1 Mark Questions

1. The Scientist who developed aseptic methods using phenol to prevent infections was
   (a) Robert Koch (b) John Tyndall
   (c) Paul Ehrlich (d) Joseph Lister

2. The organism Robert Koch used first to propose Koch's postulates was
   (a) *Mycobacterim tuberculosis*
   (b) *Salmonella typhimurium*
   (c) *Bacillus anthracis*
   (d) *Klebsiella pneumoniae*

3. The primary strain used for staining endospore is
   (a) cyrstal violet (b) malachite green
   (c) safranin (d) carbol fuchsin

4. The engulfment of disease causing bacteria by macrophages was discovered by
   (a) Emil von Behring
   (b) Elie Metchnikoff
   (c) Shibasaburo Kitasato
   (d) J. Bordet

5. The two key enzymes of glyoxylate cycle are
   (a) isocitrate dehydrogenase, α-ketoglutarate dehydrogenase
   (b) isocitrate lyase, α-ketoglutarate dehydrogenase
   (c) isocitrate lyase, malate synthase
   (d) malate synthase, isocitrate dehydrogenase

6. *Nitrosomonas europaea* is a chemolithotroph in which electron donor and electron acceptor, respectively are
   (a) NH_4^+, O_2 (b) H_2, O_2
   (c) NO_2^-, O_2 (d) H_2S, NO_3

7. In Gram negative bacteria , the flagellun is attached to the cytoplasmic membrane by the
   (a) S ring only (b) S and M rings
   (c) P ring only (d) P and L rings

8. In *Rhizobium* legume symbiotic nitrogen fixation, oxygen sensitive nitrogenase is protected leghaemoglobin. The ratio of leghaemoglobin bound O_2 to free O_2 is
   (a) 10 : 1 (b) 100 : 1
   (c) 1000 : 1 (d) 10000 : 1

9. Non-phosphorylated Entner Doudoroff Pathway (EDP) is operative in species of
   (a) *Pyrococcus* (b) *Streptococcus*
   (c) *Micrococcus* (d) *Staphylococcus*

10. A 'regulon' is defined as
    (a) a set of operons that are functionally coordinated
    (b) a master gene regulating the function of a set of genes
    (c) all the regulatory genes of the genome
    (d) the genes present in the control region of an operon

2 Marks Questions

11. In TCA cycle, both carbons of acetyl Co-A are oxidised to CO_2 two steps which are
    (a) Cis-aconitate → Isocitate → α-Ketoglutarate
    (b) α-Ketoglutarate → Succinate → Fumarate
    (c) Isocitrate → α-Ketoglutarate → Succinate
    (d) Citrate → Cis-aconitate → Isocitrate

12. Cells of *Escherichia coli* grown on mineral salts medium with glycerol as carbon source are harvested and exposed to three different inducers of *lac* operon.Their inducing effciencies are
    (a) TMG < IPTG < Lactose
    (b) Lactose < TMG < IPTG
    (c) IPTG < Lactose < TMG
    (d) TMG < Lactose < IPTG

13. A bacterial suspension when counted in Petroff-Hausser bacteria counting chamber showed on overage 20 bacteria in one large square (each large square = 1/25 mm^2). The number of bacteria/mL of the suspension is

(a) 25×10^6 (b) 50×10^6
(c) 10×10^7 (d) 25×10^7

14. *Pseudomonas* species metabolise a wide range of organic compound through β-ketoadipate, whose structure is
(a) $CH_3 \cdot CH_2 \cdot CO \cdot CH_2 \cdot COOH$
(b) $HOOC \cdot CH_2 \cdot CH_2 \cdot CO \cdot COOH$
(c) $HOOC \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot CO \cdot COOH$
(d) $HOOC \cdot CH_2 \cdot CH_2 \cdot CO \cdot CH_2 \cdot COOH$

15. In a different plantet, codons have four bases instead of three and there are four termination codons as against three found in our planet. Which of the following statements will not hold true in four base codon planet assuming there is no evolutionary selection?
(a) The number of codons will be too few to code for all twenty amino acids
(b) There will be greater codon degeneracy than in earth
(c) The number of *t*RNA genes will be more compared to earth
(d) The sizes of proteins will be generally longer

16. In most phototrophic and autotrophic organisms, CO_2 is fixed by Rubisco *via* Calvin cycle.The sugar into which CO_2 gets fixed is
(a) Ribulose 5-phosphate
(b) Glyceraldehyde 3-phosphate
(c) 1, 3-bisphosphoglycerate
(d) Ribulose 1, 5-bisphosphate

17. The genome size of the following organisms are in the order
(a) *Haemophilus influenzae* > *Saccharomyces cerevisiae* > *Escherichia coli* > ϕx174
(b) *Escherichia coli* > *Saccharomyces cerevisiae* > *Haemophilus influenzae* > ϕx174
(c) *Saccharomyces cerevisiae* > *Escherichia coli* > *Haemophilus influenzae* > ϕx174
(d) *Saccharomyces cerevisiae* > *Haemophilus influenzae* > ϕx174 > *Escherichia coli*

18. The following are the number of germline genes for heavy and light chains in an individual. Calculate the approximate number of diverse IgG (Kappa) molecules that the individual can generate not taking into account somatic mutation

Germline genes	Heavy chain	K chain
V	50	40
D	30	0
J	6	5

(a) 131 (b) 9200
(c) 1800000 (d) 3600000

19. A strain of *Mycobacterium tuberculosis* was found to be resistant to INH, streptomycin and rifampcin at $10^{-5}, 10^{-6}, 10^{-7}$ frequencies, respectively. The frequency of appearance of a strain resistance to all three compounds is
(a) 10^{-5} (b) 10^{-6}
(c) 10^{-11} (d) 10^{-18}

20. In *Escherichia coli*, the number of molecules per cell occur in the following order
(a) *t*RNA < *m*RNA < *r*RNA < DNA
(b) DNA < *m*RNA < *r*RNA < *t*RNA
(c) *r*RNA < *m*RNA < *t*RNA < DNA
(d) DNA < *t*RNA < *m*RNA < *r*RNA

21. Switch recombination does not take place among the immunoglobulin genes
(a) IgM ⟶ IgD (b) IgM ⟶ IgG1
(c) IgM ⟶ IgE (d) IgM ⟶ IgA

22. EMB (Eosin-Methylene Blue) agar is used to differentiate *Escherichia coli* from *Enterobacter aerogenes*. The green metallic sheen of the colonies is due to
(a) eosin and methylene blue combine to produce a precipitate under neutral conditions (*E. aerogenes*)
(b) eosin and methylene blue combine to produce a precipitate under acidic conditions (*E. coli*)
(c) methylene blue gets precipitated under acid conditions (*E. coli*)
(d) eosin gets precipitated under neutral conditions (*E. aerogenes*)

23. UN spectroscopy is not used to quantitate the compounds based on absorbance
(a) nucleic acids have absorbance peak at 260 nm
(b) NAD(P)H have absorbance peak at 340 nm
(c) aromatic amino acids have absorption maxima about 280 nm
(d) sulphur containing amino acids absorbance at 270 nm

24. Luminous baterium (*Vibrio fischeri*) and flashlight fish (*Photoblepheron palpebratus*) provide an interesting symbiotic association. In the luciferase reaction, the products are
(a) $FMN + RCOOH + H_2O$
(b) $RCOOH + H_2O$ + Light
(c) $FMN + RCOOH + H_2O$ + Light
(d) $FMNH_2 + RCOOH + H_2O$ + Light

25. The flagellate *Monas stigmatica* (6 µm long) swims at the speed of 50 cell lengths per second. The distance it covers in 1 hour is

(a) 1.08 cm (b) 10.80 cm
(c) 10.8 m (d) 1.08 m

26. The serotypes of *Salmonella* species are due to

(a) lipid A structure
(b) core polysaccharide containing KDO and heptose
(c) unusual sugars in O-side chain
(d) both lipid A structure and core polysaccharide

27. The property not possessed by archaebacteria is

(a) they have pseudomurein in their cell walls
(b) their lipids have ether linkage
(c) they have N-acetylglucosamine and N-acetylalosaminuronic acid as repeating alternating units in the backbone
(d) they have D and L-amino acids in their short peptide chain

8. Which of the following properties of diphtheria toxin is not true?

(a) The nicked toxic is biologically and immunologically identical to unnicked toxin
(b) On reduction with GSH, chains A and B are separable
(c) Diphtheria toxic inhibits protein synthesis by ADP-ribosylating EF2
(d) Chain A alone is toxic to animals and whole cells

29. The following statements are mode regarding incorporation of 5-bromodeoxyuridine into DNA

A. 5-bromodeoxyuridine substitutes thymidine in DNA
B. The minimum number of DNA replication cycles required to observe mutation is two
C. 5-bromodeoxyuridine produces GC $\longrightarrow$ AT transition
D. 5- bromodeoxyuridine generates deletion mutants

Which of the above statements are true?

(a) A and C (b) A and B
(c) A and D (d) B and C

30. In a bacterial cell culture, the initial cell population (N_0) was 10^3 cells/mL. In 6 hours and 40 minutes, it has gone through 20 generations. The final cell population (N_t) and growth rate constant (K), respectively are

	N_t	K
(a)	10^9 cells/mL and	3
(b)	10^8 cells/mL and	4
(c)	10^7 cells/mL and	5
(d)	10^6 cells/mL and	6