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Monthly Test (AUGUST-2025)
Class XII – Biology

M.M 30

TIME :1 Hr

General Instructions:

- 1) All questions are compulsory.
- 2) Section A contains 1 to 8 questions based on Multiple Choice Questions (MCQ) carries 1 mark each.
- 3) Section B contains 9 to 10 Very Short Questions carries 2 marks each.
- 4) Section C contains 11 to 13 Short Questions carries 3 marks each.
- 5) Section D contains 1 question based on Case Study carries 4 marks each.
- 6) Section E contains 1 Long question carries 5 marks.

Section A

Q1. The function of tRNA is to:

- | | |
|----------------------------------|--------------------------------|
| a) Carry amino acids to ribosome | b) Carry RNA code to cytoplasm |
| c) Carry DNA code to cytoplasm | d) Form a part of Ribosome |

Q2. A sample of normal double-stranded DNA was found to have thymine content of 27%. What will be the expected proportion of guanine in this strand?

- (a) 23% (b) 32% (c) 36% (d) 73%

Q3. Sickle-cell anaemia is caused due to mutation in the gene coding for:

- | | |
|------------------------------|-------------------------------|
| a) Beta chain of haemoglobin | b) Alpha chain of haemoglobin |
| c) RBC membrane protein | d) Clotting enzyme |

Q4. Colour blindness is an X-linked recessive disorder. This means that a daughter can:

- a) never be colour blind
- b) be colour blind if father is colour blind
- c) be colour blind if mother is colour blind
- d) be colour blind if father is colour blind and mother is carrier

Q5. The thorn and tendril shown in the picture represent examples of

- | | |
|----------------------|--------------------------|
| (a) Analogous organ | (b) Convergent evolution |
| (c) Homologous organ | (d) Vestigial organ |

Q6. Adaptive radiation leads to which of the following?

- (a) Increased competition among species
- (b) Decreased speciation rates
- (c) Limited morphological diversity among species
- (d) Rapid divergence of traits among populations inhabiting a given geographical area.



Question number 7 to 8 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 but R is not the correct explanation of A
- c) A is true but R is false
- d) A is false but R is true

Q7. Assertion (A) : Phenylketonuria is an inborn error of metabolism.

Reason (R) : The affected individual lacks an enzyme called phenylalanine hydroxylase.

Q8. Assertion: In Griffith's experiment, a mixture of heat-killed virulent bacteria R and live non-virulent bacteria S, lead to the death of mice.

Reason : 'Transforming principle' got transferred from heat-killed R strain to S strain and made it virulent.

Section-B

Q9. A Snapdragon plant homozygous for red flower colour when crossed with a white flower plant of same species produced pink flower in F₁ generation:

- What is the phenotypic expression called? ($\frac{1}{2}$)
- Work out the cross to show the F₂ generation when F₁ was self-pollinated. Give the phenotypic and genotypic ratio of F₂ generation. (1)
- How are these phenotypic and genotypic ratios compared to Mendelian monohybrid F₂ ratios? ($\frac{1}{2}$)

Q10. Name the enzymes responsible for:

- Formation of replication fork
- Joining of fragments of Lagging strand
- Proof reading of newly synthesised DNA strands
- Synthesis of hnRNA

Section - C

Q11. A. The cell cycle is fundamental to life. It's the tightly regulated series of events that allows cells to grow, replicate their DNA, and divide. Failure of any of these events may result in abnormalities. Identify the type of abnormality that results due to failure of following event:

- Failure of cell division after completion of S phase.
- Failure of segregation of a pair of chromatid during cell division.

B. Study the Karyotype and answer the questions that follow:



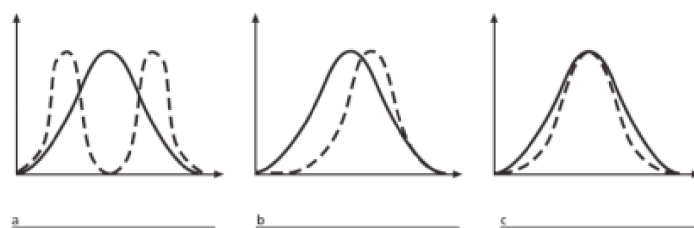
- Name the condition/abnormality. Why is this condition named so?
- Specify any two symptoms that help identify this condition.

Q12.(a) Construct a complete transcription unit with promoter and terminator based on the hypothetical coding strand given below:



- Write the RNA strand transcribed from the above transcription unit along with its polarity.
- Is it possible to use the above RNA strand to synthesis a polypeptide? Justify.

Q13. Label the three types of natural selection shown below and select the most appropriate type of natural selection in the questions that follow.



- Starlings produce an average of five eggs in each clutch. If there are more than five, the parents cannot adequately feed the young. If there are fewer than five, predators may destroy the entire clutch. This is an example of
 - disruptive selection.
 - stabilizing selection.
 - directional selection.
 - none of the above.
- The occurrence of large or small beak sizes among seed crackers in the absence of medium sized beaks is an example of
 - directional selection.
 - stabilizing selection.
 - disruptive selection.
 - none of the above.

(iii) Human babies usually do not survive if they are born under 4 pounds because their organs are too small to work properly; they cannot be born if they are too big because the mother would not be able to give birth without dying. This is an example of

- a. directional selection.
- b. stabilizing selection.
- c. disruptive selection.
- d. none of the above.

Section D

Q14. A population of cats can be either black or white; the black allele (B) has complete dominance over the white allele (b). Given a population of 1000 cats, 840 black and 160 white. Given this information, answer the questions below:

- (a) What is the allele frequency for B and b?
- (b) Which principle helps determine the frequencies given the information above?
- (c) What is the number of individuals per genotype?

OR

- (d) Calculate the frequency of individuals per genotype.

Section- E

Q15. (i) Draw a schematic, self-explanatory labelled diagram of lac operon in switched on condition.

- (ii) Why is regulation of lac operon referred to as negative regulation?