2022

ZOOLOGY

(Honours)

Paper Code : XII - A & B

[Molecular Biology and Biotechnology]

(New Syllabus)

Full Marks : 50 Time : Two Hours

Paper Code : XII - A

(Marks : 10)

Choose the correct answer.

Each question carries 1 Mark.

1. The function of the $3' \rightarrow 5'$ exonuclease activity of a DNA polymerase is to —

   (A) remove the polynucleotide strand that is attached to the template strand that is being copied.

   (B) remove damage nucleotides from the template strand during DNA synthesis.

   (C) remove nucleotides from the ends of DNA molecules to ensure the generation of blunt ends.

   (D) remove incurrent nucleotides from the newly synthesized strand of DNA.

2. All three types of restriction enzymes bind to DNA molecules at specific sequences; however, the type II enzymes are favoured for research for which of the following reasons?

   (A) Type II enzymes cut the DNA at a specific site.

   (B) Type II enzymes always cut the DNA to yield blunt ended molecules.

   (C) Type II enzymes always cut the DNA to yield sticky ended molecules.

   (D) Type II enzymes are the only restriction enzymes to cleave double stranded DNA.

3. DNA ligase synthesizes which type of bond?

   (A) Hydrogen bonds between the bases.

   (B) Phosphodiester bonds between the nucleotides.

   (C) The bond between the bases and deoxyribonucleotide sugar.

   (D) All of the above.

4. *E. coli* cells take up plasmid DNA in laboratory experiments by which of the following method?

   (A) Conjugation

   (B) Transduction

   (C) Transformation

   (D) All of the above

5. Which of the following statements about telomerase is true?

   (A) Telomerase is an RNA dependent DNA polymerase.

   (B) Telomerase is an RNA dependent RNA polymerase.

   (C) Telomerase is a DNA dependent DNA polymerase.

   (D) Telomerase is a DNA dependent RNA polymerase.

6. Which protein is involved in the separation of the two interlinked daughter chromosomes when DNA replication is terminated in *E. coli*?

   (A) DnaB

   (B) DNA Polymerase

   (C) Topoisomerase IV

   (D) *Tus*

7. Spontaneous mutation occurs from which of the following?

   (A) Chemical mutagen

   (B) Errors in DNA replication

   (C) Heat

   (D) Radiation

8. Which of the following types of vectors would be most suitable for introducing DNA into a human cell?

   (A) Plasmid

   (B) Bacteriophage

   (C) Cosmid

   (D) Adenovirus

9. PCR technique was invented by —

(A) Kary Mullis

(B) Watson-Crick

(C) Meselson-Stahl.

(D) F. Griffith.

10. In Northern blot technique —

(A) DNA binds to specific RNA probe

(B) RNA binds to specific RNA/DNA probe

(C) DNA moves to the northern direction of the gel apparatus

(D) RNA moves to the northern direction of the gel apparatus

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Paper Code : XII - B

(Marks : 40)

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Unit - 1 : Molecular Biology

1. Answer any *two* questions : 4×2=8

   (a) Explain tautomeric shift with a suitable diagram.

   (b) Write a short note on tumour suppressor gene.

   (c) Briefly describe ρ-dependent termination of transcription.

   (d) Describe briefly EF-Ts/EF-Tu cycle.

2. Answer any *one* question : 12×1=12

   (a) Write the characteristic features of cancer cells. Classify cancer on the basis of tissue types. Explain v-onc and c-onc with example. 2+4+(3+3)=12

   (b) Describe with diagram how thymine dimer is formed. Briefly describe the process of its repair. Add a note on *SOS* response. 4+4+4=12

   (c) Describe the experiment to prove that DNA replication occurs in semiconservative manner. Write the role of telomerase. 8+4=12

Unit - 2 : Biotechnology

3. Answer any *two* questions : 4×2=8

   (a) Write a short note on primary cell culture.

   (b) What do you mean by attenuated vaccine?

   (c) Briefly explain cryopreservation.

   (d) What are the applications of DNA fingerprinting?

4. Answer any *one* question : 12×1=12

   (a) Briefly describe the process of Southern blotting with suitable diagram. Write the application of Southern blotting. 8+4=12

   (b) Write the principle of PCR. Briefly describe the working principle of PCR. Write some applications of PCR. 2+7+3=12

   (c) Describe the process of hybridoma technology. Write its applications. 8+4=12

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