



Series : RQP2S

SET~2



प्रश्न-पत्र कोड
Q.P. Code

57/2/2

रोल नं.

Roll No.

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परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

Candidates must write the Q.P. Code on the title page of the answer-book.



जीव विज्ञान (सैद्धान्तिक) BIOLOGY (Theory)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70

नोट

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NOTE

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| <p>(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।</p> <p>(II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।</p> <p>(III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 33 प्रश्न हैं।</p> <p>(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथास्थान पर प्रश्न का क्रमांक अवश्य लिखें।</p> <p>(V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।</p> | <p>(I) Please check that this question paper contains 23 printed pages.</p> <p>(II) Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.</p> <p>(III) Please check that this question paper contains 33 questions.</p> <p>(IV) Please write down the serial number of the question in the answer-book at the given place before attempting it.</p> <p>(V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.</p> |
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General Instructions :

Read the following instructions carefully and follow them :

- (i) This question paper contains **33** questions. **All** questions are compulsory.
- (ii) Question paper is divided into **FIVE** sections – Section **A, B, C, D** and **E**.
- (iii) Section **A** – question numbers **1** to **16** are multiple choice type questions. Each question carries **1** mark.
- (iv) Section **B** – question numbers **17** to **21** are very short answer type questions. Each question carries **2** marks.
- (v) Section **C** – question numbers **22** to **28** are short answer type questions. Each question carries **3** marks.
- (vi) Section **D** – question numbers **29** and **30** are case-based questions. Each question carries **4** marks. Each question has subparts with internal choice in **one** of the subparts.
- (vii) Section **E** – question numbers **31** to **33** are long answer type questions. Each question carries **5** marks.
- (viii) 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.
- (ix) Kindly note that there is a separate question paper for Visually Impaired candidates.
- (x) Wherever necessary, neat and properly labelled diagrams should be drawn.

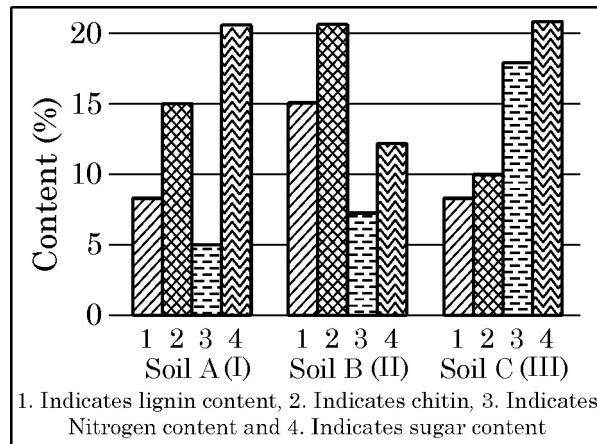
SECTION – A

Question No. **1** to **16** are Multiple Choice Type Questions, carrying **1** mark each. Only one option is correct. Choose the best option.

1. Genetically modified tobacco plants were produced using Agrobacterium vectors. Which property of Agrobacterium helps in carrying nematode specific genes into the host plant ?
- (A) Infectious for monocot plant ; has Ti plasmid
- (B) Infectious for dicot plant ; has Ti plasmid
- (C) Infectious for plants and animals ; has Ti plasmids
- (D) Infectious for monocot and dicot plants ; has cry gene

1

2. Observe the contents 1, 2, 3 and 4 of soil samples I, II and III shown in the graph. If the temperature and moisture of all soil samples are identical, which soil sample(s) will show faster decomposition ? 1



- (A) Soil Sample I (B) Soil Sample II
 (C) Soil Sample III (D) Both Soil Samples II and III
3. A woman having genes for haemophilia on one X chromosome and a gene for colour blindness on another X chromosome marries a normal man. The progeny will show 1
- (A) 50% haemophilic and colour-blind sons, 50% normal sons.
 (B) 50% haemophilic carrier daughter, 50% colour-blind carrier daughters.
 (C) All sons and daughters colour-blind and haemophilic.
 (D) Only haemophilic and colour-blind daughters.
4. Which of the following is an important parameter for assessing the impact of any biotic or abiotic factor on population growth ? 1
- (A) Birth rate
 (B) K-carrying capacity
 (C) Death rate
 (D) r-Intrinsic rate of natural increase



5. If a sperm nucleus is injected into an oocyte then all of the following events are bypassed except - 1
- (A) The swimming of sperm to meet the egg in the oviduct.
(B) The sperm's acquisition of motility in the epididymis.
(C) A sperm comes in contact with the zona pellucida layer of the ovum.
(D) The complex process like cell division and cell differentiation.
6. If A = species richness and B = Endemism then biodiversity hotspots have 1
- (A) low degree of A and low degree of B.
(B) low degree of A and high degree of B.
(C) high degree of A and low degree of B.
(D) high degree of A and high degree of B.
7. Two plants whose DNA has been sequenced are 1
- (A) Rice and Wheat (B) Wheat and Maize
(C) Maize and Barley (D) Rice and Arabidopsis
8. Antivenom injection is an example of 1
- (A) Natural Active Immunity (B) Artificial Active Immunity
(C) Natural Passive Immunity (D) Artificial Passive Immunity
9. To separate repetitive DNA from bulk genomic DNA, which of the following method is used ? 1
- (A) Elution
(B) Southern Blotting
(C) Polymerase Chain Reaction
(D) Density Gradient Centrifugation



10. What conclusion can be drawn if the forelimbs of an aquatic animal and a terrestrial animal have similar anatomical structure ?

1

- (A) Live in same habitat
- (B) Share common ancestors
- (C) Forelimbs perform same functions
- (D) Forelimbs are analogous

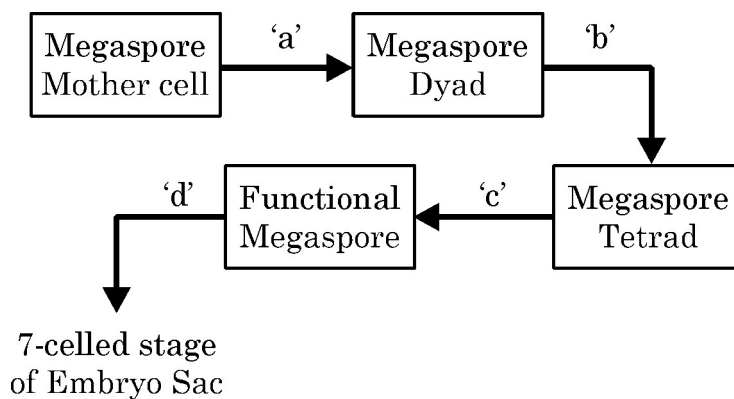
11. Which of the following is used to visualize DNA bands under UV light after gel electrophoresis ?

1

- (A) Acetocarmine
- (B) Safranine
- (C) Ethidium Bromide
- (D) Potassium Iodide

12. Given below are stages of embryo sac formation from megaspore mother cell. Identify the correct option for the cell division marked a, b, c and d.

1



- (A) a – Meiosis-I, b – No division, c – Mitosis, d – Meiosis-II
- (B) a – Meiosis-I, b – Meiosis-II, c – No division, d - Mitosis
- (C) a – Mitosis, b – Meiosis-I, c – Meiosis-II, d – No division
- (D) a – No division, b – Mitosis, c – Meiosis-I, d – Meiosis-II



For Question numbers **13** to **16**, two statements are given – one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from Code (A), (B), (C) and (D) as given below :



- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not correct explanation for Assertion (A).
- (C) Assertion (A) is true, Reason (R) is false.
- (D) Assertion (A) is false, Reason (R) is true.

13. **Assertion (A)** : Pollen grains have a mucilaginous covering on them in most of the water pollinating plants. 1

Reason (R) : Mucilaginous covering help pollen grains to be submerged in water.

14. **Assertion (A)** : Microbes are used for commercial production of alcohol and beverages. 1

Reason (R) : Yeast converts glucose into ethanol and carbon dioxide during fermentation.

15. **Assertion (A)** : IUCN Red List helps in identifying and protecting endangered species worldwide. 1

Reason (R) : The list includes the species facing risk of extinction.

16. **Assertion (A)** : DNA Ligase is used to join DNA fragments. 1

Reason (R) : It catalyses the formation of glycosidic bonds between nucleotides.



SECTION – B

17. (a) Is it possible for a trait to be inherited by an organism but not expressed in its phenotype ?

Justify and illustrate your answer with a suitable Mendelian Cross. **2**

OR

- (b) Explain the two major approaches used while sequencing the total DNA from a cell. **2**

18. Briefly describe the process of DNA extraction from a fungal cell. Name the chemicals used in the process. **2**

19. Differentiate between opioids and cannabinoids on the basis of their

(a) Receptor site in human body. **$\frac{1}{2} + \frac{1}{2}$**

(b) Mode of action in human body. **$\frac{1}{2} + \frac{1}{2}$**

20. (a) (i) Name the organ that forms a connection between foetus and the uterus of a pregnant human female. **$\frac{1}{2}$**

(ii) How does it support both nutrition and hormonal regulation ? **$1\frac{1}{2}$**

OR

- (b) Give reasons for :

(i) All copulations do not lead to pregnancy. **1**

(ii) Meiosis I in spermatogenesis and oogenesis are markedly different. **1**

21. (a) In some cases, measuring population density by counting individuals may not be feasible. Mention two other parameters that can be used and justify their use with suitable examples. 2

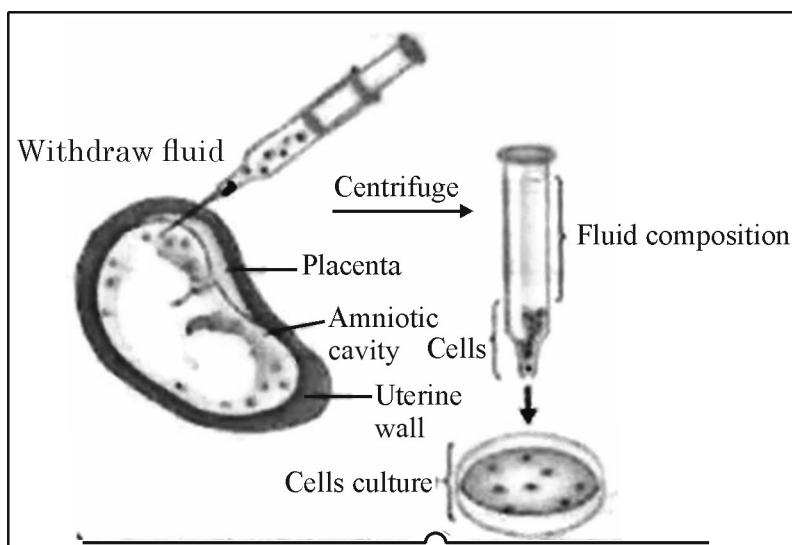
OR

- (b) What factors contribute to the Amazonian rain forests in South America being the most biodiverse regions on Earth ? 2

SECTION – C

22. (a) A person inhales dust and pathogens but does not always fall sick. Explain how the body protects against such infections. 1
- (b) Name and describe any two barriers involved in this protection. 2

23. Study the diagram given below :



- (a) Name and explain the procedure shown in the diagram. Mention one of its advantage and one disadvantage. 2
- (b) How is 'Saheli' different from other oral pills in terms of its composition and advantage ? 1

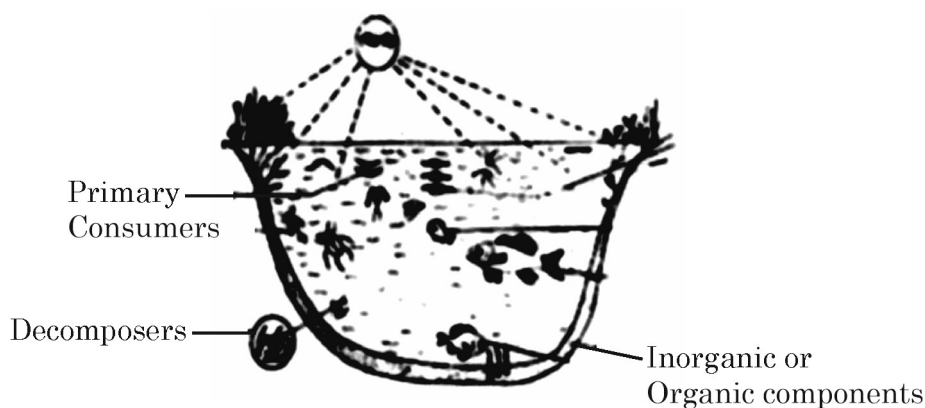


24. Chasmogamous flowers remain open and expose their reproductive parts.
Explain how this structural feature supports different types of pollination. 3
25. (a) What is a genetic code ? 1
(b) Why did scientists feel the need to propose a genetic code ? 1
(c) Genetic code is said to be 'Universal'. Why ? 1
26. There are limitations of traditional breeding techniques that led to promotion of micro-propagation ?
(a) Mention two advantages of micropropagation. 2
(b) Give two examples where it is commercially adopted. 1
27. (a) Give the scientific name of the organism used by Morgan to study sex-linked traits. 1
(b) Write any four reasons why this organism made it an ideal experimental model. 2
28. S.L. Miller conducted an experiment in 1953 to simulate the conditions of early earth in a laboratory setup.
Answer the following questions based on the experiment :
(a) What was the aim of his experiment ? 1
(b) Name the gases used and the source of energy. 2

SECTION – D

Question Nos. 29 and 30 are case-based questions. Each question has some sub-sections with internal choice in one sub-section.

29. Below is shown a pond that represents a self-sustaining natural ecosystem with both biotic and abiotic components interacting in a balanced food web.



Based on the diagram, answer the questions :

- (a) Mention two abiotic components of a pond ecosystem. 1
- (b) Differentiate between the roles of producers and decomposers in such an ecosystem. 2
- (c) Draw a simple food chain operating in such an ecosystem and label each trophic level. 1

OR

- (c) Why is transfer of energy not 100% efficient between trophic levels ? 1

30. Gene manipulation is a fast emerging science. It started with the development of recombinant DNA molecules. This technology which mostly involves cutting and pasting of desired DNA fragments is based on two most important discoveries in bacteria – presence of plasmid and restriction endonucleases. The science of r-DNA technology took birth when Cohen and Boyer (1973) were able to produce a piece of gene containing foreign DNA introduced into plasmid of E.coli.

- (a) Name one core technique of biotechnology that alters the genetic material. 1
- (b) What is a plasmid ? Mention its importance in biotechnology. 2



- (c) Which gene was isolated by Cohen and Boyer and from which bacteria ? 1

OR

- (c) How is the action of exonuclease different from that of endonuclease ? 1

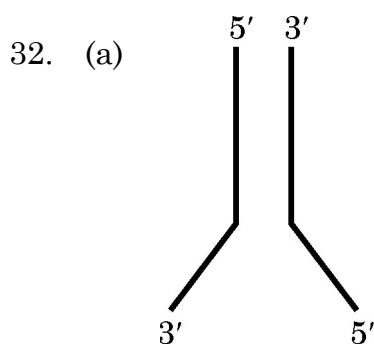
SECTION – E

31. (a) A 30 year old man was admitted to a hospital with recurrent infections, weight loss, prolonged fever. His blood report showed a decline in count of T-Lymphocytes thus affecting immune system.

- (i) Identify the disease and its causative agent. 2
(ii) How did the pathogen affect the immune system once it entered the body ? Explain. 2
(iii) Mention two major modes of its transmission. 1

OR

- (b) (i) Why are microbes considered effective biocontrol agents in sustainable agriculture ? 1
(ii) Explain the role of the following as biocontrol agents naming the pests or diseases they help to control :
(1) A Bacterium 1½
(2) A Fungus 1
(3) Virus 1½



- (i) Identify the structure shown above and name the process taking place. 1



- (ii) Write the source of energy for the process and list the enzymes involved. 1
- (iii) Mention the difference in the process based on polarity. What terms are used for such synthesis ? 2
- (iv) Redraw the structure after completion of the process and label the newly synthesised parts. 1

OR

- (b) (i) How would you find out whether a given tall garden pea plant is homozygous or heterozygous ? 1
- Substantiate your answer with the help of Punnet square. 3
- (ii) Given below are F_2 phenotypic ratios of two independently carried monohybrid crosses.
- (1) 1 : 2 : 1
- (2) 3 : 1
- Mention what does each ratio suggest. $\frac{1}{2} + \frac{1}{2}$

33. (a) (i) Explain the role of stigma in pollen pistil interaction. 1
- (ii) Describe the post pollination events leading to double fertilization in angiosperms starting with 2-celled pollen grain. 4

OR

- (b) (i) Explain menstrual phase in the menstrual cycle of human female. 1
- (ii) Why is follicular phase also called proliferative phase ? 1
- (iii) Explain the events that occur in Graafian follicle at the time of ovulation and thereafter. 2
- (iv) Draw a Graafian follicle and label – Antrum and secondary oocyte. 1