SMT. MISRI DEVI GIYAN NIKETAN
PRE BOARD I 2024-25

Class XII (044 Biology) (SET- II)

Virender 18

Maximum Marks: 70 Time: 3 hours

General Instructions:

(i) All questions are compulsory.

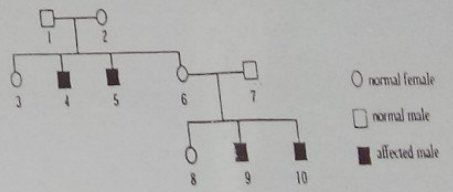
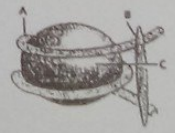
(ii) The question paper has five sections and 33 questions. All questions are compulsory.

(iii) Section – A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section – C has 7 questions of 3 marks each; Section – D has 2 case-based questions of 4 marks each; and Section – E has 3 questions of 5 marks each.

(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v) Wherever necessary, neat and properly labeled diagrams should be drawn

Section - A

Q. no	Question	Marks
1	The fimbriae help in: a) Collection of ovum b) Collection of sperm c) Fertilization of sperm and ovum d) Maturation of sperm	1
2	Study the given diagram and choose the correct option against 'A' and 'B' a) A-Egg apparatus; B-Polar body b) A-Antipodals; B-Egg apparatus c) A-Synergids; B- Egg apparatus d) A-Central cell; B-Antipodals 	1
3	Which of the following statements about Untranslated regions is/are true? I. present on rRNA II. present on mRNA at 3' position only III. present on mRNA at 5' position only IV. present on mRNA at both 3' and 5'position V. not required in translation process. VI. required for efficient translation process. a) I only b) II and V c) III and VI d) IV and VI	1
4	Which of the following statements regarding sex determination are true? In addition to autosomes – I. Male grass hoppers have one less sex chromosome than females. II. Male birds have one more sex chromosome than female. III. Number of sex chromosomes is equal in male and female birds. IV. Male grass hoppers have one additional sex chromosome than females. V. Male and female grass hoppers have the same number of sex chromosomes. a) I and II b) I and III c) II and IV d) III and V	1
5	Large holes in Swiss cheese are prepared by a) Saccharomyces cerevisiae b) Propionibacterium sharmanii c) Penicillium chrysogenum d) Acetobacter aceti	1
6	The process of evolution of different species in a geographical area starting from a point and radiating to other areas of geography is called – a) Founder effect b) Adaptive radiation c) Convergent evolution d) Saltation	1
7	The family tree below shows the inheritance of Duchenne Muscular Dystrophy (DMD) in a family. The pattern of inheritance in DMD is  a) Autosomal Dominant b) Autosomal Recessive c) X linked Dominant d) X linked Recessive	1
8	Identify A, B and C in the given diagram.  a) A. DNA, B. H1 histone, C. Histone octamer b) A. Histone octamer, B. DNA, C.H1 histone c) A. DNA, B. Histone octamer, C. H1 histone d) A. Histone octamer, B. H1 histone, C. DNA	1

9 Sea Anemone gets attached to the surface of the hermit crab. The kind of population interaction exhibited in this case is — 1
a) amensalism
b) commensalism
c) mutualism
d) parasitism

10 Restriction enzymes cut the strand of DNA – 1
I. a little away from the centre of palindrome sites
II. closer to the centre of palindrome sites
III. between the same two bases on the opposite strands
IV. between the different bases on the same strands
V. and leave single stranded portions at the ends
VI. and do not leave the single stranded portions at the ends
a) I, III and VI
b) I, III and V
c) I, IV and VI
d) II, IV and V

11 Which of the following techniques serves the purpose of early diagnosis of a disease? 1
a) Recombinant DNA Technology, Serum Analysis, ELISA
b) Urine analysis, Serum Analysis, ELISA
c) Recombinant DNA Technology, PCR, ELISA
d) PCR, Serum Analysis, Urine analysis

12 Which of the following is prepared by acetylation of morphine ? 1
a) Cocaine
b) Heroin
c) Hashish
d) Marijuana

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true and R is not the correct explanation of A.

c) A is true but R is false.

d) A is False but R is true.

13 **Assertion:** Perisperm is the protective covering of seed which helps in its dispersal. 1
Reason: A ripened ovary wall forms a pericarp which functions as a fruit wall.

14 **Assertion:** In the process of transcription, template strand with polarity 3′ → 5′ plays a major role. 1
Reason: DNA dependent RNA polymerase catalyses the polymerization in only one direction, that is 5′ → 3′.

15 **Assertion:** Sickle cell anemia is an autosomal recessive trait. 1
Reason: It is transmitted from parents to the offsprings even when one partner is the carrier for the disease.

16 **Assertion:** Plasmids and bacteriophages are used as cloning vectors in rDNA technology. 1
Reason: They have low copy number of their genome within the bacterial cell.

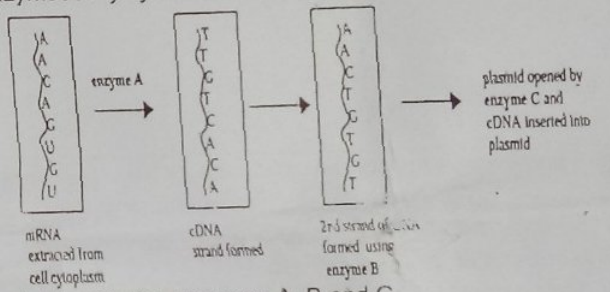
Section B

17 Consuming mother's milk for the first few days is important for the baby not just for energy, but also for other reasons. Elaborate. 2

18 In bacteria, how are all three steps of transcription catalyzed by a single RNA polymerase? 2

19 A patient was complaining of fever, chills, cough and headache. His lips and fingernails turned grey. What diagnosis would you make? Name the two causal organisms and state the category to which these pathogens belong. 2

20 In an effort to mass produce a useful protein, scientists extracted a precise section of mRNA from the cytoplasm of cells which naturally produced the protein. The mRNA strand was then used as a template to enzymatically synthesise a strand of complementary DNA (cDNA). 2



a) Identify the enzymes A, B and C.
b) Plasmid was used as a vector in this investigation. Name another vector that can be used here.

21 Pollen grains are well-preserved as fossils. Analyse the properties of pollen grains that help in fossilisation. 2

OR

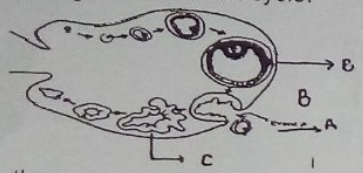
Taking an example of homologous organs in plants, write the type of evolution they are based on, giving a reason.

Section – C

22 a) Explain how pituitary hormones influence the activity of Leydig cells and Sertoli cells present in human testes. (3)

b) The Spermatogonia has 46 chromosomes in a human male. Give the number of chromosomes in a (i) Primary spermatocyte and (ii) Spermatid.

23 The figure below shows the sequence of changes within the ovary that occur during the menstrual cycle. (3)

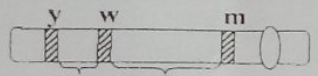


a) Name the process A. Name the hormone that plays an important role during this event.

b) Identify B and name the hormone that regulates the maturation of B.

c) Identify and write the function of C.

24 (3)



y - yellow body
w - white eye
m - miniature wing
in *Drosophila*

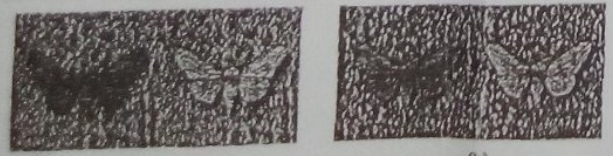
Above figure indicates the percentage of recombination between 2 pairs of genes – y and w; w and m. On the basis of this data what conclusion can you draw -

a) Which two of these genes are tightly linked? Justify your answer.

b) Which scientist used such data of the frequency of recombination between gene pairs on the same chromosome to prepare genetic maps and how?

c) How are genetic maps useful?

25 The figure given below shows white winged and dark winged moth present on a tree trunk with variable lichen growth (a) in unpolluted area and (b) in polluted area. Which variety of moth is likely to survive in these two conditions? Justify your answer. (3)



(a) (b)

26 (i) Why is it important to measure biochemical oxygen demand (BOD) of the effluent? At what stage of sewage treatment is this testing done? (3)

(ii) BOD level of three samples of water labelled as A, B and C are 60 mg/L, 20 mg/L and 500 mg/L respectively. Which sample of water is most polluted?

27 When two different varieties– a conventional variety and a GM crop of corn crop were grown in a field, it was noticed that corn borers attacked only the conventional variety. (3)

a) Suggest a suitable treatment using genetic engineering approach for damage control in the conventional variety. Justify your approach.

b) Name the gene associated for development of GM crop for the control of this pest. Explain its impact on the insect pest?

c) How does it not harm the source from which it is taken?

OR

Factor VIII protein is a very useful protein for blood clotting in the human body. If deficient, it can either be plasma derived or can be made as a genetically engineered recombinant protein.

a) Name a genetic disease that may be treated using recombinant human factor VIII.

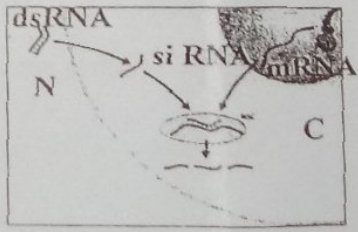
b) Before recombinant human factor VIII was available, this disease was treated with factor VIII received from donated blood. Give two possible advantages of using recombinant human factor VIII instead of it being obtained from donated blood, to treat this disease.

c) What is unique feature in inheritance pattern of the disease as mentioned in part (a) above.

28 It is established that RNA is the first genetic material. Explain giving three reasons. (3)

Section – D

29 Given below is an image showing a special situation in which a dsRNA from a source has been introduced into a host cell. (4)



N - Nematode specific gene
C- Cell of Tobacco plant

a) How can dsRNA of nematode specific gene be introduced into the host cell as shown in the figure given above?

b) What can be the source of dsRNA for this process?

c) What will be the impact of this interaction between dsRNA and mRNA on the mRNA and entire cellular machinery of host plant?

OR

c) What is the economic importance of the technique shown in the above figure? Justify your statement.

30 | 4

In a huge culture flask with unlimited supply of nutrient medium, bacteria were grown. Their population kept on increasing as they were dividing by binary fission.

a) What type of growth pattern will be seen in this population?

b) Write the equation which can be used to calculate the population size after time t, when the initial population size of the bacteria is represented by N and population size after time t is represented by N_t.

c) Draw a growth curve to depict the growth in the population size when growth in the population size is plotted over time. What will be the shape of this growth curve?

OR

c) If instead of providing the unlimited supply of culture medium in a huge flask, it is provided only in a very small test tube, then what will be the pattern of growth and the shape of the growth curve? Depict diagrammatically also.

Section - E

31 | 5

A couple had unprotected intercourse.

i) Which are the two possible emergency contraceptives that can be used to avoid pregnancy in such a case?

ii) What is the basic principle of each of these?

iii) Will these contraceptive devices provide protection to the couple from STDs as well? Justify your answer.

iv) Removal of gonads cannot be considered as a contraceptive option. Justify.

OR

Consider the following three possible diagnoses for infertility and answer the trailing questions.

(i) Inability to produce a normal egg.
(ii) Low Count of Sperm.
(iii) Blocked Fallopian tube

a) Suggest and explain different methods of ART based on clinical examination for the above cases.

b) What are the legally acceptable reasons that allow MTPs to be carriedout?

32 | 5

The table below shows some of the 64 available codons and their associated amino acids.

Codon	Amino acid
AGG	arginine
CAG	glutamine
GGG	glycine
GGU	glycine
GUU	valine
UUA	leucine
UCA	serine
UUU	phenylalanine

The diagram below shows the coding strand of a length of DNA with its bases indicated.

T A C A A T C C C A A A A T C

a) Write down the base sequence of a length of the mature RNA that would be transcribed from this DNA.

b) In a eukaryotic cell, the base sequence of the mRNA might be different from the sequence of the HnRNA. Explain why.

c) 'Genetic code is nearly universal'. Explain this statement.

d) Explain why glycine has two codons in the above table.

e) Give reasons why RNA is less stable than DNA.

OR

a) ABO blood group in humans is an example of multiple allelism and Co-dominance. Justify.

b) A couple who has blood groups A and B have four children. Each child has a different blood group. Explain with the help of crosses to show how this is possible.

33 | 5

a) Innate immunity is a non-specific type of defense and consists of four types of barriers. Categorize these barriers and give one example for each.

b) Differentiate between benign and malignant tumors? Which one is lethal and why?

OR

a) State three characteristics of acquired immunity.

b) List the different ways by which it can be attained by humans.