

## 1 Mark Questions

1. Which of the following scientists are associated with the discoveries listed below?

Group I	Group II
A. Identification of DNA as the genetic material	1. Fleming
B. Discovery of penicillin	2. Avery
C. Demonstration of bacterial transformation	3. Beijerinck
D. Demonstration of filterable infectious agent	4. Griffith

### Codes

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

2. Density of cells of a bacterial culture is routinely measured using spectrophotometer. This is based on the principle of
- (a) light absorption                      (b) light diffraction  
(c) light scattering                        (d) light reflection
3. Which one of the following life styles does *Rhizobium* species adopt to fix molecular nitrogen to ammonia?
- (a) Both symbiotic as well as non-symbiotic  
(b) Only symbiotic  
(c) Only non-symbiotic  
(d) Only commensalism
4. A tryptophan auxotrophic Hfr strain of *E. coli* is mixed with F-histidine auxotroph and plated on to minimal medium to select for prototrophs. The prototrophs are formed due to
- (a) conjugation                              (b) transduction  
(c) transformation                          (d) transfection
5. Identify the correct pair of amino acids which differ only by an atom in the side chain (R) group.
- (a) Gly-Ala                                      (b) Ser-Cys  
(c) Met-Leu                                     (d) Ser-Asp

6. Which one of the following antibiotics inhibits protein biosynthesis precisely by blocking the peptidyl transfer stage?

(a) Bleomycin                                  (b) Rifampicin  
(c) Chloramphenicol                        (d) Tetracycline

7. Pseudopeptidoglycan is present in the cell wall of

(a) *Escherichia coli*  
(b) *Bacillus subtilis*  
(c) *Saccharomyces cerevisiae*  
(d) *Methanococcus jannaschii*

## 2 Marks Questions

8. A wild type strain of *E. coli* growing on a mixture of glucose and acetate shows a typical biphasic diauxic growth. A mutant strain was isolated and was found not to exhibit the second phase of diauxic growth. This mutant is likely to be defective in
- (a) pyruvate decarboxylase  
(b) isocitrate lyase  
(c) glucose-6-phosphate dehydrogenase  
(d) phosphoglucose isomerase
9. Which one of the following approaches would be appropriate if one wants to cultivate microorganisms under constant physiological conditions?
- (a) Fed batch culture  
(b) Batch culture  
(c) Continuous culture  
(d) Discontinuous culture
10. Which one of the following bacterial toxins does not have ADP ribosylation activity?
- (a) Diphtheria toxin  
(b) Cholera toxin  
(c) *S. aureus*  $\alpha$ -toxin  
(d) *Pseudomonas* exotoxin



11. The high frequency of recombinants obtained from a cross between Hfr and F<sup>-</sup> strains is because
- (a) the F factor integrated into the chromosome mediates transfer of large regions of chromosome into the recipient
  - (b) the strain bears high number of F pilli on its surface
  - (c) there are high number of copies of the F plasmid per cell
  - (d) it induces recombination at high rate

12. A silent mutation is one that
- (a) results in a truncated polypeptide
  - (b) replaces an amino acid with an equivalent amino acid in polypeptide
  - (c) does not change the amino acid sequence of the polypeptide
  - (d) changes the reading frame of the mRNA leading to an altered polypeptide

13. The rotatory motion of bacterial flagellum is driven by
- (a) energy obtained through hydrolysis of ATP
  - (b) trans-membrane electrochemical potential linked to proton pumping
  - (c) direct uptake of extra-cellular nutrients
  - (d) concentration gradient of nutrients in the environment

14. Which one of the following metabolic intermediate is involved in the biosynthesis of phenylalanine and tyrosine in bacteria?
- (a) Chorismate
  - (b) Pantothenate
  - (c)  $\alpha$ -ketobutyrate
  - (d) Indole 3-phosphate

15. The DNA mixture containing unlabelled and N<sup>15</sup> labelled DNA from phage T<sub>4</sub> was denatured and allowed to reanneal. How many bands one would observe upon CsCl<sub>2</sub> density gradient centrifugation of the above mixture?
- |       |       |
|-------|-------|
| (a) 0 | (b) 1 |
| (c) 2 | (d) 3 |

16. A temperate phage differs from a virulent phage in the temperate phage
- (a) can exhibit only lytic cycle
  - (b) can choose between lytic and lysogenic cycle
  - (c) can exhibit only lysogenic cycle
  - (d) engages in lysogenic cycle only at high temperature

17. RecA is a protein involved in
- (a) recombinational repair
  - (b) mismatch repair
  - (c) nucleotide excision repair
  - (d) base excision repair

18. In which of the following bacterium, chemical energy is converted to both mechanical as well as light energy?
- (a) *Vibrio fischeri*
  - (b) *Bacillus subtilis*
  - (c) *Escherichia coli*
  - (d) *Pseudomonas fluorescens*

19. Initial density of a culture of bacteria with a generation time of 30 minutes was  $1 \times 10^5$  cells/mL. After 5 hours of incubation, what serial dilution will you have to plate out to get ~ 100 colonies per mL?
- |            |            |
|------------|------------|
| (a) $10^3$ | (b) $10^4$ |
| (c) $10^5$ | (d) $10^6$ |

20. Effective chemotherapeutic agents are difficult to develop for the treatment of fungal infection because
- (a) fungi have cell wall
  - (b) fungi have better mechanisms to inactivate drugs
  - (c) fungi are eukaryotic cells and their cellular machinery is similar to that of the host
  - (d) fungal pathogens typically infect organs inaccessible for antibiotic treatment

21. Which one of the following is not the criterion for using ribosomal RNAs as evolutionary chronometers?
- (a) The large size of ribosomal RNAs, gives large number of possible sequence combination
  - (b) Ribosomal RNAs are functionally invariant
  - (c) Ribosomal RNAs are universally distributed
  - (d) Ribosomal RNAs have enzyme activity