1 Mark Questions

1. Quinolones inhibit bacterial growth by targeting
   (a) DNA replication
   (b) *m*RNA translation
   (c) RNA polymerase
   (d) active transport of nutrients into the cell

2. To select for spontaneously arising histidine auxotrophs in a population, you would use a medium containing
   (a) histidine and penicillin
   (b) penicillin but no histidine
   (c) histidine and lysozyme
   (d) lysozyme but no histidine

3. Which one of the following statements in not associated with contributions of Louis Pasteur?
   (a) Anthrax is caused by anthrax bacillus
   (b) Bacteria causing food spoilage come from air
   (c) The disease causing organism must be isolated in pure culture
   (d) Bacteria cause the wine disease

4. The active transport of solute in the cell is characterized by
   (a) its uptake along the concentration gradient utilizing energy
   (b) requirement of a carrier to support transport along the concentration gradient
   (c) chemical modification of the solute during its uptake
   (d) its uptake against the concentration gradient

5. Catabolite repression allows cells to save energy by
   (a) inactivating catabolic enzymes
   (b) inhibiting synthesis of total RNA
   (c) regulating expression of genes required for utilization of less-efficient metabolites
   (d) inhibiting translation of *m*RNAs encoding catabolic enzymes

6. A newly emerged variant of influenza virus can be selectively propagated from the mixed population by addition of
   (a) Gangcyclovir
   (b) Tamiflu
   (c) Interferon gamma
   (d) Neutralizing antibody

7. The synthesis of an immunoglobulin in either a secretory or membrane bound form is governed by
   (a) allelic exclusion
   (b) class switching
   (c) differential RNA processing
   (d) affinity maturation

8. The *cis-trans* test can determine whether a gene codes for
   (a) an activator or a repressor
   (b) an RNA or a protein
   (c) a protein with the same or different amino acids
   (d) a diffusible or non-diffusible product

9. Which of the following are expected to be the abundant inhabitants of a nitrate and sulphate rich soil naturally depleted for oxygen?
   (a) *Pseudomonas* and *Azotobacter*
   (b) *Pseudomonas* and *Desulfovibrio*
   (c) *Azotobacter* and *Thiobacillus*
   (d) *Nitrosomonas* and *Nitrobacter*

10. Which one of the following immersion oils would you use to get the best resolution in a light microscope (with 100X objective)?
    (a) An oil with refractive index of 1.6
    (b) An oil with refractive index of 1.5
    (c) An oil with refractive index of 1.4
    (d) An oil with refractive index of 1.3

2 Marks Questions

11. Four Hfr strains of *E. coli* were generated from the same F^+ strain. The Hfr strains donated markers in the following order
    Strain 1 : DQWMT; Strain 2 : AXPTM;
    Strain 3 : BNCAX; Strain 4 : BDQWM

The order of the markers in the original F^+ strain is
(a) DQWMTPXACNB (b) AXPTMDQWBNC
(c) BNCAXPTMDQW (d) BDQWMNCAXPT

12. Which one of the following forms of the same DNA molecule would bind maximum ethidium bromide?
(a) Negatively supercoiled
(b) Covalently closed relaxed circle
(c) Linear
(d) Positively supercoiled

13. An actively growing culture of *E. coil* divides in about 20 min. Under laboratory conditions, time taken to replicate the entire genome of this bacterium would be about
(a) 20 min (b) 40 min
(c) 10 min (d) 18 min

14. Which of the statements about *Corynebacterium diphtheriae* biology is not correct?
(a) All strains of *C. diphtheriae* are producers of diphtheria toxin
(b) Diphtheria toxin production can be minimized by high concentration of iron in the medium
(c) Diphtheria toxin inhibits protein synthesis
(d) Diphtheria toxin is an A-B toxin secreted as a polypeptide of 62 kDa

15. Match the name of investigators in group I with their contributions in group II

Group I	Group II
A. Joseph Lister	1. Role of phagocytosis in infection
B. John Needham	2. Disproved spontaneous generation
C. Elie Metchnikoff	3. Proved spontaneous generation
D. Lazaro Spallanzani	4. Use of agar as solidifying agent
	5. Use of carbolic acid as disinfectant

Codes

	A	B	C	D
(a)	5	3	4	1
(c)	4	3	1	5

	A	B	C	D
(b)	5	3	1	2
(d)	3	2	1	4

16. During replication of the *E. coli* chromosome, Okazaki fragments are produced from
(a) only one of the strands of the circular genome
(b) both the strands of the circular genome
(c) one of the strands in one generation and the other strands in the next generation
(d) both the strands of the circular genome provided that the heavy nitrogen (^{15}N) is present in the medium

17. A new isolate of a facultative anaerobe utilizes either oxygen or pyruvate as terminal electron acceptor. This bacterium was grown either anaerobically with glucose as sole carbon source; or aerobically with lactose as the sole carbon source. Net increase in ATP production (per mole of the carbon source) during the aerobic growth would be
(a) 2-folds (b) 4-folds
(c) 19-folds (d) 38-folds

18. Based on their properties, match the 'Genera' in group I with those in group II

Group I	Group II
A. *Bacillus*	1. *Sarcina*
B. *Neisseria*	2. *Azotobacter*
C. *Rhizobium*	3. *Hyphomicrobium*
D. *Caulobacter*	4. *Clostridium*

Codes

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

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

19. An actively growing culture (20 mL) of *E. coli* (2×10^5 per mL) was mixed with a total of 100 T_4 phage particles, grown further for 40 min and mixed with a few drops of chloroform. Under the conditions used, the generation time of *E. coli* is 30 min, the infection cycle of phage T_4 is 20 min, and the burst size is 100. Assuming that each infection was a successful one, how many plaque forming units would you expect at the end of the experiment?
(a) 10^4 (b) 10^3 (c) 10^5 (d) 10^6

20. Match the pair of organisms in group I with their characteristic interactions in group II

Group I	Group II
A. *Photoblepharon palpebratus* and *Vibrio fischeri*	1. Mutualism
B. *Pseudomonas* and *Bdellovibrio*	2. Symbiosis
C. *Aspergillus* and *Pseudomonas*	3. Antagonism
D. *Thiobacillus ferrooxidans* and *Beijerinckia lacticogenes*	4. Parasitism

Codes

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

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