M : Microbiology

Q.1 – 10 carry one mark each

Q.1 Mycoplasmas are different from other prokaryotes by

(A) presence of chitin in cell walls
(B) presence of murein in cell walls
(C) presence of proteins in cell walls
(D) absence of cell wall itself

Q.2 Selective media facilitate growth of only one kind of organism. Saboraud's medium is used to selectively isolate

(A) Coliform bacteria
(B) Gram positive bacteria
(C) Yeasts
(D) Acid fast organisms

Q.3 The cell walls of Gram positive bacteria contain two modified sugars, viz., N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM). They are covalently linked by

(A) α-1,4-glycosidic bond
(B) β-1,6-glycosidic bond
(C) α-1,6-glycosidic bond
(D) β-1,4-glycosidic bond

Q.4 The metal ion required for the enzymatic activities of nitrogenase and nitrate reductase is

(A) Molybdenum
(B) Iron
(C) Copper
(D) Zinc

Q.5 DNA gyrase is inhibited by

(A) Tetracyclin
(B) Nalidixic acid
(C) Aurintricarboxylic acid
(D) Cephalosporin

Q.6 Surface receptor (IgA) on the target cell is the site of binding of

(A) Hepatitis B virus
(B) HIV
(C) Rabies
(D) Influenza A, B viruses

Q.7 In anoxygenic photosynthesis, the green and purple bacteria do not use the following one as electron source

(A) H_2O
(B) H_2
(C) H_2S
(D) S (elemental sulphur)

Q.8 Marcophages are professional antigen-presenting cells. The protein molecule through which they present antigen in humans is

(A) Actin
(B) Interleukin
(C) HLA
(D) CD8

Q.9 The organism used for production of 'BT' bioinsecticide belongs to the genus

(A) Borrelia
(B) Bacillus
(C) Bordetella
(D) Blastobacter

Q.10 The bacteriophage with a single stranded circular DNA, as genome is

(A) T4 phage
(B) λ phage
(C) MS2
(D) ϕ x 174

Q.11 – 30 carry two marks each

Q.11 A gram negative rod showed on EMB agar colonies with dark centre and greenish metallic sheen. The organism is

(A) Salmonella
(B) Shigella
(C) *E. coli*
(D) Pseudomonas

Q.12 Two antibiotics have different sites of action in a bacterial cell. The frequency of occurrence of resistance to these antibiotics used singly are 10^{-5} and 10^{-6}, respectively. When the antibiotics are used in combination the frequency of occurrence of resistance to both antibiotics are

(A) 10^{-5} (B) 10^{-6} (C) 10^{-30} (D) 10^{-11}

Q.13 Species of penicillium, streptomyces and bacteria have been sources of the following group of important biomedical and industrial product(s)

(A) Methane and other gases
(B) Steroids
(C) Antibiotics
(D) Insulin, interferon

Q.14 In the normal human being the concentration(s) of various antibodies in the serum is (are) in the order

(A) IgM > IgA > IgG > IgE
(B) IgG > IgA > IgM > IgE
(C) IgE > IgG > IgM > IgA
(D) IgA > IgM > IgE > IgG

Q.15 The milk Streptococci produce acetoin that gets spontaneously oxidised yielding a flavoring agent (responsible for aroma of butter) is

(A) Acetone
(B) Acetyl CoA
(C) Butyric acid
(D) Diacetyl

Q.16 Syntrophy is the phenomenon where

(A) one microorganism degrades a substance and uses it
(B) one microorganism degrades the substance and the other microorganism uses it
(C) two or more microorganisms cooperate to degrade a substance which neither can do alone
(D) two or more organisms can independently degrade the substance but one inhibits the other from doing so

Q.17 Association coefficient S_{AB} is given by the expression : $2N_{AB}/(N_A + N_B)$

Organism A UCACUUCUG-3' PO_4
Organism B UAUCUAAUG-3' PO_4

S_{AB} value for organisms 1 and 2 is

(A) 0.25
(B) 0.50
(C) 0.75
(D) 1.00

Q.18 ATP synthetase is a multifunctional enzyme with a subunit constitution of $\alpha_3\beta_3\gamma\delta\varepsilon$. The pair of constituent subunits taking part in nucleotide binding and catalysis are

(A) $\alpha 1\beta 1$
(B) $\alpha 2\beta 2$
(C) $\alpha 3\beta 3$
(D) $\gamma\delta$

Q.19 The release of terminal D-ala from Park peptide during cross-linking, is catalyzed by

(A) carboxypeptidase
(B) protease
(C) aminopeptidase
(D) transpeptidase

Q.20 Which one of the following sequences has helped in identifying Eukaryotes, Eubacteria and Archeabacterial cell types?

(A) signature sequence
(B) signal sequence
(C) Shine-Dalgarno sequence
(D) aminoacid sequence

Q.21 In photoreactivation of UV-exposed cells the enzyme which synthesizes daughter DNA strand at 70 C and also proof-reads is

(A) Klenow fragment
(B) DNA pol I (*E. coli*)
(C) Pfu pol (*Pyrococcus furiosus*)
(D) Taq polymerase

Q.22 Leuconostoc mesenteroides when streaked and grown on sucrose medium produces large mucoid colonies. It is due to the synthesis of dextran layer having a chemical structure of

(A) α-glu-β-fru 2 ⟶ 6 β-fru
(B) α-fru-β-glu 2 ⟶ 6 β-glu
(C) β-fru-α-glu 1 ⟶ 6 α-glu
(D) β-glu-α-fru 2 ⟶ 6 α-fru

Q.23 Media containing spores and thermolabile constituents are sterilized by

(A) Pasteurization
(B) UV irradiation
(C) Dry heat
(D) Tyndallization

Q.24 A highly aerobic and metabolically versatile organism used in oil-spill-clearing is

(A) *Mycobacterium smegmatis*
(B) *Azotobacter vinelandii*
(C) *Pseudomonas cepacia*
(D) *Leuconostoc mesenteroides*

Q.25 Penicillin and lysozyme prevent synthesis and cause lysis, respectively, of cell walls of

(A) *Micrococcus lysodeikticus*
(B) *Escherichia coli*
(C) *Saccharomyces cerevisiae*
(D) *Methanobacterium barkeri*

Q.26 In Adansonian numerical taxonomy two organisms (a) and (b) tested positive and/or negative to a battery of tests

Number of tests positive in both (a) and (b) = 80
Number of tests positive in (a) only = 6
Number of tests positive in (b) only = 4
Number of tests negative in both (a) and (b) = 10

Similarity coefficient S_j is

(A) 0.88
(B) 0.77
(C) 0.66
(D) 0.55

Q.27 In Calvin cycle, RubisCO incorporates CO_2 into ribulose 1,5-bisphosphate (1^{st} 6 carbon compound), which rapidly splits into

(A) glyceraldehyde-3-P
(B) 2,3-phosphoglyceric acid
(C) 3-phosphoglycerate
(D) 1,3-diphosphoglycerate

Q.28 A bacterial culture had an initial cell density of 10^3 cells/ml. In 6 hours the cell density reached 10^6 cells/ml. Given the formula for the number of generations,

$n = (\log_{10}N_t - \log_{10}N_0) \ / \ 0.301$

The number of generations (n) the cells have undergone is

(A) 3
(B) 10
(C) 15
(D) 20

Q.29 Zymomonas mobilis metabolises glucose by Entner-Doudoroff pathway. In this pathway dehydratase converts 6-phosphogluconic acid into

(A) phosphogluconic acid
(B) 2-keto-6-phosphogluconic acid
(C) 2-keto-6-deoxygluconic acid
(D) 2-keto-3-deoxyphosphogluconic acid

Q.30 When a 'pseudomonad' is wet-mounted and observed by microscopy, the motility stops after a few minutes. Motility is restored by adding arginine solution because

(A) Arginine replenishes amino acid pool
(B) Arginine metabolism yields ATP
(C) Arginine gets hydrolysed to citrulline and ammonia
(D) Arginine metabolism leads to the formation of other amino acids

End of Section M