



Series : P1QSR

SET~2



प्रश्न-पत्र कोड
Q.P. Code **57/1/2**

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	{}	NOTE
(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।	(I)	Please check that this question paper contains 23 printed pages.
(II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।	(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.
(III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 33 प्रश्न हैं।	(III)	Please check that this question paper contains 33 questions.
(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथास्थान पर प्रश्न का क्रमांक अवश्य लिखें।	(IV)	Please write down the serial number of the question in the answer-book at the given place before attempting it.
(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।	(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.



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** – questions number **1** to **16** are multiple choice type questions. Each question carries **1** mark.
- (iv) Section **B** – questions number **17** to **21** are very short answer type questions. Each question carries **2** marks.
- (v) Section **C** – questions number **22** to **28** are short answer type questions. Each question carries **3** marks.
- (vi) Section **D** – questions number **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** – questions number **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 candidate has to write answer for 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 Nos. **1** to **16** are Multiple Choice Type Questions, carrying **1** mark each. Choose the best option.

1. Match Column-I with Column-II and choose the correct option : 1

Column-I		Column-II	
a.	Biolistic gun	i.	Bacterial cell
b.	Chitinase	ii.	Tumour inducing
c.	Ti	iii.	Animal cell
d.	Ca ⁺⁺	iv.	Fungal cell
		v.	Plant cell

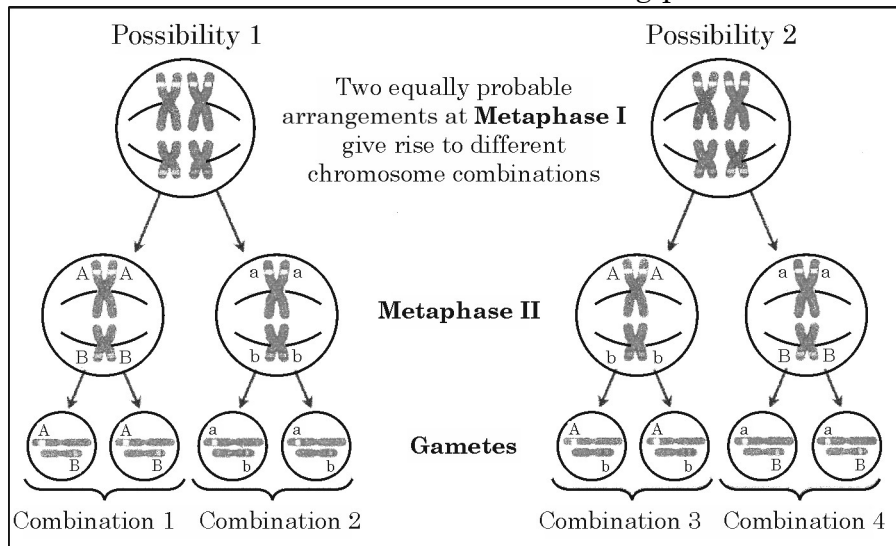
Options :

	a	b	c	d
(A)	i	ii	iii	iv
(B)	ii	v	i	iii
(C)	v	iv	ii	i
(D)	v	i	iv	ii



2. Microbes commonly used in kitchen are 1
(A) *Lactobacillus* and Yeast (B) *Penicillium* and Yeast
(C) *Microspora* and *E.coli* (D) *Rhizopus* and *Lactobacillus*
3. The features of some structures of human male reproductive system are given below. Choose the correct option that matches the features with the structures. 1
(i) It opens into the Vasa efferentia through rete testis.
(ii) It carries semen as well as urine.
(iii) It maintains temperature (2 – 2.5°C) lower than body temperature for sperm formation.
(iv) It leads to vas deferens that ascends to the abdomen.
- | | (i) | (ii) | (iii) | (iv) |
|-----|---------------------|--------------|---------|---------------------|
| (A) | Seminal vesicle | Urethra | Scrotum | Seminiferous tubule |
| (B) | Prostrate | Scrotum | Testes | Vas Deferens |
| (C) | Seminiferous tubule | Urethra | Scrotum | Epididymis |
| (D) | Seminiferous tubule | Vas Deferens | Urethra | Sertoli cells |
4. Exploration of molecular, genetic and species level diversity for gaining products of economic importance is called 1
(A) Exploitation (B) Bio-prospecting
(C) Bio-patenting (D) Bio-piracy
5. Which connective tissue connects ovary to pelvic wall and uterus ? 1
(A) Tendons (B) Ligaments
(C) Cartilage (D) Bone
6. Which of the following is not a component of detritus food chain ? 1
(A) Dead Leaves (B) Bacteria
(C) Fungi (D) Zooplankton

7. Identify the plant in which emasculation is not required for artificial hybridization. 1
 (A) Rice (B) Wheat
 (C) Pea (D) Papaya
8. Pomato was produced by fusing protoplasts of 1
 (A) Tomato and Potato (B) Pomegranate and Tomato
 (C) Pomegranate and Potato (D) Pomegranate, Potato and Tomato
9. Which of the following sacred groves is found in Meghalaya ? 1
 (A) Jaintia hills (B) Bastar
 (C) Chanda (D) Sarguja
10. Messelson and Stahl's experiment carried out centrifugation in $CsCl_2$ density gradient to separate : 1
 (A) DNA from RNA (B) DNA from protein
 (C) RNA from protein (D) Normal DNA from heavy DNA
11. Which one of the following is not a component required for Polymerase Chain Reaction (PCR) ? 1
 (A) Template DNA (B) Primers
 (C) DNA Ligase (D) DNA Polymerase
12. In the following figure, two ways of pairing of two homologous pairs of chromosomes are shown. Which of the following phenomena is expressed ? 1



- (A) Linkage of genes (B) Independent assortment of genes
 (C) Multiple alleles (D) Incomplete dominance



For Questions number **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 the codes (A), (B), (C) and (D) 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 the correct explanation for Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

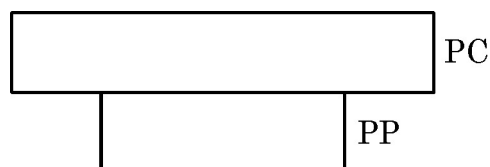
13. **Assertion (A)** : When we see stars, we are apparently peeping into the past.
Reason (R) : What we see today is an object whose emitted light started its journey millions of years back reaching our eyes now. 1
14. **Assertion (A)** : Flocs are masses of bacteria associated with fungal filaments in secondary treatment of sewage.
Reason (R) : Flocs help in digestion of solid waste by anaerobic respiration. 1
15. **Assertion (A)** : In terrestrial ecosystem much larger fraction of energy flows through grazing food chain.
Reason (R) : Grazing food chain may be connected to Detritus food chain at some levels. 1
16. **Assertion (A)** : The milk produced by transgenic cow 'Rosie' was nutritionally more balanced product for human babies than natural cow milk.
Reason (R) : It was human protein enriched milk containing human alpha lactaglobulin. 1

SECTION – B

17. (a) What is the role of LAB (Lactic Acid Bacteria) in preparation of curd ? 1
(b) Mention two health benefits of consuming curd. 1
18. (a) Name the muscular and glandular layers of female uterus. Mention one function of each. 2

OR

- (b) (i) Why are STI (Sexually Transmitted Infections) not detected in time ? (2 pts.) 1
(ii) Write two complications caused in later stages. 1
19. Write the importance of following in biotechnology :
(a) Ori (Origin of Replication) 1
(b) Enzyme Polymerase used in Polymerase Chain Reaction 1
20. (a) Given below is a pyramid found in an ecosystem, where each bar represents the standing crop available in the trophic level.



- (i) Identify the kind of pyramid and with the help of an example explain the conditions where this kind of pyramid is possible in nature. 1
(ii) Write any two limitations of ecological pyramids. 1

OR

- (b) In an ecosystem there was loss of biodiversity due to some project in that area.
(i) How will biodiversity be affected ? (2 points) 1
(ii) List two major causes of loss of biodiversity. 1



21. (a) Analyse the following two cases of sex determination in different organisms :

Case I : Males have (XO) sex chromosomes and females have two copies of same sex chromosome (XX).

Case II : Females have two different sex chromosomes (ZW) and males have two copies of same sex chromosome (ZZ).

Identify the type of heterogamety in each case, giving one example of each.

1 + 1

OR

- (b) (i) Differentiate between a DNA and RNA nucleotide. 1
(ii) Name the two types of bonds present within a single nucleotide. 1

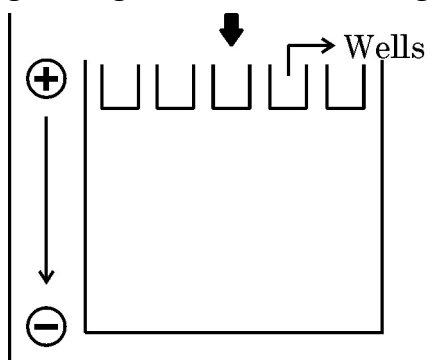
SECTION – C

22. A farmer grew two varieties of corn crop in field A and B. He grew normal corn crops in field A and GM corn crops in field B.

He observed that corn borers attacked only in field A. To control it, spores of Bt were sprayed on field A.

- (a) Name the gene in the spores responsible for control of pest. $\frac{1}{2}$
(b) What effect will the spores of Bt have on insect pest ? $1\frac{1}{2}$
(c) How has corn plants of field B developed resistance against this pest ? Explain. 1

23. Observe the given picture carefully. A mixture of DNA with fragments ranging from 100 base pairs to 1800 base pairs were separated by electrophoresis on agarose gel with the following arrangement :

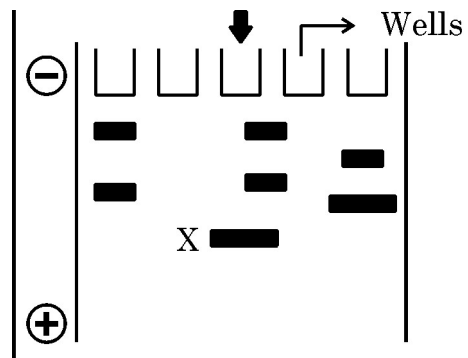


- (a) What result will be obtained in staining with ethidium bromide ? Explain with reasons.

1



- (b) The above setup was modified as shown below and a band with 100 base pairs was obtained at X.



What changes were made to the previous design to get a band at 'X'.
Why did the band appear at 'X' ?

2

24. (a) Mention the scientific name of the source plant and the part from which opioids are extracted. 1
- (b) How are morphine and heroin related ? Mention the effect each one of them has on human body. 2

25. Give the schematic representation of oogenesis in human female. Indicate chromosome number also. 3

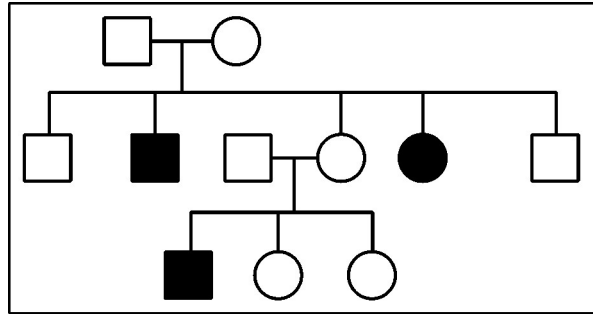
26. (a) Do all pollen grains remain viable for the same length of time ? Support your answer with two suitable examples. 2½
- (b) How are pollen grains stored in pollen banks ? ½

27. (a) What is pedigree analysis ? Mention its importance in human genetics. (2 pts.) 1 + 1
- (b) Analyse the following pedigree and write the
- (i) Pattern of inheritance. ½



- (ii) Give one example of disease showing such an inheritance pattern.

½



28. (a) How is Hardy-Weinberg expression $(p^2 + 2pq + q^2) = 1$ derived ?

2

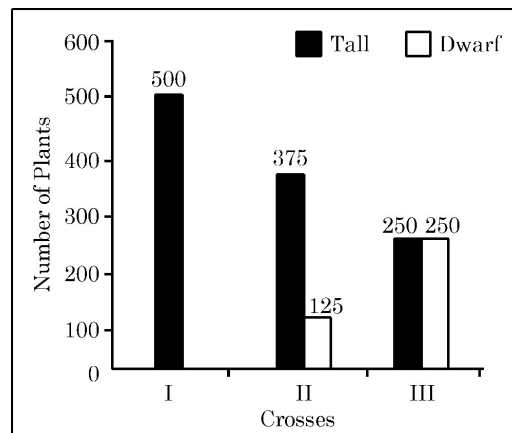
- (b) List any two factors that disturb the genetic equilibrium.

1

SECTION – D

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

29. A student performed some crosses in plants and represented the result in the form of bar graphs as shown below. Each graph displays the phenotypic proportion of the progeny. Study the graphs and answer the questions :



- (a) What can you infer about the genotype of parents in crosses I and II ?

1

OR

- (a) Which genetic cross is represented by these crosses ?
- (b) Looking at bar graph of cross III, identify the type of cross performed and its importance in genetics.
- (c) What conclusion can you draw from the results of bar graphs of crosses I and II ? Name the genetic principle illustrated.

1

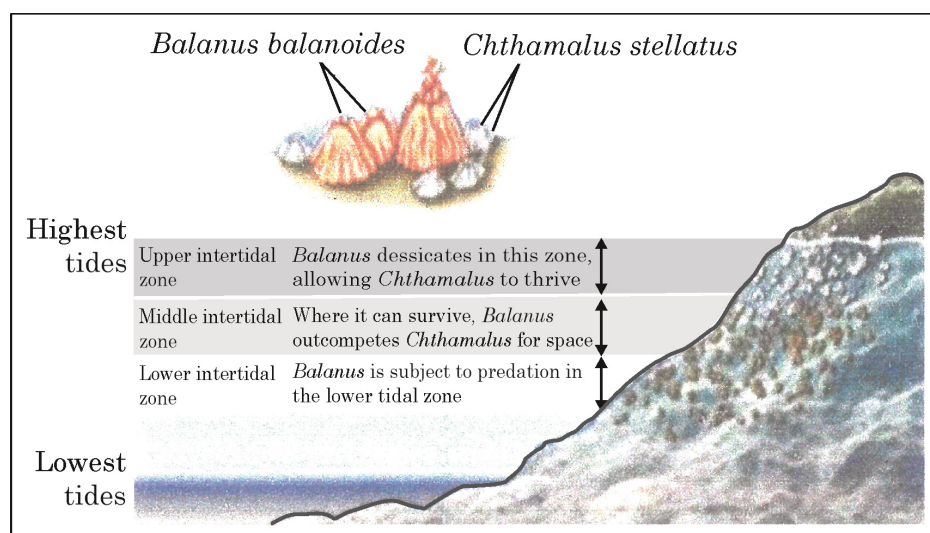
2

1

30. The diagram below shows the distribution of two barnacle species, *Chthamalus* and *Balanus* on a rocky sea shore.

When *Balanus* is experimentally removed, *Chthamalus* expands its range in lower intertidal zone.

- (a) Identify and define the ecological phenomenon demonstrated by this observation. 1



OR

- (a) State the principle that explains the elimination of one species. 1
- (b) Two different species can compete for the same resource. Give another example of it. 1
- (c) How do species avoid competition in nature ? Explain with an example. 2

SECTION – E

31. (a) In angiosperms, the female gametophyte develops from a single cell of megasporangium. 3
- (i) Name that cell of megasporangium and describe the sequential changes it undergoes to form a mature female gametophyte. 3
- (ii) Draw a well labelled diagram of mature female gametophyte. Label any four parts. 2

OR



- (b) Given below are certain situations related to birth control. Analyse each situation carefully and suggest appropriate contraceptive method that could be used. Also explain its mode of action.

Situation 1 – To prevent entry of sperm into cervix. 1

Situation 2 – Devices that are inserted by doctors or expert nurses in the vagina. 1

Situation 3 – Effective emergency contraceptive. 1

Situation 4 – Permanent method for male partner. 1

Situation 5 – Surgical method in female to prevent pregnancy. 1

32. (a) (i) Name the protozoan species that is responsible for causing the most serious and even fatal malarial disease. $\frac{1}{2}$
- (ii) Name the host in which the parasite completes its sexual stages and explain the changes taking place. 2
- (iii) How does the parasite damage the human body after entering the blood stream ? $1\frac{1}{2}$
- (iv) Suggest two effective preventive measures to control the spread of this disease in endemic regions. 1

OR

- (b) (i) What are bio-fertilizers ? 1
- (ii) Name the different types of microorganisms used as bio-fertilizers in organic farming and explain how each contributes to soil fertility. 3
- (iii) Write two advantages of using bio-fertilizers over chemical fertilizers. 1

33. (a) (i) Watson and Crick's discovery of double helical structure was based on which two findings. Also mention the name of the scientists associated with these findings. 2
- (ii) Write down the salient features of double helix structure of DNA (any three points). 3

OR



- (b) Given below is a stretch of DNA showing the coding strand of structural gene of transcription unit.

5' - ATG ACC GTA TTT TCT GTA GTG CCC GTA CTT CAG GCA TTA 3'

- (i) Write the corresponding template strand and m-RNA strand that will be transcribed along with its polarity. 2
- (ii) If GUA of transcribed mRNA is an intron, then depict the sequence involved in formation of mRNA / mature / processed hnRNA strand :
- (1) In a bacterium 1
- (2) In humans 1
- (iii) How many amino acids the resulting polypeptide will have after the process of translation in humans ? 1
-

