



Series 3HKP35/C



SET~4

Code No. 57(B)

Roll No.

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

NOTE :

- (i) Please check that this question paper contains **12** printed pages.
- (ii) Code number 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) Please check that this question paper contains **33** questions.
- (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 students will read the question paper only and will not write any answer on the answer-book during this period.

BIOLOGY (Theory)



(FOR VISUALLY IMPAIRED CANDIDATES ONLY)

Time allowed : 3 hours



Maximum Marks : 70

57(B)

Page 1

P T O



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) Question paper comprises **four** sections — **A, B, C and D.***
- (ii) There are **33** questions in the question paper. **All** questions are compulsory.*
- (iii) **Section A** – Questions no. **1 to 14** carry **1** mark each. Questions no. **15 and 16** are case based questions, carrying **4** marks each.*
- (iv) **Section B** – Questions no. **17 to 25** carry **2** marks each.*
- (v) **Section C** – Questions no. **26 to 30** carry **3** marks each.*
- (vi) **Section D** – Questions no. **31 to 33** carry **5** marks each.*
- (vii) Answers should be brief and to the point.*
- (viii) There is no overall choice in the question paper. However, an internal choice has been provided in some questions. Only one of the choices in such questions have to be attempted.*
- (ix) The diagrams drawn should be neat, proportionate and properly labelled wherever necessary.*
- (x) In addition to this, separate instructions are given with each section and question, wherever necessary.*

SECTION A

- 1.** How is sporopollenin in the exine beneficial to the pollen grain ? 1
- 2.** Mention the two favourable conditions that break dormancy of seeds. 1
- 3.** How many mitotic divisions occur in the formation of the embryo sac in flowering plants ? State the characteristic feature of these mitotic divisions. 1
- 4.** Write the technical term and the type of pollination when pollen grains are transferred from the anther to the stigma of another flower of the same plant. 1



5. Why did Mendel use true-breeding pea lines in his artificial/cross pollination experiments? 1
6. Name the disorder in a human having XO type of sex chromosomes. 1
7. Name the bond that links the nitrogenous base and pentose sugar in a nucleoside. 1
8. Mention the significance of elution in gel electrophoresis. 1
9. Write the scientific name of the source organism for 'cry' genes. 1
10. Write one difference between eurythermal and stenothermal organisms. 1

For questions number 11 to 14, 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) Both Assertion (A) and Reason (R) are false.



11. (a) *Assertion (A)* : In Griffith's experiment, R-strain bacteria had somehow been transformed by the heat-killed S-strain bacteria.

Reason (R) : Some non-transforming principle from heat-killed S-strain enabled R-strain to become virulent. 1

OR

(b) *Assertion (A)* : The possibility of a female becoming a haemophilic is extremely rare.

Reason (R) : Mother of such a female is unviable in the later stage of life. 1

12. *Assertion (A)* : Transgenic mice are used in testing the safety of vaccines before they are used on humans.

Reason (R) : If successful and found to be reliable, mice could replace monkeys. 1

13. *Assertion (A)* : Organisms living in oceans, lakes and rivers do also face water-related problems, very much like those living on land.

Reason (R) : The quality (chemical composition, pH) and salinity is important for aquatic organisms. 1

14. *Assertion (A)* : Adaptation of the organism is always morphological changes only that enable it to survive and reproduce in its habitat.

Reason (R) : Because only morphological changes are inherited. 1



Questions no. 15 and 16 contains **five** sub-parts each. You are expected to answer any **four** sub-parts in each of these questions.

15. Read the following passage and answer any **four** questions from 15(i) to 15(v) given below : $4 \times 1 = 4$

The predator-prey relationship is the interaction between two species and their consequent effect on each other. In this relationship, the predator species feeds on the other species called the prey species. Prey may be a plant or an animal and therefore the predator is either a herbivore or a carnivore respectively. Some examples of predator and prey are lion and zebra, bear and fish, fox and rabbit, bear and berry, rabbit and lettuce, grasshopper and leaf. Predator and prey share the same environment and therefore tend to evolve together. To ensure that they get to eat and survive, the predators have evolved various means like speed, stealth, camouflage, a good sense of smell, sight or hearing, immunity to the prey's poison and produce poison (to kill the prey). In turn prey too have evolved with adaptations that ensure their safety and protection. Some of these adaptive features are speed, camouflage, a good sense of smell, sight or hearing, thorns, poison (to spray when approached or bitten), etc. An example of camouflage : in the snowy environment, the polar bear is white to avoid being noticed. Another example is the Galapagos tortoise which feeds on the branches of cactus plant that also grow in the Galapagos islands. On one of the islands, where long-necked tortoises live, the branches are higher off the ground. On the other hand, where short-necked tortoises live, the branches are lower down. The cacti which are the prey may have evolved high branches so that the tortoises, the predators, cannot reach them.



- (i) Which one of the following does **not** have a predator-prey relationship ?
- (A) Lion and zebra
 - (B) Bear and fish
 - (C) Fox and rabbit
 - (D) Cow and deer
- (ii) Biological control methods are adopted from which of the following population interactions ?
- (A) Mutualism
 - (B) Competition
 - (C) Predation
 - (D) Commensalism
- (iii) Which one of the following adaptations have the predator and prey **not** evolved with for their survival ?
- (A) Speed
 - (B) Camouflage
 - (C) A good sense of smell, sight or hearing
 - (D) Change their choice of food
- (iv) Which one of the following exhibits the correct predator-prey relationship ?
- (A) Bear and lettuce
 - (B) Rabbit and leaf
 - (C) Grasshopper and berry
 - (D) Galapagos tortoise and cactus



(v) Assertion (A) : Predator and prey do not evolve together.

Reason (R) : As they share the same environment, they tend to face extinction.

(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) Both Assertion (A) and Reason (R) are false.

16. Read the following passage and answer any **four** questions from 16(i) to 16(v) given below : $4 \times 1 = 4$

Down's Syndrome was first identified and described by John Langdon Down. It is a chromosomal disorder, caused due to failure of segregation of chromatids during cell division resulting in gain of an extra copy of chromosome 21 in an ovum or a sperm. When such an ovum (or a sperm) is fertilised with a respective normal gamete, the zygote produced will have three copies of chromosome 21 instead of two. This is called trisomy of 21st chromosome. The resulting zygote will have 47 chromosomes instead of 46 and will develop into a person with Down's Syndrome.

Statistical data shows that the incidence of Down's Syndrome is seen in 600 to 1000 live births in all races and economic groups. The physical features and medical problems associated with Down's Syndrome can vary widely from child-to-child. Most people with Down's Syndrome have IQs that fall in the mild to moderate range of mental retardation. They may have delayed language development and slow motor development. Some common physical signs of Down's Syndrome are flat face with an upward slant of the eye, short neck and abnormally shaped ears, small hands and feet, deep crease in the palm of the hand; poor muscle tone, loose ligaments and white spots on the iris of the eye.



- (i) Down's Syndrome is a congenital anomaly associated with :
- (A) X-chromosome
 - (B) autosomal chromosome
 - (C) cytoplasm
 - (D) Y-chromosome
- (ii) Down's Syndrome is named after :
- (A) Schleiden and Schwann
 - (B) Gregor Mendel
 - (C) John Langdon
 - (D) Sutton and Boveri
- (iii) The number of chromosomes in each cell of a person with Down's Syndrome is :
- (A) 45
 - (B) 46
 - (C) 44
 - (D) 47
- (iv) Affected Down's Syndrome persons have :
- (A) dark spots on the iris of the eye.
 - (B) early language development.
 - (C) low muscle tone.
 - (D) normal IQs.



(v) Assertion (A): Trisomy of chromosome 21 results in Down's Syndrome.

Reason (R): Trisomy of chromosome 21 occurs when a zygote is formed as a result of fusion of three cells, each with one copy of chromosome 21.

- (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) Both Assertion (A) and Reason (R) are false.

SECTION B

17. Name any two copper-releasing IUDs and their functions. 2
18. (i) Name the pattern of inheritance in snapdragon with respect to flower colour.
- (ii) Write the genotype of snapdragon plants bearing pink flowers and red flowers. 2
19. Write the full form of LAB. How is it beneficial to us ? 2
20. (a) What is a plasmid ? State its importance in biotechnology. 2

OR

- (b) Explain the role of selectable markers in pBR322. 2
21. How does 'EcoRI' act on the DNA segment ? Explain. 2



22. (a) How is the insulin produced by 'r-DNA' technology different from proinsulin produced in our body ? 2

OR

- (b) Expand ELISA. State the principle on which ELISA test is based. 2
23. How does addiction to drugs occur ? What happens when drugs are abruptly discontinued ? 2
24. "Tropics account for greater biological diversity than temperate regions." Give two reasons in support of this statement. 2
25. Write the scientific name of the source plant marijuana is obtained from. How does its intake affect the human body ? 2

SECTION C

26. Name the male accessory glands in the human body and mention the role played by them. 3
27. Write the scientific name of the organism T.H. Morgan used for his experiments. How did he explain linkage and recombination of genes ? 3
28. "Microbes are used for production of enzymes." Mention any three such enzymes and their functions. 3
29. Describe PCR technique and mention its role in biotechnology experiments. 3



- 30.** (a) Describe Gause's 'Competitive Exclusion Principle'. Site an example supporting the principle. 3

OR

- (b) Differentiate between the two growth models of population. Which one of the two is more realistic and why? 3

SECTION D

- 31.** (a) At what age does the process of oogenesis begin in a human female? Describe the process up to ovulation. 5

OR

- (b) (i) Where do microsporogenesis and megasporogenesis occur in a flower? Differentiate between the two processes.
- (ii) Why is megasporogenesis termed as monosporic?
- (iii) Describe double fertilisation in angiosperms. 5

- 32.** (a) Name the scientists who proved that DNA replication is semiconservative. Explain the process of DNA replication in prokaryote. 5

OR

- (b) Why is the Lac operon referred to as negative regulation? Explain the working of the operon in the presence of its inducer. 5



33. (a) (i) Write the mode of transmission and specific symptoms of any **three** of the following diseases :

I. Malaria

II. Typhoid

III. Filariasis

IV. Ringworm

(ii) What is a 'vaccine' ? Write the basis on which it works to provide protection against a disease. 5

OR

(b) Describe the treatment that the sewage generated in our cities undergoes before its water can be released into natural water bodies. 5



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