



Series PP4QQ/4



SET-3

प्रश्न-पत्र कोड
Q.P. Code 57/4/3

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 पृष्ठ 23 हैं।
- (II) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 33 प्रश्न हैं।
- (III) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
- (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।

NOTE

- (I) Please check that this question paper contains 23 printed pages.
- (II) Please check that this question paper contains 33 questions.
- (III) 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.
- (IV) Please write down the serial number of the question in the answer-book before attempting it.
- (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.

जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70

57/4/3/21

228 C

1



P.T.O.



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 number **1** to **16** are multiple choice type questions. Each question carries **1** mark.*
- (iv) *Section **B** – question number **17** to **21** are very short answer type questions. Each question carries **2** marks.*
- (v) *Section **C** – question number **22** to **28** are short answer type questions. Each question carries **3** marks.*
- (vi) *Section **D** – question 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** – question 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 section **B, C** and **D** of 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.*





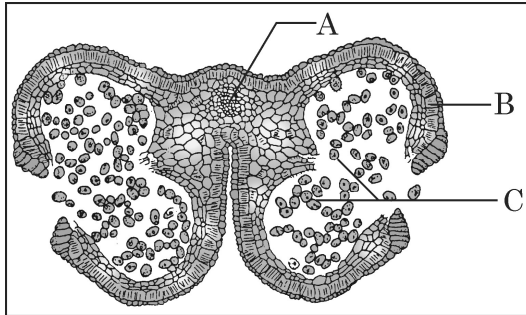
SECTION – A

16 × 1 = 16

Question Nos. 1 to 16 are Multiple Choice type Questions, carrying 1 mark each.

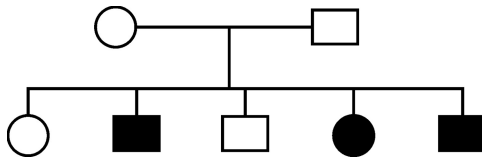
1. In a fertilized ovule of an angiosperm, the cells in which n , $2n$ and $3n$ conditions respectively occur are : 1
(A) antipodal, zygote and endosperm
(B) zygote, nucellus and endosperm
(C) endosperm, nucellus and zygote
(D) antipodals, synergids and integuments

2. Study the following diagram of Transverse Section of a young anther of an angiosperm : 1



Select the option where parts 'A', 'B' and 'C' are correctly identified.

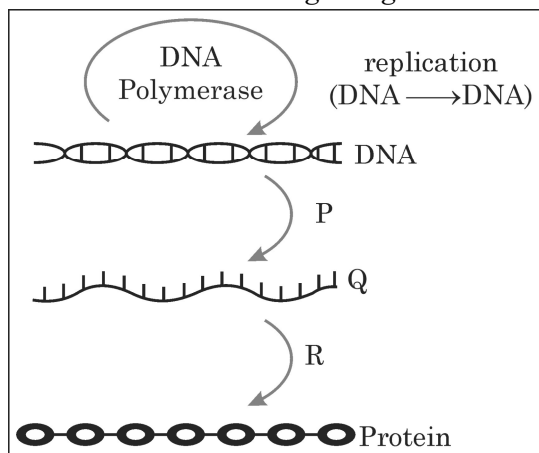
- (A) A – Connective, B – Endothecium, C – Pollen grain.
 - (B) A – Endothecium, B – Connective, C – Pollen grain.
 - (C) A – Pollen grain, B – Connective, C – Endothecium.
 - (D) A – Endothecium, B – Pollen grain, C – Connective.
-
3. Identify the category of genetic disorder depicted in the pedigree chart given below : 1



- (A) X-Linked recessive
- (B) X-Linked dominant
- (C) Autosomal recessive
- (D) Autosomal dominant



4. Which of the options has correct identification of 'P', 'Q' and 'R' in the illustration of 'Central Dogma' given below ? 1



- (A) P – Replication, Q – rRNA, R – Transcription
(B) P – Translation, Q – mRNA, R – Transcription
(C) P – Replication, Q – mRNA, R – Translation
(D) P – Transcription, Q – mRNA, R – Translation
5. Hugo de Vries proposed the mutation theory of organic evolution after his experiments on 1
- (A) Garden pea (B) Evening primrose
(C) Fruit fly (D) Four O' clock plant
6. A list of organisms is given in column 'R', whereas in column 'S' a list of products produced by them :

Column 'R' (Organisms)	Column 'S' (Products)
(A) <i>Lactobacillus</i>	(i) Cheese
(B) <i>Saccharomyces cerevisiae</i>	(ii) Curd
(C) <i>Aspergillus niger</i>	(iii) Citric acid
(D) <i>Acetobacter aceti</i>	(iv) Bread
	(v) Acetic acid

Select the option where the organisms are correctly matched with the product. 1

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



7. Study the table given below :

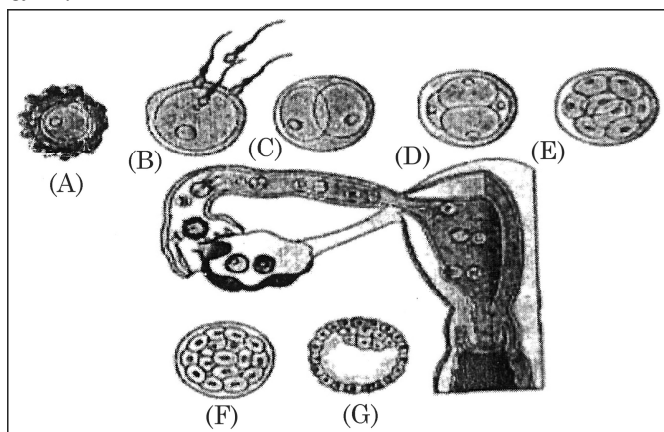
1

Contraceptive / Contraceptive Method	Mode of Action
A. The pill	I. Prevent sperm reaching cervix
B. Condom	II. Prevent implantation
C. Vasectomy	III. Inhibits ovulation
D. Copper-T	IV. Semen contains no sperm

Select the option where contraceptive/contraceptive method are correctly matched with their mode of action.

- (A) A – III, B – II, C – I, D – IV (B) A – II, B – III, C – I, D – IV
(C) A – III, B – I, C – IV, D – II (D) A – IV, B – III, C – II, D – I
8. Select the option that gives the correct identification of ovum, morula and blastocyst in a human female reproduction system as shown in the following diagram :

1



- (A) Ovum – B, Morula – D, Blastocyst – F
(B) Ovum – A, Morula – B, Blastocyst – G
(C) Ovum – A, Morula – E, Blastocyst – G
(D) Ovum – B, Morula – D, Blastocyst – G
9. The commonly used vector for human genome sequencing was/were : 1
(A) Retrovirus
(B) T-DNA
(C) BAC and YAC
(D) Plasmid Vector
10. Turner's syndrome in humans occurs due to 1
(A) Aneuploidy (B) Euploidy
(C) Polyploidy (D) Autosomal abnormality



11. ELISA technique is based on the principle of 1
(A) DNA replication
(B) antigen-antibody interaction
(C) pathogen – antigen interaction
(D) antigen – protein interaction
12. The ‘molecular scissors’ fall in the category of : 1
(A) Cleaving enzyme (B) Endonuclease
(C) Exonuclease (D) Restriction enzymes

Question Nos. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

- (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
(B) Both (A) and (R) are true and (R) is not the correct explanation of (A).
(C) (A) is true, but (R) is false.
(D) (A) is false, but (R) is true.
13. **Assertion (A) :** Plasmids are autonomously replicating circular extra-chromosomal DNA. 1
Reason (R) : Plasmids are usually present in Eukaryotic cells.
14. **Assertion (A) :** A given fig species can be pollinated only by its partner’ wasp. 1
Reason (R) : The wasp pollinates the fig inflorescence while searching for suitable egg laying sites.
15. **Assertion (A) :** Some aquatic ecosystems have inverted biomass pyramids. 1
Reason (R) : More energy is required by the organisms occupying higher trophic levels.
16. **Assertion (A) :** Patents are granted by government to an inventor. 1
Reason (R) : Patents prevents others from commercial use of an invention.

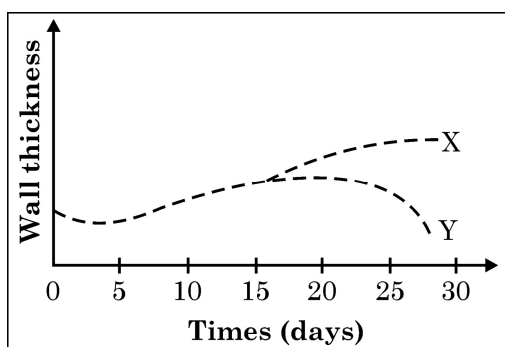


SECTION – B

17. (a) Name the first developed transgenic cow.
(b) Explain the improvement in the quality of the milk produced by it.

2 × 1 = 2

18. Study the graph given below that represents the changes in the thickening of the uterine wall in women 'X' and women 'Y' over a period of one month :



What does the graph with respect to woman 'X' and woman 'Y' indicate ? Give suitable reason.

2

19. (a) Mention any two ways by which HIV and Hepatitis-B can be transmitted to a healthy person.

- (b) Why is an early detection of these diseases essential ?

2 × 1 = 2

20. (a) Biodiversity hotspots cover less than 2% of Earth's land area. Strict protection of these areas can reduce the rate of ongoing extinctions. Explain.

- (b) Name any two hotspots in India.

2

21. (a) Differentiate between grazing food chain and detritus food chain.

2

OR

- (b) Explain Brood parasitism with the help of a suitable example.

2



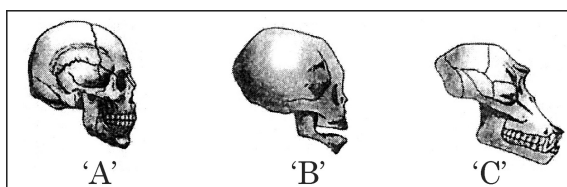
SECTION – C

22. Draw a schematic diagram of the *E.coli* vector pBR 322 and mark the following in it :
- (a) ori
 - (b) rop
 - (c) ampicillin resistant gene
 - (d) tetracycline-resistant gene
 - (e) restriction site Bam HI
 - (f) restriction site EcoRI
- 3**

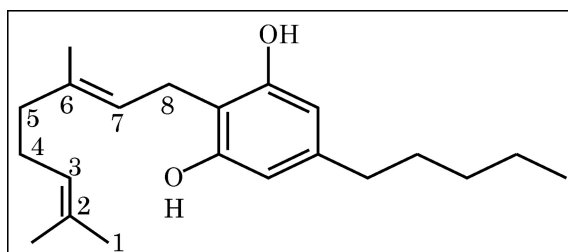
23. How has the use of *Agrobacterium* as vector helped in controlling *Meloidogyne incognita* infestation in tobacco plants ? Explain in correct sequence.
- 3**

24. Explain the role of the following during the sewage treatment :
- (a) flocs
 - (b) anaerobic sludge digester
- 3**

25. (a) Whose skulls 'A', 'B', and 'C' are shown below ? Which of the two are more similar to each other ?
- 2**



- (b) Name the (i) ape like (ii) man like primates that existed 1.5 million years ago.
- 1**
26. (a) (i) Name the group of drugs whose skeletal molecule is shown below :





- (ii) How are such drugs consumed ?
(iii) Name the human body organ affected by the consumption of these drugs. **3 × 1 = 3**

OR

- (b) Draw a schematic diagram of an antibody molecule and label any 4 parts. Mention their chemical nature. Name the cells which produce them. **3**
27. A pea plant with purple flowers, when crossed with a plant with white, produced 50 plants with only purple flowers. On selfing these plants produced 482 plants with purple flower and 162 with white flowers. Explain the pattern of inheritance with the help of Punnet square. **3**
28. Draw a well labelled diagram of sectional view of male gametophyte/microspore of an angiosperm and write the functions of any two parts labelled. (Any four labels). **3**

SECTION – D (Case Based Questions)

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

29. Generally, in eukaryotic cells the average length of a transcription unit along a DNA molecule is about 8,000 nucleotides, so the RNA product of the transcription is also that long. But it only takes about 1200 nucleotides from the above RNA product to translate average sized polypeptide of 400 Amino acids.
- (a) Name this RNA product transcribed from the DNA that subsequently translates into a polypeptide of 400 amino acids. Mention the enzyme responsible for transcribing this type of RNA from the DNA. **1**
- (b) Name and explain the process the RNA molecule transcribed from 8000 nucleotide long DNA undergoes to be able to translate a polypeptide of 400 amino acids. **2**



- (c) Write the number of RNA polymerases involved in the transcription of DNA in a prokaryote and eukaryotes. 1

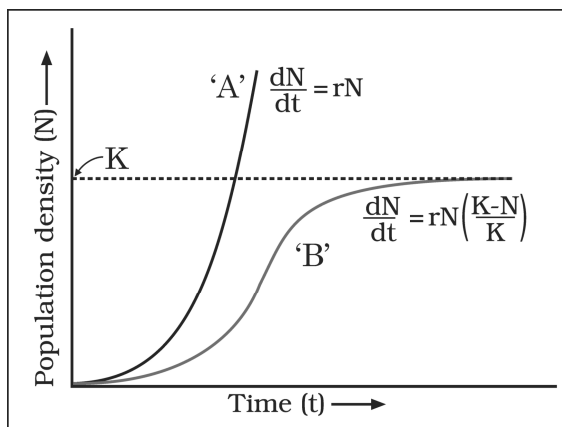
OR

- (c) Mention the difference in the site of transcription in a prokaryote and eukaryote cell. 1

30. Read the following passage :

Populations evolve to maximise their reproductive fitness in the habitat in which they live. Ecologists suggest, the life history of organisms have evolved in relations to the constraints imposed by the biotic and abiotic components of the habitat in which they live. This gets reflected in the population growth pattern of all organisms including humans.

Study the population growth curves shown in the given graph and answer the questions that follow :



- (a) Identify the growth curves 'A' and 'B'. 1
- (b) Mention what does the dotted line in the graph indicate and state its importance also. 1

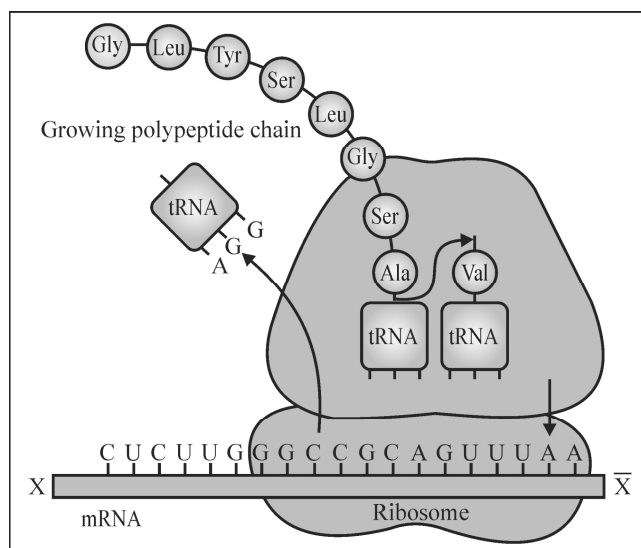
OR

- (b) Growth curve 'B' shows a different pattern from that of growth curve 'A'. Justify giving one reason. 1
- (c) (i) Which one of the two curves is more "realistic" and why ?
- (ii) Which one of the two curves is relevant in present days with respect to human population in our country and why ? 1 + 1



SECTION – E

31. (a) Study the schematic diagram given below and answer the questions that follow :



- (i) Identify the polarity from 'X' to ' $\bar{X}$ ' in the mRNA segment shown. Mention how many more amino acids can be added to the polypeptide that is being translated and why. 1½
- (ii) Write the initiating codon for translation, its anticodon and the amino acid it codes for. 1½
- (iii) Explain the charging of an adaptor molecule. Why this molecule needs to be charged ? 2

OR

- (b) (i) Why is sickle-cell anaemia, a human blood disorder so named ? 1
- (ii) Explain the genetic basis that results in the expression of this disorder. 2
- (iii) Work out a cross to explain how normal parents may have a sickle-cell anaemic child. 2



32. (a) Describe the life cycle of HIV from the time of its entry into the human body till full blown AIDS sets in. **5**

OR

- (b) (i) Write the symptoms of malaria in human and explain what causes these symptoms. **2½**
- (ii) Describe the different steps in the sexual mode of reproduction in the life cycle of a malarial parasite from the time of its initiation till where it is completed and ready to start a fresh cycle. **2½**
33. (a) (i) State the objective of adopting artificial hybridisation programme in plants.
- (ii) Describe the steps followed in this technique. **5**

OR

- (b) (i) Describe the development of placenta during pregnancy in a human female. **2**
- (ii) Explain its role. **3**
-

