

**General Instructions:-**

- This question paper consists of four sections **A, B, C & D**. Section **A** contains **5** questions of **1** mark each, section **B** is of **7** questions of **2** marks each, section **C** is of **12** questions of **3** marks each and section **D** is **3** questions of **5** marks each.
- All questions are compulsory.
- There is no overall choice. However, an internal choice is provided in one question of **2** marks, one question of **3** marks and all questions of **5** marks weightage. Attempt only **one** of the choices 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. How is the number of chromosomes of meiocytes and gametes interrelated? 1
2. Define biofortification. 1
3. A patient has to take immuno-suppressants all his life after undergoing an organ transplant. Give reason. 1
4. Genetic equilibrium states the status of evolution. Justify. 1
5. Pollination is a chance factor in both wind and water pollination. How do plants compensate for these uncertainties? 1

SECTION-B

6. State Morgan's contribution in the field of genetics. (Any two points). 2
7. Government of India has imposed strict conditions for MTPs in our country, yet it is essential. Justify giving a reason for both. 2
8. A man who was bleeding due to an injury with an old iron object was taken to a hospital. The doctor gave him an injection to protect him against a deadly disease.
 - a) What did the doctor inject into the patient's body?
 - b) How do you think this injection would protect the patient against the disease?
 - c) Name the disease against which this injection was given and the kind of immunity it provides. 2
9. Inbreeding is the strategy used to increase homozygosity in cattle for desired traits. Mention one advantage and disadvantage of this technique. 2
10. How do Darwin's finches provide a biogeographical evidence in favour of evolution? 2
11. a) Why are thalassemia and haemophilia categorized as Mendelian disorders?
 b) Explain the pattern of inheritance in haemophilia. Write the genotypes of the normal parents producing a haemophilic son.

OR

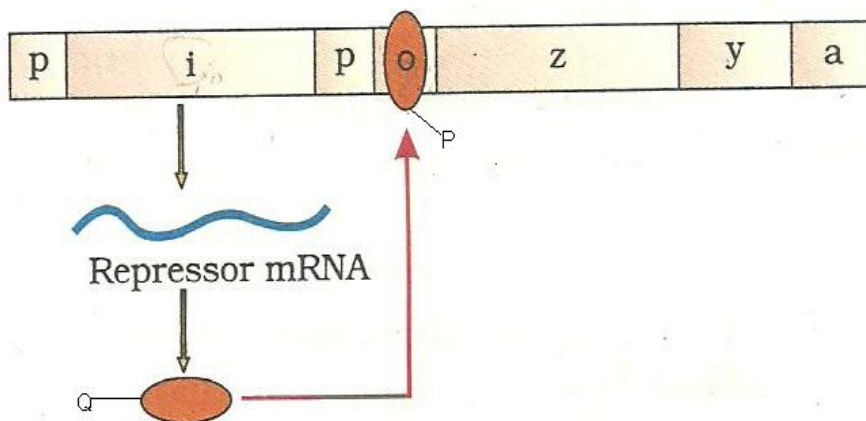
- A colour blind man marries a woman with normal vision whose father was colourblind. Work out a cross to show the genotype of the new couple and their prospective sons. 2
12. MOET is a technique used for successful production of hybrids. List the steps involved and an advantage of the given technique. 2

SECTION-C

13. Draw a well labelled diagram showing the structure of a sperm. 3
14. Contraceptive methods help prevent unwanted pregnancies.
 a) List the characteristics of an ideal contraceptive. (Any four points)
 b) Is the use of contraceptives justified? Give reasons. 3
15. How is the process of formation of a mature female gamete markedly different from spermatogenesis? (Any three points) 3
16. Adolescence means a period between 12-18 years of age during which a child mature in terms of his/her attitudes and beliefs for effective participation in society. It is a bridge linking childhood and adulthood. It is accompanied by several biological and behavioral changes and is a vulnerable phase.
 a) What are the two main causes which motivate youngsters towards drug and alcohol abuse?
 b) List four measures useful for prevention and control of drugs and alcohol abuse among adolescents. 3
17. AIDS is acquired during the lifetime of an individual it is not a congenital disease. Give a schematic representation showing replication of HIV in humans. 3
18. Fill in the gaps from A to F in the given table. 3

Microbe	Products	Significance
A) -----	Streptokinase	B) -----
<i>Monascus purpureus</i>	C)-----	D) -----
E) -----	F) -----	Immunosuppressive agent

19. The length of a DNA is far greater than the dimension of a typical nucleus. How is such a long polymer packaged in a cell? 3
20. Study the schematic representation of the genes involved in the lac operon given below and answer the questions that follow. 3



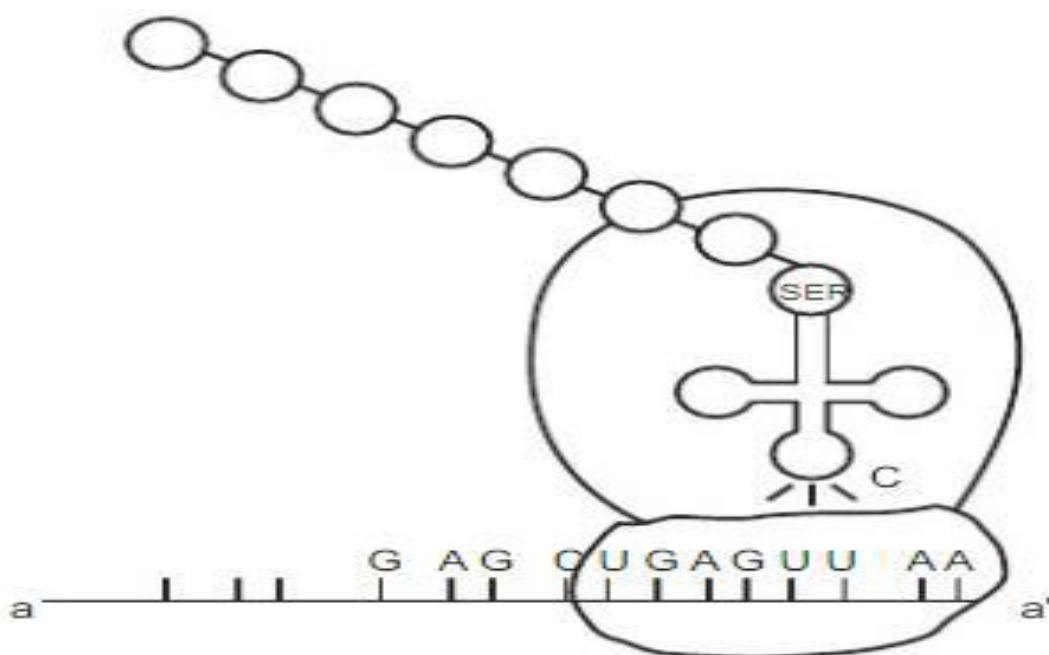
- a) Identify and name the regulatory gene in this operon.
 b) Why is lac Operon regulation referred to as negative regulation?
 c) Name the inducer molecule and the products of the genes 'z' and 'y' of the operon.

21. We treat evolution as a consequence of a process called natural selection. How does natural selection operate on different traits in a population? 3
22. The genetic code is the set of rules by which information encoded within genetic material is translated into proteins by living cells. State the conditions when 'genetic code' is said to be 3
- (i) Degenerate (ii) Unambiguous (iii) Universal.

OR

DNA fingerprinting is a quick way to compare the DNA sequences of any two individuals. Enumerate the steps involved in DNA fingerprinting analysis.

23. Explain the importance of the following in organic farming/ human welfare. 3
- (i) Mycorrhiza (ii) Baculoviruses (iii) Spirulina.
24. Study the figure given below and answer the following: 3



- a) Identify the polarity from a to a' in the above diagram. How are the amino acids linked to form a polypeptide chain?
- b) If the DNA sequence coding for serine and tyrosine are AGU and UAC. Give the anticodon of tRNA for the same amino acids.
- c) Why are some untranslated sequence of bases seen in mRNA coding for a polypeptide? Where exactly are they present on mRNA?

SECTION-D

25. How do microbes play a dual role when used for sewage treatment as they not only help retrieve usable water but also generate fuel? 5

OR

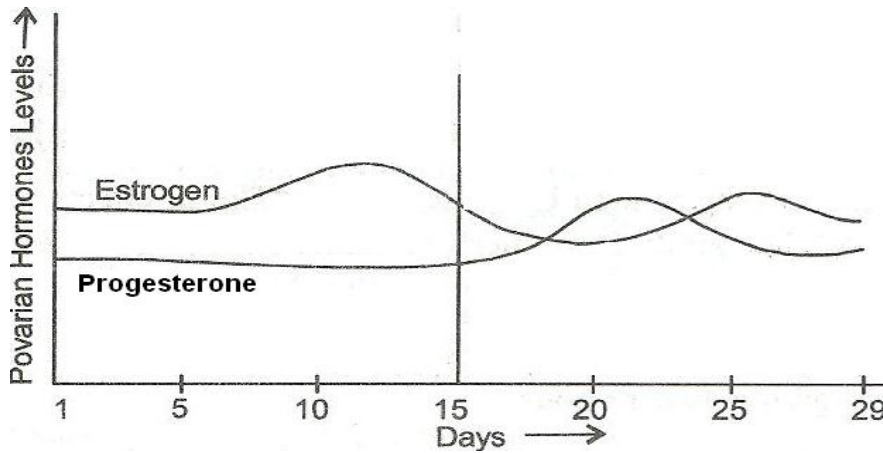
- a) Plant breeding programmes are carried out in a systematic way worldwide. How are new disease resistant varieties of crops created?
- b) Name any two crop varieties bred by hybridization and selection for insect pest resistance.

26. a) Enumerate the post- pollination events that leads to zygote formation in plants.
 b) How are apomicts important in hybrid seed industry?

5

OR

- a) Study the graph given below showing the level of ovarian hormones during menstruation and correlate the uterine events that take place according to the hormonal levels.
 (i) 6 - 15 days (ii) 16– 25 days.



- b) Which hormones are (i) essential for supporting foetal growth and pregnancy,
 (ii) involved in the induction of parturition?

27. DNA separated from one cell, when introduced in another cell is able to bestow some of the properties of the latter.

- a) Describe the experimental evidences which led to the discovery of the above phenomenon.
 Give the technical term for the above change.
 b) How was the biochemical nature of the above principle characterized?

5

OR

- a) Explain, the process of transcription in bacteria.
 b) hnRNA formed after transcription in eukaryotes need to be processed before translation.
 How is hnRNA processed to form a mature mRNA?
