1 Mark Questions

1. Reverse transcriptase used in genetic engineering was discovered by
   (a) Temin and Baltimore
   (b) Smith and Arber
   (c) Smith and Baltimore
   (d) Temin and Arber

2. Infection of *E. coli* by bacteriophage λ is normally detected by
   (a) resistance of the bacteria to an antibiotic
   (b) growth of single colony on the agar plate
   (c) the appearance of plaques or lysed bacteria on agar plates
   (d) restriction digest of the bacterial DNA

3. A microscope that has a total magnification of 1500X with an oil immersion lens has an ocular of power
   (a) 1.5 X (b) 15 X
   (c) 150 X (d) 1500 X

4. Which of the following species shows a high resistance to radiation damage?
   (a) *Deinococcus* (b) *Micrococcus*
   (c) *Staphylococcus* (d) *Planococcus*

5. Peptic ulcers are caused by
   (a) *Shigella sonei*
   (b) *Giardia lambia*
   (c) *Enterobius vermicularis*
   (d) *Helicobacter pylori*

6. The evolutionary history of an organism is called
   (a) taxonomy (b) dendrogram
   (c) phylogeny (d) cladogram

2 Marks Questions

7. Which vector would be the most appropriate for cloning a 150 kb fragment of DNA?
   (a) p^{BR322} (b) λ vector
   (c) YAC (d) BAC

8. Which group of microorganisms have a high level of unsaturated fatty acids in their cell membrane?
   (a) Mesophilic (b) Psychrophilic
   (c) Thermophilic (d) Hyperthermophilic

9. Complete denitrification of nitrate results in the formation of
   (a) N_2 (b) NH_3
   (c) N_2O_5 (d) NH_2OH

10. Which of the following disease in not caused by the coxsackie virus?
    (a) Intestinal infection (b) Meningitis
    (c) Gingivitis (d) Myocarditis

11. Bacterial cell wall biosynthesis is inhibited by the antibiotic
    (a) vancomycin (b) tetracycline
    (c) chloramphenicol (d) erythromycin

12. Match the correct combination of plasmid DNA to their properties.

Plasmid DNA	Property
A. Conjugative plasmid	1. can integrate into the chromosome and replicate when the chromosome is copied
B. Cryptic plasmid prokaryotes	2. Capable of transferring itself between
C. Episome	3. Does not appear to have any function

Codes

	A	B	C
(a)	1	3	2
(b)	2	3	1
(c)	2	1	3
(d)	3	2	1

13. An Hfr bacterium is one that contains
(a) many unusual plasmids
(b) chromosomal material acquired from a recipient cell
(c) the ability to undergo transduction
(d) A plasmid integrated into its chromosome

14. Match the following product/process to the microorganism involved

Product/Process	Microorganism
A. Bioplastics	1. *Beauveria bassiana*
B. Bioremediation	2. *Thiobacillus thiooxidans*
C. Bioleaching	3. *Ralstonia eutropha*
D. Biopesticide	4. *Pseudomonas putida*

Codes

	A	B	C	D		A	B	C	D
(a)	3	2	4	1	(b)	1	2	3	4
(c)	3	4	2	1	(d)	1	4	2	3

15. Which of the following enzymes convert glucose 6-phosphate to 6-phosphoglucono-δ-lactone in the Entner-Doudoroff pathway?
(a) Glucose 6-phosphate dehydrogenase
(b) Phosphoglucoisomerase
(c) Phosphoglucolactonase
(d) 6-phosphogluconate dehydrase

16. The process in which a molecule is transported into the cell while being chemically altered is called
(a) passive transport (b) group translocation
(c) facilitated transport (d) None of these

17. MacConkey agar is a type of
(a) selective media (b) differential media
(c) Both (a) and (b) (d) None of the above

18. Which of the following modes of DNA replication are used by bacteria?
(a) Rolling circle
(b) Theta replication
(c) Bidirectional replication
(d) All of the above

19. Which of the following is incorrect about negative staining procedure?
(a) It utilizes a stain such as nigrosin
(b) Microorganisms stain deeply
(c) Microorganisms repel the dye
(d) An acidic dye is used

20. A mutation in the codon UCG to UAG is described as
(a) non-sense mutation (b) silent mutation
(c) mis-sense mutation (d) neutral mutation

21. The ineffectiveness of many antibiotics today is closely associated with
(a) bacteriophages
(b) F plasmids
(c) R plasmids
(d) bacterial transformations

22. Which type of cells actually secrete antibodies?
(a) T-cells (b) Macrophages
(c) Monocytes (d) Plasma cells

Common Data for Questions 23 and 24
The 50 µL of competent *E. coli* cells (10^9 CFU/mL) were transformed using 0.5ng of a 5kb plasmid DNA to which 950 µL of SOC medium was added. Only 50 µL of this was plated on a selective agar plate. A after a 12h incubation at 37°C, 90 colonies were observed.

23. Calculate the efficiency of this transformation in CFU/µg of DNA
(a) 3.6×10^5 (b) 3.6×10^6
(c) 1.8×10^5 (d) 1.8×10^6

24. Calculate the percentage of transformed cells
(a) 0.36% (b) 0.72%
(c) 3.6% (d) 7.2%

Statement for Linked Answer Questions 25 and 26
An egg sandwich got contaminated with 10 cells of a bacterium. It was left open at 37°C for 4 hours. It was found to contain 40960 cells.

25. What is the generation time of this bacterium?
(a) 15 min (b) 20 min
(c) 25 min (d) 30 min

26. If the initial inoculum was only 1 cell, then after 10 hours what will be the number of cells
(a) 20^{20} (b) 2^{24}
(c) 2^{30} (d) 2^{40}

Statement for Linked Answer Questions 27 and 28

27. What is the ratio of genome size of the microorganism relative to average size of the fragment in the gene library?
(a) 3000 (b) 1500
(c) 45000 (d) None of these

28. The genomic library was created in vectors that were transformed into bacterial cells. If there is a 95% probability of the transformation, how many recombinant bacterial colonies will have to be screened to find this particular gene?
(a) 7000 (b) 8000
(c) 9000 (d) 10000