN   | 850   | F03   | 06-JUN-08 |
| 10009 | INFORMAL PANT  | 1500  | F02   | 20-OCT-08 |
| 10007 | FORMAL PANT    | 1350  | F01   | 09-MAR-08 |
| 10020 | FROCK          | 850   | F04   | 09-SEP-07 |
| 10089 | SLACKS         | 750   | F03   | 20-OCT-08 |

Table : FABRIC

| FCODE | TYPE     |
|-------|----------|
| F04   | POLYSTER |
| F02   | COTTON   |
| F03   | SILK     |
| F01   | TERELENE |

- (i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE

Ans `SELECT GCODE, DESCRIPTION FROM GARMENT  
ORDER BY GCODE DESC;`

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (ii) To display the details of all the GARMENTS, which have READYDATE in between 08-DEC-07 and 16-JUN-08(inclusive of both the dates).

Ans `SELECT * FROM GARMENT WHERE READYDATE BETWEEN ' 08-  
DEC-07' AND , 16-JUN-08' ;`

OR

`SELECT * FROM DRESS WHERE LAUNCHDATE >= '08-DEC-07'  
AND LAUNCHDATE<='16-JUN-08' ;`

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (iii) To display the average PRICE of all the GARMENTS, which are made up of FABRIC with FCODE as F03.

Ans `SELECT AVG (PRICE) FROM GARMENT WHERE FCODE = 'F03';`

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (iv) To display FABRIC wise highest and lowest price of GARMENTS from GARMENT table. (Display FCODE of each GARMENT along with highest and lowest price)

Ans `SELECT FCODE, MAX (PRICE), MIN(PRICE) FROM GARMENT  
GROUP BY FCODE;`

(1 Mark for correct query)

(½ Mark for partially correct answer)

(v) SELECT SUM (PRICE) FROM GARMENT WHERE FCODE = 'F01' ;

Ans SUM (PRICE)  
26:10

(½ Mark for correct output)

(vi) SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC WHERE GARMENT.FCODE = FABRIC.FCODE AND GARMENT. PRICE >= 1260 ;

Ans DESCRIPTION            TYPE  
INFORMAL SHIRT        COTTON  
INFORMAL PANT         COTTON  
FORMAL PANT            TERELENE

(½ Mark for correct output)

(vii) SELECT MAX (FCODE) FROM FABRIC;

Ans MAX (FCODE)  
F04

(½ Mark for correct output)

(viii) SELECT COUNT (DISTINCT PRICE) FROM GARMENT ;

Ans COUNT(DISTINCT PRICE)  
7

(½ Mark for correct output)

6. (a) Verify  $X'Y + X.Y' + X'Y' = (X' + Y')$  using truth table.

2

Ans

| X | Y | X' | Y' | X'Y | XY' | X'Y' | X'Y+XY'+X'Y' | X'+Y' |
|---|---|----|----|-----|-----|------|--------------|-------|
| 0 | 0 | 1  | 1  | 0   | 0   | 1    | 1            | 1     |
| 0 | 1 | 1  | 0  | 1   | 0   | 0    | 1            | 1     |
| 1 | 0 | 0  | 1  | 0   | 1   | 0    | 1            | 1     |
| 1 | 1 | 0  | 0  | 0   | 0   | 0    | 0            | 0     |

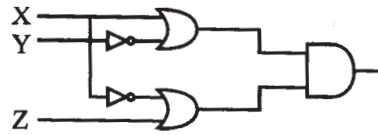


(1 Mark for drawing the truth table with correct inputs)

(1 Mark for deriving LHS values = RHS values)

(b) Write the equivalent Boolean Expression for the following Logic Circuit:

2



Ans  $(x+Y') \cdot (X' + Z)$

(2 Marks for the final expression  $(x+Y') \cdot (X' + Z)$ )

OR

(1 Mark for any of the correct terms out of  $(X+Y')$  or  $(X' +Z)$ )

(c) Write the POS form of a Boolean function H, which is represented in a truth table as follows:

1

| A | B | C | H |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

Ans  $(A+B+C) \cdot (A' + B + C') \cdot (A' + B' + C)$

OR

$H(A,B,C) = \Pi (0, 5, 6)$

(1 Mark for the correct POS form)

Note: Deduct 1/2 mark if wrong variable names are used

(d) Reduce the following Boolean Expression using K-Map :

3

$F(P, Q, R, S) = \Sigma(1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15)$

Ans  $P'Q' \quad P'Q \quad PQ \quad PQ'$

|        |   |   |    |    |
|--------|---|---|----|----|
| $R'S'$ |   |   |    |    |
| $R'S$  | 0 | 4 | 1  | 12 |
| $RS$   | 1 | 1 | 1  | 1  |
| $RS'$  | 1 | 1 | 1  | 1  |
|        | 1 | 2 | 1  | 6  |
|        |   |   | 14 | 10 |

$$F(P, Q, R, S) = PQR' + R + P'R$$

(½ Mark for placing aU1 s at correct positions in K-Map)

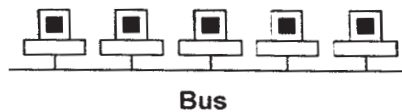
(½ Mark for each grouping)

(1 Mark for writing final expression in reduced/minimal form)

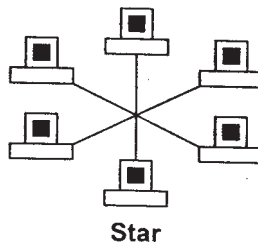
Note: Deduct ½ mark if wrong variable names are used

7. (a) What is difference between Star Topology and Bus Topology of network? 1

Ans Bus Topology: It is characterised by common transmission medium shared by all the connected hosts, managed by dedicated nodes. It offers simultaneous flow of data and control.



Star Topology: It is characterised by central switching node (communication controller) and unique path (point to point link) for each host. It is easy to add and remove additional hosts by upgrading the centralised node



(1 Mark for correct difference, either Textual or Diagrammatical)

OR

(½ Mark for correct Textual/Diagrammatical explanation of either Bus or Star Topology)

- (b) Expand the following abbreviations: 1

- (i) GSM
- (ii) CDMA

Ans (i) Global System for Mobile Communication

(ii) Code Division Multiple Access

(½ Mark for correct expansion of GSM)

(½ Mark for correct expansion of CDMA)

- (c) What is protocol? Which protocol is used to search information from internet using an internet browser?

1

Ans A protocol is the set of rules for governing communication between two communication devices. It also infers documentation, negotiations and establishment of rules.

Protocol used to search information from internet using an internet browser is :

TCP/IP OR HTTP

(½ Mark for explaining protocol correctly)

(½ Mark for TCP/IP or HTTP)

- (d) Name two switching techniques used to transfer data between two terminals (computers ).

1

Ans Message Switching and Packet Switching

OR

Circuit Switching and Message Switching

OR

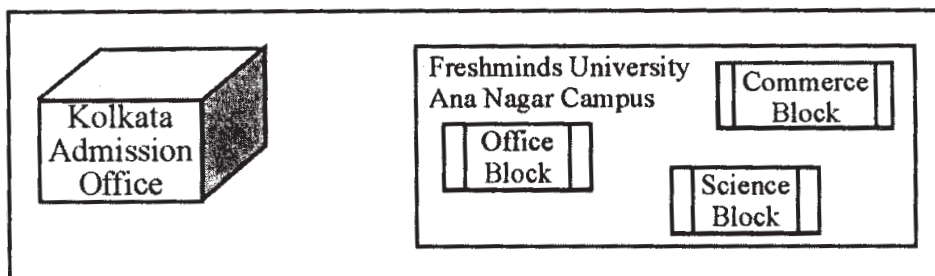
Circuit Switching and Packet Switching

(½ Mark for first switching technique)

(½ Mark for second switching technique)

- (e) Freshminds University of India is starting its first campus in Ana Nagar of South India with its center admission office in Kolkata. The university has 3 major blocks comprising of Office Block, Science Block and Commerce Block in the 5 KM area Campus.

As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distance and other given parameters.



Expected Wire distances between various locations:

|                                              |         |
|----------------------------------------------|---------|
| Office Block to Science Block                | 90 m    |
| Office Block to Commerce Block               | 80 m    |
| Science Block to Commerce Block              | 15 m    |
| Kolkata Admission office to Ana Nagar Campus | 2450 km |

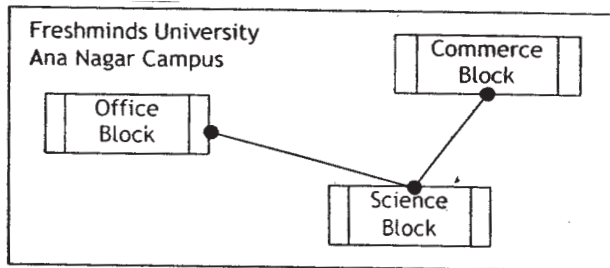
Expected number of Computers to be installed' at various locations in the University are as follows:

|                          |     |
|--------------------------|-----|
| Office Block             | 10  |
| Science Block            | 140 |
| Commerce Block           | 30  |
| Kolkata Admission office | 8   |

- (E1) Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks.

1

Ans



(1 Mark for mentioning any valid connectivity or topology or diagram connecting various blocks inside university campus)

- (E2) Suggest the most suitable place (i.e. block) to house the server of this university with a suitable reason.

1

Ans Science Block as it contains maximum number of computer.

(½ Mark for mentioning the block)

(½ Mark for correct reason)

Note: 1 mark if Commerce Block is written with valid justification eg.  
Minimum wiring needed

- (E3) Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers:

1

- (i) MODEM



- (ii) SWITCH
- (iii) GATEWAY

Ans SWITCH

( 1 Mark for correct device)

(E4) Suggest the most suitable. (very high speed) service to provide data connectivity between Admission Office located in Kolkata and the campus located in Ana Nagar from the following options: 1

- Telephone line
- Fixed-Line Dial-up connection
- Co-axial Cable Network
- GSM
- Leased line
- Satellite Connection

Ans Satellite Connection

OR

Leased line

(1 Mark for correct service name)

#### QUESTION PAPER CODE 91

#### EXPECTED ANSWERS

1. (a) What is the difference between Actual Parameter and Formal Parameter?  
Give an example in C++ to illustrate both types of parameters. 2

Ans A parameter used in the function call is known as Actual Parameter. It is used to send the data to function.

A parameter used in the function definition is known as Formal Parameter, It is used to accept the data from actual parameter.

```
void Seventimes(int A)//A is formal parameter
{
cout<<7*A;
}
```

```

void main ()
{
 int P=6;
 Seventimes(P); //p is actual parameter
}

```

(½ Mark for each correct explanation of Actual Parameter and Formal Parameter)

(½ Mark for each correct example of Actual Parameter and Formal Parameter)

OR

(Full 2 Marks for correct examples demonstrating the difference between Actual Parameter and Formal Parameter)

OR

(Only 1 Mark to be awarded for Explanation given without supporting examples)

(b) Write the names of the header files to which the following belong: 1

(i) **setw()**

(ii) **sqrt()**

Ans (i) `iomanip.h` (ii) `math.h`

(½ Mark for writing each correct header file)

(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```

include <iostream.h>
include <stdio.h>
class MyStudent
{
 int StudentId = 1001;
 char Name [20] ;
public
 MyStudent(){ }
}

```

```

 void Register () {cin>>StudentId; gets (Name) ;}
 void Display () {cout<<StudentId<< ":" <<Name<<endl;}
} ;
void main ()
{
 MyStudent MS ;
 Register.MS() ;
 MS.Display() ;
}

```

Ans

```

include <iostream.h>
include <stdio.h>
class MyStudent
{ int StudentId;
 char Name[20];
public :
 MyStudent() {StudentId = 1001;}
 void Register(){ cin>>StudentId; gets (Name);}
 void Display () {cout<<StudentId<<":"<<Name<<endl;}
};
void main ()
{
 MyStudent MS;
 MS. Register ();
 MS. Display () ;
}

```

(½ Mark for writing both include as #include)

(½ Mark for removing = 1001 from int StudentId = 1001;)

(½ Mark for writing: after public)

(½ Mark for writing MS. Register ( ) ; correctly)

Note: ½ mark for identifying any two errors without valid correction and

1 mark for identifying all five errors without valid correction

(d) Find the output of the following program:

3

```
#include<iostream.h>
void main ()
{
 int A[] = {10, 15, 20, 25, 30}
 int *p = A;
 while (*p < 30)
 {
 if (*p%3 != 0)
 *p = *p + 2 ;
 else
 *p = *p + 1;
 p++;
 }
 for (int J = 0; J<=4; J++)
 {
 cout << A[J] << "*" ;
 if (J%3 == 0) cout<<endl;
 }
 Cout<<A[4] * 3<<endl;
}
```

Ans 12\*

16\*22\*27\*

30\*90

(1 Mark for each line with correct values)

Note:

Deduct ½ Mark if any/all '\*' missing

Deduct ½ Mark if endl is not considered at the right positions

(e) Find the output of the following program:

2

```
#include <iostream.h>
#include <ctype.h>
```

```

void Secret (char Mig[], int N);
void main ()
{
 char SMS[] = "rEPorTmE" ;
 Secret{SMS,2);
 cout<<SMS<<endl;
}
void Secret(char Msg[], int N)
{
 for (int C=0; Msg[C] !=' \0' ;C++)
 if (C%2==0)
 Msg[C] = Msg[C]+N;
 else if (isupper(Msg[C]))
 Msg[C] = tolower(Msg[C]);
 else
 Msg[C] = Msg[C]-N;
}

```

Ans teRmttoe

(½ Mark for writing t,e as the first two characters)

(½ Mark for writing R,m as the next two characters)

(½ Mark for writing t,t as the next two characters)

(½ Mark for writing o,e as the next two characters)

(f) Study the following program and select the possible output from it :

2

```

#include <iostream.h>
#include <stdlib.h>
const int MAX=3 ;
void main ()
{
 randomize() ;
 int Number ;

```

```

 Number = 50 + random{MAX} ;
 for (int P=Number; P>=50; P- -)
 cout<<p<< " # " ;
 cout<<endl;
}

```

(i) 53#52#51#50#

(ii) 50#51#52#

(iii) 50#51#

(iv) 51#50#

Ans (iv) 51#50#

(2 Marks for mentioning correct option)

Note: No Marks to be awarded for any other answer

2. (a) What is function overloading? Give an example in C++ to illustrate function overloading.

2

Ans Function overloading is an example of polymorphism, where the functions having same name with different set of parameters perform different operations.

OR

When a function is having more than one definition and differentiable by the number/type of parameters is known as function overloading

Example:

```

void Disp() //Function 1
{
 cout<<"Hello"<<endl;
}
void Disp(int N) // Function 2
{
 for (int I=1;I<=N;I++)
 cout<<I<<endl;
}

```

```

void main ()
{
 int x=5;
 Disp(x);//call for Function 2 - Prints numbers from 1 to 5
 Disp(); //call for Function 1 - Prints Hello
}

```

(1 Mark for correct definition or explanation of Function Overloading)

(1 Mark for a valid example of Function Overloading)

- (b) Answer the questions (i) and (ii) after going through the following class: 2

```

class Job
{
 int JobId;char JobType;
public:
 ~Job () //Function 1
 { cout<< "Resigned" <<endl; }
 Job () //Function 2
 { JobId=10 ; JobType ='T' ;}
 void TellMe()//Function 3
 { cout<<JobId<< " : " <<JobType<<endl; }
 Job (Job &J) //Function 4
 {
 JobId=J.JobId+10; JobType=J.JobType+1;
 }
};

```

- (i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Job is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

Ans Function 1.

Destructor.

(½ Mark for mentioning the correct function)

(½ Mark for identifying it as Destructor)

```
(ii) Job P ; //Line 1
 Job Q(P) ; //Line 2
```

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Job will be called on execution of statement written as Line 2 ? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

Ans Function 4.

Copy Constructor.

(½ Mark for mentioning the correct function)

(½ Mark for identifying it as Copy constructor)

(c) Define a class HOTEL in C++ with the following description:

4

Private Members:

- Rno //Data member to store *Room No*
- Name //Data member to store customer name
- Tariff //Data member to store per day charges
- NOD //Data member to store number of days of stay
- CALC() //A function to calculate and return Amount as  $NOD * Tariff$  and if the value of  $NOD * Tariff$  is more than 10000 then as  $1.05 * NOD * Tariff$

Public Members

- Checkin () // A function to enter the content Rno, Name,  
//Tariff and NOD
- Checkout() // A function to display Rno, Name, Tariff,  
//NOD and Amount (Amount to be displayed by  
//calling function CALC())



```

Ans class HOTEL
{
 int Rno;
 char Name[20];
 float Tariff;
 int NOD;
 float CALC() ;
public:
 void Checkin() ;
 void Checkout() ;
} ;
float HOTEL::CALC()
{
 float Amount = Tariff*NOD;
 if (Amount>10000)
 Amount = 1.05*NOD*Tariff;
 return Amount;
}
void HOTEL::Checkin()
{
 cin>>Rno;
 gets (Name);
 cin>>Tariff;
 cin>>NOD;
}
void HOTEL::Checkout()
{
 cout<<Rno<<" "<<Name<<" "<<Tariff<<" "<<NOD<<
 CALC ()<<endl;
}

```

(½ Mark for correct syntax for class header)

(½ Mark for correct declaration of data members)

(1 Mark for correct definition of CALC())

(1 Mark for correct definition of Checkout() with proper invocation of CALC() function)

(1 Mark for correct definition of Checkin())

NOTE: Deduct ½ Mark if CALC() is not invoked properly inside Checkout() function

(d) Answer the questions (i) to (iv) based on the following:

4

```
class Regular
{
 char SchoolCode[10];
public:
 void InRegular();
 void OutRegular();
} ;

class Distance
{
 char StudyCentreCode [5] ;
public:
 void InDistance();
 void OutDistance();
} ;

class Course: public Regular, private Distance
{
 char Code [5] ;
 float Fees;
 int Duration;
public:
 void InCourse();
 void OutCourse();
} ;
```

(i) Which type of Inheritance is shown in the above example?

Ans Multiple Inheritance

(1 Mark for mentioning correct type of inheritance)

(ii) Write names of all the member functions accessible from OutCourse function of class Course.

Ans InCourse(),

InDistance(), OutDistance(),

InRegular(), OutRegular()

(1 Mark for correct answer)

Note: No marks to be awarded for any other alternative answer

(iii) Write name of all the .:members accessible through an object of class Course.

Ans InCourse(), OutCourse(),

InRegular(), OutRegular()

(1 Mark for correct answer)

Note: No marks to be awarded for any other alternative answer

(iv) Is the function InRegular() accessible inside the function InDistance()? Justify your answer.

Ans No, function InRegular() is not accessible inside the function InDistance(), because InRegular() is a member of class Regular and InDistance() is a member of class Distance, and the classes Regular and Distance are two independent classes.

(½ Mark for mentioning NOT ACCESSIBLE correctly)

(½ Mark for correct justification)

OR

(1 Mark if YES is supported with valid justification that the function InRegular() is accessible inside the function InDistance() ONLY for an object of the derived class OR in context of Inheritance }

NOTE: No mark to be awarded if only YES is written without any justification.

3. (a) Write a function SORTSCORE() in C++ to sort an array of structure Examinee in descending order of Score using Bubble Sort.

3

Note: Assume the following definition of structure Examinee

```
struct Examinee
{
 long RollNo;
 char Name[20] ;
 float Score;
} ;
```

Sample Content of the array (before sorting)

| RollNo | Name          | Score |
|--------|---------------|-------|
| 1001   | Ravyank Kapur | 300   |
| 1005   | Farida Khan   | 289   |
| 1002   | Anika Jain    | 345   |
| 1003   | George Peter  | 297   |

Sample Content of the array (after sorting)

| RollNo | Name          | Score |
|--------|---------------|-------|
| 1002   | Anika Jain    | 345   |
| 1001   | Ravyank Kapur | 300   |
| 1003   | George Peter  | 297   |
| 1005   | Farida Khan   | 289   |

Ans void SORTSOORE (Examinee E[], int N)

```
{
 Examinee Temp;
 for (int I = 0; I<N-1; I++)
 for (int J = 0; J<N-I-1; J++)
 if(E[J].Score < E[J+1].Score)
 {
```

```

Temp = E[J];
E[J] = E[J+1];
E[J+1] = Temp;
}
}

```

OR

Any other correct equivalent function definition

(½ Mark for correct Function Header)

(½ Mark for each correct loop)

(1 Mark for correct comparison of adjacent elements)

(½ Mark for swapping the values correctly)

Note:

Deduct ½ Mark if sorted in ascending order instead of descending order

Deduct ½ Mark if only Score is swapped instead of the whole Structure

Deduct ½ Mark if Temp is not declared with correct data type

- (b) An array T[50][20] is stored in the memory along the column with each of the elements occupying 4 bytes. Find out the base address and address of element T[30][15], if an element T[25][10] is stored at the memory location 9800.

4

$$\begin{aligned}
 \text{Ans } \text{Loc}(T[I][J]) &= \text{Base}(T) + W(I + J * N) \\
 \text{Loc}(T[25][10]) &= \text{Base}(T) + 4(25 + 10 * 50) \\
 \text{Base}(T) &= 9800 - 4 * 525 \\
 \text{Base}(T) &= 9800 - 2100 \\
 \text{Base}(T) &= 7700 \\
 \text{Loc}(T[30][15]) &= \text{Base}(T) + 4(30 + 15 * 50) \\
 \text{Loc}(T[30][15]) &= 7700 + 4(30 + 750) \\
 &= 7700 + 4 * 780 \\
 &= 7700 + 3120 \\
 &= 10820
 \end{aligned}$$

OR

Address of  $T[i][j]$  = BaseAddress +  $W [(i - L1) + (j - L2) * M]$

Address of  $T[25][10]$  = BaseAddress +  $4[(25 - 0) + (10 - 0) * 50]$

$$9800 = \text{Base Address} + 4 [525]$$

$$\begin{aligned} \text{Base Address} &= 9800 - 4 * 525 \\ &= 9800 - 2100 \\ &= 7700 \end{aligned}$$

Address of  $T[30][15]$  =  $7700 + 4 [(30 - 0) + (15 - 0) * 50]$

$$\begin{aligned} &= 7700 + 4 * 780 \\ &= 7700 + 3120 \\ &= 10820 \end{aligned}$$

OR

Address of  $T[i][j]$  along the column =

Base Address +  $W [(i - L1) + (j - L2) * M]$

Address of  $T[25][10]$  = BaseAddress +  $4[(25 - 1) + (10 - 1) * 50]$

$$9800 = \text{Base Address} + 4 [474]$$

$$\begin{aligned} \text{Base Address} &= 9800 - 4 * 474 \\ &= 9800 - 1896 \\ &= 7904 \end{aligned}$$

Address of  $T[30][15]$  =  $7904 + 4 [(30 - 1) + (15 - 1) * 50]$

$$\begin{aligned} &= 7904 + 4 * 729 \\ &= 7904 + 2916 \\ &= 10820 \end{aligned}$$

(1 Mark for writing correct formula (for column major) OR substituting formula with correct values for calculating correct Base Address)

(1 Mark for calculating correct Base Address)

(1 Mark for writing correct formula (for column major) OR substituting formula with correct values for calculating Address of  $T[30][15]$ )

(1 Mark for calculating correct address of  $T[30][15]$ )

- (c) Write a function QUEDEL() in C++ to display and delete an element from a dynamically allocated Queue containing nodes of the following given structure:

4

```
struct NODE
{
 int Itemno;
 char Itemname[20];
 NODE *Link;
} ;
```

Ans class Queue

```
{
 Node *Front, *Rear;
public:
 QUEUE() //Constructor to initialize Front and Rear
 {
 Front = NULL;
 Rear = NULL;
 }
 void QUEINS(); //Function to insert a node
 void QUEDEL(); //Function to delete a node
 void QUEDISP(); //Function to display nodes
 ~Queue(); //Destructor to delete all nodes
};

void Queue::QUEDEL()
{
 if (Front!=NULL)
 {
 NODE *Temp=Front;
 cout<<Front->Itemno<<" ";
 cout<<Front->Itemname<<"Deleted";
 Front=Front->Link;
 }
}
```

```

delete Temp;
if (Front == NULL) Rear=NULL;
}
else
cout<<"Queue Empty..";
}
OR
void QUEDEL(Node *&Front, Node *&Rear)
{
if (Front != NULL)
{
NODE *Temp=Front;
cout<<Front->Itemno<<" ";
cout<<Front->Itemname<<"Deleted ";
Front=Front->Link;
delete Temp;
if (Front == NULL) Rear=NULL;
}
else
cout<<"Queue Empty..";
}

```

(1 Mark for checking Empty Queue)

(½ Mark for assigning Front to Temp)

(½ Mark for displaying the deleted Node detail(s))

(1 Mark for reassigning Front with Front->Link)

(½ Mark for deleting Temp)

(½ Mark for assigning Rear with NULL if Queue becomes Empty)

- (d) Define a function SWAPARR() in C++ to swap (interchange) the first row elements with the last row elements, for a two dimensional integer array passed as the argument of the function.



Example: If the two dimensional array contains

|   |   |   |   |
|---|---|---|---|
| 5 | 6 | 3 | 2 |
| 1 | 2 | 4 | 9 |
| 2 | 5 | 8 | 1 |
| 9 | 7 | 5 | 8 |

After swapping of the content of first row and last row, it should be as follows:

|   |   |   |   |
|---|---|---|---|
| 9 | 7 | 5 | 8 |
| 1 | 2 | 4 | 9 |
| 2 | 5 | 8 | 1 |
| 5 | 6 | 3 | 2 |

Ans `void SWAPARR(int A[][100], int M, int N)`

```
{
 int Temp, Ji
 for (J=0; J<N; J++)
 {
 Temp = A[0][J] ;
 A[0][J] = A[M-1][J];
 A[M-1][J] = Temp;
 }
}
```

OR

```
void SWAPARR(int A[4][4])
{
 int Temp, J;
 for (J=0; J<4; J++)
 {
 Temp = A[0][J];
 A[0][J] = A[3][J];
```

```

 A[3][J] = Temp;
 }
}

```

OR

Any other correct equivalent function definition

(1 Mark for correct function header)

(1 Mark for correct loop)

(1 Mark for swapping the first row with last row correctly)

- (e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion:

2

$$A + B * (C - D) / E$$

Ans  $A + B * (C - D) / E$

$$= (A + ( (B * (C - D)) / E ) )$$

| Element Scanned | Stack | Postfix   |
|-----------------|-------|-----------|
| (               |       |           |
| A               |       | A         |
| +               | +     |           |
| (               |       |           |
| (               |       |           |
| B               |       | AB        |
| *               | +*    |           |
| (               |       |           |
| C               |       | ABC       |
| -               | +*-   |           |
| D               |       | ABCD      |
| )               | +*    | ABCD-     |
| )               | +     | ABCD-*    |
| /               | +/    |           |
| E               |       | ABCD-*E   |
| )               | +     | ABCD-*E/  |
| )               |       | ABCD-*E/+ |

OR

| Element Scanned | Stack  | Postfix   |
|-----------------|--------|-----------|
| (               | (      |           |
| A               | (      | A         |
| +               | ( +    | A         |
| B               | ( +    | AB        |
| *               | ( +*   | AB        |
| (               | ( +*(  | AB        |
| C               | ( +*(  | ABC       |
| -               | ( +*(- | ABC       |
| D               | ( +*(- | ABCD      |
| )               | ( +*   | ABCD-     |
| /               | ( +/   | ABCD-*    |
| E               | ( +/   | ABCD-*E   |
| )               |        | ABCD-*E/+ |

OR

Any other method for converting the given infix expression to its equivalent postfix expression showing the Stack Status.

(½ Mark for correctly converting expression up to each operator)

(1 Mark only to be given for writing correct answer without showing the Stack Status)

4. (a) Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task. 1

```
#include <fstream.h>
class Library
{
 long Ano; //Ano - Accession Number of the Book
 char Title[20]; //Title - Title of the Book
 int Qty; //Qty - Number of Books in Library
public:
void Enter (int); //Function to enter the content
```

```

void Display(); //Function to display the content
void Buy(int Tqty)
{
 Qty+=Tqty;
} //Function to increment in Qty
long GetAno() {return Ano;}
} ;
void BuyBook(long BANo,int BQty)
 //BANo → Ano of the book purchased
 //BQty → Number of books purchased
{
 fstream File;
 File.open("STOCK.DAT" ,ios::binary|ios::in|ios::out);
 int position=-1;
 Library L;
 while (Position== -1 && File.read((char*)&L,sizeof(L)))
 if (L. GetAno() ==BANo)
 {
 L.Buy(BQty); //To update the number of Books
 Position = File.tellg()-sizeof(L) ;

//Line 1: To place the file pointer to the required position
 _____;

//Line 2:To write the object L on to the binary file
 _____;

 }

 if (Position== -1)
 cout<< "No updation done as required Ano not found..";
 File.close();
}

```

Ans Statement 1:

```
File.seekp(Position);
```

OR

```
File. seekp (-sizeof (L), ios::cur);
```

OR

```
File.seekg(Position); //Not advisable
```

OR

```
File.seekg(-sizeof(L), ios::cur); //Not advisable
```

OR

Any equivalent correct method

Statement 2:

```
File.write((char*)&L, sizeof(L));
```

OR

```
File.write((char*)&L, sizeof(Library));
```

OR

Any equivalent correct method

(½ Mark for each correct Statement)

- (b) Write a function COUNT\_TO() in C++ to count the presence of a word 'to' in a text file "NOTES.TXT".

2

Example:

If the content of the file "NOTES.TXT" is as follows:

It is very important to know that

smoking is injurious to health.

Let us take initiative to stop it.

The function COUNT\_TO() will display the following message:

Count of -to- in file: 3

Note: In the above example, 'to' occurring as a part of word stop is not considered.

```
Ans void COUNT_TO ()
{
 fstream Fil;
```

```

Fil.open ("NOTES.TXT", ios::in);
char Word[80];
int Count =0;
while(!Fil.eof())
{
 Fil>>Word;
 if (strcmp(Word, "to")==0)
 Count++;
}
Fil.close(); //Ignore
cout<<"Count of -to- in file:"<<Count;
}

```

OR

```

void COUNT_TO ()
{
 ifstream Fil("NOTES.TXT");
 char STR[10];
 int c=0;
 while (Fil.getline(STR, 10, ' '))
 {
 if (strcmpi (STR, "to") ==0)
 c++;
 }
 Fil.close();//Ignore
 cout<<"Count of -to- in file:"<<c<<endl;
}

```

OR

```

void COUNT_TO ()

```

```

{
 ifstream Fil;
 Fil.open("NOTES.TXT")
 char Word[80],Ch;
 int Count =0, I=0;
 while(Fil.get(Ch))
 {
 if (Ch!= ' ')
 Word [I++] = Ch;
 else
 {
 Word[I] = '\0';
 if (strcmp (Word, "to") ==0)
 Count++;
 I=0;
 }
 }
 Fil.close(); //Ignore
 cout<<"Count of -to- in file: "<<Count;
}

```

OR ifstream Fil("NOTES.TXT");

OR

Any other correct function definition performing the desired operation

(½ Mark for opening NOTES. TXT correctly)

(½ Mark for reading each word (Whichever method adopted) from the file)

(½ Mark for comparing the word with 'to' and incrementing counter)

(½ Mark for displaying the number of 'to' with/without the Text Message)

- (c) Write a function in C++ to read and display the detail of all the members whose membership type is 'L' or 'M' from a binary file "CLUB.DAT". Assume the binary file "CLUB.DAT" contains objects of class CLUB, which is defined as follows:

```

class CLUB
{
int Mno; //Member Number
char Mname [20]; //Member Name
char Type; //Member Type: L Life Member M Monthly Member G Guest
public:
 void Register();//Function to enter the content
 void Display(); //Function to display all data members
 char WhatType() {return Type;}.
} ;

```

Ans void DisplayL\_M()

```

{
 CLUB C;
 fstream fin;
 fin. open ("CLUB.DAT", ios::binary|ios::in);
 while(fin.read((char*)&C, sizeof(C))
 {
 if(C.WhatType()=='L' || C.WhatType()=='M')
 C .Display ();
 }
 fin.close(); //Ignore
}

```

OR

```

ifstream fin ("CLUB.DAT", ios::binary);

```

OR

```

void DisplayL_M ()
{
 CLUB C;
 fstream fin;
 fin.open ("CLUB.DAT", ios::binary | ios::in);

```



OR

```
ifstream fin ("CLUB.DAT", ios::binary);
```

```
if (fin)
{
 fin.read((char*)&C, sizeof(C));
 while(!fin.eof())
 {
 if(C.WhatType()=='L' || C.WhatType()=='M')
 C. Display();
 fin.read((char*)&C, sizeof(C));
 }
 fin.close(); //Ignore
```

(½ Mark for opening CLUB.DAT correctly)

(½ Mark for reading each record from CLUB.DAT)

(½ Mark for correct loop / checking end of file)

(1 Mark for comparing value returned by WhatType() with 'L', 'M')

(½ Mark for displaying the matching record)

5. (a) What is the purpose of a key in a table? Give an example of a key in a table. 2

Ans An attribute/group of attributes in a table that identifies each tuple uniquely is known as a Key.

OR

Any correct definition of Key / Primary Key / Candidate Key / Alternate Key

**Table:Item**

| Ino | Item   | Qty |
|-----|--------|-----|
| I01 | Pen    | 560 |
| I02 | Pencil | 780 |
| I04 | CD     | 450 |
| I09 | Floppy | 700 |
| I05 | Eraser | 300 |
| I03 | Duster | 200 |

↑ Key

(1 Mark for writing correct definition/purpose of any valid Key)

(1 Mark for giving suitable example)

OR

(2 Marks for illustrating the purpose of Key with/without showing it as a part of a Table)

- (b) Consider the following tables DRESS and MATERIAL. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

6

Table: **DRESS**

| DCODE | DESCRIPTION    | PRICE | MCODE | LAUNCHDATE |
|-------|----------------|-------|-------|------------|
| 10001 | FORMAL SHIRT   | 1250  | M001  | 12-JAN-08  |
| 10020 | FROCK          | 750   | M004  | 09-SEP-07  |
| 10012 | INFORMAL SHIRT | 1450  | M002  | 06-JUN-08  |
| 10019 | EVENING GOWN   | 850   | M003  | 06-JUN-08  |
| 10090 | TULIP SKIRT    | 850   | M002  | 31-MAR-07  |
| 10023 | PENCIL SKIRT   | 1250  | M003  | 19-DEC-08  |
| 10089 | SLACKS         | 850   | M003  | 20-OCT-08  |
| 10007 | FORMAL PANT    | 1450  | M001  | 09-MAR-08  |
| 10009 | INFORMAL PANT  | 1400  | M002  | 20-OCT-08  |
| 10024 | BABY TOP       | 650   | M003  | 07-APR-07  |

Table: **MATERIAL**

| MCODE | TYPE      |
|-------|-----------|
| MOO1  | TERELENE  |
| MOO2  | COTTON    |
| MOO4  | POLYESTER |
| MOO3  | SILK      |

- (i) To display DCODE and DESCRIPTION of each dress in ascending order of DCODE.

Ans SELECT DCODE, DESCRIPTION FROM DRESS ORDER BY DCODE ;

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (ii) To display the details of all the dresses which have LAUNCHDATE in between 05-DEC-07 and 20-JUN-08 (inclusive of both the dates).

Ans SELECT \* FROM DRESS WHERE LAUNCHDATE  
BETWEEN '05-DEC-07' AND '20-JUN-08'

OR

SELECT \* FROM DRESS WHERE LAUNCHDATE >= '05-DEC-07'  
AND LAUNCHDATE <= '20-JUN-08'

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (iii) To display the average PRICE of all the dresses which are made up of material with MCODE as M003.

Ans SELECT AVG(PRICE) FROM GARMENT WHERE MCODE = 'M003'

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (iv) To display materialwise highest and lowest price of dresses from DRESS table. (Display MCODE of each dress along with highest and lowest price)

Ans SELECT MCODE, MAX(PRICE), MIN (PRICE) FROM DRESS  
GROUP BY MCODE

(1 Mark for correct query)

(½ Mark for partially correct answer)

- (v) SELECT SUM(PRICE) FROM DRESS WHERE MCODE='M001';

Ans SUM(PRICE)  
2700

(½ Mark for correct output)

- (vi) SELECT DESCRIPTION, TYPE FROM DRESS, MATERIAL WHERE  
DRESS.DCODE = MATERIAL.MCODE AND DRESS.PRICE >= 1250;

Ans DESCRIPTION TYPE

(NO OUTPUT)

(½ Mark for the above)

OR

(½ Mark for attempting the question)

(vii) SELECT MAX(MCODE) FROM MATERIAL;

Ans MAX (MCODE)

MOO4

(½ Mark for correct output)

(viii) SELECT COUNT(DISTINCT PRICE) FROM DRESS;

Ans COUNT(DISTINCT PRICE)

6

(½ Mark for correct output)

6. (a) State and verify absorption law using truth table.

2

Ans Absorption Law : For every  $X, Y \in B$

$$i) X + X \cdot Y = X$$

$$X \cdot (X + Y) = X \text{ (by Duality)}$$

$$ii) X + X' \cdot Y = X + Y$$

(i)

| X | Y | XY | X+XY |
|---|---|----|------|
| 0 | 0 | 0  | 0    |
| 0 | 1 | 0  | 0    |
| 1 | 0 | 0  | 1    |
| 1 | 1 | 1  | 1    |

↑  
↑  
↑  
↑  
VERIFIED

(ii)

| X | X' | Y | X'Y | X+X'Y | X+Y |
|---|----|---|-----|-------|-----|
| 0 | 1  | 0 | 0   | 0     | 0   |
| 0 | 1  | 1 | 1   | 1     | 1   |
| 1 | 0  | 0 | 0   | 1     | 1   |
| 1 | 0  | 1 | 0   | 1     | 1   |

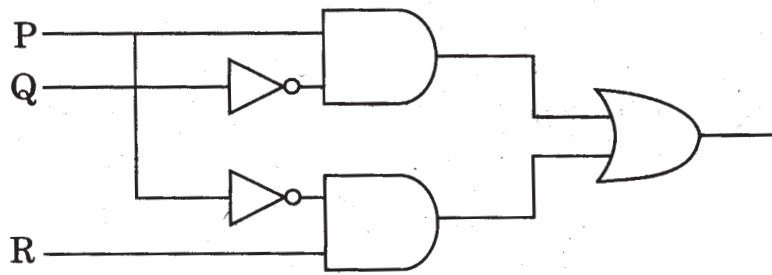
↑  
↑  
↑  
↑  
VERIFIED

(1 Mark for stating anyone of the Absorption Laws)

(1 Mark for verifying the law using Truth Table)

(b) Write the equivalent Boolean Expression for the following Logic Circuit:

2



Ans  $P \cdot Q' + P' \cdot R$

(2 Marks for the final expression  $P \cdot Q' + P' \cdot R$ )

OR

(1 Mark for anyone of the correct terms out of  $P \cdot Q'$  or  $P' \cdot R$ )

(c) Write the POS form of a Boolean function G, which is represented in a truth table as follows:

1

| U | V | W | G |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

Ans  $(U+V'+W) \cdot (U+V'+W') \cdot (U'+V'+W)$

OR

$G(U,V,W) = \Pi (2, 3, 6)$

(1 Mark for the correct POS form)

Note: Deduct ½ mark if wrong variable names are used

(d) Reduce the following Boolean Expression using K-Map :

3

$$H(U,V,W,Z) = \Sigma(0, 1, 4, 5, 6, 7, 11, 12, 13, 14, 15)$$

Ans

|      | U'V' | U'V | UV   | UV'  |
|------|------|-----|------|------|
| W'Z' | 1 0  | 1 4 | 1 12 | 8    |
| W'Z  | 1 1  | 1 5 | 1 13 | 9    |
| WZ   | 3    | 1 7 | 1 15 | 1 11 |
| WZ'  | 2    | 1 6 | 1 14 | 10   |

$$H(U,V,W,Z) = V + U'W' + UWZ$$

(½ Mark for placing all 1s at correct positions in K-Map)

(½ Mark for each grouping)

(1 Mark for writing final expression in reduced/minimal form)

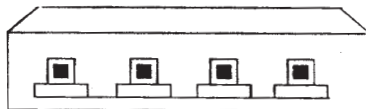
Note: Deduct ½ mark if wrong variable names are used

7. (a) What is the difference between LAN and WAN?

1

Ans **LAN (Local Area Network):**

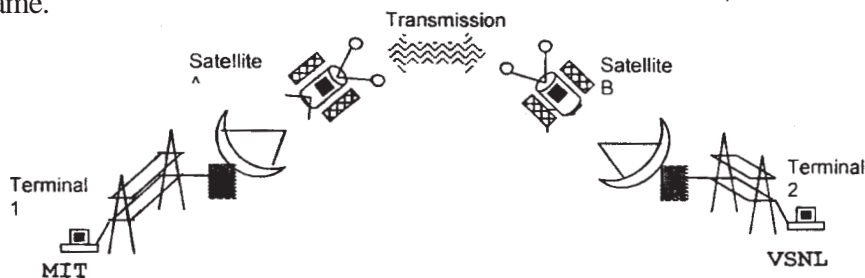
Interconnects a high number of access or node points or stations within a confined physical area. An example is the territory covered in a single office building that houses various departments/offices. All these areas are interconnected using a LAN.



**WAN (Wide Area Network)**

It is used to connect systems with no limitation of geographical area. It is used to serve many locations distributed over a large geographical area.

A system of overnight teller machines used by a banking organisation covering the North of India is an example of a WAN. Internet is also an example of the same.



(1 Mark for correct difference, either Textual or Diagrammatical)

OR

(½ Mark each for correct Textual/Diagrammatical explanation of LAN or WAN)

(b) Expand the following abbreviations: 1

(i) HTTP

(ii) ARPANET

Ans (i) Hyper Text Transfer Protocol

(ii) Advanced Research Projects Agency Network

(½ Mark for correct expansion of HTTP)

(½ Mark for correct expansion of ARPANET)

(c) What is protocol? Which protocol is used to copy a file from/to a remotely located server? 1

Ans A protocol is the set of rules for governing communication between two communication devices. It also infers documentation, negotiations and establishment of rules.

Protocol used to copy a file from/to a remotely located server is FTP (File Transfer Protocol)

(½ Mark for explaining protocol correctly)

(½ Mark for FTP)

(d) Name two switching techniques used to transfer data between two terminals (computers). 1

Ans Message Switching and Packet Switching

OR

Circuit Switching and Message Switching

OR

Circuit Switching and Packet Switching

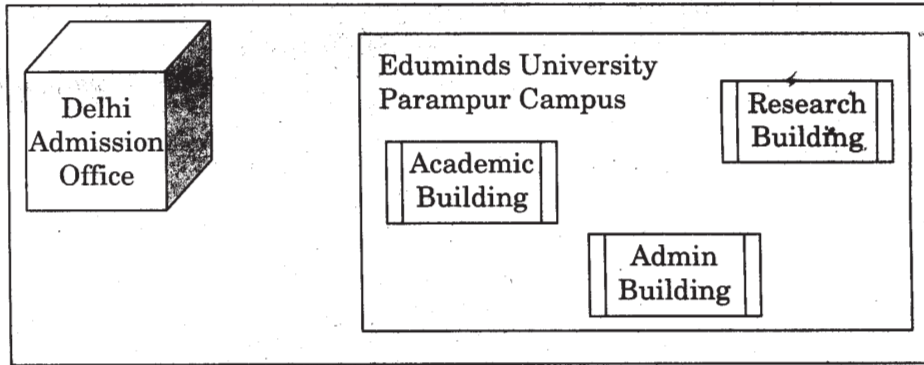
(½ Mark for naming first switching technique)

(½ Mark for naming second switching technique)

(e) Eduminds University of India is starting its first campus in a small town Parampur of Central India with its center admission office in Delhi. The university has 3

major buildings comprising of Admin Building, Academic Building and Research Building in the 5 KM area Campus.

As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters.



Expected Wire distances between various locations:

|                                           |         |
|-------------------------------------------|---------|
| Research Building to Admin Building       | 90m     |
| Research Building to Academic Building    | 80m     |
| Academic Building to Admin Building       | 15m     |
| Delhi Admission Office to Parampur Campus | 1450 km |

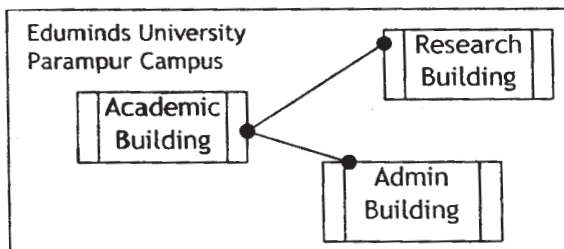
Expected number of computers to be installed at various locations in the university are as follows:

|                        |     |
|------------------------|-----|
| Research Building      | 20  |
| Academic Building      | 150 |
| Admin Building         | 35  |
| Delhi Admission Office | 5   |

(E1) Suggest to the authorities, the cable layout amongst various buildings inside the university campus for connecting the buildings.

1

Ans





(1 Mark for mentioning any valid connectivity or topology or diagram connecting various buildings inside university campus)

(E2) Suggest the most suitable place (i.e. building) to house the server of this organisation, with a suitable reason. 1

Ans Academic Building as it contains maximum number of computers.

(½ Mark for mentioning the building)

(½ Mark for correct reason)

Note: 1 mark if any suitable place/building is suggested with valid justification

(E3) Suggest an efficient device from the following to be installed in each of the buildings to connect all the computers : 1

(i) GATEWAY

(ii) MODEM

(iii) SWITCH

Ans SWITCH

( 1 Mark for correct device)

(E4) Suggest the most suitable (very high speed) service to provide data connectivity between Admission Building located in Delhi and the campus located in Par am pur from the following options: 1

- Telephone line
- Fixed-Line Dial-up connection
- Co-axial Cable Network
- GSM
- Leased line
- Satellite Connection

Ans Satellite Con nection

OR

Leased line

(1 Mark for correct service name)

# ENGINEERING DRAWING

*Time allowed : 3 hours*

*Maximum Marks : 70*

**Note :**

- (i) Attempt **all** the questions.
- (ii) Use both sides of the drawing sheet, if necessary.
- (iii) All dimensions are in millimeters.
- (iv) Missing and mismatching dimensions, if any, may be suitably assumed.
- (v) Follow the SP : 46-1988 codes  
(with First Angle method of projection).
- (vi) In no view of questions 1 and 3, hidden edges / lines are required.

## QUESTION PAPER CODE 68/1

1. (a) Construct an isometric scale. 4
- (b) Construct the isometric projection to isometric scale, of the frustum of a regular pentagonal pyramid, kept in the inverted position (base edge = 30 mm, top edge = 50 mm and height = 70 mm), with its pentagonal end of 30 mm side, resting on H.P. One of the top edges (50 mm) and one of the base edges (30 mm), are parallel to H.P. and V.P., and are closer to V.P. Give all dimensions. Draw the axis and indicate the direction of viewing. 9
- (c) A cone (base diameter = 50 mm and height = 70 mm) is resting, centrally, on the top triangular face of an equilateral triangular prism (side = 80 mm and height = 30 mm), with the circular base on it. One of the sides (80 mm) of the triangular face, on H.P., is parallel to V.P. and away from it. The common axis of the solids is perpendicular to H.P.
- Draw the isometric projection of the solids to an isometric scale. Draw the common axis and indicate the direction of viewing. Give all the dimensions. 12
2. (a) Draw to scale 1 : 1, the front view of the assembly of a square head bolt,

diameter ( $d = 30$  mm) and a hexagonal nut, diameter ( $d = 30$  mm) with a washer (outer diameter =  $2d + 4$  mm), keeping the axis parallel to H.P. and V.P. Two opposite sides of the square head of the bolt and that of the hexagonal nut, are parallel to V.P. Take the following dimensions:

Length of the bolt = 120 mm, threaded length of bolt = 80 mm and thickness of the washer = 4 mm. Give all the standard dimensions.

9

**OR**

Draw to scale 1 : 1, the top view and front view of a square nut, diameter ( $d = 30$  mm), keeping its axis perpendicular to H.P. and one of the diagonals of the square face, parallel to H.P. and V.P. Give standard dimensions.

(b) Sketch freehand the front view and the top view of a pan head rivet, taking diameter = 25 mm, keeping its axis vertical. Give standard dimensions.

6

**OR**

Sketch freehand the front view, the top view and the side view of a rectangular taper key for a shaft of 60 mm diameter. Give standard dimensions.

3. Fig. 1 shows the parts of a Foot Step Bearing. Assemble the parts correctly, and then draw the front view, showing right half in section, using the scale 1 : 1.

24

Print title and scale used. Give 8 important dimensions.

6

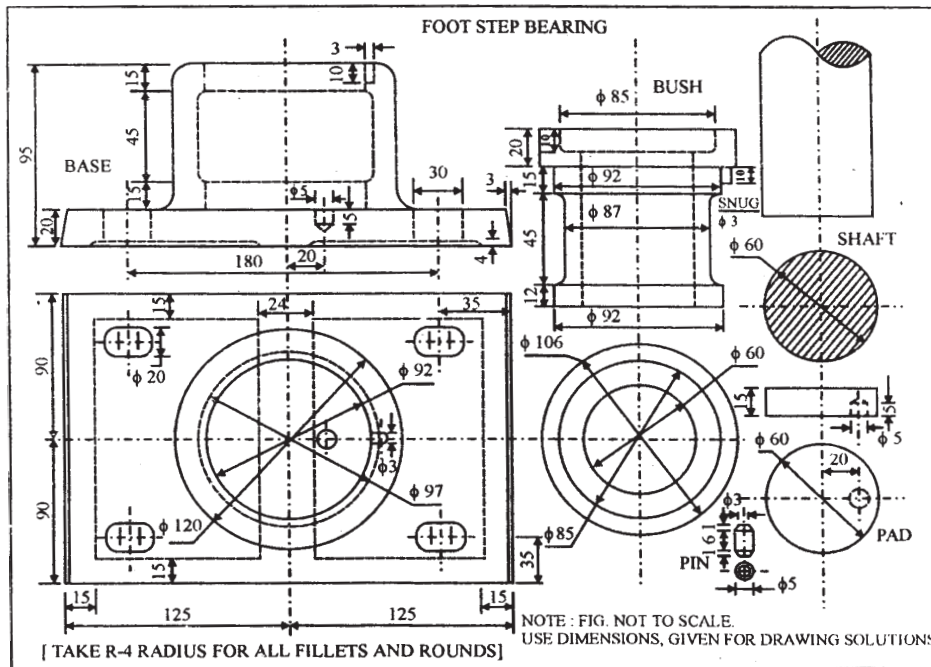


Fig. 1 / चित्र 1

OR

Fig.2 shows the assembly of a Turnbuckle. Its front view and the side view are given. Disassemble the parts correctly, and then draw the following views, to a scale 1 : 1, keeping the same position of the parts with respect to H.P. and V.P. :

(a) Front view of the body, showing the upper half in section, and its top view. 16

(b) Front view of Rod-B, and its side view, as seen from the left. 8

Print titles of both, and the scale used. Draw the projection symbol. Give 8 important dimensions. 6

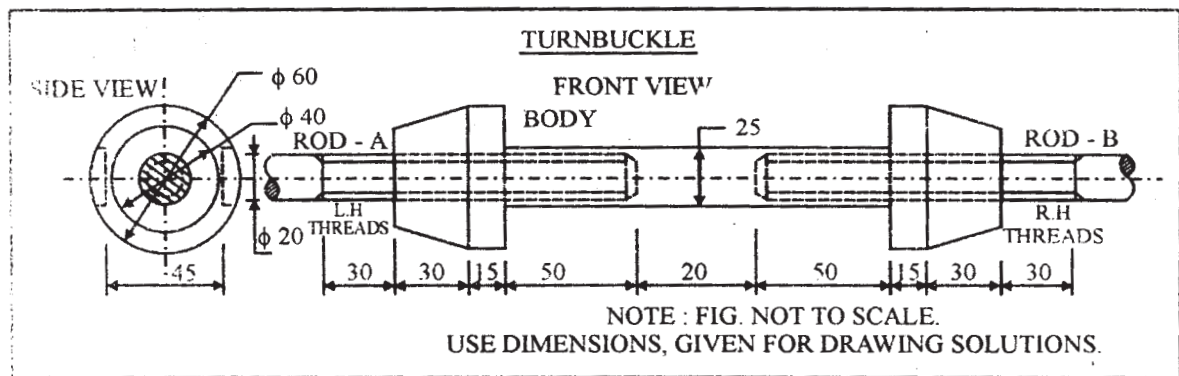


Fig 2 / चित्र 2

QUESTION PAPER CODE 68

- (a) Construct an isometric scale. 4

(b) Construct the isometric projection to isometric scale, of a frustum of an equilateral triangular pyramid, kept in the inverted position (base edge = 30 mm, top edge = 60 mm and height = 50 mm), with its triangular end of 30 mm side, resting on H.P. One of the top edges (60 mm) and one of the base edges (30 mm) are parallel to H.P. and V.P., and are away from V.P. Give all dimensions. Draw the axis and indicate the direction of viewing. 8

(c) A hemisphere (diameter = 70 mm) is, centrally placed, with its circular face up, on a hexagonal prism (base edge = 30 mm and height = 40 mm), on its hexagonal face. Two of the opposite base edges of the hexagonal face, on H.P., are perpendicular to V.P. The common axis is perpendicular to H.P. and parallel to V.P.

Draw the isometric projection of the two solids, placed together, to isometric scale. Draw the common axis and indicate the direction of viewing. Give all dimensions.

13

2. (a) Draw to scale 1 : 1, the front view of the assembly of a hexagonal head bolt of diameter  $d = 30$  mm, and a square nut of diameter  $d = 30$  mm, with a washer (outer diameter =  $2d + 4$  mm), keeping the axis parallel to H.P. and V.P. Two opposite sides of the hexagonal head bolt and that of the square nut are parallel to V.P. Take the following dimensions:

Length of the bolt = 120 mm, threaded length of the bolt = 80 mm and thickness of the washer = 4 mm.

Give all standard dimensions.

9

**OR**

Draw to scale 1 : 1, the top view, front view and side view of a hexagonal nut of diameter  $d = 30$  mm, keeping its axis, perpendicular to H.P. and two opposite sides of the hexagon, parallel to V.P. Give standard dimensions.

- (b) Sketch freehand the front view and the top view of a snap head rivet, taking diameter as 25 mm, keeping its axis vertical. Give standard dimensions.

6

**OR**

Sketch freehand the front view, side view and top view of a double head gib key for a shaft of 60 mm diameter. Give standard dimensions.

3. Figure 1 shows the parts of a sleeve and cotter joint. Assemble the parts correctly, and then draw the following views to a scale 1 : 1 :

(a) Front view, upper half in section.

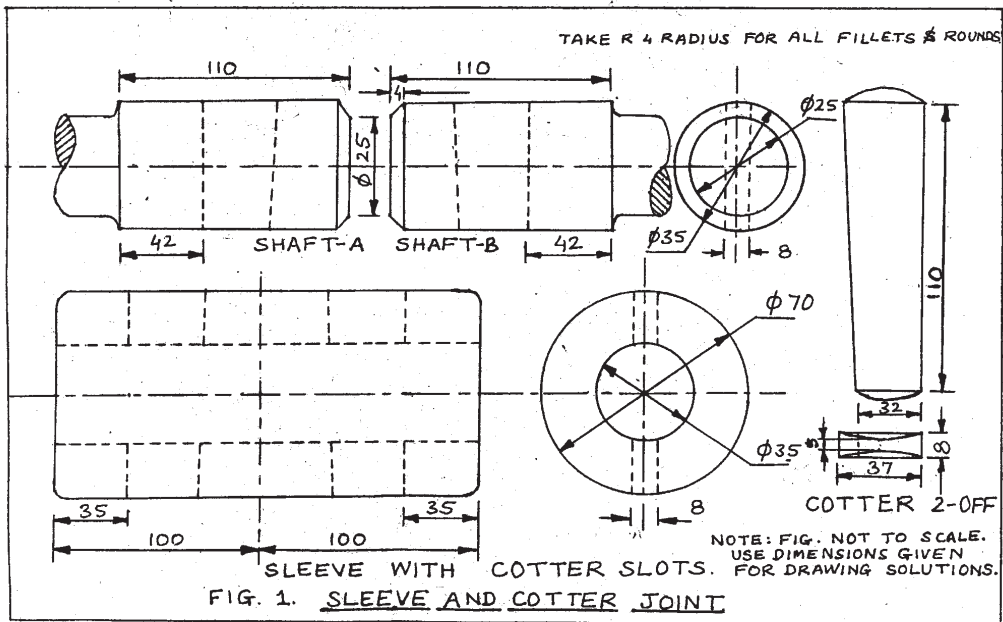
17

(b) Side view, viewing from the left.

7

Print title and scale used. Draw the projection symbol. Give 8 important dimensions.

6

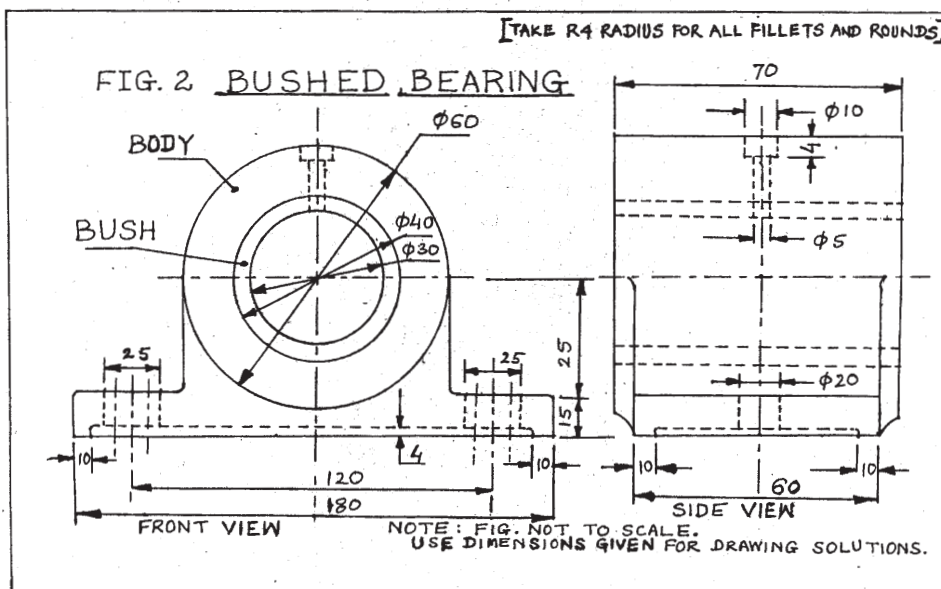


OR / अथवा

Figure 2 shows the assembled front view and the side view of a Bushed Bearing. Disassemble the body and the bush, and draw the following views to a scale 1 : 1, keeping the same positions of both the body and the bush, with respect to H.P. and V.P. :

- (a) Front view of the body, showing right half in section, and its top View. 17
- (b) Front view of the bush, showing left half in section, and its top View. 6

Print titles of both and scale used. Draw the projection symbol. Give 8 important dimensions. 6



## Marking Scheme — Engineering Drawing

### *Notes:*

- (i) Marks are to be awarded in proportion to the work done.
- (ii) Mistakes in dimensioning up to  $\pm 1.0$  mm may be ignored.
- (iii) In dimensioning, arrow-heads of various types, as per SP46-1988, are usable. However, where space is too small for an arrowhead, oblique stroke or a dot maybe employed.
- (iv) In no view of **questions '1' and '3'**, hidden edges / lines are required to be drawn.
- (v) Other standard proportions for features like nuts, heads of bolts, screws etc., employed by examinees, may also be accepted.

**All Questions are to be answered correctly and accurately.**

QUESTION PAPER CODE 68/1

### EXPECTED ANSWERS/VALUE POINTS

- Q.1. (a): ISOMETREIC SCALE (4)**
- (i) Marking of divisions of 10 mm and 1 mm on true scale.  $\frac{1}{2}$
  - (ii) Marking angles of  $30^\circ$  and  $45^\circ$   $\frac{1}{2}$
  - (iii) Projections from scale 1 : 1 to get points on Isometric Scale.  $\frac{1}{2}$
  - (iv) Construction of isometric scale with main divisions of 10 mm each. 1
  - (v) Division of first part into 10 sub-divisions. 1
  - (vi) Printing 'Scale 1 : 1' and 'Isometric Scale'.  $\frac{1}{2}$
- (b): ISOMETRIC PROJECTION OF AN INVERTED FRUSTUM OF A PENTAGONAL PYRAMID (9)**
- (i) Helping view (with isometric scale or scale 1 : 1) of pentagon with a side, parallel to V.P. and closer to it 2
  - (ii) Drawing isometric pentagons. On top and at the base.  $2\frac{1}{2}$
  - (iii) Drawing slant edges. 2

- |                                                                  |    |
|------------------------------------------------------------------|----|
| (iv) Marking the Axis.                                           | ½  |
| (v) Three dimensions, including that of axis through in-centers. | 1½ |
| (vi) Direction of viewing                                        | ½  |

**NOTE:**

For incorrect position of frustum, like using 30 mm sides for the top and 50 mm sides for the base, 1½ marks should be deducted. If axis is drawn perpendicular to V.P. instead of drawing perpendicular to H.P., as asked, 1½ marks should be deducted. Also, in the helping view, if a side of the base is not taken parallel and closer to V.P., 1 mark (½ + ½) should be deducted.

**(c): CONE PLACED, CENTRALLY, ON AN EQUILATERAL TRIANGULAR PRISM**

**(A) TRIANGULAR PRISM**

- |                                                                             |    |
|-----------------------------------------------------------------------------|----|
| (i) Helping view of triangle with a side parallel to V.P. and away from it. | 1  |
| (ii) Drawing Isometric triangles.                                           | 2½ |
| (iii) Drawing face edges, parallel to vertical axis / V.P..                 | 1½ |
| (iv) Dimensioning the edge of the base and axis, i.e., height of prism.     | 1  |

**(B) CONE AND DIRECTION OF VIEWING (6)**

- |                                                    |    |
|----------------------------------------------------|----|
| (i) Drawing elliptical curve for base.             | 2½ |
| (ii) Drawing tangents to curves, i.e., generators. | 1  |
| (iii) Indicating the common axis of two solids.    | 1  |
| (iv) Dimensioning of diameter and axis.            | 1  |
| (v) Direction of viewing.                          | ½  |

**NOTE:**

For incorrectly placed solids etc., proportionate deductions, as proposed in Q. I (b) may be used.

**Q.2. (a) SQUARE HEAD BOLT WITH HEXAGONAL NUT AND WASHER (9)**

- |                                             |    |
|---------------------------------------------|----|
| (i) Bolt head with radius of curvature etc. | 1½ |
|---------------------------------------------|----|



- |                                            |   |
|--------------------------------------------|---|
| (ii) Length of bolt and threaded length... | 1 |
| (iii) Curve of $R = d$ at the end.         | ½ |
| (iv) Hexagonal nut, drawn correctly.       | 2 |
| (v) Washer, drawn correctly.               | 1 |
| (vi) Four dimensions.                      | 2 |
| (vii) Neatness and line work.              | 1 |

**OR**

**SQUARE NUT** **(9)**

**Front View**

- |                                                                                                                                                 |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---|
| (i) Front view of square nut of diameter 30 mm with three dark vertical Lines, four hidden vertical lines, two horizontal lines and chamfering. | 3 |
| (ii) Drawing two arcs by $60^\circ$ angle method or any other method.                                                                           | 1 |

**Top View**

- |                                                                                           |   |
|-------------------------------------------------------------------------------------------|---|
| (i) Chamfer circle of diameter = $1.5d / 1.5d+3$ mm.                                      | 1 |
| (ii) Indicating thick circle of diameter $0.85 d$ and thin circle of diameter $d= 30$ mm. | 1 |
| (iii) Circumscribed square (at $45^\circ$ angles)                                         | 1 |
| (iv) Line work and four dimensions, at least.                                             | 2 |

**NOTE**

3 marks may be deducted, in all, if sketched freehand instead of drawing to scale 1 : 1.

- (b) Following components are to be sketched free hand proportionately.

**PAN HEAD RIVET** (for a diameter of rivet 25 mm) **(6)**

**Front View**

- |                                                              |    |
|--------------------------------------------------------------|----|
| (i) Sketching the head with correct proportions.             | 2½ |
| (ii) Sketching cylindrical portion, broken end and hatching. | 1½ |

**Top View**

- |                   |   |
|-------------------|---|
| (i) Two circles.  | 1 |
| (ii) Dimensioning | 1 |

**OR**

**RECTANGULAR TAPER KEY** (For a shaft of diameter 60 mm) **(6)**

- (i) Sketching the Front View. 3
- (ii) Sketching the Side View. 1
- (iii) Sketching the Top View. 1
- (iv) Dimensioning 1

( $L = 1\frac{1}{2}d$  to  $3d$ ,  $W = d/4$ ,  $T = 2/3 W = d/6$  and Taperl : 100.)

**NOTE:**

Deduct 2 marks, if these components are drawn with instruments instead of being sketched free hand.

**Q.3. FOOT STEP BEARING (Assembly)** **(30)**

- (A) Front View, Right Half in section. 22
  - (i) Body: (a) Right half in section with pin hole etc. 7
    - (b) Left half without section 3
  - (ii) Bush: (a) Drawn in correct position with right half in section. 4
    - (b) Left half without section 2
  - (iii) Disc: Placed in correct position, including hatching lines and hole. 3
  - (iv) Pin: Placed correctly in hole. 1½
  - (v) Shaft: Placed correctly in position with broken end and hatching lines. 1½
- (B) (i) Line work 2
  - (ii) Printing title and scale used. 2
  - (iii) Showing 8 dimensions 4

**OR**

**TURN BUCKLE (Dis-assembly)** **(30)**

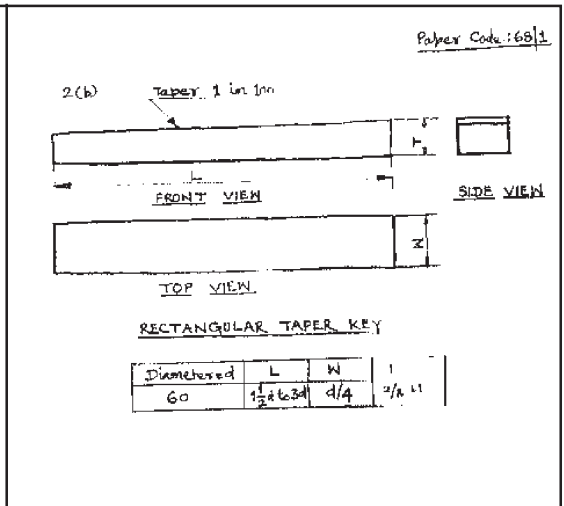
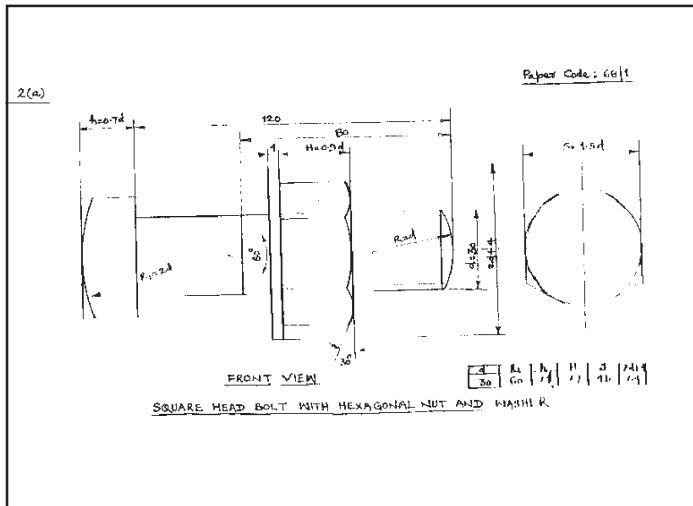
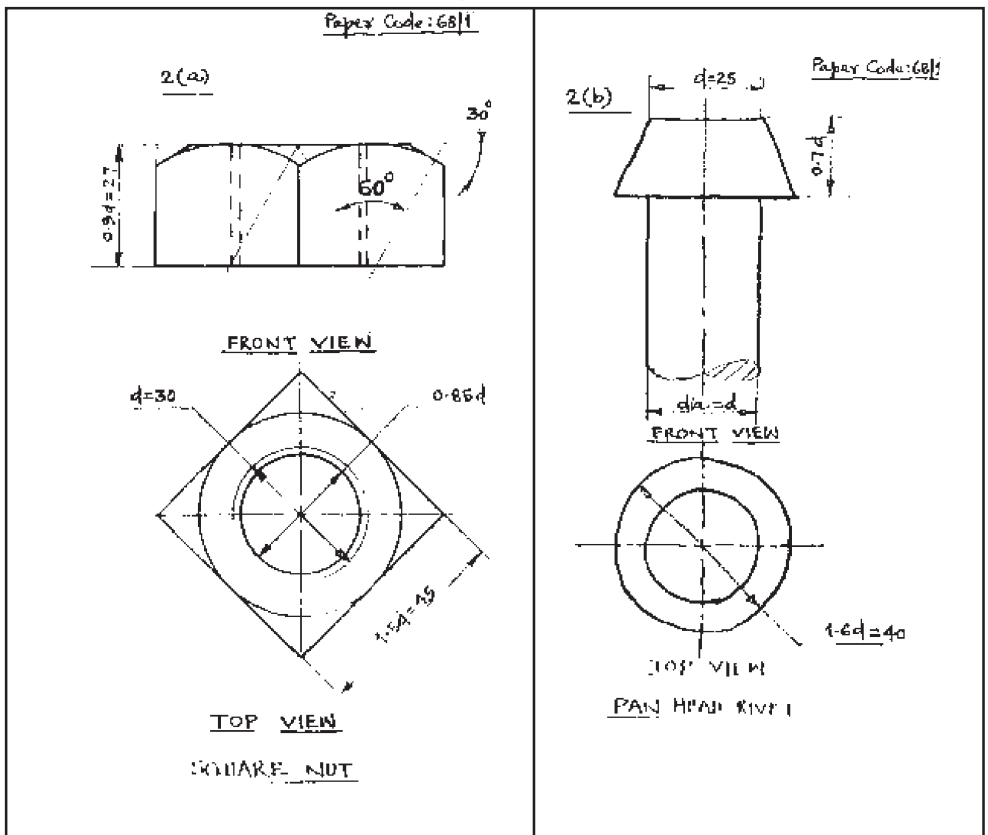
(A) **BODY** **(16)**

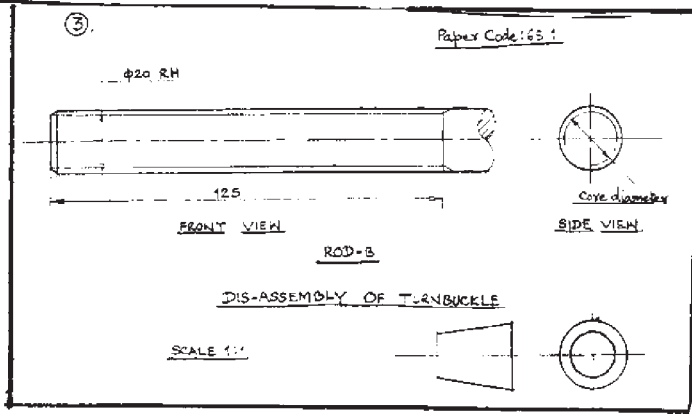
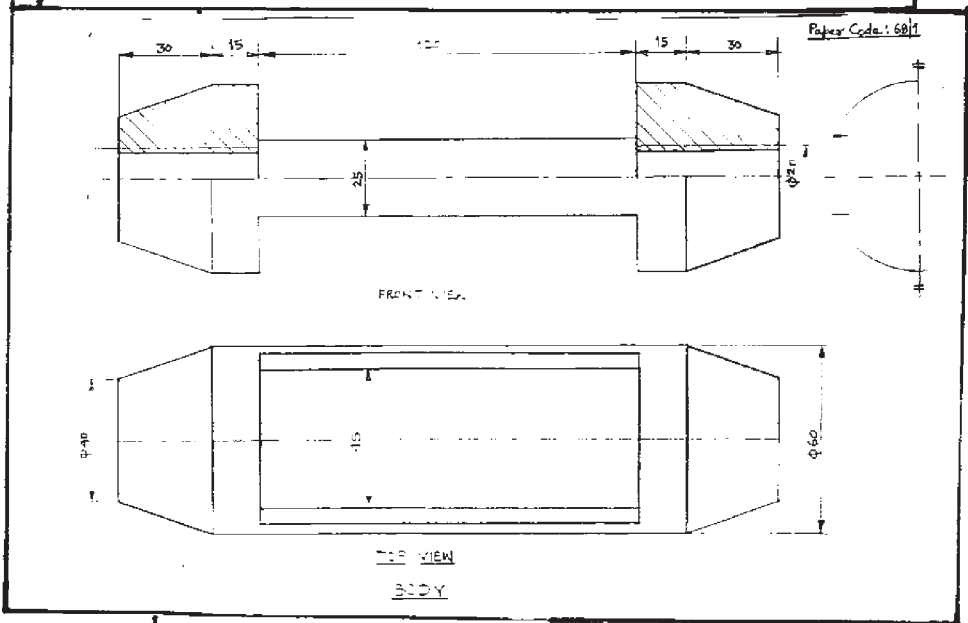
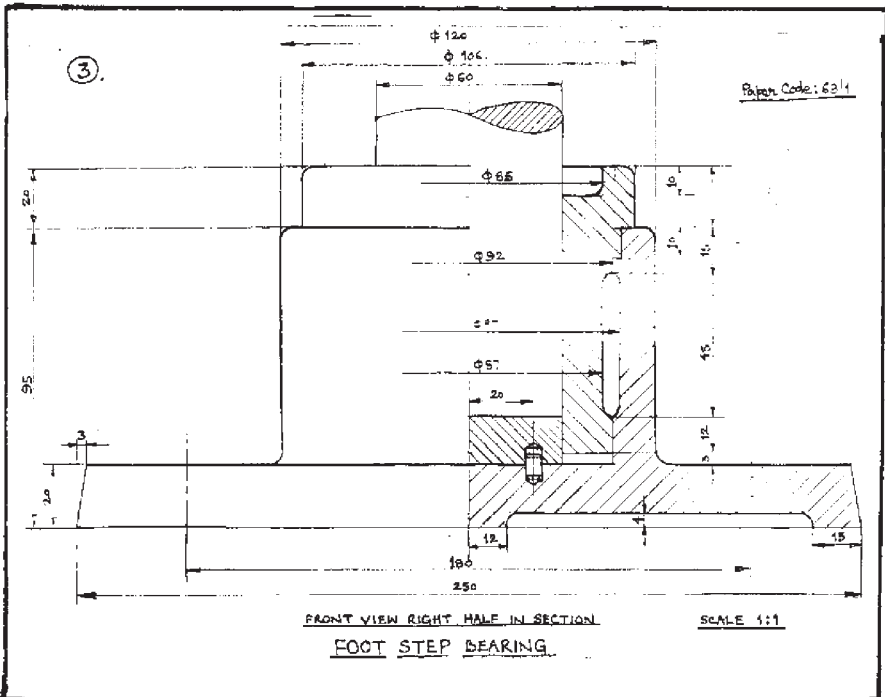
**Sectional front view.**

- (i) Boundary and horizontal axis. 3

|                   |                                                                                                           |          |
|-------------------|-----------------------------------------------------------------------------------------------------------|----------|
| (ii)              | Remaining two vertical lines in lower half and two vertical lines in upper half.                          | 1        |
| (iii)             | Sectional portion with thick lines, indicating the diameter of 0.85 d and thin lines at a diameter 20 mm. | 2        |
| (iv)              | Hatching lines on both sides upto thick horizontal lines, cutting thin lines.                             | 2        |
| <b>Top View</b>   |                                                                                                           |          |
| (v)               | Two identical ends, all lines and axis                                                                    | 3        |
| (vi)              | Middle portion involving 6 horizontal lines and two vertical lines.                                       | 4        |
| (vii)             | Neatness and line work.                                                                                   | 1        |
| <b>(B) ROD-B</b>  |                                                                                                           | <b>8</b> |
| <b>Front View</b> |                                                                                                           |          |
| (i)               | Thick lines/ thin lines for threaded length of 125 mm length.                                             | 2        |
| (ii)              | Chamfered end on the left                                                                                 | 1        |
| (iii)             | Remaining portion on the right with broken end and hatching.                                              | 2        |
| <b>Side View</b>  |                                                                                                           |          |
| (iv)              | Thick circle for diameter = 20 mm.                                                                        | 1        |
| (v)               | Broken circle for root diameter (inside).                                                                 | 1        |
| (vi)              | Line work.                                                                                                | 1        |
| (vii)             | Titles (2), Projection symbol (1), scale used (1) and dimensioning (2)                                    |          |







QUESTION PAPER CODE 68

**EXPECTED ANSWERS/VALUE POINTS**

- Q.1. (a) ISOMETRIC SCALE (4)**
- (i) Marking of divisions of 10 mm and 1 mm on true scale. 1/2
  - (ii) Marking angles of 30° and 45°. 1/2
  - (iii) Projections from scale 1:1 to get points on isometric scale. 1/2
  - (iv) Construction of isometric scale with main divisions of 10 mm each. 1
  - (v) Division of first part into 10 sub-divisions. 1
  - (vi) Printing 'Scale 1:1' and 'Isometric Scale'. 1/2
- (b) ISOMETRIC PROJECTION OF A FRUSTUM OF AN EQUILATERAL TRIANGULAR PYRAMID (8)**
- (i) Helping view (with isometric scale, or scale 1 : 1) 2
  - (ii) Drawing of isometric triangle on top and at the base. 2
  - (iii) Drawing of slant edges. 1 1/2
  - (iv) Indicating the axis. 1/2
  - (v) Three dimensions, including that of axis through in-centers. 1 1/2
  - (vi) Direction of viewing. 1/2
- NOTE: For incorrect position of frustum, like using 30 mm side for the top and 60 mm for the base, 1 1/2 marks should be deducted. If the axis is drawn perpendicular to the V.P. instead of being vertical, as asked, 1 1/2 marks should be deducted. Also, in the helping view, if a side of the triangle is taken perpendicular to the V.P. instead of parallel, or taken parallel but closer to V.P., 1 mark should be deducted.
- (c): HEMISPHERE PLACED CENTRALLY, ON A HEXAGONAL PRISM. (13)**
- HEXAGONAL PRISM**
- (i) Helping view of a hexagon with two opposite sides, perpendicular to the V.P. 1 1/2
  - (ii) Drawing isometric hexagons. 2 1/2
  - (iii) Drawing face edges, parallel to vertical axis / V.P. 2
  - (iv) Dimensioning side of the base and axis, i.e. height of prism. 1

### HEMISPHERE

- |       |                                                                      |   |
|-------|----------------------------------------------------------------------|---|
| (i)   | Drawing isometric ellipse along with center lines.                   | 3 |
| (ii)  | Drawing semi-circular portion of hemi-sphere.                        | 1 |
| (iii) | Ensuring central location and showing common axis of the two solids. | 1 |
| (iv)  | Dimensioning diameter and height.                                    | 1 |

**NOTE:** For incorrectly placed solids etc., proportionate deductions, as proposed in Q. I.(b) may be used.

### Q.2 (a): HEXAGONAL HEAD BOLT WITH SQUARE NUT AND WASHER (9)

- |       |                                                            |                |
|-------|------------------------------------------------------------|----------------|
| (i)   | Bolt head with curves, chamfering etc.                     | 2              |
| (ii)  | Length of bolt and threaded length.                        | 1              |
| (iii) | Curve of $R = d$ at the end, or chamfering at $45^\circ$ . | $\frac{1}{2}$  |
| (iv)  | Square nut drawn correctly.                                | $1\frac{1}{2}$ |
| (v)   | Washer drawn correctly.                                    | 1              |
| (vi)  | Neatness, line work and four dimensions at least.          | 3              |

**OR**

### HEXAGONAL NUT

#### Front View

- |      |                                                                                                                              |                |
|------|------------------------------------------------------------------------------------------------------------------------------|----------------|
| (i)  | Front view of hexagonal nut of diameter = 30 mm with six vertical lines and two horizontal lines with chamfering at the top. | $1\frac{1}{2}$ |
| (ii) | Drawing arcs.                                                                                                                | 1              |

#### Top View

- |      |                                                                                                                              |                |
|------|------------------------------------------------------------------------------------------------------------------------------|----------------|
| (i)  | Distance across flats = Chamfer circle of diameter = $1.5d$ ( or $1.5d + 3$ mm) and hexagon circumscribed on chamfer circle. | $1\frac{1}{2}$ |
| (ii) | Indication of thick circle of $0.85 d$ and thin broken circle of diameter = $d$ .                                            | 1              |

#### Side View

- |       |                                                |   |
|-------|------------------------------------------------|---|
| (i)   | Seven vertical lines and two horizontal lines. | 1 |
| (ii)  | Drawing arcs.                                  | 1 |
| (iii) | Line work and minimum four dimensions.         | 2 |



**NOTE:**

3 marks may be deducted, in all, if sketched free hand proportionately instead of drawing to scale 1 : 1.

**Q. 2. (b) Following components are to be sketched free hand proportionately.**

**SNAP HEAD RIVET**

**(6)**

**Front View**

- (i) Sketching of head of the rivet proportionately. 2
- (ii) Sketching of shank, broken end and hatching. 2

**Top View**

- (i) Sketching one dark and one dotted circle. 1
- (ii) Dimensioning. 1

**(OR)**

**DOUBLE HEAD GIB KEY**

- (i) Sketching front view correctly. 2½
- (ii) Sketching top view correctly. 1½
- (iii) Sketching side view correctly. 1
- (iv) Dimensioning. 1

**NOTE**

2 marks may be deducted if these components are drawn with instruments instead of being sketched free hand.

**Q.3. SLEEVE AND COTTER JOINT (Assembly)**

**(30)**

**Front View (upper half in section):**

**(17)**

- (i) Sleeve with upper half in section along with curves of R 4 and hatching lines. 4
- (ii) Sleeve in lower half with curves. 2
- (iii) Rods drawn correctly, in position, with chamfered ends, curves of R 4. and hatching lines in broken ends. 4
- (iv) Both cotters with inward tapers and four clearances. 5
- (v) Neatness and line work. 2

|                                                                |            |
|----------------------------------------------------------------|------------|
| <b>Side view as seen from the left:</b>                        | <b>(7)</b> |
| (i) Circle for sleeve (1) and two circles for Rod- (2)         | 3          |
| (ii) Side view of cotter.                                      | 2          |
| (iii) Showing cutting plane in side view.                      | ½          |
| (iv) Neatness and line work.                                   | 1½         |
| Title (1), scale used (1), symbol (1) and eight dimensions (3) | 6          |

**OR**

**BUSHED BEARING (Dis - assembly) (30)**

**(A) BODY (17)**

**Front View right half in section:**

|                                                                                                                               |   |
|-------------------------------------------------------------------------------------------------------------------------------|---|
| (i) Marking boundary of body alongwith radii of R 4 at four locations, one fourth curve of diameter =60 mm and vertical axis. | 3 |
| (ii) Indicating center distance of two holes and clearance gap of 4 mm at the base with proper fillets.                       | 2 |
| (iii) Marking of hole of 25 mm size.                                                                                          | 1 |
| (iv) Marking of circle of diameter = 40 mm.                                                                                   | 1 |
| (v) Marking of oil hole.                                                                                                      | 1 |
| (vi) Hatching lines in body.                                                                                                  | 2 |

**Top View**

|                                                                    |    |
|--------------------------------------------------------------------|----|
| (i) Drawing inner rectangle correctly (1) and side rectangles (1). | 2  |
| (ii) Drawing of bolt holes, oil hole circle and two center lines.  | 3½ |
| (iii) Drawing cutting plane line in this view.                     | ½  |
| (iv) Neatness and line work.                                       | 1  |

**(B) BUSH (7)**

**Front view left half in section**

|                                            |    |
|--------------------------------------------|----|
| (i) Drawing two circles with center lines. | 2  |
| (ii) Showing oil hole and hatching lines.  | 1½ |

### **Top View**

|                                                            |   |
|------------------------------------------------------------|---|
| (i) Drawing rectangle with center lines.                   | 1 |
| (n) Drawing oil hole circle.                               | 1 |
| (iii) Drawing cutting plane.                               | ½ |
| (iv) Line work.                                            | 1 |
| Titles (2), symbol (1), scale used (1) and dimensions (2). | 6 |

