M.Sc. 3rd Semester Examination, 2022

MICROBIOLOGY

(*Cell Biology/Genetic Engineering*)

PAPER – MCB-301.1&301.2

Full Marks : 40

Time : 2 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

PAPER—MCB-301.1

(*Cell Biology*)

[*Marks* : 20]

A. Answer any *two* questions : 2×2

1. Differentiate between microtubule and microfilament.

2. Give example of one pro-apoptotic and one anti-apoptotic protein.

3. Name two death ligand.

4. Give two examples of mode of activation of proto-oncogene.

B. Answer any *two* questions : 4×2

5. Write a short note on synaptonemal complex. Describe the mechanism of movement of chromosomes during mitosis. $2\frac{1}{2} + 1\frac{1}{2}$

6. Differentiate between normal and cancer cell line. Why is serum used for cell culture ? What is the reason of creating serum free media ? $2 + 1 + 1$

7. During cancer balance between the factors stimulating and inhibiting growth are disrupted-critically discuss.

8. Discuss the role of p53 protein in prevention of tumour.

C. Answer any *one* question : 8×1

9. Describe the intrinsic pathway of apoptosis. How it differs from extrinsic pathway ? $5 + 3$

10. Diagrammatically describe the process of positive regulation of cell cycle. State the function of retinoblastoma in cell cycle. $6 + 2$

PAPER—MCB-301.2

(*Genetic Engineering*)

[*Marks* : 20]

D. Answer any *two* questions : 2×2

11. How double stranded cDNA is synthesized from eukaryotic mRNA ?

12. How a bacteria producing restriction endonuclease protect their own DNA from digestion by the same enzyme ?

13. Mention the significance of shuttle vector ?

14. Define Southern and Northern blotting mentioning the genetic information that can be obtained from these analysis.

E. Answer any *two* questions : 4×2

15. 'In case of preparation of genomic library of higher eukaryote, cosmid vector is preferred over plasmid vector'-explain. What is blue-white selection of pUC19 vector ? 2 + 2

16. What is pyrosequencing ? Briefly state principle of that process. 1 + 3

17. How N-terminal aminoacid sequence of a protein is determined by Edman degradation method ?

18. State the mechanism of real-time PCR with suitable diagram.

F. Answer any *one* question : 8×1

19. What is chromosome walking ? Write short note on : (*i*) DNA microarray and its applications, (*ii*) Bt-cotton 2 + (3 + 3)

20. A protein sample is isolated from a biological source and you have to check the ability of the protein to bind with a particular DNA. How do you perform the experiment ? State the applications of RFLP technique. A linear DNA fragment of 7.5 kb is cleaved with individual restriction enzyme EcoR1 and Hind III and then with the combination of this two. The fragments generated are as follows.

EcoR1 : 205 kb, 5 kb

Hind III : 2.0 kb, 5.5 kb

Hind III & EcoR1 : 2.5 kb, 3.0 kb, 2.0 kb

Determine the restriction map. 4 + 2 + 2