

**General Instructions:-**

- All questions are compulsory. There are 27 questions in all.
- This question paper consists of four sections **A, B, C & D**.
- Section **A** contains **5** questions of **1** mark each, Section **B** contains **7** questions of **2** marks each. Section **C** contains **12** questions of **3** marks each and Section **D** contains **3** questions of **5** marks each.
- Internal choices have been provided in two questions of one mark, two questions of two marks, four questions of three marks and three questions of five marks weightage. **A student has to attempt only one of the alternatives in such questions.**
- Questions of Section **A** are to be answered in one word or **one sentence** each, Section **B** in approximately **20-30** words each, Section **C** in **30-50** words each and Section **D** in **80-120** words each.
- Wherever necessary, the diagrams drawn should be neat and properly labeled.

SECTION-A

1. What kind of development takes place in the zygote in organisms with haplontic life cycle?

OR

In case of polyembryony, an embryo A develops from the synergids and embryo B develops from the nucellus. State the ploidy of embryo A and B. 1

2. How do neutrophils act as a cellular barrier to pathogens in humans? 1

3. Traditional hybridization procedures used in breeding leads to inclusion and multiplication of undesirable genes along with desired genes. Name the techniques of genetic engineering that helps to overcome this limitation. 1

4. Do eukaryotic cells have restriction endonucleases? Justify. 1

5. Name the type of biodiversity represented by the following;

- a) 50,000 different strains of rice in India.
- b) Estuaries and alpine meadows in India.

OR

Very small animals are rarely found in Polar Regions. Justify. 1

SECTION-B

6. State the Mendelian principle which can be derived from a monohybrid cross and not from dihybrid cross. 2

OR

Using a Punnett square, find out the nature of offspring of a test cross. What is the ratio obtained?

7. Draw a neat labelled diagram of an ovum surrounded by sperms. 2

8. Why does the lac operon shut down some time after the addition of lactose in the medium where *E.coli* was growing? 2

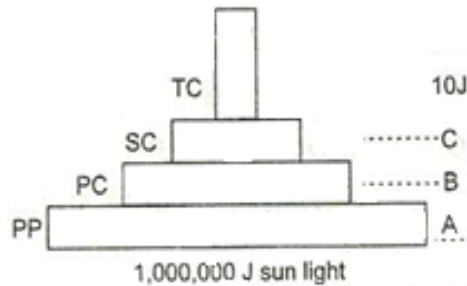
9. A wide range of pathogens, affect the yield of cultivated crop species, especially in tropical climates. How does breeding of disease resistant plants prove to be advantageous to mankind? 2

10. The advancements made in biological sciences have armed us to effectively deal with many infectious diseases. Justify. 2

11. A multinational company outside India tried to propagate a new variety of crop without proper authorization.
- Name the term used and cite an example for such an act committed by the multinational company.
 - What are the steps taken by our government to prevent such deeds?

2

12. Study the given figure and answer the following:



- What is the amount of energy available at A, B and C?
- Pyramid of energy is always upright. Give reason.

OR

Differentiate between mutualism and commensalism, giving one example of each.

2

SECTION-C

13. A wide range of contraceptive methods are presently available. Explain the barrier methods of contraception and the principle used in them. 3
14. "Pollen grains in wheat are shed at 3-celled stage while in peas they are shed at 2-celled stage." Explain. Mention the location and role of germ pores in a pollen grain?

OR

The uterus is single and is also called the womb. Explain its structure and its role.

3

15. Compare and contrast the theories of evolution proposed by Darwin and Hugo De Vries. 3

- Mention two events in which DNA is unzipped.
- What would happen when both the template and the coding strand of a DNA segment participate in transcription process?

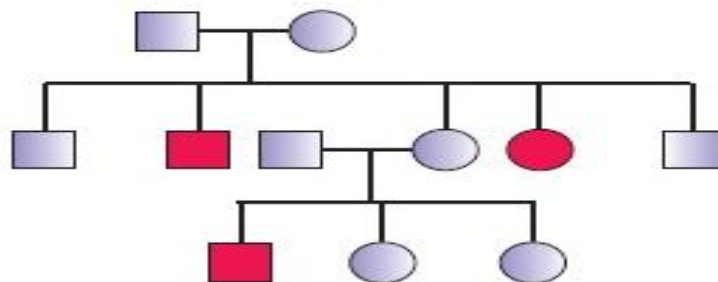
OR

Aneuploidy of chromosomes in human beings results in certain disorders. Taking an example mention the karyotype of the disorder and the consequences in the individual.

3

17. Study the given pedigree chart and answer the following:

3



- Is the trait sex-linked or autosomal?
- Is the trait recessive or dominant?
- Give the genotypes of the parents shown in generation I and their third child shown in generation II and the first grandchild shown in the further generation.

d) Name two Mendelian disorders traced by pedigree analysis.

18. Give reason:

- a) During transplantation organs cannot be taken from just anybody.
- b) Mother's milk considered essential for the newborn infant.
- c) Both bone marrow and thymus are important lymphoid organs.

OR

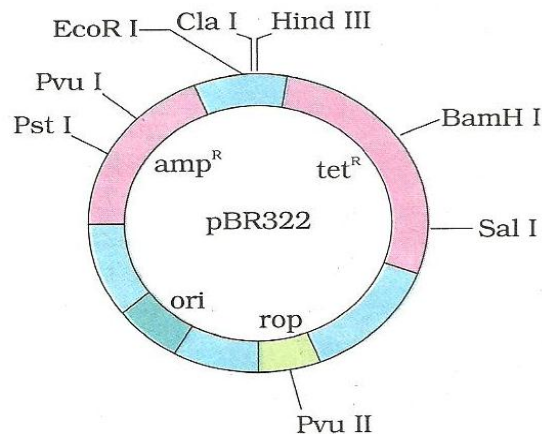
Name the human disease, its causal organism and carrier, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter.

3

19. Success rate of artificial insemination in cattle is fairly low. How will you explain to a dairy farmer another technique for the successful productions of hybrids? State two advantages of this technique.

3

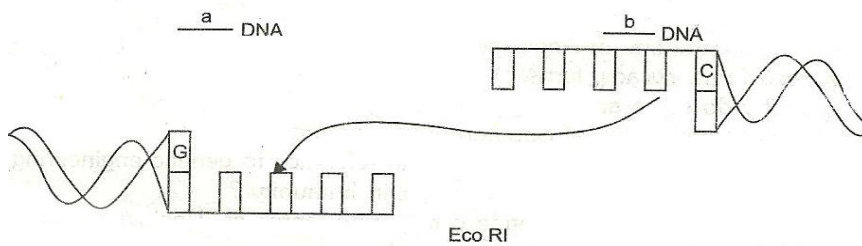
20. Study the figure of *E. coli* cloning vector pBR322 shown below, and answer the following:



- (a) Identify the selectable markers in the diagram of *E. coli* vector shown above.
- (b) How is the coding sequence of B-galactosidase considered a better marker than the ones identified by you in the diagram? Explain

OR

The following figure depicts the linking of DNA fragments:



- a) Name 'a' DNA and 'b' DNA in the above figure.
- b) Name the restriction enzyme that: (i) can recognize the specific nucleotide sequence shown in the DNA strand, (ii) links these two DNA fragments.
- c) What are the nucleotide sequences in the DNA that each restriction enzyme can recognize called and name them?

3

21. How does the application of the following microbes to the agricultural farm increase the farm output?

- a) *Bacillus thuringiensis*,
- b) Baculoviruses,
- c) *Glomus*

3

22. Gene therapy allows the correction of a defective gene that has been in a child or embryo. Illustrate this taking an example. 3
23. a) Succession is a process that starts where no living organisms ever existed. Explain the seral stages that occur from xeric to mesic conditions.
b) Differentiate between the primary and secondary succession. (One point) 3
24. The greenhouse effect is a naturally occurring phenomenon, today it has led to global warming.
a) Mention any four consequences of global warming.
b) What are the effects of ozone depletion on human beings? 3

SECTION-D

25. a) How did Hershey and Chase differentiate between DNA and protein in their experiment while proving that DNA is the genetic material?
b) Give two chemical differences between DNA and RNA.

OR

- a) Explain the steps involved in the polymerization of amino acids to form a polypeptide.
b) Compare the translational unit and untranslated regions in mRNA. 5
26. a) Trace the development of a zygote of a dicot angiosperm into a fully-developed embryo with diagrams.
b) Differentiate between geitonogamy and xenogamy.

OR

- a) The process of fusion of a sperm with an ovum is called fertilisation. Explain the steps that leads to implantation and pregnancy.
b) Parturition is induced by a complex neuroendocrine mechanism. Give reason. 5
27. a) Water bodies are our lifeline as well as that of all other living organisms. Explain, how activities of human kind (any three) can harm life forms in water bodies.
b) In the 1990s, Delhi ranked fourth among the 41 most polluted cities of the world. What were the appropriate measures taken by the government to minimize vehicular pollution?

OR

- a) Following are the responses of different animals to various abiotic stresses. Describe each one with an example.
a) Regulate b) Suspend c) Conform d) Migrate.
- b) If in a pond there are 20 lotus plants last year and through reproduction 8 new plants are added. Calculate the birth rate of offspring per year. 5
