MARKING SCHEME

2008

CLASS XII

SCIENCE SUBJECTS

CENTRAL BOARD OF SECONDARY EDUCATION
DELHI

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CENTRAL BOARD OF SECONDARY EDUCATION
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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.

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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 datailed 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 2008 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 2008 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 प्रभूत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य] बनाने केलिए, 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

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई॰ को एतद्द्वारा 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 कर्त्तव्य

51 क. मूल कर्त्तव्य - भारत के प्रत्येक नागरिक का यह कर्त्तव्य 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 मे समरसता और समान भ्रातृत्व की भावना का निर्माण करें जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओ का त्याग करें जो स्त्रियों के सम्मान के विरूद्ध हैं;

(च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्व समझें और उसका परिक्षण 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 बढ़ाने 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 deals 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.

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Senior School Certificate Examination (XII)

Marking Scheme

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

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ENGLISH (Core)

Time allowed : 3 hours ***Maximum Marks : 100***

General Instructions:

(i) This paper is divided into three Sections: A, Band 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 word 'depressed' in common usage means sad, frustrated, fed up, bored up and pessimistic. The mood of a depressed person is much lower at his or her best moments than the mood of the normal person at his or her worst. Depression is a state of mind. It is specifically a mental disorder characterised by a lowering of the individual's vitality, his mood, desires, hopes, aspirations and of his self-esteem.

2. Depression arising out of environmental factors is called reactive depression whereas depression arising out of some biochemical changes in the brain is called endogenous depression. If depression is mild or moderate and if the individual is in touch with his surroundings, it is known as neurotic depression. If the individual is severely disturbed and is not able to comprehend what is happening around, such a state is called psychotic depression.

3. Old age is one of the stages of human development, where a person attains wisdom, maturity, social and economic stability with social recognition and emotional fulfilment. Generally, societies show a great respect and consideration for the aged. In ancient times old people were considered as the guiding stars in Indian families, since they were symbols of tradition, respect, wisdom and experience. In primitive, ancient and medieval cultures, old persons had a recognized social role. They were of great value because they could impart knowledge and skill to youngsters. The old people were considered as repositories of wisdom and traditions and were not perceived as problems.

4. At present, social structures and values are undergoing transformation from traditional to modern. There is a rapid stride in urbanization and industrialization leading to the breaking up of joint families and property. This has ultimately weakened the traditional families, social position and status of the aged in the family. From time to time changes in the institutions of marriage and family have diminished the control of parents over their children. It has increased the freedom of children and they view the aged as a useless and non-productive entity. Modernization has eventually led to the degradation of their status and authority. Consequently the integrity of the family and the existence of the elderly as an integral part of the family are being uprooted. The importance of their functional positions thus declines and consequently their authority and much of the respect and prestige that they enjoyed earlier get faded. These changes generally bring about depression in older people.

5. As old age advances events at home may also contribute more to their problems. The 'empty nest' feeling arising as a result of the grown up children leaving the home, daughters departing as a result of wedlock and sons leaving station in pursuit of higher education or jobs may make the aged more lonely. The loneliness also arises because of premature loss of spouse. This would deprive the person of a long standing emotional bond that had provided plenty of emotional succour and security. The loss wherever it might occur in the later years leaves the individual terribly lonely and at the mercy of the sons and daughters-in-law. Added to these the increasing gap and interactional stress and strain in the family may leave the elderly without peace of mind. The elderly as a result of these developments feel marginalised, alienated and left out of the main stream. The foregoing are the common problems faced by most of the elderly. These either directly or indirectly lead to a state of depression and make ageing for many an unwanted and unpleasant event to be abhorred.

6. Usually, the mild depression which is caused due to environmental factors is temporary. The person reconciles within a short time and tries to forget the loss. Kind words, and timely support of friends, relatives and family members help one recover from depression.

(a)	(i)	What does 'depressed' mean in common usage?	2
	(ii)	What is reactive depression?	1
	(iii)	What was the status of the old people in ancient India?	2
	(iv)	What are the causes for disintegration of joint family system?	2
	(v)	How does one recover from mild depression?	2

(b) Pick out the words from the passage that mean the same as the following: 3x1=3

(i) decreased (para 4)

(ii) to feel that they do not belong to a group (para 5)

(iii) a husband or wife (para 5)

2. Read the passage given below and answer the questions that follow: (8 marks)

A vast blanket of pollution stretching across South Asia is cutting down sunlight by 10 per cent over India, damaging agriculture, modifying rainfall patterns and putting hundreds of thousands of people at risk, according to a new study.

The startling findings of scientists working with the United Nations Environment Programme indicate that the spectacular economic growth seen in this part of the world in the past decade may soon falter as a result of this pollution.

Research carried out in India indicates that the haze caused by pollution might be reducing winter rice harvests by as much as 10 per cent, the report said.

"Acids in the haze may, by falling as acid rain, have the potential to damage crops and trees. Ash falling on leaves can aggravate the impacts of reduced sunlight on earth's surface. The pollution that is forming the haze could be leading to several hundreds of thousands of premature deaths as a result of higher levels of respiratory diseases," it said. Results from seven cities in India alone, including Delhi, Mumbai, Ahmedabad and Kolkata, estimate that air pollution was annually responsible for 24,000 premature deaths in the early 1990s. By the mid 1990s they resulted in an estimated 37,000 premature fatalities.

"The haze has cut down sunlight over India by 10 per cent (so far) - a huge amount! As a repercussion, the North West of India is drying up," Prof. V. Ramanathan said when asked specifically about the impact of the haze over India. Stating that sunlight was going down every year, he said. "We are still in an early stage of understanding of the impact of the haze.

Asked whether the current drought in most parts of India after over a decade of good monsoon was owing to the haze, he said, "it was too early to reach a conclusion. If the drought persists for about four to five years, then we should start suspecting that it may be because of the haze."

India, China and Indonesia are the worst affected owing to their population density, economic growth and depleting forest cover. The preliminary results indicate that

the build up of haze, a mass of ash, acids, aerosols and other particles is disrupting weather systems, including rainfall and wind patterns and triggering droughts in western parts of the Asian Continent. The concern is that the regional and global impacts of the haze are set to intensify over the next 30 years as the population of the Asian region rises to an estimated five billion people.

(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 80 words using the notes made and also suggest a suitable title. 3

SECTION B : ADVANCED WRITING SKILLS 35 Marks

3. You lost your wrist watch in your school auditorium. Write a notice in not more than 50 words for your school notice board giving a detailed description of the watch. You are Anirudh/Arundhati of class XII of Springfields School, Pune. 5

OR

You are Dr. Madhu, M.D. You are looking for an independent house in Ghaziabad on a reasonable rent for your residence-cum-clinic. Draft a suitable advertisement in not more than 50 words to be published in Hindustan Times, New Delhi. Your telephone no is 12341234.

4. You are Amrit/Anuradha of B.M.B. Public School, Dalmianagar. Recently your school celebrated Environment Week. Giving details of the celebrations write a report in 100-125 words for your school magazine. 10

OR

You are Akash / Ambika. You attended a seminar arranged for class XII students by AMC School, Chennai on the topic, 'How to face the examination with confidence.' Write a report in 100-125 words for your school magazine. Invent the necessary details.

5. As Sports Incharge of A.C.C. Public School, Secunderabad, write a letter to the Secretary of the Sports Authority of India, Delhi, requesting him to send the details of scholarships admissible to different categories of students of the school, who have achieved excellence in various sports. 10

OR

You are the Librarian of T.H.S.S. School, Kolar. Write a letter to Messrs Vikas Publishers, Chennai placing an order for some books for your school library. Mention

the details of the books (at least four) and ask for the discount available on the purchase.

6. National Cadet Corps is an organization which not only inculcates discipline in the youth but also prepares them for the defence of the country. It also provides an opportunity to the students to participate in various other activities such as adventure, culture etc. Write an article in 150-200 words on the need to make N.C.C. compulsory in all schools in the country. 10

OR

Joint family system is gradually disintegrating in the country. Many elderly people get neglected because of the nuclear set up of families. It increases the need of homes for the aged. Write an article in 150-200 words on the topic entitled "Should there be Homes for the Aged in India.".

SECTION C : LITERATURE **45 Marks**

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

.....but soon
put that thought away, and
looked out at young
trees sprinting, the merry children spilling
out of their homes.

(i) Who looked out at young trees? 1

(ii) Which thought did she put away? 2

(iii) What do young sprinting trees signify ? 1

OR

Perhaps the Earth can teach us
as when everything seems dead
and later proves to be alive.
Now I'll count up to twelve
and you keep quiet and I will go.

(i) What does the earth teach us ? 2

(ii) Why does the poet count up to twelve? 1

(iii) What will keeping quiet help us achieve? 1

(b) Answer any **three** of the following questions in 30-40 words each: 3 x2=6

(i) What was the plea of the folk who had put up the roadside stand?

(ii) What does the poet wish for the children of the slums?

(iii) How does the poet describe Aunt Jennifer's tigers?

(iv) What makes human beings love life in spite of troubles and sufferings? (A Thing of Beauty)

8. Answer the following questions in 30-40 words each : 5x2 = 10

(a) Garbage to them is gold. Why does the author say so about the ragpickers?

(b) How was the scene in the school in the morning of the last lesson different from that on other days?

(c) How do we know that ordinary people too contributed to the freedom movement?

(d) Why did everybody in the studio think of giving the author some work to do ?

(e) State the reason for the huge success of the novel, 'The Name of the Rose.'

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

What was Douglas's fear? How did he overcome that fear?

OR

Compare and contrast the character of the iron master with that of his daughter.

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

How did Mr. Lamb's meeting with Derry become a turning point in Derry's life?

OR

The world's geological history is trapped in the Antarctica. How is the study of this region useful to us ?

11. Answer the following questions in 30-40 words each: 4x2 = 8

(a) Do you think that the third level was a medium of escape for Charlie? Why?

(b) How did the tiger king celebrate his victory over the killing of the 100th tiger?

(c) How did the gardener react when Dr. Sadao told him about the wounded American soldier?

(d) How does Jo want the story to end and why?

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 word 'depressed' in common usage means sad, frustrated, fed up, bored and pessimistic. The mood of a depressed person is much lower at his or her best moments than the mood of the normal person at his or her worst. Depression is a state of mind. It is specifically a mental disorder characterised by a lowering of the individual's vitality, his mood, desires, hopes, aspirations and of his self-esteem.

2 Depression arising out of environmental factors is called reactive depression whereas depression arising out of some biochemical changes in the brain is called endogenous depression. If depression is mild or moderate and if the individual is in touch with his surroundings, it is known. as neurotic depression. If the individual is severely disturbed and is not able to comprehend what is happening around, such a state is called psychotic depression.

3 Old age is one of the stages of human development, where a person attains wisdom, maturity, social and economic stability with social recognition and emotional fulfilment. Generally, societies show a great respect and consideration for the aged. In ancient times old people were considered as the guiding stars in Indian families, since they were symbols of tradition, respect, wisdom and experience. In primitive, ancient and medieval cultures, old persons had a recognized social role. They were of great value because they could impart knowledge and skill to youngsters. The old people were considered as repositories of wisdom and traditions and were not perceived as problems.

4 At present, social structures and values are undergoing transformation' from traditional to modern. There is a rapid stride in urbanization and industrialization leading to the breaking up of joint families and property. This has ultimately weakened the traditional families, social position and status of the aged in the family. From time to time changes in the institutions of marriage and family have diminished the control of parents over their children. It has increased the freedom of children and they view the aged as a useless, and non-productive entity. Modernization has eventually led to the degradation of their status and authority. Consequently the integrity of the family and the existence of the elderly as an integral part of the family are being uprooted. The importance of

their functional positions thus declines and consequently their authority and much of the respect and prestige that they enjoyed earlier get faded. These changes generally bring about depression in older people.

5 As old age advances, events at home may also contribute more to their problems. The 'empty nest' feeling arising as a result of the grown-up children leaving the home, daughters departing as a result of wedlock and sons leaving station in pursuit of higher education or jobs may make the aged more lonely. The loneliness also arises because of premature loss of spouse. This would deprive the person of a long standing emotional bond that had provided plenty of emotional succour and security. The loss wherever it might occur in the later years leaves the individual terribly lonely and at the mercy of the sons and daughters-in-law. Added to these the increasing gap and interactional stress and strain in the family may leave the elderly without peace of mind. The elderly as a result of these developments feel marginalised, alienated and left out of the mainstream. The foregoing are the common problems faced by most of the elderly. These either directly or indirectly lead to a state of depression and make ageing for many an unwanted and unpleasant event to be abhorred.

6 Usually, the mild depression which is caused due to environmental factors is temporary. The person reconciles within a short time and, tries to forget the loss. Kind words, and timely support of friends, relatives and family members help one recover from depression.

(a) (i) What does 'depressed' mean in common usage? 2

(ii) What is reactive depression? 1

(iii) What was the status of the old people in ancient India? 2

(iv) What are the causes of disintegration of joint family system? 2

(v) How does one recover from mild depression? 2

(b) Pick out words from the passage that mean the same as the following: 3x1=3

(i) decreased (para 4)

(ii) to feel that they do not belong to a group (para 5)

(iii) a husband or wife (para 5)

2. Read the passage given below and answer the questions that follow: (8 marks)

A vast blanket of pollution stretching across South Asia is cutting down sunlight by

10 per cent over India, damaging agriculture, modifying rainfall patterns and putting hundreds of thousands of people at risk, according to a new study.

The startling findings of scientists working with the United Nations Environment Programme indicate that the spectacular economic growth seen in this part of the world in the past decade may soon falter as a result of this pollution.

Research carried out in India indicates that the haze caused by pollution might be reducing winter rice harvests by as much as 10 per cent, the report said.

"Acids in the haze may, by falling as acid rain, have the potential to damage crops and trees. Ash falling on leaves can aggravate the impacts of reduced sunlight on the earth's surface. The pollution that is forming the haze could be leading to several hundreds of thousands of premature deaths as a result of higher levels of respiratory diseases," it said. Results from seven cities in India alone, including Delhi, Mumbai, Ahmedabad and Kolkata estimate that air pollution was annually responsible for 24,000 premature deaths in the early 1990s. By the mid 1990s they resulted in an estimated 37,000 premature fatalities."

"The haze has cut down sunlight over India by 10 per cent (so far) - a huge amount! As a repercussion, the North West of India is drying up," Prof. V. Ramanathan said when asked specifically about the impact of the haze over India. Stating that sunlight was going down every year, he said, "we are still in an early stage of understanding of the impact of the haze."

Asked whether the current drought in most parts of India after over a decade of good monsoon was owing to the haze, he said, "it is too early to reach a conclusion. If the drought persists for about four to five years, then we should start suspecting that it may be because of the haze."

India, China and Indonesia are the worst-affected owing to their population density, economic growth and depleting forest cover. The preliminary results indicate that the build-up of haze, a mass of ash, acids, aerosols and other particles is disrupting weather systems, including rainfall and wind patterns and triggering droughts in western parts of the Asian continent. The concern is that the regional and global impacts of the haze are set to intensify over the next 30 years as the population of the Asian region rises to an estimated five billion people.

(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 80 words using the notes made and also suggest a suitable title. 3

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

3. You are Saran / Swati, Cultural Secretary of Queen's Senior Secondary School, Patna. Write a notice in not more than 50 words for your school notice board, giving details of the cultural programme to be organised by your school. Invite the names of the participants. 5

OR

You want to sell your car as you are going abroad. Draft a suitable advertisement in not more than 50 words to be published in the classified columns of 'The Hindu'. Give necessary details of the car. You are Suman/ Sushil, 21 Ram Nagar, Delhi.

4. Your school celebrated the Diamond Jubilee year of India's independence. Write a report in 100 - 125 words for your school magazine, giving details of the celebrations. You are Amit / Anita of Maharani Laxmibai Senior Secondary School, Gwalior. 10

OR

You are a staff reporter of 'The Hindu', New Delhi. You have witnessed a road accident involving a lorry and a Maruti car at Mathura Road. Write a report in 100 -125 words. You are Ashok / Aruna.

5. You are Krishan / Kiran studying at Hindustan School, Chennai. The road leading to your school is full of potholes causing a lot of congestion. Students and parents are often caught in traffic jams. In spite of several representations the Chennai Corporation has not done anything to improve the condition. Write a letter to the Editor of 'The Hindu', Chennai, drawing the attention of the Corporation authorities to the problem. Also offer your suggestions for improvement. 10

OR

You are Gaurav / Garima, 13, Vaishali, Delhi. Read the advertisement given below and write a letter to the advertiser, applying for the job. Also give your detailed resume which you would send along with your letter of application.

WISDOM PUBLISHERS LTD.,
10, Sector 24, Faridabad

Wanted Sales Manager

Qualification: M.Com. / M.B.A.

Experience: 5 years for M. Com.; 1 or 2 years for M.B.A.

Competency : Knowledge of computers, finances and related commercial activities.
Salary commensurate with qualification and experience.
Apply to the General Manager.

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6. You are Gopal/ Gopika, a social worker. You have observed that young boys and girls go on increasing their academic qualification without proper direction. Most of them do not get any employment creating the problem of the educated unemployed. Some of them drift into unsocial activities. Write an article in 150 - 200 words on how this problem of the 'educated unemployed' can be solved. 10

OR

Cyclones often hit the coastal areas causing a lot of devastation in terms of life and property. Helping the sufferers requires a lot of assistance from private and public sources. A scientific mechanism is necessary to cope with the situation in time of emergency. Write an article in 150 - 200 words on how the victims of cyclones can be helped. You are Kamal/Kamala.

SECTION C : TEXT BOOKS **45 Marks**

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

Fishermen in the cold sea
would not harm whales
and the man gathering salt
would look at his hurt hands.

(i) What does the poet expect of the fishermen and why? 2

(ii) What will the man gathering salt do ? 1

(iii) What do the hurt hands imply? 1

OR

A thing of beauty is a joy forever
Its loveliness increases, it will never
Pass into nothingness; but will keep
A bower quiet for us, and a sleep
Full of sweet dreams, and health, and quiet breathing.

(i) How does a thing of beauty remain a joy forever? 2

(ii) Mention any two sources of joy which a thing of beauty provides to us. 2

(b) Answer any three of the following questions in 30 - 40 words each: 3x2=6

(i) What was the plea of the folk who had put up the roadside stand?

(ii) Describe the tigers created by Aunt Jennifer.

(iii) Why does the poet, Stephen Spender call the map a bad example?

(iv) What do the parting words of the poet, Kamala Das to her mother signify?

8. Answer the following questions in 30 - 40 words each: 5x2=10

(a) What is Saheb looking for in the garbage dumps? Where has he come from and why?

(b) How did the drowning experience affect Douglas?

(c) Why did the peddler accept Edla's invitation? How did he feel?

(d) How was Gandhiji able to influence the lawyers?

(e) Why was Sophie jealous of Geoff's silence?

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

Describe the effect, on life at school, produced by the passing of Alsace and Lorraine into Prussian hands.

OR

Why did Umberto Eco start writing novels and when? What does Eco say about the huge success of his novel, 'The Name of the Rose' in spite of it being a difficult and very serious novel?

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

The astrologer's prediction about the death of the Tiger King came to be true. Do you agree with this statement? Explain why or why not.

OR

What oppression and discrimination did Zitkala-Sa and Bama experience during their childhood? How did they respond to their respective situations?

11. Answer the following questions in 30 - 40 words each: 4x2=8

(a) Who do you think has outwitted the other – Evans or the 'Governor? How?

(b) How does Mr. Lamb try to remove the baseless fears of Derry?

(c) How can a visit to the Antarctica be an enlightening experience?

(d) How did the Skunk's mother get his old smell back?

Marking Scheme — English Core

General Instructions :

1. 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 group or individually on the first day of their starting evaluation.
2. 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 variation in the marking of individual evaluators.
3. 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 is the only guideline.
4. The Marking Scheme carries only suggested value points for the answers. These are only guidelines and do 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 out in 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. 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 is 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) questions have been designed to test a student's understanding and his ability to interpret, evaluate and respond to the given passage. In other words, only the ability to comprehend the given passage on the part of the students must be tested so that the examinees are not unnecessarily penalized for language errors.

11. However, where questions have been designed to test the writing skills of students, expression (grammatical accuracy, appropriate use of words, style, spelling, organization and presentation of relevant matter in a coherent and logical way) is important.

12. Wherever the word limit is given, no deduction of marks is to be made if the word limit exceeds only upto 25%. However, beyond this permitted limit, marks are to be deducted as follows:

    Penalty for exceeding the word limit

    For a 50 word answer:
    Above 60 - deduct ½ mark

    For a 125 word answer:
    150 to 175 words - deduct ½ mark
    Above 175 words - deduct 1 mark

    For a 150 word answer:
    175 to 200 words - deduct ½ mark
    Above 200 words - deduct 1 mark

    For a 200 word answer:
    225 to 250 words - deduct ½ mark
    Above 250 words - deduct 1 mark

    However, no marks should be deducted in respect of short answer type questions (under Q7, 8 & 11).

13. 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 full marks.

14. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) are to be deducted for this as long as it is relevant and indicative of the desired understanding on the part of the student (especially in questions under Q 1 and Q7).

15. A full scale of marks - 0 to 100 - has to be used. In case of an answer book deserving 95 and above marks, award marks 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

(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) unhappy / sad / frustrated / fed up / mental disorder / bored up and pessimistic — 2 marks

(ii) depression arising out of environmental factors — 1 mark

(iii) – considered as guiding stars — 2 marks
– had a recognised social role
– were of great value as they could impart knowledge
(any two)

(iv) – transformation of social structures and values from traditional to modem — 2 marks
– rapid stride in urbanisation and industrialization

(v) – with kind words — 2 marks
– timely support of friends, relatives and family members

(b) (i) diminished / degradation / declined / weakened — 1 mark

(ii) alienated / marginalised / left out — 1 mark

(iii) spouse — 1 mark

2 **Note**

- **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) part**
- **Min. 3 main headings and 3 sub-headings to form content**

The notes provided below arc 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 not to be accepted as notes.

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: Pollution / Effects of Pollution / Global Impact of Pollution / Any other suitable title)

1 Effects of polln. (in S. E. Asia)

- 1.1 cuts sunlight - 10% in India
- 1.2 damages agri.
- 1.3 modifies rainfall patterns
- 1.4 people at risk / hindering eco. growth

2 Findings of UNEP

- 2.1 blanket of polln. across S. E. Asia
- 2.2 growth may falter
- 2.3 might reduce winter rice harvest

3 Research about India

- 3.1 acid rains damage crops & trees
- 3.2 ash on leaves reduces sunlight
- 3.3 respiratory diseases
- 3.4 2400 premature deaths
- 3.5 N. W. India drying up due to drought

4 Far reaching global impact

4.1 esp. in India, China, Indonesia due to

- popu. density
- economic growth
- depleting forest cover

4.2 effect

- haze disrupts weather system
- triggers drought in West Asia

(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 or the answer.

3 **NOTICE**

Format 1 mark

Content 2 marks

Expression 2 marks

Suggested value points

(LOST / LOST WRISTWATCH / LOST AND FOUND)

– day & date / time / location

– description of wristwatch - make, looks, design, shape etc

– whom to contact / where

– incentive for finder

OR

ADVERTISEMENT

Content 3 marks

Expression 2 marks

Suggested value points
(ACCOMODATION WANTED)

– location

– facilities required for house-cum-clinic

- 24 hours water
- electricity backup
- fully furnished
- big rooms

– approximate rent

– contact address / phone

4 **REPORT WRITING**

Format 1 mark

1. title, reporter's name

Content 4 marks

Expression 5 marks

Grammatical accuracy, appropriate words and spellings [2 ½]

Coherence and relevance of ideas and style [2 ½]

Suggested value points:
(ENVIRONMENT WEEK)

– when

– where

– activities/programmes conducted during the week

– any other special feature(s)

OR

Suggested value points
(SEMINAR ON HOW TO FACE THE EXAMINATION WITH CONFIDENCE)

– when

– where

– details of seminar
e.g. panel of experts / student interaction / response
– any other special feature(s)

5 **LEITER WRITING**

[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]

(DETAILS OF SCHOLARSHIP)

Suggested Value Points

– mention the categories

– what excellence has been achieved

– how to apply for scholarship

OR

(ORDER FOR BOOKS)

Suggested Value Points

– list of books / author / no. of copies

– request for bulk discount

– mode of payment

– deadline for delivery of books

6 **ARTICLE WRITING**

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

Content 4 marks

Expression

Grammatical accuracy, appropriate words and spelling [2 ½]

Coherence and relevance of ideas and style [2 ½]

Suggested Value Points

(NCC / A Must for All Schools / NCC and Schools / any other suitable title)

– activities of NCC

– how it inculcates discipline in youth

– what do children learn as a cadet

– motivates youth to be adventurous

– grooms youth

– close to culture

– prepares for defence forces

– reasons to make NCC compulsory

– any other relevant point

OR

Suggested Value Points

(SHOULD THERE BE HOMES FOR THE AGED IN INDIA?)

Reasons

– joint family disintegrating - setting up of nuclear families

– elderly alienated - children getting married / going abroad

Solutions

Yes	**No**
– safety for elders	– basically a western concept
– combats loneliness	– against Indian culture
– medical attention	– the aged need physical & mental support from family members
– like-minded people stay together	– families can utilise their maturity / wisdom
– enjoy pastime	– provide support system for the family
– have freedom – no burden on children	
(any four)	(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 (a) [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]

Value points:

(i) – the poet / Kamala Das / narrator — 1 mark

(ii) – thought of separation / death / unpleasant thoughts of old age — 2 marks

(iii) – continuity of life / life / youthfulness / energy / passage of time — 1 mark

OR

(i) – everything not dead on this earth / there is life under apparent stillness — 2 marks

– teaches us to be alive / regeneration / power to recover from loss

(ii) – there are twelve markings on the clock to measure time / there are 12 months / taking time to calm down — 1 mark

(iii) – understanding of ourselves / peace and tranquillity / ceasing of all cruel activities / introspection — 1 mark

7 (b) **Short answer type questions (Poetry)**

Distribution of marks:

Content: — 1 mark

Expression — 1 mark

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

Value points:

(i) – desired the city dwellers to buy goods — 2 marks

– wanted flow of cash for better standard of living

(ii) – for the governors, inspectors, visitors / authorities to bring about a change — 2 marks

– to widen their horizons

– to take the children closer to nature / liberate them from their miserable condition

– provide good education

(any two)

(iii) – topaz / golden coloured 2 marks

– prancing, bright-eyed denizens

– free and fearless

– sleek and chivalric

(any two)

(iv) – nature is the best healer 2 marks

– brings beauty and joy to our life

– the memory of the beautiful experiences help us to bear our sorrows/ provide a bower / a peaceful retreat

(any two)

8 **Short answer type questions (Prose)**

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) – expect to get some coins. notes or valuables 2 marks

– sometimes they find a rupee or even a ten-rupee note

– for children garbage is wrapped in wonder

– for adults - a means of livelihood

(any two)

(b) other days 2 marks

– noisy and boisterous

– day of the last lesson

– unusually silent / M. Hamel dressed in his best suit / classmates already in their places / village people sitting quietly in the class

(c) – thousands of people demonstrated around the court room where Gandhi was summoned which made the Britishers feel challenged and baffled. 2 marks

– Prof J B Kriplani received Gandhiji at the station with a large body of students.

– sharecroppers from Champaran came barefooted to see Gandhiji.

– Muzzafarpur lawyers too called upon him.

– Raj Kumar Shukla, a peasant initiated Gandhiji's fight in Champaran.

(any two)

(d) – Ashokmitran's job was to cut newspaper clippings and preserve them in a file. 2 marks

– everybody thought he was practically doing nothing.

(e) – different kinds of novels (personal, narrative, unconventional style) 2 marks

– probes into metaphysics, theology and medieval history

– detective and serious yarn

– written at the right time

(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 view point.]

9 Distribution of marks:

Content 5 marks

Expression 5 marks

Grammatical accuracy, appropriate words and spelling [2 ½]

Coherence and relevance of ideas and style [2 ½]

Value points:

fear

– aversion to water since childhood (California beach and YMCA pool incidents)

overcoming fear

– decided to get an instructor to learn swimming and conquer his fear
– instructor made him practise five days a week
– taught him how to exhale under water and inhale above water
– made a swimmer out of Douglas piece by piece
– dived off a dock at Triggs Island
– swam two miles across Lake Wentworth in New Hampshire
– practised different kinds of strokes in swimming

OR

ironmaster

– commits judgemental error - mistakes the stranger as his old regimental friend, requests him to come home
– shows friendliness by sending his daughter when the stranger declines invitation
– attitude changes when the truth revealed that the stranger not his friend
– calls him dishonest and threatens to hand him over to the sheriff

daughter

– more sedate, understanding and affectionate
– intervenes to stop her father from ill treating the stranger
– treats him like a captain and gifts him a suit
– provides him with peaceful atmosphere
– is able to bring about a change in the peddler's attitude

(any five points)

10 Distribution of 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 Lamb and Derry handicapped

– Derry in the beginning withdrawn and defiant
– couldn't stand people staring at him
– Lamb open-minded and generous
– kept garden gate open and welcomed all
– had a positive attitude, taught Derry not to indulge in self pity / love life
– taught him the ways of dealing with people
– Derry confessed to his mother that Lamb talked of things that nobody had ever talked of - things that gave him an optimistic outlook
– even defied his mother
– Derry's return to Lamb's garden shows his appreciation for Lamb / restored confidence

(any four points)

OR

– Antarctica - only place in the world remaining pristine (never sustained human population)
– holds in its ice-cores half million year-old carbon records
– only place to study Earth's past, present and future

can enable us to

– study problems of global warming (glacier retreating, ice-shelves collapsing)
– concept of evolution and extinction
– significance of Cordilleran folds and granite shields; ozone and carbon

11 Short answer type questions

Questions are to be answered in 30-40 words

Distribution of marks:

Content : 1 mark

Expression : 1 mark

Value points :

(a) If Yes 2 marks

– it was a waking dream
– a wish fulfilment
– provided escape from modem day fear, insecurity, worry

If No

– then the place really existed as Charley describes vividly-railway station, people, dresses, newspaper and counters
– Sam exchanging money, disappearance, letter in the first day cover

(any two)

(b) – filled with joy 2 marks

– exclaimed that his vow had been fulfilled

– ordered the tiger to be brought in a grand procession

– turned his attention to his son

– gave him a special gift on his birthday

(any two)

(c) – old gardener pulled a few hairs on his upper lip 2 marks

– strongly opposed his master for treating the wounds of the enemy

– said that the sea wished to kill him

– the gun-wound intended to kill him

– refused to obey the orders

(any two)

(d) Jo wants

– Roger Skunk to smell like rose and not have the skunk's foul smell

– the wizard to take revenge on the mother by hitting her

– to assert her own point of view

– can understand the need of Skunk to be accepted by peers

(any two)

QUESTION PAPER CODE 1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: READING **20 Marks**

1 COMPREHENSION PASSAGE

(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) unhappy / sad / frustrated / fed up / mental disorder / bored up and pessimistic 2 marks

(ii) depression arising out of environmental factors — 1 mark

(iii) – considered as guiding stars — 2 marks
– had a recognised social role
– were of great value as they could impart knowledge
(any two)

(iv) – transformation of social structures and values from traditional to modem — 2 marks
– rapid stride in urbanisation and industrialization

(v) – with kind words — 2 marks
– timely support of friends, relatives and family members

(b) (i) diminished / degradation / declined / weakened — 1 mark

(ii) alienated / marginalised / left out — 1 mark

(iii) spouse — 1 mark

2 **Note**

- **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) part**
- **Min. 3 main headings and 3 sub-headings to form content**

The notes provided below arc 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 not to be accepted as notes.

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: Pollution / Effects of Pollution / Global Impact of Pollution / Any other suitable title)

1 Effects of polln. (in S. E. Asia)

- 1.1 cuts sunlight - 10% in India
- 1.2 damages agri.
- 1.3 modifies rainfall patterns
- 1.4 people at risk / hindering eco. growth

2 Findings of UNEP

- 2.1 blanket of polln. across S. E. Asia
- 2.2 growth may falter
- 2.3 might reduce winter rice harvest

3 Research about India

- 3.1 acid rains damage crops & trees
- 3.2 ash on leaves reduces sunlight
- 3.3 respiratory diseases
- 3.4 2400 premature deaths
- 3.5 N. W. India drying up due to drought

4 Far reaching global impact

- 4.1 esp. in India, China, Indonesia due to
  - popu. density
  - economic growth
  - depleting forest cover
- 4.2 effect
  - haze disrupts weather system
  - triggers drought in West Asia

(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 or the answer.

3 **NOTICE**

Format — 1 mark

Content — 2 marks

Expression — 2 marks

Suggested value points

(CULTURAL PROGRAMME)

– what

– where

– when

– details of cultural programmes

– conditions of participation

– last date for submission of names

OR

ADVERTISEMENT

Content — 3 marks

Expression — 2 marks

Suggested value points

(FOR SALE / CAR FOR SALE)

– make, model and mileage

– colour, condition and price

– contact name and address

– any other feature

4 **REPORT WRITING**

Format — 1 mark

1. title, reporter's name

Content 4 marks

Expression 5 marks

Grammatical accuracy, appropriate words and spellings [2 ½]

Coherence and relevance of ideas and style [2 ½]

Suggested value points:

(DIAMOND JUBILEE YEAR OF INDIA'S INDEPENDENCE)

– what

– where

– when

– guests and dignitaries present

– highlights of the cultural programme

– audience response

– any other relevant details

OR

Suggested value points:

(ROAD ACCIDENT)

– what

– when

– where

– casualties and damage

– response of authorities / local people

– suggestions

5 **LETTER WRITING**

[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]

(POOR CONDITION OF ROADS)

Suggested Value Points

– frequent traffic jams / accidents

– great inconvenience to all

– inaction by Chennai authorities

– suggestions for improvement i.e. improvement of roads, better implementation of laws, greater awareness

– any other relevant details

OR

(APPLICATION FOR JOB)

Suggested Value Points

– post applied for

– skills

– resume

- name
- father's name
- age
- address and contact no.
- educational qualification
- experience
- hobbies
- references
- testimonials attached

[NOTE: 'résumé' may be a part of the letter or attached separately]

6 **ARTICLE WRITING**

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

(EDUCATED UNEMPLOYED)

– qualification without direction

– leading to educated unemployed

– some drift into unsocial activities (any two)

suggestions

– guidance and counselling to create awareness of employment opportunities

– need for vocational courses

– scope for self-employment

– any other relevant point

(any two)

OR

Suggested Value Points

(HELPING CYCLONE VICTIMS)

– devastation caused by cyclones in coastal areas

– loss of life and property

– short-term and long-term help / rehabilitation programmes required from public and private agencies

– scientific mechanism required for warning / precautions

– disaster management cells - medical and financial help

– appropriate construction norms to be established

– training / awareness programmes on coping with the aftermath

(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 question deserve equal importance while awarding marks.

7 (a) [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)

(i) Value points:

– not to harm the whales 1 mark

– peace / togetherness may prevail/to protect the environment 1 mark

(ii) – he would look at his hurt hands / introspect / will stop all work 1 mark

(iii) – hurtful/hostile activities of man / symbolic of unending toil / work 1 mark

OR

(i) – a thing of beauty is a source of constant joy 2 marks

– its beauty increases

– never passes into nothingness / emptiness

(any two)

(ii) – sweet dreams, peaceful breathing, health and comfort 2 marks

(b) **Short answer type questions (poetry)**

Distribution of marks:

Content: 1 mark

Expression 1 mark

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

(i) **Value points:**

– to stop and buy / to pay attention to what they sell 2 marks

– they want to earn more money to improve their standard of living

(ii) – have the traits of the beasts of prey 2 marks

– topaz denizens of green forests

– well built and well groomed

– chivalric and full of confidence

(any two)

(iii) – because the map does not depict the poor / negative world of narrow lanes and hovels — 2 marks
– sharp contrast to the cheerful world outside

(iv) – reassure her that they would meet again — 2 marks
– emotions hidden behind the smile

8 **Short answer type questions (prose)**

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)

(a) **Value points:** — 2 marks
– gold
– Dhaka / Bangladesh because homes and fields had been swept away by storms

(b) – revived his aversion to water / created haunting fear in his heart — 2 marks
– avoided water / swimming / fishing

(c) – because of her compassionate and friendly manner — 2 marks
– her voice made him comfortable / felt reassured

(d) – Gandhiji was ready to be imprisoned for the sake of sharecroppers' cause — 2 marks
– lawyers realised it was also their duty to support the cause

(e) – he was silent and did not share his experiences / she felt excluded / she had never been to the places where her brother had been — 2 marks

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:

Content 5 marks

Expression 5 marks

Grammatical accuracy, appropriate words and spelling [2½]

Coherence and relevance of ideas and style [2½]

Value points:

– orders from Berlin, only German to be taught

– school was unusually quiet and serious

– M. Hamel's last class

– Hamel's dress / appearance / behaviour

– villagers present - to thank M. Hamel

– understood the significance of the French language

– everyone thought it was the best French class by Hamel

– everyone emotional about loss of language / identity

– any other relevant point

(any five)

OR

– university professor who wrote novels on Sundays

– became novelist by accident

– started writing novels at the late age of 50

– writing novels was secondary / occasional occupation

– 'The name of the Rose' acquired fame / acquired the equivalent of intellectual superstardom with it

– the medieval background was one of the reasons for its success

– phenomenal success of the novel was a mystery

– difficult and serious novel

– proved journalists and publishers wrong

– thought it was written at the most appropriate time, hence the success

– story told like the Chinese wise man

– narrative, playful and personal style

(any five)

10 Distribution of marks:

Content 4 marks

Expression 3 marks

Grammatical accuracy, appropriate words and spelling [1½]

Coherence and relevance of ideas and style [1½]

Value Points:

– prediction after the King's birth

– tiger king resolved to kill 100 tigers / told to be careful of the 100th tiger / hunt became an obsession / tigers became extinct / bullet missed 100th tiger

– bought wooden tiger for his son / a sliver of which infected and killed the king

– accept 'yes' or 'no' as answer provided proper justification is given

OR

– both Bama and Zitkala-Sa victims of discrimination

– Zitkala-Sa faced racial discrimination e.g. compulsory cutting of hair hurting her native culture / had to adopt alien way of dress, food, rules etc.

– Barna discriminated due to caste

– both rebel against discrimination by fighting for their rights / through education / presenting their viewpoints / earning a name for themselves

11 Short answer type questions

Questions are to be answered in 30-40 words

Distribution of marks:

Content : 1 mark

Expression : 1 mark

Value points :

(a) – Evans outwitted the governor 2 marks

– prison officer and driver of the van his accomplices

– directed the van to go to Newbury as planned

– escaped from prison once again

– superintendent very complacent and casual

(any two)

(b) – by infusing optimism 2 marks

– laying more stress on the inner self rather than external beauty

(c) – the visit helps us grasp where we have come from and where we could possibly be going / knowledge of evolution and extinction / gives first hand experience of global warming 2 marks

(d) – Skunk's mother hit the wizard on his head and he agreed to restore the original foul smell of Roger Skunk 2 marks

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 following passage and answer the questions that follow: 12

THE SAMPHIRE GATHERER

1. At sunset, when the strong wind from the sea was beginning to feel cold, I stood on the top of the sand-hill looking down at an old woman hurrying about over the low damp ground beneath; I wondered at her, because her figure was that of a feeble old woman, yet she moved over that damp level ground in a surprisingly swift light manner, pausing at intervals to stoop and gather something from the surface. But I couldn't see her distinctly: the sun was sinking below the horizon, and that dimness in the air, when the year too was declining, made all objects look dim. Going down to her I found that she was old, with thin grey hair, a lean dark face and grey eyes that were not old and looked steadily at mine, affecting me with a sudden mysterious sadness. For they were unsmiling eyes or perhaps a shadowy something which sadness had left in them, when all pleasure and all interest in life forsook her, with all affections, and she no longer cherished either memories or hopes.

2. I asked her what she was doing there so late in the day, and she answered in a quiet even voice which had a shadow in it too, that she was gathering samphire of that kind which grows on the flat saltings and has a dull green, leek like, fleshy leaf. She carried a pail to put it in, and a table-knife in her hand to dig the plants up by the roots, and she also had an old sack in which she put every

dry stick and chip of wood she came across. She added that she had gathered samphire at this same spot every August end for very many years.

3. I prolonged the conversation, questioning her and listening with affected interest to her mechanical answers, while trying to fathom those unsmiling, unearthly eyes that looked so steadily at mine.

4. And presently, as we talked, a babble of human voices reached our ears, and half turning we saw the crowd, of golfers coming from the golf-house; remarkably good-looking lot with well-fed, happy faces, well dressed and in a merry mood. We suspended the conversation while they were passing us. I thought, some change will surely come into those unchanging eyes at the sight of all these merry, happy golfers.

5. But though I watched her face closely there was no change, no faintest trace of ill-feeling or feeling of any kind; only that same shadow which had been there was there still. And it was the same when they had all gone by and we finished our talk and I put money in her hand; she thanked me without a smile, in the same quiet even tone of voice in which she had replied to my question about the samphire.

6. Let me then take the case of the man who has trained his eyes, or rather whose vision has unconsciously trained itself, to look at every face he meets, to find in most cases something, however little of the person's inner life. But it does not haunt him long; another arresting face follows, and then another, and the impressions all fade and vanish from the memory in a little while. But from time to time, at long intervals once perhaps in a lustrum, he will encounter a face that will not cease to haunt him, whose vivid impression will not fade for years. It was a face and eyes of that kind which I met in the samphire gatherer on that cold evening; but the mystery of it is a mystery still.

W.H. HUDSON- *A Traveller in Little Things.* (599 words)

(a) On the basis of your understanding of the passage, answer the following in your own words:

(i) What time of the day was it when the author met the old woman? 1

(ii) What aspect of the woman's movement surprised the narrator ? 1

(iii) Why couldn't he see her clearly? Give two reasons. 1

(iv) What was strange about the eyes of the old woman? 1

(v) What was the old woman doing? 1

(vi) What is samphire ? 1

(vii) Contrast the mood of the golfers and the old woman. 1

(viii) Why do you think could the author never forget the old woman? Give two reasons. 1

(b) Pick out two words/phrases from the passage which are similar in meaning to the following: 4

(i) lacking strength (para 1)

(ii) to get at the true meaning (para 3)

(iii) confused sound of many people talking (para 4)

(iv) something that keeps coming to your mind so that you cannot forget it (para 6)

2. Read the passage given below and answer the questions that follows: 8

One of the fastest-growing areas of the UK economy is the so-called creative industries. In 1988 a study was published on the economic importance of the arts in Britain. This marked an important shift in public and political perceptions about the arts. Traditionally the visual and performing arts had been seen as interesting but not useful, as recreational or leisure activities. The arts received public money, but this was seen as subsidy, as a loss leader so to speak. The 1988 study made an important new argument: that the arts make a significant contribution to the national economy and are serious forms of employment for very many people. In 1988 this contribution was estimated at six billion pounds per year to GDP. In 1998, the Government set up a creative industries task-force. The following year it published an assessment of the economic significance of this sector. It defined the creative industries as including advertising, architecture, arts and antiques, crafts, design, fashion, film, leisure software, music, performing arts, publishing, software and computer services, television and radio.

In 1998 the government estimated that these creative industries had generated annual revenues of £60 billion, a tenfold increase in ten years. The communications revolution, increasing bandwidth and the advent of digital networks are creating new global markets, multiplying outlets and increasing consumer demand. These new forms of work are creating a demand for new sorts of skill and aptitude. Unlike many ‘other industrial sectors, the creative industries continue to benefit from high growth rates,

in part because they build on and interact with innovations in science and technology. In Britain, employment in the creative industries has grown by 34% in a decade, against a background of almost no growth in employment in the economy as a whole.

This picture is comparable in the United States. There, the intellectual property sectors, whose value depends on their ability to generate new ideas rather than to manufacture commodities, are now the most powerful element in the US economy. The Intellectual Property Association in Washington has estimated these sectors to be worth currently $360 billion a year, making them more valuable than automobiles, agriculture or aerospace. They are growing at twice the rate of the economy as a whole, and generating jobs at three times the underlying rate. The intellectual property sector is even more significant when patents from science and technology are included: in pharmaceuticals, electronics, biotechnology, and information systems among others. All of these technologies are based on fundamental advances in the sciences and in engineering. They are creative fields of huge significance. The creative industries are labour- intensive and need many different types of specialist skill. Television and film production for example, draws on a variety of specialist roles in performance, in script writing, in camera and sound operation, in lighting, makeup, design, editing and postproduction. As the financial significance of this sector grows, so does its employment base. This is not true of the financial services.

(a) On the basis of your reading of the above passage, make notes on it using headings and sub-headings. Use recognisable abbreviations wherever necessary. 5

(b) Using the notes write a summary of the above passage in 80 words. 3

SECTION B: WRITING (25 marks)

3. The Eco-Club of 'High Hope School' is organising a panel discussion for teachers and students on 'Building Energy Awareness on Conservation.' Invite Professor Shirish Shukla, the well known environmentalist to chair the session. 5

Or

Read the following information provided and write a factual description of the place referred to. You are Manish/Meena, an executive working for a travel company. Do not use more than 80 words.

Visit Nagaland !

Capital - Kohima

Languages - English, Nagamese, Angami,

Places to visit - World War II Cemetery, Bara Basti, Nagaland Museum, Zoo, Tribal Village.

4. You are Ankita/Ankur. You come across the following advertisement in a national daily. You consider yourself suitable for the post. Write an application in response to the advertisement along with your detailed resume. 10

Applications are invited for a Physical Education Instructor in a reputed Health Club of Mumbai. The applicant must have 3 years of previous experience, appropriate qualifications, pleasant personality, excellent communicative abilities and motivation. Interested candidates may apply to Box No. 2563, Daily News, VS Marg, Mumbai within ten days.

Or

You see beggar children on the streets and wonder about their lack of nutrition, education, medical attention and living in abject poverty in unhygienic conditions. As Editor of your school magazine write to the editor of the local newspaper highlighting their plight and suggest suitable remedies.

5. You are Nivedita/Nikunj. Based on following input, write an article on 'Securing Children for the Future' for the literary supplement of the local newspaper. 10

Critical Concerns

- Every fifth child in the world lives in India
- Every third malnourished child in the world lives in India
- Every second Indian child is underweight
- Three out of four children in India are anaemic
- Decline in female/male ratio is maximum in 0-6 years, 927 females per 1000 males
- Traditional practices - child marriage, discrimination against the girl child; child labour

WCD Report 2007

Or

On the basis of the input given below prepare a speech to be delivered in the morning assembly on 'Shifting Values of Young Teenagers.'

Teenagers Today

- Self Esteem - Identity crisis
- Rebellion - Breaking the rules
- Impact of popular culture
- Inappropriate behaviour
- Experimentation
- Peer pressure

SECTION-C GRAMMAR (20 marks)

6. Rearrange the following sentences sequentially to make complete sense. 5

Vegetable Biryani

(a) Next take a pan, heat oil, add sliced onions, cumin seeds, salt, pepper corns, ginger-garlic paste and tomato puree;- Add vegetables and cook covered for 2-5 minutes.

(b) First wash and soak rice for half an hour.

(c) Finally garnish with fried nuts, raisins, saffron and spread few leaves of chopped coriander before serving.

(d) Now add boiled and cooled rice to it and cook for another 5-6 minutes.

(e) Then boil rice in a pan with salt and one tablespoon oil at 100% power for 5 minutes, remove and let cool.

7. You have checked into Hotel Sunrise in Mount Abu, Rajasthan after a tiring bus journey. You need some tea and wish to find out other details regarding your stay in the hotel. Based on the input given below make a set of five dialogues to complete the telephone conversation. You are Namrata/Naveen. The first one has been done for you. 5

Receptionist: Good Morning

You: Good Morning. I am calling from Room No. 203

- Help
- Tea - sandwiches

- Yes - Anything else
- Hot water - bath

- Right Away
- Telephone number - railway station

- Need to know if Mr. Akash Goyal is waiting at reception for me
- Will find out - get back

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

		Incorrect	Correct
	Globalization and population growth <u>on</u>	on	In
(a)	rural and urban areas will making		
(b)	urban growth inevitable during come		
(c)	decades. Migrants keep to coming		
(d)	to a cities because they perceive		
(e)	correctly that despite all the drawback		
(f)	urban habitats offering more choices.		
(g)	The policy makers need into improve		
(h)	the social and economy status of the		
(i)	poor, ensure that quality health service is		
(j)	afford and empowers women.		

9. The Director of a popular film, based on women's hockey, Shimit Amin is visiting your school. You are Annie/Aryan, the editor of your school magazine. You have decided to interview him. Based on the input given below, frame ten questions. 5

Inspiration - film; reality - fiction; major theme; happy - acting skills of girls; insecure - choosing hockey not cricket; most memorable moment; success - expect; any other innovative projects; consider sports again; favourite film.

SECTION-D LITERATURE (35 marks)

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

Then in a wailful choir the small **gnats** mourn
Among the river **sallows,** borne aloft
Or sinking as the light wind lives or dies;
And full-grown lambs loud bleat from hilly **bourn;**
Hedge-crickets sing; and now with treble soft
The red-breast whistles from a garden-**croft;**
And gathering swallows twitter in the skies.

(a) Name the poem and the poet. 1

(b) What are the sounds of autumn depicted in these lines? 1

(c) Pick out the word image about the river sallows and the gnats and describe them in your own words. 2

(d) Mention two birds named in the extract. 1

(e) What do you mean by the following: 2

(i) 'wailful choir'

(ii) 'Whistles from a garden croft'

Or

I know why the caged bird sings, ah me,
When his wing is bruised and his bosom sore-
When he beats his bars and would be free;
It is not a **carol** of joy or glee;
But a prayer that he sends from his heart's deep core,
But a plea, that upward to Heaven, he flings-
I know why the caged bird sings!

(a) Name the poem and the poet. 1

(b) What is the state of the bird? 1

(c) What kind of a song is the bird singing and why? 2

(d) Why is the first and last line repeated in the stanza? 1

(e) What do you mean by the following: 2

(i) ... 'he beats his bars'

(ii) 'But a plea, that upward to
Heaven, he flings-

11. Answer any two of the following: 4x2=8

(a) 'Curtains' is a symbol. Explain in the context of the poem.

(b) What are the exceptional characteristics of a good poem as brought out in 'Ars Poetica' ?

(c) Who are the 'Survivors' ? Why are they 'broken' ?

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

The play 'The Monkey's Paw' is about values, beliefs and superstition as epitomised in the Whites. Comment. 5

Or

Compare and contrast the greatness of Alexander and Asoka from the point of view of both strengths and weaknesses.

13. Answer any two of the following: 4x2=8

(a) The author says 'you'll find your freedom, a room of your own.' What does he mean and what is the care one has to take not to lose it ?

(b) Which words kept ringing in Mrs Malik's ears again and again and why?

(c) What are the reminiscences that the hum of the insects brings into the mind of the author?

14. Answer anyone of the following in 100-125 words. 7

'While Robichon had duped an audience, Quinquart had duped Robichon himself.' How was this achieved?

Or

Bring out the poignance in the situation that the cab-driver Iona Potapov finds himself in. How does he find relief?

QUESTION PAPER CODE 212

SECTION A - READING (20 marks)

1. Read the following passage and answer the questions that follow: 12

WORDS

1 Worry about words, Bobby. Your grandmother is right. For, whatever else you may do, you will be using words always. All day and every day, words matter. For words are the tools of thought, and you will find often that you are thinking badly because you are using the wrong tools, trying to bore a hole with a screw-driver, or draw a cork with a coal-hammer.

2 Excited persons will tell you - and are telling you now - that you must be "air-minded". No doubt, at the moment, they are right. But flying is only the last, and, I suspect, the least interesting, of numerous methods of locomotion. The birds have had it for a long time and it is not important. We catch and keep the birds in cages, not because they fly but because they sing. Before you die the aeroplane may be as out of date as the rickshaw is today. But words will still matter; and your capacity for thought and speech will still be the only quality that keeps you out of the zoo.

3 Every trade and every profession is conducted with words. The English language, like the right of criticism, belongs to every subject. And so we might expect that the same authorities which urge you to get "air-mindedness" and "road sense" and "hygiene-awareness" and "civic spirit" would beg you sometimes to think about your words, to respect and treasure the language which you are using, changing, enriching or damaging every hour of every day. Such exhortations are seldom heard; and it is not surprising that most of us choose and use our words with no more thought than we give to respiration, fondly supposing that it is as easy and natural to speak the English language as it is to breathe air. But I, though I have no particular title nor aptitude for the affair and am in error as frequently as you, exhort you boldly in the nation's name to worry about words, to have an affection and a respect and a curiosity for words, to keep a dictionary in the home and ask yourself often: "Now why do I say that ?". I am not urging you to be always right: for few can hope to be that.

4 We poor professional writers receive by every other post, advice and criticism from strangers, not only about what we say but about our manner of saying it - hyphens, split infinitives, relative clauses, "if and when" etc. Sometimes the

strangers are very wrong, but often they are right and helpful. In either case they show a healthy interest in the use of language and encourage care in the writer.

5 Then there is the advertiser, who has much less excuse; for he has quiet and time, and his mischief is done deliberately. Write to him and tell him that his language offends you so much that you will not buy his goods. Tell the "stockist" who offers to "service" you that you prefer to deal with a simple fellow who is content to serve you. And be a nuisance in the home. Interrupt them! Badger them! Write to them! Ask them what they mean! Let none of the wicked words escape without a challenge. And do not be afraid of being called a snob or a pedant. We are not attacking ignorance but inefficiency. Words are the tools of every trade, and there is nothing snobbish or pedantic in expecting everyone to know (or try to know) his job. It is not pedantic to bowl straight, nor is the umpire snobbish when he says "Out !" (595 words)

A.P. Herbert

(a) On the basis of your understanding of the passage, answer the following in your own words:

(i) What would happen if you were to use the wrong words? 1

(ii) What are the two examples that the author gives about using wrong words? 1

(iii) Why does the author talk about birds in relation to words? 1

(iv) Why does the author want you to use a dictionary ? 1

(v) What are the writer's thoughts on getting advice from strangers? 1

(vi) Why does the writer not want to excuse the advertiser? 1

(vii) Do you agree with the author about using appropriate words? Why/ Why not? Justify your opinion. 2

(b) Pick out words/phrases from the passage which are similar in meaning to the following: 4

(i) to make a round hole (para 1)

(ii) to urge or advise strongly (para 3)

(iii) the activity of making judgement about somebody or something (para 4)

(iv) a person who pays too much attention to small details (para 5)

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

THE PAPERLESS OFFICE '?

The development of the Internet, email and the word processor led to widespread, confident predictions about the paperless office. With these new electronic media, there would be no need for written communications to be sent on paper, or so it was said. In fact, the demand for office paper in total has grown on average by 8.1% each year since 1981. It is predicted to grow by at least 4 - 5 per cent until 2010 and even beyond. This overall increase conceals some intriguing underlying trends. There has been a relative decline in demand for copier paper. In Europe, between 1995 and 2000 the consumption of copier paper was reduced by 11%.

So what is driving the growth in office paper sales? There are two factors. The first is information. The amount of information available to the average office worker will, according to some reports, increase six-fold by the year 2010. This insatiable appetite for information is coupled with a quantum leap in ease of access. Although the percentage of information being printed is in sharp decline, this is more than compensated for by the fact that the amount of information available to us is doubling every two years. The net effect is growth in office paper of around 5% across Europe.

Many people don't like reading complicated emails, and print them off to look at them later. Email speeds communication but it encourages a more thoughtless process of writing - what has been called a stream of unconsciousness. Word processors encourage repeated drafting and new levels of perfectionism that are creating an exponential demand for paper.

Underlying these patterns is a profound change in the way documents are produced. The old way was print and distribution, a way of working that was dominated by the photocopier and small officer printer. The new mode is distribution and print: 'This is the realm of the office printer and everyone has access to one of those. The world has gone from supporting 10,000 publishers to 100 million publishers and the figure rises every minute.' The paperless office is a clear fiction, although the products and applications and, most importantly, the customers for paper have changed radically. In 1997, the printer overtook the copier as the largest consumer of paper. By 2005 two-thirds of all paper in the office will go through the printer. The fate of the paperless office is just one example of the difficulty of predicting the effects of technological innovations on economic and social systems. So is the idea of the leisured society. (429 words)

(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) Using the notes write a summary of the above passage in 80 words. 3

SECTION B - WRITING (25 marks)

3. The Eco-Club of 'Green Happy School' is promoting a drive to encourage water conservation by making rain water harvesting a part of the action plan of school policy. Draft a poster to highlight and create awareness about conserving this rich natural resource. 5

OR

Read the following information provided and write a factual description of the place referred to. You are Vijay / Vibha, an executive working for a travel firm.

Visit Daman and Diu!
Capital - Daman
Languages - Gujarati, English
Places to Visit - Forts, Beaches, Church of our Lady of Rosary, Light House, Amusement Park

4. You are Devesh / Devina, a student of class XII of Vistas Public School, Madurai. Write a letter to the Registrar, National Institute of Physical Education, Chennai requesting for a prospectus for an integrated four year course in Bachelor of Physical Education (B.P.Ed.). Also enquire about the fee-structure, career options and placement opportunities. 10

OR

You are Rukmani / Ritesh, a class XII student. You recently attended a campaign against Child Labour where you met children who were ragpickers, labourers in stone quarries and open cast mines, domestic helps and workers in textile units. Write a letter to the editor of a local daily highlighting the need to give these children an ideal childhood that provides enough education and play opportunities. Give your own suggestions to uplift society and reach out to all children.

5. You are Kamla / Ketan, a student living in a city which faces acute water shortage. You recently read the following report about this urban phenomenon across the world. Write an article on 'Urbanisation and Natural Resources'. Give your own solutions to this global problem. 10

- Urbanisation changes land cover and causes habitat loss
- Inadequate water and sanitation
- Poor air quality
- Limited or no waste disposal
- Expansion of roads - reduce absorption of rain water
- Climate change
- Migration from rural areas to urban - urban poverty
- Slums - hygiene and sanitation

OR

The young people of the country are being employed in large numbers in jobs which involve working at night. This is leading to health problems. Based on the input given and your own views prepare a speech on 'Youth Employment - a Health Hazard' to be delivered in the morning assembly . You are Vineeta / Vishal.

- Immediate employment - short term benefits
- Good pay packet - perks
- Working in shifts - impact on biological clock - sleep
- Food intake - nutrition
- Health related problems - eyes, aches, digestive disorders - voice disorders
- Social maladjustments
- Is there any value addition to society that they live in ?

SECTION C - GRAMMAR (20 marks)

6. Rearrange the following sentences sequentially to make complete sense. 5

Steamed Raisin Cake

(a) Pour the mixture into a well greased dish and bake at high heat for 3 - 4 minutes.

(b) First sift flour well.

(c) Now mix the beaten egg whites and yolks; add flour and stir quickly.

(d) Then beat egg whites in a bowl until soft peaks are formed, gradually add sugar and continue beating.

(e) Just before pouring mixture into a baking dish, add raisins and stir.

7. You have to go to Chandigarh for a Student Exchange Program. Based on the input given below write out a complete conversation. The first one has been done as an example. You are Renu / Ravi, talking to your friend Ahmed. 5

Example:

You: I have to go to Chandigarh.
Ahmed: When?

- tenth of April
- propose to go - how
- car or train
- program - begin - when
- 9.00 a.m.
- previous night by train
- early morning - road
- possible
- come along
- together - difficult - busy with theatre workshop here

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

	Incorrect	correct
Poor people lack power to <u>made</u> their	made	make

(a) voices heard by policymakers. Many is

(b) effective invisible to urban policymakers.

(c) Invisibility mean less investment,

(d) inaccessibility schools and health posts,

(e) high absentee rates from doctors and

(f) teachers assign to poor districts and a

(g) significance social distance between

(h) service providers and they clients.

(i) Gender based constraints, as well as opportunity

(j) influence access into income and assets, housing, transport and basic services.

9. P.T. Usha is a role model for the youth of the country. You are on the Editorial Board of your school magazine and have been asked to interview her. Frame ten questions that you would like to ask her, based on the items given below: 5

Age - started running; competitive athletics - when; first competition- when and where; studies; her perception - turning point; her role-model; strengths - success; weaknesses-areas of concern; leisure and recreation; big dream.

SECTION D - LITERATURE (35 marks)

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

From her ear-rings three diamonds
splash a handful of needles,
and I see my mother run back
from rain to the crying cradles
The rains **tack** and sew
with broken thread the rags
of the tree-tasselled light.

(a) Name the poem and the poet. 1

(b) Is the 'mother' depicted here, old or young'? Pick out words from the extract to substantiate your answer. 2

(c) Pick out and name the figure of speech being used in line 4. Explain. 2

(d) What qualities of mother are brougth out in these lines? 1

(e) Rain is a symbol. What does it signify? 1

OR

Is it so easy, then? Goodbye no more than this
Quiet disaster? And is there cause for sorrow

That in the small white murder of one kiss

Are born two ghosts, two **Hamlets,** two **soliloquies,**

Two worlds apart, tomorrow?

(a) Name the poem and the poet. 1

(b) Saying Goodbye is always difficult. Why is it more so in this poem? 1

(c) What does 'quiet' imply here? 1

(d) The poet uses 'two' four times in the last two lines. Which symbols are being invoked and why? 2

(e) Justify the title of the poem. 2

11. Answer any two of the following in about 50 words each: 4x2=8

(a) Bring out the senses and sounds invoked by the poet, John Keats in 'Ode to Autumn',

(b) What qualities of a good poem are brought out in 'Ars Poetica' ?

(c) Do you agree with the poet that war can make men 'broken and mad' ? Why/ why not?

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

The play, 'The Monkey's -Paw' is a comment on the greed instinct of human nature.' Comment. 5

OR

Compare and contrast the character of Alexander with Asoka from the point of view of both strengths and weaknesses.

13. Answer any two of the following in about 50 words each: 4x2=8

(a) 'Perhaps play-acting is my destiny, after all.' Who says these words and why does she feel like this?

(b) 'I remained in the litchi tree, pondering over his wisdom and wondering how a man so wise could be so poor.' Who is 'I'? Whose wisdom is he pondering over? What was the wisdom about?

(c) What was the change in Mrs. Malik's situation and how was her status affected when she finally shifted into the new house?

14. Answer any ***one*** of the following in 100 - 125 words: 7

'Iona's feelings are too much for him and he tells the little horse the whole story.' What led Iona to do this and what is sad about this state?

OR

'Therefore the school and the teacher must guard against employing the easy method of creating individual ambition in order to induce the pupils to diligent work.' Do you agree with Einstein's views expressed here? Justify your answer.

Marking Scheme — Functional English

General Instructions :

1. 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.

2. 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 should be given only after ensuring that there is no significant variation in the marking of individual evaluators.

3. Evaluation is to be done as per instructions provided in the Marking Scheme. However the Marking Scheme carries only suggested value points and does not constitute the complete answer.

4. 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.

5. If a question does not have any parts, marks must be awarded in the left-hand margin.

6. 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.**

7. 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.**

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. Under Section A, Reading (Q1) and Section D, Literature (Q 10) questions have been designed to test a students' understanding of the passage and his ability to interpret, evaluate and respond to the given passage. In other words only the reading skills are to be tested. As such, content assumes more importance than expression in the answers to these questions. Therefore students should not be unduly penalized for poor expression and incorrect spellings as long as the answer clearly reveals understanding of the passage.

10. However 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.

11. Section C is on grammar. Care should be taken not to award marks to any inaccurate answer carrying errors in grammar.

12. 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.

13. 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).

14. Please do not hesitate to award full marks if the answer deserves it especially in the long answers i.e. Section B 4 and 5; Section D 12 and 14

15. In all the sections there are higher order open ended questions that test the students ability to think creatively vely and respond critically. Therefore marks should be awarded for individual

QUESTION PAPER CODE 212/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING) 20 Marks

Q1. READING THE SAMPHIRE GATHERER TOTAL MARKS: 12

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

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

Answers : a) i. sunset 1 mark

ii. feeble yet swift and light 1 mark

iii - sun sinking below horizon
- objects looked dim ½ + ½= 1 mark

iv. unsmiling, sad, no interest in life (any 2) 1 mark

v. gathering samphire

vi. samphire - a plant / a plant that grows on flat saltings/
a plant with leek like fleshy leaf 1 mark

vii. golfers – good looking, well – fed, happy faces /
well dressed in merry mood ½ + ½ marks
Old woman – with unchanging / unearthly / unsmiling eyes

viii. - her face never ceased to haunt him
- vivid impression of her face that will not fade
- a mysterious face with sadness left in it
- unchanging / unearthly / unsmiling eyes (any 2) 1 mark

Q1.2 VOCABULARY

Objective : To deduce the meanings of unfamiliar lexical items.

Marking : 1 mark each (4 marks)

Answers : i) feeble
ii) fathom
iii) babble
iv) haunt / vivid expression

Note: If a child picks out any word / words / phrases similar in meaning they should be awarded marks

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 (with or without key) (minimum four)	1 mark
Content (minimum three sub-headings)	3 marks

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 sentences 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 : Creative Industries

I. Changing Perspectives / Outlook
   - a. traditional perception interesting not useful
   - b. new argument – defined creative industries such as advrt. arts, antiquets
   - c. contribution to nat. economy
   - d. increase in G.D.P. growth
   - e. generates employment

II. Reasons for growth of U.K. Creative Industries
   - a. ten fold increase in anul. revenue
   - b. commn. revolution
   - c. advent of digital network
   - d. creating new glob. markets
   - e. multiplying outlets and consumer demands

III. Intellectual Property Sectors
   - a. ability to generate new ideas rather than commodities
   - b. grows a twice at the rate of economy
   - c. tech. based on advances in science & engineering
   - d. increased employment generation
     - i. labour intensive
     - ii. specialist skills – e.g. T.V. and film production

Q2. b) SUMMARY

Objective: 1) To expand notes (heading 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 creative industries, 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**

Q.3.

OPTION 1 **INVITATION - PANEL DISCUSSION** **TOTAL – 5 MARKS**

Objective : To write in an appropriate style and format of an invitation letter

Marking : Format (date ,address and complimentary close) 1 mark
(heading, organizer)

Content 2 marks
- Name of event – panel discussion
- Time, Date , Venue
- Purpose of invitation – chair discussion
- Confirmation

Expression 2 marks
(Coherence and relevance of ideas and style)

OPTION 2 FACTUAL DESCRIPTION : VISIT NAGALAND TOTAL – 5 MARKS

Objectives: To write in an appropriate style and format a factual description.

Marking: Format (heading) ½ mark

Content 2½ mark

Suggested Value points

- capital
- main languages
- main attractions

Expression 2 marks

Q.4. OPTION (1) **JOB APPLICATION** **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

Note: Any 4 of the above if included in the answer maybe awarded 2 marks

Content 4 marks

- covering letter
- bio-data (2+2)

Note:Marks may be awarded irrespective of whether the biodata is a part of the main letter or an enclosure

Suggested value points

- Reference to advertisement
- Suitability for the post of Physical Education Instructor in health club
- Qualification and experience – 3 years experience / excellent communication skills / motivated
- Bio data

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 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

Note: Any 4 of the above if included in the answer maybe awarded 2 marks

Content 4 marks

Suggested value points

- Introducing subject
- Plight of beggar children } 2 marks

- Suitable remedies / own suggestions 2 marks

Expression 4 marks

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

Q.5. ARTICLE – SECURING CHILDREN FOR THE FUTURE

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 5 marks

Suggested value points

- Atleast four of the ideas from the given input to be included 3 marks
- Suggestions on how to deal with this problem 2 marks

Expression 4 marks

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

Or

OPTION – 2 SPEECH - SHIFTING VALUES OF TEENAGERS TOTAL – 10 MARKS

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

Marking: Format 1 mark

Introduction of speech and appropriate ending

Content 5 marks

Suggested Value Points

- Atleast four of the ideas from the given input to be included 3 marks
- Possible solutions 2 marks

Expression 4 marks

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

SECTION C (GRAMMAR) 20 MARKS

Q6. REARRANGING TOTAL: 5 MARKS

Objectives: To be able to present ideas in grammatically logical sequence 5 marks

Marking: 1 mark for every correct answer

Note: Full marks should be awarded even if only the sentence sequence is indicated by the corresponding alphabets Answer

(b, a, ⇆ e, d, c)

OR

1. First wash and soak rice for half an hour
2. Then boil rice in a pan with salt and one tablespoon oil at 100% power
3. Next take a pan, heat oil, add sliced onions, cumin seeds, salt, peppercorns, ginger - garlic paste and tomato puree. Add vegetables and cook covered for 2 to 5 minutes.

   (Either can come before the other)
4. Now add boiled and cooled rice to it and cook for another 5-6 minute
5. Finally garnish with fried nuts, raisins, saffron and spread few leaves of chopped coriander before serving.

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 of dialogue provided it is accurately and appropriately expressed. 5 marks

Sample Answers:

(Any other suitable exchanges to be accepted. Full marks to be awarded for 5 sets of exchanges even if it includes the first exchange given in the question paper)

1. Receptionist: Can / may I help you sir / madam?
   You : Yes I would like to have some tea and sandwiches please
2. Receptioist: Yes definitely. Is there anything else I can do for you?
   You: Can you also manage some hot water for my bath please?
3. Receptionist: Right away Sir / Ma'am
   You: can you give me the telephone number of the railway station please?
4. You: I also need to know if Mr. Akash Goyal is waiting for me at the reception
   Receptionist: I will find out and get back to you.

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 word marks should be awarded.No marks are to be deducted if the candidate has only the correct words

	Incorrect		Correct
a)	making	-	make
b)	come	-	coming
c)	to	-	on
d)	a / cities	-	the / city
e)	drawback	-	drawbacks
f)	offering	-	offer
g)	into	-	to
h)	economy	-	economic
i)	ensure	-	ensuring
j)	afford	-	affordable

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
Marks may be awarded for any other relevant questions.

Suggested questions:

a) Who / What inspired you to make this film?
b) Is it based on reality or fiction?
c) What is the major theme of the film?
d) Are you happy with the acting skills of the girls?
e) Why did you chose to make a film on hockey and not cricket?
f) Which was the most memorable moment while making the film?
g) Did you expect this film to be a success?
h) Are you involved with any other innovative projects?
i) Would you consider making any other film on sports?
j) Which is your favourite film?

SECTION D : LITERATURE **TOTAL -35 MARKS**

Q10. REFERENCE TO CONTEXT **TOTAL- 7 MARKS**

Objective: To test students' comprehension of poetry at different levels and of different kinds- local, global, interpretative, inferential, evaluative and extrapolatory

Marking: 7 marks

Answers:

OPTION (1) ODE TO AUTUMN

a) Ode to Autumn ; John Keats - ½ + ½

b) wailful choir of small gnats; loud bleating of lambs; singing of hedge – crickets; whistling of red breasts; twittering of swallows - 1 mark

(any 2)

c) Then in a wailful choir the small gnats mourn among the river sallows, borne aloft or sinking as the light wind lives or dies - 1 mark

It refers to the rise and fall of gnats / sound of gnats with the wind - 1 mark

d) red breast and swallows

e) i) sad sound of insects / gnats - 1+1 mark
ii) sounds of a bird -'red breast'

OPTION (2)

a) Sympathy – Paul Laurence Dunbar - ½ + ½

b) imprisoned / caged / behind bars, bruised due to the pain of wanting to be free - 1 mark

c) carol / prayer to the Almighty / Heaven to grant freedom from its imprisonment - 1+1 marks

d) reinforcement to convey the message that freedom is the ultimate joy and the narrator empathizes with the pain and longing of the bird - 1 mark

e) i. the bird beats wings against the bars of the cage - 1 mark

ii. the bird sends a prayer to heaven to set it free from bondage - 1 mark

Q11. POETRY **TOTAL 4X2=8 MARKS**

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

Marking: Content: 3 marks

Expression: 1 mark

a) Curtain

– a symbol of separation / division / end of a relationship

– two worlds get separated

– a curtain drawn between two lovers and their relationship

b) Ars – Poetica

A good poem is symbolic , expressive , full of word images, suggestive, timeless, eternal, universal. palpable, sensory experience, open to varied interpretation - any 4

c) Survivors of the war - soldiers who were once happy and care free – after effect of war – 'broken and mad'

Q12. PLAY **TOTAL-5 MARKS**

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

Marking: Content: 3 marks

Expression: 2 marks

OPTION (1) **MONKEY'S PAW**

a. Mr. White – disbelief , curiosity, after Herbert's death belief in the power of the paw

b. Mrs. White – fearful, superstitious, apprehensive

c. Son – disbelief, ridicules

OR

OPTION (2) ALEXANDER

- Alexander – conqueror died early ; adventurer, ambitious
- change only at the time of death - ½ + ½
- Asoka – king – concerned about welfare of subjects
- established kingdom, administrator / missionary character, transformation after Kalinga war / acknowledged guilt publicly – Asoka conquered hearts, Alexander conquered bodies
- Similarities – excellent generals ; great leaders ' led by example
- any other relevant ideas to be accepted

Q13. SHORT ANSWERS (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) - what you want most – freedom / space / your own place in the sun
- not to be careless, not take it for granted, not be greedy

b) - ' I thought it could be my mother-in-law's room and after her it might be converted into a store'

- guilt

- now a mother-in-law, the room that she had proposed to give to her mother in-law was now to be hers

c) - memory of being a child
- Peace/innocence of childhood
- Grandfather's song / garden
- present that overflowed with kindness – no past or future
- nature, the chief 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) JUDGEMENT OF PARIS

Suggested Value Points:

- both suitors
- Suzanne's challenge
- Robichon impersonates Jaques Roux and dupes audience
- Quinquart disguised as Marquis, invites Robichon
- accuses him of murdering his son
- climax – Robichon paralysed with fear
- Quinquart reveals identity and thus duped Robichon himself

OPTION (2) GRIEF

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

- only son died
- no one to share grief
- felt heart would burst
- passengers and fellow cab driver indifferent to his plight
- unburdens to his horse
- symbolic of callousness and selfishness of man and his inhumanity

QUESTION PAPER CODE 212

EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING) 20 Marks

Q1.1 READING WORDS TOTAL MARKS: 12

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

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

Answers :

a)	i)	Find that you are thinking badly / reflects one's thoughts	1 Mark
	ii)	Boring a hole with a screwdriver	½ Mark
		draw a cork with a coal hammer	½ Mark
	iii)	Both are "air minded" / shows relation between birds and song and humans and words	1 Mark
	iv)	To use appropriate words	1 Mark
	v)	Useful for writers	½ Mark
		Showing care / interest	½ Mark
	vi)	Deliberate mischief; has adequate time and quiet	1 Mark
	vii)	Any appropriate answer with justification	2 Marks

b) VOCABULARY

Objective : To deduce the meanings of unfamiliar lexical items.

Marking : 1 mark each (4 marks)

Answers : i) bore
ii) exhortations
iii) criticism
iv) pedant

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 and indentation	½ + ½ mark
	Abbreviations / Symbols	1 mark
	(with or without key)	
	(minimum four)	

Content 3 marks

(atleast two- 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 sentences 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 : The Paperless Office or any other relevant heading

I. Predictions

i. Drop in use of off. Paper

a. Due to dev electronic media

ii. No need for paper communication

II. Reality

i. Incr. Demand for off. Paper

ii. Decline in demand for copied paper

III. Reasons

i. Incr information

ii. Easy access

iii. Encouragement of thoughtless writing

iv. Repeated drafting

v. Perfectionism

vi. Preference for reading later

vii. Old mthd – print ⟶ distribute

viii. Today – distribute ⟶ print

Q2. b) SUMMARY

Objective: 1) To expand notes 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 paperless office, 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

Q.3. OPTION-1

POSTER – RAIN WATER HARVESTING TOTAL – 5 MARKS

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

Marking :

Format - 1 mark

(Heading, issuing authority)

Content - 3 marks

Expression - 1 marks

(Coherence and relevance of ideas and style)

Suggested Value Points

Purpose / Objective - What?

Reason - Why?

Method - How?

Note : Credit should be given for creativity, slogans, ideas coherently and clearly presented

Option-2

FACTUAL DESCRIPTION DAMAN TOTAL – 5 MARKS

Objectives: To write in an appropriate style and format

Marking: Format (heading) ½ mark

Content 2½ mark

Expression (Fluency, Accuracy) 2 marks

Suggested Value points

- Name of place, capital
- Places to visit
- main languages
- special attractions

Can include other relevant details

Q.4. Option -1

LETTER OF ENQUIRY **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

Note: Any 4 of the above if included in the answer maybe awarded 2 marks

Content 4 marks

Suggested value points

- request for prospectus
- enquire about :
- fee structure
- career options
- placement opportunities

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 **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)

Note: Any 4 of the above if included in the answer maybe awarded 2 marks

Content 4 marks

Suggested value points

- plight of deprived children – child labourers
- need to provide ideal childhood
- education / play opportunities
- suggestions for uplifting such children
- or any other relevant ideas

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 – URBANISATION AND NATURAL RESOURCES

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 5 marks

Suggested value points

- use inputs given (atleast 4) 3 marks
- any other relevant ideas
- solutions to the problem 2 marks

Expression 4 marks

- Grammatical accuracy,

  appropriate words and spellings 2 marks

- Coherence and relevance of ideas and style 2 marks

Or

Option 2 SPEECH – YOUTH EMPLOYMENT – A HEALTH HAZARD

TOTAL – 10 MARKS

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

Marking: Format 1 mark

Introduction of speech and appropriate ending

Content 5 marks

Suggested Value Points

- use given inputs(any 4) } 3 marks
- any other relevant ideas }
- solutions to the problem 2 marks

Expression 4 marks

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

SECTION C (GRAMMAR) 20 MARKS

Q6. REARRANGING **TOTAL: 5 MARKS**

Objectives: To be able to present ideas in grammatically logical sequence 5 marks

Marking: 1 mark for every correct answer

Note: The last two sentences can be interchanged. Full marks may be awarded even if the sentence sequence is indicated only by the corresponding alphabets

Answers:

(b, d, c, a, e) OR

b. First sift flour well
d. Then beat egg whites in a bowl until soft peaks are formed
c. Now mix the beaten egg whites and yolks
a. Just before pouring mixture into a baking dish, add raisins and stir
e. Pour the mixture into a well greased dish

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. 5 marks

Sample Answers:

(Any other suitable exchange to be accepted)

1. You: On the tenth of April / I am going on the tenth of April / tenth of April
   Ahmed: How do you propose to go?
2. You: I will go either by car or train / by car or train
   Ahmed: When does the program begin?
   When will the program begin?
3. You: 9:00 a.m. / at 9:00 a.m. / The programme begins at 9:00 a.m.
   Ahmed: Then you should / must leave the previous night
4. You: Can I go by road if I leave early in the morning?
   Ahmed: Yes, it is possible
5. You: Why don't you come along with me?
   Ahmed: No, it is difficult to go together as I am busy with the Theatre Workshop here.

Q.8. EDITING **TOTAL: 5 MARKS**

Objectives: To use grammatical items appropriately

Marking: ½ mark each [10 × ½]

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

	Incorrect		Correct
a)	is	-	are
b)	effective	-	effectively
c)	mean	-	means
d)	inaccessibility	-	inaccessible
e)	from	-	of / among
f)	assign	-	assigned
g)	significance	-	significant
h)	they	-	their
i)	opportunity	-	opportunities
j)	into	-	to

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 based on the given inputs

Note: Marks may be awarded for any other relevant questions.

Sample questions:

a) At what age did you start running? How old were you?

b) When did you get into competitive athletics?

c) When and where was the first competition held?

d) Where did you study? / How did you cope with your studies?

e) What do you perceive as the turning point in your career?

f) Who has been / was / your role model?

g) What are your strengths? / What made you successful?

h) What are your areas of weakness and concern?

i) What do you do in your leisure time?

j) What is your big dream?

SECTION D: LITERATURE **TOTAL -35 MARKS**

Q10. REFERENCE TO CONTEXT **TOTAL- 7 MARKS**

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

Marking: 6 marks

Answers:

OPTION (1) OF MOTHER'S AMONG OTHER THINGS

a) Of Mothers, Among Other Things ; A.K. Ramanujan ½ + ½

b) as a young woman e.g.
- e.g. run back
- crying cradles
- three diamond earrings (any 2) 1 mark

c) • Transferred epithet 1 mark
• Alliteration /

'Crying cradles' symbolize a baby crying in the cradle / explanation of the use of the figure of speech 1 mark

Caring, active, busy, energetic, protective (Any 2) ½ + ½

d) rain symbol of mother / tailor / continuity / hard work of mother / continuous care of mother / protective nature of mother (any one) 1 mark

OPTION (2) CURTAIN

a) Curtain ; Helen Spalding

b) It is the separation between two lovers.

c) Only known to the two lovers

d) Symbols – ghosts, Hamlets, soliloquies, two worlds 1+1 mark
(Any 2) to convey ghostly / pale, lifeless appearance / indecision / loneliness / separation (any 2 corresponding to the 2 symbols used above)

e) Curtain - symbol of separation 1 mark

Theme of the poem - separation of two lovers 1 mark

Q11. POETRY **TOTAL 4X2=8 MARKS**

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

Marking: Content: 3 marks

Expression: 1 mark

a) e.g. of visual images / sound images / activities / poses

[atleast 2 sense images and 2 sound images]

b) good poem – symbolic and suggestive ; eternal ; universal ; palpable ; sensory; open to varied interpretations / an experience (atleast 4)

Or any other relevant points from the poem

c) If the answer is 'Yes' – shock + strain / stammering / neurasthesia / traumatic experience or any other relevant point from the poem. If the answer is 'No' – any suitable answer with justification

Q12. DRAMA **TOTAL-5 MARKS**

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

Marking: Content: 3 marks

Expression: 2 marks

OPTION (1) MONKEY'S PAW

- Inspite of warning / caution / mystery / he decides to wish
Greed - could be for money / for 3 wishes

OR

OPTION (2) ALEXANDER

Contrast:

- Alexander – conqueror, adventurer, ambitious, died early
- Change only at the time of death
- Asoka – king – concerned about welfare of subjects
- established kingdom / administrator / missionary / character - early transformation – (Kalinga war)
- Alexander sent Generals to conquer men's bodies, Asoka sent monks to conquer minds
- Similarity – excellent generals ; great leaders ; led by example
- Any two points of comparison and contrast should be included
- Any other relevant ideas to be accepted

Q13. FICTION **TOTAL 4X2=8 MARKS**

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

Marking: Content: 3 marks

Expression: 1 mark

a)
- Lisa - ½ mark
- Wanted to leave play acting for Doronin - 1 mark
- Doronin's death, no where to go - 1 mark
- Returned to play acting - ½ mark

b)
- Narrator / Ruskin Bond / boy - ½ mark
- Beggar's / old man's - ½ mark
- Follow one's dream / nurture dream / don't expect too much too soon / not to stand in any other's way (Any 2 points) - 2 marks

c)
- became a mother-in-law
- lost husband and mother-in-law
- both children married
- moving into own house at last – as a mother-in-law
- daughter –in- law allots her the store room / the room she had wanted to give to her mother-in-law

(Any three points) - 3 marks

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 GRIEF

Note: Marks should be awarded for the students' creativity

Suggested Value Points:

- Iona Potapov – lost his son Barin – wants to share his grief
- fails in his attempts to find a sympathetic listener
- finally shares his unbearable grief with his old horse

Option- 2 ON EDUCATION

Suggested Value Points:

If the answer is 'Yes' – desire for recognition leads to unhealthy competition, creates egoistic individuals, harmful to society

If the answer is 'No' – any suitable argument with justification to be accepted

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

1. If $f(x) = x + 7$ and $g(x) = x - 7$, $x \in$ R, find (fog) (7)

2. Evaluate: $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$

3. Find the value of x and y if : $2\begin{bmatrix}1 & 3\\ 0 & x\end{bmatrix} + \begin{bmatrix}y & 0\\ 1 & 2\end{bmatrix} = \begin{bmatrix}5 & 6\\ 1 & 8\end{bmatrix}$

4. Evaluate: $\begin{vmatrix}a+ib & c+id\\ -c+id & a-ib\end{vmatrix}$

5. Find the co-factor of a_{12} in the following: $\begin{vmatrix}2 & -3 & 5\\ 6 & 0 & 4\\ 1 & 5 & -7\end{vmatrix}$

6. Evaluate: $\int \frac{x^2}{1+x^3}\,dx$

7. Evaluate: $\int_0^1 \frac{dx}{1+x^2}$

8. Find a unit vector in the direction of $\vec{a} = 3\hat{i} - 2\hat{j} + 6\hat{k}$

9. Find the angle between the vectors $\vec{a} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} - \hat{k}$

10. For what value of λ are the vectors $\vec{a} = 2\hat{i} + \lambda\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 3\hat{k}$ perpendicular to each other?

Section B

11. (i) Is the binary operation *, defined on set N, given by a* b = $\frac{a+b}{2}$ for all a, bεN, commutative?

(ii) Is the above binary operation * associative?

12. Prove the following: $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

13. Let A = $\begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$. Express A as sum of two matrices such that one is symmetric and the other is skew symmetric.

OR

If A= $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, verify that $A^2 - 4A - 5I = 0$

14. For what value of *k* is the following function continuous at *x* = 2 ?

$$f(x) = \begin{cases} 2x+1 & ; \quad x < 2 \\ k & ; \quad x = 2 \\ 3x-1 & ; \quad x > 2 \end{cases}$$

15. Differentiate the following with respect to x : $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right)$

16. Find the equation of tangent to the curve $x = \sin 3t$, $y = \cos 2t$, at $t = \pi/4$

17. Evaluate : $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x}\, dx$

18. Solve the following differential equation:

$(x^2 - y^2)\, dx + 2xy\, dy = 0$

given that $y = 1$ when $x = 1$

OR

Solve the following differential equation:

$\frac{dy}{dx} = \frac{x(2y-x)}{x(2y+x)}$, if $y = 1$ when $x = 1$

19. Solve the following differential equation:

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

20. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{j} - \hat{k}$, find a vector $\vec{c}$ such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a} \cdot \vec{c} = 3$

OR

If $\vec{a} + \vec{b} + \vec{c} = 0$ and $|\vec{a}| = 3$, $|\vec{b}| = 5$ and $|\vec{c}| = 7$, show that the angle between $\vec{a}$ and $\vec{b}$ is 60°.

21. Find the shortest distance between the following lines:

$\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$

Or

Find the point on the line $\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2}$ at a distance $3\sqrt{2}$ from the point (1, 2, 3)

22. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of number of successes.

Section C

23. Using properties of determinants, prove the following:

$$\begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta+\gamma & \gamma+\alpha & \alpha+\beta \end{vmatrix} = (\alpha-\beta)\,(\beta-\gamma)\,(\gamma-\alpha)\,(\alpha+\beta+\gamma)$$

24. Show that the rectangle of maximum area that can be inscribed in a circle is a square.

OR

Show that the height of the cylinder of maximum volume that can be inscribed in a cone of height h is $\frac{1}{3}$ h.

25. Using integration find the area of the region bounded by the parabola $y^2 = 4x$ and the circle $4x^2 + 4y^2 = 9$.

26. Evaluate: $\int_{-a}^{a} \sqrt{\frac{a-x}{a+x}}\, dx$

27. Find the equation of the plane passing through the point (–1, –1, 2) and perpendicular to each of the following planes:

$2x + 3y - 3z = 2$ and $5x - 4y + z = 6$

OR

Find the equation of the plane passing through the points (3, 4, 1) and (0, 1, 0) and parallel to the line $\frac{x+3}{2} = \frac{y-3}{7} = \frac{z-2}{5}$

28. A factory owner purchases two types of machines, A and B for his factory. The requirements and the limitations for the machines are- as follows:

Machine	Area occupied	Labour force	Daily output (in units)
A	1000 m^2	12 men	60
B	1200 m^2	8 men	40

He has maximum area of 9000 m^2 available, and 72 skilled labourers who can operate both the machines. How many machines of each type should he buy to maximise the daily output?

29. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accident involving a scooter, a car and a truck are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver.

QUESTION PAPER CODE 65/1
SECTION A

1. Let $*$ be a binary operation defined by $a * b = 2a + b - 3$. Find $3 * 4$.

2. Using principal value, evaluate the following:

$$\cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin\frac{2\pi}{3}\right)$$

3. For what value of x, is the following matrix singular?

$$\begin{bmatrix} 3-2x & x+1 \\ 2 & 4 \end{bmatrix}$$

4. Evaluate:

$$\begin{vmatrix} \sin 30° & \cos 30° \\ -\sin 60° & \cos 60° \end{vmatrix}$$

5. A matrix A, of order 3×3, has determinant 4. Find the value of $|3A|$.

6. Evaluate:

$$\int \frac{2\cos x}{3\sin^2 x}\,dx$$

7. Evaluate:

$$\int_0^1 \frac{2x}{1+x^2}\,dx$$

8. If $\vec{P}$ (1, 5, 4) and $\vec{Q}$ (4, 1, -2), find the direction ratios of $\overrightarrow{PQ}$.

9. If $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{b} = 3\hat{i} + \hat{j} - 5\hat{k}$ find a unit vector in the direction of $\vec{a} - \vec{b}$

10. If $|\vec{a}| = \sqrt{3}$, $|\vec{b}| = 2$ and $\vec{a} \cdot \vec{b} = 3$, find the angle between $\vec{a}$ and $\vec{b}$.

SECTION B

11. Show that the relation R defined by (a, b) R (c, d) $\Rightarrow$ a + d = b + c on the set N $\times$ N is an equivalence relation.

12. Prove the following:

$$\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$$

OR

Solve for x :

$$\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$$

13. If f(x), defined by the following, is continuous at x = 0, find the values of a, b and c.

$$f(x) = \begin{cases} \dfrac{\sin(a+1)x + \sin x}{x}, & \text{if } x < 0 \\ c, & \text{if } x = 0 \\ \dfrac{\sqrt{x + bx^2} - \sqrt{x}}{bx^{3/2}}, & \text{if } x > 0 \end{cases}$$

14. If $y = \sin^{-1}\left[\dfrac{5x + 12\sqrt{1-x^2}}{13}\right]$, find $\dfrac{dy}{dx}$.

OR

If $x = a(\cos\theta + \log\tan\dfrac{\theta}{2})$ and $y = a\sin\theta$, find the value of $\dfrac{dy}{dx}$ at $\theta = \dfrac{\pi}{4}$.

15. Find the intervals in which the function $f(x) = 2x^3 - 9x^2 + 12x + 15$ is (i) increasing and (ii) decreasing,

OR

At what points will the tangent to the curve $y = 2x^3 - 15x^2 + 36x - 21$ be parallel to x-axis? Also, find the equations of tangents to the curve at those points.

16. Evaluate:

$$\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x}\, dx$$

OR

Evaluate:

$$\int_0^{\frac{\pi}{2}} \log \sin x \, dx$$

17. Solve the following differential equation:

$$(x^2 + 1)\ \frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$$

18. Solve the following differential equation:

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

Given that $y = 1$, when $x = 1$.

19. If vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ are such that $\vec{a} + \vec{b} + \vec{c} = 0$ and $|\vec{a}| = 3$, $|\vec{b}| = 5$ and $|\vec{c}| = 7$, find the angle between $\vec{a}$ and $\vec{b}$.

20. Find the length and the foot of the perpendicular drawn from the point $(2, -1, 5)$ to the line $\frac{x-11}{10} = \frac{y+2}{-4} = \frac{z+8}{-11}$.

21. 12 cards, numbered 1 to 12, are placed in a box, mixed up thoroughly and then a card is drawn at random from the box. If it is known that the number on the drawn card is more than 3, find the probability that it is an even number.

22. If x, y, z are different and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$, show that $xyz = -1$.

SECTION C

23. Using matrices, solve the following system of linear equations;

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

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

$3x - 3y - 4z = 11$

OR

Using elementary transformations, find the inverse of the following matrix:

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix}$$

24. Show that the semi-vertical angle of the cone of maximum volume and of given slant height is $\tan^{-1}\sqrt{2}$.

OR

Show that the volume of the greatest cylinder that can be inscribed in a cone of height h and semi-vertical angle α is $\frac{4}{27}\ \pi h^3 \tan^2 \alpha$.

25. Evaluate:

$$\int_0^1 2\,(\tan^{-1} x)^2\,dx$$

26. Find the area of the region bounded by the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.

27. From the point P (1, 2, 4), a perpendicular is drawn on the plane $2x + y - 2z + 3 = 0$. Find the equation, the length and the coordinates of the foot of the perpendicular.

28. In a bulb factory, machines A, B and C manufacture 60%, 30% and 10% bulbs respectively. 1%, 2% and 3% of the bulbs produced respectively by A, B and C are found to be defective. A bulb is picked up at random from the total production and found to be defective. Find the probability that this bulb was produced by the machine A.

29. A diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 units of calories. Two foods A and B are available at a cost of Rs. 5 and Rs. 4 per unit respectively. One unit of the food A contains 200 units of vitamins, 1 unit of minerals and 40 units of calories, while one unit of the food B contains 100 units of vitamins, 2 units of minerals and 40 units of calories. Find what combination of the foods A and B should be used to have least cost, but it must satisfy the requirements of the sick person. Form the question as LPP and solve it graphically.

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.

QUESTION PAPER CODE 65/1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION 'A'

1. 7 — 1 m

2. 1 — 1 m

3. $x = 3,\ y = 3$ — 1 m

4. $a^2 + b^2 + c^2 + d^2$ — 1 m

5. 46 — 1 m

6. $\frac{1}{3}\log\left|\left(1+x^3\right)\right| + c$ — 1 m

7. $\frac{\pi}{4}$ — 1 m

8. $\frac{3}{7}\hat{i} - \frac{2}{7}\hat{j} + \frac{6}{7}\hat{k}$ — 1 m

9. $\theta = \cos^{-1}\left(-\frac{1}{3}\right)$ — 1 m

10. $\lambda = \frac{5}{2}$ — 1 m

SECTION 'B'

11. (i) If a candidate writes that the given operation is not a binary operation, give full credit

OR

(ii) If the candidate verifies that the * operation is commutative but not associative, full credit may be given

12. $\text{LHS} = \left(\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}\right)+\left(\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}\right)$

$= \tan^{-1}\frac{8/15}{14/15} = + \tan^{-1}\frac{15/56}{55/56}$ (1½+1½) m

$= \tan^{-1}\frac{4}{7} + \tan^{-1}\frac{3}{11} = \tan^{-1}\frac{65/77}{65/77} = \tan^{-1}1 = \pi/4 = \text{RHS}$ 1 m

13. $A = \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}, \quad A' = \begin{bmatrix} 3 & 4 & 0 \\ 2 & 1 & 6 \\ 5 & 3 & 7 \end{bmatrix}$ 1 m

$\therefore \quad \frac{A+A'}{2} = \frac{1}{2}\begin{bmatrix} 6 & 6 & 5 \\ 6 & 2 & 9 \\ 5 & 9 & 14 \end{bmatrix} = \begin{bmatrix} 3 & 3 & \frac{5}{2} \\ 3 & 1 & \frac{9}{2} \\ \frac{5}{2} & \frac{9}{2} & 7 \end{bmatrix} \Rightarrow$ Symmetric 1 m

$\frac{A-A'}{2} = \frac{1}{2}\begin{bmatrix} 0 & -2 & 5 \\ 2 & 0 & -3 \\ -5 & 3 & 0 \end{bmatrix} = \begin{bmatrix} 0 & -1 & \frac{5}{2} \\ 1 & 0 & \frac{-3}{2} \\ \frac{-5}{2} & \frac{3}{2} & 0 \end{bmatrix} \Rightarrow$ Skew symmetric 1 m

$\therefore \quad \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix} = \begin{bmatrix} 3 & 3 & \frac{5}{2} \\ 3 & 1 & \frac{9}{2} \\ \frac{5}{2} & \frac{9}{2} & 7 \end{bmatrix} + \begin{bmatrix} 0 & -1 & \frac{5}{2} \\ 1 & 0 & \frac{-3}{2} \\ \frac{-5}{2} & \frac{3}{2} & 0 \end{bmatrix}$ 1 m

OR

$$A^2 = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$$ 2 m

$$4A = \begin{bmatrix} 4 & 8 & 8 \\ 8 & 4 & 8 \\ 8 & 8 & 4 \end{bmatrix}, \quad 5I = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$ 1 m

$$\therefore \ A^2 - 4A - 5I = \begin{bmatrix} 9-4-5 & 8-8-0 & 8-8-0 \\ 8-8-0 & 9-4-5 & 8-8-0 \\ 8-8-0 & 8-8-0 & 9-4-5 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} = 0$$ 1 m

14. Getting LHL = 5 1½ m

RHL = 5 1½ m

$\Rightarrow k = 5$ 1 m

15. Let $x = \cos 2\theta, \sqrt{1+x} = \sqrt{2}\cos\theta, \sqrt{1-x} = \sqrt{2}\sin\theta$ 1 m

$$\text{Let } y = \left[\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right] = \tan^{-1}\left[\frac{1-\tan\theta}{1+\tan\theta}\right] = \tan^{-1}\tan\left(\frac{\pi}{4} - \theta\right)$$ 1+½ m

$$= \frac{\pi}{4} - \theta = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x$$ ½ m

$$\therefore \ \frac{dy}{dx} = \frac{-1}{2}\left(\frac{-1}{\sqrt{1-x^2}}\right) = \frac{1}{2\sqrt{1-x^2}}$$ 1 m

16. $x = \sin 3t \Rightarrow \dfrac{dx}{dt} = 3\cos 3t\,,\ (x)_{t=\frac{\pi}{4}} = \dfrac{1}{\sqrt{2}},\ (y)_{t=\frac{\pi}{4}} = 0$ ½ + ½ m

$y = \cos 2t \Rightarrow \dfrac{dy}{dt} = -2\sin 2t$ ½ m

$\therefore \dfrac{dy}{dx} = \dfrac{-2}{3}\ \dfrac{\sin 2t}{\cos 3t}$ 1 m

$\left(\dfrac{dy}{dx}\right)_{t=\frac{\pi}{4}} = \dfrac{-2}{3}\ \dfrac{\sin \pi/2}{\cos 3\pi/4}$ ½ m

$= \dfrac{2\sqrt{2}}{3}$

$\therefore$ Equation of tangent is $y - 0 = \dfrac{2\sqrt{2}}{3}\left(x - \dfrac{1}{\sqrt{2}}\right)$

$3y = 2\sqrt{2}\ x - 2$

or $3y - 2\sqrt{2}\ x + 2 = 0$ 1 m

17. $I = \displaystyle\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x}\,dx$

$= \displaystyle\int_0^{\pi} \frac{(\pi - x)\sin(\pi - x)}{1+\cos^2(\pi - x)}\,dx = \int_0^{\pi} \frac{(\pi - x)\sin x}{1+\cos^2 x}\,dx$ 1 m

$\Rightarrow 2I = \pi \displaystyle\int_0^{\pi} \frac{\sin x}{1+\cos^2 x}\,dx$ 1 m

$I = \dfrac{\pi}{2} \cdot 2 \displaystyle\int_0^{\pi/2} \frac{\sin x\,dx}{1+\cos^2 x} = -\pi\ \left[\tan^{-1}(\cos x)\right]_0^{\pi/2}$ 1 m

$= -\pi\ \left[-\dfrac{\pi}{4}\right] = \dfrac{\pi^2}{4}$ (½ + ½) m

18. $(x^2 - y^2)\,dx + 2xy\,dy = 0$

$\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{2xy}$ ½ m

This is a homogeneous differential equation

Let $y = vx \Rightarrow \frac{dy}{dx} = v + x\frac{dv}{dx}$ ½ m

$$v + x\frac{dv}{dx} = \frac{x^2(v^2-1)}{2v\,x^2} = \frac{v^2-1}{2v}$$

$$x\frac{dv}{dx} = \frac{v^2-1-2v^2}{2v} = -\frac{1+v^2}{2v}$$

$\Rightarrow \frac{2v}{1+v^2}dv = -\frac{dx}{x}$ 1 m

$\log|1+v^2| = -\log|x| + \log c = \log\frac{c}{x}$ 1 m

$1+v^2 = \frac{c}{x} \Rightarrow 1+\frac{y^2}{x^2} = \frac{c}{x}$

$\Rightarrow x^2 + y^2 = cx$

when x = 1, y = 1, $\Rightarrow$ c = 2 1 m

$\therefore \quad x^2 + y^2 = 2x$

OR

$\frac{dy}{dx} = \frac{2y-x}{2y+x}$ ½ m

$y = vx \Rightarrow \frac{dy}{dx} = v + x\frac{dv}{dx}$ ½ m

$\therefore \quad v + x\frac{dv}{dx} = \frac{x[2v-1]}{x[2v+1]}$

$\Rightarrow \quad x\frac{dv}{dx} = \frac{2v-1}{2v+1} - v = \frac{2v-1-2v^2-v}{2v+1}$

$= -\frac{2v^2-v+1}{2v+1}$

$\frac{2v+1}{2v^2-v+1}dv = -\frac{dx}{x}$ 1 m

$\frac{1}{2}\frac{4v-1+3}{2v^2-v+1}dv = -\frac{dx}{x}$

$$\frac{1}{2}\frac{4v-1}{2v^2-v+1}\,dv+\frac{3}{4}\frac{dv}{v^2-\frac{1}{2}v+\frac{1}{2}}=-\frac{dx}{x}$$ 1 m

$$\frac{1}{2}\log\left|2v^2-v+1\right|+\frac{3}{4}\times\frac{4}{\sqrt{7}}\tan^{-1}\frac{v-\frac{1}{4}}{\frac{\sqrt{7}}{4}}=-\log x+c$$

$$\frac{1}{2}\log\left|\frac{2y^2-xy+x^2}{x^2}\right|+\frac{3}{\sqrt{7}}\tan^{-1}\frac{4y-x}{\sqrt{7}\,x}=-\log x+c$$ 1 m

when $x=1, y=1 \Rightarrow c=\frac{1}{2}\log 2+\frac{3}{\sqrt{7}}\tan^{-1}\frac{3}{\sqrt{7}}$

19. The given differential equation can be written as

$$\frac{dy}{dx}+\sec^2x\,y=\tan x\cdot\sec^2x$$ ½ m

$$I.F=e^{\tan x}$$ 1 m

$\therefore$ The solution is

$$y.e^{\tan x}=\int e^{\tan x}\cdot\tan x\cdot\sec^2x\,dx+c$$ ½ m

Let $\tan x=z \Rightarrow \sec^2 x\,dx=dz$

$$\therefore \int e^{\tan x}\tan x\sec^2x\,dx=\int z\,e^z dz+c$$

$$=z\cdot e^z-e^z+c=e^z(z-1)+c$$ 1 m

$$y\,e^{\tan x}=e^{\tan x}(\tan x-1)+c$$ 1 m

$$\text{or } y=(\tan x-1)+ce^{-\tan x}$$

20. Let $\vec{c}=x\hat{i}+y\hat{j}+z\hat{k}$

It is given that $\vec{a}\times\vec{c}=\vec{b}$

$$\vec{a}\times\vec{c}=\begin{bmatrix}\hat{i}&\hat{j}&\hat{k}\\1&1&1\\x&y&z\end{bmatrix}=\hat{i}(z-y)-\hat{j}(z-x)+\hat{k}(y-x)=0\hat{i}+\hat{j}-\hat{k}$$

$$\Rightarrow z-y=0 \Rightarrow y=z,\ -z+x=1,\ x-y=1$$

$$\Rightarrow z=x-1,\ y=x-1$$

(1+1) m

Also, $\vec{a}\cdot\vec{c}=3 \Rightarrow x+y+z=3$ ½ m

$$\therefore\ x+x-1+x-1=3 \Rightarrow x=\frac{5}{3}$$

$$\Rightarrow z=y=\frac{2}{3} \Rightarrow \vec{c}=\frac{5}{3}\hat{i}+\frac{2}{3}\hat{j}+\frac{2}{3}\hat{k}$$

(1+½) m

OR

$\vec{a}+\vec{b}+\vec{c}=0 \Rightarrow \vec{a}+\vec{b}=-\vec{c}$ 1 m

$$\Rightarrow \left|\vec{a}\right|^2+\left|\vec{b}\right|^2+2\,\vec{a}\cdot\vec{b}=\left|\vec{c}\right|^2$$ 1 m

$$9+25+2\left|\vec{a}\right|\left|\vec{b}\right|\cos\theta=49$$ 1 m

$$2\cdot3\cdot5\cos\theta=49-34=15$$

$$\Rightarrow \cos\theta=\frac{1}{2} \Rightarrow \theta=\pi/3$$

1 m

21. Here $\vec{a}_1=3\hat{i}+5\hat{j}+7\hat{k},\ \vec{b}_1=\hat{i}-2\hat{j}+\hat{k}$

$\vec{a}_2=-\hat{i}-\hat{j}-\hat{k},\ \vec{b}_2=7\hat{i}-6\hat{j}+\hat{k}$

1 m

Shortest distance (SD) $=\dfrac{\left|\left(\vec{a}_2-\vec{a}_1\right)\cdot\left(\vec{b}_1\times\vec{b}_2\right)\right|}{\left|\vec{b}_1\times\vec{b}_2\right|}$ 1 m

$\vec{a}_2-\vec{a}_1=-4\hat{i}-6\hat{j}-8\hat{k}$ ½ m

Finding $\vec{b}_1 \times \vec{b}_2 = 4\hat{i} + 6\hat{j} + 8\hat{k}$ 1 m

$$\therefore \text{ SD } = \frac{\left|-16-36-64\right|}{\sqrt{116}} = \frac{116}{\sqrt{116}} = \sqrt{116}$$ ½ m

OR

A general point on the line

$$\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2} = \lambda \text{ is}$$

$x = 3\lambda - 2,\ y = 2\lambda - 1,\ z = 2\lambda + 3$ 1 m

Its distance D from $(1, 2, 3) = 3\sqrt{2}$

$$\therefore \left(3\sqrt{2}\right)^2 = (3\lambda - 3)^2 + (2\lambda - 3)^2 + (2\lambda)^2$$ 1 m

$$\Rightarrow \lambda = 0 \text{ or } \lambda = \frac{30}{17}$$ 1 m

$$\therefore \text{ The points are } \left(\frac{56}{17}, \frac{43}{17}, \frac{111}{17}\right) \text{ or } (-2, -1, 3)$$ (½ + ½) m

22. P (a doublet) $= \frac{1}{6} \Rightarrow p = \frac{1}{6},\ q = \frac{5}{6}$

Probability distribution is given by $\left(\frac{1}{6} + \frac{5}{6}\right)^4$ } 1 m

Let X be the number of successes and P (X), the corresponding probability, where X takes values from 0 to 4 } ½ m

$\therefore$ The distribution is

X	0	1	2	3	4
P (X)	$625/1296$	$500/1296$	$150/1296$	$20/1296$	$1/1296$

2½ m

SECTION 'C'

23. LHS : $\Delta = \begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta+\gamma & \gamma+\alpha & \alpha+\beta \end{vmatrix}$

r

$R_3 \rightarrow R_3 + R_1 \Rightarrow \Delta = \begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \alpha+\beta+\gamma & \alpha+\beta+\gamma & \alpha+\beta+\gamma \end{vmatrix}$ 1½ m

$= (\alpha+\beta+r) \begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ 1 & 1 & 1 \end{vmatrix}$ ½ m

Applying $C_1 \rightarrow C_1 - C_2$ and $C_2 \rightarrow C_2 - C_3$

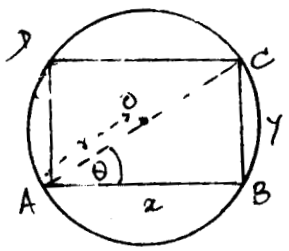
$\Delta = (\alpha+\beta+\gamma) \begin{vmatrix} \alpha-\beta & \beta-\gamma & \gamma \\ \alpha^2-\beta^2 & \beta^2-\gamma^2 & \gamma^2 \\ 0 & 0 & 1 \end{vmatrix}$ 1+1 m

$= (\alpha+\beta+\gamma)(\alpha-\beta)(\beta-\gamma) \begin{vmatrix} 1 & 1 & \gamma \\ \alpha+\beta & \beta+\gamma & \gamma^2 \\ 0 & 0 & 1 \end{vmatrix}$ 1 m

Expanding by last row to get

$\Delta = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)(\alpha+\beta+\gamma) = \text{RHS}$ 1 m

24.



Correct figure 1 m

Let $\angle CAB = \theta$

$\Rightarrow x = 2r\cos\theta,\ y = 2r\sin\theta$ 1 m

Area $A = x.y = 4r^2 \sin\theta\cos\theta = 2r^2 \sin 2\theta$ 1 m

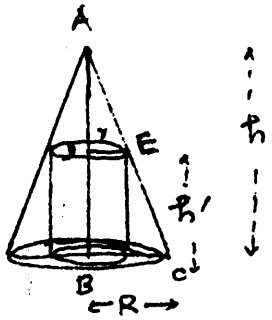
$\frac{dA}{d\theta} = 4r^2 \cos 2\theta ; \frac{dA}{d\theta} = 0 \Rightarrow \theta = \pi/4$ 1 m

$$\left(\frac{d^2A}{d\theta^2}\right)_{\theta=\pi/4} = \left(-8r^2 \sin 2\theta\right)_{\theta=\pi/4} = -8r^2 < 0$$ 1 m

$\therefore$ A is maximum, at $\theta = \pi/4$

$\Rightarrow x = y \Rightarrow$ Rectangle is a square } 1 m

OR



Correct figure 1 m

$$\Delta ADE \sim \Delta ABC \Rightarrow \frac{h-h'}{h} = \frac{r}{R}$$

$$\Rightarrow r = \frac{R}{h}(h-h')$$

Volume V of cylinder is given by

$$V = \pi r^2 h' = \pi \frac{R^2}{h^2}\left[h^2 + h'^2 - 2hh'\right]h'$$ 2 m

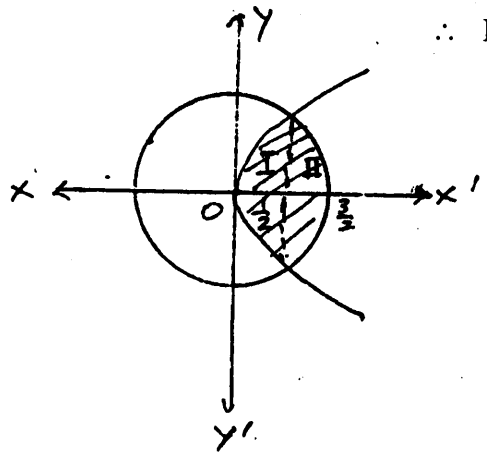
$$\frac{dV}{dh'} = \pi \frac{R^2}{h^2}\left[h^2 + 3h'^2 - 4hh'\right]; \frac{dv}{dh'} = 0 \Rightarrow h' = \frac{h}{3}$$ 1 m

$$\frac{d^2V}{dh'^2} = \frac{\pi R^2}{h^2}\left[-4h + 6h'\right] = \frac{\pi R^2}{h^2}\left[-4h + 2h\right] = -ve$$ 1 m

$\therefore$ V is maximum at $h' = \frac{1}{3}h$

$\therefore$ Height of cylinder is $\frac{1}{3}h$ 1 m

25.



Correct figure 1 m

Point of intersection, $x = \frac{1}{2}$ 1 m

The required area = I + II

$$= 2\int_0^{\frac{1}{2}} 2\sqrt{x}\,dx + 2\int_{\frac{1}{2}}^{3/2} \sqrt{\frac{9}{4} - x^2}\,dx$$ 2 m

$$= 2\left| 2\cdot\frac{2}{3}x^{3/2}\right|_0^{1/2} + 2\left|\frac{x\sqrt{\frac{9}{4}-x^2}}{2} + \frac{9}{8}sin^{-1}\frac{x}{\frac{3}{2}}\right|_{1/2}^{3/2}$$

$$= \frac{2\sqrt{2}}{3} - \frac{\sqrt{2}}{2} + \frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\frac{1}{3} \qquad \text{2 m}$$

[Note : If the candidate finds the other area and gets the

answer as $\frac{9\pi}{8} - \frac{\sqrt{2}}{6} + \frac{9}{4} - \sin^{-1}\frac{1}{3}$, full credit may be given]

26. $I = \int_{-a}^{a}\sqrt{\frac{a-x}{a+x}}\,dx = \int_{-a}^{a}\frac{a-x}{\sqrt{a^2-x^2}}\,dx = \underset{I_1}{\int_{-a}^{a}\frac{a\,dx}{\sqrt{a^2-x^2}}} - \underset{I_2}{\int_{-a}^{a}\frac{x\,dx}{\sqrt{a^2-x^2}}}$ (1+1) m

I_1 is even function and I_2 is odd function 1 m

$\therefore \quad I_2 = 0$ 1 m

$I = 2a\int_0^a \frac{dx}{\sqrt{a^2-x^2}} = 2a\cdot\frac{\pi}{2} = \pi a$ 1 m

$\therefore \quad I = \pi a$ 1 m

27. The equation of plane passing through (–1, –1, 2) is

a (x+1) + b (y+1) + c (z–2) = 0 where a, b, c

are d.r's of normal to the plane ..... (i) } 1 m

(i) is $\perp$ to $2x + 3y - 3z = 2$ and $5x - 4y + z = 6$

$\therefore \quad 2a + 3b - 3c = 0$

and $5a - 4b + c = 0$ } 2 m

$\therefore \quad \frac{a}{-9} = \frac{b}{-17} = \frac{c}{-23}$ 2 m

The d.r's of normal to the plane are 9, 17, 23

$\therefore$ Equation of plane is

$9(x+1) + 17(y+1) + 23(z-2) = 0$

$\Rightarrow \quad 9x + 17y + 23z = 20$ } 1 m

OR

The equation of plane passing through (3, 4, 1) is

$a(x-3) + b(y-4) + c(z-1) = 0$ 1 m

It passes through (0, 1, 0) $\Rightarrow -3a - 3b - c = 0$

$\Rightarrow 3a + 3b + c = 0$ ..... (i) 1 m

The plane is parallel to the line $\frac{x+3}{2} = \frac{y-3}{7} = \frac{z-2}{5}$

$\Rightarrow$ line is $\perp$ to normal of the plane

$\therefore \quad 2a + 7b + 5c = 0$ ..... (ii) 1 m

From (i) and (ii) : $\frac{a}{8} = \frac{b}{-13} = \frac{c}{15}$

$\Rightarrow$ The d.r's are 8, –13, 15 2 m

$\therefore$ Equation of plane is

$8(x-3) - 13(y-4) + 15(z-1) = 0$

$8x - 13y + 15z + 13 = 0$ } 1 m

28.

	Machine A	Machine B	Max available
Area needed	1000 m^2	1200 m^2	9000 m^2
Labour Force	12	8	72
Daily Output	60 units	40 units	

Let x and y be the number of machines A and B respectively

Getting the constraints

$1000\,x + 1200\,y \leq 9000 \Rightarrow 5x + 6y \leq 45$

$12\,x + 8\,y \leq 72 \Rightarrow 3x + 2y \leq 18$

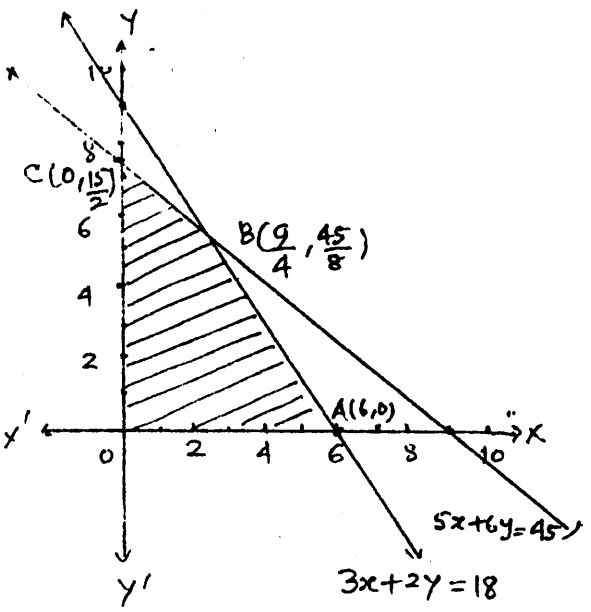
$1\frac{1}{2} + \frac{1}{2}$ m

$x \geq 0,\ y \geq 0$

Total output $P = 60x + 40\,y$ 1 m

The vertices of feasible region are

$0\ (0,0),\ A(6,0),\ B\left(\frac{9}{4}, \frac{45}{8}\right),\ c\left(0, 15/2\right)$



Correct graph 2 m

$P(0,0) = 0$

$P(6,0) = 360$

$P\left(0, \frac{15}{2}\right) = 300$

$P\left(\frac{9}{4}, \frac{45}{8}\right) = 60 \times \frac{9}{4} + \frac{45}{8} \times 40$

$= 135 + 225 = 360$

1 m

$\therefore$ P is equal 360 at A and B

29. Let E_1, E_2, E_3 be the events of a person be a scooter driver, car driver and truck driver respectivily.

Let A be the event of a vehicle meeting an accident.

$\therefore\ P(E_1) = \frac{1}{6},\ P(E_2) = \frac{1}{3},\ P(E_3) = \frac{1}{2}$ $(1+\frac{1}{2})$ m

$$P\left(\frac{A}{E_1}\right) = \frac{1}{100},\quad P\left(\frac{A}{E_2}\right) = \frac{3}{100},\quad P\left(\frac{A}{E_3}\right) = \frac{15}{100}$$ (1+½) m

$$P\left(\frac{E_1}{A}\right) = \frac{P(E_1)\times P\left(\frac{A}{E_1}\right)}{\sum_{i=1}^{3} P(E_i)\times\left(\frac{A}{E_i}\right)},\ i = 1, 2, 3$$ 1 m

$$= \frac{\frac{1}{6}\times\frac{1}{100}}{\frac{1}{6}\times\frac{1}{100}+\frac{1}{3}\times\frac{3}{100}+\frac{1}{2}\times\frac{15}{100}} = \frac{\frac{1}{6}}{\frac{1}{6}+1+\frac{15}{2}} = \frac{1}{6}\times\frac{6}{52} = \frac{1}{52}$$ 2 m

QUESTION PAPER CODE 65/1

EXPECTED ANSWERS/VALUE POINTS

SECTION - A

1. $3 * 4 = 2\times 3 + 4 - 3 = 7$ 1 m

2. $\cos^{-1}\left(\cos\frac{2\pi}{3}\right)+\sin^{-1}\left(\sin\left(\pi - \frac{\pi}{3}\right)\right)$

$= \frac{2\pi}{3}+\frac{\pi}{3} = \pi$ 1 m

3. $\begin{vmatrix} 3-2x & x+1 \\ 2 & 4 \end{vmatrix} = 0$

$\Rightarrow 12 - 8x - 2x - 2 = 0$

$\Rightarrow\ x = 1$ 1 m

4. I 1 m

5. $|3A| = 3^3 \text{ x } 4 = 108$ 1 m

6. $= -\frac{2}{3\sin x} + c$ or $-\frac{2}{3}$ cosec x + c — 1 m

7. $\left[\log\left|1+x^2\right|\right]_0^1 = \log 2$ — 1 m

8. 3, – 4, – 6 or – 3, 4, 6 — 1 m

9. $\vec{a} - \vec{b} = -2\hat{i} + \hat{j} + 4\hat{k}$

Unit vector in the direction of $(\vec{a} - \vec{b}) = \frac{1}{\sqrt{21}}\left[-2\hat{i} + \hat{j} + 4\hat{k}\right]$ — 1 m

10. $\theta = cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{6}$ — 1 m

SECTION - B

11. (i) (a, b) R (c,d) $\Rightarrow$ a+d = b+c

where (a,b), (c,d) $\in$ N x N

(a, b) R (a,b) $\Rightarrow$ a+b = b+a $\Rightarrow$ True

R is Reflexive — 1 m

(ii) (a, b) R (c,d) $\Rightarrow$ a+d = b+c $\Rightarrow$ b+c = a+d

= c+b = d+a

$\Rightarrow$ (c,d) R (a,b)

Hence R is Symmetric — 1 m

(iii) Let (a,b) R (c,d) and (c,d) R (e,f)

$\Rightarrow$ a+d = b+c and c+f = d+e

Adding we get

a+d + c+f = b+c +d+e

$\Rightarrow$ a+f = b+e $\Rightarrow$ (a,b) R (e,f)

$\therefore$ R is transitive 1½ m

$\therefore$ R is an equivalence relation ½ m

12. $\text{LHS} = \left(\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}\right)+\left(\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}\right)$

$\tan^{-1}\frac{\frac{1}{3}+\frac{1}{5}}{1-\frac{1}{15}} = \tan^{-1}\frac{8}{14} = \tan^{-1}\frac{4}{7}$ and 1½ m

$\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8} = \tan^{-1}\frac{15}{55} = \tan^{-1}\frac{3}{11}$ 1½ m

$\therefore \tan^{-1}\frac{4}{7}+\tan^{-1}\frac{3}{11} = \tan^{-1}\frac{65/77}{1-\frac{12}{77}} = \tan^{-1}1 = \pi/4$ 1 m

OR

$\tan^{-1}\left(\frac{x-1}{x-2}\right)+\tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$

$\tan^{-1}\left(\frac{\frac{x-1}{x-2}+\frac{x+1}{x+2}}{1-\frac{x-1}{x-2}\times\frac{x+1}{x+2}}\right) = \frac{\pi}{4}$ 2 m

$\tan^{-1}\left(\frac{2x^2-4}{-3}\right) = \frac{\pi}{4}$

$$\Rightarrow \quad \frac{2x^2-4}{-3} = 1$$

$$\Rightarrow \quad 2x^2 = 1 \qquad 1\frac{1}{2}\text{ m}$$

$$\Rightarrow \quad x = \pm \frac{1}{\sqrt{2}} \qquad \frac{1}{2}\text{ m}$$

13. $\text{L.H.L.} = \lim\limits_{x\to 0^-}\left(\frac{\sin(a+1)x}{(a+1)x}(a+1)+\frac{\sin x}{x}\right) = a+2$ 2 m

$\text{R.H.L.} = \lim\limits_{x\to 0^+}\left(\frac{\sqrt{1+bx}-1}{bx}\right) = \lim\limits_{x\to 0^+}\frac{1}{\sqrt{1+bx}+1} = \frac{1}{2}$ 1 m

$f(0) = c$

As $f(x)$ is continuous at $x = 0$,

$\therefore\ c = \frac{1}{2}, a+2 = \frac{1}{2} \Rightarrow a = -\frac{3}{2}$, b can take any arbitrary value 1 m

14. Let $\frac{5}{13} = \cos\alpha$ and $x = \sin\theta$ 1 m

$\therefore\ \sin\alpha = \frac{12}{13}, \sqrt{1-x^2} = \cos\theta$ 1 m

$\therefore\ y = \sin^{-1}(\sin\theta\cos\alpha + \cos\theta\sin\alpha) = \sin^{-1}[\sin(\theta+\alpha)]$

$= \theta+\alpha = \sin^{-1}x + \text{constant}$ 1½ m

$\therefore\ \frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$ ½ m

OR

$x = a(\cos\theta + \log\tan\frac{\theta}{2}),\ y = a\sin\theta$

$$\frac{dx}{d\theta} = a\left[-\sin\theta + \frac{\frac{1}{2}\sec^2\theta/2}{\tan\frac{\theta}{2}}\right], \qquad 1\text{ m}$$

$$= a\left[-\sin\theta + \frac{1}{2}\ \frac{1}{\cos^2\theta/2}\ \frac{\cos\theta/2}{\sin\theta/2}\right],$$

$$= a\left[\frac{1}{\sin\theta} - \sin\theta\right] = \frac{a\cos^2\theta}{\sin\theta},\ \frac{dy}{d\theta} = a\cos\theta \qquad (1+1)\text{ m}$$

$$\frac{dy}{dx} = \frac{a\cos\theta\times\sin\theta}{a\cos^2\theta} = \tan\theta \qquad ½\text{ m}$$

$$\left(\frac{dy}{dx}\right)_{\text{at }\theta=\pi/4} = 1 \qquad ½\text{ m}$$

15. $f(x) = 2x^3 - 9x^2 + 12x + 15$

$f'(x) = 6x^2 - 18x + 12 = 6(x^2 - 3x + 2) = 6(x-1)(x-2)$ 1 m

$f'(x) = 0$ gives the intervals

$(-\infty, 1), (1,2), (2, \infty)$ 1½ m

Increasing in $(-\infty,1) \cup (2, \infty)$

Decreasing in $(1,2)$ 1½ m

OR

$y = 2x^3 - 15x^2 + 36x - 21$

$\frac{dy}{dx} = 6x^2 - 30x + 36 = 6\left(x^2 - 5x + 6\right) = 6\,(x-2)(x-3)$ 1 m

If the tangent is parallel to x–axis, $\frac{dy}{dx} = 0$

$\therefore$ x = 2, x = 3 1 m

At x = 2, y = 2×8 – 15×4 + 36×2 – 21

= 16 – 60 + 72 – 21 = 7

At x = 3, y = 2×27 – 15×9 + 36×3 – 21

= 54 – 135 + 108 – 21 = 6

$\therefore$ The points are (2,7), (3,6) 1 m

$\therefore$ The equation of tangent at (2,7) is y = 7

at (3,6) is y = 6 } 1 m

16. $I = \int_0^{\pi} \frac{x \tan x}{\sec x + \tan x}\,dx = \int_0^{\pi} \frac{x \sin x}{1+\sin x}\,dx$

Also, $I = \int_0^{\pi} \frac{(\pi - x)\sin(\pi - x)}{1+\sin(\pi - x)}\,dx = \int_0^{\pi} \frac{(\pi - x)\sin x\,dx}{1+\sin x}$ 1 m

$\therefore$ $2I = \pi \int_0^{\pi} \frac{\sin x}{1+\sin x}\,dx = \pi \int_0^{\pi} \frac{1+\sin x - 1}{1+\sin x}\,dx$ 1 m

$= \pi \left[\int_0^{\pi} dx - \int_0^{\pi} \frac{1-\sin x}{\cos^2 x}\,dx \right]$ ½ m

$= \pi \times \pi - \pi \left[\int_0^{\pi} \sec^2 x\,dx - \int_0^{\pi} \sec x \tan x \right] dx$

$= \pi^2 - \pi \left[\left| \tan x - \sec x \right| \right]_0^{\pi}$ 1 m

$= \pi^2 - \pi \left[0 - (-1-1)\right] = \pi^2 - 2\pi$

$\therefore \quad I = \pi \left(\frac{\pi}{2} - 1 \right)$ ½ m

OR

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

$\therefore \quad 2I = \int_0^{\pi/2} \log (\sin x \cos x) \, dx = \int_0^{\pi/2} \log \frac{\sin 2x}{2} \, dx$ 1 m

$= \int_0^{\pi/2} \log \sin 2x \, dx - \int_0^{\pi/2} \log 2 dx$

$= \frac{1}{2} \times 2 \int_0^{\pi/2} \log \sin t \, dt - \frac{\pi}{2} \log 2 ; \quad \left[t = 2x , \frac{dt}{2} = dx \right]$ 1 m

$= I - \frac{\pi}{2} \log 2$

$I = - \frac{\pi}{2} \log 2$ 1 m

17. $(x^2 + 1) \frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$

$\frac{dy}{dx} + \frac{2x}{x^2 + 1} y = \frac{\sqrt{x^2 + 4}}{x^2 + 1}$ 1 m

I.F. $= e^{\int \frac{2x}{x^2+1} dx} = (x^2 + 1)$ 1 m

Solution is $y \cdot (x^2 + 1) = \int \sqrt{x^2 + 4} \, dx + c$ 1 m

$y (x^2 + 1) = \frac{1}{2} x \sqrt{x^2 + 4} + 2 \log \left(x + \sqrt{x^2 + 4} \right) + c$ 1 m

18. $\frac{dy}{dx} = \frac{y^2 + 2xy}{x^2}$

Let $y = vx \Rightarrow \frac{dy}{dx} = v + x\frac{dv}{dx}$ ½ m

$v + x\frac{dv}{dx} = v^2 + 2v \Rightarrow x\frac{dv}{dx} = v^2 + v$ 1 m

$\Rightarrow \int \frac{dv}{v(v+1)} = \int \frac{dx}{x}$ ½ m

$\Rightarrow \int \left(\frac{1}{v} - \frac{1}{v+1}\right) dv = \int \frac{dx}{x}$

$\log \frac{v}{v+1} = \log cx$

$cx = \frac{\frac{y}{x}}{\frac{y}{x}+1} = \frac{y}{x+y}$ 1 m

when $x = 1,\ y = 1,\ c = \frac{1}{2}$ ½ m

$\Rightarrow \frac{x}{2} = \frac{y}{x+y} \Rightarrow x^2 + xy - 2y = 0$ ½ m

19. $\vec{a} + \vec{b} = -\vec{c}$ 1 m

$|\vec{a}|^2 + |\vec{b}|^2 + 2\vec{a}\cdot\vec{b} = |\vec{c}|^2$ 1 m

$9 + 25 + 2|\vec{a}||\vec{b}|\cos\theta = 49$ 1 m

$30\cos\theta = 15 \Rightarrow \cos\theta = \frac{1}{2} \Rightarrow \theta = 60^\circ = \frac{\pi}{3}$ 1 m

20. Any point P on the line is given by

$x = 10\lambda + 11,\ y = -4\lambda - 2,\ z = -11\lambda - 8$ 1 m

The given point is Q (2, – 1, 5)

Direction Ratio's of PQ are $10\lambda + 9, -4\lambda - 1, -11\lambda - 13$ 1 m

PQ $\perp$ to the given line

$\therefore \quad 10(10\lambda + 9) - 4(-4\lambda - 1) - 11(-11\lambda - 13) = 0$

$100\lambda + 90 + 16\lambda + 4 + 121\lambda + 143 = 0$

$237\lambda + 237 = 0 \Rightarrow \lambda = -1$ 1 m

$\therefore$ The point P is $(11 - 10, 4 - 2, 11 - 8)$

or $(1, 2, 3)$ ½ m

$\therefore \quad PQ^2 = (2-1)^2 + (-1-2)^2 + (5-3)^2$

$= 1 + 9 + 4 = 14$

$\Rightarrow \quad PQ = \sqrt{14}$ ½ m

21. Let A be the event that the card taken out has an even number and B is the event that the card taken out bears a number > 3

$S = \{1, 2, 3, \ldots\ldots\ldots, 12\}$

$A = \{2, 4, 6, 8, 10, 12\}$

$B = \{4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A \cap B = \{4, 6, 8, 10, 12\}$ 1 m

$P(A) = \frac{6}{12} = \frac{1}{2}, \quad P(B) = \frac{9}{12} = \frac{3}{4}, \quad P(A \cap B) = \frac{5}{12}$ ½x3 = 1½ m

$$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{5/12}{9/12} \qquad 1\text{ m}$$

$$= \frac{5}{9} \qquad ½\text{ m}$$

22. $$\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$$

$$\Delta = \begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} + \begin{vmatrix} x & x^2 & x^3 \\ y & y^2 & y^3 \\ z & z^2 & z^3 \end{vmatrix}$$

$$= \begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} + xyz \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$$

$$= (1 + xyz) \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$$

$R_2 \to R_2 - R_1,\ R_3 \to R_3 - R_1$

$$\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = \begin{vmatrix} 1 & x & x^2 \\ 0 & y-x & y^2-x^2 \\ 0 & z-x & z^2-x^2 \end{vmatrix} = (y-x)(z-x) \begin{vmatrix} 1 & x & x^2 \\ 0 & 1 & y+x \\ 0 & 1 & z+x \end{vmatrix} \qquad 1½\text{ m}$$

$$= (y-x)\ (z-x)\ (z+x-y-x)$$

$$= (y-x)\ (z-x)\ (z-y)$$

$$= (x-y)\ (y-z)\ (z-x) \qquad 1½\text{ m}$$

$\therefore\quad \Delta = (1 + xyz)\ (x-y)(y-z)(z-x) = 0$ (given)

As $x-y \neq 0,\ y-z \neq 0,\ z-x \neq 0 \Rightarrow 1 + xy\ z = 0$ 1 m

SECTION - C

23. The given system of equations can be written as

$$AX = B, \text{ where}$$

$$A = \begin{pmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{pmatrix}, \quad X = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \quad B = \begin{pmatrix} -4 \\ 2 \\ 11 \end{pmatrix}$$

$$\therefore \quad X = A^{-1} B, \text{if } A^{-1} \text{ exists} \qquad 1\,m$$

$$|A| = 1(-12 + 6) - 2(-8 - 6) - 3(-6 - 9)$$

$$= -6 + 28 + 45 = 67 \neq 0 \qquad 1\,m$$

$$\therefore \quad A^{-1} \text{ exists}$$

$$A^{-1} = \frac{1}{|A|} \text{ Adj. } A$$

$$\text{Adj. } A = \begin{pmatrix} -6 & 17 & 13 \\ 14 & 5 & -8 \\ -15 & 9 & -1 \end{pmatrix} \qquad 2\,m$$

(Note : For any four correct enteries 1 m)

$$\Rightarrow \quad A^{-1} = \frac{1}{67} \begin{pmatrix} -6 & 17 & 13 \\ 14 & 5 & -8 \\ -15 & 9 & -1 \end{pmatrix} \qquad ½\,m$$

$$\therefore \quad X = \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \frac{1}{67} \begin{pmatrix} -6 & 17 & 13 \\ 14 & 5 & -8 \\ -15 & 9 & -1 \end{pmatrix} \begin{pmatrix} -4 \\ 2 \\ 11 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}$$

$$\therefore \quad x = 3, \; y = -2 \quad z = 1 \qquad 1½\,m$$

OR

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} A$$ 1 m

Applying $R_2 \to R_2 - 2R_1$, $R_3 \to R_3 + 2R_1$, we get

$$\begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix} A$$ 1 m

Applying $R_1 \to R_1 - 2R_2$, we get

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 5 & -2 & 0 \\ -2 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix} A$$ 1 m

Applying $R_1 \to R_1 - R_3$, we get

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 3 & -2 & -1 \\ -2 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix} A$$ 1 m

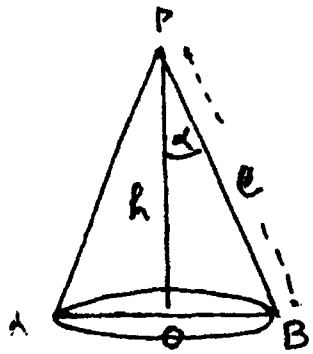
Applying $R_2 \to R_2 - R_3$, we get

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

$$\therefore \quad A^{-1} = \begin{pmatrix} 3 & -2 & -1 \\ -4 & 1 & -1 \\ 2 & 0 & 1 \end{pmatrix}$$ 1 m

Note : *If the candidate writes $A = AI$, column operations should be done and not row operations.*

24.



Correct Figure 1 m

Let ℓ be the slant height and α, the semi - vertical angle of the cone

$\therefore$ $h = PO = \ell \cos\alpha$

$BO = r = \ell \sin\alpha$

The volume V of the cone is

$$V = \frac{1}{3}\pi\ (\ell \sin\alpha)^2\ (\ell \cos\alpha)$$

$$= \frac{1}{3}\pi\ \ell^3 \sin^2\alpha\ \cos\alpha$$ 2 m

$$\therefore \quad \frac{dV}{d\alpha} = \frac{1}{3}\pi\ell^3\ \left[2\sin\alpha\cos^2\alpha - \sin^3\alpha\right]$$

$$\frac{dV}{d\alpha} = 0 \Rightarrow \text{ sin } \alpha = \text{Press : zerohere or } \tan\alpha = \sqrt{2}$$

As $\alpha = 0$ is not possible $\Rightarrow$ $\alpha = \tan^{-1}\sqrt{2}$ 2 m

Showing $\frac{d^2v}{d\alpha^2}$ to be negative at $\alpha = \tan^{-1}\sqrt{2} \Rightarrow$ max. 1 m

$\therefore$ Volume V is maximum at $\alpha = \tan^{-1}\sqrt{2}$

OR

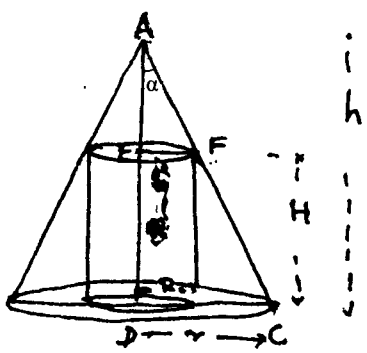


Figure 1 m

Let r be the radius of cone and R that of cylinder

Let h and H be heights of cone and cylinder respectively

Let α be the semi - vertical angle

Δ AEF $\sim$ Δ ADC

$$\Rightarrow \frac{h-H}{R} = \frac{h}{r}, \text{ Also } \frac{r}{h} = \tan\alpha \Rightarrow r = h\tan\alpha$$

$\therefore$ $R = (h - H)\tan\alpha$

Volume V of cylinder is given by

$V = \pi\ (h-H)^2 \tan^2\alpha \times H$

$= \pi\ (h^2H + H^3 - 2hH^2)\tan^2\alpha$ 2 m

$$\therefore \quad \frac{dV}{dH} = \pi \tan^2 \alpha \, [h^2 + 3H^2 - 4h\,H)$$

$$\frac{d^2V}{dH^2} = \pi \tan^2 \alpha \, [-4h + 6\,H)$$

$$\frac{dV}{dH} = 0 \Rightarrow \quad 3H^2 - 4h\,H + h^2 = 0$$

$$\Rightarrow \quad H = h, h/3$$

$$\Rightarrow \quad H = \frac{h}{3} \qquad (\text{As } h \neq H) \qquad 1\text{ m}$$

$$\left(\frac{d^2V}{dH^2}\right)_{\text{at } H = \frac{h}{3}} = \pi \tan^2 \alpha \, [-4h + 6 \cdot \frac{h}{3}]$$

$$= -2\pi\, h \tan^2 \alpha < 0$$

$$\Rightarrow \text{ at } H = \frac{h}{3}, \text{ V is maximum} \qquad 1\text{ m}$$

$$\therefore \quad \text{Max. volume} = \pi\, H\,(h - H)^2 \tan^2 \alpha$$

$$= \pi \times \frac{h}{3}\left(\frac{4h^2}{9}\right)\tan^2 \alpha = \frac{4}{27}\,\pi\, h^3 \tan^2 \alpha \qquad 1\text{ m}$$

25. Full marks for this question.

26.

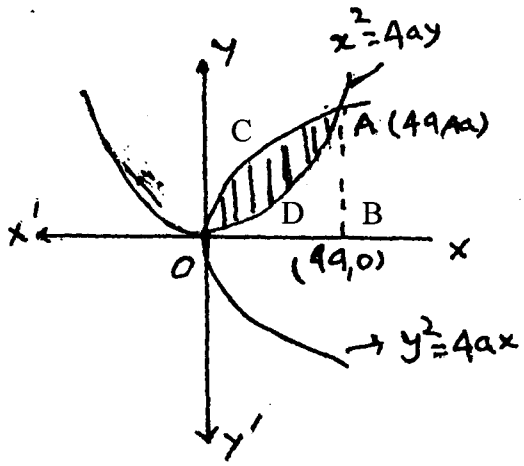


Figure 1 m

Point of intersection i.e. $x = 4a$ 1 m

Area of shaded region

= Area of region OCABO

– Area of region ODABO

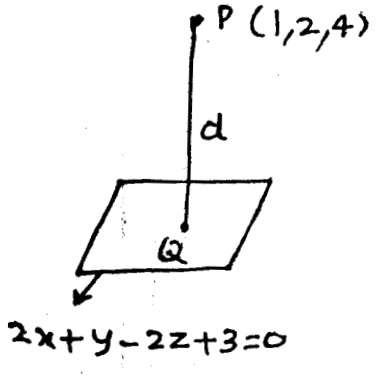
$$= \int_0^{4a} \sqrt{4a\,x}\,dx - \int_0^{4a} \frac{x^2}{4a}\,dx \qquad 1\tfrac{1}{2}\text{ m}$$

$$= \left| 2\sqrt{a} \cdot \frac{2}{3} x^{3/2} \right|_0^{4a} - \frac{1}{4a}\left[\frac{x^3}{3}\right]_0^{4a} \qquad 1\tfrac{1}{2}\text{ m}$$

$$= \frac{32}{3}a^2 - \frac{16}{3}a^2 = \frac{16}{3}a^2 \text{ square units} \qquad 1\text{ m}$$

27. The direction ratio's of a line $\perp$ to the plane are the same as those of normal to the plane.

The $\perp$ is drawn from (1, 2, 4) to the plane. $2x + y - 2z + 3 = 0$



Equation of $\perp$ is

$$\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-4}{-2} = \lambda \text{ (say)} \qquad 1\text{ m}$$

$$x = 2\lambda + 1,\ y = \lambda + 2,\ z = -2\lambda + 4 \qquad 1\text{ m}$$

Since this point lies on the plane

$$2(2\lambda + 1) + (\lambda + 2) - 2(-2\lambda + 4) + 3 = 0 \qquad 1\text{ m}$$

$$9 + (2 + 2 - 8 + 3) = 0$$

$$\lambda = \frac{1}{9} \qquad 1\text{ m}$$

$\therefore$ The foot of $\perp$ is $\left(2\times\frac{1}{9}+1,\ \frac{1}{9}+2,\ -2\times\frac{1}{9}+4\right)$

or $\left(\frac{11}{9},\ \frac{19}{9},\ \frac{34}{9}\right)$ 1 m

$\therefore$ Length of PQ = $\sqrt{\left(\frac{11}{9}-1\right)^2 + \left(\frac{19}{9}-2\right)^2 + \left(\frac{34}{9}-4\right)^2}$

$$\frac{1}{9}\sqrt{4+1+4} = \frac{3}{9} = \frac{1}{3} \qquad 1\text{ m}$$

28. Let E_1, E_2, E_3 be the events that the bulb has been manufactured on Machines A, B and C respectively. Let A be the event that bulb is defective.

$\therefore$ $P(E_1) = \frac{6}{10},\ P(E_2) = \frac{3}{10},\ P(E_3) = \frac{1}{10}$ 1½ m

$P(A/E_1) = \frac{1}{100},\ P(A/E_2) = \frac{2}{100},\ P(A/E_3) = \frac{3}{100}$ 1½ m

$$P(E_1/A) = \frac{P(E_1)\cdot P(A/E_1)}{\sum_{i=1}^{3} P(E_i)\cdot P(A/E_i)} \qquad 1\text{ m}$$

$$= \frac{\frac{6}{10}\times\frac{1}{100}}{\frac{6}{10}\times\frac{1}{100}+\frac{3}{10}\times\frac{2}{100}+\frac{1}{10}\times\frac{3}{100}} = \frac{6}{6+6+3} = \frac{2}{5} \qquad 2\text{ m}$$

29.

Contents of food	Food A	Food B	Requirement (in units)
Vitamins	200	100	4000
Minerals	1	2	50
Calories	40	40	1400
Cost (per unit)	Rs 5	Rs 4	

Let x units of Food A and y units of Food B are taken

Getting the constraints

$200x + 100y \geq 4000 \Rightarrow 2x + y \geq 40$

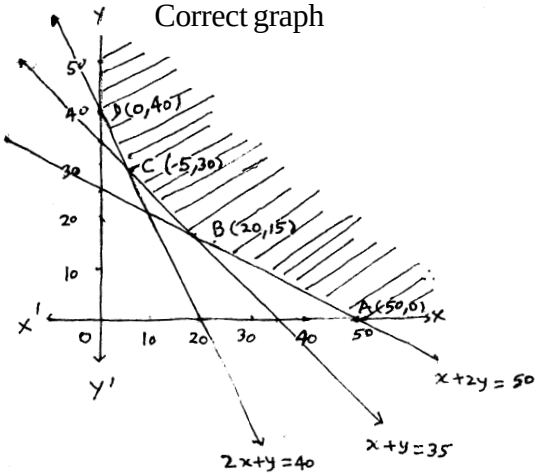
$x + 2y \geq 50 \Rightarrow x + 2y \geq 50$ 1½ m

$40(x + y) \geq 1400 \Rightarrow x + y \geq 35$

$x \geq 0, \quad y \geq 0$

Cost $C = 5x + 4y$ 1 m

Correct graph 2 m



The vertices of feasible region are

A (50, 0), B (20, 15), C (5, 30), D (0, 40)

$C_A = 250$, $C_B = 160$, $C_C = 145$, $C_D = 160$

Cost is least at $x = 5, y = 30$ 1 m

$\therefore$ 5 units of Food A and 30 units of Food B be mixed for minimum cost meeting the requirements ½ m

PHYSICS (Theory)

Time allowed : 3 hours ***Maximum Marks : 100***

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 physical constants wherever necessary.

$c = 3 \times 10^{8}$ ms^{-1}

$h = 6.626 \times 10^{-34}$ Js

$e = 1.602 \times 10^{-19}$ C

$\mu_0 = 4\pi \times 10^{-7}$ T mA^{-1}

$\frac{1}{4\pi\varepsilon_0} = 9 \times 10^{9}$ Nm^{2}C^{-2}

Mass of neutron $m_n = 1.675 \times 10^{-27}$ kg

Boltzmann's constant $k = 1.381 \times 10^{-23}$ JK^{-1}

Avogadro's number $N_A = 6.022$ X 10^{23} / mol

QUESTION PAPER CODE 51/1/1

1. What is the direction of the force acting on a charged particle q, moving with a velocity $\vec{v}$ in a uniform magnetic field $\vec{B}$? 1

2. Name the part of the electromagnetic spectrum of wavelength 10^{-2}m and mention its one application. 1

3. An electron and alpha particle have the same de-Broglie wavelength associated with them. How are their kinetic energies related to each other? 1

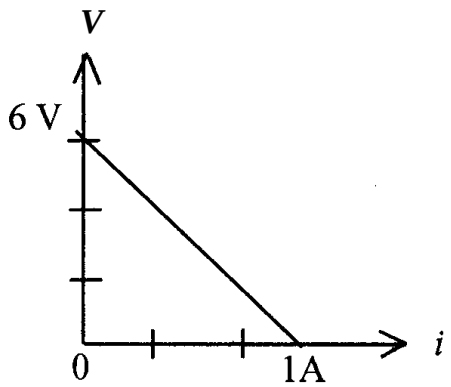
4. A glass lens of refractive index 1.5 is placed in a trough of liquid. What must be the refractive index of the liquid in order to make the lens disappear? 1

5. A 500 μC charge is at the centre of a square of side 10 cm. Find the work done in moving a charge of 10 μC between two diagonally opposite points on the square. 1

6. State the reason, why heavy water is generally used as a moderator in a nuclear reactor. 1

7. How does the fringe width of interference fringes change, when the whole apparatus of Young's experiment is kept in a liquid of refractive index 1.3 ? 1

8. The plot of the variation of potential difference across a combination of three identical cells in series, versus current is as shown below. What is the emf of each cell ? 1



9. Derive an expression for the electric potential at any point along the axial line of an electric dipole? 2

10. Define magnetic susceptibility of a material. Name two elements, one having positive susceptibility and the other having negative susceptibility. What does negative susceptibility signify ? 2

11. The oscillating magnetic field in a plane electromagnetic wave is given by

$$B_y = (8 \times 10^{-6}) \sin [2 \times 10^{11} t + 300\ \pi x]\ T$$

(i) Calculate the wavelength of the electromagnetic wave. 1

(ii) Write down the expression for the oscillating electric field. 1

12. Prove that an ideal capacitor, in an a.c. circuit does not dissipate power. 2

OR

Derive an expression for the impedance of an a.c. circuit consisting of an inductor and a resistor.

13. A nucleus $^{23}_{10}Ne$ undergoes $\beta-$ decay and becomes $^{23}_{11}Na$. Calculate the maximum kinetic energy of electrons emitted assuming that the daughter nucleus and anti-neutrino carry negligible kinetic energy. 2

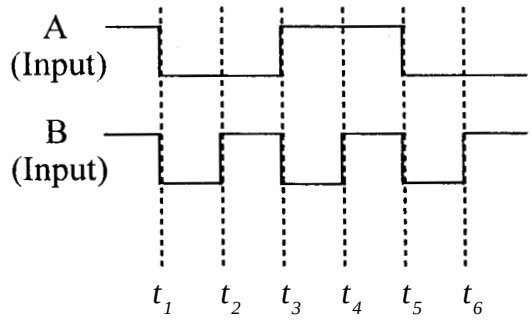
$$\left\{ \begin{array}{l} \text{mass of } ^{23}_{10}Ne = 22.994466 \text{ u} \\ \text{mass of } ^{23}_{11}Na = 22.989770 \text{ u} \\ 1 \text{ u} = 931.5 \text{ MeV}/c^2 \end{array} \right\}$$

14. Distinguish between an intrinsic semiconductor and P-type semiconductor. Give reason, why, a P-type semiconductor crystal is electrically neutral, although $n_h >> n_e$? 2

15. Draw a ray diagram of a reflecting type telescope. State two advantages of this telescope over a refracting telescope. 2

16. A ray of light passing through an equilateral triangular glass prism from air undergoes minimum deviation when angle of incidence is 3/4th of the angle of prism. Calculate the speed of light in the prism. 2

17. The given inputs A, B are fed to a 2-input NAND gate. Draw the output wave form of the gate. 2

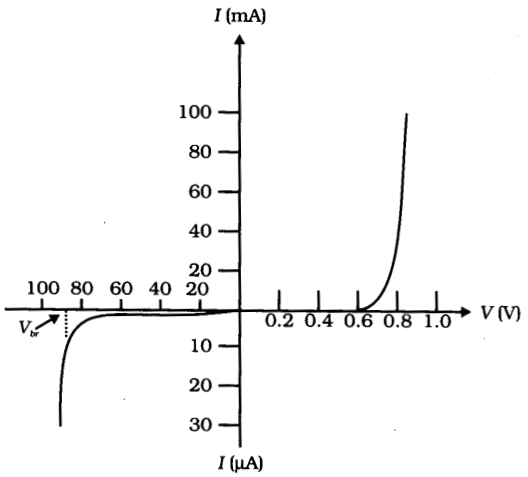


18. A transmitting antenna at the top of a tower has a height of 36 m and the height of the receiving antenna is 49 m. What is the maximum distance between them, for satisfactory communication in the LOS mode? (Radius of earth = 6400 km) 2

19. How is a wavefront defined? Using Huygen's construction draw a figure showing the propagation of a plane wave refracting at a plane surface separating two media. Hence verify Snell's law of refraction. 3

20. A metallic rod of length *l* is rotated at a constant angular speed ω, normal to a uniform magnetic field *B*. Derive an expression for the current induced in the rod, if the resistance of the rod is *R*. 3

21. The figure below shows the *V-I* characteristic of a semiconductor diode.



(i) Identify the semiconductor diode used.

(ii) Draw the circuit diagram to obtain the given characteristic of this device.

(iii) Briefly explain how this diode can be used as a voltage regulator. 3

22. An inductor 200 mH, capacitor 500 μF, resistor 10 Ω are connected in series with a 100 V, variable frequency a.c. source. Calculate the

(i) frequency at which the power factor of the circuit is unity.

(ii) current amplitude at this frequency.

(iii) Q-factor. 3

23. Prove that the current density of a metallic conductor is directly proportional to the drift speed of electrons. 3

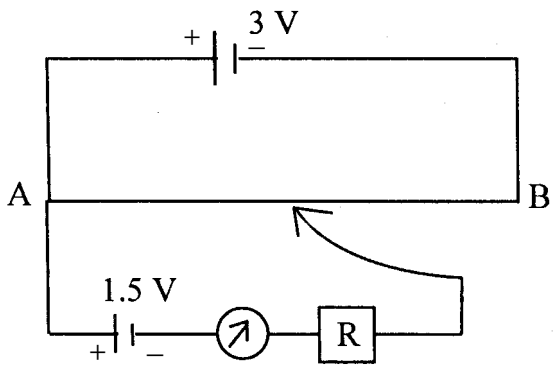
OR

A number of identical cells, *n*, each of emf *E*, internal resistance *r* connected in series are charged by a d.c. source of emf *E'*, using a resistor *R*.

(i) Draw the circuit arrangement.

(ii) Deduce the expressions for (a) the charging current and (b) the potential difference across the combination of the cells.

24. A potentiometer wire of length 1 m is connected to a driver cell of emf 3 V as shown in the figure. When a cell of 1.5 V emf is used in the secondary circuit, the balance point is found to be 60 cm. On replacing this cell and using a cell of unknown emf, the balance point shifts to 80 cm.



3

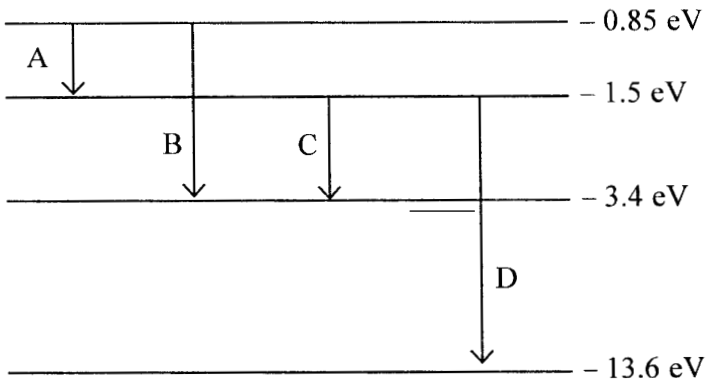
(i) Calculate unknown emf of the cell.

(ii) Explain with reason, whether the circuit works, if the driver cell is replaced with a cell of emf 1 V.

(iii) Does the high resistance R, used in the secondary circuit affect the balance point? Justify your answer. 3

25. An electromagnetic wave of wavelength λ is incident on a photosensitive surface of negligible work function. If the photo-electrons emitted from this surface have the de-Broglie wavelength λ_1, prove that $\lambda = \left(\frac{2mc}{h}\right)\lambda_1^2$ 3

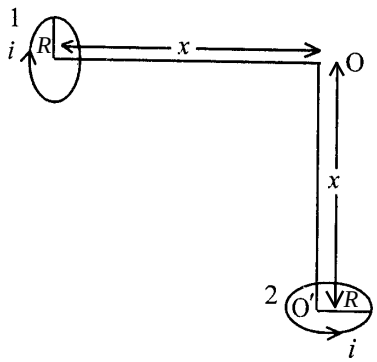
26. The energy level diagram of an element is given below. Identify, by doing necessary calculations, which transition corresponds to the emission of a spectral line of wavelength 102.7 nm. 3



27. Draw a plot of the variation of amplitude versus ω for an amplitude modulated wave. Define modulation index. State its importance for effective amplitude modulation. 3

28. (a) Using Biot-Savart's law, derive an expression for the magnetic field at the centre of a circular coil of radius *R*, number of turns *N*, carrying current *i*.

(b) Two small identical circular coils marked 1, 2 carry equal currents and are placed with their geometric axes perpendicular to each other as shown in the figure. Derive an expression for the resultant magnetic field at O. 5



OR

Draw a schematic diagram of a cyclotron. Explain its underlying principle and working, stating clearly the function of the electric and magnetic fields applied on a charged particle.

Deduce an expression for the period of revolution and show that it does not depend on the speed of the charged particle.

29. (a) For a ray of light travelling from a denser medium of refractive index n_1 to a rarer medium of refractive index n_2, prove that $\frac{n_2}{n_1} = \sin i_c$, where i_c is the critical angle of incidence for the media.

(b) Explain with the help of a diagram, how the above principle is used for transmission of video signals using optical fibres. 5

OR

(a) What is plane polarised light? Two polaroids are placed at 90° to each other and the transmitted intensity is zero. What happens when one more polaroid is placed between these two, bisecting the angle between them? How will the intensity of transmitted light vary on further rotating the third polaroid?

(b) If a light beam shows no intensity variation when transmitted through a polaroid which is rotated, does it mean that the light is unpolarised ? Explain briefly.

30. (a) Using Gauss' law, derive an expression for the electric field intensity at any point outside a uniformly charged thin spherical shell of radius *R* and charge density σ C/m^2. Draw the field lines when the charge density of the sphere is (i) positive, (ii) negative.

(b) A uniformly charged conducting sphere of 2.5 m in diameter has a surface charge density of 100 μC/m^2. Calculate the

(i) charge on the sphere.

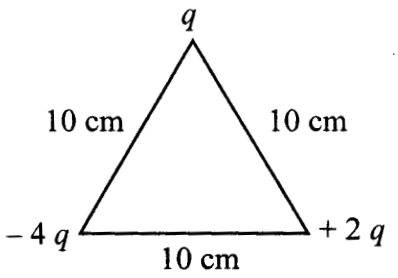
(ii) total electric flux passing through the sphere. 5

OR

(a) Derive an expression for the torque experienced by an electric dipole kept in a uniform electric field.

(b) Calculate the work done to dissociate the system of three charges placed on the vertices of a triangle as shown.

Here $q = 1.6 \times 10^{-10}$C



QUESTION PAPER CODE 51/1

1. State two characteristic properties of nuclear force. 1

2. How does the angle of minimum deviation of a glass prism vary, if the incident violet light is replaced with red light? 1

3. The instantaneous current and voltage of an a.c. circuit are given by

$i = 10 \sin 300t$ A and $v = 200 \sin 300t$ V

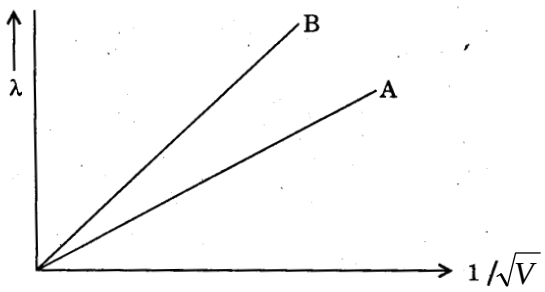
What is the power dissipation in the circuit? 1

4. Why should the spring / suspension wire in a moving coil galvanometer have low torsional constant? 1

5. Why does the bluish colour predominate in a clear sky? 1

6. Which orientation of an electric dipole in a uniform electric field would correspond to stable equilibrium? 1

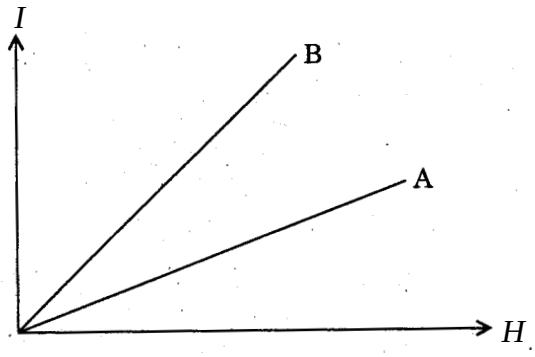
7. Two lines, A and B, in the plot given below show. the variation of de Broglie wavelength, λ versus $1/\sqrt{V}$, where V is the accelerating potential difference, for two particles carrying the same charge. Which one of two represents a particle of smaller mass? 1



8. State the reason, why GaAs is most commonly used in making of a solar cell. 1

9. Draw a labelled ray diagram of an astronomical telescope in the near point position. Write the expression for its magnifying power. 2

10. The following figure shows the variation of intensity of magnetisation versus the applied magnetic field intensity, *H*, for two magnetic materials A and B :



(a) Identify the materials A and B. 1

(b) Why does the material B, have a larger susceptibility than A, for a given field at constant temperature? 1

11. Two metallic wires of the same material have the same length but cross-sectional areas are in the ratio 1:2. They are connected (i) in series and (ii) in parallel. Compare the drift velocities of electrons in the two wires in both the cases (i) and (ii). 2

12. Draw a block diagram of a simple amplitude modulation. Explain briefly how amplitude modulation is achieved. 2

13. Calculate the energy released in MeV in the following nuclear reaction: 2

$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He + Q$

[Mass of $^{238}_{92}U$ = 238·05079 u

Mass of $^{234}_{90}Th$ = 234·043630 u

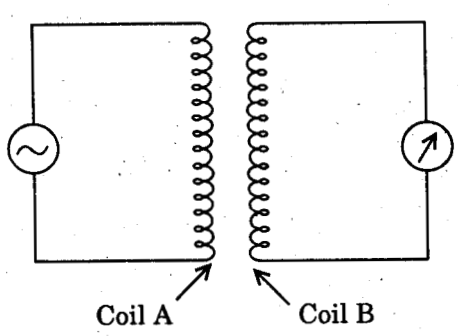
Mass of $^{4}_{2}He$ = 4·002600 u

1 u = 931.5 MeV/c^2]

14. Using Ampere's circuital law, obtain an expression for the magnetic field along the axis of a current carrying solenoid of length l and having N number of turns. 2

15. Derive an expression for the resistivity of a good conductor, in terms of the relaxation time of electrons. 2

16. The circuit arrangement given below shows that when an a.c. passes through the coil A, the current starts flowing in the coil B.



(i) State the underlying principle involved. 1

(ii) Mention two factors on which the current produced in the coil B depends. 1

17. State one feature by which the phenomenon of interference can be distinguished from that of diffraction.

A parallel beam of light of wavelength 600 nm is incident normally on a slit of width 'a'. If the distance between the slit and the screen is 0.8 m and the distance of 2nd order maximum from the centre of the screen is 15 mm, calculate the width of the slit. 2

18. Two point charges, $q_1 = 10 \times 10^{-8}$ C and $q_2 = -2 \times 10^{-8}$ C are separated by a distance of 60 cm in air.

(i) Find at what distance from the 1st charge, q_1 would the electric potential be zero.

(ii) Also calculate the electrostatic potential energy of the system. 2

OR

Two point charges $4Q$, Q are separated by 1 m in air. At what point on the line joining the charges is the electric field intensity zero?

Also calculate the electrostatic potential energy of the system of charges, taking the value of charge, $Q = 2 \times 10^{-7}$ C.

19. Identify the following electromagnetic radiations as per the wavelengths given below. Write one application of each. 3

(a) 10^{-3} nm

(b) 10^{-3} m

(c) 1 nm

20. Explain, why high frequency carrier waves are needed for effective transmission of signals.

A message signal of 12 kHz and peak voltage 20 V is used to modulate a carrier wave of frequency 12 MHz and peak voltage 30 V. Calculate the (i) modulation index (ii) side-band frequencies. 3

21. Distinguish between unpolarised and plane polarised light. An unpolarised light is incident on the boundary between two transparent media. State the condition when the reflected wave is totally plane polarised. Find out the expression for the angle of incidence in this case. 3

22. Draw the labelled circuit diagram of a common-emitter transistor amplifier. Explain clearly how the input and output signals are in opposite phase. 3

OR

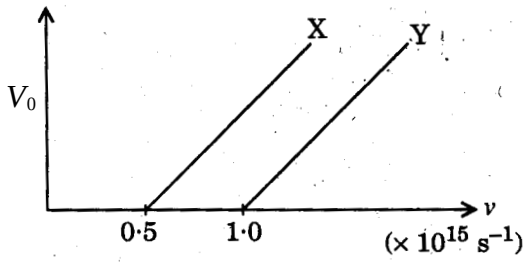
State briefly the underlying principle of a transistor oscillator. Draw a circuit diagram showing how the feedback is accomplished by inductive coupling. Explain the oscillator action.

23. The ground state energy of hydrogen atom is –13.6 eV.

(i) What is the kinetic energy of an electron in the 2nd excited state?

(ii) If the electron jumps to the ground state from the 2nd excited state, calculate the wavelength of the spectral line emitted. 3

24. The following graph shows the variation of stopping potential V_0 with the frequency v of the incident radiation for two photosensitive metals X and Y :



(i) Which of the metals has larger threshold wavelength? Give reason.

(ii) Explain, giving reason, which metal gives out electrons, having larger kinetic energy, for the same wavelength of the incident radiation.

(iii) If the distance between the light source and metal X is halved, how will the kinetic energy of electrons emitted from it change? Give reason. 3

25. A circular coil of 200 turns and radius 10 cm is placed in a uniform magnetic field of 0.5 T, normal to the plane of the coil. If the current in the coil is 3.0 A, calculate the

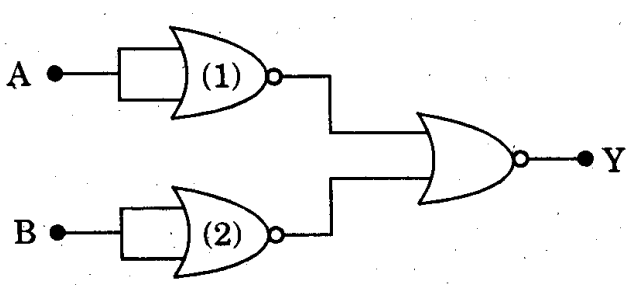
(a) total torque on the coil.

(b) total force on the coil.

(c) average force on each electron in the coil, due to the magnetic field.

Assume the area of cross-section of the wire to be 10^{-5} m^2 and the free electron density is $10^{29}/m^3$. 3

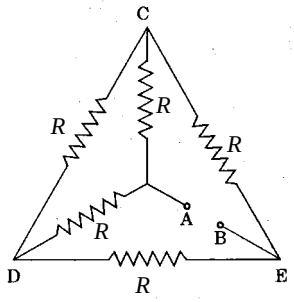
26. The inputs A and B are inverted by using two NOT gates and their outputs are fed to the NOR gate as shown below.



Analyse the action of the gates (1) and (2) and identify the logic gate of the complete circuit so obtained. Give its symbol and the truth table. 3

27. (i) Calculate the equivalent resistance of the given electrical network between points A and B.

(ii) Also calculate the current through CD and ACB, if a 10 V d.c. source is connected between A and B, and the value of R is assumed as 2 Ω. 3



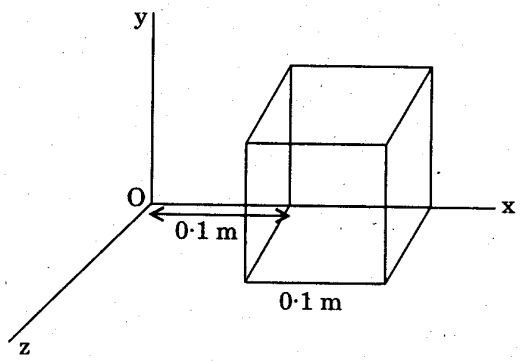
28. Derive an expression for the energy stored in a parallel plate capacitor.

On charging a parallel plate capacitor to a potential V, the spacing between the plates is halved, and a dielectric medium of $\varepsilon_r = 10$ is introduced between the plates, without disconnecting the d.c. source. Explain, using suitable expressions, how the (i) capacitance, (ii) electric field and (iii) energy density of the capacitor change. 5

OR

(a) Define electric flux. Write its SI unit.

(b) The electric field components due to a charge inside the cube of side 0.1 m are as shown:



$E_x = \alpha x$, where $\alpha = 500$ N/C-m

$E_y = 0$, $E_z = 0$.

Calculate (i) the flux through the cube and (ii) the charge inside the cube.

29. Derive the lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ for a concave lens, using the necessary ray diagram.

Two lenses of powers 10 D and – 5 D are placed in contact.

(i) Calculate the power of the new lens.

(ii) Where should an object be held from the lens, so as to obtain a virtual image of magnification 2 ? 5

OR

(a) What are coherent sources of light ? Two slits in Young's double slit experiment are illuminated by two different sodium lamps emitting light of the same wavelength. Why is no interference pattern observed?

(b) Obtain the condition for getting dark and bright fringes in Young's experiment. Hence write the expression for the fringe width.

(c) If *s* is the size of the source and *d* its distance from the plane of the two slits, what should be the criterion for the interference fringes to be seen?

30. An a.c. source generating a voltage $v = v_m \sin \omega t$ is connected to a capacitor of capacitance *C*. Find the expression for the current, *i*, flowing through it. Plot a graph of *v* and *i* versus ωt to show that the current is $\pi/2$ ahead of the voltage.

A resistor of 200 Ω and a capacitor of 15.0 μF are connected in series to a 220 V, 50 Hz a.c. source. Calculate the current in the circuit and the rms voltage across the resistor and the capacitor. Is the algebraic sum of these voltages more than the source voltage? If yes, resolve the paradox. 5

OR

Explain briefly, with the help of a labelled diagram, the basic principle of working of an a.c. generator.

In an a.c. generator, coil of *N* turns and area *A* is rotated at *v* revolutions per second in a uniform magnetic field *B*. Write an expression for the emf produced.

A 100-turn coil of area 0.1 m^2 rotates at half a revolution per second. It is placed in a magnetic field 0.01 T perpendicular to the axis of rotation of the coil. Calculate the maximum voltage generated in the coil.

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. **Some of the questions relate to higher order thinking ability. These, questions are indicated separately. These, questions are to be evaluated carefully to judge the student's understanding/analytical ability.. High order thinking skill questions have been marked as "HOTS" in the marking scheme.**
3. 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.
4. 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.
5. If a question does not have any parts, marks are be awarded in the left hand margin only.
6. 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.
7. No marks are to be deducted for the cumulative effect of an error. The student should be penalized only once.
8. Deduct ½ mark for writing wrong units, or missing units, in the final answer to numerical problems.
9. Formula can be taken as implied from the calculations even if not explicitly written.
10. In short answer type questions, asking for two features/ characteristics/ properties, if a candidate writes three features/ characteristics/ properties or more, only the first two should be evaluated.
11. 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

EXPECTED ANSWERS/VALUE POINTS

1. Perpendicular to the plane of $\vec{v}$ and $\vec{B}$

   Alternatively

   Direction of $f = q(\vec{v} \times \vec{B})$ — 1 — 1

   [Note: Award ½ mark if only formula is given)

2. Microwave — ½

   Application: Radar / microwave oven / any other — ½ — 1

3. K.E. $= \frac{p^2}{2m}$

   $\therefore$ K.E. $\propto \frac{1}{m}$ (for same p) — 1 — 1

   (as $\lambda = h/p$ is the same)

   Alternatively

   $\therefore \frac{E_{ke}}{E_{ka}} = \frac{m_a}{m_e}$ — 1 — 1

4. 1.5 (or same as that of glass) — 1 — 1

5.(HOTS) Zero — 1 — 1

   Alternatively

   W $= q \times$ Pot. difference between the two points — ½

   $= q \times 0 = 0$ — ½ — 1

   Alternatively

   The work done is zero as the two points are at the same potential — 1 — 1

6.(HOTS) Lesser absorption probability of neutrons/ more effective in slowing down neutrons to thermal energies. 1 1

7. Decreases 1 1

Alternatively

Become 1/1.3 times of its initial value 1 1

8.(HOTS) 2 volts 1 1

Alternatively

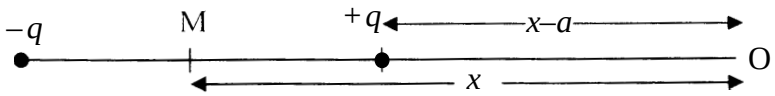
When $I = 0$, $E = V$ ½

$\therefore$ Emf of each cell = $\frac{6V}{3} = 2$ volts ½ 1

[Note: Award ½ mark if the candidate only writes $E = V + Ir$]

9.

(i) Diagram	½
(ii) Derivation	1½



½

Potential at O due to the dipole

$V = V_1 + V_2$ ½

$\therefore\ V = \frac{q}{4\pi\varepsilon_0}\left[\frac{1}{(x-a)} - \frac{1}{(x+a)}\right]$ ½

$= \frac{1}{4\pi\varepsilon_0}\frac{q.2a}{(x^2 - a^2)}$

$= \frac{1}{4\pi\varepsilon_0}\frac{p}{(x^2 - a^2)}$ ½

10.

(i) Definition	½
(ii) Naming two elements	½ + ½
(iii) Significance	½

(i) Measure of how a magnetic material responds to an external magnetic field

Alternatively

Property which determines how easily the material can be magnetised.

Alternatively

Ratio of the magnitude of magnetisation (M) produced in the material to the intensity of magnetizing field (H) or M/H ½

(ii) a) Positive susceptibility -para-magnetic material/Al, Ca, Cr, Li etc.

(any one) ½

b) Negative susceptibility- diamagnetic material / Bi, Cu, diamond,

Au, Hg etc. (any one) ½

(iii) Any one characteristics / property of diamagnetic materials. ½

Alternatively

The material is diamagnetic in nature.

Alternatively

The magnetic moment, developed in the material, is opposite in direction to that of the applied external magnetic field. 2

11.(HOTS)

(i) Calculation	1
(ii) Expression	1

(i) Comparing the given expression with

$$B_y = B_0 \sin\left(\frac{4\pi t}{T} - \frac{2\pi}{\lambda}\right)$$ ½

Alternatively

$B = B_0 \sin(\omega t + kx)$

we get

$\therefore\ k = \dfrac{2\pi}{\lambda} = 300\pi$

$\therefore\ \lambda = \dfrac{1}{150}$ m or $\dfrac{2}{3}$ cm or 0.67 cm ½

(ii) $E_z = E_0 \sin(2 \times 10^{11}\, t + 300\pi x)\text{Vm}^{-1}$ ½

$= 2400 \sin(2 \times 10^{11}\, t + 300\pi x)\text{Vm}^{-1}$ ½

Alternatively

$E_z = c \times 8 \times 10^{-6} \sin(2 \times 10^{11}\, t + 300\pi x)\text{Vm}^{-1}$

Award full mark if either of the second or third line expression is written without writing the first line. 2

12

(i) Formula for average power	1
(ii) Showing average power dissipation is zero	1

(i) Average power over a cycle

$P = V_{eff}\, I_{eff}\ cos\phi$ 1

(ii) For an ideal capacitor, current leads the voltage in phase by $\pi/2$ ($\phi = \pi/2$) ½

$\therefore\ P = V_{eff}\, I_{eff}\ cos90^o$

$= 0$ ½ 2

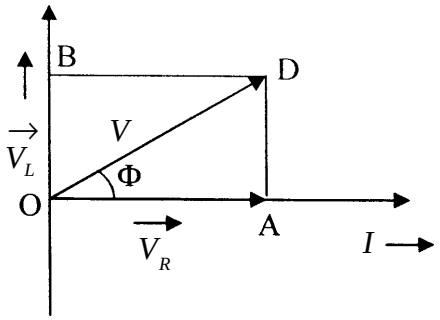
Alternatively

In an a.c. circuit containing ideal capacitor, energy is supplied by the source to the capacitor during the charging of the capacitor which is returned back to the source during its discharging. Hence no net power is dissipated over a complete cycle. 1 1 2

OR

(i) Phasor diagram	½
(ii) Derivation	1½

(i)



½

(ii) $OD^2 = OA^2 + OB^2$ ½

$V^2 = \left(V_R^2 + V_L^2\right)$

$= I^2 R^2 + I^2 X_L^2 = I^2 \left(R^2 + X_L^2\right)$ ½

$\therefore Z = \frac{V}{I} = \sqrt{R^2 + X_L^2}$ ½ 2

13.

(i) Calculation of mass defect	½
(ii) Calculation of maximum kinetic energy	1½

(i) Mass defect (Δm)

$= (\text{mass of } {}^{23}_{10}\text{Ne}) - (\text{mass of } {}^{23}_{11}\text{Na} + \text{mass of } {}^{0}_{-1}\beta)$

$\cong 0.004696$ u ½

(neglecting the mass of the electron which is not given)

(ii) Maximum kinetic energy of the electron emitted = $(\Delta m)c^2$

$= 0.004696 \times 931.5$ MeV

$\cong 4.37$ MeV ½

[Note : If the candidate includes the mass of the electron (for calculating mass defect) no mark should be deducted for the slightly different answer.] 2

14.

(i) Distinction	1½
(ii) Reason	½

(i) Intrinsic semiconductor does not contain any impurity while p-type semiconductor is doped with a trivalent impurity.

Alternatively

For an intrinsic semiconductor, $n_e = n_h$ while for a p-type semiconductor $n_h >> n_e$ or any other difference

Alternatively

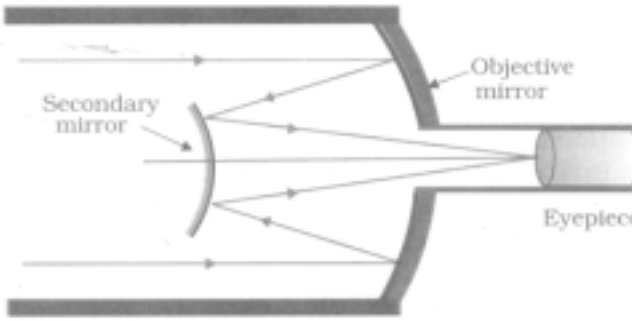
Shows the distinction by band diagram 1½

(HOTS) (ii) p-type semiconductor is made by doping the neutral intrinsic semiconductor with trivalent impurity atoms. ½ 2

15

Ray diagram	1
Two advantages	½ + ½

(i)



1

(ii) Advantages: (a) No chromatic aberration. ½

(b) No spherical aberration.
or any other advantage ½ 2

16.(HOTS)

(i) Formula	1
(ii) Calculation	1

(i) $D_m = 2i - A$; $D_m = 2 \times \frac{3}{4} A - A = A/2$

$\therefore\ D_m = \frac{60^0}{2} = 30^0$ ½

$n = \frac{c_1}{c_2} = \frac{\sin\left(\frac{A + D_m}{2}\right)}{\sin\frac{A}{2}}$ ½

$\therefore\ n = \frac{c_1}{c_2} = \frac{\sin 45^0}{\sin 30^0} = \sqrt{2}$ ½

$c_2 = \frac{c_1}{\sqrt{2}} = \frac{3\times10^8}{\sqrt{2}}\ \text{ms}^{-1} = 1.5\sqrt{2}\ \text{ms}^{-1}$

$\approx 2.12 \times 10^8\ \text{ms}^{-1}$ ½ 2

Alternatively

$r_1 + r_2 = A$

At minimum deviation,

$2r = A$

or, $r = \frac{A}{2}$

$=30^0$

Also $i = \frac{3}{4} \times A = 45°$ ½

$\therefore\ n = \frac{c}{c_0} = \frac{\sin i}{\sin r}$

$= \frac{\sin 45^0}{\sin 30^0} = \sqrt{2}$ ½

$c_2 = \frac{c_1}{\sqrt{2}} = \frac{3\times10^8 \text{ms}^{-1}}{\sqrt{2}}$

$= 1.5\sqrt{2} \times 10^8\ \text{ms}^{-1}$

$\approx 2.12 \times 10^8\ \text{ms}^{-1}$ ½ 2

[Note: Accept all three ways of expressing the value of c_2]

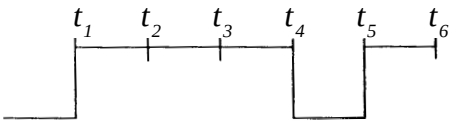
17.

(i) Writing Truth Table	1
(ii) Drawing Output waveform	1

Writing truth table

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

1



1 2

18.

(i)	Formula	1
(ii)	Calculations and result	1

Distance = $\sqrt{2Rh_T} + \sqrt{2Rh_R}$

= $\sqrt{2R}\left(\sqrt{h_T} + \sqrt{h_R}\right)$ 1

= $\sqrt{2\times6400\times1000}\,(6+7)$

= $13 \times 800 \times \sqrt{20}$ m ½

= $26 \times 800\sqrt{5}$ m = 20.8 $\sqrt{5}$ km

≈ 46.5km ½ 2

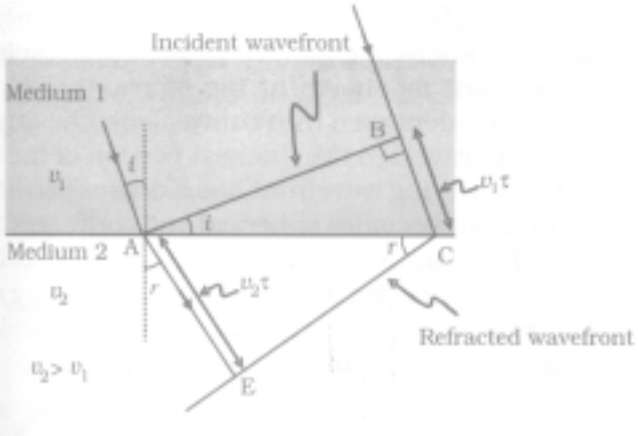
[Note: Accept all these or any other correct form of the answer with the underroot term.)

19.

(i)	Definition	1
(ii)	Figure	1
(iii)	Verification	1

i) A surface of constant phase / A locus of points which oscillate in same phase 1

ii)



1

iii) $\text{Sin } i = \dfrac{BC}{AC}$

$\text{Sin } r = \dfrac{AE}{AC}$ 1 3

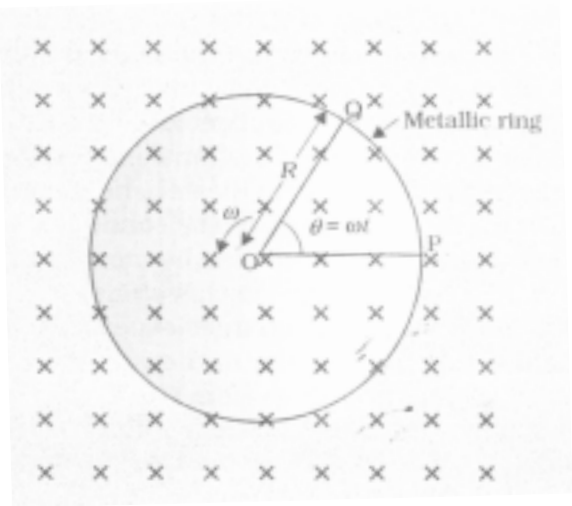
$\therefore \dfrac{\sin i}{\sin r} = \dfrac{BC}{AE}$

$= \dfrac{c_1 t}{c_2 t} = \dfrac{c_1}{c_2} = n = \text{constant}$

20.

(i) Figure	1
(ii) Calculation of emf	1
(iii) Calculation of current	1

(i) Figure



1

(ii) Induced emf $\varepsilon = \int_0^{\ell} B\omega\, r dr$ ½

$= \int_0^{\ell} B\omega\, r dr$ ½

$= \frac{B\omega l^2}{2}$

(iii) Current $= \frac{E}{R} = \frac{B\omega l^2}{2R}$ 1

Note (i) If the rod is assumed to rotate about an axis, passing through its mid-point, the expression for the induced emf and current will be

$\varepsilon = \frac{B\omega l^2}{8R}$ and

$I = \frac{B\omega l^2}{8R}$ respectively.

Full credit should be given for these expression also.

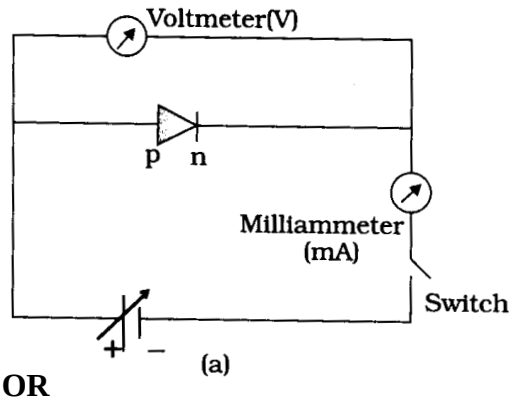
Note (ii): Full credit should be given to the candidate if correct expressions are obtained by using any other method. 3

21.(HOTS)

(i) Identification	1
(ii) Circuit diagram	1
(iii) Use as voltage regulator	1

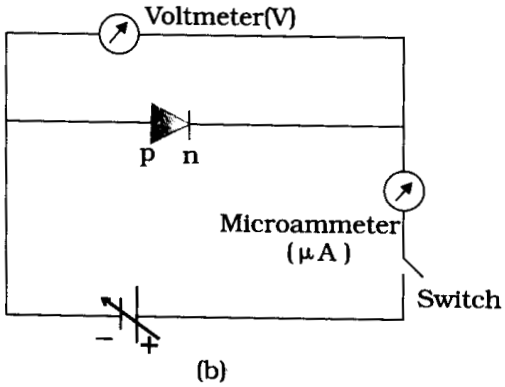
(i) Zener diode/P-N junction diode/semiconductor diode/ silicon diode. 1

(ii) Circuit diagram (Either forward bias or reverse bias)

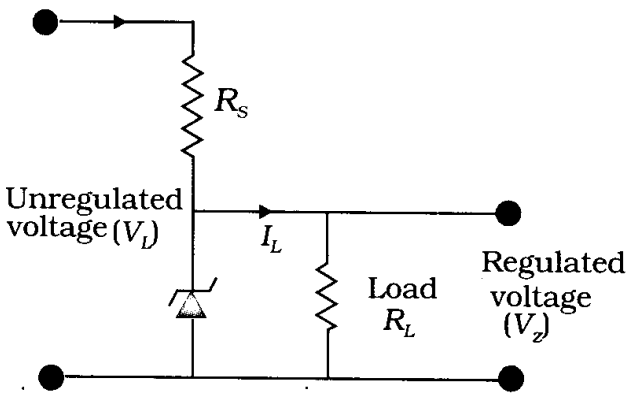


1

OR



(iii)



½

If the input voltage increases, the current through R_s and Zener diode also increases. This increases voltage drop across R_s without any change of voltage across zenor diode. ½

Alternatively

The semiconductor diode /(p-n) juncton diode can be used as a voltage regulator by increasing its doping level to make it as a Zener diode. 1 3

22.

(i)	Calculations	
	(a) Frequency	1
	(b) Current amplitude	1
	(c) Q- factor	1

(i) $\omega = \dfrac{1}{\sqrt{LC}}$ ½

$= \dfrac{1}{\sqrt{200\times10^{-3}\times500\times10^{-6}}} = 100$ radian s^{-1} ½

(or $v = \dfrac{\omega}{2\pi} = \dfrac{50}{\pi}$ Hz ≈ 15.9Hz)

(ii) $I = \dfrac{V}{R} = \dfrac{100}{10} = 10$ A ½ + ½

(iii) Q-factor = $\dfrac{1}{R}\sqrt{\dfrac{L}{C}}$ (Q-factor = $\dfrac{\omega_0 L}{R}$) ½

= 2 ½ 3

23.

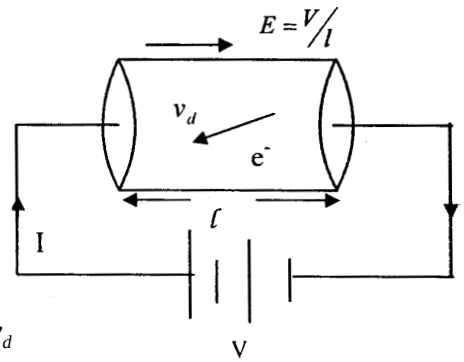
Derivation of $I = nAe\,v_d$	2
Current density J v_d	1

Total number of free electrons, $N = nA$ ½

∴ Total Charge $Q = N\,e$ ½

$= nAel$

$\tau = \dfrac{l}{v_d}$



∴ $I = \dfrac{Q}{\tau} = \dfrac{nAel}{l} v_d$ ½

$= nAev_d$

J = current density = $\frac{I}{A}$ ½

$\therefore \quad J = \frac{nAev_d}{A} = nev_d$

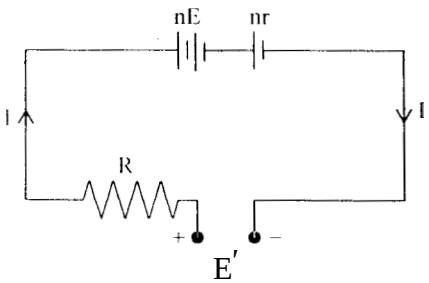
$\therefore \quad J \propto v_d$ ½ 3

OR

(HOTS)

(i) Circuit diagram	1
(ii) Expression for	
(a) Charging current	1
(b) Potential difference	1

(i)



1

(ii) (a) $I\,(nr + R) = \varepsilon' - n\varepsilon$ ½

$\therefore \quad I = \frac{\varepsilon' - n\varepsilon}{R + nr}$ ½

(b) $V = n\varepsilon + Inr$ 1 3

24

(i) E.M.F. of Cell	1
(ii) Reason	1
(iii) Justification	1

(i) $\frac{E_1}{E_2} = \frac{l_1}{l_2}$ ½

$\therefore \quad E_2 = \frac{E_1 \ell_2}{\ell_1} = 2V$ ½

(ii) No. P.D. across wire AB will not be able to balance 1.5V emf / ½

balance point will not exist on the wire AB. ½

(iii) No. At balance point no current is drawn from the cell. Balance point ½

is independent of *R*. ½ 3

25.(HOTS)

(i) Photoelectric Equation	1
(ii) Proof	1

(i) $h\nu = \omega_0 + E_k$ ½

(ii) $h\,\frac{c}{\lambda} = 0 + E_k$ ½

de Broglie wavelength $\lambda_1 = \frac{h}{mu} = \frac{h}{\sqrt{2mE_k}}$ ½

$\therefore\ \lambda_1 = \frac{h}{\sqrt{2m \times \frac{hc}{\lambda}}} = \sqrt{\frac{h\lambda}{2mc}}$ 1

$\therefore\ \lambda = \left[\frac{2mc}{h}\right]\lambda_1^2$ ½ 3

26.(HOTS)

(i) Calculation	2
(ii) Identification	1

Given:

$\lambda = 102.7$ nm $= 102.7 \times 10^{-9}$ nm

$\Delta E = \frac{hc}{\lambda} = \frac{6.626 \times 10^{-34} \times 3 \times 10^{8}}{102.7 \times 10^{-9}}$ ½+½

$$= \frac{6.626\times3}{102.7}\times10^{-17}$$

$= 19.3 \times 10^{-9}$ J ½

$$= \frac{19.3\times10^{-19}}{1.6\times10^{-19}}$$

= 12.1 eV ½

This change in energy compounds to 'D' transition. 1 3

Alternatively,

(i) $h\nu = \frac{hc}{\lambda} = E_1 - E_2$ ½

$\therefore\ \lambda = \frac{hc}{E_1 - E_2}$ ½

for transition D, $E_1 - E_2 = -1.5 - (-13.6)$ eV ½

= 12.l eV

$= 12.1 \times 1.6 \times 10^{-19}$ J

$\therefore\ \lambda = \frac{6.626\times10^{-34}\times3\times10^{8}}{12.1\times1.6\times10^{-19}} = 102.7$ nm ½ + ½

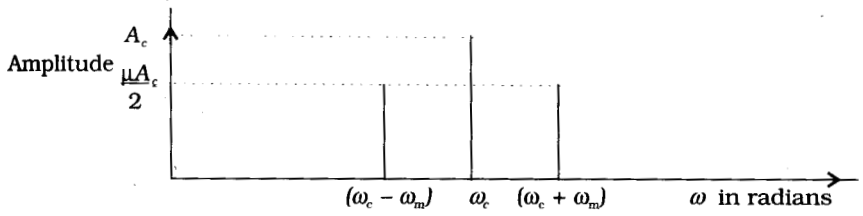
(ii) $\therefore$ The transition corresponding to λ=102.7 nm, is 'D' ½ 3

[Note: The candidate may write:
(a) 102.7 nm belongs to UV part of e.m. spectrum.
The UV rays in hydrogen spectrum (Lyman Series) are due to transitions ending at the ground level (= –13.6 eV), hence the corrected transition is D. Award full marks in such cases.]

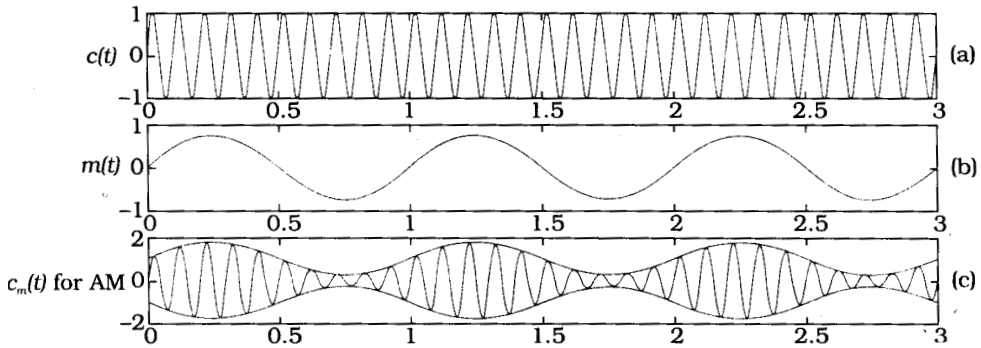
27.

(i) Plot	1
(ii) Definition	1
(iii) Importance	1

(i) Plot of 'amplitude' vs 'ω' 1



Alternatively



(ii) Modulation index- It is the ratio of amplitude of message or modulating signal to the amplitude of the carrier wave. 1

Alternatively

$$\mu = A_m / A_c$$

(HOTS) (iii) Importance: Avoid distortion 1

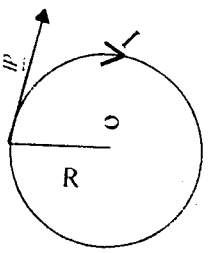
(Also accept "No mixing of signals"/"more effective power radiation" "proper length of the transmitting antenna") 3

28.

(i)	Derivation of $\vec{\beta}$ expression	3
(ii)	Expression for the resultant magnetic field	2

(a) From Biot Savart's law, magnetic field due to current element *dl* at the centre O

$$d\vec{\beta} = \frac{\mu_0}{4\pi} \frac{I\left(\vec{dl} \times \vec{R}\right)}{\left|\vec{R}\right|^3}$$ 1



$$\therefore dB = \frac{\mu_0}{4\pi}\frac{I\,dl\sin(90^0)}{R^2}$$ 1

$$B = \frac{\mu_0 I}{4\pi R^2}\int dl = \frac{\mu_0 I}{4\pi R^2}.2\pi R$$ ½

$\therefore$ Field due to coil $= \frac{\mu_0 I}{2R}$

½

(HOTS) (b) Field due to loop (1)

$$B_1 = \frac{\mu_0 IR^2}{2(x^2+R^2)^{3/2}} \cong \frac{\mu_0 IR^2}{2x^3}$$ ½

$\vec{B}_1$ is directed along geometric axes of loop (1)

Field due to loop (2)

$$B_2 = \frac{\mu_0 IR^2}{2(x^2+R^2)^{3/2}} \cong \frac{\mu_0 IR^2}{2x^3}$$ ½

$\vec{B}_2$ is directed along geometric axes of loop (2)

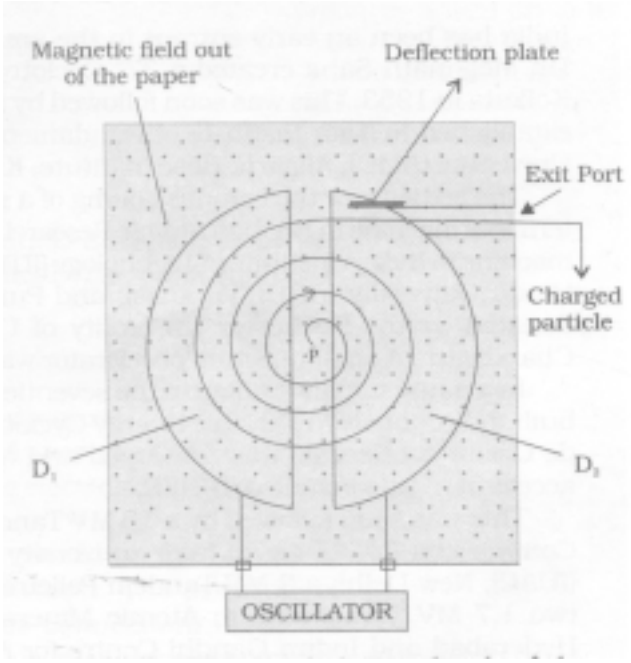
$\therefore$ Resultant field at O, $B = \sqrt{B_1^2 + B_2^2}$ ½

$\therefore B = \frac{\sqrt{2\mu_0 IR^2}}{2x^3}$ (*Note:* Also accept $B = \frac{\sqrt{2}\mu_0 IR^2}{2(x^2+R^2)^{3/2}}$) ½ 5

OR

(i)	Diagram	1
(ii)	Principle and working	1
(iii)	Function of electric and magnetic field	1
(iv)	Expression for time period	2

(i)



1

(ii) Principle and working 1

(iii) The magnetic field make the charged particles go round in circular path inside the dees and electric field accelerates them every time the particles move from one dee to other. 1

$$\frac{mv^2}{r} = qvB \qquad ½$$

$$\therefore \quad v = \frac{qBr}{m}$$

$$\therefore \text{ Period of revolution, } T = \frac{2\pi r}{v} \qquad ½$$

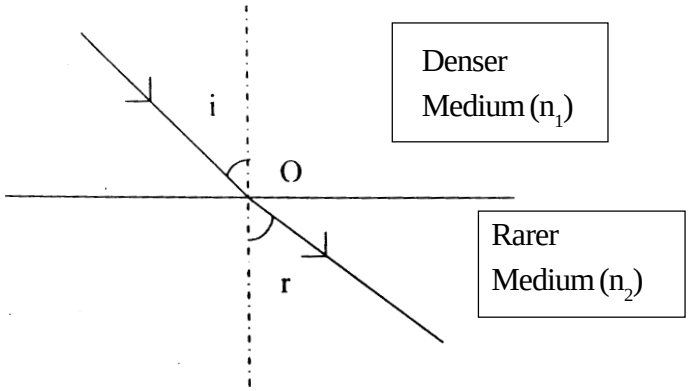
$$= \frac{2\pi rm}{qBr} = \frac{2\pi m}{qB} \qquad ½$$

$\therefore$ *'T' is independent of 'v'* ½ 5

29.

(a)	(i)	Ray diagram	1
	(ii)	Proof	2
(b)	(i)	Diagram	1
	(ii)	Explanation	1

(a) (i)



1

(ii) $\frac{n_2}{n_1} = \frac{\sin i}{\sin r}$ ½

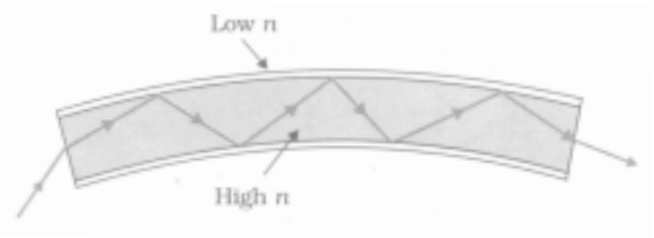
For $\angle i = \angle i_c$ (critical angle) ½

$\angle r = 90^o$ 1

$\therefore \quad \frac{\sin i_c}{\sin 90^o} = \frac{n_2}{n_1}$

or $\sin i_e = \frac{n_2}{n_1}$

(b) (i)



1

(ii) When a video signal is directed at one end of the fiber at a suitable angle, it undergoes repeated total internal reflections along the length of the fiber and comes out of it. 1 5

OR

a)	(i) Definition	1
	(ii) Observation	1
	(iii) Comment on intensity	1
b)	Explanation	2

(i) A light wave, having its electric vectors oscillating in a plane perpendicular to the direction of propagation, is called plane polarized light. 1

(ii) The intensity of polarized light transmitted by the polaroid placed in the middle,

$I_2 = I_0 \cos^2 45^0$ (I_0 = Intensity of light transmitted by the first polaroid)

$= \frac{I_0}{2}$ ½

The intensity of polarized light, transmitted by third polaroid,

$I_3 = I_2 \cos^2 45^0$

$= \frac{I_0}{4}$ ½

(iii) The intensity of transmitted light decreases till it becomes zero. 1

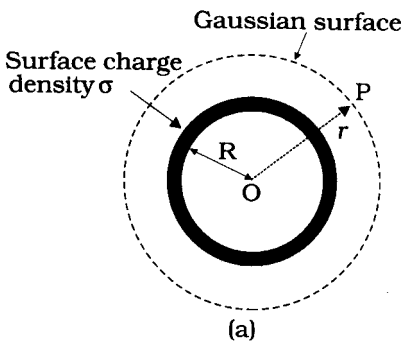
(HOTS) (b) Yes; ½

The rotation of the first polarizer simply rotates the plane of polarization. 1

There is no change in the intensity of the polarized light. ½ 5

30.

(a)	(i)	Derivation for expression	2
	(ii)	Drawing field lines	½ + ½
(b)	(i)	Calculation of charge	1
	(ii)	Total flux	1



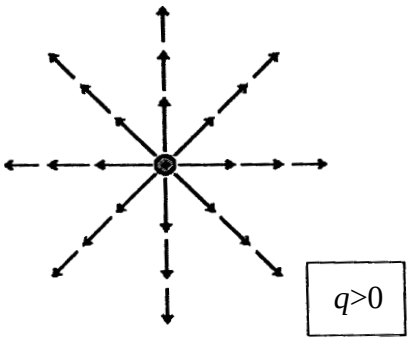
(a) 1

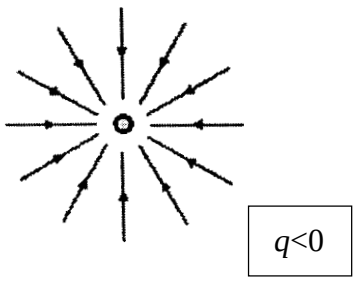
$$\oint \vec{E}.\vec{ds} = \frac{q}{\epsilon_0}$$ ½

$$\oint Eds\cos\theta = \frac{\sigma 4\pi R^2}{\epsilon_0}$$ ½

$$E4\pi r^2 = \frac{\sigma 4\pi R^2}{\epsilon_0}$$

$$\therefore\ E = \frac{\sigma R^2}{\epsilon_0 r^2}$$ ½ +½





½

(b) (i) $q = \sigma\ 4\pi\ R^2$

$= 100 \times 10^{-6} \times 4 \times 3.14 \times \left(\frac{2.5}{2}\right)^2$ ½

$= 19.6 \times 10^{-4}$ C ½

(ii) flux, $\phi = \frac{q}{\epsilon_0}$

$= \frac{19.6\times10^{-4}}{8.85\times10^{-12}}$ ½ 5

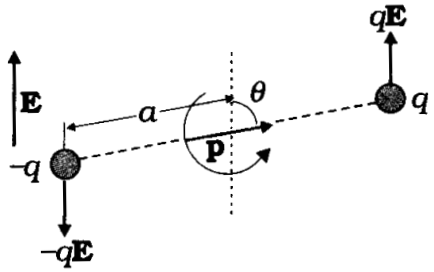
$= 2.2 \times 10^{-4}\ Nm^2\ C^{-1}$

(or $= 2.2 \times 10^8$ Vm)

OR

a)	Derivation of Expression for torque	3
b)	Calculation of Work Done	2

a)



½

Electric force on + $q = qE$ ½

Electric force on – $q = -qE$ ½

(HOTS) ∴ Magnitude of torque (π) = $qE.2a\sin\theta$

$\tau = (q.2a)E \sin\theta$ ½

$\tau = pE \sin\theta$ ½

The correct direction of $\vec{\tau}$ is given by $\vec{p} \times \vec{E}$

Hence $\vec{\tau} = \vec{p} \times \vec{E}$ ½

b) Work done (W) = – (electric P.E. of the system) ½

$$W = -\frac{1}{4\pi \in_0 l}(q_1q_2 + q_2q_3 + q_3q_1)$$ ½

$$= -\frac{9\times10^9}{10^{-1}}(-4q \times q + q \times 2q + 2q \times -4q) = 9 \times 10^{10} \times 10q^2$$ ½

$= 9 \times 10^{11} \times (1.6 \times 10^{-10})^2$ J

$= 2.3$ x 10^{-8} J ½ 5

[Note: Award 2 marks if the candidates only calculate electric potential energy equal to -2.3×10^{-8} J]

QUESTION PAPER CODE 55/1

EXPECTED ANSWERS/VALUE POINTS

1 Any two properties of Nuclear Force: ½ + ½ 1

- Short range / saturation.
- Strongest
- Charge independent

2 (HOT) Angle of Minimum Deviation, D_m, decreases. 1 1

[(If only the formula $\mu = \frac{\sin\left(\frac{A + D_m}{2}\right)}{\sin\left(A/2\right)}$ is given, award ½ mark.)]

3 Power dissipated = 1000 W or 1 kW 1 1

[(If only formula $P = \frac{1}{2} E_0 I_0$ is written, award ½ marks.)]

4. To increase current sensitivity. 1 1

or

To increase deflection.

[For the formula, $\frac{\phi}{I}$ or Current Sensitivity = $\frac{NBA}{k}$, award ½ mark.]

5. Scattering of light / blue has shorter wavelength and is scattered more. 1 1

6. Parallel / $\phi = 0$ / diagram only 1 1

7. (HOT) Straight line denoted by 'B' 1 1

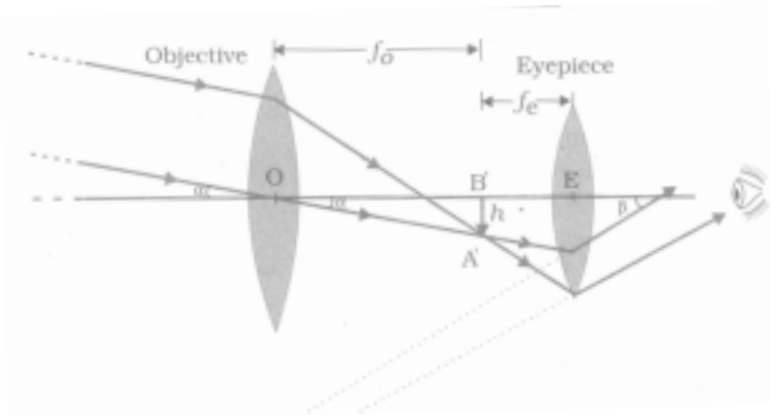
[For the formula, $\lambda = \frac{h}{\sqrt{2meV}}$, award ½ mark.]

8. (HOT) Bandgap (1 eV to 1.8 eV) / high absorption coefficient / conductivity (any one) 1 1

9.

Labelled Diagram	1½
Expression	½

Labelled Diagram :



1½

Magnifying Power:

$$m = \frac{f_0}{f_e}\left(1 + \frac{f_e}{D}\right) \quad \text{or} \quad m = \frac{f_0}{f_e}$$ ½ 2

10.

Identification	½ + ½
Reasoning	1

(a) A - Paramagnetic / any one example, e.g., Al, Na etc. ½
B - Ferromagnetic / any one example, e.g., Iron, Cobalt. ½

(b) Consists of domains which orient themselves along the magnetic field./ field lines are highly concentrated / can be magnetized early (any one of the reasons.) 1 2

11.

(i)	Formula	½
	Comparison	½
(ii)	Formula	½
	Comparison	½

(i) Formula $v_d = \dfrac{I}{neA}$ ½

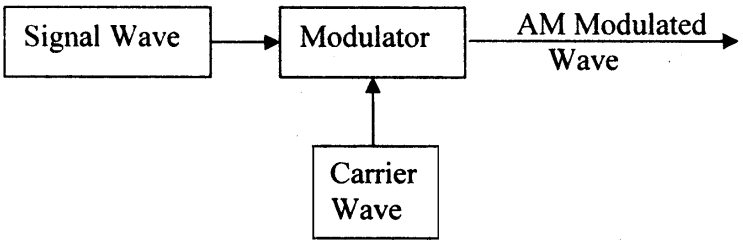
$v_{d_1} : v_{d_2} = 2 : 1$ ½

(i) Formula $v_d = \dfrac{eV\tau}{ml}$ ½

$v_{d_1} : v_{d_2} = 1 : 1$ ½ 2

12.

Diagram	1
Explanation	1

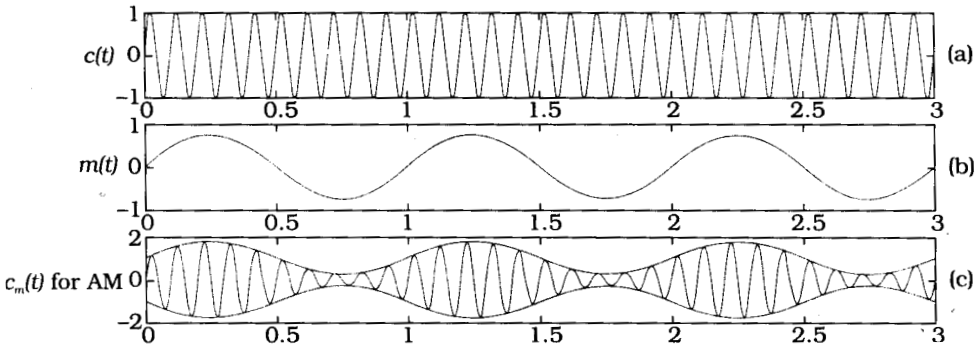


1

Explanation:

Amplitude of the carrier wave changes in accordance with the instantaneous values of amplitude of information signal. 1 2

Alternative



13

Formula for mass defect	½
Calculation	½
Formula for energy	½
Calculation	½

Mass defect ½

$= 0.00456$ u ½

Energy released, $E = \Delta m \times 931$ MeV

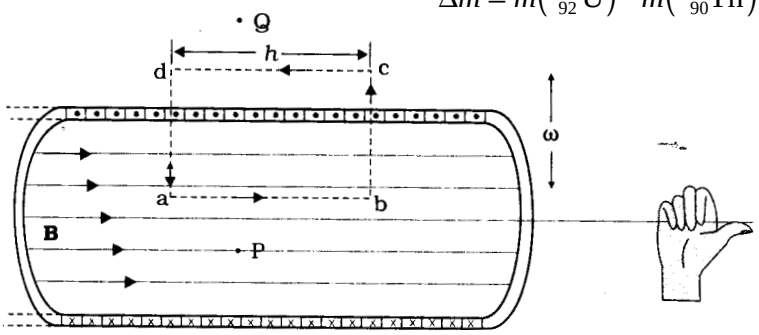
$= 4.245$ MeV ½ 2

14.

Diagram	½
Ampere's Circuital Low	½
Derivation	1

Diagram:

$\Delta m = m\left({}^{235}_{92}\mathrm{U}\right) - m\left({}^{234}_{90}\mathrm{Th}\right) - m\left({}^{4}_{2}\mathrm{He}\right)$ ½



Law: $\oint \overline{B} \cdot \overline{dl} = \mu_0 \sum I \text{ or } \mu_0 I_e$ ½

Derivation: $B = \mu_0 nI \quad or \quad \mu_0 \frac{N}{l} I$ 1 2

15.

Relevant formulae	1
Derivation	1

$I = neAv_d$ ½

$v_d = \frac{e\tau}{m}\frac{V}{l}$

$I = \frac{ne^2 Ar}{ml} \cdot V$ ½

$R = \frac{m}{ne^2\tau} \cdot \frac{l}{A}$ ½

$\therefore \rho = \frac{m}{ne^2\tau}$ ½ 2

or any other equivalent method.

16.

Principle	1
Two factors	½ + ½

(a) Electromagnetic Induction / Mutual Induction. 1

(b) Rate of change of flux / number of turns / cross-section area / relative separation / core material / load resistance (any two) 1 2

τ

17.

One feature		1
Numerical :	Formula	½
	Substitution and Result	½

Any ONE of the given features :-

	Interference	Diffraction
(i)	Fringes of equal width	Fringes of unequal width
(ii)	Fringes of equal intensity	Fringes of decreasing intensity
(iii)	Due to superposition of two waves (wavefronts)	Due to superposition of secondary wavefronts.
(iv)	Maximal at $\theta = \frac{\lambda}{a}$	Minima at $\theta = \frac{\lambda}{a}$

1

(Numerical : Formula $y = \frac{(2n+1)\lambda D}{2a}$ *or* $\frac{5\lambda D}{2a}$ ½

Substitution and Result: 8×10^{-5} m or 0.08 mm ½ 2

18.

(i)	Formula	½
	Calculation and Result	½
(ii)	Formula	½
	Calculation and result	½

(i) $\frac{Kq_1}{x} + \frac{Kq_2}{(r-x)} = 0 \quad if\ (x < r)$ ½

or $\frac{Kq_1}{x} + \frac{Kq_2}{x-r} = 0 \quad if\ (x > r)$

which gives, x = 50 cm (from $q_1 = 10 \times 10^{-8}$ C) ½

or x = 75 cm

(ii) $u = \frac{kq_1q_2}{r}$ ½

$u = -3 \times 10^{-5}$ J ½ 2

OR

(i)	Formula	½
	Calculation and Result	½
(ii)	Formula	½
	Calculation and result	½

(i) $\frac{k4Q}{x^2} = \frac{KQ}{(r-x)^2}$ ½

$x = \left(\frac{2}{3}\right)$ m or x = 2 m (from 4Q) ½ 2

(ii) $u = \frac{kq_1q_2}{r}$

$u = 1.44 \times 10^{-3}$ J

19.

Identification	½ + ½ + ½
Uses (one for each)	½ + ½ + ½

(a)	10^{-3}nm	X-rays / γ-rays	½	
	Use	Medical / crystallography / transmutation	½	
(b)	10^{-3}m	microwave/ short radio wave	½	
	Use	Oven / communication	½	
(c)	1nm	UV-rays/ X-rays	½	
	Use	Water purification/medical	½	3

20.

Explanation (one reason)		1
Numerical :	Formula for M.I.	½
	Calculation and Result	½
	Formula for side bands	½
	Calculation and Result	½

Explanation:

(i) Size of antenna
(ii) Power radiated 1
(iii) Mixing up signals
(Any two)

Numerical:

(i) Modulation Index = $\frac{V_m}{V_c}$ ½

= 2/3 or 0.66 ½

(ii) Side bands: $f_c \pm f_m$ ½

= 11.988 MHz and 12.012 MHz ½ 3

21.

One Distinction	1
Condition	½
Derivation	1½

Unpolarised light : Vibrations are symmetrically distributed in all direction 1

Polarised light : Vibrations are restricted to one plane only.

Condition : $\tan i_p = \mu$

OR

Reflected and refracted rays should be perpendicular to each other.

OR

Light should be incident at polarizing angle.

(any one) ½

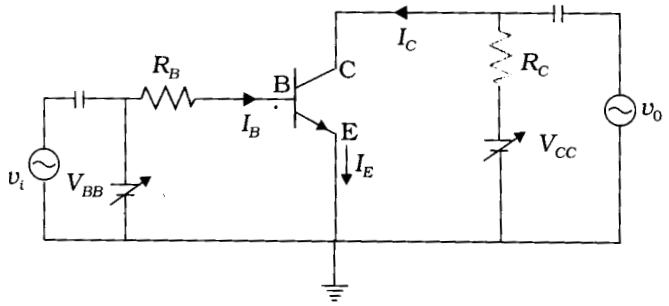
Derivation: $\mu = \dfrac{\sin i_p}{\sin r} = \dfrac{\sin i_p}{\sin(\dfrac{\pi}{2} - i_p)}$

$= \tan i_p$ 1½ 3

22.

Circuit Diagram	2
Explanation	1

Circuit Diagram :



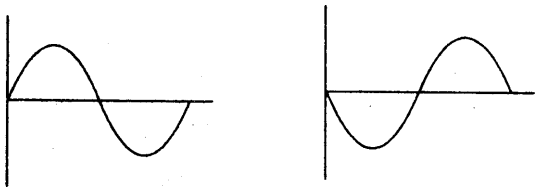
2

Explanation : The voltage gain of the amplifier is $A_v = -\beta_{ac} R_L / r$

The negative sign represents the output voltage which is opposite in phase with the input voltage, as input voltage increases output voltage decreases.

OR

Graphically:



Input Output 1 3

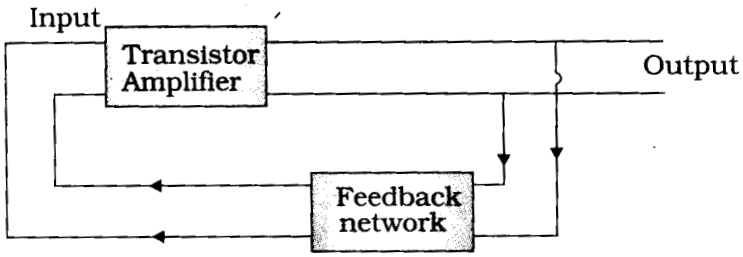
(OR any other proper explanation)

OR

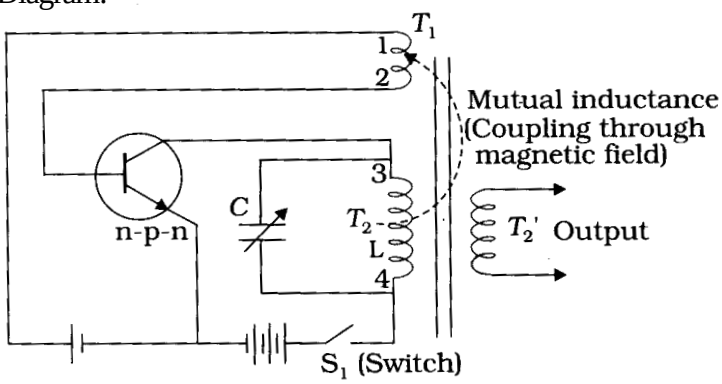
Principle	½
Circuit Diagram	2
Explanation	½

Principle: Positive feedback ½

OR

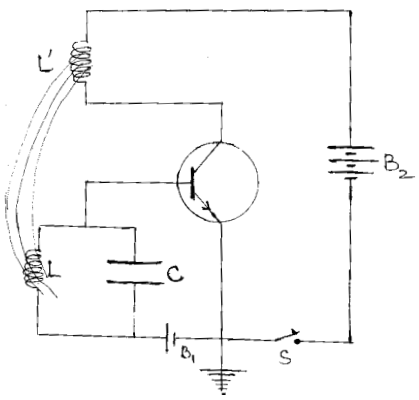


Circuit Diagram:



2

OR



Explanation: By the process of mutual induction (or inductive coupling), energy is fedback to the tank circuit, in phase. The output in an oscillator is selfsustained. ½ 3

23.(HOT)

(i)	Formula for KE	½
	Calculation	½ + ½
(ii)	Formula for wavelength	½
	Substitution and Calculation	½ + ½

(i) $En = \frac{13.6}{n^2}$ eV ½

$= \frac{-13.6}{9} = 1.51$ eV ½

KE(K) $= +E_n = +1.51$ eV ½

(ii) $E =$ $[-1.5 - (-13.6)] = 12.1$ eV ½

Calculation of $\lambda = 1.02 \times 10^{-7}$ m 1

Alternatively, $\left[\frac{1}{\lambda} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)\right]$ ½

$\lambda = \frac{9}{8R}$ *or* 1.02×10^{-7} m $\left[\frac{hc}{\lambda}\right]$ 1 3

24.

(i)	Identification of metal	½
	Reason	½
(ii)	Reason	½
	Identification	½
(iii)	Affect	½
	Reason	½

(i) 'X' ½

as X has smaller threshold frequency. ½

(ii) Since $\phi_y > \phi_x$
So $KE_y < KE_x$ | OR $KE = hu - \phi$ ½

therefore 'X' gives out electrons with larger KE. ½

(iii) No change ½

as KE of photoelectron does not depend on the intensity of incident radiations. ½ 3

25.

Formula	½ + ½ + ½
Calculation	½ + ½ + ½

(a) $\tau = NBIA\sin\theta$ ½

as $\theta = 0°$ so $\tau = 0$ ½

(b) $\vec{F} = I(\vec{l} \times \vec{B})$ ½

$F_{net} = 0$ ½

(c) $F_e = e\,vB$ or $F_e = \frac{BI}{NA}$ ½

$F_e = 1.5 \times 10^{-24}$ N ½ 3

26.

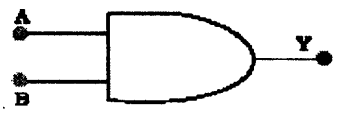
Analysis of gate 'l' and '2'	½
Identification	1
Symbol	½
Truth table	1

Analysis : (1) and (2) are 'NOT' gates ½

Identification: Whole circuit is equivalent to AND gate

$(\overline{\overline{A} + \overline{B}} = A.B)$ 1

Symbol:



½

Truth table:

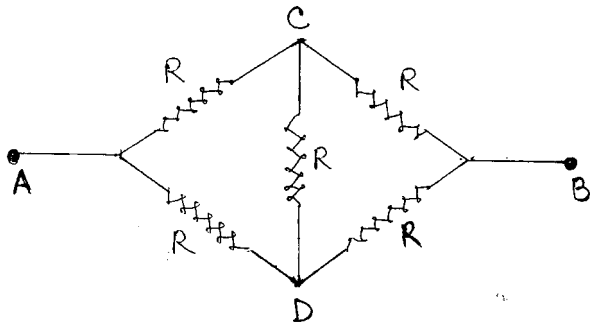
Input		Output
A	**B**	**Y**
0	0	0
0	1	0
1	0	0
1	1	1

1 3

27

Equivalent Circuit diagram	1
Calculation of equivalent resistance	1
Calculation of current	½ + ½

(i) Circuit:



1 1

Calculation of $\frac{1}{R_{AB}} = \frac{1}{2R} + \frac{1}{2R}$ or $R_{AB} = R$ 1 2

(ii) Current through CD = 0 ½

Current through ACB = $\frac{10\text{V}}{4\Omega} = 2.5\,\text{A}$ ½

28 (HOT)

Derivation for Energy Stored		2
Expression and Change for		
	Capacitance	½ +½
	Electric field	½ +½
	Energy Density	½ +½

Derivation for Energy stored

$dW = V.dq$ 1

$W = \int_0^Q \frac{q}{C}\, dq$ ½

$W = \frac{Q^2}{2C}$ = Energy Stored ½

Change of capacitance:

$C' = \frac{K \in_0 A}{d'}$ ½

$$C_0 = \frac{\epsilon_0 A}{d}$$ ½

$$C' = 20C_0$$

Change of field:

$$E' = \frac{V}{d'}$$ ½

$$E' = 2E_0 \; ; \; E_0 = \frac{V}{d}$$ ½

Change of Energy Density

$$U_0 = \frac{1}{2} E_0^{\,2} \, \epsilon_0$$ ½

$$U = \frac{1}{2} \, \epsilon_0 \, 4E_0^{\,2} \times 10$$

$$= 40U_0$$ ½ 5

OR

(a)	Definition	1
	S.I. unit	1
(b)	Formula and calculation of net flux	½ + 1
	Formula and calculation of net charge	½ + 1

(a) Definition: Number of Electric field lines passing through a surface normally 1

S.I. Unit of flux = Nm^2C^{-1} 1

(b) Net flux $\Phi = (E_L - E_R)A = 500\,(-0.1 + 0.2).01$ ½

Calculation and Result = $0.5\ Nm^2C^{-1}$ 1

Charge enclosed $Q = \epsilon_0 \Phi$ ½

Calculation and Result = $4.42 \times 10^{-12}\ C = 8.85 \times 10^{-12} \times 0.5\ C$ 1 5

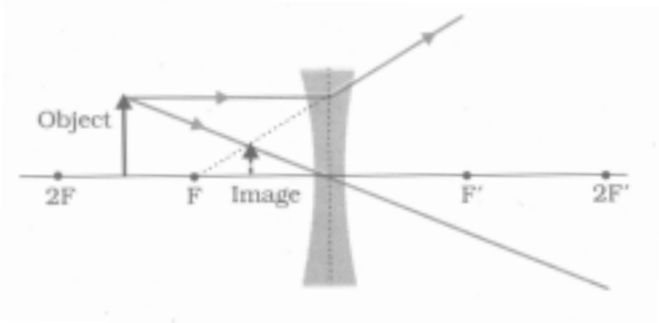
or

$0.5\ \epsilon_0\ Nm^2C^{-1}$

29

Diagram		1
Derivation		2
(i)	Calculation of Power	½
(ii)	Formula and calculation of 'U'	1

Diagram :



1

Derivation : $\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$ 2

(i) Power = $P_1 + P_2$

= 10 – 5 = 5 D

(ii) f = 20 cm

$m = \frac{v}{u} = 2$

$\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$ ½

u = – 10 cm 1 5

OR

(a)	Definition of coherent sources	1
	Reason	½
(b)	Derivation for fringe width	3
(c)	Criteria	½

(a) Two sources of light which emit waves of constant or zero phase difference between them. 1

Reason : Because they are not coherent. ½

(b) Condition of dark fringe.

$$\Delta x = (2n + 1)\ \frac{\lambda}{2}$$

Condition for bright fringe :

$\Delta x = n\lambda$ 3

Expression of fringe width :

$$\beta = \frac{\lambda D}{d}$$

(HOT) (c) Criteria $\frac{s}{d} < \frac{\lambda}{a}$ ½ 5

30.

Derivation of Expression for current	2
Graph : v and I v/s ωt	1
Numerical :	
Calculation of i, V_R, V_e	½ + ½ + ½
To show: $V_{Total} \neq V_{eff}$	½

Derivation: Given $\upsilon = \upsilon_m \sin \omega t$

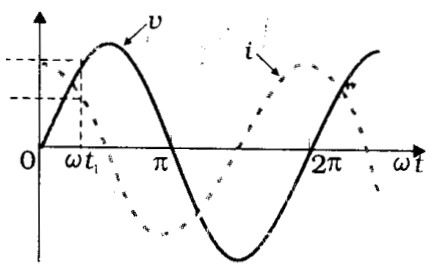
$q = c\upsilon$ 2

$$i = \frac{dq}{dt}$$

$i = i_m \cos \omega t$

$$i = i_m \sin\left(\omega t + \frac{\pi}{2}\right)$$

Graph:



1

Numerical: $i = \frac{V}{Z} = 0.756A$ ½

where $Z = \sqrt{(200)^2 + (212)^2}$

$= 291.5\ \Omega$ ½

$V_R = IR = 151V$

$V_C = I X_C = 160.5V$ ½

$V_R = V_C = 151 + 160.5$

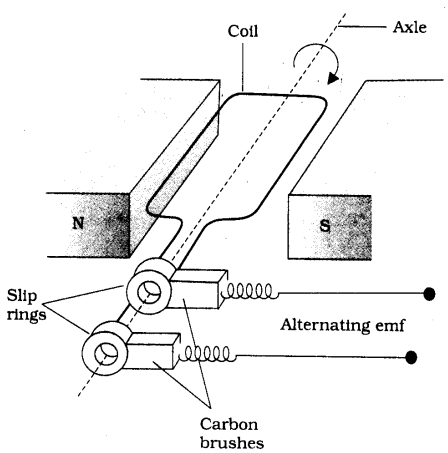
$= 311.5\ V > 220\ V$ ½ 5

(Because V_R and V_C are not in phase)

OR

Labelled diagram	2
Principle	1
Expression for emf	½
Numerical: Formula	½
Calculation and Result	1

Diagram of AC Generator:



2

Principle: electromagnetic induction 1

Expression: $e = NBA\ \omega \sin \omega t$ ½

or

$e = e_o \sin \omega t$

Numerical- Formula $e_o = NBA\ \omega$ ½

Substitution of value and result $e_o = 0.314V$ 1 5

CHEMISTRY (Theory)

Time allowed : 3 hours ***Maximum Marks : 70***

General Instructions:

(i) This paper is divided into four Sections: A, B, C and D. All the sections are compulsory.

(i) All questions are compulsory.

(ii) Question nos. 1 to 8 are very short answer questions and carry 1 mark each.

(iii) Question nos. 9 to 18 are short answer questions and carry 2 marks each.

(iv) Question nos. 19 to 27 are also short answer questions and carry 3 marks each.

(v) Question nos. 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

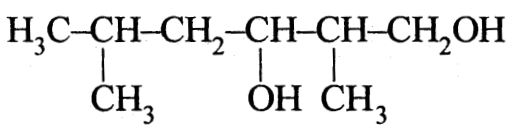
1. What is the coordination number of each type of ions in a rock-salt type crystal structure? 1

2. Define the term 'order of reaction' for chemical reactions. 1

3. What causes Brownian movement in a colloidal solution? 1

4. In which one of the two structures, NO_2^+ and NO_2^- the bond angle has a higher value? 1

5. Write the IUPAC name of the following compound: 1



6. Arrange the following compounds in an increasing order of their acid strengths: 1
$(CH_3)_2CHCOOH$, $CH_3CH_2CH(Br)COOH$, $CH_3CH(Br)CH_2COOH$

7. Write a chemical reaction in which the iodide ion replaces the diazonium group in a diazonium salt. 1

8. Name a substance that can be used as an antiseptic as well as a disinfectant. 1

9. Explain as to why haloarenes are much less/reactive than haloalkanes towards nucleophilic substitution reactions. 2

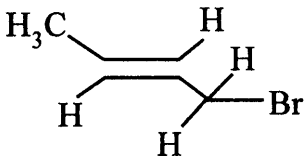
OR

Which compound in each of the following pairs will react faster in S_N2 reaction with -OH ? Why?

(i) CH_3Br or CH_3I

(ii) $(CH_3)_3CCI$ or CH_3CI

10. (a) State the IUPAC name of the following compound: 2



(b) Complete the following chemical equation:

$CH_3CH_2CH{=}CH_2 + HBr \text{ peroxide} \xrightarrow{\text{peroxide}} .....$

11. State Henry's law correlating the pressure of a gas and its solubility in a solvent and mention two applications for the law. 2

12. A first order decomposition reaction takes 40 minutes for 30% decomposition. Calculate its $t_{½}$ value. 2

13. What is meant by the 'rate constant, *k*' of a reaction? lf the concentration be expressed in mol L^{-1} units and time in seconds, what would be the units for *k* (i) for a zero order reaction and (ii) for a first order reaction? 2

14. Define the following terms in relation to proteins: 2

(i) Peptide linkage

(ii) Denaturation

15. List the reactions of glucose which cannot be explained by its open chain structure. 2

16. Assign a reason for each of the following statements: 2

(i) Ammonia is a stronger base than phosphine.

(ii) Sulphur in vapour state exhibits a paramagnetic behaviour.

17. Draw the structures of the following molecules: 2

(i) SF_4

(ii) XeF_4

18. What are biodegradable and non-biodegradable detergents? Give one example of each class. 2

19. What is a semiconductor? Describe the two main types of semiconductors and explain mechanisms for their conduction. 3

20. Calculate the temperature at which a solution containing 54 g of glucose, ($C_6H_{12}O_6$), in 250 g of water will freeze.

(K_f for water = 1.86 K mol^{-1} kg)

21. What are lyophilic and lyophobic sols? Give one example of each type. Which one of these two types of sols is easily coagulated and why? 3

22. State briefly the principles which serve as basis for the following operations in metallurgy: 3

(i) Froth floatation process

(ii) Zone refining

(iii) Refining by liquation

23. Write chemical equations for the following processes: 3

(i) Chlorine reacts with a hot concentrated solution of sodium hydroxide

(ii) Orthophosphorous acid is heated

(iii) PtF_6 and xenon are mixed together

OR

Complete the following chemical equations:

(i) Ca_3P_2 (s) + H_2O (1) ⟶ .....

(ii) Cu^2 + (aq) + NH_3(aq) ⟶ .....
(excess)

(iii) F_2(g) + H_2O(1) ⟶ .....

24. (a) What is a ligand? Give an example of a bidentate ligand. 3

(b) Explain as to how the two complexes of nickel, $[Ni(CN)_4]^{2-}$ and $Ni(CO)_4$, have different structures but do not differ in their magnetic behaviour. (Ni = 28)

25. Name the reagents which are used in the following conversions: 3

(i) A primary alcohol to an aldehyde

(ii) Butan-2-one to butan-2-ol

(iii) Phenol to 2, 4, 6-tribromophenol

26. Account for the following observations: 3

(i) pK_b for aniline is more than that for methylamine.

(ii) Methylamine solution in water reacts with ferric chloride solution to give a precipitate of ferric hydroxide.

(iii) Aniline does not undergo Friedel-Crafts reaction.

27. Write the names and structures of the monomers of the following polymers: 3

(i) Buna-S

(ii) Neoprene

(iii) Nylon-6

28. Conductivity of 0.00241M acetic acid solution is 7.896×10^{-5} S cm^{-1}. Calculate its molar conductivity in this solution. If A_m^0 for acetic acid be 390.5 S cm^2 mol^{-1}, what would be its dissociation constant? 5

OR

Three electrolytic cells A, B and C containing solutions of zinc sulphate, silver nitrate and copper sulphate, respectively are connected in series. A steady current of 1.5 ampere was passed through them until 1.45 g of silver were deposited at the cathode of cell B. How long did the current flow? What mass of copper and what mass of zinc were deposited in the concerned cells? (Atomic masses of Ag = 108, Zn = 65.4, Cu = 63.5)

29. Assign reasons for the following: 5

(i) The enthalpies of atomisation of transition elements are high.

(ii) The transition metals and many of their compounds act as good catalyst.

(iii) From element to element the actinoid contraction is greater than the lanthanoid contraction.

(iv) The E^0 value for the Mn^{3+}/Mn^{2+} couple is much more positive than that for Cr^{3+}/cr^{2+}.

(v) Scandium (Z = 21) does not exhibit variable oxidation states and yet it is regarded as a transition element.

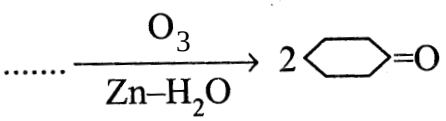
OR

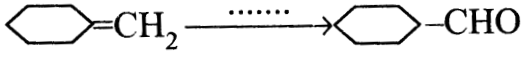
(a) What may be the possible oxidation states of the transition metals with the following *d* electronic configurations in the ground state of their atoms:

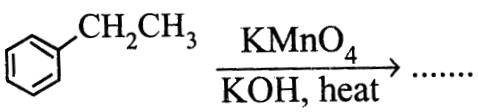
$3d^34s^2$, $3d^54s^2$ and $3d^6 4s^3$. Indicate relative stability of oxidation states in each case.

(b) Write steps involved in the preparation of (i) Na_2CrO_4 from chromite ore and (ii) K_2MnO_4 from pyrolusite ore. 3, 2

30. (a) Complete the following reaction statements by giving the missing starting material, reagent or product as required: 3, 2







(b) Describe the following reactions:

(i) Cannizaro reaction

(ii) Cross aldol condensation

OR

(a) How would you account for the following:

(i) Aldehydes are more reactive than ketones towards nucleophiles.

(ii) The boiling points of aldehydes and ketones are lower than of the corresponding acids.

(iii) The aldehydes and ketones undergo a number of addition reactions.

(b) Give chemical tests to distinguish between:

(i) Acetaldehyde and benzaldehyde

(ii) Propanone and propanol 3,2

QUESTION PAPER CODE 56/1

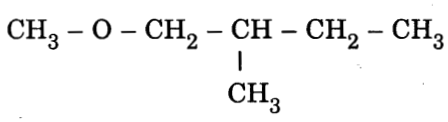
1. What is the total number of atoms per unit cell in a face-centred cubic (fcc) crystal structure? 1

2. Express the relation between the conductivity and the molar conductivity of a solution. 1

3. Of physisorption and chemisorption which type of adsorption has a higher enthalpy of adsorption? 1

4. Why is the bond angle in PH_3 molecule lesser than that in NH_3 molecule? 1

5. Write the IUPAC name of the following compound: 1



6. Draw the structure of the compound whose IUP AC name is 4-Chloropentan-2-one. 1

7. Write two main functions of carbohydrates in plants. 1

8. Define the term 'polymerisation'. 1

9. State Raoult's law for solutions of volatile liquid components. Taking a suitable example, explain the meaning of positive deviation from Raoult's law. 2

OR

Define the term 'osmotic pressure'. Describe how the molecular mass of a substance can be determined on the basis of osmotic pressure measurement. 2

10. Depict the galvanic cell in which the reaction

$Zn\ (s) + 2\ Ag^{+}\ (aq) \rightarrow Zn^{2+}\ (aq) + 2\ Ag\ (s)$

takes place. Further indicate what are the carriers of the current inside and outside the cell. State the reaction at each electrode. 2

11. The resistance of a conductivity cell containing 0.001 M KCI solution at 298 K is 1500 Ω. What is the cell constant if the conductivity of 0.001 M KCI solution at 298 K is
$0.146 \times 10^{-3}\ S\ cm^{-1}$? 2

12. Answer the following: 2

(i) Which neutral molecule would be isoelectronic with ClO^{-} ?

(ii) Of Bi(V) and Sb(V) which may be a stronger oxidising agent and why?

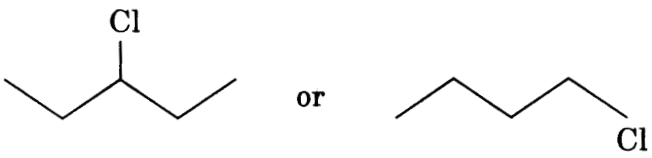
13. Write complete chemical equations for:

(i) Oxidation of Fe^{2+} by $Cr_2O_7^{2-}$ in acid medium.

(ii) Oxidation of $S_2O_3^{2-}$ by MnO_4^{-} in neutral aqueous medium.

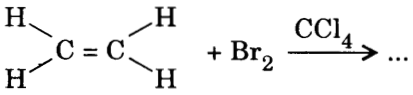
14. (i) Why are haloalkanes more reactive towards nucleophilic substitution reactions than haloarenes ?

(ii) Which one of the following two substances undergoes S_N1 reaction faster and why? 2



15. Complete the following reaction equations: 2

(i) $C_6H_5N_2Cl + KI \rightarrow ...$

(ii)  $+ Br_2 \xrightarrow{CCl_4} ...$

16. Write one chemical reaction each to illustrate the following: 2

(i) Hofmann's bromamide reaction

(ii) Gabriel phthalimide synthesis

17. (i) Arrange the following in an increasing order of basic strength in water:

$C_6H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$ and NH_3.

(ii) Arrange the following in increasing order of basic strength in gas phase:

$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$ and CH_3NH_2.

18. What are thermoplastic and thermosetting polymers? Give one example of each. 3

19. Silver crystallises in an fcc lattice. The edge length of its unit cell is 4.077×10^{-8} cm and its density is 10.5 g cm^{-3}. Calculate on this basis the atomic mass of silver. ($N_A = 6.02 \times 10^{23}$ mol^{-1})

20. A solution containing 8 g of a substance in 100 g of diethyl ether boils at 36,86° C, whereas pure ether boils at 35.60° C. Determine the molecular mass of the solute. (For ether $K_b = 2.02$ K kg mol^{-1}) 3

OR

Calculate the temperature at which a solution containing 54 g of glucose, $C_6H_{12}O_6$, in 250 g of water will freeze. [K_f for water = 1.86 K kg mol^{-1}]

21. Explain what is observed when 3

(i) KC1, an electrolyte, is added to hydrated ferric oxide sol,

(ii) an electric current is passed through a colloidal solution,

(iii) a beam of light is passed through a colloidal solution.

22. What chemical principle is involved in choosing a reducing agent for getting the metal from its oxide ore? Consider the metal oxides, Al_2O_3 and Fe_2O_3, and justify the choice of reducing agent in each case. 3

23. How would you account for the following situations? 3

(i) The transition metals generally form coloured compounds.

(ii) With $3d^4$ configuration, Cr^{2+} acts as a reducing agent but Mn^{3+} acts as an oxidising agent. (Atomic Numbers, Cr = 24, Mn = 25)

(iii) The actinoids exhibit a larger number of oxidation states than the corresponding lanthanoids.

24. (a) What is the basis of formation of the spectro-chemical series?

(b) Draw the structures of geometrical isomers of the following coordination complexes:

$[Co(NH_3)_3C1_3]$ and $[CoC1_2(en)_2]^+$

(en = ethylenediamine and atomic number of Co is 27) 3

25. (a) Name the reagents and write the chemical equations for the preparation of the following compounds by Williamson's synthesis:

(i) Ethoxybenzene

(ii) 2-Methyl-2-methoxypropane

(b) Why do phenols not give the protonation reaction readily? 3

26. What happens when D-glucose is treated with the following reagents? 3

(i) HI

(ii) Bromine water

(iii) HNO_3

27. Mention one use each of the following drugs: 3

(i) Ranitidine

(ii) Paracetamol

(iii) Tincture of iodine

28. (a) Derive the general expression for half-life of a first order reaction.

(b) The decomposition of NH_3 on platinum surface is a zero order reaction. What would be the rates of production of N_2 and H_2 if k = 2.5×10^{-4} mol L^{-1} s^{-1} ? 2, 3

OR

(a) List the factors that determine the rate of a chemical reaction.

(b) The half-life for decay of radioactive ^{14}C is 5730 years. An archaeological artefact containing wood had only 80% .of the ^{14}C activity as found in a living tree. Calculate the age of the artefact. 2, 3

29. Assign reasons for the following: 1×5

(i) Sulphur vapour is paramagnetic.

(ii) Ammonia (NH_3) has greater affinity for protons than phosphine (PH_3).

(iii) The negative value of electron gain enthalpy of fluorine is less than that of chlorine.

(iv) SF_6 is much less reactive than SF_4.

(v) Of the noble gases only xenon is known to form well-established chemical compounds.

OR

(a) Describe the favourable conditions for the manufacture of (i) ammonia by Haber's process, and (ii) sulphuric acid by contact process.

(b) Draw the structures of the following: 2, 3

(i) PCl_5 (g)

(ii) S_8 (g)

(iii) ClF_3 (g)

30. (a) Giving a chemical equation for each, illustrate the following processes:

(i) Cannizzaro reaction

(ii) Acetylation

(iii) Decarboxylation

(b) State chemical tests to distinguish between the following pairs of compounds:

(i) Propanal and Propanone

(ii) Phenol and Benzoic acid 3, 2

OR

(a) An organic compound A contains 69,77% carbon, 11.63% hydrogen and the rest is oxygen. The molecular mass of the compound is 86. It does not reduce Tollen's reagent but forms an addition product with sodium hydrogen sulphite and gives: positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acids. Write the possible structure of the compound A.

(b) Write the chemical tests to distinguish between the following pairs of compounds:

(i) Acetophenone and Benzophenone

(ii) Ethanal and Prop anal 3, 2

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 6:6 or 6 1

2 The sum of powers of the concentration terms of the reactants in the rate law expression is called the order of that chemical reaction. 1

Or

rate = $k[A]^p[B]^q$

Order of reaction = p+q

3 Due to unbalanced bombardment of the colloidal particles by the molecules of the dispersion medium. 1

4 NO_2^+

5 2,5-Dimethylhexane -1,3-diol. 1

6. $(CH_3)_2CHCOOH < CH_3CH(Br)CH_2COOH < CH_3CH_2CH(Br)COOH$ 1

7. $C_6H_5N_2^+Cl^- + KI \longrightarrow C_6H_5I + KCl + N_2$ 1

8. Phenol 1

9. Aryl halides are less ractive towards nucleophilic substitution **<u>because of any of the following reasons with correct explanation:</u>** 2

(i) Resonance effect stabilization

(ii) sp^2 hybridization in haloarenes being more electronegative than sp^3 in haloalkanes.

(iii) Instability of phenyl cation which is not stabilized by resonance.

(iv) possible repulsion between electron rich nucleophile and electron rich arene

OR

(i) CH_3I, Because iodine is a better leaving group due to its larger size. 1

(ii) CH_3Cl,the presence of bulky group on the carbon atom in $(CH_3)_2CCl$ has an inhibiting effect. 1

10. (a) 1-Bromobut-2-ene 1

(b) $CH_3CH_2CH_2CH_2Br$ 1

11. Henry's law states that at a constant temperature, the solubility of a gas in a liquid is directly proportional to the pressure of the gas over the solution. 1

Applications :

(i) To increase the solubility of CO_2 in soft drinks and soda water, the bottle is sealed under high pressure.

(ii) Scuba divers must cope with high concentrations of dissolved Nitrogen with breathing air at high pressure underwater.To avoid this air is diluted with He.

(iii) At high altitudes the partial pressure of oxygen is less than that at the ground level. Low blood oxygen causes anoxia. ½, ½

(any two)

12. $k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$ ½

$k = \frac{2.303}{40\text{min}} \log \frac{100}{70}$

$k = \frac{2.303}{40} \times 0.155 = 0.00892\text{min}^{-1}$

$t_{½} = \frac{0.693}{k}$ ½

$t_{½} = \frac{0.693}{0.00892}\text{min}$

$t_{½} = 77.7\text{min}$ 1

13 Rate constant 'k' of a reaction is defined as the rate of reaction when the concentration of the reactant(s) is unity. / or Rate constant is the proportionality factor in the rate law. 1

(i) Unit for 'k' for a zero order reaction = mol L^{-1} s^{-1} ½

(ii) Unit for 'k' for a first order reaction = s^{-1} ½

14 (i) Peptide linkage: Peptide linkage is an amide (-CO-NH-) bond formed between –COOH and $–NH_2$ group in protein formation. 1

(ii) Denaturation: When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH, protein loses its biological activity. This is called denaturation of protein. 1

15.* (i) Despite having the aldehyde group, glucose does not give 2,4-DNP test or Schiff's test.

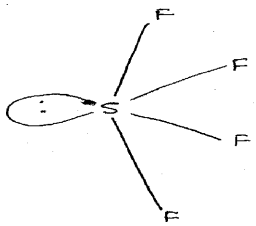
(ii) It does not form the hydrogensulphite addition product with $NaHSO_3$.

(iii) The pentaacetate of glucose does not react with hydroxylamine indicating the absence of free –CHO group. 1+1 ***(any two)***

16. (i) The lone pair of electrons on N atom in NH_3 is directed and not diffused / delocalized as it is in PH_3 due to larger size of P.

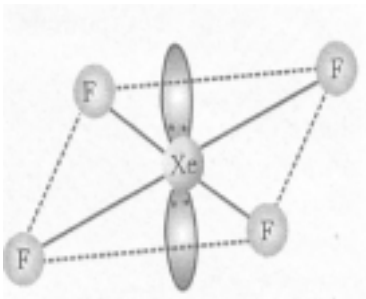
(ii) S_2 molecule like O_2, has two unpaired electrons in antibonding ð* orbitals. 1+1

17. SF_4



1

XeF_4



1

18. Biodegradable detergents are those detergents which are easily degraded by the micro-organisms and hence are pollution free. ½

ex. Soap / Sodium laurylsulphate / any other unbranched chain detergent. ½

(any one)

Non Biodegradable Detergents are those detergents which cannot be degraded by the bacteria easily and hence create pollution. **[example not essential]** 1

19. The solids with intermediate conductivities between insulators and conductors are termed **semiconductors.** 1

(i) **n- type semiconductor** : It is obtained by doping Si or Ge with a group 15 element like P. Out of 5 valence electrons , only 4 are involved in bond formation and the fifth electron is delocalized and can be easily provided to the conduction band. The conduction is thus mainly caused by the movement of electron. 1

(ii) **p – type semi conductor :** It is obtained by doping Si or Ge with a group 13 element like Gallium which contains only 3 valence electrons. Due to missing of 4^{th} valence electron,electron hole or electron vacancy is created The movement of these positively charged holes is responsible for the conduction. 1

20. $\Delta T_f = K_f m$ 1

No. of moles of glucose = $\frac{54\ g}{180\ g\ mol^{-1}}$

Molality of Glucose solution = $\frac{54}{180}$ mol x $\frac{1000}{250 kg}$ = $1.20 mol\ kg^{-1}$

$\Delta T_f = K_f m$

= $1.86\ K\ kg\ mol^{-1}$ x $1.20\ mol\ kg^{-1}$

= 2.23 K 1

Temperature at which solution freezes =(273.15 – 2.23)K = 270.77K or -2.23^0C
Or (273.000 – 2.23)K = 270.7 K 1

21. Lyophilic sols are solvent attracting sols
ex. Gum,gelatine,starch,rubber *(any one)* ½+½

Lyophobic sols are solvent repelling sols
ex. Metal sols,metal sulphides *(any one)* ½+½

Lyophobic sols are readily coagulated because they are not stable. ½+½

22. (i) Froth floatation process: This method is based on the difference in the wettability of the mineral particles (sulphide ores)and the gangue particles. The mineral particles become wet by oils while the gangue particles by water and hence gets separated. 1

(ii) Zone refining: This method is based on the principle that the impurities are more soluble in the melt than in the solid state of metal. 1

(iii) Refining by Liquation:The method is based on the lower melting point of the metal than the impurities and tendency of the molten metal to flow on the sloping surface. 1

23 (i) $3Cl_2+6NaOH \rightarrow 5NaCl+NaClO_3+3H_2O$

(ii) $4H_3PO_3 \rightarrow 3H_3PO_4+PH_3$

(iii) $Xe^+[PtF_6]^-$

OR

(i) $Ca_3P_2(s)+ 6H_2O(l) \rightarrow 3Ca(OH)_2(aq) + 2PH_3(g)$

(ii) $Cu^{2+}(aq)+ 4NH_3(aq) \rightarrow [Cu(NH_3)_4]^{2+}(aq)$

(iii) $2F_2(g)+ 2H_2O(l) \rightarrow 4H^+(aq) + 4F^-(aq) + O_2(g)$ 1x3 = 3

24* (a) Ligand: The ions or molecules bound to the central atom/ion in the coordination entity are called ligands.

ex. of bidentate ligand- ethane-1,2-diamine or oxalate ion ½+½

(b)* $[Ni(CN)_4]^{2-}$, dsp^2 hybridization
Structure square planar
Diamagnetic in nature as its 3d-orbitals contain paired electrons ½+½

$Ni(CO)_4$, sp^3 hybridization
Structure tetrahedral
Diamagnetic in nature as its 3d-orbitals contain paired electrons ½+½

25. (i) PCC, $KMnO_4$, CrO_3 *(any one)*

(ii) $LiAlH_4$, $NaBH_4$ *(any one)*

(iii) aqueous Br_2 1x 3=3

(or any other suitable reagent)

26. (i) It is because in aniline the $-NH_2$ group is attached directly to the benzene ring. It results in the unshared electron pair on nitrogen atom to be in conjugation with the benzene ring and thus making it less available for protonation.
(or any other suitable reason)

(ii) Methyl amine in water gives OH^- ions which react with $FeCl_3$ to give precipitate of ferric hydroxide/ or

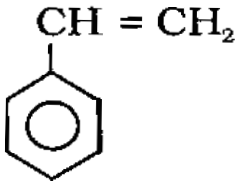
$$CH_3NH_2 + H_2O \longrightarrow CH_3\overset{+}{N}H_3OH^- \longrightarrow CH_3\overset{+}{N}H_3 + OH^-$$

$$Fe^{3+} + 3OH^- \longrightarrow Fe(OH)_3$$

(iii) Aniline does not undergo Friedel-Crafts reaction due to salt formation with aluminium chloride, the Lewis acid. 1x 3=3

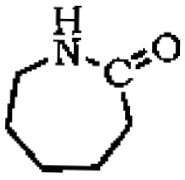
27. (i) Buna-S : 1,3- Butadiene and Styrene ½+½

$CH_2 = CH - CH = CH_2$ and



(ii) Neoprene:Chloroprene ½+½

(iii) Nylon-6: Caprolactum



½+½

28* $\Lambda_m = \frac{\kappa}{c}$ 1

$= \frac{7.896 \times 10^{-5}\ S\ cm^{-1} \times 1000\ cm^3 L^{-1}}{0.00241\ mol L^{-1}}$

$= 32.76\ Scm^2\ mol^{-1}$

$\alpha = \frac{\Lambda_m}{\Lambda_m^0}$ 1

$= \frac{32.76\ Scm^2\ mol^{-1}}{390.5\ Scm^2\ mol^{-1}}$

$= 0.084\ Scm^2\ mol^{-1}$ 1

$K = \frac{C\alpha^2}{(1-\alpha)} = C\alpha^2$ 1

$= 0.00241 \times (0.084)^2$

$= 1.7 \times 10^{-5}$ or 1.865×10^{-5} **(if á is not neglected)** 1

OR

$Ag^+ + e^- \rightarrow Ag$

108 g silver is deposited by 96500C electric charge

1.45 g of silver is deposited by $\frac{96500C \times 1.45\ g}{108\ g} = 1295.6\ C$ 1

Quantity of electricity passed = Current x t

$t = \frac{1295.6C}{1.5\ amp} = 863.7\ s$

$Cu^{2+} + 2e^- \rightarrow Cu$

2 x 96500 C deposits 63.5 g of Cu

1295.6 C deposits $\frac{63.5g \times 1295.6\ C}{2 \times 96500\ C}$ of Cu 1

= 0.426 g of Cu

$Zn^{2+} + 2e^- \rightarrow Zn$

2 x 96500 C deposits 65.4 g of Zn

1295.6 C deposits $\frac{65.4g \times 1295.6\ C}{2 \times 96500\ C}$ of Zn 1

= 0.44 g of Zn

(or any other suitable method)

29* (i) Because of larger number of unpaired electrons in their atoms they have stronger interatomic interaction and hence stronger bonding between atoms resulting in higher enthalpies of atomisation.

(ii) Because of their ability to adopt multiple oxidation states and to form complexes.

(iii) Because of poorer shielding by 5f electrons than that by 4f electrons, actinoid contraction is greater than the lanthanoid contraction.

(iv) Much larger third inonisation energy of Mn(where the required change is d^5 to d^4) is mainly responsible for this.

(v) Because of the presence of incomplete d-orbital ($3d^1 4s^2$) in its ground state. 1x5 = 5

OR

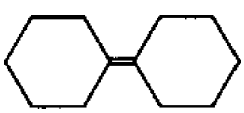
$3d^3 4s^2$(Vanadium): Oxidation states +2,+3,+4,+5
Stable oxidation state: +4 as VO^{2+} ,+5 as VO_4^{3-}

$3d^5 4s^2$(Manganese): Oxidation states +2,+3,+4,+5,+6,+7
Stable oxidation states: +2 as Mn^{2+} ,+7 as MnO^-_4

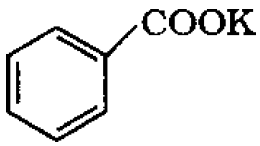
$3d^6 4s^2$(Iron): Oxidation states +2,+3 1x3 = 3
Stable oxidation state: +2 in acidic medium, +3 in neutral or in alkaline medium.

(b) (i) $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \longrightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$

(ii) $2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$ 1+1

30 (a)
(i) 

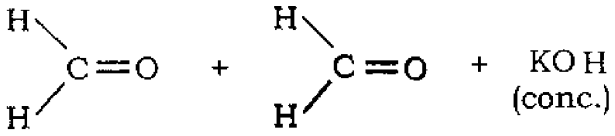
(ii) BH_3, H_2O_2 / OH^-, PCC ***(any two)***

(iii) 

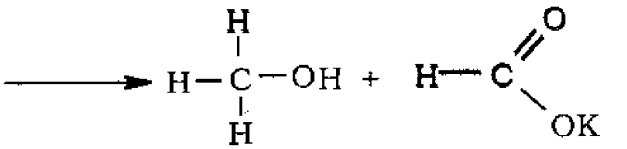
1½+1½

(NOTE:any two correct answers to be evaluated and 1½ marks for each to be awarded)

(b) (i) **Cannizzaro reaction:** Aldehydes which do not have an á-hydrogen atom, uhdergo self oxidation and reduction reaction on treament with concentrated alkali.



formaldehyde

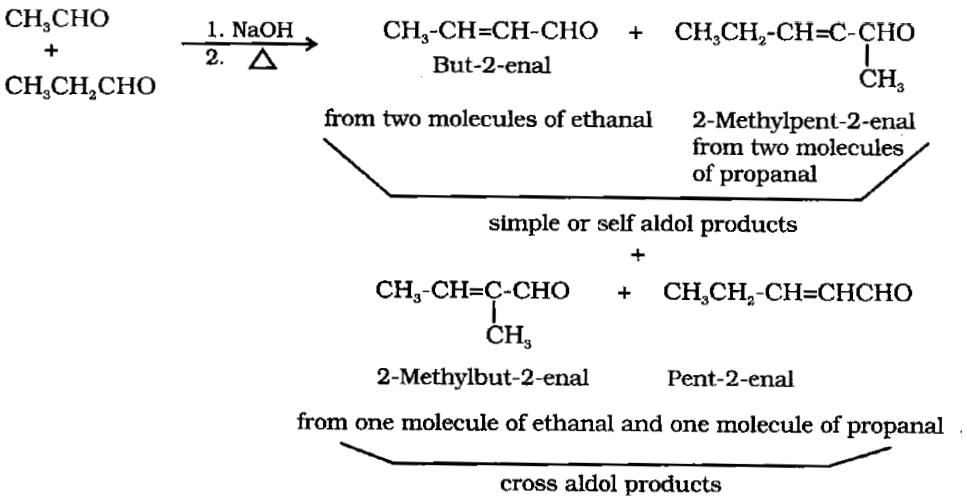


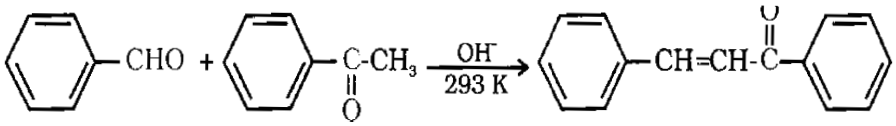
methanol sodium formate

1

(or any other suitable reaction)

(ii) **Cross aldol condensation:** When aldol condensation is carried out between two different aldehydes and /or ketones, it is called Cross aldol condensation





1

(or any other suitable reaction)

(Note: Award full marks for correct chemical equation;award ½ mark if only statement is written)

OR

(i) Because two alkyl groups in ketones reduce the positive charge on carbon atom of the carbonyl group more effectively than in aldehydes. **/ or** sterically, the presence of two relatively large substituents in ketones hinders the approach of nucleophile to carbonyl carbon than in aldehydes having only one such substituents.

(ii) Beacuase of the absence of hydrogen bonding in aldehydes and ketones.

(iii) Because of the presence of the sp^2 hybridised orbitals(or ð-bond) of carbonyl carbon. 1x3 = 3

(b) (i) **<u>Acetaldehyde and benzaldehyde</u>** : Acetaldehyde gives yellow ppt of Iodoform(CHI_3)on addition of NaOH / I_2 whereas benzaldehyde does not give this test.

(or any other suitable test)

(ii) **<u>Propanone and propanol</u>** : Propanone gives yellow ppt of Iodoform (CHI_3)on addition of NaOH / I_2 whereas propanol does not give this test. Or / Propanol gives brisk effervesence on adding a piece of Sodium metal whereas Propanone does not give this test. 1+1

(or any other suitable test)

QUESTION PAPER CODE 56/1

EXPECTED ANSWERS/VALUE POINTS

1. 4 1

2. $\Lambda_m = \frac{\kappa}{c}$ where Λ_m is molar conductivity , κ is conductivity, c is concentration in mol L^{-1} 1

3. Chemisorption 1

4. Because of decrease in sp^3 hybridization character from NH_3 to PH_3 1

5. 1-methoxy-2-methylbutane 1

or

2-methyl-1-methoxybutane 1

6. $CH_3 - C(=O) - CH_2 - CH(Cl) - CH_3$ 1

7. (i) Structural support.

(ii) Storage molecules.

(iii) Constituent of cell wall. ***(any two)*** ½+½

8. The process of formation of polymers from the respective monomers is called polymerization. 1

9. Raoult's law states that for a solution of volatile liquids, the partial vapour pressure of each component in the solution is directly proprtional to its mole fraction.

When the solute-solvent interaction is weaker than those between the solute-solute and solvent-solvent molecules then solution shows positive deviation from Raoults law hence the partial pressure of each component is greater. ex. mixture of ethanol and acetone **or** carbondisulphide and acetone behave in this manner. ½, ½

or

The extra pressure applied on the solution side that just stops the flow of solvent to solution through semi-permeable membrane is called osmotic pressure of the solution. 1

Here r is the osmotic pressure and R is the gas constant.

π = (n2 / V) RT

$$\pi V = \frac{w_2 R T}{M_2}$$

or $M_2 = \frac{w_2 R T}{\pi V}$ 1

Thus knowing the quantities w_2, T, ð and V we can calculate the molar mass of the solute.

10. The galvanic cell is depicted as:

$Zn(s)|\ Zn^{2+}(aq)\ ||\ Ag^{+}(aq)|Ag\ (s)$

(i) Zinc electrode is negatively charged

(ii) The ions formed i.e Zn^{2+} and Ag^{+} in the solution are the carriers of the current in the cell and electrons in the external circuit.

(iii) At anode: $Zn(s) \rightarrow Zn^{2+}(aq) + 2e^{-}$
At cathode: $2Ag^{+}(aq) + 2e^{-} \rightarrow 2Ag(s)$ ½x4=2

11. $R = \rho(\ell / A)$ 1

Cell constant, $\ell / A = R/\rho = R\kappa$

$= (1500\ \Omega) \times (0.146 \times 10^{-3}\ S\ cm^{-1})$

$= 0.219\ cm^{-1}$ 1

12.* (i) ClF *(or any other)* 1

(ii) Bi (V), due to greater stability of its lower oxidation state effect. 1

13. (i) $Cr_2O_7^{2-} + 14\ H^{+} + 6\ Fe^{+2} \longrightarrow 2\ Cr^{3+} + 6\ Fe^{+3} + 7H_2O$

(ii) $8MnO_4^{-} + 3S_2O_3^{2-} + H_2O \longrightarrow 8\ MnO_2 + 6\ SO_4^{2-} + 2OH^{-}$ 1+1

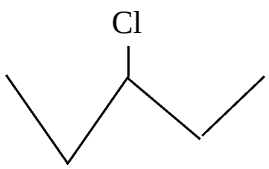
14 Aryl halides are less ractive towards nucleophilic substitution **<u>because of any of the following reasons</u>**

(i) Resonance effect stabilization

(ii) sp^2 hybridization in haloarenes and sp^3 in haloalkanes. 1

(iii) Instability of phenyl cation

(iv) possible repulsion

(ii) 

½

It undergoes S_N1 reaction faster because of the stability of secondary carbocation. ½

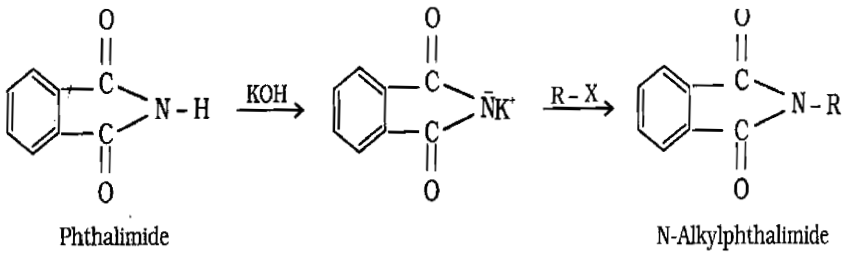
15 (i) $C_6H_5N_2^+Cl^- + KI \rightarrow C_6H_5I + KCl + N_2$

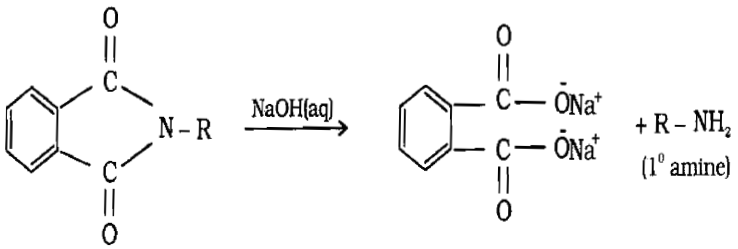
(ii) $CH_2 = CH_2 + Br_2 \rightarrow CH_2(Br) - CH_2(Br)$ 1+1

16 (i) Hoffmann Bromamide Reaction

$R\text{-}CONH_2 + Br_2 + 4\ NaOH \rightarrow R\text{-}NH_2 + Na_2CO_3 + 2NaBr + 2\ H_2O$ 1

(ii) Gabriel pthalimide synthesis





1

17i) i) $C_6H_5NH_2 < NH_3 < (C_2H_5)_3N < (C_2H_5)_2NH$ **in water** 1

ii) $CH_3NH_2 < C_2H_5NH_2 < (C_2H_5)_2NH < (C_2H_5)_3N$ **in gas phase** 1

18 Polymers which can be remoulded again and again are called thermoplastic polymers

ex. Polythene, PVC etc ½+½

Polymers which cannot be remoulded again and again are called thermosetting polymers.

ex. Bakelite, Melamine etc ½+½

19 $d = \frac{Z \times M}{a^3 \times N_A}$ 1

For fcc lattice Z= 4 ½

$10.5\ g\ cm^{-3} = \dfrac{4 \times M}{(4.077 \times 10^{-8}\ cm)^3 \times 6.022 \times 10^{23} mol^{-1}}$ ½

$M = \dfrac{10.5\ g\ cm^{-3} \times (4.077 \times 10^{-8}\ cm)^3 \times 6.022 \times 10^{23} mol^{-1}}{4}$ 1

$M = 107.12 g\ mol^{-1}$

20. $\Delta T_b = (36.86 - 35.60)^0C = 1.26^0C$ or 1.26 K

No. of moles of solute = $\dfrac{8\ g}{M}$

Molality of Glucose solution = $\dfrac{8\ g}{M} \times \dfrac{1000}{100 kg}$

$\Delta T_b = K_b\ m$ 1

$1.26\ K = 2.02\ K\ kg\ mol^{-1} \times \dfrac{8\ g}{M} \times \dfrac{1000}{100 kg}$ ½

$M = 128.25\ g\ mol^{-1}$ 1

Where M is molar mass of the solute

OR

$\Delta T_f = K_f\ m$ 1

No. of moles of glucose = $\dfrac{54\ g}{180\ g\ mol^{-1}}$

Molality of Glucose solution = $\dfrac{54\ mol}{180} \times \dfrac{1000}{250 kg} = 1.20 mol\ kg^{-1}$ ½

$\Delta T_f = K_f\ m$

$= 1.86\ K\ kg\ mol^{-1} \times 1.20\ mol\ kg^{-1}$

$= 2.23\ K$

Temp. at which solution freezes $= (273.15 - 2.23)K = 270.77K$ or -2.23^0C /
$= (273.000 - 2.23)K = 270.7\ K$ 1

21. (i) Ferric hydroxide sol is positively charged. By adding potassium chloride, the excess chloride ions neutralize its positive charge and cause it to **coagulate.**

(ii) The dispersed phase and dispersion medium migrate towards oppositely charged electrodes (electrophoresis).

(iii) The beam of light is scattered by colloidal particles(Tyndall effect). 1x3=3

22.* Role of reducing agent is to provide ΔG^{o} '–ve' and large enough to make the sum of ΔG° of two reactions ' –ve' . 1

Al_2O_3 can be reduced by Mg at lower temperature

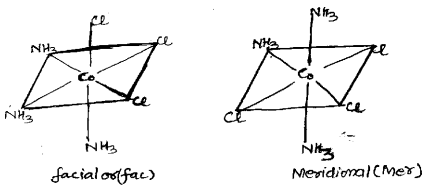
Fe_2O_3 can be reduced by CO at lower temperature / or by C at higher temperature. 1

23. (i) Transition metal contain unpaired electrons and are excited to higher energy levels/ d-d transition / absorption in visible region

(ii) Cr^{2+} is reducing as its configuration changes from d^4 to d^3, the latter having half filled t_{2g} level whereas Mn^{3+} to Mn^{2+} results in half filled configuration

(iii) Because 5f, 6d, and 7s are of comparable energy. 1x3=3

24.* (a) Ligands are arranged in the increasing order of field strength / based on absorption of light of complexes with different ligands- (extent of splitting) 1

(b)* 

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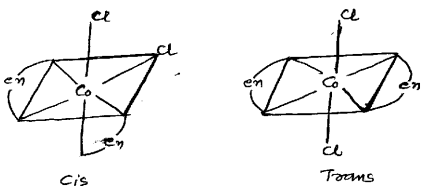
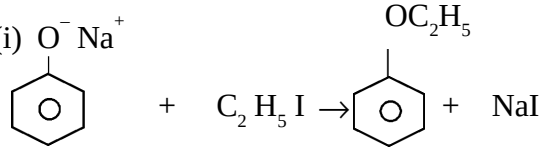


1

(or any other correctly drawn **cis** isomer)

25. (a) (i) 

1

Sod. Phenoxide ethoxybenzene

(ii) $(CH_3)_3\,C\text{-}O^-Na^+ + CH_3\,Br \rightarrow (CH_3)_3\,C\text{-}OCH_3 + Na\,Br$ 1

Sod. tert. butoxide methylbromide 2- methoxy- 2- methyl propane

(b) The lone pair of electrons present on oxygen atom is involved in delocalization due to resonance. Hence protonation is not easier 1

(or any other suitable reason) 1x3=3

26. (i) With HI, n-hexane is formed

(ii) With Bromine water, gluconic acid is formed

(iii) With HNO_3,Saccharic acid is formed

(or structural representation) 1x3=3

27. Ranitidine: used as Antihistamne/ antacid.

Paracetamol: used as Antipyretic/ Analgesic

Tincture of Iodine: used as Antiseptic. 1x3=3

28 (a) **<u>Half life of a First order reaction:</u>**

$$k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$$ ½

$$\text{at } t_{1/2} \quad [R] = \frac{[R]_0}{2}$$ ½

So, the above equation becomes

$$k = \frac{2.303}{t_{1/2}}\log\frac{[R]_0}{[R]_0/2}$$

$$\text{or} \quad t_{1/2} = \frac{2.303}{k}\log 2$$

$$t_{1/2} = \frac{2.303}{k} \times 0.301$$

$$t_{1/2} = \frac{0.693}{k}$$ 1

(b) $2NH_3\,(g) \xrightarrow{Pt} N_2\,(g) + 3\,H_2(g)$

Rate = $-\frac{d[NH_3]}{dt} = k[NH_3]^O = 2.5 \times 10^{-4} Ms^{-1}$ 1

$$-\frac{1}{2}\frac{d[NH_3]}{dt} = +\frac{d[N_2]}{dt} = +\frac{1}{3}\frac{d[H_2]}{dt}$$

Rate of production of $N_2 = +\frac{d[N_2]}{dt} = -\frac{1}{2}\frac{[NH_3]}{dt}$

$$= \frac{1}{2} \times (2.5 \times 10^{-4}\ Ms^{-1}) = 1.25 \times 10^{-4}\ Ms^{-1}$$ 1

Rate of production of hydrogen $= \frac{d[H_2]}{dt} = -\frac{3}{2}\frac{[NH_3]}{dt}$

$$= \frac{3 \times (2.5 \times 0^{-4}\ Ms^{-1})}{2}$$ 1

$$= 3.75 \times 10^{-4}\ Ms^{-1}$$

or

Rate $= -\frac{d[NH_3]}{dt} = k[NH_3]^O = 2.5 \times 10^{-4} Ms^{-1}$ 1

Rate $= -\frac{1}{2}\frac{d[NH_3]}{dt} = +\frac{d[N_2]}{dt} = +\frac{1}{3}\frac{d[H_2]}{dt}$

Rate of production of $N_2 = +\frac{d[N_2]}{dt}$ = Rate $= 2.5 \times 10^{-4} Ms^{-1}$ 1

Rate of production of hydrogen $= \frac{d[H_2]}{dt} = 3 \times$ Rate

$$= 3 \times (2.5 \times 0^{-4}\ Ms^{-1})$$

$$= 7.5 \times 10^{-4}\ Ms^{-1}$$ 1

OR

(a) Factors affecting rate of chemical reaction are:

(i) Concentration of reactants
(ii) Temperature
(iii) Presence of catalyst 1x2=2
(iv) Surface Area ***(any four)***
(v) Activation energy