



Previous Year Solved Question Paper
of

G.A.T.E. (XL) 2003

LIFE SCIENCES

XL: Microbiology

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING



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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 Macrophages 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, streptomycetes 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' PO₄

Organism B UAUCUAAUG-3' PO₄

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 $\alpha_3\beta_3\gamma\delta\epsilon$. 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 Archeobacterial 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) $\alpha\text{-glu-}\beta\text{-fru } 2 \longrightarrow 6 \beta\text{-fru}$
- (B) $\alpha\text{-fru-}\beta\text{-glu } 2 \longrightarrow 6 \beta\text{-glu}$
- (C) $\beta\text{-fru-}\alpha\text{-glu } 1 \longrightarrow 6 \alpha\text{-glu}$
- (D) $\beta\text{-glu-}\alpha\text{-fru } 2 \longrightarrow 6 \alpha\text{-fru}$

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 (1st 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

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