

BUDHA DAL PUBLIC SCHOOL, PATIALA

First Term Examination (12 September 2024)

Class XII (Science)
Subject - Biology (Set - B)

M.M. 70

Time: 3hrs.

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory
- (iii) Section-A has 16 questions of 1 mark each; Section-B has 5 questions of 2 marks each; Section- C has 7 questions of 3 marks each; Section- D has 2 case-based questions of 4 marks each; and Section-E has 3 questions of 5 marks each.
- (iv) 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
- (v) Wherever necessary, neat and properly labelled diagrams should be drawn.

Section - A

- Q1. Select the plant species, where emasculation is not required for artificial hybridization experiment.
a) Castor b) Maize c) Papaya d) Wheat
- Q2. Figure (i) and figure (ii) given below are showing two stages of megasporogenesis in a typical angiosperm plant.

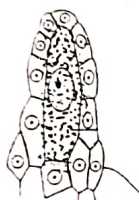


Fig. (i)

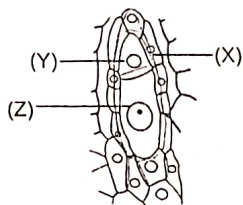


Fig. (ii)

Choose the option showing the correct ploidy of X, Y and Z in the table given below:

	X	Y	Z
(a)	2n	n	2n
(b)	2n	n	n
(c)	2n	3n	n
(d)	3n	2n	n

- Q3. The first gene-sequenced crop is
a) wheat b) tobacco c) rice d) cotton
- Q4. When did some of the land reptiles go back to water to evolve into fish-like reptiles?
a) 100 mya b) 200 mya c) 300 mya d) 500 mya
- Q5. Which of the following options gives the correct matching of a disease with its pathogen as well as the mode of transmission?
a) Typhoid - Salmonella typhi - Inhaling the droplets of a patient
b) Pneumonia - Streptococcus pneumonia - Bite of Culex mosquito
c) Malaria - Plasmodium sp. - Bite of female Anopheles mosquito
d) Elephantiasis - Wuchereria sp. - Contaminated food and water

- Q6. Study the table given below

Contraceptive/ Contraceptive method	Mode of action
A) The pill	i) Prevent sperm reaching cervix
B) Condom	ii) Prevent implantation
C) Vasectomy	iii) Inhabits
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
- Q7. Withdrawal of which hormone causes degeneration of corpus luteum?
a) FSH b) LH c) Progesterone d) Oestrogen

- Q8. The expected phynotypic ratio amongst the progeny of 60 individuals, obtained from a cross between heterozygous tall pea plant and dwarf pea plant is:
a) 45 tall and 15 dwarf b) 40 tall and 20 dwarf c) 30 tall and 30 dwarf d) 35 tall and 25 dwarf

- Q9. A template strand in a bacterial DNA has the given base sequence:
 5' - AGGTTTAACG - 3'
 What would be the RNA sequence transcribed from this template strand?
 a) 5'-CGUAAAACCU -3' b) 5'- AGGUUUUUCG- 3'
 c) 5'- TCCAAATTGC- 3' d) 5'- AGGTTTAACG - 3'
- Q10. One of the possible early source of energy was/were :
 a) CO₂ b) chlorophyll c) green plants d) UV rays and lightning
- Q11. ELISA techniques is based on the principle of:
 a) DNA replication b) antigen-antibody interaction
 c) pathogen-antigen interaction d) antigen-protein interaction
- Q12. In the presence of allolactose, the lac repressor in the operon of E.coli.
 a) binds to the operator b) cannot bind to the operator
 c) binds to the promoter d) binds to the regulator
- Two statements are given - one labelled Assertion (A) and the other labelled Reason (R).
 Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
- a) Both assertion and reason are true, and the reason is correct explanation of the assertion.
 b) Both assertion and reason are true, and the reason is not the correct explanation of the assertion.
 c) Assertion is true but reason is false.
 d) Assertion is false but Reason is true.
- Q13. Assertion : Nuclear endosperm is formed by subsequent nuclear division without wall formation.
 Reason : Coconut is an example of such endosperm, where the endosperm remains nuclear throughout the development of the fruit.
- Q14. Assertion : Infundibulum is a funnel-shaped part closer to ovary.
 Reason : The edges of infundibulum helps in collection of the ovum after ovulation.
- Q15. Assertion : The first formed earth originally had reducing atmosphere.
 Reason : Hydrogen was abundant and there was no free oxygen.
- Q16. Assertion : Accumulation of phenylalanine in the brain results in mental retardation in phenylketonuria.
 Reason : The affected person lacks phenylalanine which is therefore not converted to tyrosine.

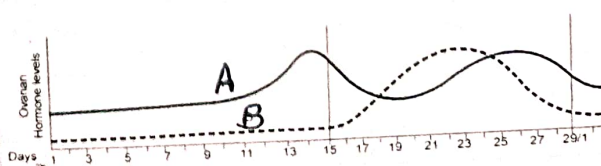
Section - B

- Q17. How is it possible in Oxalis and Viola plants to produce assured seed sets even in the absence of pollinators?
- Q18. a) Where do the signals for parturition originate in humans?
 b) Why is it important to feed the new born babies on colostrums?
- Q19. Explain the mode of action of Cu²⁺ releasing IUDs as a good contraceptive. How is hormone releasing IUD different?
- Q20. Write the scientific names of the causal organisms of elephantiasis and ringworm in humans. Mention the body parts affected by them.
- Q21. How many base pairs would a DNA segment of length 1.36 mm have?

Section - C

- Q22. Define apomixis. Mention any two applications of apomixis in hybrid seed industry. How is it different from polyembryony?
- Q23. The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle :

- i) Identify 'A' and 'B'.
 ii) Specify the source of the hormone marked in the diagram.
 iii) Compare the role of A and B.



Q24. Identify a, b, c, d, e and f in the table given below:

No.	Syndrome	Cause	Characteristics of affected individuals	Sex-male/female/Both
1.	Down's	Trisomy of 21	a (i), (ii)	b
2.	c	XXY	Overall masculine development	d
3.	Turner's	45 with XO	e (i), (ii)	f

Q25. A small stretch of DNA strand that codes for a polypeptide is shown here
3' - CAT CAT AGA TGA AAC - 5'

a) Which type of mutation could have occurred in each type resulting in the following mistakes during replication of the above original sequence :

i) 3' - CAT CAT AGA TGA ATC - 5'

ii) 3' - CAT ATA GAT GAA AC - 5'

b) How many amine acids will be translated from each of the above strands (i) and (ii)?

Q26. Select two pairs from the following which exhibit divergent evolution. Give reasons for your answer.

- Fore limbs of Cheetah and mammals
- Flippers of dolphins and penguins
- Wings of butterflies and birds
- Fore limbs of whales and mammals

Q27. a) Why does DNA replication occur within a replication fork and not in its entire length simultaneously?

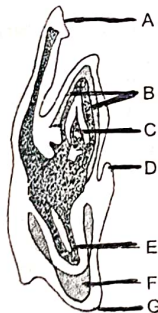
b) "DNA replication is continuous and discontinuous on the two strands within the replication fork". Explain with the help of a schematic representation.

Q28. One of the twins born to parents having normal colour vision was colourblind, whereas the other twin had normal vision. Work out the cross. Give two reasons how it is possible.

Section - D

Q29. In an angiosperm, the zygote starts its development only after a certain amount of endosperm is formed. It is an adaptation to provide assured nutrition to the developing embryo. Though the monocot and the dicot seeds vary greatly, the early stages of embryo development are similar in both dicot and monocot plants.

Study the diagram of a monocot (grass) embryo given below and answer the questions that follow:

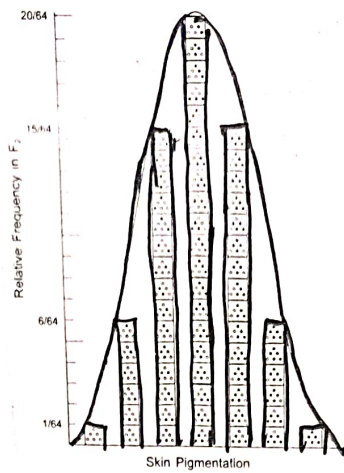


- Identify and name the (i) single functional cotyledon (ii) second rudimentary cotyledon
- What technical term is given to the embryonal axis below the level of attachment of cotyledon(s)? What does it terminate into, at its lower end?
- Identify and name the two parts that are not found in a dicot embryo. Explain them.

OR

c) Identify the labels, which represents respectively (i) the plumule and (ii) the radical in the diagram. What do they give rise to, on germination of the seed?

Q30. The traits studied by Mendel showed two distinct alternate forms, called contrasting traits/characters. But, there are many heritable characters, which are not so distinct in their occurrence, but are spread across a gradient. Such traits are controlled by more than one gene and their inheritance is described as polygenic inheritance. When the relative frequency of the polygenic cross is plotted, a bell-shaped curve appears as given below:



Answer the following questions:

- Give two examples of human traits that show polygenic inheritance.
 - How many genes are involved in the trait shown in the graph and how many phenotypes have appeared?
 - How does polygenic inheritance differ from pleiotropy?
- OR
- How does polygenic inheritance differ from multiple allelism?

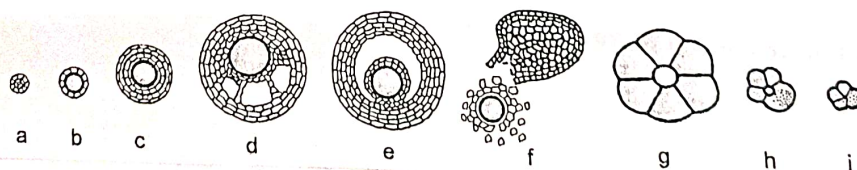
Section - E

- Q31.
 - How did Darwin explain adaptive radiation? Give another example exhibiting adaptive radiation.
 - Name the scientist who influenced Darwin and how?

OR

- Explain the observations of Meselson and Stahl when:
 - They cultured *E. coli* in a medium containing for a few generations and centrifuged the content.
 - They transferred one such bacterium to the normal medium of?
 - What does the above experiment prove?
 - Which is the first genetic material identified?
- Q32.
 - Differentiate between spermatogenesis and oogenesis on the basis of (i) Time of initiation of the process (ii) Site of completion of process (iii) Nature of meiotic division undergone by gamete mother cells.
 - Name the hormones and state their role involved in controlling spermatogenesis in humans.

OR



- Identify the figure that illustrates corpus luteum and name the pituitary hormone that influences its formation.
 - Specify the endocrine function of corpus luteum. How does it influence uterus?
 - What is difference between 'd' and 'e'?
 - Draw a labelled sketch of Graafian follicle.
- Q33.
 - A Capsicum flower has 240 ovules in its ovary. But it produces a fruit with only 180 viable seeds. Explain giving reason that could be responsible for such a result.
 - Describe the development of an endosperm in a viable seed. Why does endosperm development precede embryo development?
 - Give an example of an angiosperm seed that has a perisperm. Name the part from which perisperm develops.

OR

- How does Hardy-Weinberg equation explain genetic equilibrium?
- Describe how does this equilibrium get disturbed which may lead to founder effect.