(b) $k = \frac{0.693}{t_{1/2}}$ ½

$k = \frac{0.693}{5730\ y}$

$K = 1.21 \times 10^{-4}\ y^{-1}$ ½

$t = \frac{2.303}{k} \times \log \frac{[A_0]}{[A]}$ 1

$k = \frac{2.303}{1.21 \times 10^{-4}\ y^{-1}} \times \log \frac{100}{80}$

$k = \frac{2.303}{1.21 \times 10^{-4}\ y^{-1}} \log 1.25$

$k = \frac{2.303}{1.21 \times 10^{-4}\ y^{-1}} \times 0.0969$

= 1845 years

29* i) Because sulplhur vapour like $O_2$ contains two unpaired electrons in antibonding orbitals.

(ii) Because of small size and high elctron density on N

(iii) Because of small size and high elctron repulsoion in F

(iv) Because $SF_6$ is sterically protected by six F atoms.

(v) Because of low lonisation enthalpy of Xe (comparable to that of oxygen )/ compared to that of other noble gases. 1x5=5

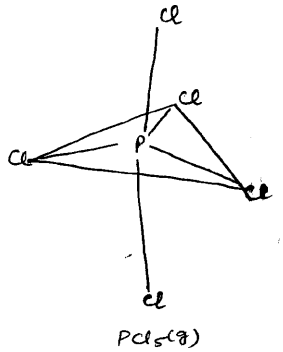
OR

(a) Favourable conditions for the manufacture of

(i) $NH_3$ by Haber's process are low temperature and high pressure.

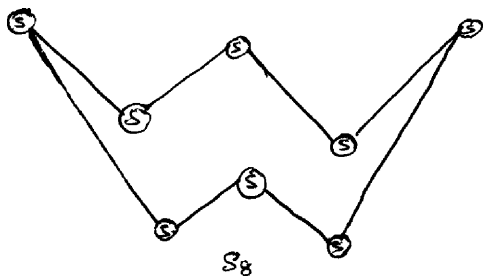
(ii) $H_2SO_4$ by contact process are low temperature and high pressure. 1x2=2

(b) (i)



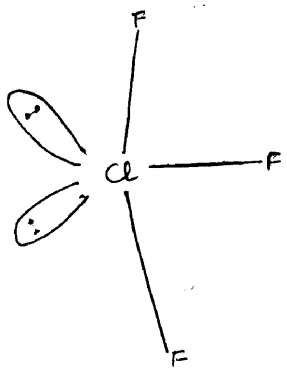

$PCl_5(g)$

(ii)



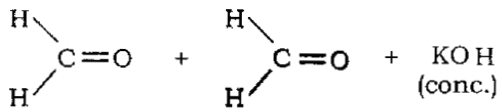

$S_8$

(iii)

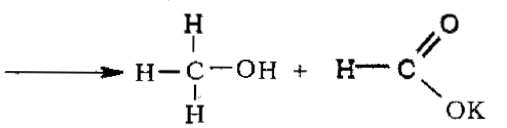



$ClF_3$ 1x3=3

30 (a) **(i)** **<u>Cannizzaro reaction:</u>** Aldehydes which do not have an á-hydrogen atom, uhdergo self oxidation and reduction reaction on treament with concentrated alkali.




formaldehyde




methanol sodium formate

***( or any other suitable reaction)***

**(ii)** **Acetylation:** The introduction of acetyl ($CH_3CO$) group in alcohols or phenols is known as Acetylation.

$$Ar/R\text{-}OH + (R'CO)_2O \underset{\longleftarrow}{\overset{H^+}{\longrightarrow}} Ar/ROCOR' + R'COOH$$

$$R/ArOH + R'COCl \xrightarrow{Pyridine} R/ArOCOR' + HCl$$

**(iii)** **Decarboxylation:** Carboxylic acids lose carbon dioxide to form hydrocarbons when their sodium salts are heated with sodalime.The reaction is known as decarboxylation.

$$R\text{-}COONa \xrightarrow[Heat]{NaOH\ \&\ CaO} R\text{-}H + Na_2CO_3$$ 1x3=3

***(Note: Award full marks for correct chemical equation;award ½ mark if only statement is written)***

(b)

(i) **Propanal and propanone** : Propanone gives yellow ppt of Iodoform ($CHI_3$)on addition of NaOH / $I_2$ whereas propanal does not give this test. Or / Propanal gives Tollen's test / or Fehling's test whereas Propanone does not give any of this test. 1

(ii) **Phenol and Benzoic acid** : Add neutral $FeCl_3$to both of them. Phenol gives violet colour. 1

***( or any other suitable test)***

OR

(a)

| Element | Percentage/ At.mass | Divide by lowest | Simple whole No.ratio |
|---|---|---|---|
| C | 69.77/12 = 5.81 | 5.81/1.16 | 5 |
| H | 11.63/1 = 11.63 | 11.63/1.16 | 10 |
| O | 18.60/16 = 1.16 | 1.16/1.16 | 10 |

Empirical formula $C_5H_{10}O$, 1

Empirical formula mass = 60+10+16=86

Mol formula = $C_5H_{10}O$ 1

It is a ketone as it appears from its reactions which on oxidation gives ethanoic and propanoic acids, hence the compound is

$CH_3COCH_2CH_2CH_3$ 1

(b) (i) **Acetophenone and Benzophenone:** Heat both of them with NaOH / $I_2$, Acetophenone forms yellow ppt of Iodoform whi ℓe Benzophenone does not 1

(ii) **Ethanal and Propanal:** Heat both of them with NaOH / $I_2$, Ethanal forms yellow ppt of Iodoform, whi ℓe Propanal does not. 1

# BIOLOGY (Theory)

***Time allowed : 3 hours*** ***Maximum Marks : 70***

***General Instructions:***

*(i) All questions are compulsory.*

*(ii) The question paper consists of four sections A, B, C and D. Section A contains 8 questions of 1 mark each, Section B is of 10 questions of 2 marks each, Section C has 9 questions of 3 marks each whereas Section D is of 3 questions of 5 marks each.*

*(iii) There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.*

*(iv) Wherever necessary, the diagrams drawn should be neat and properly labelled.*

**QUESTION PAPER CODE 57/1/1**

**SECTION A**

**1.** What causes speciation according to Hugo de Vries? 1

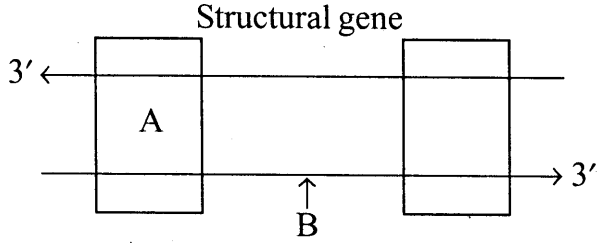
**2.** When and why do some animals like frogs hibernate? 1

**3.** List any two economically important products for humans obtained from *Apis indica.* 1

**4.** Name the Indian variety of rice patented by an American company.

**5.** What role do macrophages play in providing immunity to humans? 1

**6.** Name the parts 'A' and 'B' of the transcription unit given below.




1

**7.** Name the world's most problematic aquatic weed. What is the nature of the water body in which the weeds grow abundantly? 1

**8.** What is the major difference you observe in the offsprings produced by asexual reproduction and in the progeny produced by sexual reproduction? 1

## SECTION B

**9.** The flower of brinjal is referred to as chasmogamous while that of beans is cleistogamous. How are they different from each other? 2

**10.** Name the interaction in each of the following:

(a) Cuckoo lays her eggs in the crow's nest.

(b) Orchid grows on a mango tree.

(c) Ticks live on the skin of dogs.

(d) Sea anemone is often found on the shell of hermit crab. 2

**11.** A man with blood group A married a woman with B group. They have a son with AB blood group and a daughter with blood group O. Work out the cross and show the possibility of such inheritance. 2

**Or**

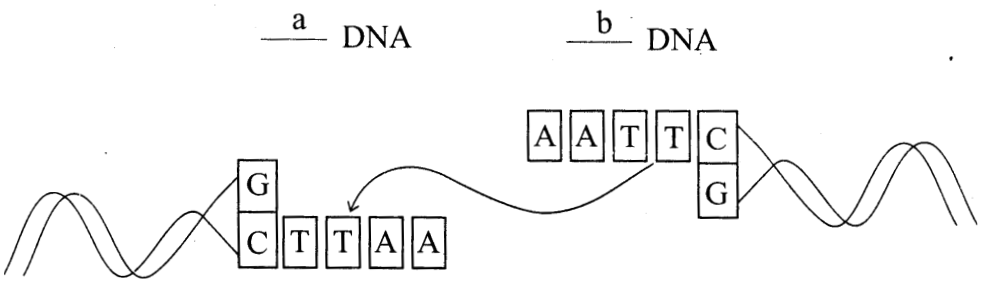
The male fruit fly and female fowl are heterogametic while the female fruit fly and the male fowl are homogametic. Why are they called so ?

**12.** Why is using tobacco in any form injurious to the health? Explain. 2

**13.** Differentiate between a detritivore and a decomposer giving an example of each. 2

**14.** A mother of one year old daughter wanted to space her second child. Her doctor suggested CuT. Explain its contraceptive actions. 2

**15.**



Study the linking of DNA fragments shown above.

(i) Name 'a' DNA and 'b' DNA.

(ii) Name the restriction enzyme that recognises this palindrome.

(iii) Name the enzyme that can link these two DNA fragments. 2

**16.** What is divergent evolution? Explain taking an example of plants. 2

**17.** Name the blank spaces a, b, c and d in the table given below : 2

| Type of Microbe | Name | Commercial Product |
|---|---|---|
| Fungus | a | Penicillin |
| Bacterium | *Acetobacter aceti* | b |
| c | *Aspergillus niger* | citric acid |
| Yeast | d | ethanol |

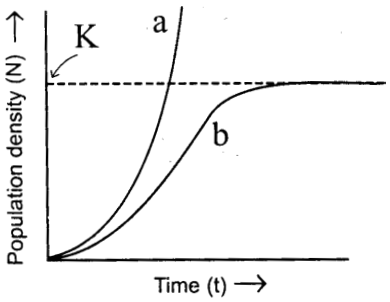
**18.** Thermal power plants are inevitable in an industrial and densely populated country like ours. What harm do they do to the environment? Also mention any precaution that could be taken to save our environment. 2

**19.** Draw a labelled diagram of the microscopic structure of a human sperm. 3

**20.** Expand MOET. Explain the procedure of this technology in cattle improvement. 3

**21.** One of the codons on mRNA is AUG. Draw the structure of tRNA adapter molecule for this codon. Explain the uniqueness of this tRNA ? 3

**22.** Study the population growth curves in the graph given below and answer the questions which follow :



(i) Identify the growth curves 'a' and 'b'.

(ii) Which one of them is considered a more realistic one and why?

(iii) If $\frac{dN}{dt} = rN\left(\frac{K - N}{K}\right)$ is the equation of the logistic growth curve, what does K stand for?

(iv) What is symbolised by N ? 3

**23.** How and why is the bacterium *Thermus aquaticus* employed in recombinant DNA.technology? Explain. 3

**Or**

(a) What are "molecular scissors"? Give one example.

(b) Explain their role in recombinant DNA technology.

**24.** Given below is a part of the template strand of a structural gene:

TAC CAT TAG GAT

(a) Write its transcribed mRNA strand with its polarity.

(b) Explain the mechanism involved in initiation of transcription of this strand. 3

**25.** (i) How and at what stage does *Plasmodium* enter into a human body?

(ii) With the help of a flow-chart only show the stages of asexual reproduction in the life-cycle of the parasite in the infected human.

(iii) Why does the victim show symptoms of high fever? 3

**26.** It has been recorded that the temperature of the earth's atmosphere has increased by O.6°C.

(a) What has caused this increase?

(b) Explain its consequences. 3

**27.** Explain the pattern of inheritance of haemophilia in humans. Why is the possibility of a human female becoming a haemophilic extremely rare? Explain. 3

## SECTION D

**28.** Draw a labelled diagram of the sectional view of a mature pollen grain in angiosperms. Explain the functions of its different parts.

**Or**

Give a schematic representation of oogenesis in humans. Mention the number of chromosomes at each stage. Correlate the life phases of the individual with the stages of the process.

**29.** (a) Mention the role of vectors in recombinant DNA technology. Give any *two* examples.

(b) With the help of diagrammatic representation only, show the steps of recombinant DNA technology. 5

**Or**

(a) What is a plasmid?

(b) What is meant by ADA deficiency? How is gene therapy a solution to this problem? Why is it not a permanent cure?

**30.** Explain Hershey-Chase experiment. What was proved through this experiment? 5

(a) A true breeding pea plant, homozygous for inflated green pods is crossed with another pea plant with constricted yellow pods (ff gg). What would be the phenotype and genotype of $F_1$ and $F_2$ generations? Give the phenotype ratio of $F_2$ generation.

(b) State the generalisation proposed by Mendel on the basis of the above mentioned cross.

## QUESTION PAPER CODE 57/1
## SECTION A

**1.** Name any two vertebrate body parts that are homologous to human forelimbs. 1

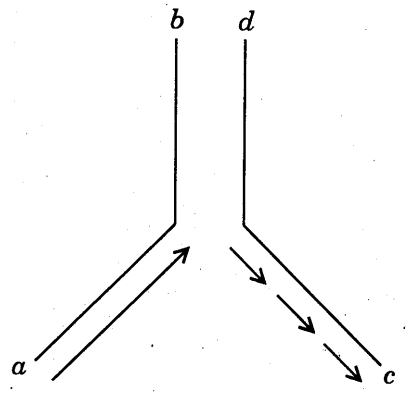
**2.** When and why do some animals like snails go into aestivation? 1

**3.** What is the economic value of *Spirulina*?

**4.** What was the speciality of the milk produced by the transgenic cow Rosie? 1

**5.** How do neutrophils act as a cellular barrier to pathogens in humans?

**6.** Mention the polarity of the DNA strands *a* - *b* and *c* - *d* shown in the replicating fork given below. 1




**7.** Mention any two significant roles predation plays in nature. 1

**8.** Why is the polar region not a suitable habitat for tiny humming birds? 1

## SECTION B

**9.** (a) Expand IUD.

(b) Why is hormone releasing IUD considered a good contraceptive to space children? 2

**10.** Name the: interaction in each of the following: 2

(a) *Cuscuta* growing on a shoe flower plant

(b) Mycorrhizae living on the roots of higher plants

(c) Clown fish living among the tentacles of sea anemone

(d) Koel laying her eggs in crow's nest

**11.** A plant of *Antirrhinum majus* with red flowers was crossed with another plant of the same species with white flowers. The plants of the $F_1$ generation bore pink flowers. Explain the pattern of inheritance with the help of a cross. 2

**OR**

A woman, with blood group O married a man with AB group. Show the possible blood groups of the progeny. List the alleles involved in this inheritance.

**12.** Why do sports persons often fall a victim to cocaine addiction? 2

**13.** State the difference between the first trophic levels of detritus food chain and grazing food chain. 2

**14.** Coconut palm is monoecious while date palm is dioecious. Why are they called so ? 2

**15.** How can DNA segments, separated by gel electrophoresis, be visualised and isolated? 2

**16.** How do Darwin's finches illustrate adaptive radiation? 2

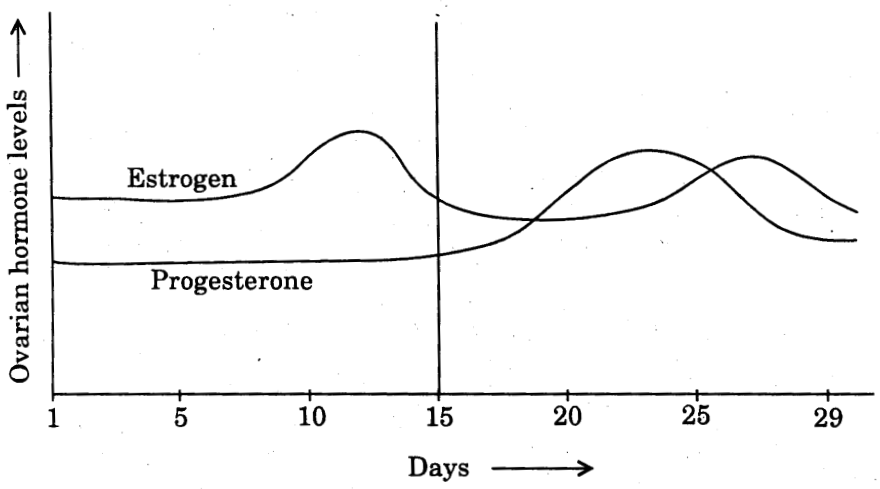
**17.** Name the blank spaces a, b, c and d from the table given below: 2

| Type of Microbe | Scientific name | Commercial product |
|---|---|---|
| Bacterium | a | Lactic acid |
| Fungus | b | Cyclosporin A |
| c | *Monascus purpureus* | Statin |
| Fungus | *Penicillium notatum* | d |

**18.** DDT content in the water of-a lake that supplies drinking water to the nearby villages, is found to be 0.003 ppm. The kingfishers of that area are reported to have 2 ppm of DDT. Why has the concentration increased in these birds? What harm will this cause to the bird population? Name the phenomenon. 2

## SECTION C

**19.** (a)



Read the graph given above and correlate the uterine events that take place according to the hormonal levels on

(i) 6 - 15 days

(ii) 16 - 25 days

(iii) 26 - 28 days (if the ovum is not fertilised)

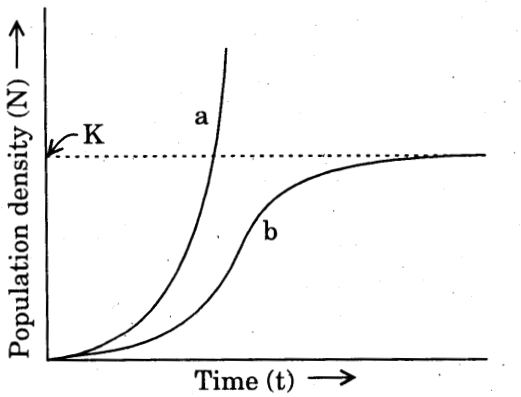
(b) Specify the sources of the hormones mentioned in the graph. 3

**20.** Explain the role of baculoviruses as biological control agents. Mention their importance in organic farming. 3

**22.** (a) Draw the stucture of the initiator tRNA adaptor molecule.

(b) Why is tRNA called an adaptor molecule ? 3

**22.**




Study the population growth curves shown above.

(i) Identify curves 'a' and 'b'.

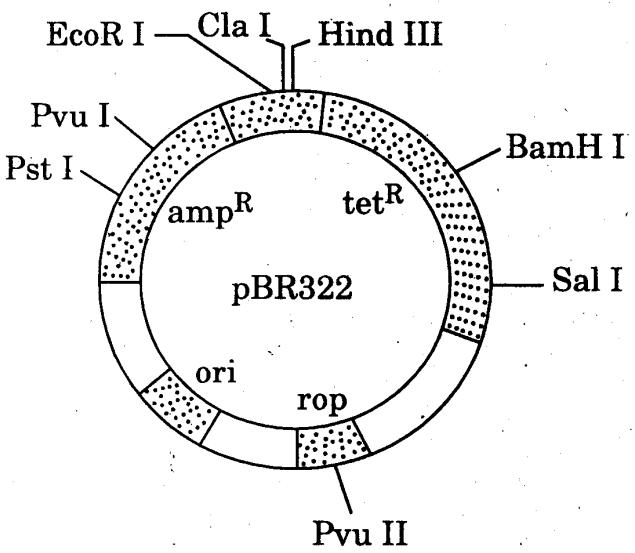
(ii) Mention the conditions responsible for the curves 'a' and 'b' respectively.

(iii) Give the necessary equation for the curve 'b'. 3

**23.** Why is *Agrobacterium tumefaciens* a good cloning vector? Explain. 3

**OR**

Explain the importance of (a) ori, (b) $amp^R$ and (c) rop In the *E. coli* vector shown below:




**24.** a UAC GAG _ _ _ _ _ _ _ _ _ AGA UUU b

Study the mRNA segment given above which is complete to be translated into a polypeptide chain.

(i) Write the codons 'a' and 'b'.

(ii) What do they code for?

(iii) How is peptide bond formed between two amino acids in the ribosome? 3

**25.** (a) Name the infective stage of *Plasmodium* which *Anopheles* mosquito takes in along with the blood meal from an infected human.

(b) Why does the infection cause fever in humans?

(c) Give a flow chart of the part of the life-cycle of this parasite passed in the insect. 3

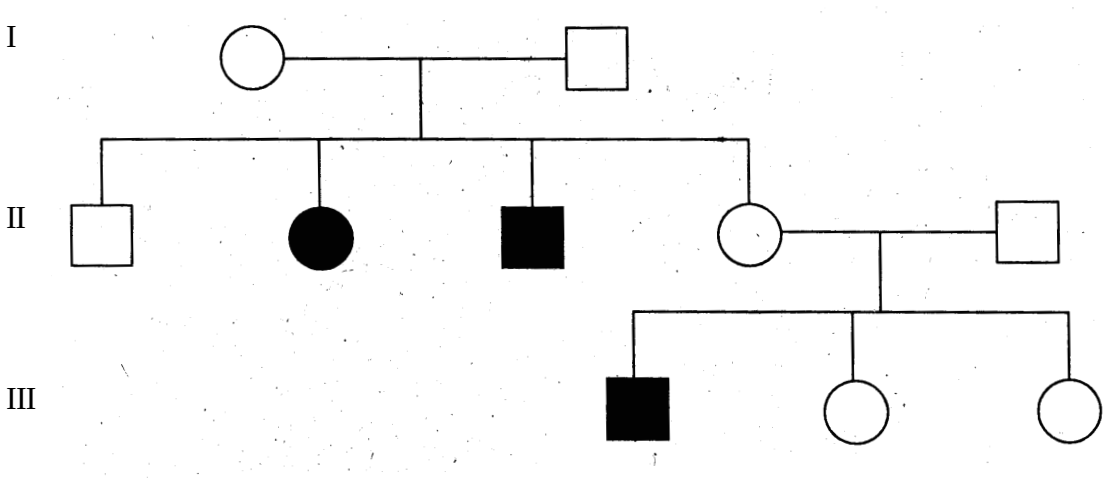
**26.** A factory drains its waste water into the nearby lake. It has caused algal bloom.

(a) How was the algal bloom caused?

(b) What would be the consequences?

(c) Name the phenomenon that caused it. 3

**27.** Study the given pedigree chart and answer the questions that follow.




(a) Is the trait recessive or dominant?

(b) Is the trait sex-linked or autosomal?

(c) Give the genotypes of the parents in generation I and of their third and fourth child in generation II. 3

## SECTION D

**28.** (a) Draw a schematic labelled diagram of a fertilised embryo sac of an Angiosperm.

(b) Describe the stages in embryo development in a dicot plant. 5

**OR**

(a) Draw a labelled diagram of a sectional view of human seminiferous tubule.

(b) Differentiate between gametogenesis in human males and females on the basis of

(i) time of initiation of the process.

(ii) products formed at the end of the process.

**29.** Explain the steps involved in the production of genetically engineered insulin. 5

**OR**

(a) Name the nematode that infests and damages tobacco roots.

(b) How are transgenic tobacco plants produced to solve this problem?

**30.** What is 'semi-conservative' DNA replication? How was it experimentally proved and by whom? 5

**OR**

A homozygous tall pea plant with green seeds is crossed with a dwarf pea plant with yellow seeds.

(i) What would be the phenotype and genotype of $F_1$ ?

(ii) Work out the phenotypic ratio of $F_2$ generation with the help of a Punnett square.

# BIOLOGY (Theory)

***Time allowed : 3 hours*** ***Maximum Marks : 70***

***General Instructions:***

1 *In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.*

2. *Any words/phrases given within brackets do not have marks.*

3. *Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.*

4. *In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substiute.*

5. *All awarded marks are to be written in the left hand margin at the end of the question or its part.*

6. *Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place "Half-tick" ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).*

7. *If no marks are awarded to any part or question put a cross (×) at incorrect value portion and mark it zero (in words only).*

8. *Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.*

9. *Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.*

10. *If parts have been attempted at different places do the totalling at the end of the part attempted last.*

11. *If any extra part is attempted or any question is reattempted, score out the last one and write "extra".*

12. *In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.*

13. *Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.*

14. *Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.*

15. *Some of the questions may relate to higher order thinking ability. These questions will be indicated to you separately by a star mark. These questions are to be evaluated carefully and the students' understanding / analytical ability may be judged.*

16. *The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.*

QUESTION PAPER CODE 57/1/1

**EXPECTED ANSWERS/VALUE POINTS**

**SECTION A**

**Q.Nos. 1 - 8 are of one mark each.**

**1. What causes speciation according to Hugo deVries ?**

Ans Mutation (s) / large ( heritable ) differences arising suddenly in a population / Saltation ( single step large mutation ). = 1

[1 Mark]

**2. When and why do some animals like frogs hibernate ?**

Ans In winter, to tide over extreme cold conditions / to survive in extreme cold conditions. = ½ + ½ = 1

[1 Mark]

**3. List any two economically important products for humans obtained from *Apis indica*.**

Ans Honey, ( Bee ) wax. = ½ + ½ = 1

[1 Mark]

**4. Name the Indian variety of rice patented by an American company.**

Ans Basmati. = 1

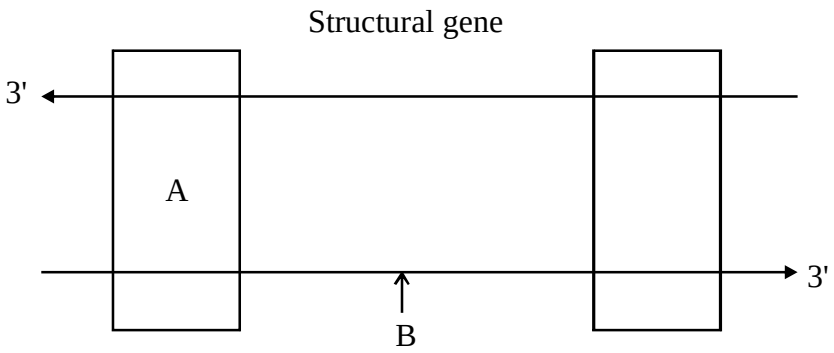
[1 Mark]

**5. What role do macrophages play in providing immunity to humans?**

Ans Phagocytose / kill / destroy germs or microbes. = 1

[1 Mark]

**6. Name the parts 'A' and 'B' of the transcription unit given below.**




Ans A – Promoter , B – Coding strand. = ½ + ½ = 1

[ 1 Mark]

**7. Name the world's most problematic aquatic weed. What is the nature of the water body in which the weeds grow abundantly?**

Ans *Eicchornia crassipes* / water hyacinth ,

Stagnant water / Eutrophic / nutrient enriched water bodies / polluted with nutrients. = ½ + ½ = 1

[ 1 Mark]

**8. What is the major difference you observe in the offsprings produced by asexual reproduction and in the progeny produced by sexual reproduction?**

Ans Offsprings of asexual reproduction – genetically same / clones,

Offsprings of sexual reproduction – show variation. = ½ + ½ = 1 [ 1 Mark]

## SECTION B

**Q.Nos. 9 - 18 are of two marks each.**

**9. The flower of brinjal is referred to as chasmogamous while that of beans is cleistogamous. How are they different from each other?** [ 1 Mark]

Ans Brinjal – Exposed anther and stigma , cross pollinated , = ½ + ½ = 1

Bean – Plants do not open / anthers and stigma lie close to each other , flowers self pollinated. = ½ + ½ = 1

[1 + 1 = 2 Marks]

**10. Name the interaction in each of the following :**

**(a) Cuckoo lays her eggs in the crow's nest.**

**(b) Orchid grows on a mango tree.**

**(c) Ticks live on the skin of dogs.**

**(d) Sea anemone is often found on the shell of hermit crab.**

Ans (a) Brood parasitism ,

(b) Commensalism ,

(c) Parasitism ,

(d) Mutualism. = ½ × 4 = 2

[1 + 1 = 2 Marks]

**11. A man with blood group A married a woman with B group. They have a son with AB blood group and a daughter with blood group O. Work out the cross and show the possibility of such inheritance.**

Ans Parent $I^Ai$ (A group father) × $I^Bi$ (B group mother) = ½

Gamete $I^A$ , i , $I^B$ , i = ½

$I^A$ $I^B$ ii

Children Son AB Daughter O = ½

Alleles – $I^A$ , $I^B$ and i = ½ [ ½ × 4 = 2]

**OR**

**The male fruit fly and female fowl are heterogametic while the female fruit fly and the male fowl are homogametic. Why are they called so?**

Ans Genotype of male fruit fly – X Y
female fowl – Z W , = ½

The sex chrmosomes are dissimiliar hence called heterogametic , = ½

While female fruit fly has X X and male fowl has Z Z , = ½

The sex chrmosomes are similiar hence homogametic. = ½

[ ½ × 4 = 2 Marks]

**12. Why is using tobacco in any form injurious to the health? Explain.**

Ans – Nicotine acts as stimulant ,

– Raises blood pressure and heart rate.

– Increases incidence of lung cancer , urinary bladder and throat ,

– Bronchitis ,

– Emphysema ,

– Coronary heart disease ,

– Gastric ulcer ,

– Cancer of the oral cavity ,

– Smoking increases carbon monoxide ( CO ) content in blood which reduces oxygen carrying capacity. ( any four points ) = ½ × 4 = 2

[ 2 Marks]

**13. Differentiate between a detrivore and a decomposer giving an example of each.**

Ans Detrivore feeds on dead plants and animals / detritus = ½

Example : Earthworm / Nematodes , = ½

Decomposer breaks down complex ( organic ) matter into simpler ( inorganic ) matter = ½

Example : Fungus / Bacteria. = ½

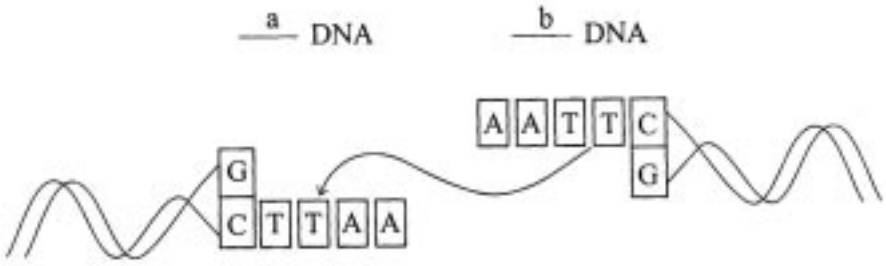
[ ½ × 4 =2 Marks]

**14. A mother of one year old daughter wanted to space her second child. Her doctor suggested CuT. Explain its contraceptive actions.**

Ans CuT release $Cu^+$ ions, increases phagocytosis of sperms , suppresses sperm motility , reduces fertilizing capacity. = ½ × 4 = 2

[2 Marks]

15.




**Study the linking of DNA fragments shown above.**

**(i) Name 'a' DNA and 'b' DNA.**

**(ii) Name the restriction enzyme that recognises this palindrome.**

**(iii) Name the enzyme that can link these two DNA fragments.**

Ans (i) 'a' – Vector DNA , 'b' – Foreign DNA , = ½ + ½ = 1

(ii) – EcoRI , = ½

(iii) – DNA ligase. = ½

[ 1+ ½ + ½ = 2 Marks]

**16 What is divergent evolution? Explain taking an example of plants.**

Ans The same structure developed along different directions due to adaptations to different needs. This is divergent evolution and these structures are homologous, = 1

Eg : Thorn of *Bougainvillea* and Tendrils of *Cucurbita* represent homology. = 1

[ 1+ 1 = 2 Marks]

**17. Name the blank spaces a, b, c and d in the table given below :**

| Type of Microbe | Name | Commerical Product |
|---|---|---|
| **Fungus** | **a** | **Penicillin** |
| **Bacterium** | ***Acetobacter aceti*** | **b** |
| **c** | ***Aspergillus niger*** | **citric acid** |
| **Yeast** | **d** | **ethanol** |

Ans a – *Penicillium notatum* ,

b – Acetic acid ,

c – Fungus ,

d – *Saccharomyces cerevisiae.* = ½ × 4 = 2

[ 2 Marks]

**18. Thermal power plants are inevitable in an industrial and densely populated country like ours. What harm do they do to the environment? Also mention any precaution that could be taken to save our environment.**

Ans Release particulate and gaseous air pollutants , hot thermal waste kills organism sensitive to high temperature , indigenous flora and fauna lost , = ½ × 3 = 1½

Use of electrostatic precipitator. = ½

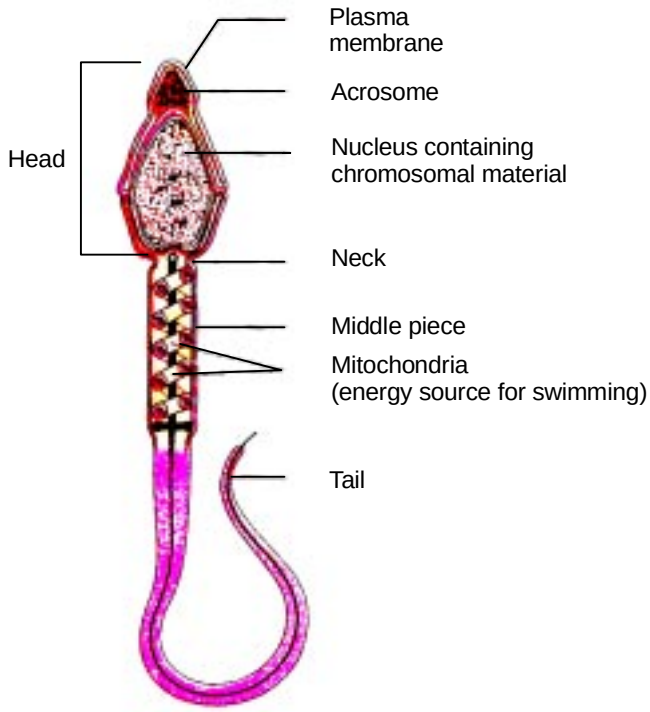
[ 1½+ ½ = 2 Marks]

## *SECTION C*

**Q.Nos. 19 - 27 are of three marks each.**

**19. Draw a labelled diagram of the microscopic structure of a human sperm.**

Ans.




Plasma membrane, acrosome, nucleus, mitochondria = ½ x 4 = 2

tail / centriole / head / neck / middle piece (any two) = ½ x 2 = 1

[2+1 = 3 Marks]

**20. Expand MOET. Explain the procedure of this technology in cattle improvement.**

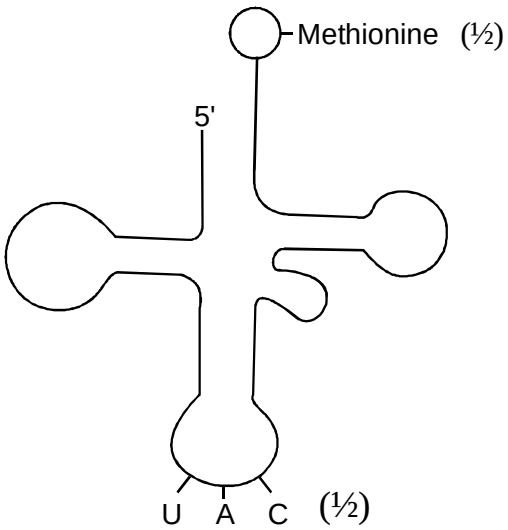
Ans. Multiple Ovulation Embryo Transfer Technology, = 1

Cow is administrated with FSH, 6 to 8 eggs are produced per cycle, mated with elite bull or artificially inseminated, fertilized egg at 32 cell stage transferred to surrogate mother. =½ × 4=2

[1+2=3 Marks]

**21 One of the codons on mRNA is AUG. Draw the structure of tRNA adapter molecule for this codon. Explain the uniqueness of this tRNA ?**

Ans.

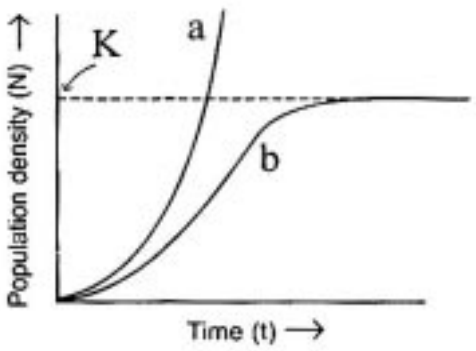



— Clover leaf shaped = 1

This tRNA is specific for methionine / can act as initiator tRNA. = 1

[3 Marks]

***22. Study the population growth curves in the graph given below and answer the questions which follow:**



**(i) Identify the growth curves 'a' and 'b'**

**(ii) Which one of them is considered a more realistic one and why ?**

**(iii) If $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$ is the equation of the logistic growth curve, what does K stand for?**

**(iv) What is symbolised by N ?**

Ans (i) 'a' – Exponential ,

'b' – Logistic / Sigmoid / Verhulst – Pearl Logistic , = ½ + ½ =1

(ii) 'b' – because food for the animals is finite and so will soon become a limiting factor , so in normal environment it will be the realistic one , = ½ + ½ = 1

(iii) 'K' – Carrying capacity , = ½

(iv) 'N' – Population density at time 't'. = ½

[ 1 + 1 + ½ + ½ = 3 Marks]

**23. How and why is the bacterium *Thermus aquaticus* employed in recombinant DNA technology? Explain.**

Ans Bacterium is a source of enzyme Taq polymerase , = 1

Which is isolated from bacterium *Thermus aquaticus,* and is used to amplify DNA *in vitro* (by PCR) = 1

It remains active even under high temperature at which DNA denatures. = 1

[1 +1 +1 =3 Marks]

**OR**

**(a) What are "molecular scissors" ? Give one example.**

**(b) Explain their role in recombinant DNA technology.**

Ans (a) Restriction enzymes ,

EcoRI / Hind II , = 1 + 1 =2

(b) They recognize and cut at aspecific site on DNA. = 1

[ 2 +1 =3 Marks]

**24. Given below is a part of the template strand of a structural gene :**

**TAC CAT TAG GAT**

**(a) Write its transcribed mRNA strand with its polarity.**

**(b) Explain the mechanism involved in initiation of transcription of this strand.**

Ans (a) 5' AUG GUA AUC CUA 3' , = ½ ( Polarity ) , = ½

(b) RNA polymerase, binds at 5 end, in the presence of ( initiation factor ) $\sigma$ factor , at the promoter site. = ½ × 4 = 2

[ ½ + ½ + 2 =3 Marks]

**25. (i) How and at what stage does *Plasmodium* enter into a human body ?**

**(ii) With the help of a flow-chart only show the stages of asexual reproduction in the life-cycle of the parasite in the infected human.**

**(iii) Why does the victim show symptoms of high fever ?**

Ans (i) Bite of female Anopheles mosquito , sporozoite , = ½ + ½ = 1

(ii) (Sporozoite reach liver cells through blood )

Asexual reproduction / liver cells burst , = ½

↓

Daughter cells are released into blood and parasite enter RBC , = ½

↓

Asexually reproduce ; RBC burst . = ½

↓

( fresh infection of RBC )

(iii) Due to release of toxin / haemozoin. = ½

[ 1 + ½ × 3 + ½ =3 Marks]

**26. It has been recorded that the temperature of the earth's atmosphere has increased by 0.6°C.**

**(a) What has caused this increase ?**

**(b) Explain its consequences.**

Ans (a) Increase in level of greenhouse gases , molecules of these gases do not allow the Infra red radiation of the earth to escape into space , this heat is radiated back , causing global warming. = ½ × 4 = 2

(b) Consequences – Polar ice caps and glaciers will melt , rise in sea level , mutation of DNA. (any two ) = ½ × 2 =1

[ 2 + 1 = 3 Marks]

***27. Explain the pattern of inheritance of haemophilia in humans. Why is the possibility of a human female becoming a haemophilic extremely rare ? Explain.**

Ans. Sex linked recessive disease , present on X chromosome ,= ½ + ½ = 1

Mother should be carrier and father should be haemophilic for a daughter to be affected ,=1

The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be atleast carrier and the father should be haemophilic (unviable in the later stages of life ) . / Shows criss cross inheritance from mother to son and from haemophilic father to daughter. =1

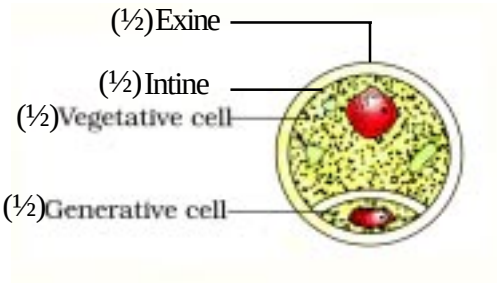
[1+1+1=3 marks]

## *SECTION D*

**Q.Nos. 28 - 30 are of five marks each.**

**28. Draw a labelled diagram of the sectional view of a mature pollen grain in angiosperms. Explain the functions of its different parts.**

Ans.




*= ½ × 4 = 2*

Exine – It can withstand high temperatures / strong acids / alkali ,

Intine – It is thin and continuous layer made up of cellulose and pectin ,

Vegetative cell – It is bigger , has abundant food reserve and a large irregularly shaped nucleus ,

Generative cell – It divides mitotically to give rise to the two male gametes.

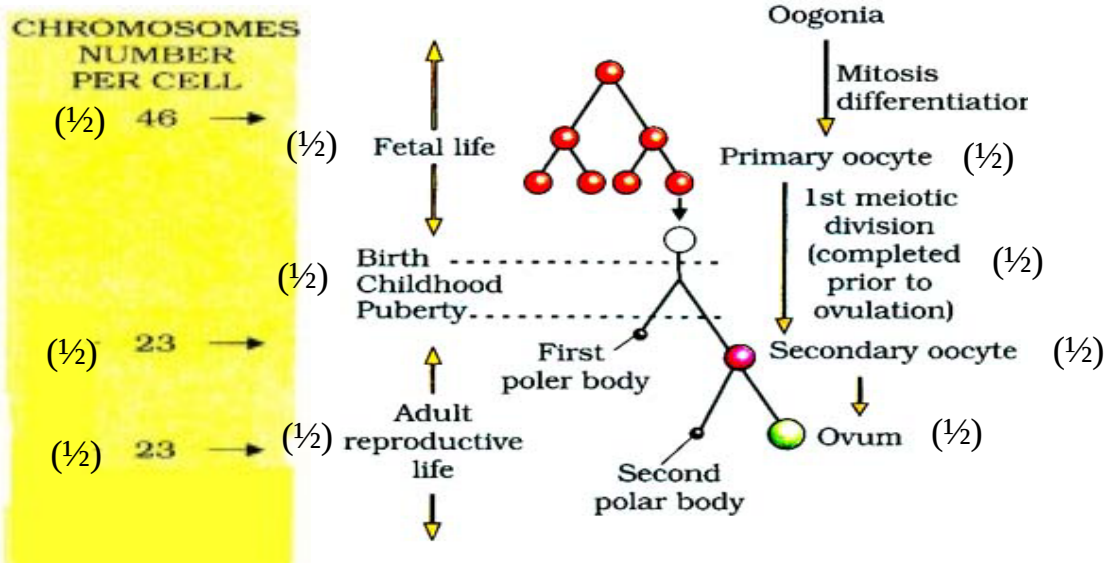
( any three) = 1 × 3 = 3

[ 2 +3 =5 Marks ]

**OR**

**Give a schematic representation of oogenesis in humans. Mention the number of chromosomes at each stage. Correlate the life phases of the individual with the stages of the process.**

Ans



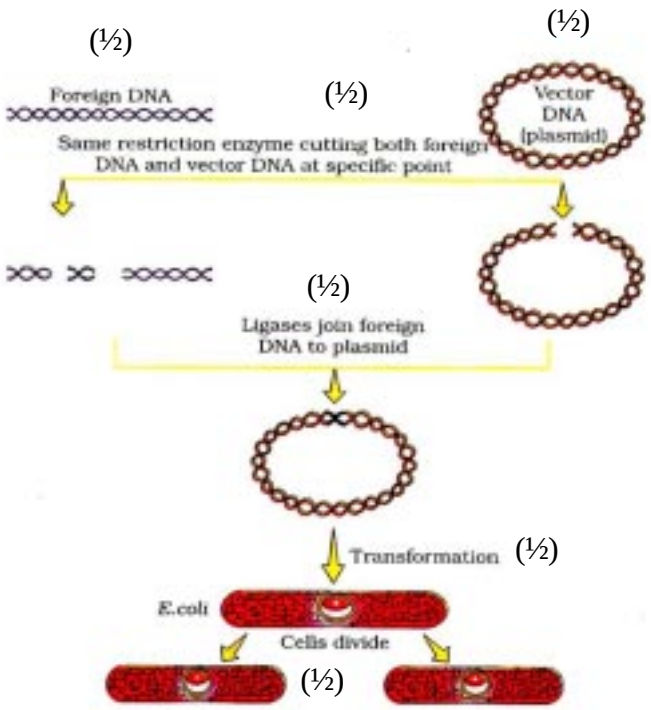

[ ½ × 10 = 5 Marks ]

**29. (a) Mention the role of vectors in recombinant DNA technology. Give any two examples.**

**(b) With the help of diagrammatic representation only, show the steps of recombinant DNA technology.**

Ans (a) To deliver an alien / foreign / desired piece of DNA into the host organism so that the foreign gene can be amplified , = 1

Example – Plasmids , Viruses. = ½ + ½ = 1




= ½ × 6 =3

[ 2 + 3 = 5 Marks ]

**OR**

**(a) What is a plasmid ?**

**(b) What is meant by ADA deficiency ? How is gene therapy a solution to this problem ? Why is it not a permanent cure ?**

Ans (a) Plasmid is an autonomously replicating circular extra chromosomal DNA of a bacterium. = 1

(b) Adenosine deaminase deficiency ,

Lymphocytes of the patient's blood is isolated, and grown in culture,

ADA cDNA is introduced into these lymphocytes , subsequently returned to the patient,

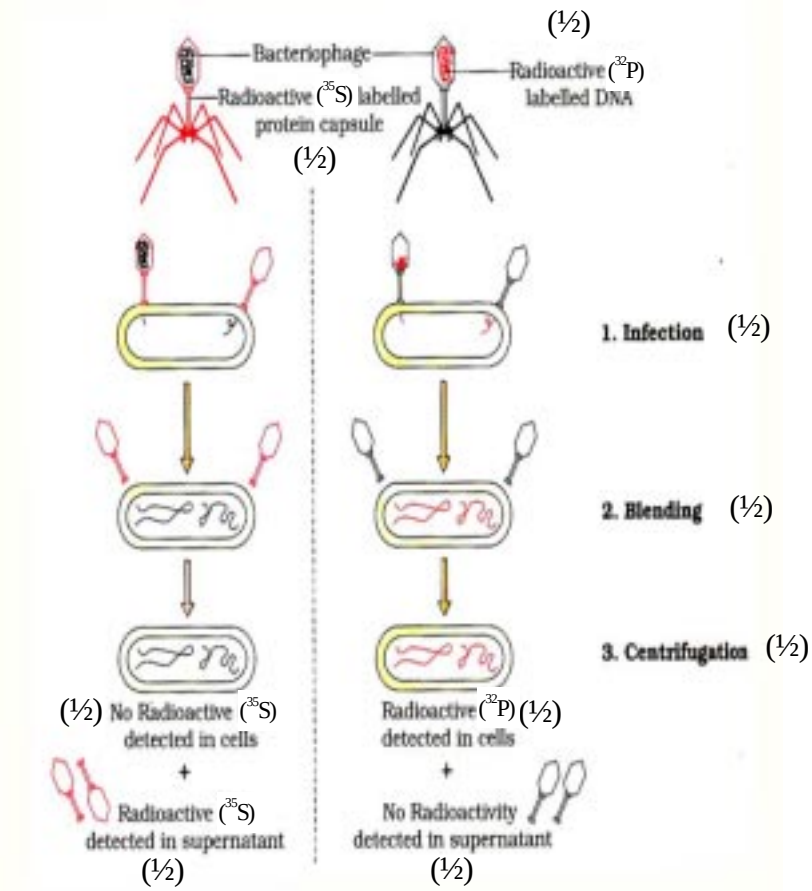
Cells could now produce ADA , deficiency overcome,

Because these genetically engineered lymphocytes are not immortal. = ½ × 8 = 4

[ 1 + 4 = 5 Marks]

**30. Explain Hershey-Chase experiment. What was proved through this experiment ?**

Ans (½)




= ½ × 9 = 4 ½

DNA is genetic material = ½

[ 4 ½ + ½ = 5 Marks]

**OR**

**(a) A true breeding pea plant, homozygous for inflated green pods is crossed with another pea plant with constricted yellow pods (ff gg). What would be the phenotype and genotype of $F_1$ and $F_2$ generations ? Give the phenotype ratio of $F_2$ generation.**

**(b) State the generalisation proposed by Mendel on the basis of the above mentioned cross.**

Ans (a) **Parents :** **F F G G** × **f f g g** = (½)
**Inflated green** **Constricted yellow**

**gametes :** FG fg = (½)

$F_1$ – Ff Gg × Ff Gg – (Hybrid) inflated green = (½)

selfing

| (½) | | FG | Fg | fG | fg | |
|---|---|---|---|---|---|---|
| | FG | FFGG<br>Inflated green | FFGg<br>Inflated green | FfGG<br>Inflated green | FfGg<br>Inflated green | $F_2$ |
| | Fg | FFGg<br>Inflated green | FFgg<br>Inflated yellow | FfGg<br>Inflated green | Ffgg<br>Inflated yellow | |
| | fG | FfGG<br>Inflated green | FfGg<br>Inflated green | ffGG<br>Constricted green | ffGg<br>Constricted green | |
| | fg | FfGg<br>Inflated Green | Ffgg<br>Inflated yellow | ffGg<br>Constricted green | ffgg<br>Constricted yellow | = 2 |

Phenotypes – Inflated Green : Inflated yellow : Constricted green : Constricted yellow

Phenotype ratio – 9 : 3 : 3 : 1

(b) Law of independent assortment = 1 [ 4 + 1 =5 Marks ]

QUESTION PAPER CODE 57/1

**EXPECTED ANSWERS VALUE POINTS**

**SECTION A**

***Q.Nos. 1 - 8 are of one mark each.***

**1. Name any two vertebrate body parts that are homologous to human forelimbs.**

Ans. Forelimbs of horse / cow / dog / cat ....

Wings of bird / bat.

Flippers of dolphins / whale / seal .....

(Any two)

[½ + ½ = 1 mark]

**2. When and why do some animals like snails go into aestivation ?**

Ans. Summer ,

To survive from heat / to escape from desiccation.

[½ + ½ = 1 mark]

**3. What is the economic value of *Spirulina* ?**

Ans. Food rich in proteins // single cell protein // reduces pollution if grown in large quantities in waste waters.=1

[1 mark]

**4. What was the speciality of the milk produced by the transgenic cow Rosie ?**

Ans. Contains human alpha lactalbumin ,

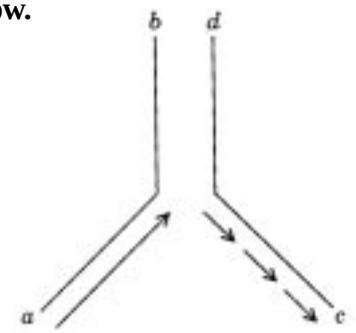
More balanced nutritionally than normal cow milk.

[½ + ½ = 1 mark]

**5. How do neutrophils act as a cellular barrier to pathogens in humans ?**

Ans. Phagocytose / kill / destroy microbes. [1 mark]

**6. Mention the polarity of the DNA strands a - b and c - d shown in the replicating fork given below.**




Ans. a-b = 3 / - 5 /

c - d = 5 / - 3 / [½ + ½ = 1 mark]

**7. Mention any two significant roles predation plays in nature.**

Ans. Conduits of energy transfer to the next trophic level / prey population is kept under control / helps in biological control / maintains species diversity. (Any two)

[½ + ½ = 1 mark]

**8. Why is the polar region not a suitable habitat for tiny humming birds ?**

Ans. When volume is considered surface area is large, loss of heat is more in cooler regions / difficult to generate more heat.

[½ + ½ =1 mark]

## *SECTION B*

***Q.Nos. 9 - 18 are of 2 marks each.***

**9. (a) Expand IUD.**

**(b) Why is hormone releasing IUD considered a good contraceptive to space children ?**

Ans. (a) Intra Uterine Device.

(b) Increases phagocytosis of sperms, reduces sperm mobility, makes uterus unsuitable for implantation, makes cervix hostile to sperms (Any two)

[1 + ½ + ½ = 2 marks]

**10. Name the interaction in each of the following :**

**(a) *Cuscuta* growing on a shoe flower plant**

**(b) Mycorrhizae living on the roots of higher plants**

**(c) Clown fish living among the tentacles of sea anemone**

**(d) Koel laying her eggs in crow's nest**

Ans. (a) Parasitism.

(b) Mutualism

(c) Commensalism

(d) Brood parasitism.

[½ × 4 = 2 marks]

**11. A plant of *Antirrhinum majus* with red flowers was crossed with another plant of the same species with white flowers. The plants of the $F_1$ generation bore pink flowers. Explain the pattern of inheritance with the help of a cross.**

Ans. Parents - Red Flower x White Flower

RR rr

Gametes - (R) (r) = ½

$F_1$ Rr - Pink = ½

Because gene for red colour is not completely dominant over the recessive gene = ½

Pattern of inheritance - Incomplete dominance = ½

[½ × 4 = 2 marks]

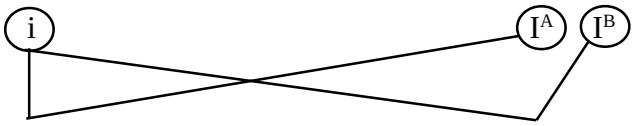
**OR**

**A woman with blood group O married a man with AB group. Show the possible blood groups of the progeny. List the alleles involved in this inheritance.**

Ans. Mother x Father

ii O Group $I^AI^B$ AB Group

Gametes i $I^A$ $I^B$



Progeny $I^Ai$ $I^Bi$

A Group B Group

Possible blood groups - A = ½

B = ½

Alleles - $I^A$, $I^B$, i - (All three = 1

Any two = ½

Any one = 0)

[½ + ½ + 1 = 2 marks]

**12. Why do sportspersons often fall a victim to cocaine addiction ?**

Ans. Cocaine being a stimulant , enhances performance.

[1 +1 = 2 marks]

**13. State the difference between the first trophic levels of detritus food chain and grazing food chain.**

Ans. DFC - Dead and decaying organic matter / Dead remains of plants and animals = 1

GFC - Living green plants / producers = 1

[1 + 1 = 2 marks]

**14. Coconut palm is monoecious while date palm is dioecious. Why are they called so ?**

Ans. Coconut palm - produces (unisexual) male and female flowers in the same plant ,

Date palm - produces (unisexual) male and female flowers in separate plants.

[1 + 1 = 2 marks]

**15. How can DNA segments, separated by gel electrophoresis, be visualised and isolated ?**

Ans. Visualised by staining the DNA fragments with ethidium bromide, exposing them to UV radiation (appear as bright orange bands). = ½+½=1

Bands are cut out from agarose gel, extracted from gel piece (by elution) = ½+½=1

[ 1 + 1 = 2 marks]

**16. How do Darwin's finches illustrate adaptive radiation ?**

Ans. Original stock of seed eating finches migrated to different habitats (of Galapagos Islands), adapted to different feeding methods, by altered beak structure, evolved into different types of finches. = ½ × 4=2

[2 marks]

**17. Name the blank spaces a, b, c and d from the table given below:**

| **Type of Microbe** | **Scientific name** | **Commercial product** |
|---|---|---|
| **Bacterium** | **a** | **Lactic acid** |
| **Fungus** | **b** | **Cyclosporin A** |
| **c** | ***Monascus purpureus*** | **Statin** |
| **Fungus** | ***Penicillium notatum*** | **d** |

Ans. a - *Lactobacillus* , = ½

b - *Trichoderma polysporum* , = ½

c - Yeast , = ½

d - Penicillin.= ½

[½ × 4= 2 marks]

**18. DDT content in the water of a lake that supplies drinking water to the nearby villages, is found to be 0.003 ppm. The kingfishers of that area are reported to have 2 ppm of DDT. Why has the concentration increased in these birds ? What harm will this cause to the bird population ? Name the phenomenon.**

Ans. DDT neither excreted nor metabolised, interferes with Calcium metabolism, decline in bird population / due to thinning of egg shell / premature breaking of eggs, bio-magnification.

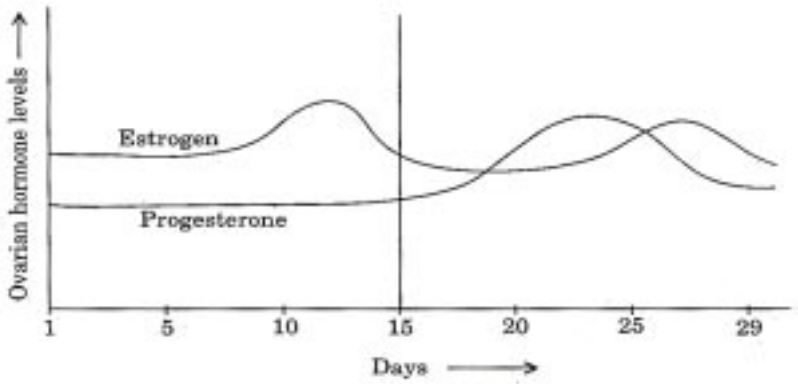
= ½ × 4 = 2.

[2 marks]

## *SECTION C*

***Q.Nos. 19 - 27 are of 3 marks each.***

**19.(a)**




**Read the graph given above and correlate the uterine events that take place according to the hormonal levels on**

**(i) 6-15 days**

**(ii) 16 - 25 days**

**(iii) 26 - 28 days (if the ovum is not fertilised)**

**(b) Specify the sources of the hormones mentioned in the graph.**

Ans. (a) (i) Regeneration of endometrium. = ½

(ii) Uterus gets highly vascularised, ready for embryo implantation = ½+½=1

(iii) Disintegration of the endometrium = ½

(½ + 1 + ½ = 2)

(b) Estrogen - by ovarian follicle. = ½
Progesterone - Corpus luteum = ½

(½ + ½ = 1)

[2 + 1 = 3 marks]

**20. Explain the role of baculoviruses as biological control agents. Mention their importance in organic farming.**

Ans. Baculoviruses produce narrow spectrum insecticides to kill insects and other arthropods which are species specific , does not affect non target organisms / no negative impact on other insects , mammals , birds , or fish.=1+1=2

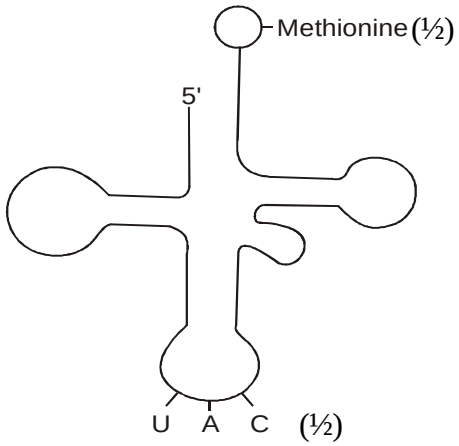
Eliminates the use of chemical pesticides. / conserves beneficial insects / integrated pest management =1

[ 2 + 1 = 3 marks]

**21. (a) Draw the structure of the initiator tRNA adaptor molecule.**

**(b) Why is tRNA called an adaptor molecule ?**

Ans. (a)

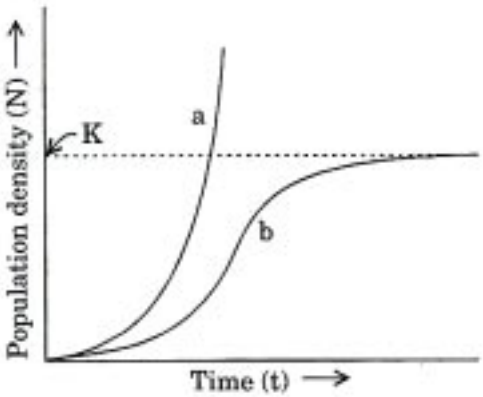



Clover leaf shape =1.

(b) On one hand it reads the code = ½.
On the other hand it binds to specific amino acid = ½.

[2 + 1 = 3 marks]

**22.**




**Study the population growth curves shown above.**

**(i) Identify curves 'a' and 'b'.**

**(ii) Mention the conditions responsible for the curves 'a' and 'b' respectively.**

**(iii) Give the necessary equation for the curve 'b'.**

Ans. (i) a - exponential curve = ½
b - logistic curve = ½

(ii) a - unlimited food resource / responses are not limiting the growth.= ½
b - limited food resource / responses are limting the growth.= ½

(iii) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

[1 + 1 + 1 = 3 marks]

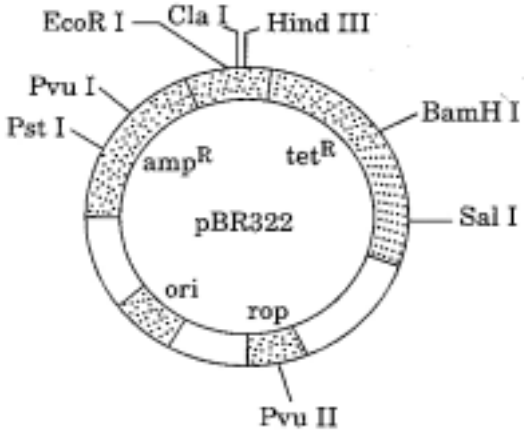
**23. Why is *Agrobacterium tumefaciens* a good cloning vector ? Explain.**

Ans. If any desired / foreign gene is linked with, Ti plasmid of *Agrobacterium tumifaciens*, the bacterium is modified into non-pathogenic, plasmid is cloned into multiple copies, can be delivered into a variety of plants, desired chemical will be produced.

[½ × 6 = 3 marks]

**OR**

**Explain the importance of (a) ori, (b) amp$^R$ and (c) rop in the *E. coli* vector shown below :**




Ans. (a) ori - origin of replication.

(b) ampR - ampicillin antibiotic resistant gene

(c) rop - gene to produce the proteins involved in the replication of the plasmid.

[1 × 3 = 3 marks]

**24.**


**Study the mRNA segment given above which is complete to be translated into a polypeptide chain.**

**(i) Write the codons 'a' and 'b'**

**(ii) What do they code for ?**

**(iii) How is peptide bond formed between two amino acids in the ribosome ?**

Ans. (i) a - AUG = ½

b - UAA / UAG / UGA = ½

(ii) AUG codes for Methionine. = ½

UAA / UAG / UGA - Stop codon / Nonsense codon / Does not code for any amino acid = ½

(iii) Charged tRNAs are brought closer together on mRNA in the ribosomes, ribosome acts as a catalyst (ribozyme) forming peptide bond.= ½ + ½ = 1.

[1 + 1 + 1 = 3 marks]

**25. (a) Name the infective stage of *Plasmodium* which *Anopheles* mosquito takes in along with the blood meal from an infected human.**

**(b) Why does the infection cause fever in humans ?**

**(c) Give a flow chart of the part of the life-cycle of this parasite passed in the insect.**

Ans. (a) Gametocyte = ½

(b) Haemozoin released during the rupture of RBC causes fever = ½

(c)

Gametocytes

↓

Formation of gametes = ½

↓

Fertilisation in the intestinal wall = ½

↓

Sporozoites are formed = ½

↓

They get into salivary glands = ½

↓

(Ready to infect when it bites another man)

[½ × 6 = 3 marks]

**26. A factory drains its waste water into the nearby lake. It has caused algal bloom.**

**(a) How was the algal bloom caused ?**

**(b) What would be the consequences ?**

**(c) Name the phenomenon that caused it.**

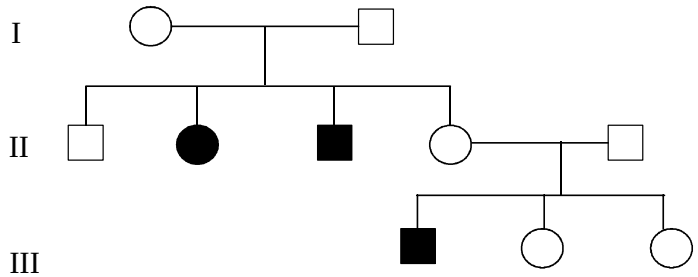
Ans. (a) Nutrients in the waste water causes / extensive growth or proliferation of planktonic or free floating algae. = ½

(b) Algae use $O_2$, BOD value goes high, deterioration of water quality, high fish mortality, scum and unpleasant odour / lake gets choked / faces death (any four) = ½ x 4 = 2

(c) Eutrophication = ½

[½ + 2 + ½ = 3 marks]

**27. Study the given pedigree chart and answer the questions that follow.**



**(a) Is the trait recessive or dominant ?**

**(b) Is the trait sex-linked or autosomal ?**

**(c) Give the genotypes of the parents in generation I and of their third and fourth child in generation II.**

Ans. (a) a - Recessive = ½

(b) b - Autosomal =½

(c) c- Parents - Aa and Aa = ½ + ½

Third child - aa = ½

Fourth child - Aa = ½

Any other alphabet can be taken in place of A and a.

[½ + ½ + 2 = 3 marks]

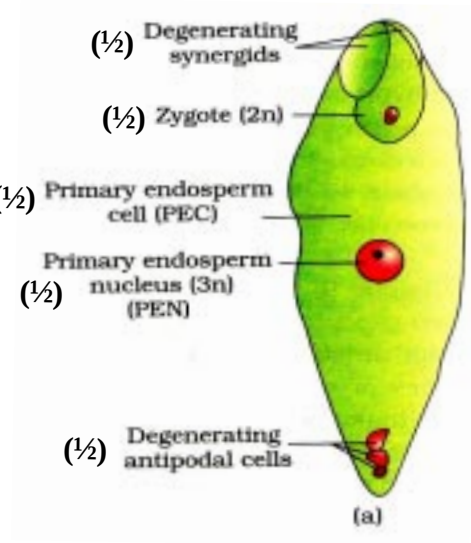
## *SECTION D*

***Q.Nos. 28 - 30 are of 5 marks each.***

**28. (a) Draw a schematic labelled diagram of a fertilised embryo sac of an Angiosperm.**

**(b) Describe the stages in embryo development in a dicot plant.**

Ans. (a)




**(**½ × 5 = 2½ )

(b) The zygote divides unequally to form two cells,

The smaller cell divides repeatedly to produce a row of 4-8 cells ,

The terminal cell divides to produce a cluster of cells called the globular embryo / proembryo The remaining cells constitute the suspensor ,

A few cells of the proembryo nearest of the suspensor develop into hypocotyl and radicle while other cells give rise to epicotyl , plumule and cotyledons. (½ × 5=2½)

[2½ + 2½ = 5 marks]

**OR**

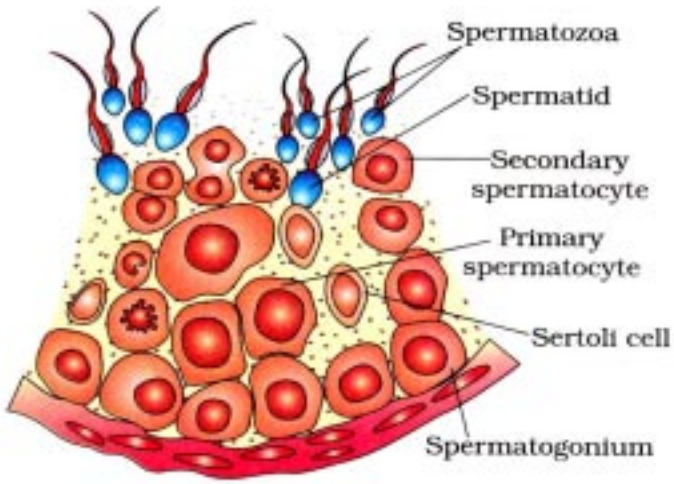
**(a) Draw a labelled diagram of a sectional view of human seminiferous tubule.**

**(b) Differentiate between gametogenesis in human males and females on the basis of**

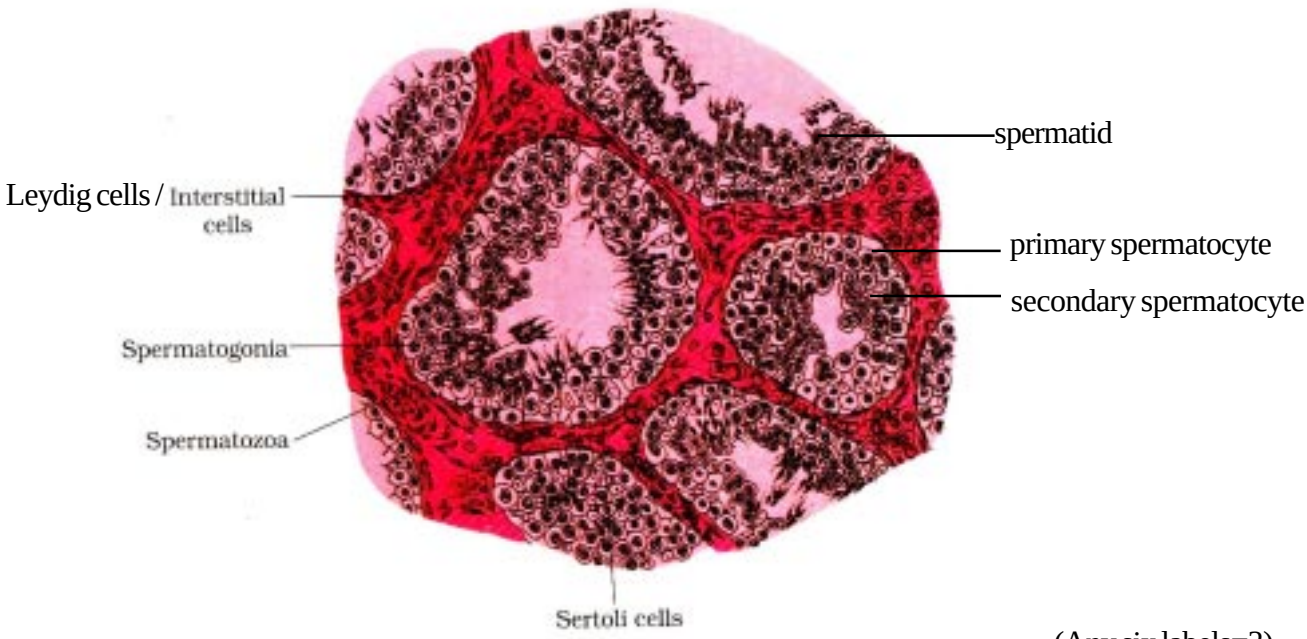
**(i) time of initiation of the process.**

**(ii) products formed at the end of the process.**

Ans. (a)




**OR**




(Any six labels=3)

(b) (i) Male - puberty
Female - foetal / embryonic stage

(ii) Male - sperm / spermatozoan

Female - ovum

(½ × 4 = 2)

[3 + 2 = 5 marks]

**29. Explain the steps involved in the production of genetically engineered insulin.**

Ans. Gene for chain A and gene for chain B of insulin are prepared , inserted into plasmid , of *E.coli* separately, *E.Coli* cultured and chains extracted , combined by disulphide bonds (to produce human insulin).

[1 × 5=5 marks]

**OR**

**(a) Name the nematode that infests and damages tobacco roots.**

**(b) How are transgenic tobacco plants produced to solve this problem ?**

Ans. (a) *Meloidegyne incognitia* = 1

(b) Nematode specific genes isolated cloned and introduced into tobacco plants ,

ds RNA are produced and RNAi interference initiated ,

mRNA translation silenced ,

survival of the nematode not possible in the host plant. = 1 x 4 = 4

[1+4=5 marks]

**30. What is 'semi-conservative' DNA replication ? How was it experimentally proved and by whom ?**

Ans. After the completion of replication (of one DNA molecule into two) each DNA molecule will have one parental strand and one newly synthesised strand = 1.

Messelson and Stahl = ½ + ½ =1

* *E.coli* grown in medium containing $^{15}NH_4Cl$ ($^{15}N$ - heavy Nitrogen) , for many generations to ensure that all DNA in the bacteria were heavy ,
* Heavy *E.coli* transferred to a medium with normal $^{14}NH_4Cl$ , (after 20 minutes) DNA of generation I extracted to measure their densities , they were of intermediate density ,
* After 40 minutes DNA of II generation were extracted and tested for their densities , they were of equal amounts of (hybrid) intermediate DNA , and light DNA / $^{14}NH_4Cl$.

(6 × ½ = 3)

[1 + 1 + 3 = 5 marks]

**OR**

**A homozygous tall pea plant with green seeds is crossed with a dwarf pea plant with yellow seeds.**

**(i) What would be the phenotype and genotype of $F_1$ ?**

**(ii) Work out the phenotypic ratio of $F_2$ generation with the help of a Punnett square.**

Ans. (i) Phenotype of $F_1$ - Tall and Yellow = ½

Genotype of $F_1$ - TtYy = ½

(ii) F1 TtYy x TtYy

F2

| | TY | Ty | tY | ty |
|---|---|---|---|---|
| TY | TTYY<br>Tall & Yellow | TTYy<br>Tall & Yellow | TtYY<br>Tall & Yellow | TtYy<br>Tall & Yellow |
| Ty | TTYy<br>Tall & Yellow | TTyy<br>Tall & Green | TtYy<br>Tall & Yellow | Ttyy<br>Tall & Green |
| tY | TtYY<br>Tall & Yellow | TtYy<br>Tall & Yellow | ttYY<br>Dwarf & Yellow | ttYy<br>Dwarf & Yellow |
| ty | TtYy<br>Tall & Yellow | Ttyy<br>Tall & Green | ttYy<br>Dwarf & Yellow | ttyy<br>Dwarf & Green |

Tall & Yellow : Tall & Green : Dwarf & Yellow : Dwarf & Green

9 : 3 : 3 : 1

Male gametes = ½

Female gametes = ½

Punnett sqaure = ½

Four phenotypes = 2

Ratio = ½

[1+4=5 marks]

# BIOTECHNOLOGY

***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.*

*(i) All questions are compulsory.*

*(ii) There is no overall choice. However, an internal choice has been provided in one question of three marks and two questions of five marks. You have to attempt only one of the choices in such questions. Question paper contains four sections - A, B, C and D.*

*(iii) Questions number 1 to 5 are very short answer questions, carrying 1 mark each.*

*(iv) Questions number 6 to 15 are short answer questions, carrying 2 marks each.*

*(v) Questions number 16 to 25 are also short answer questions, carrying 3 marks each.*

*(vi) Questions number 26 to 28 are long answer questions, carrying 5 marks each.*

*(vii) Use of calculators is not permitted. However, you may use log tables, if necessary.*

**QUESTION PAPER CODE 99/1**

**SECTION A**

**1.** Name the functionally inactive form of enzymes. How is chymotrypsinogen converted into an active enzyme. ½+½=1

**2.** In the presence of glycerol and high concentration of serum, it is possible to store animal cells for long periods at very low temperatures, why? 1

**3.** How have the molecular biologists taken advantage of the natural biological mechanisms for synthesis of large amounts of one of the strands of duplex DNA? 1

**4.** Suggest any two applications of the microbial culture technology that uses micro-organisms. 1

**5.** List two features of normal animal cell culture. 1

## SECTION B

**6.** The gene for a eukaryotic polypeptide hormone was isolated, cloned and over-expressed in a bacterium. After the polypeptide was purified from the bacterium, it failed to function in the organism from which the gene was isolated. Suggest two possibilities why the recombinant protein was inactive? 2

**7.** Expand 'BLAST'. What kind of analysis can be undertaken with this search tool? 2

**8.** What is a continuous culture? Give one application of continuous cultures in microbial technology. 2

**9.** Differentiate between primary and secondary plant metabolites. Name two secondary metabolites obtained through tissue culture. 2

**10.** Patients who are administered OKT-3 do not suffer from acute renal allograft rejection, why? 2

**11.** $^{5'}$CGCGGGGAATTCCCGGG$^{3'}$
$^{3'}$GCGCCCCTTAAGGGCCC$^{5'}$

Consider the above DNA molecule. Write down the sequence of the two restriction products as obtained by the action of EcoRI. 2

**12.** Given below is a list of the first 10 residues of the β helix in myoglobin from different organisms. Based on this information, which amino acids (a) are most conserved, and (b) are highly variable? 2

| Position → / Organism ↓ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Human | D | I | P | G | H | G | Q | E | V | L |
| Chicken | D | I | A | G | H | G | H | E | V | L |
| Alligator | K | L | P | E | H | G | H | E | V | I |
| Turtle | D | L | S | A | H | G | Q | E | V | I |
| Tuna | D | L | T | T | M | G | G | L | V | L |
| Carp | D | F | E | G | T | G | G | E | V | L |

**13.** Why is a nutrient medium autoclaved before it is used for culturing microbes? How will you sterilize a heat-labile substance such as an antibiotic solution? 2

**14.** Genes conferring resistance to insects are to be introduced into crop plants using Ti-plasmid of *Agrobacterium tumefaciens*. Describe the process in four essential steps. 2

**15.** While culturing microbes in the laboratory in a 500 ml conical flask, what measures do you suggest to enhance their growth? Suggest any two such measures. 2

## Section C

**16.** (i) The following reagents are often used in protein chemistry /proteomics :

(a) Coomassie blue

(b) Ampholytes

(c) Trypsin

(d) Ninhydrin

Indicate the use of each of them. ½x4=2

(ii) What is isoelectric point of a protein? 1

**17.** List the three databases retrieval tools available from the NCBI. Suggest any other three possible uses of NCBI resources. ½x3=1½ ½x3=1½

**18.** Name any two ways to measure microbial growth. Define doubling time. Which of these methods counts viable cells? 3

**19.** What is a callus and how can callus cultures be maintained for prolonged periods? List two applications of callus cultures. 1+1+½+½ = 3

**20.** Explain the use of the following instruments in an animal cell culture laboratory : 3

(a) $CO_2$ incubators

(b) Inverted microscopes

(c) Laminar air flow (LAF) hood

**21.** DNA microarray or chip technology allows one to monitor simultaneously the level of mRNA production from several genes of an organism. Do you think changes at mRNA level can be directly correlated with changes at protein levels? Justify your answer. Which alternative technique will be better suited for the above analysis? 1+1+1=3

**22.** Bioinformatic databases provide many different types of sequences such as cDNA, genomic DNA and EST. Suggest one possible use of each of these. 1x3=3

**Or**

What is nick translation? Suggest possible use of this technique in detecting chromosomal translocations. Draw a suitable diagram. 3

**23.** What are the potential risks of GM crops? List any six. ½x6=3

**24.** Why is it advantageous to supplement animal cell culture media with serum? 3

**25.** Why has sickle cell anaemia been selected in populations where malaria is endemic? What is the molecular basis of sickle cell anaemia? 3

## Section D

**26.** Name the technique developed by O'Farrel. Schematically depict the key steps in the separation of proteins using this technique. Highlight the basis of separation at each step. 1+2+2

**Or**

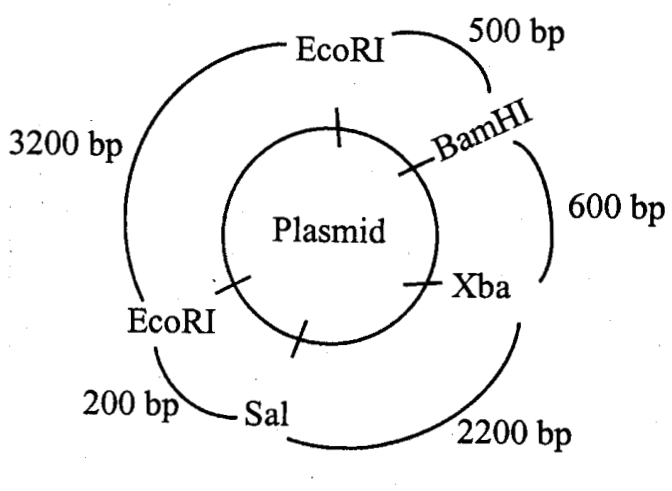
Describe the important parts of a mass spectrometer with the help of a suitable diagram. Explain how proteins are volatilised as well as analysed by a mass spectrometer. Why has this technique become so important in biotechnology? 5

**27.** (a) What are type II restriction endonucleases (RE)?

(b) Explain how RE are named?

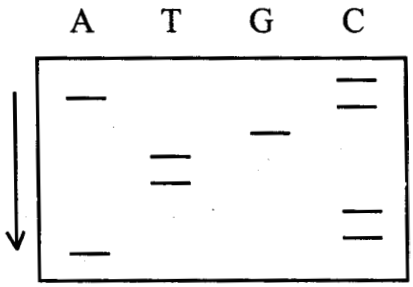
(c) Why are type II RE extensively used in recombinant DNA technology?

(d) The following is a restriction map of a plasmid. If this plasmid is digested completely with the enzymes EcoRI and Bam HI, what will be the sizes of the resultant fragments? 5



**28.** Define SNPs. Describe a possible use of this technique in medicine. Name any two diseases which can be diagnosed by this technique. 5

**Or**




Study the above autoradiogram for sequencing of a DNA fragment. Answer the following questions:

(a) Write the sequence as read from the autoradiogram in 5' $\rightarrow$ 3' direction. 2

(b) Name any one method commonly employed for DNA sequencing. 1

(c) Describe the use of ddNTPs in such process. 2

## QUESTION PAPER CODE 99

## SECTION A

**1.** Name any two naturally occurring enzymes which have a reactive serine at active site. 1

**2.** In the presence of DMSO and high concentrations of serum, it is possible to store animal cells for long periods at very low temperatures. Why? 1

**3.** Starting from double stranded DNA suggest a strategy for obtaining large amounts of pure single stranded DNA for sequencing purposes. 1

**4.** Suggest any two applications of microbial culture technology. 1

**5.** What is Erythropoietin? 1

## SECTION B

**6.** A genetic engineer wants to isolate a gene from a scorpion that encodes a deadly toxin, with the ultimate purpose of transferring the gene to bacteria and producing the toxin for use as a commercial pesticide. Should the genetic engineer create a genomic DNA library or a cDNA library? Explain your reasoning. 2

**7.** Expand 'BLAST'. What kind of analysis can be undertaken with this search tool? 2

**8.** Differentiate between batch culture and continuous culture. 2

**9.** Why do plants synthesize secondary metabolites? Name three secondary metabolites obtained through cell and tissue culture. 2

**10.** If you wish to scale up cells derived from human tissue, what kind of culture set-up will you use, and why? 2

**11.** Which vectors can be used to clone a fragment of DNA with the following lengths? 2

(a) 4 kb
(b) 35 kb
(c) 20 kb
(d) 250 kb 2

**12.** Given below is a list of the first 10 residues of the β helix in myoglobin from different organisms. Based on this information, which amino acids

(a) are most conserved?
(b) are most variable? 2

| Position → / Organism ↓ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Human | D | I | P | G | H | G | Q | E | V | L |
| Chicken | D | I | A | G | H | G | H | E | V | L |
| Alligator | K | L | P | E | H | G | H | E | V | I |
| Turtle | D | L | S | A | H | G | Q | E | V | I |
| Tuna | D | L | T | T | M | G | Q | L | V | L |
| Carp | D | F | E | G | T | G | G | E | V | L |

**13.** In culture, why is aeration important for microbial growth? How can proper aeration be achieved in microbial cultures grown in the laboratory? 2

**14.** How will you introduce novel genes into crop plants using Ti-plasmid of *Agrobacterium tumefaciens* ? Suggest additional two methods of gene transfer to plants. 2

**15.** While culturing microbes in the laboratory in a 500 ml conical flask, what measures do you suggest to enhance their growth? Suggest any two such measures. 2

## SECTION C

**16.** (i) The following reagents are often used in protein chemistry/proteomics : 2+1=3

(a) Coomassie blue

(b) Trypsin

(c) Ninhydrin

(d) Ampholytes

Indicate the use of each of them.

(ii) Define Proteomics.

**17.** (i) List any three database retrieval tools available from the NCBI.

(ii) Does similarity between two sequences always indicate their homology? Explain. 1½+1½=3

**18.** (i) Define microbial growth.

(ii) Explain one of the ways to monitor microbial growth.

(iii) Name a method to count live cells. 1+1½+½=3

**19.** What are protoplasts and how are they obtained from plant parts? List two applications of protoplast culture. 3

**20.** Explain the use of the following equipments in an animal cell culture laboratory : 3

(a) Inverted microscope

(b) $CO_2$ incubator

(c) Laminar air flow (LAF) hood

**21.** The relationship between the number of genes and the number of proteins is non-linear. Explain. 3

**22.** Bioinformatic databases provide many different types of sequences such as genomic DNA, ESTs and cDNA. Suggest one use of each of these databases. 3

**OR**

What is nick translation? Suggest possible use of this technique in detecting chromosomal translocation. Draw a suitable diagram.

**23.** What are the potential risks (any three) and benefits (any three) of GM crops? 3

**24.** Why are animal cell culture media supplemented with fetal calf serum? 3

**25.** Why is sickle cell anemia called a molecular disease? How can it be detected and confirmed? 3

## SECTION D

**26.** Schematically depict the key steps in the separation of proteins using O'Farrell's technique. Highlight the basis of separation at each step. Suggest one application of this technique. 2+2+1=5

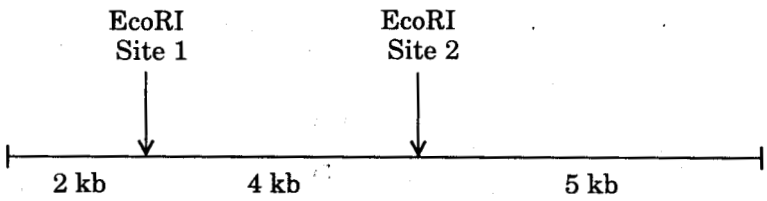
**OR**

Describe the important parts of a mass spectrometer with the help of a suitable diagram. Explain how proteins are volatilised as well as analysed by a mass spectrometer. Why has this technique become so important in biotechnology ? 5

**27.** (a) Why do bacteria produce RE ? 1

(b) Why is the DNA of the micro-organism not degraded by the RE it produces? 1

(c) Restriction mapping of a linear piece of DNA reveals the following EcoRI restriction sites:




(i) This piece of DNA is cut by EcoRI, the resulting fragments are separated by gel electrophoresis and the gel is stained with ethidium bromide. Draw a picture of the bands that will appear on the gel. 2

(ii) If a mutation that alters EcoRI Site 1 occurs in the piece of DNA, how will the banding pattern on the gel differ from the one you drew in part (i) ? 1

**28.** Schematically illustrate the technique of site-directed mutagenesis and explain two applications of the technique. 5

**OR**

What are the essential features of a vector? What is the role of DNA ligase and alkaline phosphatase in recombinant DNA technology? What is the source of these enzymes? 5

# Marking Scheme — Biotechnology

**General Instructions :**

***The Marking Scheme and mechanics of marking***

1. All awarded marks are to be written in the left hand margin at the end of the question or its part.
2. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place "Half-tick" ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
3. If no marks are awarded to any part or question put a cross (×) at incorrect value portion and mark it zero (in words only).
4. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
5. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.
6. If parts have been attempted at different places do the totalling at the end of the part attempted last.
7. If any extra part is attempted or any question is reattempted, score out the last one and write "extra".
8. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
9. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
10. Some of the questions may relate to higher order thinking ability. These questions will be indicated to you separately by a star mark. These questions are to be evaluated carefully and the students' understanding / analytical ability may be judged.
11. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.

QUESTION PAPER CODE 99/1

**EXPECTED ANSWERS/VALUE POINTS**

**SECTION A**

1. Zymogens; *In-situ* proteolytic cleavage. ½ + ½

2. Glycerol: ice crystals not found.
   Serum: Integrity of cells maintained. ½ +½

*3. By using life cycle of phage like M13. 1

4. **Any two** of the followings: ½ x 2
   - Production of whole microbial cells.
   - Production of primary metabolites.
   - Production of secondary metabolites.
   - Biotransformation reactions.
   - Exploitation of metabolism.
   - Production of recombinant proteins.

5. **Any two** of the following: ½ x 2
   - Grows for a limited number of generations.
   - Contact inhibition.
   - No cell-cell interaction.
   - No cell-matrix interaction.
   - No 3-D structure.
   - Alteration in hormonal and nutritional environment.

**SECTION - B**

*6. a) Improper folding into correct 3-D structure.
   b) Cleavage/modification like addition of carbohydrates. 1+1=2

7. a) Basic Local Alignment Search Tool
   b) Helps to analyze sequence information (Homology searches) 1+1=2

8. a) In a continuous culture, nutrients are supplied at rate volumetrically equal to that at which the cells and products are removed.
   b) Suitable for production of biomass.

**OR**

Treatment of liquid waste. 1+1=2

9. Primary metabolites – required for basic metabolic processes.
Secondary metabolites – confer additional benefits like defense. ½ x2 = 1

**Any two** secondary metabolites - alkaloids, resins, tannins, latex, taxol, vincristine, shikonin, artemisin, any other example. ½ x2 = 1

10. T-cells play a major role in allograft rejection. OKT-3 targets CD3 surface marker on T cells and removes these cells from circulation and from the grafted tissue. 2

11. 5' CGCGGGG 3' 5' AATTCCCGGG 3'
3' GCGCCCCTTAA 5' 3' GGGCCC 5' 1+1=2

*12. a) Most conserved – Position 6 (gly) and Position 9 (val) ½ x 2=1

b) Most variable – Positions 3 & 4 ½ x 2=1

13. To destroy microbial contamination.
By use of Membranes/ Ultrafilters 1+1=2

14. General strategy (all these points should be covered):

i. Use leaf discs/ embryonic callus.

ii. Infect with *Agrobacterium* carrying recombinant disarmed Ti- plasmid vector by co- cultivating them.

iii. Shift to selection medium for regeneration.

iv. Transfer regenerated shoots to root inducing medium.

v. Hardening.

vi. Transfer to soil. 2

15. Two of the following:

- Improve aeration by shaking through baffle flasks/ shakers.
- Modify medium composition.
- Monitor physical condition - temperature / pH etc. 1+1=2

## SECTION - C

16. i) a) For protein staining.
    b) To generate pH gradient in IEF.
    c) For peptide sequencing.
    d) To stain peptides/ amino acids. ½ x 4 = 2

    ii) pH at which there is no net charge on the protein. 1

17. Retrieval tools
    - ENTREZ
    - TAXONOMY BROWSER
    - LOCUS LINK ½ x 3 = 1½

    Uses of NCBI databases (**any three**):
    - Similarity searches.
    - Find chromosomal sequences.
    - Genome analysis.
    - Analysis of genome expression patterns.
    - Molecular structures. ½ x 3 = 1½

18. a) Ways to measure microbial growth (**any two**):
        - Measurement of cell mass.
        - Measuring absorbance of cell suspension (turbidity)
        - Counting the cell number (coulter counter).
        - Measuring dry weight.
        - ATP measurement.
        - Viable plate count ½ x 2 = 1

    b) Time for cell mass to double its original. 1

    c) Viable plate count. 1

19. a) Unorganized mass of cells, generally parenchymatous.
    b) By repeated subculturing. 1+1 = 2
    c) Any two applications:
        - Plant regeneration
        - Genetic transformation
        - Preparation of single cell suspension ½ x 2 = 1

20. a) Maintain high relative humidity.
Maintain fixed level of $CO_2$ ½ x 2 = 1

b) For looking cells at the bottom of the Petri-dish. 1

c) For maintaining the work area free from contamination. 1

*21. a) Not necessarily.

b) Translational control also affects protein synthesis.

c) 2-D gel electrophoresis / SDS-PAGE / Proteomics. 1+1+1=3

22. a) cDNA - looking at expressed part of genome (without introns).

b) Genomic DNA - structure of genomic information.

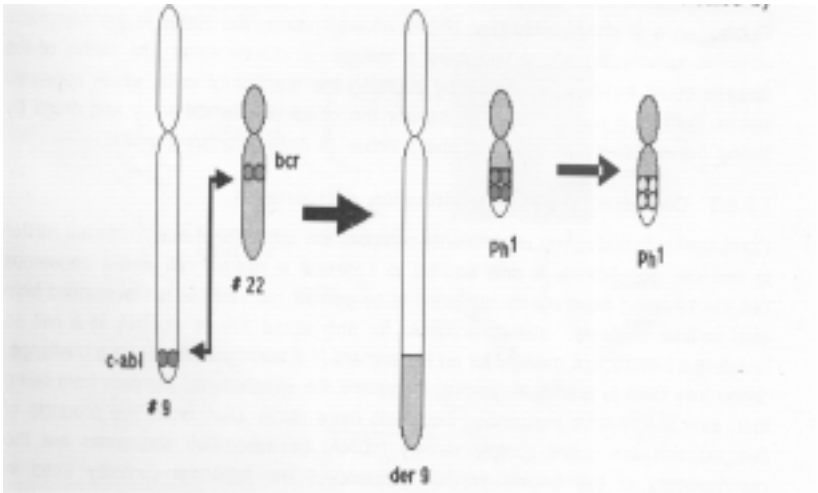
c) EST- looking at expressed sequence pattern. 1+1+1=3

**OR**

i. Nick translation - nicking /cutting of one strand of DNA

ii. by DNase I and extension by DNA pol I to introduce labeled nucleotides.

iii. For detecting chromosomal translocations as in CML (include diagram). 1+1+1=3




23. **Any three:**

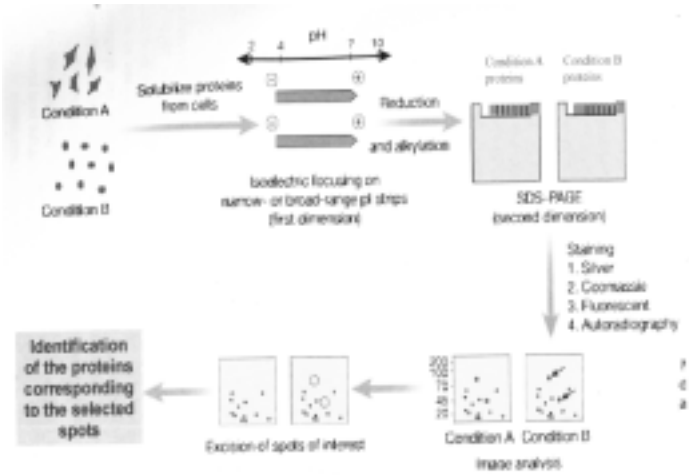
- Safety for human/ animal consumption (may cause allergenicity).
- Effect on biodiversity and environment.
- Effect on non-target and beneficial insects/microbes.
- Transgene escape leading to development of super weeds.
- Change the fundamental vegetable nature of plants.
- Exacerbation of antibiotic resistance in human/animal pathogens.
- Changes in evolutionary patterns. 1+1+1=3

24. i) Contains growth factors that promote cell proliferation.
ii) Contains cell attachment / adhesion factors.
iii) Source of amino acids/ hormones/ lipids/ vitamins /polyamines/ salts. 1+1+1=3

25. i.) Sickled RBCs resist malarial infection.
ii.) Substitution of Glu by Val at position 6 in the β-chain making haemoglobin hydrophobic & sickled shape RBC. 1½ x 2=3

## SECTION - D

26. i) 2-D gel electrophoresis.
ii) Schematic depiction:




iii) Basis of separation:
- IEF- Isoelectric pH difference
- SDS-PAGE- Differences in molecular mass. 1+2+2 = 5

**OR**

i) Parts of a mass spectrometer as shown in diagram:

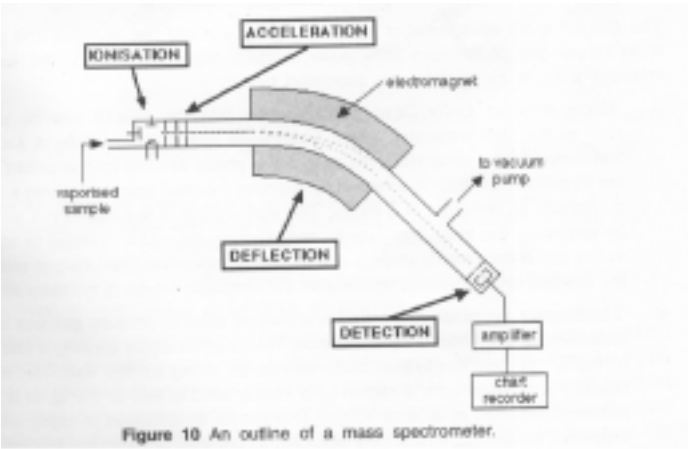


Figure 10 An outline of a mass spectrometer.

ii) Proteins dissolved in matrix, laser beam applied, protein ionizes, charged molecules are accelerated through evacuated tubes and separated by m/z ratio.

iii) It is extremely useful for obtaining protein structural information – peptide mass determination /identifying type and location of protein modification / can characterize picomoles of proteins. 2+2+1=5

27. a) Recognize palindromes and make double stranded cuts within sequence.

b) First letter is from the genus name of the bacterium, then the first two letters of its species, next is the strain of the organism and last numeral signify order of discovery.

c) Used as molecular scissors to generate reproducible fragments.

*d) 500 bp, 3000 bp and 3200 bp 1+1+1+2=5

28. a) Single nucleotide variations.

b) Describe any one:

- Physicians can predict how patients are likely to respond to a medicine.
- Importance in diagnosis of certain diseases.

c) Alzheimer's Disease; Resistance to HIV/AIDS 1+2+2=5

**OR**

a) 5′- ACCTTGCAC- 3′ (directionality should be marked).

b) Sanger's dideoxy chain termination method.

c) Dideoxy nucleotide triphosphates (ddNTPs) differ from dNTPs in having a hydrogen atom attached at the 3'-carbon rather than hydroxyl group. These molecules terminate DNA chain elongation because after incorporation they cannot form a phosphodiester bond with the next dNTP leading to chain termination. 2+1+2=5

QUESTION PAPER CODE 99

**EXPECTED ANSWERS/VALUE POINTS**

**SECTION - A**

1. Subtilisin / Trypsin / Chymotrypsin (Any two) ½ + ½

2. DMSO prevents formation of ice crystals (functions as cryopreservative);
Serum helps to maintain integrity of the cells. ½ + ½

3. By using life cycle of phage like M13. 1

4. **Any two** of the followings:
   - Production of whole microbial cells.
   - Production of primary metabolites.
   - Production of secondary metabolites.
   - Biotransformation reactions.
   - Exploitation of metabolism.
   - Production of recombinant proteins. ½ + ½

5. Hormone like substance required for proliferation and differentiation of erythropoietic cells. 1

## SECTION - B

*6. cDNA library; Bacteria lack machinery for removing introns. 1+1=2

7. Basic Local Alignment Search Tool; Helps to analyze sequence information (Homology searches). 1+1=2

8. **Any two points each:**

   Batch Culture:
   - Limited amount of nutrients.
   - Closed culture system.
   - Organism shows normal growth phases.
   - Growing cells exposed to changing chemical environment.

   Continuous culture:
   - One of the nutrients is in limited quantity.
   - Nutrients supplied at rate volumetrically equal at which cells and products are removed.
   - Log phase can be maintained for extended period of time.
   - Chemical environment is constant most of the time. ½ x 4 = 2

9. a) For defense against pests/pathogens. ½

   b) Any three:
   Taxol/Artemisin/Shikonin/Vincristine/Capsaicin etc. ½ x 3 =1½

*10. a) Roller bottles/ microcarrier beads/ spinner cultures.

   b) Increase surface area for growth and hence can attain high density. 1+1=2

11. a) Plasmid
    b) Cosmid
    c) λ - Phage
    d) BAC ½ x 4 =2

*12. a). Most conserved – Position 6 (gly) & Position 9 (valine)
    b). Most variable – Positions 3 & 4 ½ x 4 =2

13. a) For efficient $O_2$ transfer to growing microbes.
    b) By the use of shakers/ baffle flasks. 1+1=2

14. a) Infection of leaf disc/ callus with *Agrobacterium* carrying novel gene in its Ti plasmid followed by selection and regeneration of plants (stepwise answer is also acceptable). 1
    b) Any two:
    - PEG mediated
    - Microinjection
    - Electroporation
    - Biolistics (particle gun) ½ x 2 =1

15. Two of the following:
    - Improve aeration by shaking using baffle flasks/ shakers.
    - Modify medium composition.
    - Monitor physical conditions such as temperature/pH etc. 1+1

## SECTION - C

16. i) a). Protein staining.
    b). Proteolytic cleavage in sequencing.
    c). Staining peptides/ amino acids.
    d). To generate pH gradient in IEF. ½ x 4 =2
    ii) Characterization of the entire protein complement of cells, tissues and organisms. 1

17. i) Database retrieval tools:
    - ENTREZ
    - TAXONOMY BROWSER
    - LOCUS LINK ½ x3=1½

    ii) No. Homology only refers to common ancestry and not to function. 1½

18. i.) An orderly increase in all chemical components of the cell in the presence of suitable medium and environment. 1

ii.) Any one of the following:

- Measurement of cell mass.
- Measuring absorbance of cell suspension (turbidity)
- Counting the cell number (coulter counter).
- Measuring dry weight.
- ATP measurement.
- Viable plate count 1½

iii.) Viable cell count. ½

19. Plant cells without cell wall; By the use of cellulase/ hemicellulase/ pectinase. 1+1

Applications (**Any two**):

- Biochemical & metabolic studies
- Somatic hybrids
- Cybrids
- Genetic manipulation ½ x2=1

20. a) Inverted Microscope: To view cells at the bottom of the Petri plate.

b) $CO_2$ Incubator: To maintain humidity and fixed $CO_2$ levels.

c) LAF: To maintain work area free from contamination. 1+1+1

*21. In points or as diagram, following points are to be included:

Transcriptional regulation

Alternative splicing, mRNA editing, polyadenylation

Translational regulation

Proteolysis, post-translational modifications, localization. 3

22. Genomic DNA- structure of genomic information.

EST- looking at expressed sequence pattern.

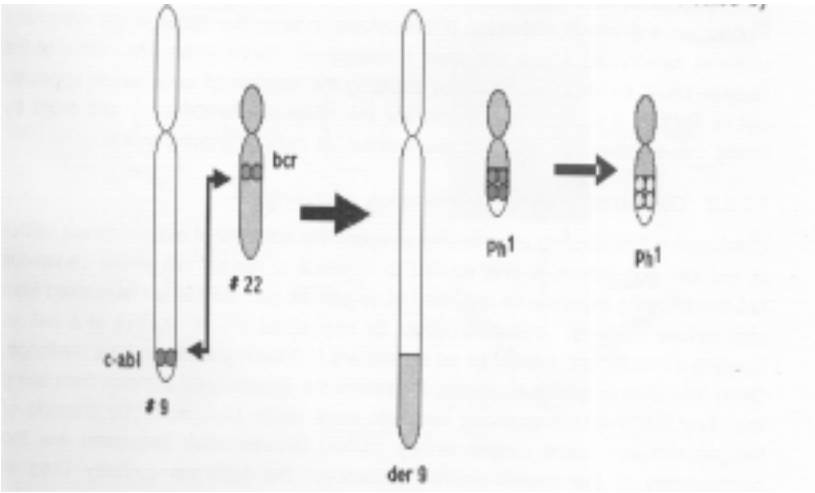
cDNA - looking at expressed part of genome (without introns). 1+1+1

**OR**

i. Nick translation - nicking /cutting of one strand of DNA

ii. by DNase I and extension by DNA pol I to introduce labeled nucleotides.

iii. For detecting chromosomal translocations as in CML (include diagram). 1+1+1




23. Any three from the following:

**Risks**

- Safety for human/ animal consumption (allergenicity).
- Effect on biodiversity/ environment.
- Effect on non-target/ beneficial insects/ microbes.
- Escape of transgene to related plant species.
- Change in fundamental vegetables nature of plants.
- Horizontal transfer of antibiotic resistance marker genes.
- Changes in evolutionary patterns.

**Benefits**

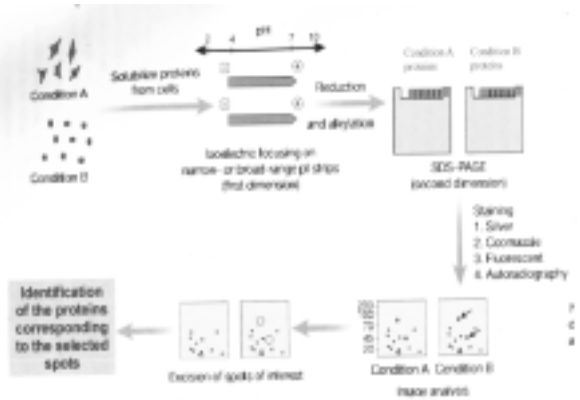
- Herbicide tolerance.
- Insect resistance.
- Disease resistance.
- Improved nutrient quality.
- Diagnostic & therapeutic proteins.
- Edible vaccines.
- Biodegradable plastics.
- Metabolic engineering & secondary products. 1+1+1=3

24. i) Contains growth factors that promote cell proliferation.
    ii) Contains cell attachment / adhesion factors.
    iii) Source of amino acids/ hormones/ lipids/ vitamins /polyamines/ salts. 1+1+1=3

25. i) Sickle cell haemoglobin differs in charge from normal haemoglobin because in beta chain glutamic acid residue at position 6 is replaced by val.
    ii) Can be detected by altered morphology of RBCs (sickle shaped).
    iii) Can be confirmed by protein fingerprinting. 1+1+1=3

## SECTION - D

26. Schematic depiction of 2-D gel electrophoresis:




Basis of separation:

IEF- Isoelectric pH difference.

SDS-PAGE- Differences in molecular mass.

Application: comparing protein profiles. 2+2+1=5

**OR**

i) Parts of a mass spectrometer:

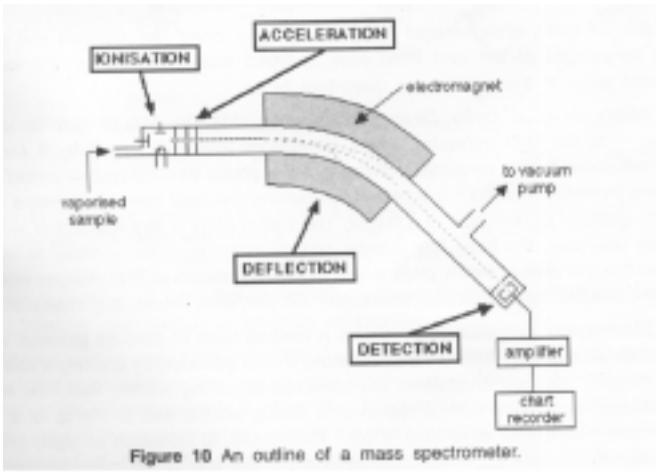



Figure 10 An outline of a mass spectrometer.

ii) Proteins dissolved in matrix, laser beam applied, protein ionizes, charged molecules are accelerated through evacuated tubes and separated by m/z ratio.

iii) It is extremely useful for obtaining protein structural information – peptide mass determination /identifying type and location of protein modification / can characterize picomoles of proteins. 2+2+1=5

27. a) To restrict the propagation of foreign DNA/ phages. 1

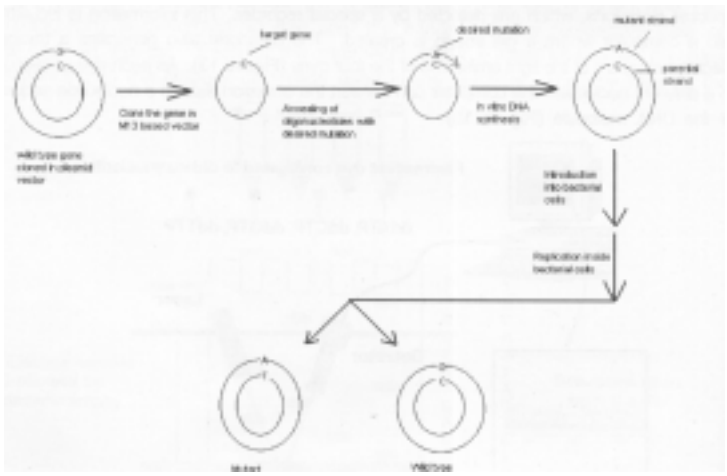
b) Due to methylation of host DNA. 1

*c) i) 2

ii) 1

| | i) | ii) |
|---|---|---|
| 6kb | | — |
| 5kb | — | — |
| 4kb | — | |
| 2kb | — | |

28. i) Schematic illustration of site-directed mutagenesis:



ii) Creating mutation to increase stability of enzyme;
Increasing catalytic efficiency etc. 3+1+1=5

**OR**

i) Origin of replication, Selectable markers, MCS/ Polylinker, Small in size.

ii) DNA ligase – join fragments; Alkaline phosphatase – removes terminal phosphate.

iii) Ligase - T4; Alkaline phosphatase – calf / bacterial. 2 +2 + ½x2=5

# INFORMATICS PRACTICES

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

**Note:**

(i) This question paper is divided into 3 sections.

(ii) Section A consists of 30 marks.

(iii) Section B and Section C are of 20 marks each.

(iv) Answer the questions after carefully reading the text.

**QUESTION PAPER CODE NO. 90/1**
**SECTION A**

**1.** Answer the following questions:

(a) Expand the following terms: 2

(i) OSS

(ii) SDLC

(b) What are the following software used for? 2

(i) Linux

(ii) Tomcat

(c) Differentiate between data warehouse and data mining. 2

(d) Name any two stages of the System Development Life Cycle. 2

(e) Identify the type of relationship represented by the following statements and draw an entity relationship diagram to show it .

"A person may be on one or more junk mail lists. Each junk list may contain one or more persons." 2

**2.** Answer the following questions:

(a) What is an iterative statement? Name any two iterative statements provided in Visual Basic. 2

(b) Name and explain the usage of any two types of modules available in Visual Basic. 2

(c) What is the extension of a code file and form file in Visual Basic? 2

(d) Explain the term ADO object model. Differentiate between the Connection Timeout and Command Timeout properties of the Connection object. 2

(e) Name and explain the usage of anyone relational and one logical operator used in Visual Basic. 2

**3.** Answer the following questions:

(a) Define a trigger. Name any two types of triggers supported by PL/SQL. 2

(b) Explain the usage of % TYPE attribute for variable declaration with the help of an example. 2

(c) Differentiate between COMMIT and ROLLBACK commands. 2

(d) Name the SQLcommands for the following situations: 2

(i) To physically delete a table.

(ii) To view the structure of a table.

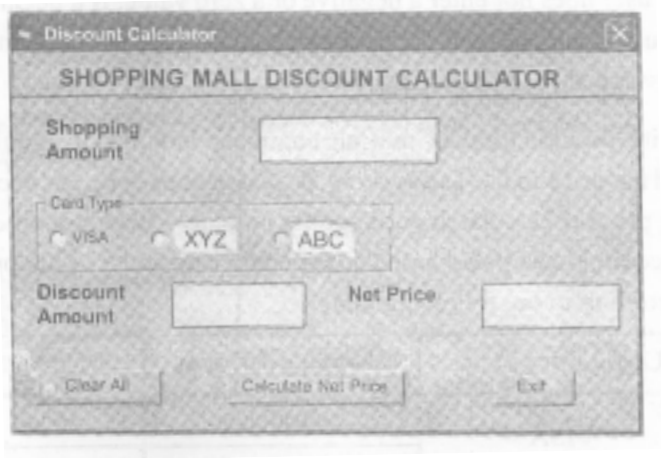
(e) Name the keyword used to : 2

(i) explicitly define a constraint that each row of a table must satisfy

(ii) give a default value to a column.

## SECTION B

**4.** Read the following case study and answer the questions that follow:
The YouWe event managers company is organizing a shopping festival in the SHOP TILL DROP Mall. The accounts manager is creating a software to calculate the discount during the shopping festival. Each customer is given a discount on the total amount spent (in all the shops) in the mall. The discount is given based on the credit card used. The following is the data entry screen used at the mall:



The list of controls for the above form is as follows:

| Object Type | Object Name | Description |
|---|---|---|
| Form | FrmDiscount | The main form |
| Text Box | TxtAmt | To input the total Shopping Amount |
| | TxtDisc | To display Discount Amount |
| | TxtNet | To display Net Price |
| Option Buttons | OptVisa | To select VISA credit card |
| | OptABC | To select ABC credit card |
| | OptXYZ | To select XYZ credit card |
| Command Buttons | CmdCalc | To calculate Discount and Net Price |
| | CmdClear | To clear all textboxes |
| | CmdExit | To Exit from the application |

(a) Write the code for CmdExit command button to display a message "Thank You for shopping in SHOP TILL DROP Mall" and exit out of the application. 1

(b) Write the code for the CmdClear command button to

(i) clear all the textboxes

(ii) disable the TxtDisc and the TxtNet textboxes 2

(c) Write the code for the change event of the TxtAmt textbox to ensure that the user does not enter a negative or a zero value. If a negative or a zero value is entered then the textbox should be made blank and a worning message should be displayed. 3

(d) Write the code for the CmdCalc command button to display the discount and net price in the TxtDisc and TxtNet textboxes respectively. Note that net price is calculated as shopping amount - discount amount and the discount is calculated based on the credit card and total shopping amount according to the following table. 4

| Credit Card Type | Shopping Amount | Discount |
|---|---|---|
| VISA | <10000 | 10% |
| | >=10000 | 20% |
| XYZ | <15000 | 15% |
| | >=15000 | 25% |
| ABC | <10000 | 15% |
| | >=10000 | 25% |

**5.** Answer the following questions:

(a) Find the errors from the following code segment and rewrite the corrected code underlining the correction made. 2

```
Publicised Function compareStr (ByValue strl As String, str2 As String) As
Bool
Dim ans As Integer
    If strl = str2 Then
        ans=O
ElseIf strl<str2 Then
        ans = -1
Else
        ans = 1
End If
compareStr=ans
End Sub
```

(b) Find the output of the following code: 2

```
Private Sub Commandl_Click ( )
Dim name As String
Dim I As Integer
I = 1
name = "TATA"
Do While I < = Len (name)
    Print InStr (Mid (name, I), "A")
    I = I + 1
Loop
End Sub
```

(c) Rewrite the following code using If Then Else construct without affecting the output: 2

```
Sum = 0
For I = 0 TO 4
  For J = 0 TO I -1
    Select Case (I + J+ 1)
      Case -1,0
        Sum = Sum + 1
      Case 1,2,3
        Sum = Sum + 2
```

```
        Case Else
            Sum = Sum + 3
    End Select
```

(d) Write a Visual Basic procedure that takes a number as argument and displays the sum of all the digits in the number. For example if the argument passed is 354, the procedure should display 12 (i.e. 3 + 5 + 4). 4

## SECTION C

**6.** Read the questions given below and answer, accordingly:

(a) Write the output produced by the following PL/SQL code: 2

```
Declare
    X NUMBER;
    Y NUMBER;
BEGIN
    Y: = 10;
    FOR X IN 1..4
    LOOP
        IF MOD (X, 2) = 0 THEN
            Y = Y - X;
        ELSE
            Y = Y + 2 * X;
        END IF;
        DBMS_OUTPUT. PUT_LINE(Y);
    END LOOP;
END;
```

(b) Find the errors from the following PL/SQL code and rewrite the corrected code underlining the correction made. 2

```
DECLARE
    CURSOR cl IS
        SELECT * FROM Employee
        FOR salary > 15000;
        T1 INTEGER: = 0;
BEGIN
    FOR REC IN c1
    LOOP
```

```
DBMS_OUTPUT.PUT('No of records'||TO_CHAR(cl%COUNTROWS)) ;
        T1 : = T1 + REC.salary;
    LOOP END
    DBMS_OUTPUT.PUT('Total =' || T);
END
```

(c) Explain the usage of an implicit and an explicit cursor. 2

(d) Write a PL/SQL Function CHCK_DATE that accepts a date from the user and returns 1 if the date has passed and returns 0 if the date is yet to come. 4

**7.** Answer the questions based on the table Voice of Asia given below:

Table: Voice of Asia

| Column Name | Data Type | Size | Constraint | Description |
|---|---|---|---|---|
| P_Code | NUMBER | 4 | PRIMARY KEY | Participant Code |
| P_Group | CHAR | 1 | 'A' or 'P' | Participant group as "A" for Agni or "P" for "Prithvi" |
| P_Name | VARCHAR2 | 25 | NOT NULL | Name of the participant |
| P_Points | NUMBER | 4, 1 | CHECK for greater than 100 | Points awarded to the participant |
| P_Vote | NUMBER | 5 | | Votes won by the participant |
| Dt_Comp | DATE | | | Date of Competition |

(a) Write the SQL command to display the participant code and names of all participants whose name starts with "S" and have scored points above 300. 2

(b) Write the SQL command to display the details of the participant with the maximum votes in each P_group. 2

(c) Write the PL/SQL code to display the records of all participants who participated in the event on a particular date entered by the user. Pass this date as a parameter. 3

(d) Write the PL/SQL code to create a stored procedure Disp _Details to display the details of all the participants of the "P" group. The code should also display the total of all the votes earned by these participants. 3

## QUESTION PAPER CODE NO. 90
## SECTION A

**1.** Answer the following questions:

(a) Expand the following: 2

(i) GNU

(ii) SDLC

(b) What are the following softwares used for? 2

(i) Mozilla

(ii) Apache

(c) Differentiate between entity and attributes with the help of an example. 2

(d) Name any two applications of data mining. 2

(e) Identify the type of relationship represented by the following statement and draw an entity relationship diagram to show it. 2

"Each garment must have one and only one price. Each price may be for one or more garments."

**2.** Answer the following questions:

(a) What is a looping statement? Differentiate between an entry controlled and an exit controlled loop. 2

(b) Name and explain the usage of any two types of procedures available in Visual Basic. 2

(c) What is the extension of a module file and code file in Visual Basic? 2

(d) Explain the term ADO. Name any two methods used to navigate through ADO recordsets. 2

(e) Name and explain the usage of any two data, types used in Visual Basic to store numbers with decimals. 2

**3.** Answer the following questions:

(a) Differentiate between GRANT and REVOKE commands explaining the purpose of each. 2

(b) Name the keyword used to : 2

(i) force every value in a column to be unique.

(ii) explicitly define a constraint that each row of a table must satisfy.

(c) Explain the usage bind variables in PL/SQL with the help of an example. 2

(d) Name the SQL commands for the following situations: 2

(i) To change the structure of a table.

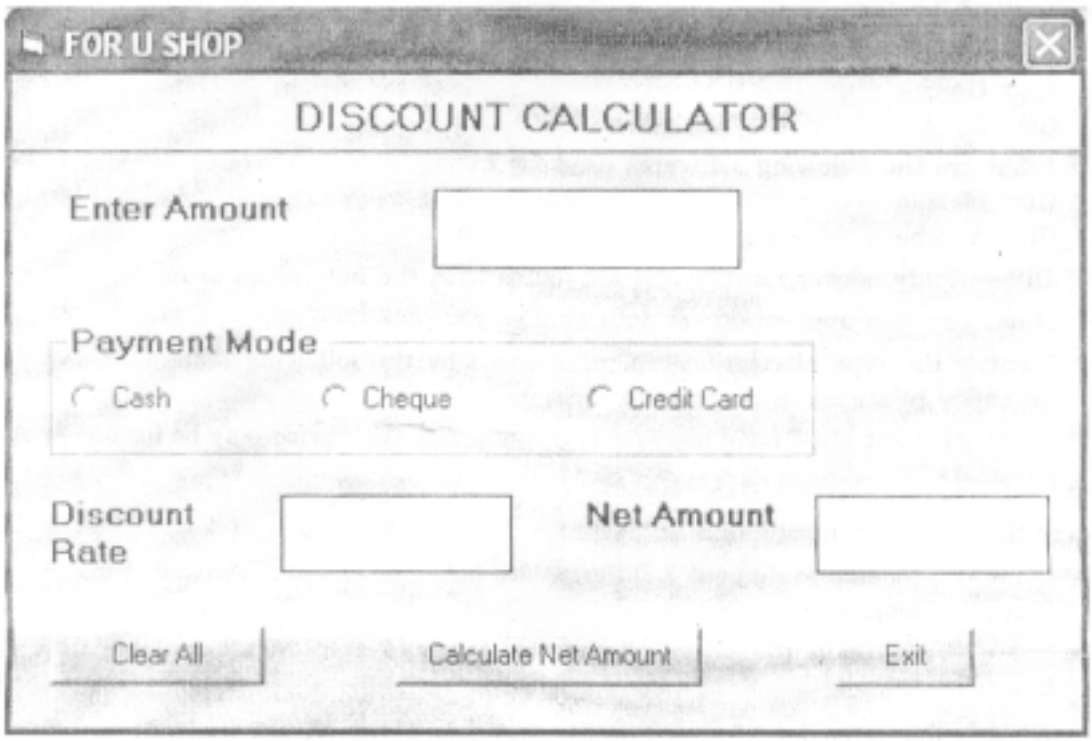
(ii) To make a new table.

(e) What is a cursor in PL/SQL? List any two commands used for cursor control. 2

## SECTION B

**4.** Read the following case study and answer the questions that follow:

The FOR U SHOP has computerized its billing. A new bill is generated for each customer. The shop allows three different payment modes. The discount rate is based on the payment mode. The following is the data entry screen used to generate the bill :




The list of controls for the above form is as follows:

| Object Type | Object Name | Description |
|---|---|---|
| Form | FrmDiscount | The main form |
| Text Box | TxtAmt | To input the total Shopping Amount |
| | TxtDisc | To display Discount Rate |
| | TxtNet | To display Net Price |

| | | |
|---|---|---|
| Option Buttons | OptCash | To select mode of payment as cash |
| | OptCheque | To select mode of payment as cheque |
| | OptCredit | To select mode of payment as credit card |
| Command Button | CmdCalc | To calculate Discount and Net Amount |
| | CmdClear | To clear all textboxes |
| | CmdExit | To Exit from the application |

(a) Write the code for the CmdClear command button to clear all the textboxes. 1

(b) Write the code for the form load event of FrmDiscount so as to 2

(i) Disable the TxtDisc and the TxtNet textboxes and set default choice in the option button as cash.

(ii) Set the focus to the TxtAmt textbox.

(c) Write the code for the change event of the TxtAmt textbox to ensure that the user does not enter a negative or a zero value. If a negative or a zero value is entered then the textbox should be made blank and a warning message should be displayed. 3

(d) Write the code for the CmdCalc command button to display the discount rate and net price in the TxtDisc and TxtNet textboxes respectively. Note that net price is calculated as shopping amount - discount amount. The discount amount is calculated according to the discount rate which is based on the payment mode and total shopping amount according to the following table. 4

| **Payment Mode** | **Shopping Amount** | **Discount Rate** |
|---|---|---|
| Cash | <10000 | 20% |
| | >=10000 | 25% |
| Cheque | <15000 | 10% |
| | >=15000 | 15% |
| Credit Card | <10000 | 10% |
| | >=10000 | 12% |

**5.** Answer the following questions:

(a) Find the errors from the following code segment and rewrite the corrected code underlining the correction made. 2

```
Sub Fibonacci (Sl As Number, S2 As Integer, N As Integer)
     Dim count As Integer; term As Integer
     Output Sl, S2
     For count EQUAL 3 TO N
          term = Sl + S2
          Print term
          Sl = S2
          S2 = term
     Next Value
End Sub
```

(b) Find the output of the following code: 2

```
Dim a As String
Dim I As Integer
a = "12345"
I = a Mod 10
Do
     Print Val (Mid (a, I ))
     I = I – 1
Loop While I > 0
```

(c) Rewrite the following code using DO....LOOP WHILE construct without affecting the output: 2

```
Dim arr(5)
Counter = 1
Do Until Counter> 5
     arr(Counter) = Counter * Counter
     If Counter = 2 Then
          Print arr(Counter)
     End If
     Counter = Counter + 1
Loop
```

(d) Write a Visual Basic procedure that takes a number as argument and displays the product of all the digits in the number. For example if the argument passed is 354, the procedure should display 60 (i.e. 3 * 5 * 4). 4

## SECTION C

**6.** Read the questions given below and answer accordingly:

(a) Write the output produced by the following PL/SQL code: 2

```
DECLARE
     count NUMBER;
     num1 NUMBER;
BEGIN
     count:= 10;
     FOR num1 IN 5..8
     LOOP
          IF MOD(num1,2) = 0 THEN
               count = count - num1;
          ELSE
               count = count + 2 * num1;
          END IF;
          DBMS_OUTPUT.PUT_LINE(count);
     END LOOP;
END;
```

(b) Find the errors from the following PL/SQL code and rewrite the corrected code underlining the correction made. 2

```
DECLARE
     B_NO NUMBER(4) ;
BEGIN
     B_NO := %BOOK_NO;
     SELECT TITLE INTO B_TITLE
     FROM BOOKS
     WHERE BOOK_NO = B_NO;
     IF B_TITLE := 'LEARNING ABC'
          UPDATE
          B_TITLE = 'LEARN ABC'
          WHERE BOOK_NO = B_NO;
     ELSE
          DBMS_OUTPUT.PUT(No Change);
END
```

(c) Differentiate between disabling a trigger and dropping a trigger. 2

(d) Write a PL/SQL Function CHCK_YEAR that accepts a date from the user and returns 1 if the year is a leap year and returns 0 otherwise. 4

7. Answer the questions based on the table Metro given below: .

**TABLE: Metro**

| Column Name | Data Type | Size | Constraint | Description |
|---|---|---|---|---|
| MT_No | NUMBER | 4 | PRIMARY KEY | Metro number |
| MT_Origin | VARCHAR2 | 15 | NOT NULL | Name of origin station |
| MT_Dest | VARCHAR2 | 15 | NOT NULL | Name of the final destination station |
| MT_KM | NUMBER | 3 | CHECK for greater than 10 | Total kilometers from origin to destination |
| MT_Time | NUMBER | 4, 2 | DEFAULT 11.00 | Time of the metro to start from the origin station |
| MT_Cap | NUMBER | 3 | | No.of seats in the metro |

(a) Write the SQL command to display the different destinations without repetition. 2

(b) Write the SQL command to display number of metros starting from each MT_Origin. 2

(c) Write the PL/SQL code to change the destination of all metros ending at ABC Station to "XYZ" which are covering a distance of more than 15 km. 3

(d) Write the PL / SQL code to create a stored procedure TIME to display the details of 'all the metros which start at a particular time of the day which is entered by the user. The time should be accepted as a parameter. 3

# Marking Scheme — Informatics Practices

Examiners are requested to consider all possible answers and program code/segments

Examiners are also requested to strictly follow the instructions (making scheme)

Questions having answers in the marking scheme are just indicative answers and bare minimum requirement, anything written extra should be ignored unless and until it is contradicting the actual answer.

**QUESTION PAPER CODE 90/1**

**EXPECTED ANSWERS**

**Important Note:**

- **All answers provided in the marking scheme are SUGGESTIVE.**
- **Examiners are requested to accept all possible alternative correct answers.**
- **In Section C, semicolon to be ignored for terminating SQL statements.**

**Section - A**

**Q 1. Answer the following questions:**

(a) Expand the following terms: 2

(i) OSS

(ii) SDLC

Ans (i) OSS : Open Source Software

(ii) SDLC : System Development Life Cycle

***(1 Mark each for correct expansion)***

(b) What are the following software used for? 2

(i) Linux

(ii) Tomcat

Ans (i) Linux is used as an operating system.

(ii) Tomcat is used as a web server.

***(1 Mark each for correct usage)***

(c) Differentiate between data warehouse and data mining. 2

Ans A data warehouse is a centralized data repository, which can be queried for business purposes while data mining is extraction of hidden predictive information from large databases.

***(2 Marks for stating the correct difference)***

**OR**

***(1 Mark <u>each</u> for individual definitions)***

(d) Name any two stages of system development life cycle. 2

Ans The stages of System Development Life Cycle are:

i) Preliminary Survey/Study

ii) Feasibility Study

iii) Investigation and Fact Recording

iv) Systems Analysis

v) Systems Design

vi) Implementation, Maintenance and Review

***(1 Mark each for any two correct stages of SDLC)***

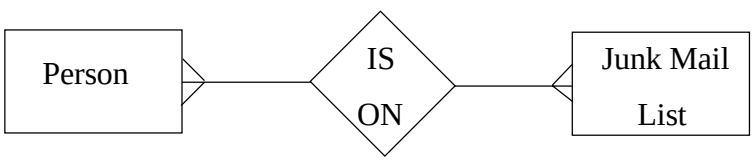
**OR**

***(1 Mark each if any two of the above stages are explained)***

(e) Identify the type of relationship represented by the following statements and draw an entity relationship diagram to show it. 2

"A person may be on one or more junk mail lists. Each junk list may contain one or more persons."

Ans Many-to-Many relationship




***(1 Mark for identifying the relationship)***
***(1 Mark for ER diagram)***

***Note: Any equivalent valid representation of E-R should be accepted***

**Q2 Answer the following questions:**

(a) What is an iterative statement? Name any two iterative statements provided in Visual Basic. 2

Ans Iterative statement is a statement that executes a set of statements repeatedly. Iterative statements provided in Visual Basic are:

- For...Next
- Do While... Loop
- Oo...Loop While
- For... Next
- For Each... Next

***(1 Mark for correct definition of iterative statement or explanation of iterative statement with the help of example)***

***(½ Mark each for any two correct iterative statements provided by Visual*** Basic)

(b) Name and explain the usage of any two types of modules available in Visual Basic. 2

Ans Form Module,

Standard Module,

Class Module.

Form Module stores all the procedures and declarations pertaining to a single form.

Standard Module stores project -wide code.

Class Module is used to represent a user defined VB object.

***(1 mark each for explaining any 2 modules)***

**OR**

***( ½ Mark each for naming any two modules)***

(c) What is the extension of a code file and form file in Visual Basic? 2

Ans Code file: BAS

Form file: frm

***(1 Mark each for correct extension)***

(d) Explain the term ADO object model. Differentiate between the Connection timeout and Command timeout properties of the Connection object. 2

Ans ADO stands for ActiveX Data Object model through which VB front end connects to a back end.

Connection TimeOut property determines how long to wait to establish a connection while CommandTimeOut property determines how long to wait, for the command to execute.

***( 1 Mark for correct definition of ADO object model)***

***(1 Mark for correct difference between Connection timeout and Command timeout properties of the Connection object)***

**OR**

***(½ Mark each for individual definitions) or***

***(½ Mark each for explaining the difference with. the help of example(s) )***

(e) Name and explain the usage of anyone relational and logical operator used in Visual Basic. 2

Ans Relational operators are used in Visual Basic to compare two values.

The relational operators are:

=, >, <, >=, <=, <>

Example:

```
IF A= B THEN PRINT "Equal"
```

The Logical operators are:

```
NOT, AND, OR, XOR
```

Example:

```
IF Age>=5 AND CLASS=l THEN PRINT "GET ON JHOOLA"
```

And logical operator results in true if both the operands that are part of AND expression are true.

***(½ Mark each for naming anyone relational operator and anyone logical operator)***

***(½ Mark each for stating the usage or explaining the usage with the help of example each of anyone relational operator and anyone logical operator)***

***(Note: Examples and usage of other Relational and Logical operators to be accepted)***

**Q3 Answer the following questions:**

(a) Define a trigger. Name any two types of triggers supported by PL/SQL. 2

Ans A Trigger is a stored procedure that defines an action that is automatically initiated on occurrence of an event such as INSERT, DELETE, UPDATE on a table.

Types of Triggers are:

- Row Level Triggers,
- Statement Level Triggers

**(1 mark for correct definition or explanation of a trigger with the help of example)**

**( ½ Mark each for naming any two correct types of triggers supported by PL/SQL)**

**Note: BEFORE Triggers, AFTER Triggers, INSTEAD OF Triggers, Triggers for System Events, Triggers for User Events should also be accepted as types of triggers**

(b) Explain the usage of % TYPE attribute for variable declaration with help of an example 2

Example 1: x NUMBER(3);

b x%TYPE;

means b variable is of the same data type as that of variable x.

Example 2: mname emp.ename% TYPE;
means mname variable is of the same data type as that of ename column of emp table.

**(2 marks for explanation of the usage of % TYPE attribute with the help of anyone example)**

**Note: Ignore explanation, if the example is correct**

(c) Differentiate between COMMIT and ROLLBACK commands. 2

Ans COMMIT command carries out all the steps of the transaction successfully and makes all the data changes upto last SAVE POINT or COMMIT permanent in the database Rollback undoes all the data changes in the transaction.

***(2 marks for stating the correct difference or 1 mark each for each correct definition)***

(d) Name the SQL commands for the following situations 2

(i) to physically delete a table

(ii) to view structure of a table

Ans i) DROP TABLE

ii) DESCRIBE

***(1 mark each for each correct SQL command)***

(e) Name the keyword used to : 2

(i) explicitly define a constraint that each row of a table must satisfy

(ii) Give a default value to column

Ans (i) CHECK constraint (Table level) OR TRIGGER

(ii) DEFAULT

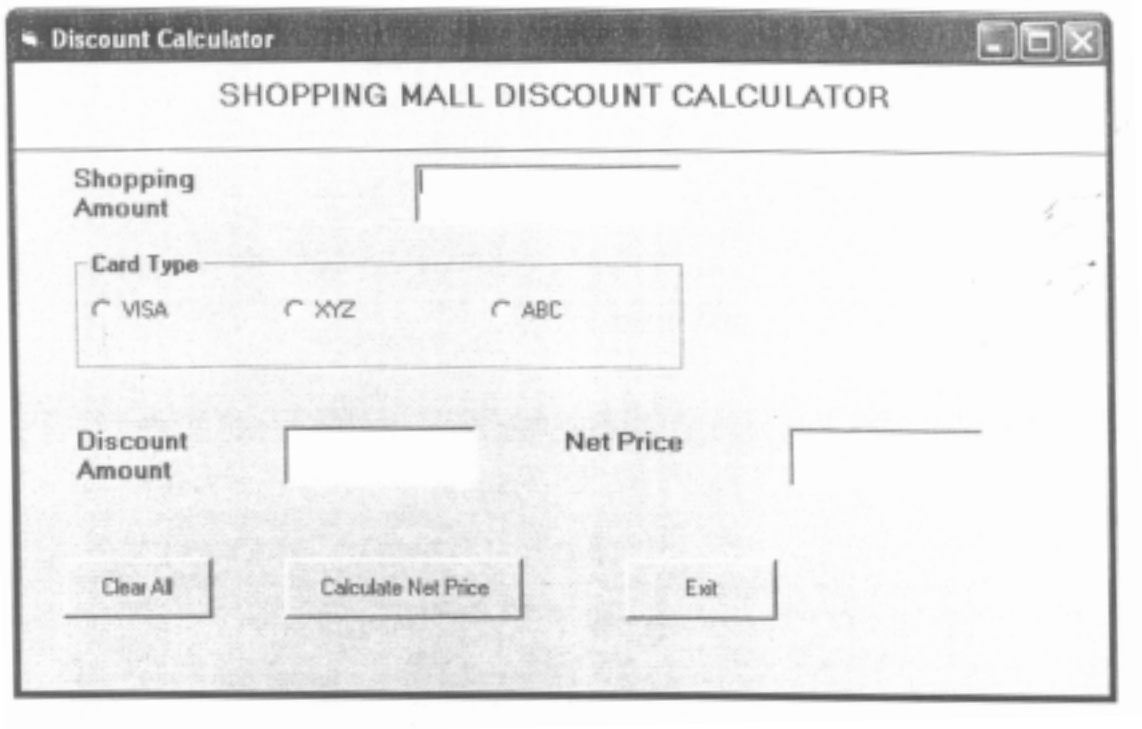
***(1 mark each for naming each keyword)***

***(Note::= may also be accepted in place of DEFAULT keyword)***

## Section B

Read the following case study and answer the questions that follows

The YouWe event managers company is organizing a shopping festival in the SHOP TILL DROP Mall. The Accounts manager is creating a software to calculate the discount during the shopping festival. Each customer is given a discount on the total amount spent (in all the shops) in the mall. The discount is given below on the credit card used. The following is the data entry screen used in the mall:



The Form details of the above form are given in the followin table:

| Object Type | Object Name | Description |
|---|---|---|
| Form | FrmDiscount | The Main Form |
| Text Box | TxtAmt | To input the total Shopping Amount |
| | TxtDisc | To display Discount Amount |
| | TxtNet | To display Net Price |
| Option buttons | OptVisa | To select VISA credit card |
| | OptABC | To select ABC credit card |
| | OptXYZ | To select XYZ credit card |
| Command Buttons | cmdCalc | To calculate Discount and Net Price |
| | cmdClear | To clear all Text boxes |
| | cmdExit | To Exit from the application |

(a) Write the code for CmdExit command button to display a message "Thank You for shopping in SHOP TILL DROP" Mall and exit out of the application. 1

Ans
```
MsgBox "ThankYou for shopping in SHOP TILL DROP Mall"
End
```

***(½ Mark each for each correct statement)***

(b) Write the code for the CmdClear command button to

i) clear all the textboxes

ii) disable the TxtDisc and the TxtNet textboxes.

Ans i)
```
TxtAmt.Text = "  "   OR   TxtAmt = "  "
TxtDisc.Text = "  "  OR   TxtDisc = "  "
TxtNet.Text = "  "   OR   TxtNet = "  "
```

**OR**

```
TxtAmt.Text = Empty   OR   TxtAmt = VBEmpty
TxtDisc.Text = Empty  OR   TxtDisc = VBEmpty
TxtNet.Text = Empty   OR   TxtNet = VBEmpty
```

ii)

```
TxtDisc.Enabled = False   OR   TxtDisc.locked = True
TxtNet.Enabled = False    OR   TxtNet.locked = True
```

**OR**

Any other equivalent code

***(1 mark for clearing textboxes)***

***(1 mark for enabled Rocked property)***

(c) Write the code for the change event of the TxtAmt textbox to ensure that the user does not enter a negative or a zero value. If a negative or a zero value is entered then the textbox should be made blank and a warning message should be displayed. 3

Ans If Val(TxtAmt.Text) <= 0 Then OR If TxtAmt <= 0 Then

TxtAmt.Text = " " OR TxtAmt = Empty

MsgBox "Negative or Zero values is not allowed"

OR

**Print "Negative or Zero values is not allowed"**

End if

OR

Any other equivalent code

***(1 Mark for correct IF condition)***

***(1 Mark for clearing text box)***

***(1 Mark for displaying message)***

(d) Write the code for the CmdCalc command button to display the discount and net price in the TxtDisc and TxtNet textboxes respectively,. Note that net price is calculated as shopping amount - discount amount and the discount is calculated based on the credit card and total shopping amount according to the following table. 4

| Credit Card Type | Shopping Amount | Discount |
|---|---|---|
| VISA | <10000 | 10% |
| | >=10000 | 20% |
| XYZ | <15000 | 15% |
| | >=15000 | 25% |
| ABC | <10000 | 15% |
| | >=10000 | 25% |

```
Dim ShopAmt, Discount As Single
ShopAmt = Val (TxtAmt)
If   OptVisa.Value = True Then
     If ShopAmt < 10000 Then
     Discount = 0.1 * ShopAmt
     Else
     Discount = 0.20 * ShopAmt
     End If
ElseIf OptXYZ.Value = True Then
     If ShopAmt < 15000 Then
     Discount = 0.15 * ShopAmt
     Else
     Discount = 0.25 * ShopAmt
     End If
ElseIf OptABC.Value = True Then
     If ShopAmt < 10000 Then
     Discount = 0.15 * ShopAmt
     Else
     Discount = 0.25 * ShopAmt
     End If
End If
TxtDisc.Text = Discount
TxtNet.Text = ShopAmt - Discount
```

**OR**

Any other equivalent code

***(1 mark each for each conditional logic construct representing each logic path)***

***(1/2 mark each for assigning the values to correct textboxes)***

***Note:***

***Ignore Cases (Lower/Upper) for all identifiers in the above Codes***

**Q5 Answer the following questions:**

(a) Find the errors from the following code segment and rewrite the corrected code underlining the corrections made. 2

```
Publicised Function compareStr (ByValue strl As String,str2 as String)
As Bool
Dim ans As Integer
If strl = str2 Then
          ans - 0
ElseIf strl < str2 Then
ans = –1
Else
ans = 1
End If
compareStr = ans
End Sub
```

Ans

```
Public Function compareStr(ByVal str1 As String, str2 As String) As
Integer
Dim ans As Integer
If str1 == str2 Then
          ans = 0
ElseIf str1 < str2 Then
ans = –1
Else
ans = 1
End If
compareStr = ans
End Function
```

***(1 Mark for identifying and correcting to Public scope)***
***(1/2 mark for identifying and correcting to ByVal)***
***(1/2 mark for identifying and correcting to As Integer)***

Note:

'As Boolean' should be accepted in place of 'As Integer' correction

(b) Write the output of the following code: 2

```
Private Sub Commandl_Click( )
Dim name As String
Dim I As Integer
I = 1
Name == "TATA"
Do While I < = Len(name)
     Print Instr(Mid(name,I),"A")
     I = I + 1
Loop
End Sub
```

Ans Correct Output

2

1

2

1

**OR**

The following also acceptable

***(½ mark for each line of correct output)***

Note:

1. Full 2 marks to be given if students have mentioned 3rd function (though the MID function accepts 3 as well as 2 parameters)
2. The following output should also be considered for awarding full marks

   0

   1

   0

   1

3. **Deduct ½ mark, if the correct values of output is shown in a single line**

(c) Rewrite the following code using If Then Else construct without affecting the output: 2

```
Sum = 0
For I = 0 TO 4
     For J = 0 To 1-1
Select Case (I+J+1)
Case -1, 0
     Sum = Sum + 1
Case 1,2,3
     Sum = Sum + 2
Case Else
     Sum = Sum + 3
End Select
```

Ans
```
T = I + J + 1
If T = – l Or T = 0 Then
     Sum = Sum + 1
ElseIf T = 1 Or T = 2 Or T = 3 Then
     Sum = Sum + 2
Else
     Sum = Sum + 3
End If
OR
T = I + J + 1
If T = -1 Or T = 0 Then
     Sum = Sum + 1
Else
     If T = 1 Or T = 2 or T = 3 Then
          Sum = Sum + 2
     Else
          Sum = Sum + 3
     End If
End If
```

OR

Any equivalent code

***(1/2 Mark each for first and last conditional logic construct)***

***(1 mark for the middle conditional logic construct)***

***Note:***

***1 Mark for attempting the question***

(d) Write a Visual Basic procedure that takes a number as argument and displays the sum of all the digits in the number. For example if the argument passed is 354, the procedure should display 12 (ie. 3+5+4). 4

Ans
```
Public Sub sumnum(n As Integer)
Dim digit, sum As Integer
sum = 0
Do While (n <> 0)
digit = n Mod 10
sum = sum + digit
     n = n \ 10
```

```
Loop
Print sum
End Sub
```

***(1 Mark for writing the procedure header)***

***(1 Mark for writing the correct loop construct)***

***(1 Mark for extracting digit and accumulating the sum)***

***(1 Mark for displaying sum)***

**Section - C**

Q6. **Read the questions given below and answer accordingly:** 2

(a) Write the output produce by the following PL/SQL code:

Ans
```
DECLARE
    X NUMBER;
    Y NUMBER;
BEGIN
    Y:=10;
    FOR X IN 1.. 4
    LOOP
        IF MOD (X,2) = 0 THEN
            Y:=Y-X;
        ELSE
            Y:=Y+2*X;
    END IF;
    DBMS_OUTPUT.PUT_LINE(Y);
    END LOOP;
END;
```

Ans
```
12
10
16
12
```

***(½ mark for each line of correct output)***

**Note:**

***Deduct ½ mark, if the correct values of output is shown in a single line***

(b) Find Error(s) in the following PL/SQL code and rewrite the correct code after underlining the corrections made. 2

```
DECLARE
CURSOR c1 IS
     SELECT * FROM Employee
          FOR salary >15000;
     T1 INTEGER :=0;
BEGIN
     FOR REC IN c1
     LOOP
          DBMS_OUTPUT.PUT('Noofrecords' || to_char(C1%COUNTROWS));
          T1 :=T1+REC.salary;
     LOOP END
     DBMS_OUTPUT. PUT ('Total = '|| T) ;
END
```

Ans

```
DECLARE
CURSOR c1 IS
     SELECT * FROM Employee
     WHERE salary >15000;
     T1 INTEGER :=0;
BEGIN
     FOR REC IN c1
     LOOP
          DBMS_OUTPUT.PUT('Noofrecords' ||to_char(C1%ROWCOUNT)); .
          T1 :=T1+REC.salary;
     END LOOP;
     DBMS_OUTPUT. PUT ( 'Total = '|| T1) ;
END;
```

***(1/2 Mark each for correcting any four errors)***

OR

***(1 Mark for only identifying any four errors - without making any correction)***

(c) Explain the usage of an implicit and explicit cursor. 2

Ans Example of an implicit cursor:

```
DELETE FROM EMP WHERE DEPTNO = 40;
Example of Explicit Cursor:
CURSOR MYCURSOR IS
     SELECT * FROM EMP
     WHERE DEPTNO = 30;
MYROW MYCURSOR%ROWTYPE;
BEGIN
     OPEN MYCURSOR;
     LOOP
     FETCH Cl
     CLOSE MYCURSOR;
END;
```

***(1 Mark for usage/example of implicit cursor)***

***(1 Mark for usage/example of explicit cursor OR simply a valid declaration of CURSOR)***

**Note:**

**1 Mark is to be given if only definition**

(d) Write a PL/SQL function CHCK_DATE that accepts a date from the user and returns 1 if the date has passed and returns 0 if the date is yet to come. 4

Ans

```
CREATE OR REPLACE FUNCTION CHKDATE RETURN NUMBER
AS/IS
     udate DATE;
BEGIN
udate := &please enter_Date;
```

OR

```
udate := '09-Mar-08' ;1
IF udate > date( ) THEN
     RETURN 1;
ELSIF udate < date( ) THEN
     RETURN 0;
ELSE
     RETURN -1;
END IF;
END;
```

IGNORE

**OR**

**Any other equivalent code**

***(1 Mark for header of function)***

***(1 Mark for declaring variable)***

***(1 Mark for accepting date)***

***(1 Mark for correct IF statement)***

Note:

Ignore the check for equality of dates

**Q7 Answer the questions based on the table Voice of Asia given below:**

**Table: Voice of Asia**

| Column Name | Data Type | Size Constraint | Description |
|---|---|---|---|
| P_Code | NUMBER | 4 PRIMARY KEY | Participant Code |
| P _Group | CHAR | 1 'A' or 'P' | Participant group as "A" for Agni or "P" for "Prithvi" |
| P_Name | VARCHAR2 | 25 NOT NULL | Name of the participant |
| P _Points | NUMBER | 4,1 CHECK for greater than 100 | Points awarded to the participant |
| P_Vote | NUMBER | 5 | Votes won by the participant |
| Dt_Comp | DATE | | Date of Competition |

(a) Write the SOL command to display the participant code and names of all participants whose name starts with "S" and have scored points above 300. 2

Ans
```
SELECT P_Code, P_Name FROM VoiceofAsia
WHERE P_Name LIKE 'S%' AND P_Points >300;
```

***(1 Mark for Selection)***

***(½ Mark for condition P _Name starting with S)***

***(½ Mark for condition P _Points>300)***

(b) Write SQL command to display the details of the participant with the maximum votes in each P_group. 2

Ans
```
SELECT * FROM VOICEOFASIA
WHERE P_VOTE IN
(SELECT MAX(P_VOTE) FROM VOICEOFASIA GROUP BY P_GROUP);
```

***(1 Mark for inner select statement)***

***(1 Mark for outer select statement)***

(c) Write PL/SQL code to display the records of all participants who participated in the event on the particular date entered by the user. Pass this date as a parameter. 3

Ans
```
CREATE OR REPLACE PROCEDURE disprec (edate DATE) AS
BEGIN
     FOR R IN SELECT * FROM VoiceofAsia WHERE Dt_Comp = edate
     LOOP
          DBMS_OUTPUT.PUT_LINE(R.P_CODE || R.P_Name ||
          R.P_Group || R.P_Points || R.P_Vote);
     END LOOP;
END;
```

**OR**

```
     CREATE OR REPLACE PROCEDURE disprec (edate DATE) AS
     CURSOR CR AS SELECT * FROM VoiceofAsia WHERE Dt_Comp = edate;
     BEGIN
          OPEN CR;
          LOOP
               FETCH CR INTO R;
               EXIT WHEN R%NOTFOUND;
               DBMS_OUTPUT.PUT_LINE(R.P_CODE || R.P_Name ||
               R.P_Group || R.P_Points || R. P_Vote) ;
          END LOOP;
          CLOSE R;
     END;
```

**OR**

Any other equivalent code

***(½ Mark for procedure header)***
***(½ Mark for using date parameter in header)***
***(½ Mark for SELECT query)***
***(½ Mark for the loop)***
***(½ Mark for output)***
***(½ mark for BEGIN and END)***

(d) Write PL/SQL code to create a stored procedure Disp_Detaiis to display the details of all the participants of the 'P' group. The code should also display the total of all the votes earned by these participants. 3

Ans
```
CREATE OR REPLACE PROCEDURE DISP_DETAILS AS
     CNTVOTE NUMBER:= 0;
BEGIN
     FOR R IN SELECT * FROM VOICEOFASIA WHERE P_GROUP = 'P'
     LOOP
```

```
          CNTVOTE:= CNTVOTE + R.P_VOTE;
          DBMS_OUTPUT. PUT_LINE (R. P_CODE ||' '|| R.P_GROUP
          ||' '|| R. P_NAME ||' '|| R.P_POINTS ||' '||
     R.P_VOTE||' '||R.DT_COMP);
     END LOOP;
     DBMS_OUTPUT. PUT_LINE(CNTVOTE) ;
END;
```

**OR**

```
CREATE OR REPLACE PROCEDURE DISP_DETAILS AS
CURSOR CUR IS
     SELECT * FROM VOICEOFASIA
     WHERE P_GROUP = 'P';
     R CUR%ROWTYPE;
     CNTVOTE P_VOTE%TYPE:= 0;
BEGIN
     OPEN CUR;
     LOOP
          FETCH CUR INTO R;
          EXIT WHEN CUR%NOTFOUND;
          CNTVOTE:= CNTVOTE + R.P_VOTE;
          DBMS_OUTPUT. PUT_LINE (R.P_CODE ||' '||
          R.P_GROUP ||' '|| R. P_NAME ||' '||R.P_POINTS
          ||' '||R.P_VOTE||' '||R.DT_COMP) ;
     END LOOP;
     CLOSE CUR;
     DBMS_OUTPUT.PUT_LINE(CNTVOTE);
END;
```

**OR**

Any other equivalent code

***(1/2 Mark for Procedure header)***
***( 1 Mark for cursor definition)***
***(1/2 Mark for loop construct)***
***(1/2 Mark for computing votes)***
***(1/2 Mark for display)***

**Note:**

1. **Semi colon need not be specified at the end of a SQL statement**
2. **Any valid PL/SQL loop construct should be accepted**

**QUESTION PAPER CODE No. 90**

**EXPECTED ANSWERS**

**SECTION A**

**Important Note:**

- **All answers provided in the marking scheme are SUGGESTIVE.**
- **Examiners are requested to accept all possible alternative correct answers.**
- **In Section C, semicolon to be ignored for terminating SQL statements.**

**Q 1. Answer the following questions:**

(a) Expand the following questions: 2

(i) GNU

(ii) SDLC

Ans GNU - GNU's not UNIX OR GNU is not UNIX

SDLC- System development life cycle

*(1 Mark each for correct expansion)*

(b) What are the following software used for? 2

(i) Mozilla

(ii) Apache

Ans (i) Mozilla is used as a web browser.

(ii) Apache is used as a web server.

*(1 Mark each for correct usage)*

(c) Differentiate between entity and attributes with the help of an example. 2

Ans Entity is an object that exists and is distinguishable from any other object.

**OR**

Entity is any object, place, person, concept or activity about which an enterprise record data.

Attribute is a property or a characteristic of a given entity.

Example of entity and attribute:
Student is entity while name of student, rollno, class, marks are attributes.

*(1 Mark for stating the correct difference)*
(1/2 Mark *each* for any correct example)

**OR**

(2 marks for explaining the difference with the help of any correct example for each)

(d) Name any two applications of data mining. 2

Ans Business
Gaming
Health Care

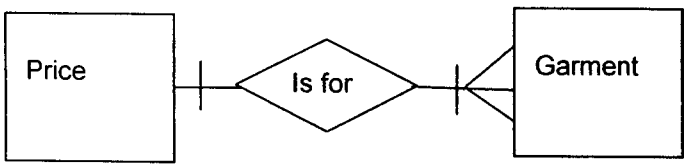
Politics

*(1 Mark for naming any two correct applications)*
*(1 Mark for giving any example of data mining)*

(e) Identify the type of relationship represented by the following statements and draw an entity relationship diagram to show it. 2

"Each garment must have one and only one price. Each price may be for more than one garment"

Ans One to one and many to one relationship




(½ Mark each for identifying the type of relationship)

(½ Mark each for each ER diagram)

Note: Any valid representation of E-R should be accepted

**Q2 Answer the following questions:**

(a) What is a looping statement? Differentiate between an entry controlled and an exit controlled loop, 2

Ans Looping statement repeats a set of statements.

In an entry-controlled loop the loop condition is checked at the top of the loop and the loop executes 0 or more times. In exit-controlled loop the loop condition is checked at the bottom of the loop and the loop executes at least once.

*(1 Mark for loop statement definition)*
*(1 Mark for the correct difference between entry-controlled and exit-controlled loops)*

OR

*(1 Mark for explaining difference using an example)*

Note: 1/2 mark if only the loop constructs of entry-controlled and exit-controlled loops are named

(b) Name and explain the usage of any two types of procedures available in Visual Basic, 2

Ans Procedure types available in Visual Basic:

(i) Function procedure
(ii) Sub procedure
(iii) Event procedure
(iv) Predefined procedure
(v) Property procedures (of class module:)

Function procedure is a Visual Basic procedure that may or may not accept parameter(s), executes statement(s) and returns a value.

Sub procedure is a Visual Basic procedure that mayor may not accept parameter(s), executes statement(s) and may and may not return value(s).

Event procedure is a Visual Basic procedure that is predefined and is triggered by an event. Predefined procedure is a Visual Basic procedure that is predefined and exists in the Visual Basic library.

*(1/2 Mark each for naming any two of the procedure types)*
*(1/2 Mark each for explanation of usage of any two procedure types)*

Note: Explanation using examples should be accepted

(c) What is the extension of a module file and code file in Visual Basic? 2

Ans
- BAS is the extension for the module file and as well as code file.

  OR

- BAS is the extension for the module file and. FRM is the extension for form code file.

*(1 Mark each for each correct extension)*

(d) Explain the term ADO. Name the two methods used to navigate through ADO recordsets. 2

Ans ADO stands for ActiveX Data Objects. It allows establishing connections between back-end and front-end applications.

Navigational methods are:

(i) MoveFirst
(ii) MoveLast
(iii) MovePrevious
(iv) MoveNext

*(1/2 Mark for expansion of ADO)*
*(1/2 Mark for explanation of ADO)*
*(1/2 Mark <u>each</u> for any two navigational methods)*

(e) Name and explain the usage of any two data types used in Visual Basic to store numbers with decimals. 2

Ans Data types that store numbers with decimals are:

(i) Single
(ii) Double
(iii) Currency

**Example:**

```
Dim X as Single
X=3.2
```

*(1/2 Mark each for naming any two data types)*
*(1/2 Mark each for any valid explanation or example of usage)*

**Q3 Answer the following questions:**

(a) Differentiate between GRANT and REVOKE commands explaining the purpose of each.

Ans GRANT is used to grant access permissions on a table to a user, REVOKE is used to remove previously granted permissions on a table from a user.

*(2 Marks for writing the correct difference or for explaining the difference with the help of example(s))*

Note:

1 mark each for correct definition

(b) Name the keyword used to: 2

(i) force every value in a column to be unique.

(ii) Explicitly define a constraint that each row of a table must satisfy.

Ans (i) UNIQUE

(ii) CHECK (Table level) or TRIGGER

*(1 Mark each for each correct answer)*

(c) Explain the usage of bind variables in PL/SQL with the help of an example. 2

**Ans Bind variables are used to pass values from the environment.**

Example:

```
VARIABLE X NUMBER
BEGIN  :X := 10;
END;
```

*(1 Mark for correct explanation)*
*(1 Mark for correct example)*

Note:

Declaration of bind variable is not essential

(d) Name the SQL commands for the following situations 2

(i) to change the structure of a table.

(ii) to make a new table.

Ans (i) ALTER TABLE

(ii) CREATE TABLE

*(1 Mark each for each correct command)*

(e) What is a cursor in PL / SQL? List any two commands used for cursor control. 2

Ans Cursor is a named work area that is under the direct control of the programmer. It points to the current tuple being processed.

Cursor control commands:

`OPEN, FETCH, CLOSE`

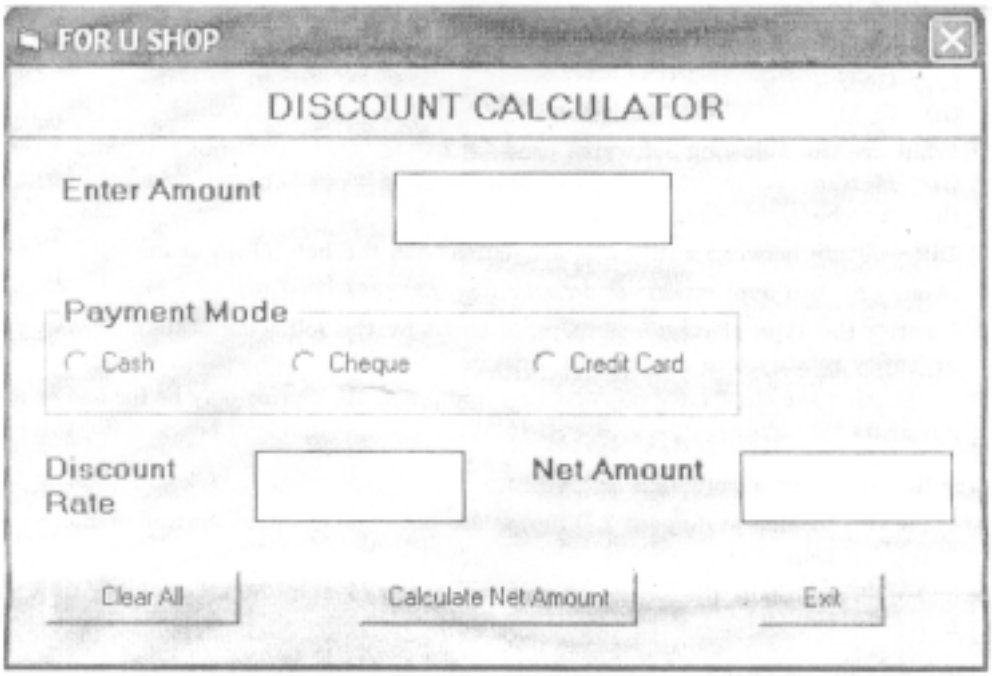
*(1 Mark for definition)*

*(1/2 Mark each for any two cursor control commands)*

## Section B

Q4 Read the following case study and answer the questions that follows

The FOR U SHOP has computerized its billing. A new bill is generated for each customer. The shop allows three different payment modes. The discount rate is based on the payment mode. The following is the data entry screen used to generate the bill.



The Form details of the above form are given in the followin table:

| Object Type | Object Name | Description |
|---|---|---|
| Form | FrmDiscount | The Main Form |
| Text Box | TxtAmt | To input the total Shopping Amount |
| | TxtDisc | To display Discount Amount |
| | TxtNet | To display Net Price |
| Option buttons | OptCash | To select mode of payment as cash |
| | OptABC | To select mode of payment as cheque |
| | OptXYZ | To select mode of payment as credit card |
| Command Buttons | cmdCalc | To calculate Discount and Net Price |
| | cmdClear | To clear all Text boxes |
| | cmdExit | To Exit from the application |

(a) Write the for the CmdClear command button to clear all the text boxes. 1

Ans
```
TxtAmt.Text = "  "   OR   TxtAmt = "  "
TxtDisc.Text = "  "  OR   TxtDisc = "  "
TxtNet.Text = "  "   OR   TxtNet = "  "
```

**OR**

```
TxtAmt = VBEmpty    OR   TxtAmt = Empty
TxtDisc = VBEmpty   OR   TxtDisc = Empty
TxtNet = VBEmpty    OR   TxtNet = Empty
```

**OR**

**Any other equivalent code**

*(1 Mark for clearing any two text boxes)*

(b) Write the code for the form load event of FrmDiscount so as to 2

i) Disable the TxtDisc and txtNet textboxes and set default choice in the option button as cash.

ii) Set the focus to the TxtAmt textbox.

Ans
```
TxtDisc.enabled = False   OR   TxtDisc.Locked = True
TxtNet.enabled = False    OR   TxtNet.Locked = True
OptCash.value = True
TxtAmt.Setfocus
```

**OR**

**Any other equivalent code**

***(1/2 Mark for each correct statement)***

(c) Write the code for the change event of the TxtAmt textbox to ensure that the user does not 3 enter a negative or a zero value. If a negative or a zero value is entered then the textbox should be made blank and a warning message should be displayed. 3

Ans
```
If Val(TxtAmt.Text) <= 0 Then    OR If TxtAmt.Text <= 0 Then
TxtAmt.Text =  "  "              OR TxtAmt.Text = Empty
MsgBox "Negative or Zero values is not allowed"
```

**OR**

```
Print "Negative or Zero values is not allowed"
End if
```

OR

Any other equivalent code

***(1 Mark for correct IF condition)***

***(1 Mark for clearing text box)***

***(1 Mark for displaying message)***

(d) Write the code for the CmdCalc command button to display the discount and net price in the TxtDisc and TxtNet textboxes respectively,. Note that net price is calculated as shopping amount - discount amount. The discount is calculated according to the discount rate which is based on the payment mode and total shopping amount according to the following table. 4

| Payment mode | Shopping Amount | Discount Rate |
|---|---|---|
| Cash | <10000 | 20% |
| | >=10000 | 25% |
| Cheque | <15000 | 10% |
| | >=15000 | 15% |
| Credit Card | <10000 | 10% |
| | >=10000 | 12% |

Ans
```
Dim ShopAmt, Discount As Single
ShopAmt = Val(TxtAmt.Text)
If   OptCash.Value = True Then
     If ShopAmt < 10000 Then
     Discount = 0.2 * ShopAmt
     Else
     Discount = 0.25 * ShopAmt
     End If
ElseIf OptCheque.Value = True Then
     If ShopAmt < 15000 Then
     Discount = 0.1 * ShopAmt
     Else
     Discount = 0.15 * ShopAmt
     End If
ElseIf OptCredit.Value = True Then
     If ShopAmt < 10000 Then
     Discount = 0.1 * ShopAmt
     Else
     Discount = 0.12 * ShopAmt
     End If
End If
TxtDisc.Text = Discount
TxtNet.Text = ShopAmt - Discount
```

OR

Any other equivalent code

*(1 mark each for each conditional logic construct representing each logic path)*
*(1/2 mark each for assigning the values to correct textboxes)*

**Q5 Answer the following questions:**

(a) Find the errors from the following code segment and rewrite the corrected code underlining the corrections made. 2

```
Sub Fibonacci (S1 As Number, S2 As Integer, N As Integer)
     Dim count As Integer; term As Integer
     Output S1, S2
     For count EQUAL 3 TO N
```

```
            Term = S1 + S2
            Print term
            S1 = S2
            S2 = term
        Next Value
    End 5ub
```

Ans

```
Sub Fibonacci (S1 As Integer, S2 As Integer, N As Integer)
    Dim count As Integer term As Integer
    Print S1, S2
    For count = 3 TO N
        Term = S1 + S2
        Print term
        S1 = S2
        S2 = term
    Next count
End 5ub
```

*(1/2 Mark each for correcting any four errors)*

(b) Find the output of the following code: 2

```
Dim a as String
    Dim I As Integer
    a = "12345"
    I = a Mod 10
    Do
        Print Val (Mid (a,I))
        I = I –1
    Loop While I > 0
```

Ans

```
5
45
345
2345
12345
```

*(2 Marks for correct output)*

Note:

1. Full 2 marks to be given if students have mentioned 3rd parameter missing in MID function (though the MID function accepts 3 as well as 2 parameters)
2. Deduct ½ mark if the correct values of output is shown in a single line

(c) Rewrite the following code using DO...LOOP... WHILE construct without affecting the output: 2

```
Dim arr(5)
Counter = 1
Do Until Counter > 5
     arr(Counter) = Counter * Counter
     If Counter =2 Then
     Print arr(Counter)
     End If
     Counter = Counter + 1
Loop
```

Ans

```
Dim arr(5)
Counter = 1
Do
     arr(Counter) = Counter * Counter
If Counter =2 Then
Print arr(Counter)
End If
Counter = Counter + 1
Loop while counter <= 5
```

*(1 Mark for writing Do.. .Loop while construct)*
*(1 Mark for writing the correct relational expression for the loop)*

Note:

1 Mark for attempting the question

(d) Write a Visual Basic procedure that takes a number as argument and displays the product of all the digits in the number. For example if the argument passed is 354, the procedure should display 60 (Le. 3*5*4). 4

Ans

```
Public Sub product(n As Integer)
Dim digit, prod As Integer
prod = 1
Do While (n <> 0)
     digit = n Mod 10
     prod = prod * digit
     n = n \ 10
Loop
PRINT prod
End Sub
```

*(1 Mark for writing the procedure header)*
*(1 Mark for writing the correct loop construct)*
*(1 Mark for extracting digit and accumulating the product)*
*(1 Mark for displaying product)*

**Section - C**

**Q6 Read the questions given below and answer accordingly:**

(a) Write the output produced by the following PL/SQL code:

```
DECLARE
     count NUMBER;
     num1 NUMBER;
BEGIN
     Count := 10;
     FOR numl IN 5..8
     LOOP
          IF MOD(numl,2) = 0 THEN
               Count = count - num1;
          ELSE
               Count = count + 2 * num1;
          END IF;
          DBMS_OUTPUT.PUT_LINE(count);
     END LOOP;
END;
```

Ans
```
20
14
28
20
```

*(2 Marks for correct output)*

Note:

2 Marks to be awarded on identifying that the code has an error as count is a keyword

(b) Find Error(s) in the following PL/SQL code and rewrite the correct code after underlining the corrections made. 2

```
DECLARE
     B_NO NUMBER(4);
```

```
BEGIN
     B_NO := %BOOK_NO;
     SELECT TITLE INTO B_TITLE
     FROM BOOKS
     WHERE BOOK_NO = B_NO;
     IF B_TITLE : = 'LEARNING ABC'
          UPDATE B_TITLE = 'LEARNING ABC'
          WHERE BOOK_NO = B_NO;
     ELSE
          DBMS_OUTPUT.PUT(NO CHANGE) ;
END
```

Ans

```
DECLARE
     B_NO NUMBER(4) ;
BEGIN
     B_NO := &BOOK_No;   OR   B_NO := 100;
     SELECT TITLE INTO B TITLE
     FROM BOOKS
     WHERE BOOK_NO = B_NO;
     IF B_TITLE = 'LEARNING ABC' THEN
          UPDATE BOOKS SET B_TITLE = 'LEARNING ABC'
          WHERE BOOK_NO = B_NO;
     ELSE
          DBMS_OUTPUT.PUT('NO CHANGE');
     ENDIF;
END;
```

*(1/2 Mark each for identifying and correcting any four errors)*

(c) Differentiate between disabling a trigger and dropping a trigger. 2

Ans Disabling a trigger doesn't remove it from the database. i.e., Trigger is not active for execution

Dropping a trigger removes the trigger from the database.

(2 Marks for writing correct difference or if examples are written to explain the difference)

Note: 1 mark to be awarded if only commands are written

(d) Write a PL/SQL function CHCK_YEAR that accepts a date from the user and returns 1 if the year is a leap year and returns 0 otherwise. 4

Ans
```
CREATE OR REPLACE FUNCTION CHCK_YEAR(DT IN DATE) RETURN
NUMBER IS
     Y NUMBER(4) ;
BEGIN
     Y := YEAR(DT) ;
     IF MOD(Y,100) = 0 THEN
          IF MOD(Y,400) = 0 THEN
               RETURN 1;
          ENDIF
     ELSIF MOD(Y,4)=0 THEN
          RETURN 1;
     ENDIF
     RETURN 0;
END;
```

**OR**

```
CREATE OR REPLACE FUNCTION CHCK_YEAR (DT IN DATE) RETURN
NUMBER IS
     Y NUMBER (4);
BEGIN
     Y := YEAR(DT) ;
     IF (MOD(Y,lOO) = 0 AND MOD(Y,400) = 0) OR MOD(Y,4)=0 THEN
          RETURN 1;
     ELSE
          RETURN 0;
     ENDIF;
END;
```

*(1 Mark for function header)*
*(1 Mark for variable declaration)*
*(1 Mark for returning value)*
*(1 Mark for leap century check OR leap year check)*

Note:
Use of PL / SQL Boolean type should also be accepted

**Q7 Answer the questions based on the table Metro given below:**

TABLE: Metro

| Column Name | Data Type | Size | Constraint | Description |
|---|---|---|---|---|
| MT_No | NUMBER | 4 | PRIMARY KEY | Metro number |
| MT_Origin | VARCHAR2 | 15 | NOT NULL | Name of origin station |
| MT_Dest | VARCHAR2 | 15 | NOT NULL | Name of the final destination station |
| MT_KM | NUMBER | 3 | CHECK for greater than 10 | Total kilometers from origin to destination |
| MT_Time | NUMBER | 4,2 | DEFAULT 11.0 | Time of the metro to start from the origin station |
| MT_Cap | NUMBER | 3 | | No. of seats in the metro |

(a) Write the SQL command to display the different destinations without repetition. 2

Ans
```
SELECT DISTINCT MT_DEST FROM METRO;
```

*(1 Mark for select without Distinct)*
*(1 Mark for using Distinct correctly)*

(b) Write SQL command to display number of metros starting from each MT_Origin. 2

Ans SELECT COUNT (MT_NO) FROM METRO GROUP BY MT_ORIGIN;

*(1 Mark for using count)*
*(1 Mark for grouping on the required column)*

(c) Write the PL/SQL code to change the destination of all metros ending at ABC station to 3

"XYZ" which are covering a distance of more than 15 km.

Ans
```
UPDATE METRO
SET MT_DEST = 'XYZ'
WHERE MT_DEST = 'ABC' AND MT_KM > 15;
```

*(1/2 Mark for using update command)*
*(1 Mark for using correct set clause)*
*(1½ Mark for where clause)*

(d) Write the PL/SQL code to create a stored procedure TIME to display the details of all the metros, which start at a particular time of the day. which is entered by the user. The time should be accepted as a parameter. 3

Ans

```
CREATE OR REPLACE PROCEDURE TIME (T IN NUMBER) IS
BEGIN
     FOR R IN SELECT * FROM METRO WHERE MT_TIME = T;
          DBMS_OUTPUT.PUT_LINE(R.MT_NOI ||''
               ||R.MT_ORIGIN ||' '||R.MT_DEST||' '
               ||R.MT_KM||' '||R.MT_CAP);
     END LOOP;
END;
```

**OR**

```
CREATE OR REPLACE PROCEDURE TIME (T IN NUMBER) IS CURSOR
TCUR IS
     SELECT * FROM METRO
     WHERE MT_TIME = T;
     TR TCUR%ROWTYPE;
BEGIN,
     OPEN TCUR;
     LOOP
          FETCH    TCUR INTO TR;
          EXIT WHEN TCUR%NOTFOUND;
               DBMS_OUTPUT.PUT_LINE(TR.MT_NO||''
                    ||TR.MT_ORIGIN||' '||TR.MT_DEST||' '
                    ||TR.MT_KM||' '||TR.MT_CAP);
     END LOOP;
     CLOSE TCUR;
END;
```

*(1/2 Mark for procedure header)*
*(1 Mark for defining cursor)*
*(1/2 Mark for loop construct with exit option)*
*(1/2 Mark for fetching)*
*(1/2 Mark for output)*

Note: Semi colon need not be specified at the end of a SQL statement
Note: Any valid PL/SQL loop construct should be accepted

# COMPUTER SCIENCE

***Time allowed : 3 hours*** ***Maximum Marks : 70***

***General Instructions:***

*(i)* ***All*** *questions are compulsory.*

*(ii)* *Programming Language: C++*

**QUESTION PAPER CODE 91/1**

**1.** (a) What is the difference between #define and const? Explain with suitable example. 2

(b) Name the header files that shall be needed for the following code 1

```
void main ( )
{
        char String [ ] = "Peace";
        cout<<setw (20) << String;
}
```

(c) Rewrite the following program after removing the syntactical error(s) if any. Underline each correction. 2

```
#include < iostream.h >
void main ( )
{
        First = 10, Second = 20;
        Jumpto (First; Second);
        Jumpto (Second);
}
        void Jumpto (int N1, int N2=20)
{
        N1 = N1 + N2;
        cout<<N1>>N2;
}
```

(d) Find the output of the following program: 3

```
#include<iostream.h>
#include<ctype.h>
```

```
void main ( )
{
    char Text [ ] = "Mind@Work!";
    for (int I = 0; Text (I)! = '\0'; 1++)
    {
        if (!isalpha (Text[I]))
            Text [I] = '*';
        else if (isupper (Text[I]))
            Text [I] = Text [I] + 1 ;
        else
            Text (I) = Text [I+ 1];
    }
    cout<<Text;
}
```

(e) Find the output of the following program: 2

```
#include<iostream.h>
void main ( )
{
    int U = 10, V = 20;
    for (int I = 1; 1 < = 2; 1++)
    {
        cout<<"[1]="<<U++<<"&"<<V–5<<endl;
        cout<<"[2]="<<++V<<"&"< <U+ 2< <endl;
    }
}
```

(f) In the following program, find the correct possible output(s) from the options: 2

```
#include<stdlib.h>
#include<iostream.h>
void main ( )
{
    randomize ( ) ;
    char City [ ] [10] = {"DEL", "CHN", "KOL", "BOM", "BNG"};
    int Fly;
    for (int I=0;I<3;I++)
    {
        Fly=random (2)+ 1;
        cout<<City[Fly]<<":" ;
```

```
    }
}
```

**outputs:**

**(i) DEL:CHN:KOL:**

**(ii) CHN:KOL:CHN:**

**(iii) KOL:BOM:BNG:**

**(iv) KOL:CHN :KOL:**

**2.** (a) Differentiate between public and private visibility modes in context of Object Oriented Programming using a suitable example illustrating each. 2

(b) Answer the questions (i) and (ii) after going through the following program 2

```
#include<iostream.h>
#include<string.h>
class Bazar
{
    char Type[20];
    char Product[20];
    int Qty;
    float Price;
    Bazar ( )                    //Function 1
    {
        strcpy (Type, "Electronic");
        strcpy (Product, "Calculator");
        Qty=10;
        Price=225;
    }
public:
    void Disp ( )                // Function 2
    {
        cout<<Type<<"-"<<Product<<":"<<Qty
            <<"@" <<Price<<endl;
    }
};
void main ( )
{
    Bazar B;                     // /Statement 1
```

```
    B. Disp ( );                    / / Statement 2
}
```

(i) Will Statement 1 initialize all the data members for object B with the values given in the Function I? (Yes OR No). Justify your answer suggesting the correction(s) to be made in the above code.

(ii) What shall be the possible output when the program gets executed? (Assuming, if required - the suggested correction(s) are made in the program)

(c) Define a class **Garments** in C++ with the following descriptions: 4

Private Members:

| | |
|---|---|
| GCode | of type string |
| GType | of type string |
| GSize | of type integer |
| GFabric | of type string |
| GPrice | of type float |

A function Assign ( ) which calculates and assigns the value of GPrice as follows

For the value of GFabric as "COTTON",

| GType | GPrice(Rs) |
|---|---|
| TROUSER | 1300 |
| SHIRT | 1100 |

For GFabric other than "COTTON" the above mentioned GPrice gets reduced by 10%.

Public Members:

A constructor to assign initial values of GCode, GType and GFabric with the word "NOT ALLOTTED" and GSize and GPrice with 0

A function Input ( ) to input the values of the data members GCode, GType, GSize and GFabric and invoke the Assign ( ) function.

A function Display ( ) which displays the content of all the data members for a Garment.

(d) Answer the questions (i) to (iv) based on the following code: 4

```
class Dolls
{
    char DCode[5] ;
protected:
    float Price;
```

```
        void CalcPrice(float);
public:
        Dolls ( );
        void DInput ( ) ;
        void DShow ( ) ;
} ;
class SoftDolls : public Dolls
{
        char SDName[20] ;
        float Weight;
public:
        SoftDolls ( ) ;
        void SDInput ( ) ;
        void SDShow ( ) ;
} ;
class ElectronicDolls: public Dolls
{
        char EDName[20] ;
        char BatteryType[10];
        int Batteries;
public:
        ElectronicDolls ( ) ;
        void EDInput ( ) ;
        void EDShow ( ) ;
} ;
```

(i) Which type of Inheritance is shown in the above example?

(ii) How many bytes will be required by an object of the class ElectronicDolls? .

(iii) Write name of all the data members accessible from member functions of the class SoftDolls

(iv) Write name of all the member functions accessible by an object of the class ElectronicDolls.

**3.** (a) Write a function in C++, which accepts an integer array and its size as parameters and rearranges the array in reverse. Example: if an array of nine elements initially contains the elements as

4, 2, 5, 1, 6, 7, 8, 12, 10

then the function should rearrange the array as

10, 12, 8, 7, 6, 1, 5, 2, 4 4

(b) An array Arr[40][10] is stored in the memory along the column with each element occupying 4 bytes. Find out the address of the location Arr[3][6] if the location Arr[30][10] is stored at the address 9000 4

(c) Write a function in c++ to Insert an element into a dynamically allocated Queue where each node contains a name (of type string) as data. 4

Assume the following definition of THENODE for the same.

```
struct THENODE
{
    char Name[20] ;
    THENODE *Link;
} ;
```

(d) Write a function in C++ to print the product of each column of a two dimensional integer array passed as the argument of the function. 2

Explain: if the two dimensional array contains

| | | |
|---|---|---|
| 1 | 2 | 4 |
| 3 | 5 | 6 |
| 4 | 3 | 2 |
| 2 | 1 | 5 |

Then the output should appear as :
Product of Column 1 = 24
Product of Column 2 = 30
Product of Column 3 = 240

(e) Evaluate the following postfix notation of expression (Show status of Stack after execution of each operation) : 2

4, 10, 5, +, *, 15, 3, /, –

**4.** (a) Observe the program segment given below carefully, and answer the question that follows: 1

```
class Applicant
{
    long AId;                    //Applicant's Id
```

```
        char Name [20] ;          //Applicant's Name
        float Score;              //Applicant's Score
    public:
        void Enroll ( );
        void Disp ( ) ;
        void MarksScore ( ); / /Function to change Score
        long R_AId () {retumAId;)
    } ;
    void ScoreUpdate (long Id)
    {
    fstream File;
    File.open ("APPLI.DAT",ios::binary|ios::in|ios::out);
    Applicant A;
    int Record = 0, Found = 0 ;
    while (!Found && File.read((char*) &C, sizeof(c)))
    {
        if(Id = =A.R_AId ( ))
        {
        cout<<"Enter new Score" ;
        A.MarksScore ( );
        _____          / / Statement 1
        _____          / /Statement 2
        Found = 1;
        }
        Record ++;
    }
    if (Found = =1) cout<<"Record Updated";
    File.close ( ) ;
}
```

Write the Statement1 **to position** the File Pointer at the beginning of the Record for which the Applicant's ld matches with the argument passed, and Statement2 **to write** the updated Record at that position.

(b) Write a function in C++ to count the number of lowercase alphabets present in a text file "BOOK.TXT". 2

(c) Given a binary file PHONE.DAT, containing records of the following structure type 3

```
class Phonlist
{
        char Name [20] ;
        char Address[30];
        char AreaCode[5];
        char PhoneNo[15] ;
public:
        void Register () ;
        Void Show ( ) ;
        int CheckCode (char AC [ ])
        {
                return strcmp (AreaCode, AC) ;
        }
} ;
```

Write a function TRANSFER ( ) in C++, that would copy all those records which are having AreaCode as "DEL" from PHONE.DAT to PHONBACK.DAT.

5. (a) Differentiate between **Candidate Key** and **Primary Key** in context of RDBMS 2

(b) Consider the following tables Product and Client. Write SQL commands for the statement (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

**TABLE: PRODUCT**

| P_ID | ProductName | Manufacturer | Price |
|---|---|---|---|
| TP01 | Talcom Powder | LAK | 40 |
| FW05 | Face Wash | ABC | 45 |
| BS01 | Bath Soap | ABC | 55 |
| SH06 | Shampoo | XYZ | 120 |
| FW12 | Face Wash | XYZ | 95 |

**TABLE: CLIENT**

| C_ID | ClientName | City | P_ID |
|---|---|---|---|
| 01 | Cosmetic Shop | Delhi | FW05 |
| 06 | Total Health | Mumbai | BS01 |
| 12 | Live Life | Delhi | SH06 |
| 15 | Pretty Woman | Delhi | FW12 |
| 16 | Dreams | Bangalore | TP01 |

(i) To display the details of those Clients whose City is Delhi

(ii) To display the details of Products whose Price is in the range of 50 to 100 (Both values included)

(iii) To display the ClientName, City from table Client, and ProductName and Price from table Product, with their corresponding matching P_ID

(iv) To increase the Price of all Products by 10

(v) SELECT DISTINCT Address FROM Client;

(vi) SELECT Manufacturer, MAX(Price), Min(Price), Count(*)
FROM Product GROUP BY Manufacturer;

(vii) SELECT ClientName, ManufacturerName
FROM Product, Client
WHERE Client.Prod_ld=Product.P_ld;

(viii) SELECT ProductName, Price *4
FROM Product

**6.** (a) State and verify De Morgan's law in Boolean Algebra 2

(b) Draw a Logical Circuit Diagram for the following Boolean Expression
X'. (Y' + Z) 1

(c) Convert the following Boolean expression into its equivalent Canonical Sum of Product Form(SOP)
(X' + Y + Z') . (X' + Y + Z) . (X' + Y' + Z) . (X' + Y' + Z') 2

(d) Reduce the following Boolean expression using K - Map
F (A,B,C,D) = $\sum$(0,2,3,4,6,7,8,10,12) 3

**7.** (a) What is a Hub? 1

(b) Expand the following terms with respect to Networking: 2

(i) MODEM

(ii) WLL

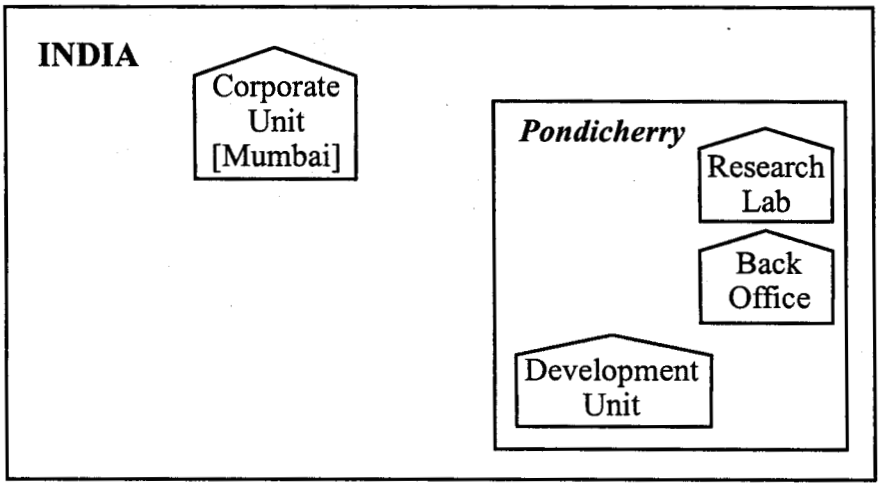
(iii) FTP

(iv) TCP/IP

(c) How is Coaxial cable different from Optical Fibre? 1

(d) "Bias Methodologies" is planning to expand their network in India, starting with three cities in India to build infrastructure for research and development

of their chemical products. The company has planned to setup their main office in Pondicherry - at three different locations and have named their offices as "Back Office", "Research Lab" and "Development Unit". The company has one more Research office namely "Corporate Office" in "Mumbai". A rough layout of the same is as follows : 4




Approximate distances between these offices is as follows:

| From | To | Distance |
|---|---|---|
| Research Lab | Back Office | 110 Mts |
| Research Lab | Development Unit | 16 KM |
| Research Lab | Corporate Unit | 1800 KM |
| Back Office | Development Unit | 13 KM |

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

| | |
|---|---|
| Research Lab | 158 |
| Back Office | 79 |
| Development Unit | 90 |
| Corporate Unit | 51 |

(i) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:

- Research Lab and Back Office
- Research Lab and Development Unit

(ii) Which one of the following device will you suggest for connecting all the computers with in each of their office units?

- Switch/Hub
- Modem
- Telephone

(iii) Which of the following communication medium, you will suggest to be procured by the company for connecting their local office units in Pondicherry for very effective (High Speed) communication?

- Telephone Cable
- Optical Fiber
- Ethernet Cable

(iv) Suggest a cable/wiring layout for connecting the company's local office units located in Pondicherry. Also, suggest an effective method/technology for connecting the company's office unit located in Mumbai.

## QUESTION PAPER CODE 91

**1.** (a) What is the purpose of using a typedef command in C++. Explain with suitable example. 2

(b) Name the header files that shall be needed for the following code: 1

```
void main ( )
{
    char Word [ ] =”Exam”;
    cout<<setw(20)<<Word;
}
```

(c) Rewrite the following program after removing the syntax error(s), if any. Underline each correction. 2

```
#include <iostream.h>
void main ( )
{
    One = 10, Two = 20;
    Callme (One;Two) ;
    Callme (Two) ;
}
void Callme (int Arg1, int Arg2=20)
{
```

```
        Arg1 = Arg1 + Arg2;
        cout<<Arg1>> Arg2;
    }
```

(d) Find the output of the following program : 3

```
#include<iostream.h>
#include<ctype.h>
void main ( )
{
    char Mystring[ ] ="What@OUTPUT!" ;
    for(int I = 0; Mystring [I] ! =' \0'; I++)
    {
        if (!isalpha (Mystring[I]))
            Mystring [I] = '*';
        else if (isupper (Mystring[I]))
            Mystring [I] = Mystring[I] +1;
        else
            Mystring [I] = Mystring [I+1];
    }
    cout<<Mystring;
}
```

(e) Find the output of the following program : 2

```
#include<iostream.h>
void main ( )
{
    int A=5, B=10;
    for (int I = 1;  I<=2; 1++)
    {
        cout<< "Linel="<<A++<< "&"<<B–2<<endl;
        cout<<"Line2="<<++B<<"&"<<A+3<<endl;
    }
}
```

(f) In the following program, find the correct possible output(s) from the options: 2

```
#include<stdlib.h>
#include<iostream.h>
void main ( )
{
```

```
    randomize() ;
    char Area [ ] [10] = { ‘‘NORTH”, ‘‘SOUTH”, “EAST”, “WEST”} ;
    int ToGo;
    for (int I=0; 1<3; 1++)
    {
        ToGo = random(2) +1;
        cout<<Area [ToGo]<<” : “;
    }
}
```

outputs:

(i) SOUTH:EAST:SOUTH:

(ii) NORTH:SOUTH:EAST:

(iii) SOUTH:EAST:WEST:

(iv) SOUTH:EAST:EAST:

**2.** (a) Differentiate between **private** and **protected** visibility modes in context of Object Oriented Programming giving a suitable example illustrating each. 2

(b) Answer the questions (i) and (ii) after going through the following program: 2

```
#include<iostream.h>
#include<string.h>
class Retail
{
    char Category [20];
    char Item [20];
    int Qty;
    float Price;
    Retail ( )                  // Function 1
    {
        strcpy (Category, “Cereal”);
        strcpy (Item, “Rice”);
        Qty = 100;
        Price = 25;
public:
    void Show ( )               // Function 2
    {
        cout<<Category<<“–”<<Item<<“ : ”<<Qty
```

```
                <<"@"<<Price<<endl;
        }
};
void main ( )
{
        Retail R;                    // Function 1
        R. Show ( ) ;.               // Function 2
}
```

(i) Will Statement 1 initialize all the data members for object R with the values given in the Function 1 ? (Yes OR No). Justify your answer suggesting the correction(s) to be made in the above code.

(ii) What shall be the possible output when the program gets executed? (Assuming, if required - the suggested correction(s) are made in the program)

(c) Define a class **Clothing** in C++ with the following descriptions: 4

Private Members:

| | |
|---|---|
| Code | of type string |
| Type | of type string |
| Size | of type integer |
| Material | of type string |
| Price | of type float |

A function Calc_Price( ) which calculates and assigns the value of Price as follows:

For the value of Material as "COTTON" :

| Type | Price (Rs.) |
|---|---|
| TROUSER | 1500 |
| SHIRT | 1200 |

For Material other than "COTTON" the above mentioned Price gets reduced by 25%.

Public Members:

A constructor to assign initial values of Code, Type and Material with the word "NOT ASSIGNED" and Size and Price with 0.

A function Enter( ) to input the values of the data members Code, Type, Size and Material and invoke the CalcPrice( ) function.

A function Show( ) which displays the content of all the data members for a Clothing.

(d) Answer the questions (i) to (iv) based on the following code: 4

```
class Toys
{
        char TCode [5] ;
protected:
        float Price;
        void Assign (float);
public:
        Toys( ) ;
        void TEntry ( ) ; ,
        void TDisplay () ;
} ;
class SoftTOYS: public Toys
{
        char STName [ 20] ;
        float weight;
public:
        SoftToys( ) ;
        void STEntry ( ) ;
        void STDisplay ( );
} ;
class ElectronicToys: public Toys
{
        char ETName[20];
        int No_of_Batteries;
public:
        ElectronicToys( ) ;
        void ETEntry ( ) ;
        void ETDisplay ( ) ;
} ;
```

(i) Which type of Inheritance is shown in the above example?

(ii) How many bytes will be required by an object of the class SoftToys ?

(iii) Write name of all the data members accessible from member functions of the class SoftToys.

(iv) Write name of all the member functions, which are accessible from an object of the class ElectronicToys.

**3.** (a) Write a function in C++, which accepts an integer array and its size as arguments and swaps the elements of every even location with its following odd location. 4

Example: if an array of nine elements initially contains the elements as

2, 4, 1, 6, 5, 7, 9, 23, 10

then the function should rearrange the array as

4, 2, 6, 1, 7, 5, 23, 9, 10

(b) An array Arr[50] [100] is stored in the memory along the row with each element occupying 2 bytes. Find out the address of the location Arr[20][50], if the location Arr[10] [25] is stored at the address 10000. 4

(c) Write a function in C++ to Delete an element from a dynamically allocated Queue where each node contains a real number as data.

Assume the following definition of MYNODE for the same. 4

```
struct MYNODE
{
    float NUM;
    MYNODE *Link;
} ;
```

(d) Write a function in C++ to print the product of each row of a two dimensional integer array passed as the argument of the function. 2

Example: if the two dimensional array contains

| | | |
|---|---|---|
| 20 | 40 | 10 |
| 40 | 50 | 30 |
| 60 | 30 | 20 |
| 40 | 20 | 30 |

Then the output should appear as :

Product of Row 1= 8000

Product of Row 2= 6000

Product of Row 3= 3600

Product of Row 4= 2400

(e) Evaluate the following postfix notation of expression (Show status of Stack after execution of each operation) : 2

5, 20, 15, –, *, 25, 2, *, +

**4.** (a) Observe the program segment given below carefully, and answer the question that follows:

```
class Candidate
{
        long Cld;                       //Candidate' s Id
        char CName [20];                //Candidate's Name
        float Marks;                    //Candidate's Marks
public:
        void Enter ( ) ;
        void Display ( ) ;
        void MarksChange( ) ;           //Function to change marks
        lond R_Cid( ) {return Cld; )
};
void MarksUpdate (long Id)
{
        fstream File;
        File.open ("CANDIDAT.DAT",ios: :binary | ios: :in | ios: :out);
        Candidate C;
        int Record=0, Found=0;
        while (! Found && File.read ( (char*) &C, sizeof (C) ) )
        {
                if (Id= =C. R_Cld ( ) )
                {
                cout<<"Enter new Marks";
                C.MarksChange( ) ;
                _____________           //Statement 1
                _____________           //Statement 2
                Found = 1;
                }
                Record++;
        }
        if (Found = 1)  cout<<"Record Updated";
        File.close ( ) ;
}
```

Write the Statement 1 **to position** the File Pointer at the beginning of the Record for which the Candidate's Id matches with the argument passed, and Statement 2 **to write** the updated Record at that position. 1

(b) Write a function in C++ to count the number of uppercase alphabets present in a text file "ARTICLE.TXT". 2

(c) Given a binary file TELEPHON.DAT, containing records of the following class Directory:

```
class Directory
{
        char Name[20] ;
        char Address [30] ;
        char AreaCode[5];
        char Phone_No[15];
public:
        void Register ( ) ;
        void Show ( ) ;
        int CheckCode(char AC[ ])
        {
                return strcmp (AreaCode, AC);
        }
};
```

Write a function COPYABC( ) in C++, that would copy only those records having AreaCode as "123" from TELEPHON.DAT toTELEBACK.DAT. 3

**5.** (a) Differentiate between **Candidate Key** and **Alternate Key** in context of RDBMS. 2

(b) Consider the following tables Item and Customer. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii). 6

**TABLE : ITEM**

| I_ID | ItemName | Manufacturer | Price |
|---|---|---|---|
| PC01 | Personal Computer | ABC | 35000 |
| LC05 | Laptop | ABC | 55000 |
| PC03 | Personal Computer | XYZ | 32000 |
| PC06 | Personal Computer | COMP | 37000 |
| LC03 | Laptop | PQR | 57000 |

**TABLE : CUSTOMER**

| C_ID | CustomerName | City | I_Id |
|---|---|---|---|
| 01 | N Roy | Delhi | LC03 |
| 06 | H Singh | Mumbai | PC03 |
| 12 | R Pandey | Delhi | PC06 |
| 15 | C Sharma | Delhi | LC03 |
| 16 | K Agarwal | Bangalore | PC01 |

(i) To display the details of those Customers whose City is Delhi

(ii) To display the details of Items whose Price is in the range of 35000 to 55000 (Both values included)

(iii) To display the CustomerName, City from table Customer and ItemName and Price from table Item, with their corresponding matching I-Id

(iv) To increase the Price of all Items by 1000 in the table Item

(v) SELECT DISTINCT City FROM Customer;

(vi) SELECT ItemName, MAX(Price), Count(*)
FROM Item GROUP BY ItemName;

(vii) SELECT CustomerName, Manufacturer FROM Item, Customer WHERE Item.Item_Id=Customer.Item.I_Id

(viii) SELECT ItemName, Price * 100
FROM Item WHERE Manufacturer ='ABC'; .

**6.** (a) State any verify Absorption law in Boolean Algebra. 2

(b) Draw a Logical Circuit Diagram for the following Boolean Expression : 1
A . (B + C')

(c) Convert the following Boolean expression into its equivalent Canonical Product of Sum Form (POS) : 2
A. B' . C + A'. B . C + A'. B . C'

(d) Reduce the following Boolean expression using K - Map: 3
F (A, B, C, D) = $\sum$ (0, l, 2, 4, 5, 8, 9, 10, 11)

**7.** (a) What is a Modem? 1

(b) Expand the following terms with respect to Networking: 2

(i) PPP

(ii) GSM

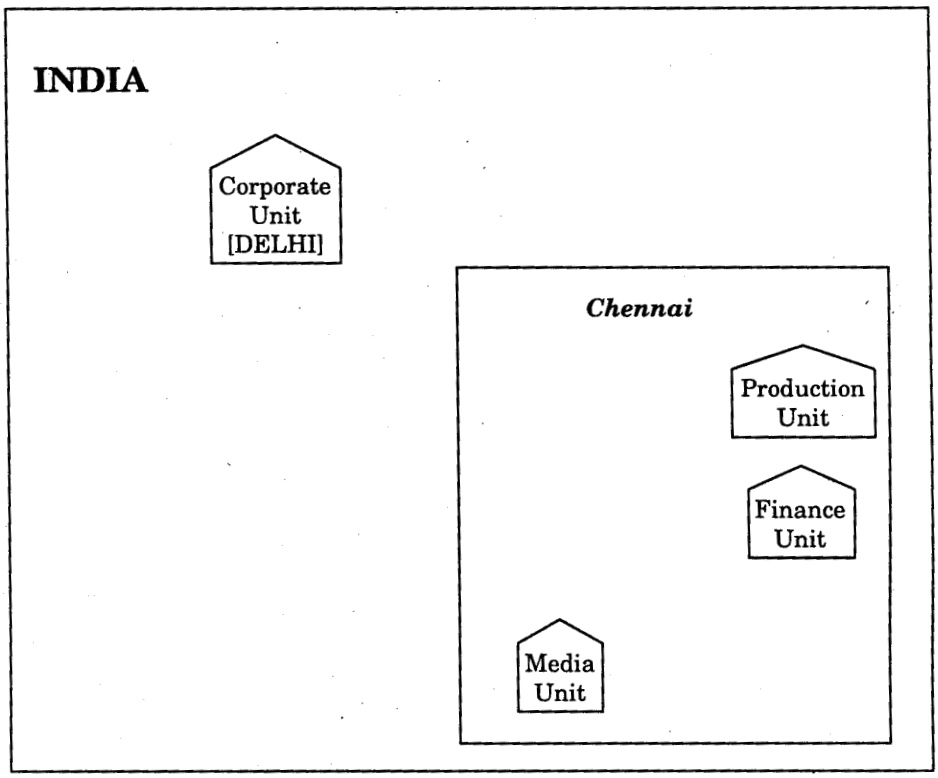
(iii) XML

(iv) HTTP

(c) How is a Hacker different from a Cracker? 1

(d) "China Middleton Fashion'" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of their product. The company has planned to set up their main office units in Chennai at three different locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit". The company has its corporate unit in Delhi.

A rough layout of the same is as follows:




Approximate distances between these Units is as follows:

| From | To | Distance |
|---|---|---|
| Production Unit | Finance Unit | 70 Mtr |
| Production Unit | Media Unit | 15 KM |
| Production Unit | Corporate Unit | 2112 KM |
| Finance Unit | Media Unit | 15 KM |

In continuation of the above, the company experts have planned to install the following number of computers in each of their office units:

| | |
|---|---|
| Production Unit | 150 |
| Finance Unit | 35 |
| Media Unit | 10 |
| Corporate Unit | 30 |

(i) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:

- Production Unit and Media Unit
- Production Unit and Finance Unit

(ii) Which one of the following devices will you suggest for connecting all the computers within each of their office units?

- Switch/Hub
- Modem
- Telephone

(iii) Which of the following communication media, will you suggest to be procured by the company for connecting their local office units in Chennai for very effective (High Speed) communication?

- Telephone Cable
- Optical Fiber
- Ethernet Cable

(iv) Suggest a cable/wiring layout for connecting the company's local office units located in Chennai. Also, suggest an effective method/technology for connecting the company's office unit located in Delhi. 4

# Marking Scheme — Computer Science

***General Instructions :***

1. The answers given in the marking scheme are SUGGESTIVE, Examiners are requested to award marks for all alternative correct Solutions / Answers conveying the similar meaning
2. All programming questions have to be answered with respect to. C++ Language only.
3. In C++, ignore case sensitivity for identifiers (Variable/Functions/Structures/Class Names).
4. In SQL related questions - both ways of text/character entries should be acceptable for Example: "AMAR" and 'amar' both are correct. .
5. In SQL related questions - semicolon should be ignored for terminating the SQL statements
6. In SQL related questions, ignore case sensitivity.

QUESTION PAPER CODE 91/1

**EXPECTED ANSWERS**

1. (a) What is the difference between #define and const? Explain with suitable example. 2

Ans: **#define:** It is a preprocessor directive in C++ for creating a Macro.

**Example:**

```
#define sqr(i) i*i
```

**const:** It is an Access Modifier in C++ that assigns a constant (non modifiable) value to a variable. Any attempt in modifying the value assigned to such a variable is reported as an error by the compiler.

**Example:**

```
const float Pi = 3.14;
```

***(½ Mark for each correct explanation of #define and const)***

***(½ Mark for each correct example of #define and const)***

**OR**

***(Full 2 Marks for correct examples demonstrating the difference between #define and const)***

**OR**

***(Only 1 Mark to be awarded if Explanation without supporting examples)***

(b) Name the header files that shall be needed for the following code 1

```
void main ( )
{
     char String [ ] = "Peace";
     cout<<setw(20)<<String;
}
```

Ans: iostream.h
iomanip.h

***(½ Mark for identifying each correct header file)***

**Note: Ignore any other header files, if mentioned.**

(c) Rewrite the following program after removing the syntactical error(s) if any. Underline each correction. 2

```
#include <iostream.h>
void main( )
{
     First = 10 , Second = 20;
     Jump to (First; Second) ;
     Jumpto (Second);
}
void Jumpto(int N1, int N2=20)
{
     N1 = N1 + N2;
     cout<<N1>>N2;
}
```

Ans:

```
#include <iostream.h>
void Jumpto(int N1, int N2=20);        // Error 1
void main( )
{
     int First = 10, Second = 20;      // Error 2
     Jumpto(First, Second);            // Error 3
     Jumpto(Second) ;
}
void Jumpto(int N1, int N2=20)
{
     N1 = N1 + N2;
     cout<<N1<<N2;                     // Error 4
}
```

**OR**

```
#include <iostream.h>
void Jumpto(int N1, int N2=20)         // Error 1
```

```
{
     N1 = N1 + N2;
     cout<<N1<< N2;                    // Error 2
}
void main ( )
{
     int First = 10, Second = 20;      // Error 3
     Jumpto(First, Second);            // Error 4
     Jumpto (Second) ;
}
```

***(½ Mark for each correction)***

***OR***

***(1 Mark for identifying at least three errors, without suggesting correction)***

(d) Find the output of the following program: 3

```
#include<iostream.h>
#include<ctype.h>
void main ( )
{
     char Text [ ] = "Mind@Work!";
     for (int I = 0; Text [I] !='\0'; I++)
     {
          if (!isalpha (Text [I])
          Text [I] = '*';
          else if (isupper(Text [I]))
               Text [I] = Text [I]+1;
          else
               Text (I) = Text [I+l];
     }
     cout<<Text;
}
```

**Ans:** **`Nnd@*Xrk!*`**

***(½ Mark for N in the 1st position)***

***(½ Mark for nd in the 2nd and 3rd position)***

***(½ Mark for @ in the 4th position)***

***(½ Mark for * in the 5th position)***

***(½ Mark for Xrk!)***

***(½ Mark for * at the end)***

**OR**

***(Fu1l 3 Marks If error is mentioned in the code for Text (I) after last else)***

(e) Find the output of the following program: 2

```
#include<iostream.h>
void main()
{
     int U=10, V=20;
     for (int I = 1; I<=2; I++)
     {
          cout<<"[1]="<<U++<<"&"<<V-5<<endl;
          cout<<"[2]="<<++V<<"&"<<U+2<<endl;
     }
}
```

**Ans:** **[1]=10&15**
**[2]=21&13**
**[1]=11 &16**
**[2]=22&14**
*(½ Mark for each correct line of output)*

***Note:***

- *½ Mark to be deducted for missing "=" and "&" symbols in the output.*
- *½ Mark to be deducted if endl is not considered in the output*

(f) In the following program, find the correct possible output(s) from the options: 2

```
#include<stdlib.h>
#include<iostream.h>
void main( )
{
     randomize( );
     char City [ ] [10] = {"DEL", "CHN", "KOL", "BOM", "BNG"};
     int Fly;
     for (int I=0;1<3;1++)
     {
          Fly = random(2)+1;
          cout<<City [Fly]<<":";
     }
}
```

**outputs:**

**(i) DEL:CHN:KOL:**
**(ii) CHN:KOL:CHN:**
**(iii) KOL:BOM:BNG:**
**(iv) KOL:CHN:KOL:**

Ans: **(ii) & (iv)**

***(2 Marks for mentioning both correct options)***

**OR**

***(1 Mark for mentioning anyone correct option)***

**2.** (a) Differentiate between public and private visibility modes in context of Object Oriented Programming using a suitable example illustrating each. 2

Ans: **public visibility mode:**

Members of a class declared under this visibility are accessible inside the class (in member functions of the class) as well as by the Objects of that class (in any non member function of the program, prototyped / defined after the class declaration).

**private visibility mode:**

Members of a class declared under this visibility are accessible only inside the class (in member functions of the class). They can not be accessed outside the class.

```
class Example
{
     int Priv;
public:
     void Assign ( )
     {
          Priv =10; //private member accessible only inside class
     }
} ;
void main ( )
{
     Example E;
     E.Assign( ); //public member accessible by Object
}
```

***(2 Marks for differentiating public and private correctly using suitable example)***

**OR**

***(1 Mark for correct explanation of private visibility)***

***(1 Mark for correct explanation of public visibility)***

**OR**

***(1 Mark for any valid example of a private member of a class)***

***(1 Mark for any valid example of a public member of a class)***

(b) Answer the questions (i) and (ii) after going through the following program 2

```
#include<iostream.h>
#include<string.h>
class Bazar
{
     char Type [20];
     char Product [20];
     int Qty;
     float Price;
     Bazar ( )
     {             //Function 1
          strcpy (Type,"Electronic");
          strcpy (Product,"Calculator");
          Qty = 10;
          Price = 225;
     }
public:
     void Disp ( )
     {             //Function 2
          cout<<Type<<"-"<<Product<<":"<<Qty
               <<"@"<<Price<<endl;
     }
};
void main ( )
{
     Bazar B;       //Statement 1
     B. Disp ( ) ;  //Statement 2
}
```

(i) Will Statement 1 initialize all the data members for object B with the values given in the Function 1? (Yes OR No). Justify your answer suggesting the correction(s) to be made in the above code.

**Ans: No, since the constructor Bazar has been defined in private section**
**Suggested Correction: Constructor Bazar() to be ,defined in public**

*(½ Mark for identifying NO)*

*(½ Mark for justification and correction)*

(ii) What shall be the possible output when the program gets executed? (Assuming, if required - the suggested correction(s) are made in the program)

Ans: If the constructor is defined as a public member, the following output shall be generated:

```
Electronic-Calculator:10@225
```

***(1 Mark for correct answer)***

**OR**

***(½ Mark each for the String and Numeric values)***

(c) Define,a class Garments in C++ with the following descriptions: 4

Private Members:

| | |
|---|---|
| GCode | of type string |
| GType | of type string |
| GSize | of type integer |
| GFabric | of type string |
| GPrice | of type float |

A function Assign ( ) which calculates and assigns the value of GPrice as follows

For the value ofGFabric as “COTTON”,

| GType | GPrice(Rs) |
|---|---|
| TROUSER | 1300 |
| SHIRT | 1100 |

For GFabric other than “COTTON” the above mentioned GPrice gets reduced by 10%.

Public Members:

A constructor to assign initial values of GCode, GType and GFabric with the word “NOT ALLOTTED” and GSize and GPrice with 0

A function Input ( ) to input the values of the data members GCode, GType, GSize and GFabricl and invoke the Assign ( ) function.

A function Display ( ) which displays the content of all the data members for a Garment.

Ans:

```
class Garments
{
     char GCode[10];
     char GType[10];
     int GSize;
     char GFabric[10] ;
     float GPrice;
```

```
     void Assign( ) ;
public:
     Garments( )
     {
          strcpy(GCode,”NOT ALLOTTED”) ;
          strcpy(GType,”NOT ALLOTTED”) ;
          strcpy (GFabric, “NOT ALLOTTED”) ;
          GSize=0;
          GPrice=0;
     }
     void Input( ) ;
     void Display( ) ;
} ;
void Garments::Assign( )
{
     if (strcmp(GFabric,“COTTON”)==0)
               //if (!strcmp(GFabric, “COTTON”))
     {
          if (strcmp(GType,“TROUSER”) ==0)
               GPrice=1300;
          else if (strcmp(GType,“SHIRT”)==0)
               GPrice=1100;
     }
     else
     {
          if (strcmp(GType,”TROUSER”) = =0)
               GPrice=1300*0.9; // 10% reduction
          else if (strcmp(GType,“SHIRT”)= =0)
               GPrice=1100*0.9; // 10% reduction
     }
}
void Garments::Input( )
{
     gets(GCode) ; // or cin >> GCode;
     gets(GType) ; // or cin >> GType;
     cin>>GSize;
     gets(GFabric) ;// or cin >> GFabric;
     Assign( ) ;
}
void Garments::Display( )
{
     cout<<GCode<<GType<<GSize<<GFabric<<GPrice<<endl;
}
```

***(½ Mark for correct syntax for class header)***
***(½ Mark for correct declaration of data members)***
***(½ Mark for correct definition of constructor)***
***(1 Mark for correct definition of Assign( ))***
***(1 Mark for correct definition of Input( ) with proper invocation of Assign( ) function)***
***(½ Mark for correct definition of Display( ))***

NOTE:

Deduct % Mark if Assign( ) is not invoked properly inside Input( ) function

(d) Answer the questions (i) to (iv) based on the following code: 4

```
class Dolls
{
     char DCode[5] ;
protected:
     float Price;
     void CalcPrice(float);
public:
     Dolls ( );
     void DInput ( ) ;
     void DShow ( ) ;
} ;
class SoftDolls : public Dolls
{
     char SDName[20] ;
     float Weight;
public:
     SoftDolls ( ) ;
     void SDInput ( ) ;
     void SDShow ( ) ;
} ;
class ElectronicDolls: public Dolls
{
     char EDName[20] ;
     char BatteryType[10];
     int Batteries;
public:
     ElectronicDolls ( ) ;
     void EDInput ( ) ;
     void EDShow ( ) ;
} ;
```

(i) Which type of Inheritance is shown in the above example?

Ans: Hierarchical Inheritance
OR
Single Level Inheritance

*(1 mark for mentioning any of the above mentioned type of Inheritance)*

(ii) How many bytes will be required by an object of the class ElectronicDolls?

Ans: 41 bytes
*(1 Mark for correct answer)*

(iii) Write name of all the data members accessible from member functions of the class SoftDolls

Ans: SDName, Weight, Price
*(1 Mark for correct answer)*

**Note:**
**No marks to be awarded for partially correct answer**

(iv) Write name of all the member functions accessible by an object of the class ElectronicDolls.

Ans: EDInput( ), EDShow( ), DInput( ), DShow( )

***(1 Mark for Correct answer)***

Note:

- ***Constructor functions ElectronicDolls( ) & Dolls( ) to be Ignored.***
- ***No marks to be awarded for partially correct answers***

**3.** (a) Write a function in C++, which accepts an integer array and its size as parameters and rearranges the array in reverse. Example: if an array of nine elements initially contains the elements as

4, 2, 5, 1, 6, 7, 8, 12, 10

then the function should rearrange the array as

10, 12, 8, 7, 6, 1, 5, 2, 4 4

Ans:

```
void Rearrange( int Arr [], int Size)
{
     for (int i = 0; i<Size/2; i++)
     {
          int T = Arr[i];
          Arr[i] = Arr[Size-1-i];
          Arr[Size-1-i]=T;
     }
}
```

OR

**Any other correct equivalent function definition**

***(1 Mark for correct Function Header with proper Arguments)***

***(1 Mark for correct loop)***

***(2 Marks for swapping the values correctly)***

**Note:**

**Deduct ½ Mark if loop runs till Size instead of Size/2 for swapping**

**Deduct ½ Mark if reversed values are stored in another array**

(b) An array Arr[40][10] is stored in the memory along the column with each element occupying 4 bytes. Find out the address of the location Arr[3][6] if the location Arr[30][10] is stored at the address 9000 4

Ans:

Address of Array[i][j] along the column =

Base Address + W [( i - L1) + (j - L2) * M]

where,

W = size of each location in bytes = 4

L1 = Lower Bound of rows = 0

L2 = Lower Bound of columns = 0

M = Number of rows per column = 40

Address of Array[30][10] = Base Address + 4 * (30 + 10 * 40)

9000 = Base Address + 4 * 430

Base Address = 9000 - 4 x 430

= 9000 -1720

= 7280

Address of Array[3][6] = 7280 + 4 * (3 + 6 * 40)

= 7280 + 4 * 243

= 7280 + 972

= 8252

OR

Address of Array[i][j] along the column =

Base Address + W (( i - L1) + (j - L2) * M)

where,

W = size of each location in bytes = 4

L1 = Lower Bound of rows = 1

L2 = Lower Bound of columns = 1

M = Number of rows per column = 40

Address of Array[30][10] = Base Address + 4 * ((30 -1) +(10 -1) * 40)

9000 = Base Address + 4 * (29+9*40)

9000 = Base Address + 4 * (29+360)

9000 = Base Address + 4 * (389)

Base Address = 9000 - 4 * 389

= 9000 -1556

= 7444

Address of Array[3][6] = 7444 + 4 * ((3 -1) + (6 -1) * 40)

= 7444 + 4 * (2+5 * 40)

= 7444 + 4 * (2+200),

= 7444 + 4 * 202

= 7444 + 808

= 8252

OR

Address of Array[i][j] along the column =

Address of Array[x][y] + W [( i-x) + (j - y) * M]

where,

W = size of each location in bytes = 4

M = Number of rows per column = 40

i , j = Index value of the unknown element

x , y = Index value of the known element

Address of Array[3][6] = Address of Array[30][10]+ 4 [(3 - 30) +(6 -10) * 40]

= 9000 + 4 [-27 -160]

= 9000 - 4 x 187

= 9000 -748

= 8252

***(2 Marks for writing correct formula (for column major), substituting formula with correct values and/or calculate Base Address)***

***(2 Marks for writing correct formula/correct substituted values, for column major properly, for calculating Address of Arr[20][50])***

(c) Write a function in c++ to Insert an element into a dynamically allocated Queue where each node contains a name (of type string) as data. 4

Assume the following definition of THENODE for the same.

struct THENODE

```
{
     char Name[20];
     THENODE *Link;
};
```

Ans:

```
void Qinsert (THENODE *&Front, THENODE *&Rear)
{
     THENODE *Temp = new THENODE;
     gets(Temp->Name);       //or cin>>Temp->Name;
     Temp->Link = NULL;
     if (Rear = = NULL)
     {
          Front = Temp;
          Rear = Temp;
     }
     else
     {
          Rear – > Link = Temp;
          Rear = Temp;
     }
}
```

OR

```
class Queue
{
     THENODE *Front, *Rear;
public:
     QUEUE( )      //Constructor to initialize Top
     {    Front = NULL;
          Rear = NULL;
     }
     void Qinsert( );//Function to insert a node
     void QDelete( );//Function to delete a node
     void QDisplay( );//Function to display nodes of Stack
     ~Queue( );    //Destructor to delete all nodes
} ;
```

```
void Queue: : Qinsert ( )
{
     THENODE *Temp;
     Temp = new THENODE;
     gets (Temp–>Name) ;//Or cin>>Temp–>Name;
     Temp–>Link = NULL;
     if (Rear = = NULL)
     {
          Front = Temp;
```

```
          Rear = Temp;
     }
     else
     {
          Rear->Link = Temp;
          Rear = Temp;
     }
}
```

**(½ Mark for declaration of a temporary pointer to THENODE)**
**(½ Mark for new allocation for temporary pointer)**
**(½ Mark for assigning OR entering the value of NAME on temporary pointer)**
**(½ Mark for assigning NULL to Temp->Link)**
**(½ Mark for checking Empty QUEUE)**
**(½ Mark for assigning Front and Rear in case of Empty QUEUE)**
**(½ Mark for assigning Rear ->Link with Temporary pointer when QUEUE is not Empty)**
**(½ Mark for reassigning Rear with Temp when the QUEUE is not Empty)**

(d) Write a function in C++ to print the product of each column of a two dimensional integer array passed as the argument of the function. 2

Explain: if the two dimensional array contains

| | | |
|---|---|---|
| 1 | 2 | 4 |
| 3 | 5 | 6 |
| 4 | 3 | 2 |
| 2 | 1 | 5 |

Then the output should appear as :
Product of Column 1 = 24
Product of Column 2 = 30
Product of Column 3 = 240

Ans:

```
void ProdCol(int Arr[][100], int Row, int Col)
{
     int i, j, Prod;
     for (j = 0; j < Col; j++)
     {
          Prod=1;
          for (i = 0; i < Row; i++)
```

```
            Prod * = Arr[i][j];
        cout<<"Product of Column"<<j<< "=" <<Prod<<endl;
    }
}
```

OR

**Any other correct equivalent function definition**

***(½ Mark for correct function header)***
***(½ Mark for correct loop(s))***
***(½ Mark for finding product of elements for each column correctly)***
***(½ Mark for printing the product in correct format)***

(e) Evaluate the following postfix notation of expression (Show status of Stack after execution of each operation) : 2

4, 10, 5, +, *, 15, 3, /, –

Ans:

| Operator Scanned | Stack Content |
|---|---|
| 4 | 4 |
| 10 | 4, 10 |
| 5 | 4, 10, 5 |
| + | 4, 15 |
| * | 60 |
| 15 | 60, 15 |
| 3 | 60, 15, 3 |
| / | 60, 5 |
| - | 55 |

**OR**

Any other method of evaluating correctly the postfix expression is showing the Stack Status.

*(½ Mark for each operation correctly evaluated showing the Stack Status)*

**OR**

*(½ Mark only to be given for writing correct answer without showing the Stack Status)*

**4.** (a) Observe the program segment given below carefully, and answer the question that follows: 1

```
class Applicant
```

```
{
     long AId;          //Applicant's Id
     char Name [20] ;   //Applicant's Name
     float Score;       //Applicant's Score
public:
     void Enroll ( );
     void Disp ( );
     void MarksScore( ); //Function to change Score
     long R_AId () {retumAId;)
} ;
void ScoreUpdate (long Id)
{
     fstream File;
     File.open ("APPLI.DAT",ios::binary|ios::in|ios::out);
     Applicant A;
     int Record = 0, Found = 0 ;
     while (!Found && File.read((char*) &C, sizeof(c)))
     {
          if(Id ==A.R_AId ( ))
          {
               cout<<"Enter new Score" ;
               A.MarksScore ( );
               _____________              // Statement 1
               _____________               //Statement 2
               Found = 1 .
          }
          Record ++;
     }
     if (Found ==1) cout<<"Record Updated";
          File.close ( ) ;
}
```

Write the Statement1 to position the File Pointer at the beginning of the Record for which the Applicant's ld matches with the argument passed, and Statement2 to write the updated Record at that position.

Ans:

Statement 1 :

```
File.seekp (Record * sizeof (A));
```

OR

```
File.seekp (Record * sizeof (Applicant));
```

OR

```
File.seekp (File. tellg() - sizeof(A));
```

OR

```
File. seekp(File. tellg() - sizeof{Applicant));
```

OR

```
File. seekp(-sizeof (A) , ios::cur);
```

OR

```
File.seekg(Record * sizeof(A));
```

OR

```
File.seekg(Record * sizeof(Applicant));
```

OR

```
File. seekg(-sizeof (A) , ios::cur);
```

OR

Any equivalent correct method

**Statement 2:**

```
File.write((char*) &A, sizeof (A));
```

OR

```
File.write((char*)&A, sizeof(Applicant));
```

OR

**Any equivalent correct method using A or C as object**

***(½ Mark for each correct Statement)***

Note:

(Full 1 Mark to be given for mentioning error in code for undeclared symbols C and c in the File.read(...))

(b) Write a function in C++ to count the number of lowercase alphabets present in a text file "BOOK.TXT". 2

Ans:

```
int CountLower()
{
     ifstream Fil;                    OR  ifstream Fil ("BOOK.TXT");
     Fil.open("BOOK. TXT")
     char Ch;
     int Count =0;
     while (Fil.get(Ch))
     {
          if (Ch>='a' && Ch<='z')
               Count++;
```

```
    }
    Fil.close() ;    //Ignore
    return Count;
}
```
OR
```
int CountLower()
{
    ifstream Fil;                    } OR ifstream Fil ("BOOK.TXT");
    Fil.open("BOOK. TXT");
    char Ch;
    int Count =0;
    while (Fil.get(Ch))
    {
        if (islower(Ch))
            Count++;
    }
    Fil.close();     //Ignore
    return Count;
}
```
OR
```
int CountLower()
{
    ifstream Fil;                    } OR ifstream Fil ("BOOK.TXT");
    Fil.open("BOOK.TXT");
    char Ch;
    int Count = 0;
    while (!Fil.eof())
    {
        ch=Fil.get() ;
        if (islower(Ch))
            Count++;
    }
    Fil.close() ;         //Ignore
    return Count;
}
```
OR

**Any other correct function definition**

*(½ Mark for opening BOOK. TXT correctly)*

*(½ Mark for reading each character from the file)*

*(½ Mark for checking lowercase alphabet)*

*(½ Mark for calculating the lowercase alphabets)*

**NOTE:**

**No Mark should be deducted if Count is not returned**

(c) Given a binary file PHONE.DAT, containing records of the following structure type 3

```
class Phonlist
{
     char Name [20] ;
     char Address[30];
     char AreaCode[5];
     char PhoneNo[15] ;
public:
     void Register () ;
     Void Show ( ) ;
     int CheckCode (char AC[])
     {
          return strcmp (AreaCode, AC) ;
     }
} ;
```

Write a function TRANSFER ( ) in C++, that would copy all those records which are having AreaCode as "DEL" from PHONE.DAT to PHONBACK.DAT.

Ans:

```
void TRANSFER()
{
     Phonlist P;
     fstream fin,fout;
     fin.open("PHONE.DAT",ios::binary|ios::in);
     fout.open("PHONBACK.DAT", ios:: binary | ios::out);
     while (fin.read((char*)&P, sizeof(P)))
     {
          if (P. CheckCode("DEL") ==0)
               fout.write((char*)& P,sizeof(P));
     }
     fin.close();      //ignore
     fout.close();     //ignore
}
```

```
OR
ifstream fin ("PHONE.DAT", ios: :binary);
ofstream fin ("PHONBACK.DAT", ios: :binary);
```

```
OR
void TRANSFER()
{
     Phonlist P;
     fstream fin, fout;
     fin. open ("PHONE. DAT", ios: : binary | ios: : in);
```

```
OR
ifstream fin ("PHONE.DAT", ios: :binary);
ofstream fin ("PHONBACK.DAT", ios: :binary);
```

```
        fout.open("PHONBACK.DAT", ios: :binary|ios: :in);
        if (fin)
        {
             fin.read((char*)&P, sizeof(P));
             while (!fn.eof())
             {
                  if (P.CheckCode("DEL") ==0)
                       fout.write((char*)&P, sizeof(P));
                  fin.read((char*)&P, sizeof(P));
             }
        }
        fin.close();      //ignore
        fout.close();     //ignore
}
```

*(½ Mark for opening PHONE.DAT correctly)*
*(½ Mark for opening PHONBACK.DAT correctly)*
*(½ Mark for reading each record from PHONE.DAT)*
*(½ Mark for correct loop / checking end of file)*
*(½ Mark for comparing value returned by CheckCode("DEL") with 0)*
*(½ Mark for writing the record to PHONBACK.DAT)*

**5.** (a) Differentiate between Candidate Key and Primary Key in context of RDBMS

Ans: **Candidate Key:** All such attributes/columns, which can uniquely identify each row/record in a table

**Primary Key:** An attribute/column among the Candidate Keys which is used to uniquely identify each row/record in a table

(2 Marks for any valid difference/relation between Candidate Key and Primary Key)

**OR**

***(1 Mark for correct explanation of Candidate Key)***

***(1 Mark for correct explanation of Primary Key)***

(b) Consider the following tables Product and Client. Write SQL commands for the statement (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

**TABLE: PRODUCT**

| P_ID | ProductName | Manufacturer | Price |
|---|---|---|---|
| TP01 | Talcom Powder | LAK | 40 |
| FW05 | Face Wash | ABC | 45 |
| BS01 | Bath Soap | ABC | 55 |
| SH06 | Shampoo | XYZ | 120 |
| FW12 | Face Wash | XYZ | 95 |

**TABLE: CLIENT**

| C_ID | ClientName | City | P_ID |
|---|---|---|---|
| 01 | Cosmetic Shop | Delhi | FW05 |
| 06 | Total Health | Mumbai | BS01 |
| 12 | Live Life | Delhi | SH06 |
| 15 | Pretty Woman | Delhi | FW12 |
| 16 | Dreams | Bangalore | TP01 |

(i) To display the details of those Clients whose City is Delhi

Ans : **SELECT * FROM Client WHERE City = 'Delhi';**

*(½ Mark for correct SELECT)*
*(½ Mark for correct WHERE clause)*

(ii) To display the details of Products whose Price is in the range of 50 to 100 (Both values included)

Ans: **SELECT * FROM Product**
**WHERE Price >=50 AND Price <=100;**

OR

**SELECT * FROM Product**

**WHERE Price BETWEEN 50 AND 100;**

*(½ Mark for correct SELECT)*
*(½ Mark for correct WHERE clause)*

(iii) To display the ClientName, City from Table Client, and ProductName and Price from table Product, with their corresponding Matching P_ID

Ans: **SELECT ClientName, City, ProductName, Price, Client.P_ID**
**FROM Client, Product**
**WHERE Client.P_ID = Product. P_ID;**

(½ Mark for correct SELECT)
(½ Mark for correct WHERE clause)

(iv) To increase the Price of all Products by 10

Ans: **UPDATE Product SET Price = Price +10;**

*(½ Mark for correct SELECT)*
*(½ Mark for correct WHERE clause)*

(v) SELECT DISTINCT Address FROM Client

Ans: **DISTINCT City**
**Bangalore**
**Delhi**

**Mumbai**

(½ Mark for correct output)

OR

(½ Mark for mentioning Address is not a Column in the Table Client OR mentioning ERROR)

(vi) SELECT Manufacturer, MAX(Price), Min(Price), Count(*)
FROM Product GROUP BY Manufacturer;

Ans:

| **Manufacturer** | **MAX(Price)** | **MIN(Price)** | **Count(*)** |
|---|---|---|---|
| ABC | 55 | 45 | 2 |
| LAK | 40 | 40 | 1 |
| XYZ | 120 | 95 | 2 |

*(½ Mark for correct output)*

(vii) SELECT ClientName, ManufacturerName FROM Product, Client
WHERE Client.Prod_Id = Product.P_Id;

Ans:

| **ClientName** | **Manufacturer** |
|---|---|
| Cosmetic Shop | ABC |
| Total Health | ABC |
| Live life | XYZ |
| Pretty Woman | XYZ |
| Dreams | LAK |

*(½ Mark for correct output)*

OR

(½ Mark for mentioning ManufactureName and Prod_ld are not valid Column in the respective Tables)

(viii) SELECT ProductName, Price * 4

Ans:

| **Product Name** | **Price * 4** |
|---|---|
| Talcom Powder | 160 |
| Face Wash | 180 |
| Bath Soap | 220 |
| Shampoo | 480 |
| Face Wash | 380 |

*(½ Mark for correct output)*

NOTE:

For Parts (v) to (viii), Ignore the Column Header and order of output rows

**6.** (a) State and verify De Morgan's law in Boolean Algebra 2

Ans:

$(X + Y)' = X' . Y'$

OR

$(X . Y)' = X' + Y'$

**Verification:**

| X | Y | X + Y | (X+Y)' | X' | Y' | X'.Y' |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 |

VERIFIED

OR

$(X+Y)' = X' . Y'$

If $(X+Y)' . (X+Y) = (X' . V') . (X+Y)$

If $0 - = X' . Y' . X + X' . Y' . Y$

If $0 = 0 + 0$

Hence Proved and Verified

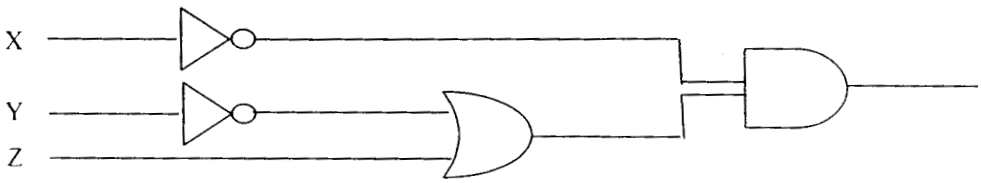
*(1 Mark for stating anyone of the De Morgan's Law)*

*(1 Mark for verifying anyone of the De Morgan's Law)*

(b) Draw a Logical Circuit Diagram for the following Boolean Expression 1

$X' . (y' + Z)$

Ans:




*(1 Marks for Drawing Logic Circuit Diagram for all )*

(c) Convert the following Boolean expression into its equivalent Canonical Sum of Product Form«SOP) 2

$(X' +Y +Z'). (X' +Y +Z). (X' +Y' +Z). (X' +Y' +Z')$"

Ans: $F( X , Y , Z) = \Pi (4 , 5 , 6 , 7)$

$= \sum (0 , 1 , 2 , 3)$

= X'. Y'. Z' + X'. Y'. Z + X'. Y. Z' + X'. Y. Z

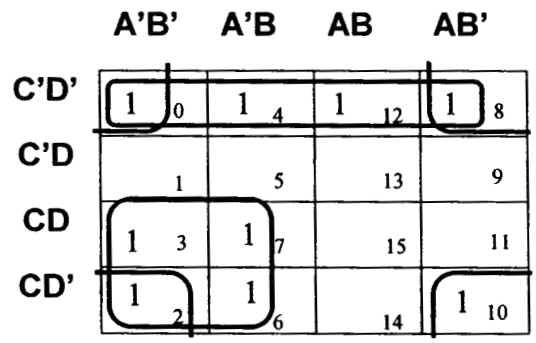
*(2 Marks for writing correct Canonical SOP Expression)*

OR

*(1 Mark for only deriving Product Terms)*

(d) Question

Ans:




**F= C'.D' + A'.C + B'.D'**

*(½ Mark for drawing correct K-Map)*

*(½ Mark for plotting 1's correctly)*

*(1 Mark for correct grouping)*

*(1 Mark for correct Answer)*

**7.** (a) What is a Hub? 1

Ans: **A Hub is used for a central connection between two or more computers on a network.**

OR

**A Hub is a network device used to connect two or more computers.**

OR

**A Hub is an unintelligent network device to connect computers.**

*(1 Mark for any correct definition / explanation)*

(b) Expand the following terms with respect to Networking: 2

(i) Modem (ii) WLL (iii) FTP (iv) TCP/IP

Ans:

**(i) Modulator - Demodulator**

**(ii) Wireless Local Loop OR Wireless in Local Loop**

**(iii) File Transfer Protocol**

**(iv) Transfer Control Protocol/Internet Protocol**

*(½ Mark for each correct expansion)*

(c) How is Coaxial cable different from Optical Fibre? 1

Ans: **Coaxial Cable:** Comparatively Slow, Economic, convenient to lay down, used in Bus topology of networks

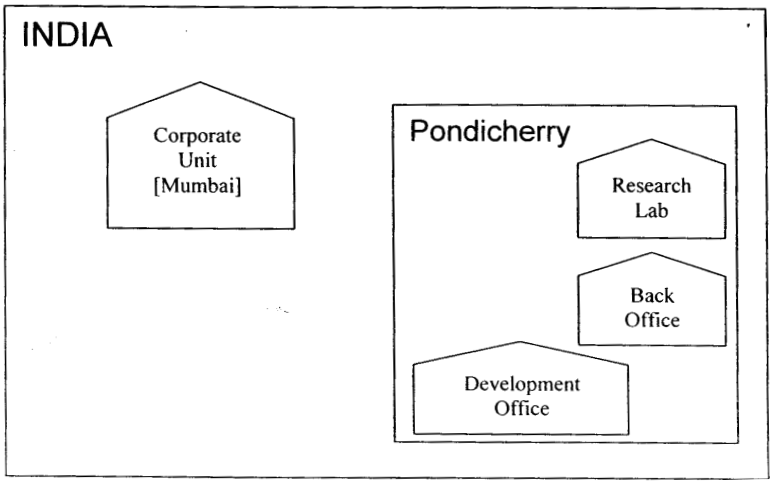
**Optical Fibre:** Very fast, expensive, reliable, no interference

***(1 Mark for mentioning anyone valid difference)***

**OR**

***(½ Mark for anyone characteristic each of Coaxial Cable or Optical Fibre)***

(d) "Bias Methodologies" is planning to expand their network in India, starting with three cities in India to build infrastructure for research and development of their chemical products. The company has planned to setup their main office in Pondicherry - at three different locations and have named their offices as "Back Office", "Research Lab" and "Development Unit". The company has one more Research office namely "Corporate Office" in "Mumbai". A rough layout of the same is as follows : 4




Approximate distances between these offices is as follows:

| From | To | Distance |
|---|---|---|
| Research Lab | Back Office | 110 Mts |
| Research Lab | Development Unit | 16 KM |
| Research Lab | Corporate Unit | 1800 KM |
| Back Office | Development Unit | 13 KM |

In continuation of the above, the company experts p.aye planned to install the following number of computers in each of their offices:

| | |
|---|---|
| Research Lab | 158 |
| Back Office | 79 |
| Development Unit | 90 |
| Corporate Unit | 51 |

(i) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:
- Research Lab and Back Office
- Research Lab and Development Unit

Ans: **Research Lab and Back Office - LAN**
**Research Lab and Development Unit - MAN**
*(½ Mark for each answer)*

(ii) Which one of the following device will you suggest for connecting all the computers within each of their office units?
- Switch/Hub
- Modem
- Telephone

Ans: **Switch I Hub**

*(1 Mark for mentioning correct option)*

(iii) Which of the following communication medium, you will suggest to be procured by the company for connecting their local office units in Pondicherry for very effective (High Speed) communication?
- Telephone Cable
- Optical Fiber
- Ethernet Cable

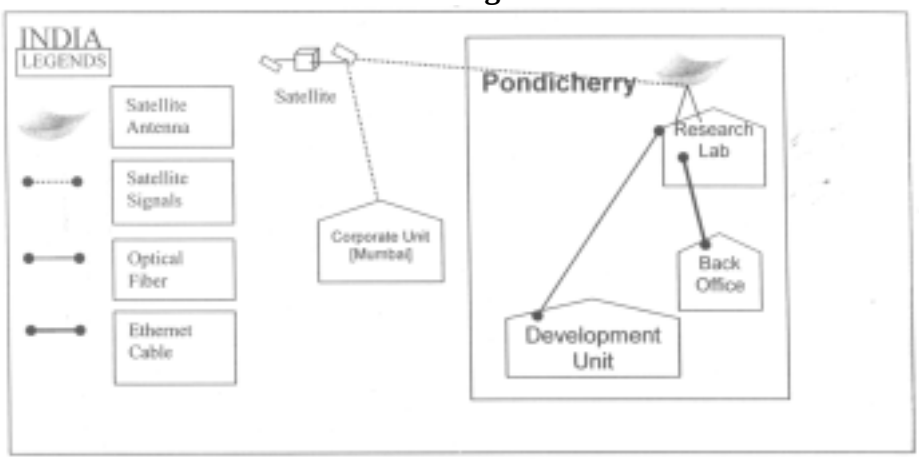
Ans: **Optical Fibre**

*(1 Mark for mentioning correct option)*

(iv) Suggest a cable/wiring layout for connecting the company's local office units located in Pondicherry. Also, suggest an effective method/ technology for connecting the company's office unit located in Mumbai.

Ans: **Local office units at Pondicherry to be connected using LAN / MAN / star Topology / Tree Topology**

**Mumbai Office to be connected using Satellite/WAN**




*(½ Mark for mentioning valid connectivity or topology or diagram for local office in Pondicherry)*
*(½ Mark. for mentioning valid connectivity or topology or diagram for Mumbai office)*

MARKING SCHEME

QUESTION PAPER CODE 91

**EXPECTED ANSWERS**

**1.** (a) What is the purpose of using a typedef command in C++. Explain with suitable example. 2

Ans: **Typedef:**

This keyword allows creating synonyms or aliases for previously defined data types

The general form of typedef is

typedef old_name new_name;

OR

typedef is used for renaming a data type.

**Example:**

```
typedef char STR [80];
OR
typedef signed char SMALLNUM;
OR
typedef float REAL;
OR
typedef long int BIGNUM;
OR
typedef int MAT[2][3] ;
```

*(1 Mark for definition of typedef)*

*(1 Mark for example of typedef)*

OR

*(Full 2 Marks for an example with an appropriate explanation)*

(b) Name the header files that shall be needed for the following code: 1

```
void main ( )
{
     char Word [ ] =”Exam”;
     cout<<setw(20)<<Word;
}
```

Ans:

```
iostream.h
iomanip.h
```

*(½ Mark for identifying each correct header file)*

*Note: Marks are not to be deducted if any additional header file is mentioned*

(c) Rewrite the following program after removing the syntax error(s), if any. Underline each correction. 2

```
#include <iostream.h>
void main ( )
{
     One = 10, Two = 20;
     Callme (One;Two) ;
     Callme (Two) ;
}
void Callme (int Arg1, int Arg2=20)
{
     Arg1 = Arg1 + Arg2;
     cout<<Arg1>> Arg2;
}
```

Ans:

```
#include <iostream.h>
void Callme (int,int Arg2=20);        //Error 1
void main ()
{
     int One=10,Two=20;               //Error 2
     Callme(One,Two);                 //Error 3
     Callme (Two);
}
void Callme (int Argl, int Arg2=20)
{
     Argl=Argl +Arg2 ;
     cout<<Argl<<Arg2;                //Error 4
}
```

*(½ Mark for each correction)*

OR

*(1 Mark for only identifying at least three errors, without suggesting correction)*

(d) Find the output of the following program :

```
#include<iostream.h>
#include<ctype.h>
void main ( )
{
     char Mystring[ ] =“What@OUTPUT!” ;
     for(int I = 0; Mystring [I] ! =’ \0'; I++)
     {
```

```
            if (!isalpha (Mystring[I]))
                Mystring [I] = '*';
            else if (isupper (Mystring[I]))
                Mystring [I] = Mystring[I] +1;
            else
                Mystring [I] = Mystring [I+1];
        }
        cout<<Mystring;
    }
```

Ans:

```
Xat@*PVUQVU*
```

*(½ Mark for X in the first position)*
*(½ Mark for at in the 2nd & 3rd positions)*
*(½ Mark for @ in the 4th position)*
*(½ Mark for * in the 5th position)*
*(½ Mark for PVUQvu)*
*(½ Mark for * at the end)*

(e) Find the output of the following program :

```
#include<iostream.h>
void main ( )
{
    int A=5, B=10;
    for (int I = 1;  I<=2; 1++)
    {
        cout<< "Linel="<<A++<<"&"<<B-2<<endl;
        cout<<"Line2="<<++B<<"&"<<A+3<<endl;
    }
}
```

Ans:

```
Line1=5&8
Line2=11&9
Line1=6&9
Line2=12&10
```

(½ Mark for each correct line of output)

Note: .

- ½ Mark to be deducted for missing Ampersand (&) in each line of output
- ½ Mark to be deducted if endl is not considered in the output

(f) In the following program, find the correct possible output(s) from the options:

```
#include<stdlib.h>
```

```
#include<iostream.h>
void main ( )
{
     randomize() ;
     char Area [] [10] = {‘‘NORTH”, ‘‘SOUTH”, “EAST”, “WEST”} ;
     int ToGo;
     for (int I=0; 1<3; 1++)
     {
          ToGo = random(2) +1;
          cout<<Area [ToGo]<<” : “;
     }
}
(i)  SOUTH:EAST:SOUTH:
(ii) NORTH:SOUTH:EAST:
(iii)SOUTH:EAST:WEST:
(iv) SOUTH:EAST:EAST:
```

Ans:

(i) and (iv)

(2 Mark for the correct answer)
OR
(1 Mark for anyone of the option)

**2.** (a) Differentiate between **private** and **protected** visibility modes in context of Object Oriented Programming giving a suitable example illustrating each.

Ans:

| **Private Visibility Mode** | **Protected Visibility Mode** |
|---|---|
| The members in private visibility modes are not accessible to objects as well as derived classes | The members in protected visibility modes are not accessible to objects but are accessible in derived classes |

```
class A
{
     int x;
protected:
     int y;
public:
     void display(void) ;
} ;
class B:public A
{
     int a;
public:
     int b;
     void readit(void) ;
};
```

*(1 mark for anyone correct difference given above)*
*(1 mark for correct example).*

(b) Answer the questions (i) and (ii) after going through the following program:

```
#include<iostream.h>
#include<string.h>
class Retail
{
     char Category [20];
     char Item [20];
     int Qty;
     float Price;
     Retail ( )     // Function 1
     {
          strcpy (Category, "Cereal");
          strcpy (Item, "Rice");
          Qty = 100;
          Price = 25;
     }
public:
     void Show ( ) // Function 2
     {
          cout<<Category<<"-"<<Item<<" : "<<Qty
               <<"@"<<Price<<endl;
     }
};
void main ( )
{
     Retail R;      // Function 1
     R. Show ( );. // Function 2
}
```

Ans: i) No, since the constructor Retail has been defined in private section.
Suggested Correction: Constructor RetailO to be defined in public section of class.

*(½ mark for identifying No)*
*(½ mark for justification)*

Ans: **ii) Cereal-Rice:100@25**

*(1 full mark for the correct answer)*

(c) Define a class **Clothing** in C++ with the following descriptions:
Private Members:

```
Code          of type string
Type          of type string
Size          of type integer
Material      of type string
Price         of type float
```

A function Calc_Price( ) which calculates and assigns the value of Price as follows:

For the value of Material as "COTTON" :

| Type | Price (Rs.) |
|---|---|
| TROUSER | 1500 |
| SHIRT | 1200 |

For Material other than "COTTON" the above mentioned Price gets reduced by 25%.

Public Members:

A constructor to assign initial values of Code, Type and Material with the word "NOT ASSIGNED" and Size and Price with 0.

A function Enter( ) to input the values of the data members Code, Type, Size and Material and invoke the CalcPrice( ) function.

A function Show( ) which displays the content of all the data members for a Clothing.

Ans:

```
class Clothing
{
     char Code[25];
     char Type[25];
     int Size;
     char Material[30];
     float Price;
Public:
     Clothing() ;
     void Calc_Price() ;
     void Enter() ;
     void Show() ;
};
Clothing::Clothing()
{
     strcpy(Code,"NOT ASSIGNED");
     strcpy(Type,"NOT ASSIGNED");
     Size=0;
```

```
        strcpy (Material, "NOT ASSIGNED");
        Price=0;
    }
    void Clothing:: Calc_Price()
    {
        if (strcmp(Type, "TROUSER") ==0 && strcmp (Material,"COTTON")==0)
            Price=1500;
        else if (strcmp(Type, "SHIRT") ==0 && strcmp(Material,"COTTON")==O)
            Price=1200;
        else if (strcmp(Type, "TROUSER") ==0 && strcmp(Material,"COTTON")!=O)
            Price=1500*0.75;
        else if (strcmp(Type,"SHIRT")==0) && strcmp(Material,"COTTON")!= 0)
            Price=1200*0.75;
    }
    void Clothing::Enter()
    {
        gets(Code) ;  // or cin >> Code;
        gets(Type) ;   // or cin >> Type;
        cin>>Size;
        gets(Material) ;// or cin >> Material;
        Calc_Price() ;
    }
    void Clothing::Show()
    {
        cout<<Code<<Type<<Size<<Material<<Price<<endl;
    }
```

(½ Mark for correct syntax for class header)
(½ Mark for correct declaration of data members)
(½ Mark for correct definition of function Calc_price())
(½ Mark for constructor)
(1 Mark for calculation of correct Price for each condition)
(½ Mark for correct Enter() with proper invocation of Calc_Price())
(½ Mark for displaying all data Members in function Show())

(d) Answer the questions (i) to (iv) based on the following code:

```
class Toys
{
    char TCode [5] ;
protected:
    float Price;
    void Assign (float);
public:
    Toys( ) ;
    void TEntry ( ) ; ,
```

```
        void TDisplay () ;
    } ;
    class SoftTOYS: public Toys
    {
        char STName [ 20] ;
        float weight;
    public:
        SoftToys( ) ;
        void STEntry ( ) ;
        void STDisplay ( );
    } ;
    class ElectronicToys: public Toys
    {
        char ETName[20];
        int No_of_Batteries;
    public:
        ElectronicToys( ) ;
        void ETEntry ( ) ;
        void ETDisplay ( ) ;
    } ;
```

(i) Which type of inheritance is shown in the above example?

Ans: Hierarchical Inheritance
OR
Single Level Inheritance

*(1 Mark to be given for mentioning any of the above mentioned type of inheritance)*

(ii) How many bytes will be required by an object of the class softToys?

Ans:

**33**
**(1 Mark for correct answer)**

(iii) Write name of all the data member(s) accessible from member functions of class SoftToys.

Ans: **Data Members: Price, STName, Weight**
***(1 Mark for all correct members)***

**NOTE:**
**No marks to be awarded for partially correct answers**

(iv) Write name of all the member functions, which are accessible from an object of the class ElectronicToys.

Ans:

**Member Functions: TEntry ( ) , TDisplay ( ) , ETEntry ( ) , ETDisplay ( )**
**(1 Mark for correct answer)**

**NOTE:**

- Constructors Toys() & ElectronicToys(), it mentioned to be ignored.
- No marks to be awarded for partially correct answers

**3.** (a) Write a function in C++, which accepts an integer array and its size as arguments and swaps the elements of every even location with its following odd location. 4

Example: if an array of nine elements initially contains the elements as

2, 4, 1, 6, 5, 7, 9, 23, 10

then the function should rearrange the array as

4, 2, 6, 1, 7, 5, 23, 9, 10

Ans:

```
void Display (int NUM[ ], int N)
{
     int T;
     for (int I=0; I<N-l; I+=2)
     {
          T=N[I] ;
          N[I]=N[I+1] ;
          N[I+1] = T ;
     }
}
```

*(1 Mark tor correct Function Header with proper Arguments)*

*(1 Mark for correct loop)*

*(2 Marks for swapping values correctly with/without a temporary variable)*

(b) An array Arr[50] [100] is stored in the memory along the row with each element occupying 2 bytes. Find out the address of the location Arr[20][50], if the location Arr[10] [25] is stored at the address 10000.

Ans:

```
Assuming LBR=LBC=0
S=2 bytes
Number of Rows (N)=50
Number of Columns (M)=100
LOC (Arr [I] [J]) =B + (I*M+J)*S
LOC (Arr [10] [25])=B +(10*100+25)*2
     10000 = B +(1000+25)*2
          B = 10000-2050
          B = 7950
LOC (Arr [20] [50]) = 7950+(20*100+50)*2
          = 7950 + (2050*2)
```

```
          = 7950+4100
          = 12050
OR
Assuming LBR=LBC=1
S=2 bytes
Number of Rows (N)=50
Number of Columns (M) =100
LOC (Arr [I] [J]) =B +((I-LBR)*M+(J-LBC))*S
LOC (Arr [10] [25]) =B +((10–1)*100+(25–1))*2
     10000 = B +(900+24)*2
          B = 10000-1848
          B = 8152
LOC (Arr [20] [50]) = 8152+ ((20-1)*100+ (50-1))*2
          = 8152 + (1949*2)
          = 8152+3898
          = 12050
```

*(2 Mark for writing correct formula(for row major), substituting formula with correct values and calculate Base Address)*

*(1 Mark for writing correct formula/correct substituted values, for row major properly, for calculating Address of Arr[20][50])*

*(1 Mark for calculating correct Address of Arr[20][50])*

(c) Write a function in C++ to Delete an element from a dynamically allocated Queue where each node contains a real number as data.

Assume the following definition of MYNODE for the same.

```
struct MYNODE
{
     float NUM;
     MYNODE *Link;
} ;
```

Ans:

```
class QUEUE
{
     MYNODE *Rear,*Front;
public:
     QUEUE() { Rear=NULL; Front=NULL;}
     void DELETE();
     ~QUEUE() ;
};
//Function definition DELETE()
```

```
void QUEUE:: DELETE()
{
     if (Front==NULL) // OR if{!Front)
     cout<<"\n Queue Underflow\n"i
     else
     {
          MYNODE *Temp;
          Temp=Front;
          cout<<Front->NUM<<":"<<"Deleted"<<endl;
          // To be ignored
          Front=Front–>Link;
          delete Temp;
          if (Front==NULL)
          Rear=NULL;
     }
}
```

OR

```
void DELETE(MYNODE *& Front, MYNODE *& Rear)
{
     if (! Front)
          cout<<"\n Queue Underflow\n";
     else
     {
          MYNODE *Temp;
          Temp=Front;
          cout<<Front–>NUM<<":"«"Deleted"<<endl;
     //To be ignored
          Front=Front–>Link;
          delete Temp;
          if (Front==NULL)
          Rear=NULL;
     }
}
```

Note. If Front and Rear are declared as Global vanabfes then Parameters are not needed in the above function.

*(½ Mark for correct function header)*
*(½ Mark for declaring Front and Rear as members OR passing them as arguments OR declaring them as global variables)*
*(1 Mark for checking Underflow)*
*(1 Mark for updating Front)*
*(1 Mark for deleting node)*

(d) Write a function in C++ to print the product of each row of a two dimensional integer array passed as the argument of the function.

Example: if the two dimensional array contains

| | | |
|---|---|---|
| 20 | 40 | 10 |
| 40 | 50 | 30 |
| 60 | 30 | 20 |
| 40 | 20 | 30 |

Then the output should appear as :

Product of Row 1= 8000
Product of Row 2= 6000
Product of Row 3= 3600
Product of Row 4= 2400

Ans:

```
// Function definition
void Display(int A[ ][3], int M, int N)
{
     int I, J;
     long int T;    // OR int T;
     cout<<"Performing Calculation:"<<endl;
     for (I=0; I<M; I=I+1)
     {
          T=1;
          for (J=0; J<N; J=J+1)
               T=T*A[M][N] ;
     cout<<"Product of Row "<<I+1<<"=       "<<T<<endl;
     }
}
```

**OR**

*Any other correct equivalent function definition*
*(1/2 mark for correct function header)*
*(1/2 mark for correct loops)*
*(1/2 mark for calculating product)*
*(1/2 mark for correct initialization of T after every inner loop)*

(e) Evaluate the following postfix notation of expression (Show status of Stack after execution of each operation) :

5, 20, 15, –, *, 25, 2, *, +

Ans: Evaluation of the given postfix expression is explained below

| Operator Scanned | Stack Content |
|---|---|
| 5 | 5 |
| 20 | 5, 20 |
| 15 | 5, 20,15 |
| - | 5, 5 |
| * | 25 |
| 25 | 25, 25, 2 |
| 2 | 25, 25, 2 |
| * | 25, 50, |
| + | 75 |

**OR**

**Any other method of evaluating the postfix expression is shown.**

***(2 Marks to be given for correct answer)***

***(½ Mark for each operation correctly evaluated)***

***(Only 1 Mark is to be awarded if correct answer is given without steps)***

**4.** (a) Observe the program segment given below carefully, and answer the question that follows:

```
class Candidate
{
     long Cld;      / /Candidate' s Id
     char CName [20];/ /Candidate's Name
     float Marks;  / /Candidate's Marks
public:
     void Enter ( ) ;
     void Display ( ) ;
     void MarksChange( ) ;            / /Function to change marks
     lond R_Cid( ) {return Cld; )
};
void MarksUpdate (long Id)
{
     fstream File;
     File.open ("CANDIDAT.DAT",ios: :binary | ios: :in | ios: :out);
     Candidate C;
     int Record=0, Found=0;
     while (! Found && File.read ( (char*) &C, sizeof (C) ) )
     {
```

```
            if (Id==C. R_Cld ( ) )
            {
            cout<<"Enter new Marks";
            C.MarksChange( ) ;
            _________________/ /Statement 1
            _________________/ /Statement 2
            Found -= 1;
            }
            Record++;
      }
      if (Found= =1)  cout<<"Record Updated";
      File.close ( ) ;
}
```

Write the Statement 1 **to position** the File Pointer at the beginning of the Record for which the Candidate's Id matches with the argument passed, and Statement 2 **to write** the updated Record at that position.

Ans:

**Statement 1:**

```
File.seekp(Record*sizeof(C));
```

**OR**

```
File.seekp(-l*sizeof(C),ios::cur);
```

**OR**

```
File.seekg (Record*sizeof(C));
```

**OR**

```
File.seekg(-l*sizeof(C),ios::cur);
```

**OR**

```
Any equivalent correct method qf calculating size of the
record in place of sizeof operator.
```

**Statement 2:**

```
File.write((char*)&C, sizeof(C));
```

**OR**

```
File.write((char*)&C,sizeof(Candidate));
```

***(½ Mark for each correct statement)***

(b) Write a function in C++ to count the number of uppercase alphabets present in a text file "ARTICLE.TXT".

Ans:

```
void theUpperAlphaCount()
{
      ifstream Fi1("ARTICLE. TXT") ;
```

```
          //R fstream Fi1;
          //Fil.open("ARTICLE. TXT", ios : : in) ;
     Char ch;
     int c=0;
     while(Fil)    // OR    while (!Fi1.eof())
          Fil.get(ch) ;   //OR    ch = Fil.get();
          if (isupper(ch))
               //OR if (ch>=65 && ch<=90) OR if (ch>='A'&&ch<='Z')
          c++;
     }
     cout<<"Number of alphabets in uppercase"<<c<<endl.;
     Fil.close() ;
     }
```

**OR**

```
void theUpperAlphaCount()
{
     ifstream Fil("ARTICLE.TXT");
          //R fstream Fil;
          //Fil.open("ARTICLE. TXT", ios:: in) ;
     char ch;
     int c=0;
     while (Fil.get(ch))
     {
          if (isupper(ch))
          //OR if (ch>=65 && ch<=90) OR  if (ch>='A' && ch<='Z')
          c++;
     }
     cout<<"Number of alphabets in uppercase"<<c<<endl;
     Fil.close();
}
```

(½ Mark for opening file in the correct mode)
(½ Mark for reading the content from the file and the loop)
(½ Mark for correct comparison)
(½ Mark for initialization and increment of the counter(variable))

(c) Given a binary file TELEPHON.DAT, containing records of the following class Directory:

```
class Directory
{
     char Name[20] ;
     char Address[30] ;
     char AreaCode[5];
```

```
        char Phone_No[15];
    public:
        void Register ( ) ;
        void Show ( ) ;
        int CheckCode(char AC[ ])
        {
            return strcmp (AreaCode, AC);
        }
    };
```

Write a function COPYABC( ) in C++, that would copy only those records having AreaCode as "123" from TELEPHON.DAT toTELEBACK.DAT.

Ans:

```
//Function to copy records from TELEPHON.DAT to
//TELEBAC.DAT
void COPYABC()
{
    fstream IS, OA;
    IS.open("TELEPHON.DAT", ios::binary|ios: :in);
    OA.open("TELEBACK. DAT", ios::binary | ios:: out);
    Directory D;
    while (IS.read((char*)&D,sizeof(D)))
    {
        if (D. CheckCode("123")==0)
            OA.write((char *)&D,sizeof(D));
    }
    IS.close() ;
    OA.close() ;
}
```

**OR**

Any other equivalent code

*(½ Mark for opening <u>each</u> file in the correct mode)*
(½ Mark for reading the content from the file)
(½ Mark for the correct loop)
(½ Mark for the correct comparison with "123")
(½ Mark for writing the content to the second file)

**5.** (a) Differentiate between **Candidate Key** and **Alternate Key** in context of RDBMS.

Ans: Candidate Key: It is the one that is capable of becoming primary key i.e., a column or set of columns that identifies a row uniquely in the relation.

Alternate Key: A candidate key that is not selected as a primary key is called an Alternate Key.

*(1 Mark each for correct definition/explanation of Candidate Key and Alternate Key)*

OR

(Full 2 Marks for illustrating the concept of Candidate and Alternate key with appropriate example)

(b) Consider the following -tables Item and Customer. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

**TABLE : ITEM**

| I_ID | ItemName | Manufacturer | Price |
|---|---|---|---|
| PC01 | Personal Computer | ABC | 35000 |
| LC05 | Laptop | ABC | 55000 |
| PC03 | Personal Computer | XYZ | 32000 |
| PC06 | Personal Computer | COMP | 37000 |
| LC03 | Laptop | PQR | 57000 |

**TABLE : CUSTOMER**

| C_ID | CustomerName | City | I_Id |
|---|---|---|---|
| 01 | N Roy | Delhi | LC03 |
| 06 | H Singh | Mumbai | PC03 |
| 12 | R Pandey | Delhi | PC06 |
| 15 | C Sharma | Delhi | LC03 |
| 16 | K Agarwal | Bangalore | PC01 |

(i) To display the details of those Customers whose City is Delhi.

Ans:

```
SELECT * FROM CUSTOMER WHERE City='Delhi' ;
```

*(½ Mark for correct use of SELECT and FROM)*
*(½ Mark for correct use of WHERE clause)*

(ii) To display the details of Items whose Price is in the range of 35000 to 55000 (Both values included)

Ans:

```
SELECT * FROM ITEM WHERE PRICE BETWEEN 35000 AND 55000;
```

OR

```
SELECT * FROM ITEM WHERE PRICE>=35000 AND PRICE<=55000;
```

*(½ Mark for correct use of SELECT and FROM)*
*(½ Mark for correct use of WHERE clause)*

(iii) To display the CustomerName, City from table Customer and ItemName and Price from table item with their corresponding matching I_Id.

Ans:

```
SELECT CustomerName, City, ItemName , Price
FROM CUSTOMER C, ITEM I WHERE I. I_Id=C.I_ID;
OR
SELECT CustomerName, City, ItemName, Price
FROM CUSTOMER, ITEM WHERE CUSTOMER.I_Id=ITEM.I_ID;
OR
SELECT C. CustomerName, C.City, I.ItemName, I.Price
FROM CUSTOMER C, ITEM I WHERE C.I_Id=I.I_ID;
OR
SELECT CUSTOMER.CustomerName, CUSTOMER.City,
     ITEM. ItemName, ITEM. Price
FROM CUSTOMER, ITEM WHERE CUSTOMER.I_Id=ITEM.I_ID;
```

*(½ Mark for correct use of SELECT and FROM)*

*(½ Mark for correct use of WHERE clause)*

(iv) To increase the Price of all Items by 1000 in the table Item.

Ans:

```
UPDATE ITEM SET PRICE=PRICE+1000;
```

*(½ Mark for cbrrect use of UPDATE)*

*(½ Mark for correct use of SET)*

(v) SELECT DISTINCT City FROM Customer;

Ans:

```
DISTINCT City
Delhi
Mumbai
Bangalore
```

*(½ Mark for correct output - ignore the order of City in the output & Column Header)*

(vi) SELECT ItemName, Max (Price), Count(*) From Item Group by ItemName;

Ans:

| ItemName | Max (Price) | Count ( * ) |
|---|---|---|
| Personal Computer | 37000 | 3 |
| Laptop | 57000 | 2 |

(½ Mark for correct output - ignore the order of rows in the output & Column Headers)

(vii) SELECT CustomerName, Manufacturer FROM Item, Customer WHERE Item.Item_Id=Customer.Item.I_Id;

Ans:

| CustomerName | Manufacturer |
|---|---|
| N Roy | PQR |
| H Singh | XYZ |
| R Pandey | COMP |
| C Sharma | PQR |
| K Agarwal | ABC |

(½ Mark for correct output - ignore the order of rows in the output & Column Headers)

OR

(½ Mark for mentioning syntax error or error as the column Item_ld is not present)

(viii) SELECT ItemName, Price*100 FROM Item WHERE Manufacturer = 'ABC';

Ans:

| ItemName | Price*100 |
|---|---|
| Personal Computer | 3500000 |
| Laptop | 5500000 |

*(½ Mark for correct output - ignore the order of rows in the output & Column Headers)*

**6.** (a) State any verify Absorption law in Boolean- Algebra.

Ans:

**X+X. Y=X**

| X | Y | X.Y | X+X.Y | X |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

OR

**X. (X+Y) = X**

| X | Y | X+Y | X. (X+Y) | X |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

OR

**X+X'.Y=X+Y**

| X | Y | X' | X'.Y | X+X'.Y | X+Y |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 |

OR

**X.(X'+Y)=X.Y**

| X | Y | X' | X'+Y | X.(X'+Y) | X.Y |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 |

OR

X+X.Y=X
L.H.S=X+X.Y
=X.1+X. Y
=X. (l+Y)
=X.1
=X
=R.H.S
Verified

OR

X(X+Y)=X
L.H.S=X. (X+Y)
L.H.S=X.X+X.Y
=X+X.Y
=X.1+X.Y
=X. (l+Y)
=X.1
=X
=R.H.S
Verified

OR

X+X′.Y=X+Y
L.H.S=(X+X′).(X+Y)
=1.(X+Y)
=X+Y
=R.H.S
Verified

OR

X.(X′+Y)=X.Y
L.H.S=X.(X′ +Y)
=X.X′+X.Y
=0+X.Y
=X.Y
=R.H.S
Verified

*(2 Marks for verification of anyone form of the Absorption Law)*

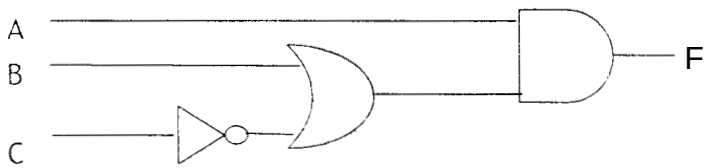
OR

(1 Mark for stating anyone form of the Absorption Law)

(b) Draw a Logical Circuit Diagram for the following Boolean Expression :

A . (B + C')

Ans:




*(1 mark for the correct circuit diagram)*

(c) Convert the following Boolean expression into its equivalent Canonical Product of Sum Form (POS) :

A. B' . C + A'. B . C + A'. B . C'

Ans:

| = Π (0, 1, 4, 6, 7) |
|---|

OR

| = (A+B+C) . (A+B+C' ) . (A' +B+C) . (A' +B' +C) . (A' +B' +C' ) |
|---|

*(2 Marks for the correct expression)*

OR

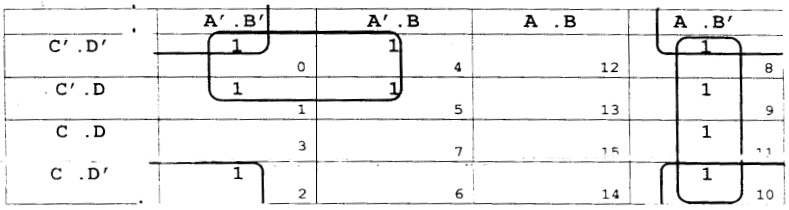
*(1 Mark if only truth table is given for the expression without deriving POS expression)*

Note: No marks to be awarded for partial answers

(d) Reduce the following Boolean expression using K - Map:

F (A, B, C, D) = ∑ (0, l, 2, 4, 5, 8, 9, 10, 11)

Ans:




F(A,B,C,D)= A' .C'+A.B' + B' .D'

(1 Mark for drawing correct K-Map )

(½ Mark for plotting 1's correctly)

(½ Mark for each correct grouping)

Note: No marks should be deducted even if the solution is arrived with the help of POS form.

**7.** (a) What is a Modem ?

Ans: **Modem** is a Modulation Demodulation device that converts analog signal to digital signal and vice versa.

(1 Mark for any correct definition/explanation)

(b) Expand the following terms with respect to Networking :

(i) PPP (ii) GSM (iii) XML (iv) HTTP

Ans: (i) Point To Point Protocol

(ii) Global System for Mobile Communication

(iii) eXtensible MarkUp Language

(iv) Hyper Text Transfer Protocol

*(½ Mark for each correct expansion)*

(c) How is a Hacker different from a Cracker?

Ans:

Hackers are the ones who get into someone's code or computer without any malicious intentions, where as Crackers are the one's who get into someone's code or computer with malicious intentions.

OR

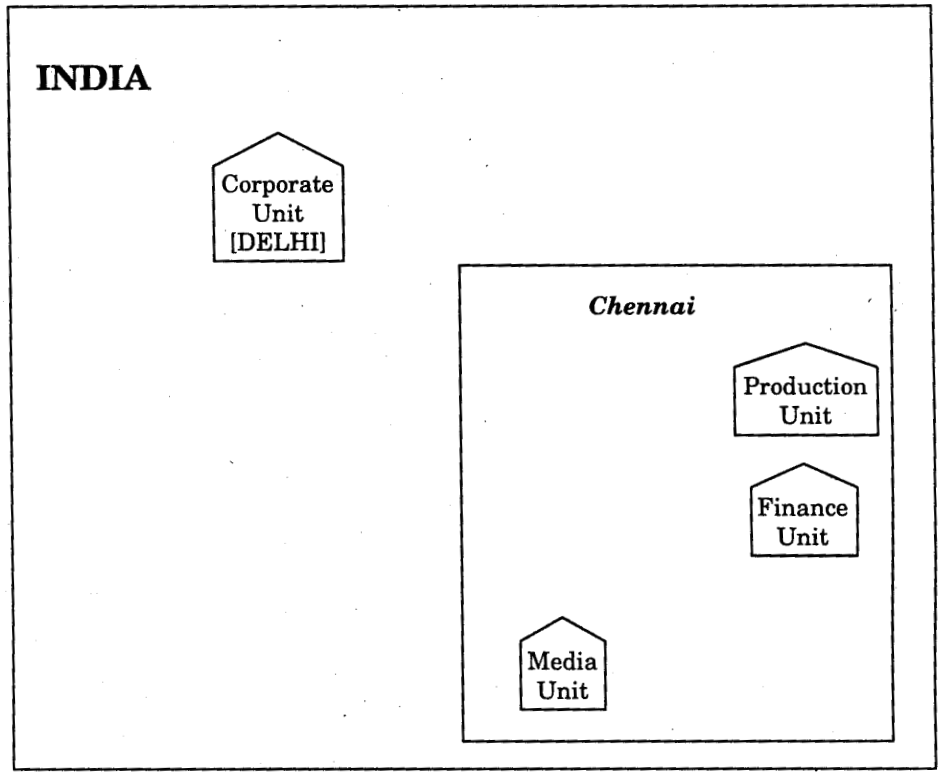
*Any equivalent difference*

(½ Mark for each correct definition)

(d) "China Middleton Fashion'" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of

their product. The company has planned to set up their main office units in Chennai at three different locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit". The company has its corporate unit in Delhi.

A rough layout of the same is as follows:




Approximate distances between these Units is as follows:

| From | To | Distance |
|---|---|---|
| Production Unit | Finance Unit | 70 Mtr |
| Production Unit | Media Unit | 15 KM |
| Production Unit | Corporate Unit | 2112 KM |
| Finance Unit | Media Unit | 15 KM |

In continuation of the above, the company experts have planned to install the following number of computers in each of their office units:

| | |
|---|---|
| Production Unit | 150 |
| Finance Unit | 35 |
| Media Unit | 10 |
| Corporate Unit | 30 |

(i) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:

- Production Unit and Media Unit
- Production Unit and Finance Unit

Ans:

- Production Unit and Media Unit : **MAN**
- Production Unit and Finance Unit : **LAN**

*(½ Mark for mention of each - MAN and LAN correctly)*

(ii) Which one of the following device will you suggest for connecting all the computers within each of their office units?

- Switch/Hub
- Modem
- Telephone

Ans:

- Switch/Hub

*(1 Mark for the correct device)*

(iii) Which of the following communication media, will you suggest to be procured by the company for connecting their local offices in Chennai for very effective (High Speed) communication?

- Ethernet cable
- Optical Fiber
- Telephone cable

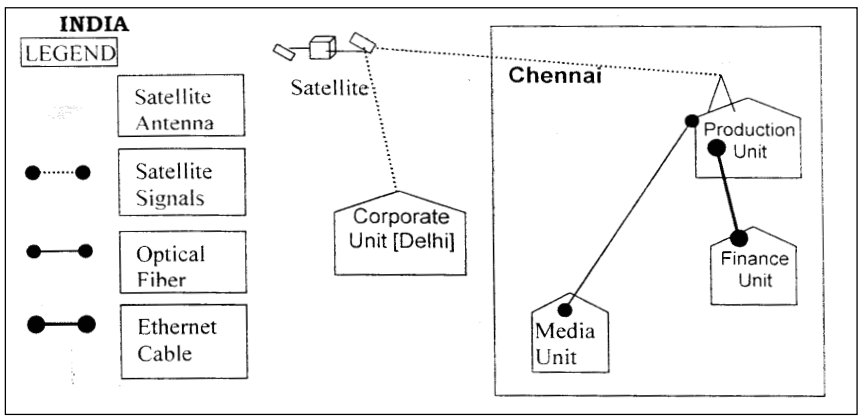
Ans:

- Optical Fiber

*(1 Mark for the correct media)*

(iv) Suggest a cable/wiring layout for connecting the company's local office units located in Chennai. Also, suggest an effective method/technology for connecting the company's office unit located in Delhi.

Ans:




Optical Fiber/Star Topology

Wireless/Satellite Link/leased Line

*(½ Mark for the correct layout)*

*(½ Mark for the equivalent correct method/technology)*

# ENGINEERING DRAWING

***Time allowed : 3 hours*** ***Maximum Marks : 70***

***Note :***

*(i) Attempt **all** the questions.*

*(ii) Use both sides of the drawing sheet, if necessary.*

*(iii) All dimensions are in millimeters.*

*(iv) Missing and mismatching dimensions, if any, may be suitably assumed.*

*(v) Follow the SP : 46-1988 codes*

*(with First Angle method of projection).*

*(vi) In no view of questions 1 and 3, hidden edges / lines are required.*

**QUESTION PAPER CODE 68/1**

**1.** (a) Construct an isometric scale. 4

(b) A frustum of a square pyramid, base side 40 mm, top side 60 mm and height 80 mm, is having its base of 40 mm side on H.P., and a base side perpendicular to V.P. The axis is perpendicular to H.P. Draw the isometric projection to the isometric scale. Give all dimensions. Indicate the direction of viewing. 7

(c) A slab, in the form of an equilateral triangular prism, with a base side of 90 mm and height of 30 mm, is resting with its triangular end on H.P. One base side being parallel to V.P. and closer to the observer. A hemisphere of diameter 80 mm, is centrally, placed on the top triangular end of the slab, with its curved surface on it.

Draw the isometric projection of the two solids, placed together, keeping their common axis vertical, to the isometric scale. Give all dimensions. 14

**2.** (a) Draw to scale 1:1, the standard profile of a metric screw thread (internal), taking enlarged pitch as 50 mm. Give standard dimensions. 9

**Or**

Draw to scale 1: 1, the front-view of the assembly of a square head bolt with a hexagonal nut and a washer. Take length of the bolt as 120 mm, threaded length as 80 mm and diameter of bolt as 30 mm. Keep the axis of the bolt parallel to HP and VP, and two opposite sides of the square head of the bolt and of the hexagonal nut, parallel to V.P. Give standard dimensions.

(b) Sketch free-hand the front-view and top-view of a cheese head screw of size M 20, keeping its axis vertical. Give standard dimensions. 6

**Or**

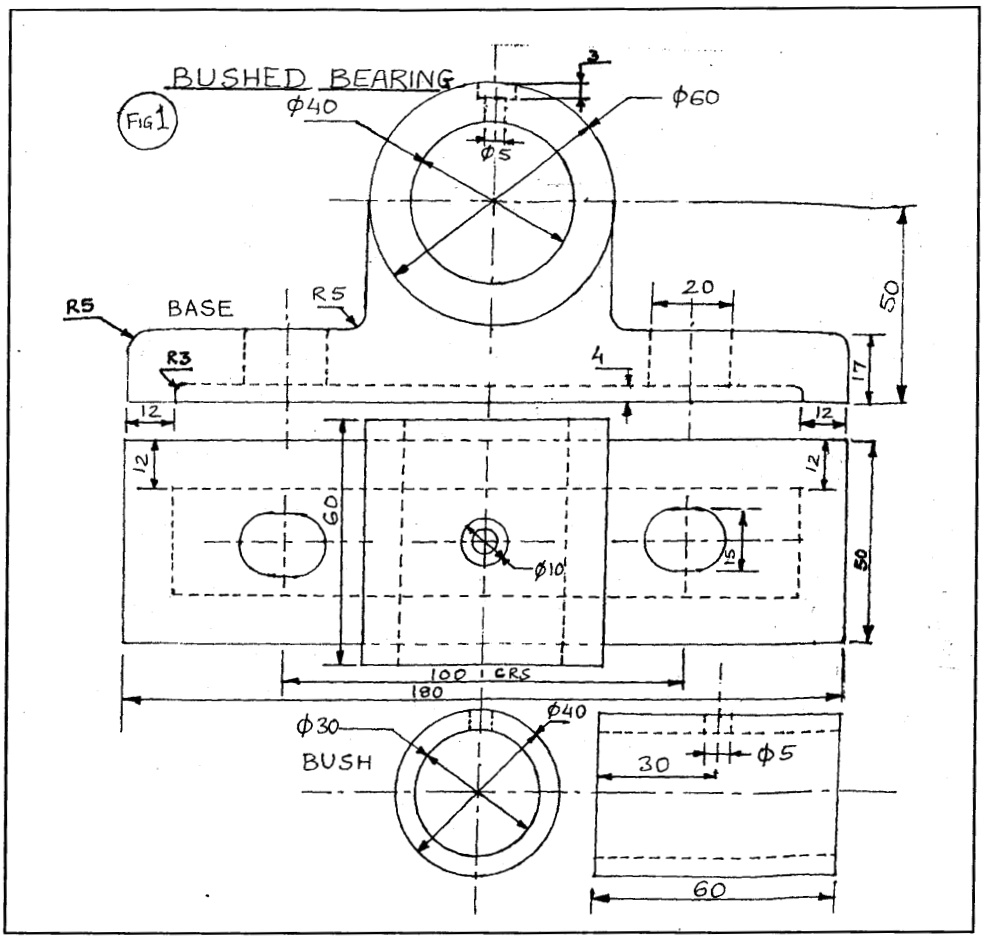
Taking diameter as 30 mm and keeping its axis vertical, sketch freehand the front-view and top-view of a snap head rivet. Give all standard dimensions.

**3.** Fig 1 shows the details of the parts of a Bushed Bearing. Assemble these parts correctly, and then draw its following views to a scale 1: 1

(a) Front-view, left half in section 17

(b) Side-view, viewing from the left 7

Print title and scale used. Draw the projection symbol. Give 8 important dimensions. 6



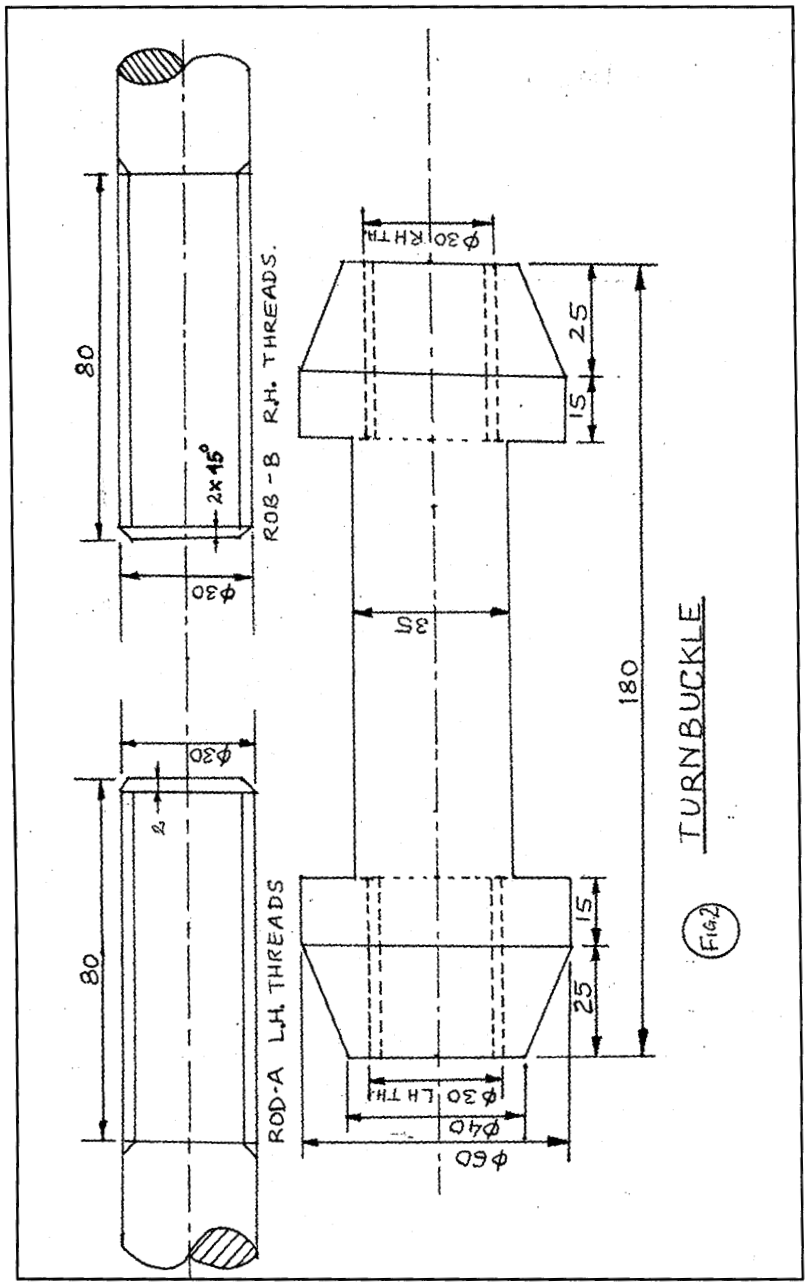
**Or**

Fig. 2 shows the details of the parts of a Turnbuckle. Assemble these parts correctly, and then draw its following views to a scale 1:1, inserting 60 mm threaded portion of each rod inside the body of the turnbuckle:

(a) Front-view, lower half in section. 18

(b) Side-view, as viewed from the right. 6

Print title and scale used. Draw the projection symbol. Give 8 important dimensions. 6



QUESTION PAPER CODE 68

**1.** (a) Construct an isometric scale. 4

(b) Construct the isometric projection to isometric scale, of a frustum of a cone, whose bottom diameter is 50 mm and the top diameter is 70 mm and the height equals 80 mm. It is resting on H.P. on its circular base of diameter 50 mm. Give all dimensions. Indicate the direction of viewing. 8

(c) An equilateral triangular pyramid, base side 40 mm and height 70 mm, is centrally placed on its base, keeping one of its base sides perpendicular to V.P., on the pentagonal end of a regular pentagonal prism, whose base side is 50 mm and height 30 mm. One of the base sides of the prism, is kept parallel to V.P. and away from it. The common axis is perpendicular to H.P. and parallel to V.P.

Draw the isometric projection of the two solids, placed together, to isometric scale. Give all dimensions. 13

**2.** (a) Draw to scale 1 : 1, the standard profile of a metric screw thread (external), taking enlarged pitch as 50 mm. Give standard dimensions. 9

**OR**

Draw to scale 1 : 1, the full sectional front view of a single riveted lap joint, taking thickness of the plates as 16 mm. Give standard dimensions.

(b) Sketch freehand the front view and top view of a round head screw of size M30, keeping its axis vertical. Give standard dimensions. 6

**OR**

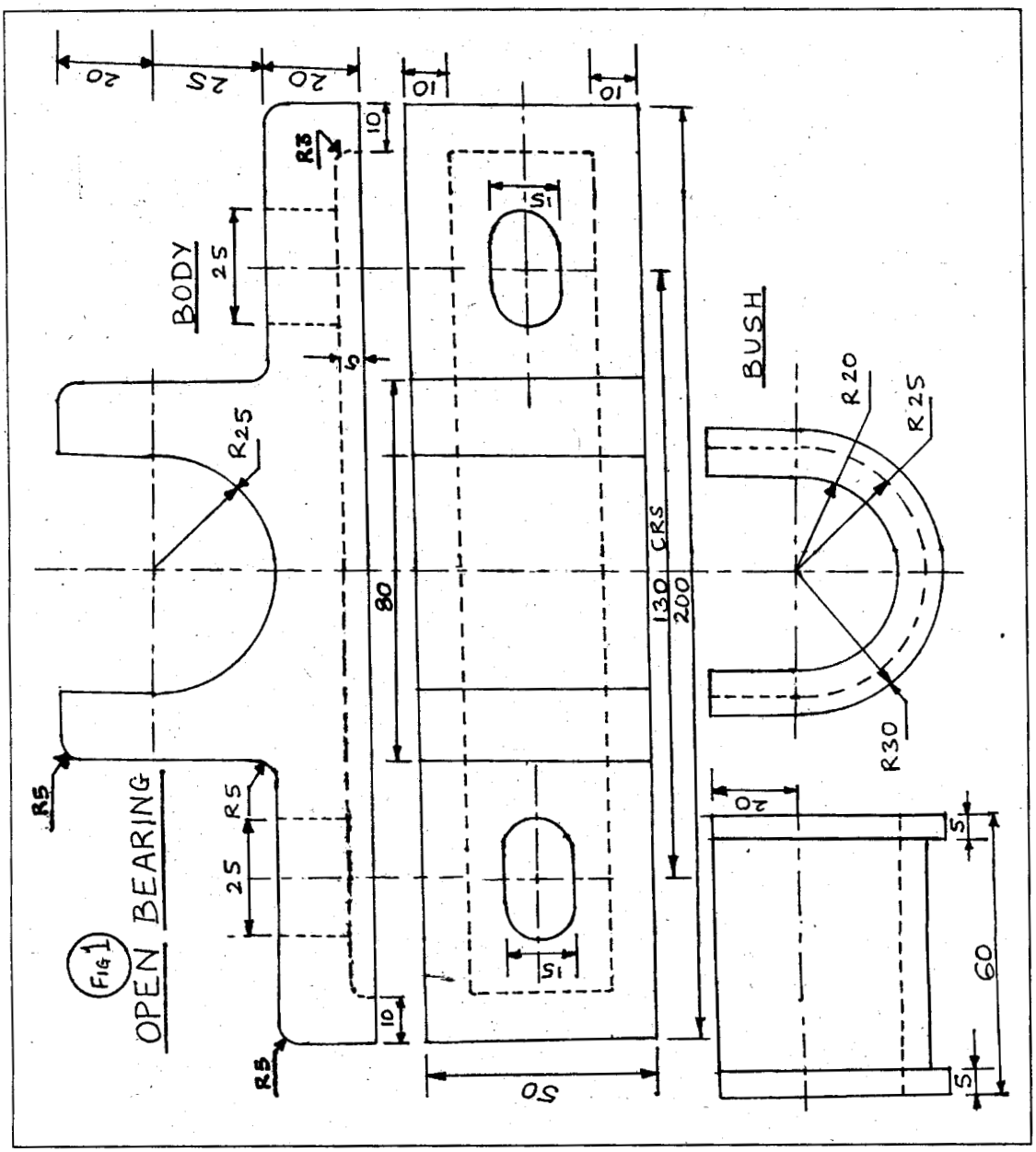
Sketch freehand a Woodruff key, not in position, for a shaft of diameter 48 mm, showing front view, top view and side view. Give all standard dimensions.

**3.** Fig 1 shows the details of the parts of an Open Bearing. Assemble these parts correctly, and then draw its following views to a scale 1 : 1.

(a) Front view, left half in section. 16

(b) Side view, viewing from the left. 8

Print title and scale used. Draw the projection symbol. Give 8 important dimensions. 6



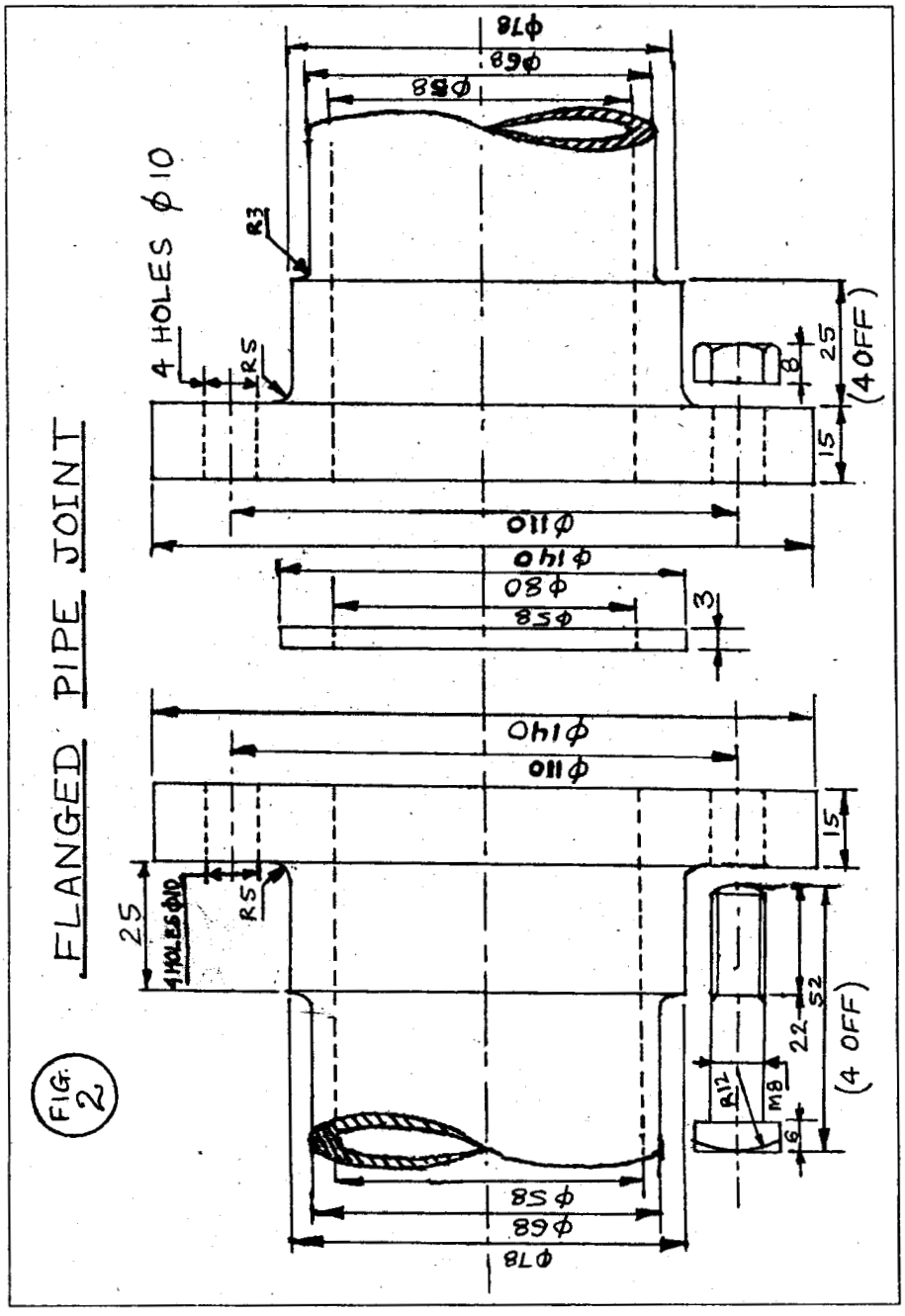

**OR**

Fig 2 shows the details of a Flanged Pipe Joint. Assemble these parts correctly, and then draw the following views to a scale full size:

(a) Front view, showing bottom half in section. 15

(b) Side view as seen from the right. 10

Print title and the scale used. Draw the projection symbol. Give 8 important dimensions. 5


FLANGED PIPE JOINT
FIG. 2
4 HOLES φ10
R3
R5
25
8
15
(4 OFF)
φ110
φ101
φ80
φ85
3
φ78
φ68
φ58
4 HOLES AND
M8
R12
22
52
6

# Marking Scheme — Engineering Drawing

***Notes:***

(i) Marks are to be awarded in proportion to the work done.

(ii) Mistakes in dimensioning up to ± 1.0 mm may be ignored.

(iii) In dimensioning, arrow–heads of various types, as per SP46-1988, are usable. However,where space is too small for an arrowhead, oblique stroke or a dot maybe employed.

(iv) In no view of **questions '1' and '3',** hidden edges / lines are required to be drawn.

(v) Other standard proportions for features like nuts, heads of bolts, screws etc., employed by examinees, may also be accepted.

**All Questions are to be answered correctly and accurately.**

QUESTION PAPER CODE 68/1

**EXPECTED ANSWERS/VALUE POINTS**

**Q.1. (a)**

**ISOMETRIC SCALE.** **(4)**

| | | |
|---|---|---|
| (i) | Marking of divisions of 10 mm and 1 mm on true scale | ½ |
| (ii) | Marking angles of $30^{o}$ and $45^{o}$ | ½ |
| (iii) | Projections from scale 1:1to get points on isometric scale. | ½ |
| (iv) | Construction of isometric scale with main divisions of 10 mm each. | 1 |
| (v) | Division of first part into 10 sub-divisions. | 1 |
| (vi) | Printing 'Scale 1:1' and 'Isometric Scale'. | ½ |

**Q.1. (b)**

**ISOMETRIC PROJECTION OF A SQUARE PYRAMID** **(7)**

| | | |
|---|---|---|
| (i) | Drawing isometric square, on top of sides 60 mm each. | 2 |
| (ii) | Drawing isometric square, at the base, of sides 40 mm each. | 1 |
| (iii) | Drawing slant edges. | 1½ |
| (iv) | Marking of axis. | ½ |
| (v) | Three dimensions, including that of axis through in-centers | 1½ |
| (vi) | Direction of viewing. | ½ |

**NOTE;**

For incorrect position of frustum, like using 60 mm sides for the base and 40 mm sides for the top, 1½ marks should be deducted. Helping figure may or may not be drawn. If axis is drawn perpendicular to V.P. instead of drawing perpendicular to H.P., as asked, 1½ marks should be deducted.

**Q.1. (c)**

**HEMISPHERE PLACED CENTRALLY ON AN EQUILATERAL TRIANGULAR PRISM.** **(14)**

**(A) TRIANGULAR PRISM** **(7)**

(i) Helping view of a triangle with a side parallel to V.P. and closer to the observer. 1½

(ii) Drawing isometric triangles. 3

(iii) Drawing face edges, parallel to vertical axis / V.P. 1½

(iv) Dimensioning edge of base and axis, i.e. height of prism. 1

**(B) HEMISPHERE** **(7)**

(i) Drawing isometric ellipse along with center lines. 4

(ii) Drawing semicircular portion of hemisphere 1

(iii) Ensuring central location and showing common axis of two solids. 1

(iv) Dimensioning diameter and height 1

**25**

**NOTE:**

For incorrectly placed solids, deductions as proposed in **Q.l (b)** may be used.

**Q.2. (a) METRIC SCREW THREAD PROFILE (INTERNAL)** **(9)**

(i) Distance, equal to pitch, marked correctly and angles of $60^{o}$, drawn correctly. 2

(ii) Curves for threads (minimum 2), drawn correctly. 2

(iii) Side edges (flanks), drawn correctly. 2

(iv) Dimensioning. 2

(v) Neatness and line work. 1

**(OR)**

**(a) SQUARE HEAD BOLT WITH HEXAGONAL NUT AND WASHER** **(9)**

(i) Bolt head with radius of curvature etc. 1½

(ii) Length of bolt and threaded length. 1

(iii) Curve of R = d at the end. ½

(iv) Hexagonal nut, drawn correctly. 2

(v) Washer, drawn correctly. 1

(vi) Four dimensions at least. 2

(vii) Neatness and line work. 1

**NOTE**

'3' marks may be deducted, in all, if sketched free hand instead of drawing to scale 1: 1.

**Q.2. (b)**

**NOTE** Following components are to be sketched free hand proportionately.

**(A) CHEESE HEAD SCREW** **(6)**

(i) Sketching front view with its axis perpendicular to H.P. 3

(ii) Sketching top view. 2

(iii) Dimensioning. 1

**(OR)**

**(B) SNAP HEAD RIVET** **(6)**

(i) Sketching front view with its axis perpendicular to H.P. 3

(ii) Sketching top view 2

(iii) Dimensioning. 1

**NOTE** **15**

'2' marks may be deducted if these components are drawn with instruments instead of being sketched free hand.

**Q.3.**

**BUSHED BEARING** **(30)**

**(A) FRONT VIEW** **(17)**

(i) Marking boundary of the body along with radii of R 5 mm (at four locations) and curve of $\phi$ 60 mm in one quadrant. 5

(ii) Marking of center to center distance of two holes (100 CRS), distance of 12 mm along with clearance gap of 4 mm and radius R 3mm. 3

(iii) Marking of hole of 20 mm size. 1

(iv) Hatching lines in the left half of the body. 2

(v) Plotting vertical center distance of hole for the bush. 1

(vi) Drawing two inner circles completely and hatching in left half of bush. 3

(vii) Oil hole. 2

**(B) SIDE VIEW** **(7)**

(i) Drawing boundary of the body and the bush along with two curves. 3

(ii) Projecting base of the body (50mm width) up to the center line ofthe bush. 2

(iii) Drawing two center lines. 1

(iv) Drawing line at 17 mm from the base. 1

**OTHER (6) MARKS ARE FOR:**

(i) Printing title. 1

(ii) Scale used. 1

(iii) Line work and neatness. 1

(iv) Projection symbol. 1

(v) Printing '8' dimensions. 2

**30**

**(OR)**

**Q.3**

**TURNBUCKLE** **(30)**

**(A) FRONT VIEW** **(18)**

(i) Drawing upper half of the body with out hatching lines. 4

(ii) Drawing lower half of the body along with hatching lines. 6

(iii) Drawing both rods with 60 mm inserted portion of each, indicating threads and hatching at ends. 8

**(B) SIDE VIEW** **(6)**

(i) Drawing three circles. 3

(ii) Hatching lines. 2

(iii) Drawing cutting plane with the direction of viewing. 1

**OTHER (6) MARKS ARE FOR:**

(i) Printing title. 1

(ii) Scale used. 1

(iii) Line work and neatness. 1

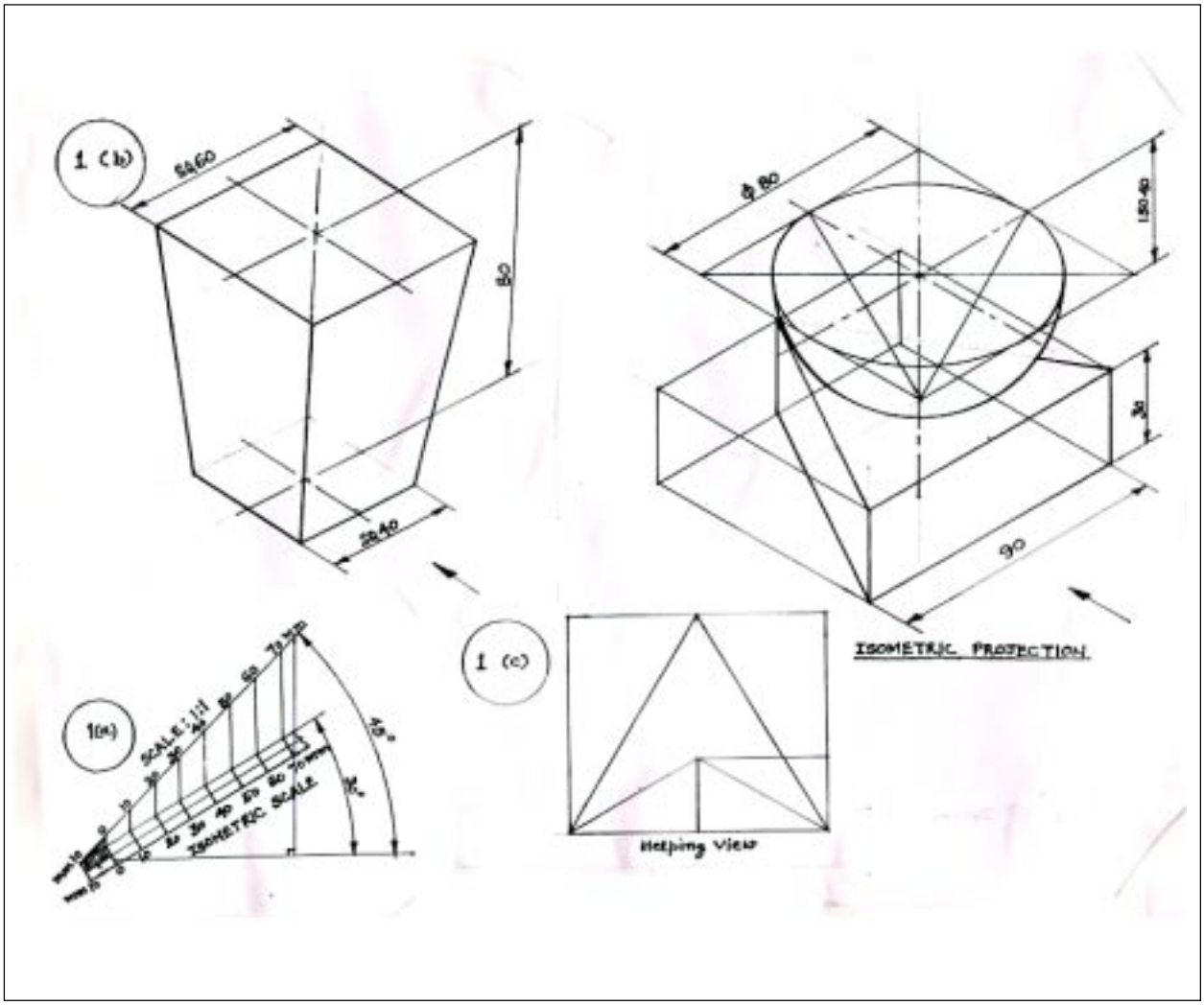
(iv) Projection symbol. 1

(v) Printing. '8' dimensions. 2

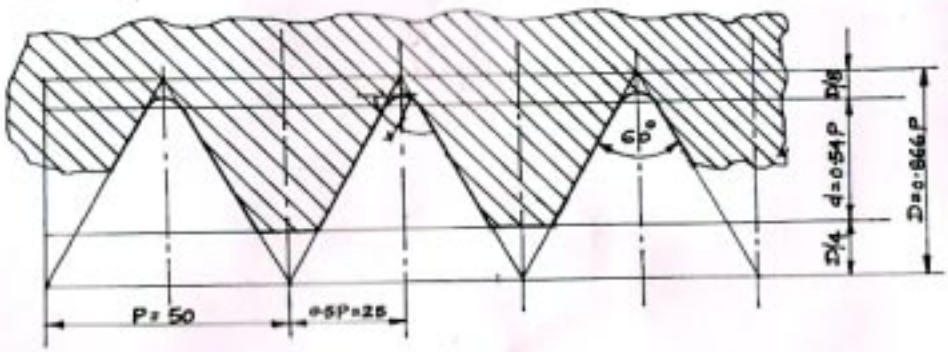
**30**

**NOTE**

If sectioning is shown on the side, other than the one, asked for, **in Q.3.** '2'marks should be deducted.

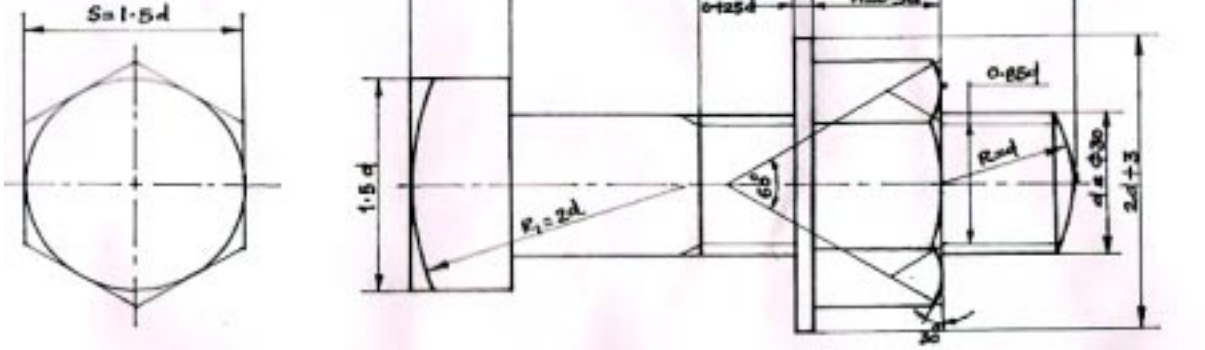

1 (b)
1 (c)
1(a)
ISOMETRIC PROJECTION
Helping View
ISOMETRIC SCALE
SCALE 1:1
45°

2 (a)




METRIC SCREW THREAD PROFILE (INTERNAL)

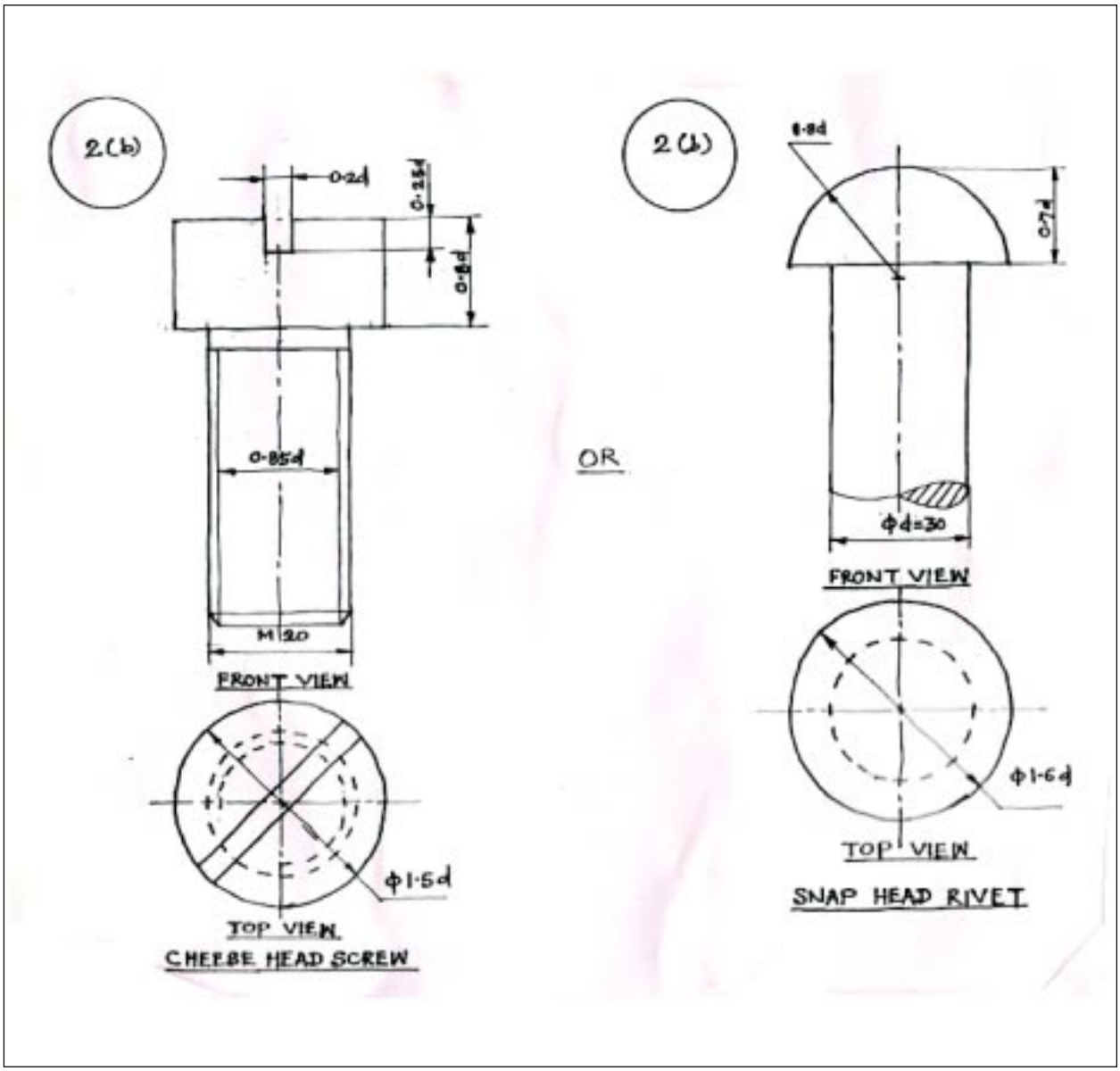
2 (a)

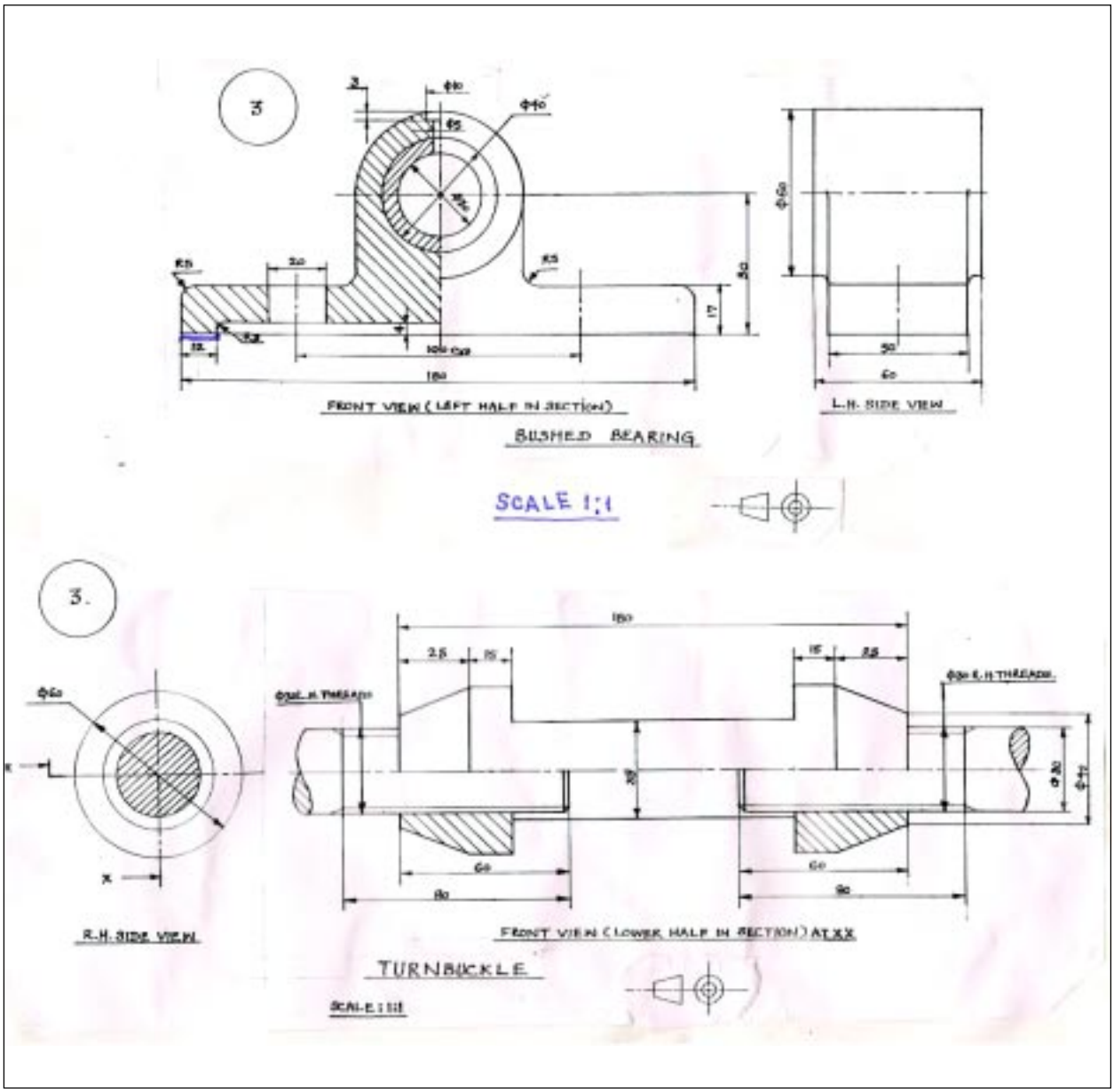



FRONT VIEW

SQUARE HEAD BOLT WITH HEXAGONAL NUT AND WASHER

| d | $R_1$ | $h_1$ | H | S | (2d+3) |
|---|---|---|---|---|---|
| 30 | 60 | 21 | 27 | 45 | 63 |


2.(b)
0.2d
0.25d
0.8d
0.85d
M 20
FRONT VIEW
φ1.5d
TOP VIEW
CHEESE HEAD SCREW
OR
2.(b)
1.8d
0.7d
φd=30
FRONT VIEW
φ1.6d
TOP VIEW
SNAP HEAD RIVET


3
FRONT VIEW ( LEFT HALF IN SECTION)
L.H. SIDE VIEW
BUSHED BEARING
SCALE 1:1
3.
R.H. SIDE VIEW
FRONT VIEW ( LOWER HALF IN SECTION) AT XX
TURNBUCKLE
SCALE 1:1

QUESTION PAPER CODE 68

**EXPECTED ANSWERS/VALUE POINTS**

**Q.1. (a)**

**ISOMETRIC SCALE.** **(4)**

| | | |
|---|---|---|
| (i) | Marking of divisions of 10 mm and 1 mm on true scale | ½ |
| (ii) | Marking angles of 30° and 45° | ½ |
| (iii) | Projections from scale 1: 1 to get points on isometric scale. | ½ |
| (iv) | Construction of isometric scale with main divisions of 10 mm each. | 1 |
| (v) | Division of first part into 10 sub-divisions. | 1 |
| (vi) | Printing 'True Scale 1:1' and 'Isometric Scale'. | ½ |

**Q.1. (b)**

**FRUSTUM OF A CONE** **(8)**

| | | |
|---|---|---|
| (i) | Drawing isometric ellipses, at the top and bottom. | 4 |
| (ii) | Side generators, drawn tangentially to ellipses. | 1 |
| (iii) | Marking of axis. | 1 |
| (iv) | Printing three dimensions. | 1½ |
| (v) | Direction of viewing | ½ |

**NOTE;**

For incorrect position of frustum, like using 70 mm diameter for the base and 50 mm diameter for the top, 1½ marks should be deducted. If axis is drawn perpendicular to V.P. instead of drawing perpendicular to H.P., as asked, 1½ marks should be deducted.

**Q.1. (c)**

**EQUILATERAL TRIANGULAR PYRAMID PLACED CENTRALLY ON A PENTAGONAL PRISM** **(13)**

**(A) PENTAGONAL PRISM**

| | | |
|---|---|---|
| (i) | Helping view of a pentagon with a side parallel to V.P. and away from it; | 1 |
| (ii) | Drawing isometric pentagons at the top and bottom. | 4 |
| (iii) | Drawing vertical edges of prism. | 1½ |
| (iv) | Printing two dimensions. | 1 |

**(B) TRIANGULAR PYRAMID**

| | | |
|---|---|---|
| (i) | Helping view of a triangle with a side perpendicular toV.P. | 1 |
| (ii) | Marking height from center of top surface of the pentagon along with the common vertical axis. | 1 |

(iii) Drawing triangular base. 1
(iv) Drawing slant edges. 1½
(v) Printing two dimensions. 1
**25**

**NOTE:**
For incorrectly placed solids, deductions as proposed in **Q.1 (b)** may be used.

**Q.2 (a)**

**METRIC SCREW THREAD PROFILE (EXTERNAL)** **(9)**

(i) Distances, equal to pitch, marked correctly and angles of 60°, drawn correctly. 2
(ii) Curves for threads (minimum 2), drawn correctly. 2
(iii) Side edges (flanks), drawn correctly. 2
(iv) Dimensioning 2
(v) Neatness and line work. 1

**(OR)**

**(a) SINGLE RIVETED LAP JOINT** **(9)**

(i) Drawing rivet with both heads. 2
(ii) Drawing both plates. 2
(iii) Drawing hatching lines. 2
(iv) Four dimensions at least. 2
(v) Neatness and line work. 1

**NOTE**
'3' marks may be deducted, in all; if sketched free hand proportionately instead of drawing to scale 1: 1.

**Q.2. (b)**

**NOTE** *Following components are* to *be sketched free hand proportionately.*

**(A) ROUND HEAD SCREW** **(6)**

(i) Sketching front view with its axis perpendicular to H.P. 3
(ii) Sketching top view. 2
(iii) Dimensioning. 1

**(OR)**

**(B) WOODRUFF KEY** **(6)**

(i) In front view, keeping horizontal edge at 0.25 t below the center. 1
(ii) Drawing the horizontal edge and curve with a radius of R=2t. 2

(iii) Drawing side view. 1
(iv) Drawing top view. 1
(v) Dimensioning. 1
**15**

**NOTE**

'2' marks may be deducted if these components are drawn with instruments instead of being sketched free hand.

**Q.3.**

**OPEN BEARING** **(30)**

**(A) FRONT VlEW** **(16)**

(i) Marking boundary of the body along with radii R 5 (at six locations), including the portion drawn with R30 and vertical line of 20 mm. 5

(ii) Marking of center to center distance of two holes (130 CRS),distance of 10 mm along with clearance gap of 5mm and radius R 3. 3

(iii) Marking of a hole of 25 mm size. 1

(iv) Hatching lines in the left half of the body. 2

(v) Plotting vertical center distance of the hole for the bush. 1

(vi) Drawing inner surface of bush, including semicircle; outer surface of bush of R 25 along with vertical line of 20 mm and hatching lines in the bush. 4

**(B) SIDEVlEW (8)**

(i) Drawing boundary of the body and 50mm wide projection of 20 mm height of the body from the base. 5

(ii) Drawing projected portion of bush of 5 mm on each side. 2

(iii) Drawing two center lines 1

**OTHER (6) MARKS ARE FOR:**

(i) Printing title. 1

(ii) Scale used. 1

(iii) Line work and neatness. 1

(iv) Projection symbol. 1

(v) Printing '8' dimensions. 2
**30**

**(OR)**

**Q.3**

**FLANGE PIPE JOINT** **(30)**

**(A) FRONT VIEW** **(15)**

(i) Drawing both flanges and pipes in top half portion (without section), including curves of R 3; R 5 and hatching lines in broken end of pipe. 4

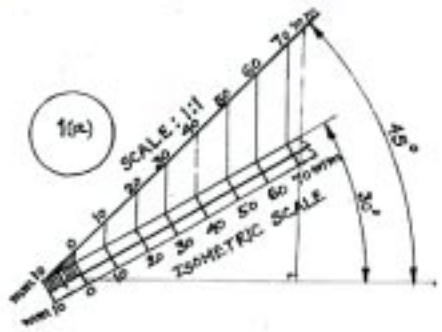
| | | |
|---|---|---|
| (ii) | Drawing both flanges and pipes in bottom half portion, including curves of R 3, R 5, and hatching lines in the broken end of pipe. | 4 |
| (iii) | Drawing a hole of $\phi$10 mm on a p.c.d. of 110 mm and hatching lines in pipes and flanges. | 2 |
| (iv) | Drawing bolts and nuts of M8 mm correctly at proper locations. | 4 |
| (v) | Indicating packing material (gasket) of outer diameter of 80 mm and thickness 3 mm with a line in the upper half and with shading or hatching in the bottom half. | 1 |
| **(B)** | **SIDE VIEW** | **(10)** |
| (i) | Drawing five circles, including p.c.d. for bolts. | 5 |
| (ii) | Drawing hatching lines to indicate the pipe thickness. | 1 |
| (iii) | Drawing chamfer circles, hexagons, M 8 mm circles and 0.85d broken circles for nuts and bolts on p.c.d. | 3 |
| (iv) | Drawing cutting plane with the direction of viewing. | 1 |

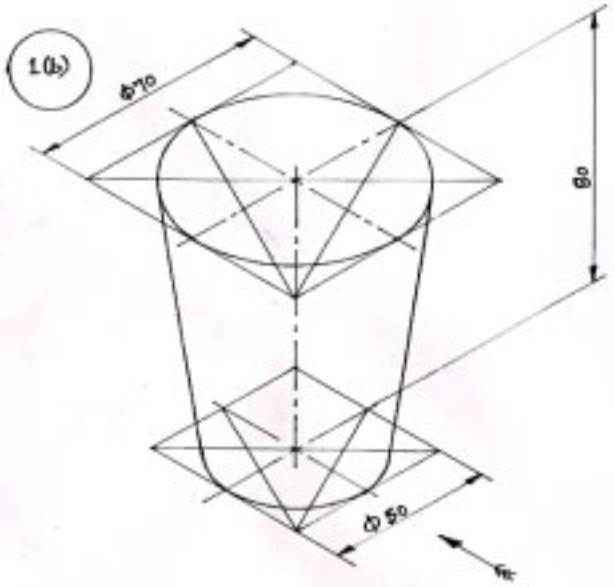
**OTHER (6) MARKS ARE FOR:**

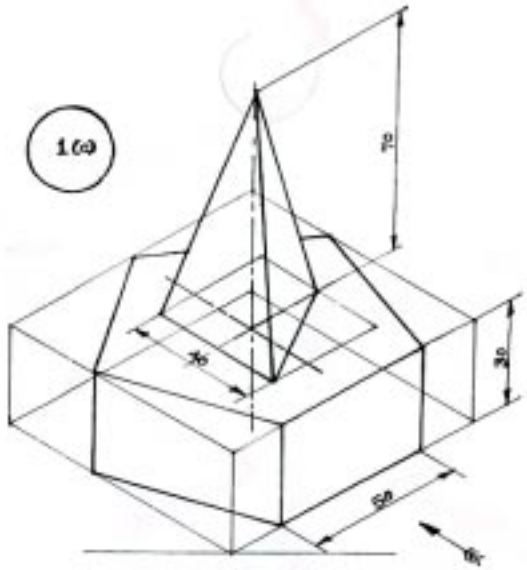
| | | |
|---|---|---|
| (i) | Printing title. | 1 |
| (ii) | Scale used. | 1 |
| (iii) | Line work and neatness. | 1 |
| (iv) | Projection symbol. | 1 |
| (v) | Printing '8' dimensions. | 2 |
| | | **30** |

**NOTE**

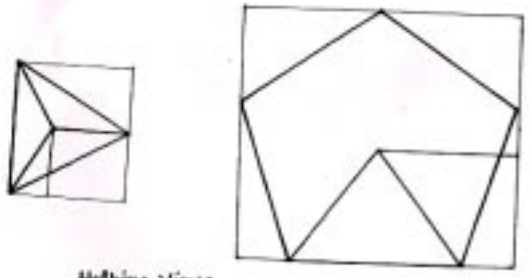
If sectioning is shown on the side, other than the one, asked for, in **Q.3.**
'2' marks should be deducted.



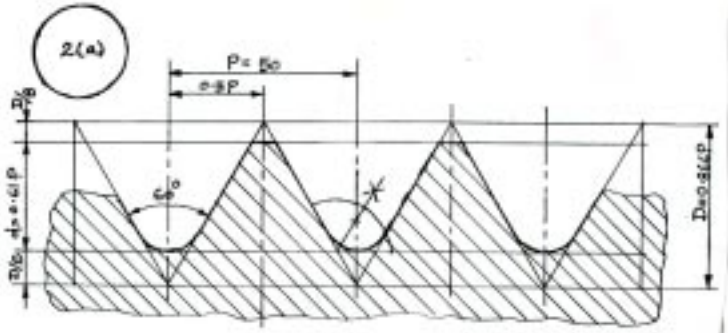




ISOMETRIC PROJECTION



Hidden View

2(a)

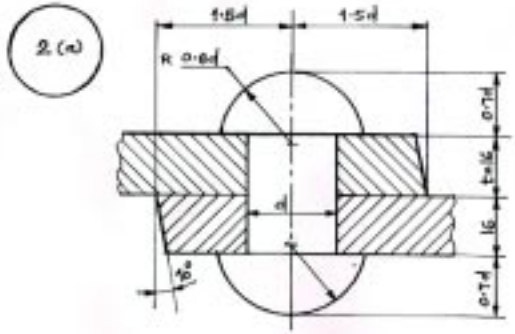



METRIC SCREW THREAD (EXTERNAL)

(OR)

Paper Code : 68

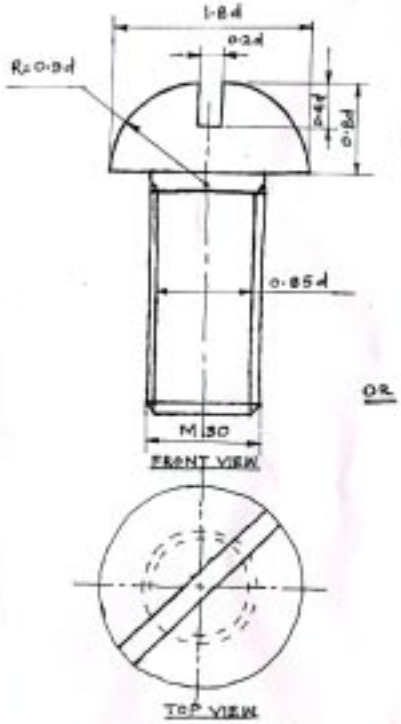
2 (a)



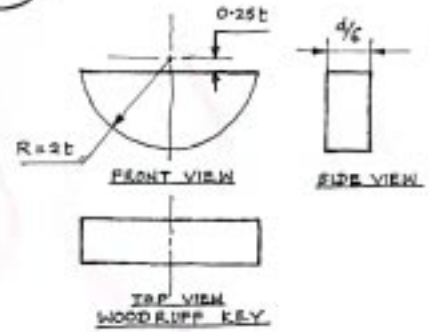

SINGLE RIVETED LAP JOINT

Note : $d = 6\sqrt{t}$

2(b)




OR

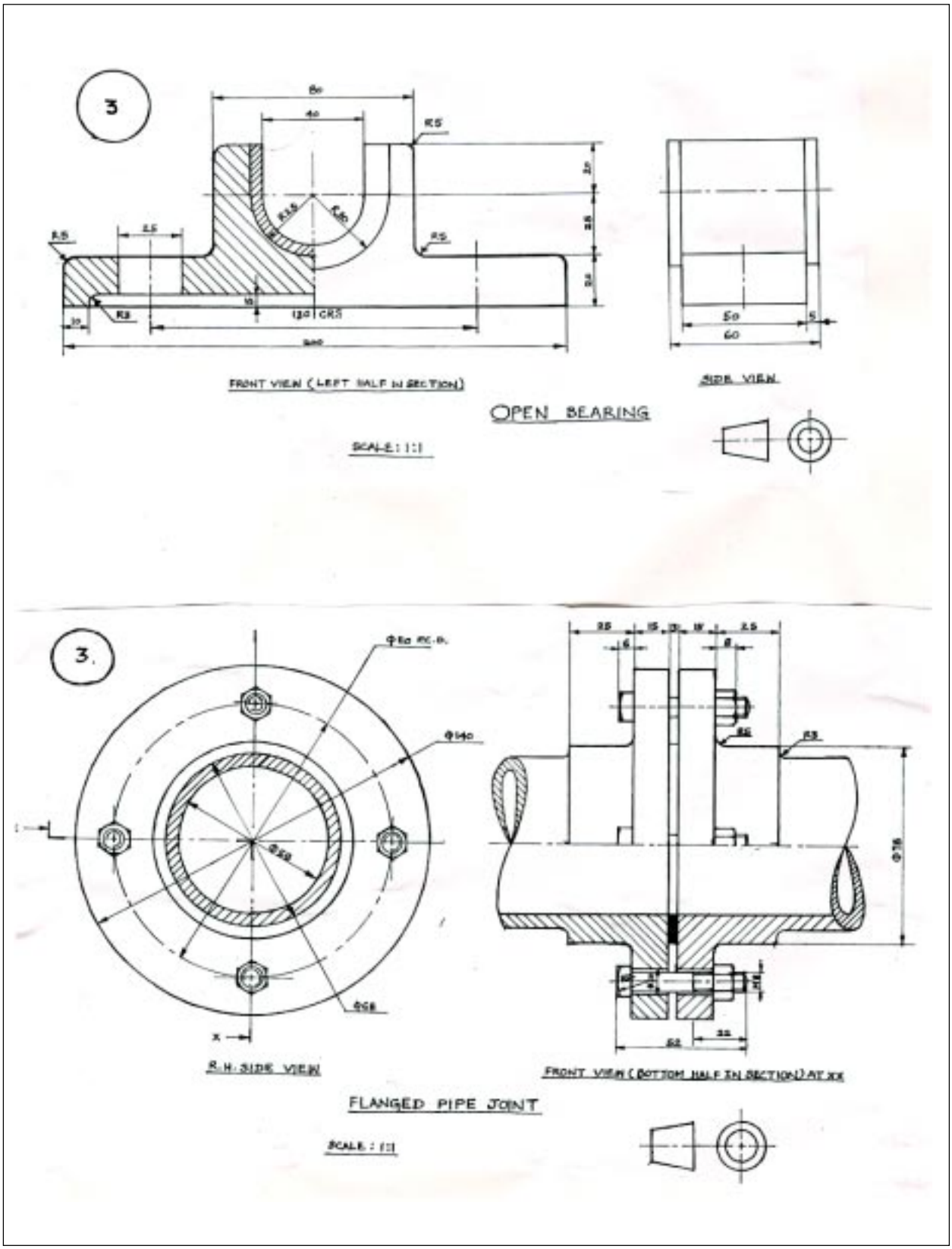



WOODRUFF KEY

d = Dia. of shaft = 48 mm

t = d/6 = 8 mm.

ROUND HEAD SCREW


3
FRONT VIEW ( LEFT HALF IN SECTION)
SIDE VIEW
OPEN BEARING
SCALE: 1:1
3.
R.H. SIDE VIEW
FRONT VIEW ( BOTTOM HALF IN SECTION) AT XX
FLANGED PIPE JOINT
SCALE : 1:1