



Series SQR1P/1



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.

नोट

(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित (I) पृष्ठ 23 हैं ।

(II) कृपया जाँच कर लें कि इस प्रश्न-पत्र में (II) 33 प्रश्न हैं ।

(III) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए (III) प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।

(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से (IV) पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।

(V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का (V) समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।

NOTE

Please check that this question paper contains 23 printed pages.

Please check that this question paper contains 33 questions.

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.

Please write down the serial number of the question in the answer-book before attempting it.

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 students will read the question paper only and will not write any answer on the answer-book during this period.

जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

निर्धारित समय : 3 घण्टे

अधिकतम अंक : 70

Time allowed : 3 hours

Maximum Marks : 70



General Instructions :

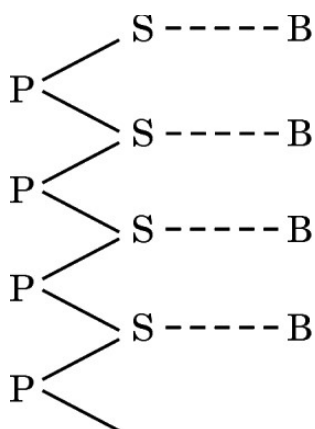
Read the following instructions carefully and follow them :

- (i) This question paper contains **33** questions. **All** questions are **compulsory**.
- (ii) Question paper is divided into **five** sections – Sections **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, an internal choice has been provided in Sections B, C and D of the question paper. 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

Questions no. **1** to **16** are Multiple Choice Type Questions, carrying **1** mark each. $16 \times 1 = 16$

1. The type of bond represented by the dotted line '— — — —' in a schematic polynucleotide chain is :



- | | |
|--------------------------|-------------------------|
| (A) Hydrogen bond | (B) Peptide bond |
| (C) N-glycosidic linkage | (D) Phosphodiester bond |



2. Select the option that has the correct sequence of events of human female reproductive cycle :

- (i) Secretion of FSH
- (ii) Ovulation
- (iii) Growth of corpus luteum
- (iv) Growth of follicle and oogenesis
- (v) Sudden increase in LH

Options :

- (A) i–iii–v–iv–ii
- (B) i–iv–v–ii–iii
- (C) iv–i–v–iii–ii
- (D) v–ii–iii–iv–i

3. *Lactobacillus* that sets milk into curd is categorised as :

- (A) Cyanobacteria
- (B) Archaeobacteria
- (C) Chemosynthetic bacteria
- (D) Heterotrophic bacteria

4. The specific Bt toxin genes which protect the cotton plants against the cotton bollworms are :

- (A) *Cry-I Ac* and *Cry-II Ab*
- (B) *Cry-I Ab* and *Cry-I Bc*
- (C) *Cry-II Ac* and *Cry-I Ac*
- (D) *Cry-II Ab* and *Cry-I Ab*

5. Listed below are some amino acids and their corresponding mRNA codons :

<i>Amino acid</i>	<i>mRNA codons</i>
Phenylalanine	UUU
Lysine	AAG
Arginine	CGA
Alanine	GCA

Select the DNA sequence that would code for the following polypeptide sequence :

Polypeptide : Alanine – Arginine – Lysine – Phenylalanine

- (A) CGT GCT TTC AAA
- (B) CGT GCT TTC TTT
- (C) CGU GCU UUC AAA
- (D) CGU GCU UUC TTT



6. In which of the following plants are both male and female flowers born on the same plant and the mode of pollination can be geitonogamy or xenogamy ?
- (A) Papaya (B) Date Palm
(C) Maize (D) Spinach
7. Which one of the following transgenic animals is being used to test the safety of the polio vaccine ?
- (A) Sheep (B) Goat
(C) Pig (D) Mice
8. In which of the following conditions/diseases is there a substantial increase in the activity of mast cells observed in the human body ?
- (A) Typhoid (B) Allergy
(C) Ascariasis (D) AIDS
9. The periodic abstinence by a couple for family planning should be from :
- (A) Day 5 to 10 of menstrual cycle
(B) Day 13 to 15 of menstrual cycle
(C) Day 10 to 17 of menstrual cycle
(D) Day 16 to 20 of menstrual cycle
10. Select the **incorrect** match from the following :
- | <i>Human Karyotype</i> | <i>Characters</i> |
|------------------------|--|
| (A) 45 + XX | – Broad palm with characteristic palm crease |
| (B) 44 + XXY | – Overall feminine development |
| (C) 44 + XO | – Sterile females as ovaries are rudimentary |
| (D) 44 + XY | – Normal male |
11. Using a DNA template, how many new DNA molecules would be generated after 10 cycles of amplification in PCR ?
- (A) 512 (B) 1024
(C) 2048 (D) 256



12. Read the four statements given below and select the option having two correct statements :
- (i) A lion eating a deer and a sparrow feeding on grains are ecologically similar in being consumers.
 - (ii) Predator starfish *Pisaster* helps in maintaining species diversity of some invertebrates.
 - (iii) Predators ultimately lead to extinction of prey species.
 - (iv) Production of chemicals nicotine and strychnine by plants are metabolic disorders.
- (A) (i) and (iii) (B) (ii) and (iv)
(C) (i) and (ii) (D) (iii) and (iv)

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) as given below.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the 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) : *Agrobacterium tumefaciens* is a pathogen of several monocot plants.
Reason (R) : It is able to deliver a piece of DNA known as 'T-DNA' to transform normal plant cells into a tumor.
14. Assertion (A) : The laws of our country permit legal adoption and it is as yet, one of the best methods for childless couples looking for parenthood.
Reason (R) : Emotional, religious and social factors are no deterrents to the legal adoption of orphaned and destitute children in India.
15. Assertion (A) : Linked genes do not show dihybrid F_2 ratio 9 : 3 : 3 : 1.
Reason (R) : Linked genes do not undergo independent assortment.



16. *Assertion (A)* : Functional ADA cDNA genes must be inserted in the lymphocytes at the early embryonic stage in gene therapy for ADA deficiency.

Reason (R) : Cells in the embryonic stage are immortal, differentiated and easy to manipulate.

SECTION B

17. Do you think apomixis can be compared to asexual reproduction ? Justify your answer. State the benefits of apomixis to the farmers. 2

18. (a) A farmer while working on his farm was bitten by a poisonous snake. He was rushed to a nearby health centre where the doctor gave him an injection to save his life.

(i) What did the doctor inject and why ?

$1\frac{1}{2}$

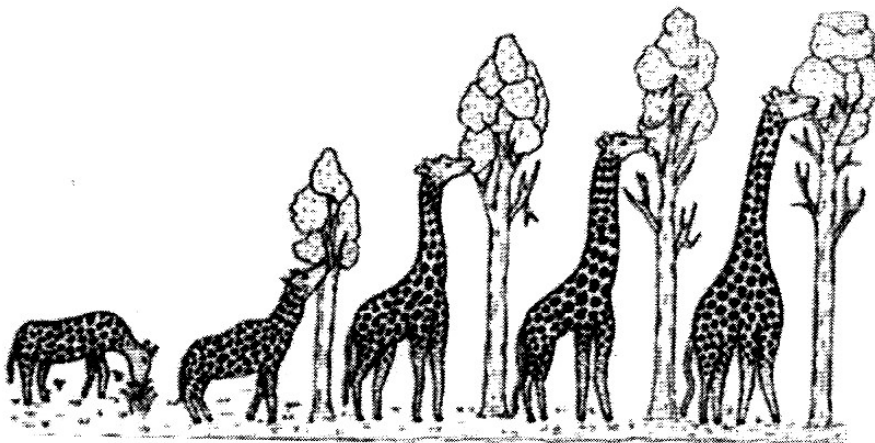
(ii) Name the kind of immunity provided by this injection.

$\frac{1}{2}$

OR

- (b) Why do organic farmers not recommend complete eradication of insect pests ? Explain giving reason. 2

19. Observe the picture given below. Name the naturalist and write the explanation given by him that evolution of life forms had occurred on the basis of this example. 2



20. Write the basic steps followed in the Assisted Reproductive Technologies (ART) programme to help childless couples. Why is it also known as test tube baby programme ? 2



21. A specific plant species was introduced into Australia in 1920 and later it became invasive spreading over millions of hectares of rangeland.
- (a) Name the plant that was introduced into Australia and mention the reason for its uncontrollable growth. 1
- (b) State how its spread was eventually brought under control. 1

SECTION C

22. (a) (i) What are transgenic animals ? 1
- (ii) Name the first transgenic cow and state its importance. 2

OR

- (b) (i) Explain the convention for naming EcoRI. 2
- (ii) With the help of an illustration only, show the action of EcoRI on a DNA Polynucleotide. 1
23. Identify A, B, C, D, E and F in the table given below : 3

<i>Name of Human Disease</i>	<i>Causative Organism</i>	<i>Symptoms</i>
Pneumonia	<i>Streptococcus</i>	'A'
Typhoid	'B'	High fever, weakness, headache, stomach pain
Common cold	Rhino virus	'C'
Ringworm	'D'	Dry scaly lesions on body parts, redness, itching
Ascariasis	<i>Ascaris</i>	'E'
'F'	<i>Entamoeba histolytica</i>	Constipation, cramps, stools with mucous and blood clots

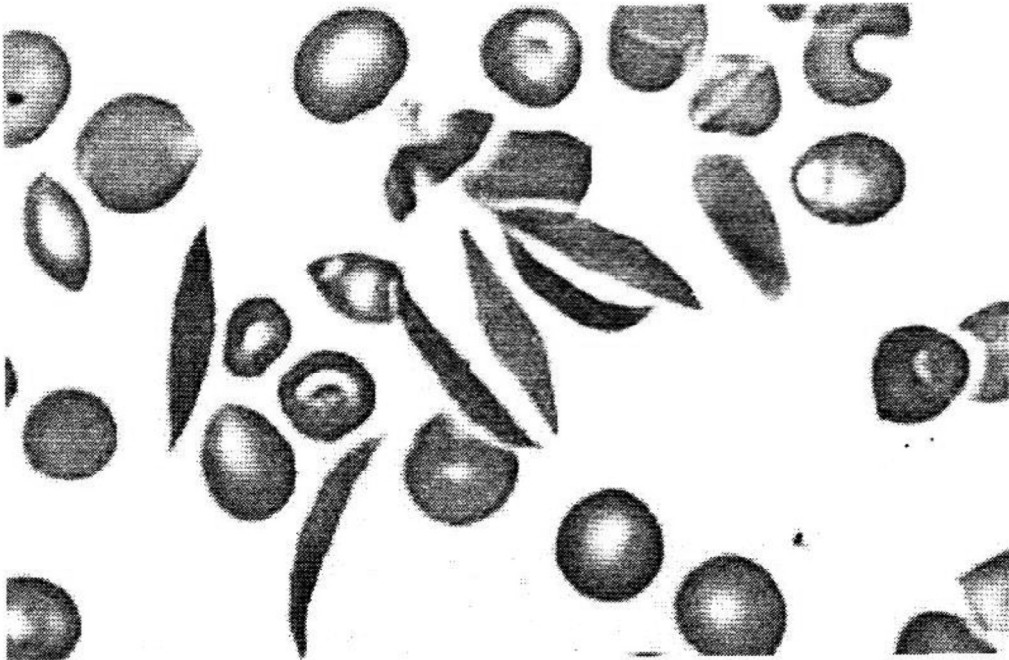


24. Explain the mode of action of contraceptive pills taken by human females. Mention the schedule to be followed for effective outcome. 3

25. (a) Name and write two characteristics of the type of DNA that forms the basis of DNA fingerprinting technique. 1+1

(b) Mention any two applications of this technique. $\frac{1}{2} + \frac{1}{2}$

26. Given below is a picture that shows the magnified blood smear of a patient under a microscope.



(a) Name the disease the blood smear is indicative of. Write the symptoms of the disease and its cause. 1

(b) Explain the inheritance pattern of the disease with the help of a suitable cross. 2

27. (a) Explain the significance of the experiment carried out by S.L. Miller. Name the scientists whose hypothesis prompted him to carry out this experiment. $2\frac{1}{2}$

(b) How does meteorite analysis favour this hypothesis? $\frac{1}{2}$

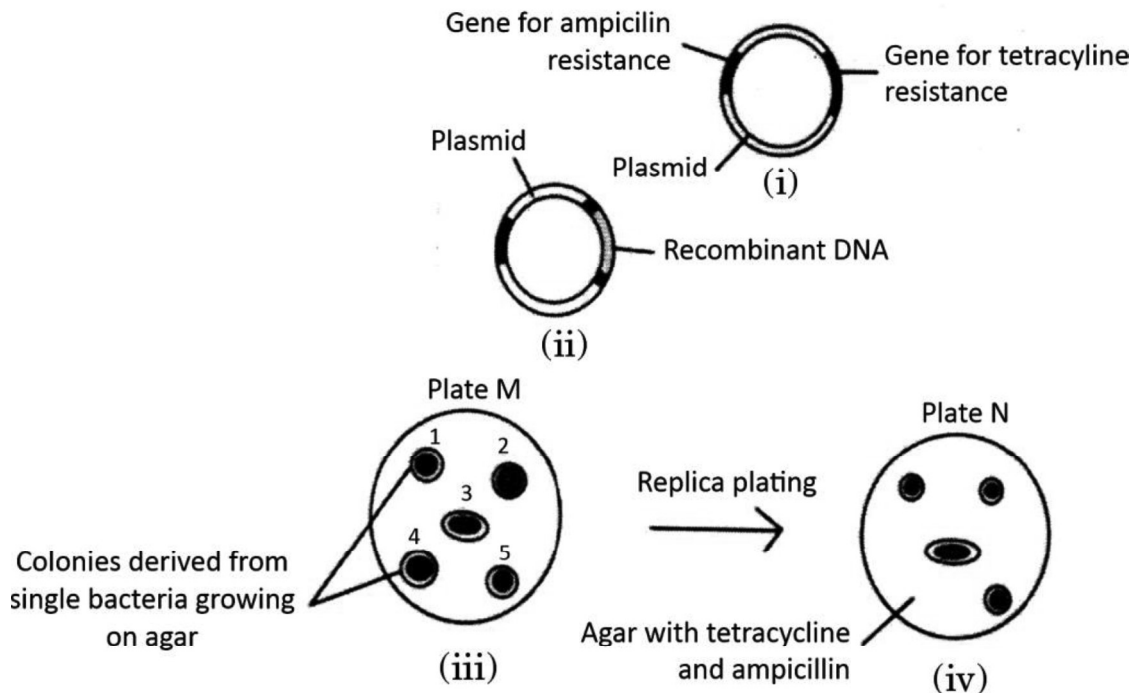


28. (a) State what is primary productivity and mention its units. $1\frac{1}{2}$
- (b) Some ecologists observed that primary productivity of a place in Rajasthan was low as compared to a particular place in Kerala. Explain why. $1\frac{1}{2}$

SECTION D

Questions No. 29 and 30 are case-based questions. Each question has 3 sub-questions with internal choice in one sub-question.

29. Study the diagram given below that shows the steps involved in the procedure of selecting transformed bacteria and answer the questions that follow :



- (a) Identify the colony that has got transformed. Justify your answer. $\frac{1}{2} + \frac{1}{2}$
- (b) What are the sites in a plasmid called where ampicillin and tetracycline resistance genes are inserted ? State their role in genetic engineering. 2
- (c) Name two enzymes playing an important role in genetic engineering. 1

OR

- (c) State the role of β -galactosidase in insertional inactivation. 1

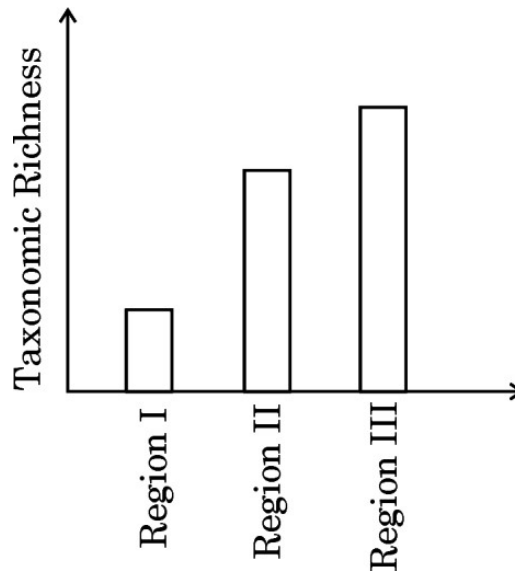


30. Read the following passage and answer the questions that follow.

4

Isn't it incredible that India's land area is only 2.4 per cent of the world's total land area whereas its share of the global species diversity is an impressive 8.1 per cent ! However, in these estimates of species, prokaryotes do not figure anywhere.

Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph given below :



- (a) Why is the species richness maximum in Region III in the bar graph ?

1

OR

- (a) Why is the species richness minimum in Region I in the bar graph ?
- (b) Plants and animals do not have uniform diversity in the world but show rather uneven distribution. Mention what this kind of diversity is referred to as.
- (c) Why is it that prokaryotes do not have an estimated number of their species diversity as seen in plants and animals ? Explain.

1

1

2



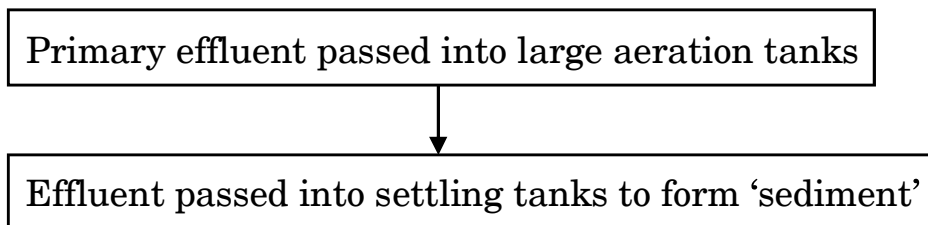
SECTION E

31. (a) (i) Name and explain the property present in normal cells but is lost in cancer cells. 1 $\frac{1}{2}$
- (ii) All normal human cells have genes that may become cancerous under certain conditions. Name them and explain how. 1
- (iii) State the role of the following techniques in detection and diagnosis of cancer :
- (1) Biopsy and Histopathology 1
- (2) Magnetic Resonance Imaging 1 $\frac{1}{2}$

OR

- (b) Large quantities of sewage are generated every day in cities as well as in towns and are treated in Sewage Treatment Plants (STPs) to make them less polluting. Given below is the flow diagram of stages of STP.

Study the flow diagram and answer the questions that follow :



- (i) (1) Why is primary effluent passed into large aeration tanks ? 1
- (2) What is the 'sediment' formed, referred to as ? Mention its significance. 1
- (3) Explain the final step in the settling tank before the treated effluent is released into water bodies. 1
- (ii) Name any two organisms commonly used as biofertilisers, belonging to different kingdoms. Write how each one acts as a biofertiliser. 2



- 32.** (a) Many patterns of inheritance deviate considerably from the pattern of inheritance as explained by Mendel. List any four such inheritance patterns and explain any three with the help of an example each. 2+3

OR

- (b) (i) Construct a transcription unit with a coding strand given below with proper labelling : 2
- | | | | | | | | | | | | |
|-------|---|---|---|---|---|---|---|---|---|---|---|
| A | T | G | C | T | G | A | T | G | C | G | A |
| | | | | | | | | | | | |
| <hr/> | | | | | | | | | | | |
- (ii) When does a coding strand become a template strand ? 1
- (iii) Why does a double-helix DNA molecule transcribe into a single-stranded RNA molecule ? 2

- 33.** (a) (i) Explain the development of male gametophyte in an angiosperm. $2\frac{1}{2}$
- (ii) Draw a labelled diagram of a three-celled male gametophyte. $2\frac{1}{2}$

OR

- (b) (i) Draw a diagrammatic sectional view of ovary of human female and label the following : 2
- (1) Blood vessels

(2) Primary follicle

(3) Tertiary follicle

(4) Ovum
- (ii) At which stage of life are primary follicles formed in a human female ? $\frac{1}{2}$
- (iii) Explain the events (both hormonal and structural) that occur at the time of ovulation till the onset of the next menstrual cycle. $2\frac{1}{2}$