UG/II/BIOT/H/III/16(Old)

2016

BIOTECHNOLOGY

[Honours]

PAPER – III

Full Marks : 90

Time : 4 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

[OLD SYLLABUS]

GROUP – A

[*Marks* : 30]

Answer any **two** questions from the following : 15 × 2

1. (*a*) Distinguish between complete and incomplete penetrance. 2

(*b*) Write the common features of sex-linked inheritance. How does it differ from autosomal inheritance ? 3 + 2

(*c*) In poultry birds, the comb shape is determined by interaction of two non-allelic genes. Briefly describe different comb shapes with their respective genotypes. 4

(*d*) Why promoters are essential for gene expression ? What is promoterless transcription ? 3 + 1

2. (*a*) Distinguish between generalized and specialized transduction. 2

(*b*) In bacterial transformation experiment, a cross of $lac^+ pro^+ leu^+$ with $lac^- pro^- leu^-$ following recombinant classes were produced :

(*i*) $lac^- pro^- leu^+ = 680$

(*ii*) $lac^- pro^- leu^- = 400$

(*iii*) $lac^- pro^+ leu^+ = 3650$

(*Continued*)

(*iv*) $lac^+ pro^- leu^- = 2610$

(*v*) $lac^+ pro^- leu^+ = 100$

(*vi*) $lac^+ pro^+ leu^- = 1170$

(*vii*) $lac^+ pro^+ leu^+ = 12,000$

Calculate linkage distance and draw a linkage map from the above results. 8

(*c*) Distinguish between Hfr^+ and F′ strain of bacteria. 2

(*d*) Compare and contrast linkage and independent assortment. 3

3. (*a*) Distinguish between coding and non-coding sequences. 2

(*b*) What is non-disjunction ? Describe the mechanism of formation of Gynandromorph in Drosophila. 2 + 3

(*c*) Describe one-gene-one polypeptide hypothesis taking sickle cell anemia as an example. 5

(*d*) Give an illustration of solenoid model of chromatin. 3

4. (*a*) What is hybrid vigour ? How is it produced ? 2 + 2

(*b*) Write a brief note on chloroplast DNA. What is meant by intron and exon ? 4 + 2

(*c*) Describe the photoreactivation mechanism of DNA repair. What is Southern blotting ? 3 + 2

GROUP – B

[*Marks* : 40]

Answer any **five** questions from the following : 8 × 5

5. (*a*) What do you mean by self splicing ? Describe the mechanism. 1 + 3

(*b*) Describe the mechanism of termination of transcription in prokaryotes. What is antitermination ? 3 + 1

6. (*a*) What is inducible system of genetic regulation ? How it differs from repressible system ? 2 + 2

(*b*) What is capping ? How it regulates the initiation mechanism of translation in eukaryotes ? 2 + 2

7. (*a*) Write short notes on C-value paradox. 3

(*b*) State the role of EF-Tu-EF-Ts complex in translation mechanism. 3

(*c*) What is satellite DNA ? 2

8. (*a*) Write common protestics of genetic code. 3

(*b*) Write the importance and application of HGP. 4

(*c*) What is C-DNA ? 1

9. (*a*) What is tautomerism of DNA bases ? Describe the mechanism of formation of transition mutation by tautomerism. 2 + 3

(*b*) State the role of variation in evolution. 3

10. (*a*) What do you mean by complete interference for linked genes ? 2

(*b*) What is PCR ? State the importance of it in genetic engineering. 2 + 3

(*c*) What is replicon ? 1

11. (*a*) Highlight glucose effect in lac operon. 3

(*b*) What is inversion ? How does inversion act as crossover suppressor ? 1 + 2

(*c*) What are pseudogenes ? 2

12. (*a*) What are topoisomerases ? State their types and mechanism of action. 2 + (2 + 3)

(*b*) What are holandric genes ? 1

13. (*a*) Elaborate the process of DNA methylation. Describe its role in gene expression. 2 + 2

(*b*) What are restriction endonucleases ? 2

(*c*) Add a note on overlapping genes. 2

GROUP – C

[*Marks* : 20]

Answer any five questions from the following : 4 × 5

14. Comment on 'X' test in genetic analysis. 4

15. Describe the structure of t RNA. 4

16. What is cot curve ? State its importance in determining genomic complexity. 2 + 2

17. (*a*) What are DNA binding motifs ? 2

(*b*) Why DNA replication is called semi-discontinuous ? 2

18. What are mutagens ? How do differ from careinoges ? 2 + 2

19. What are vectors ? State the role of bacterio-phages as genetic vectors. 2 + 2

20. (*a*) What is TATA box ? 2

(*b*) What is Klenow fragment ? 2

21. What are Cosmids and Triplasmids ? 2 + 2