



Previous Year Solved Question Paper
of

G.A.T.E. (XL) 2012

LIFE SCIENCES

XL: K Microbiology

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING



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GATE XL 2012 K :**MICROBIOLOGY Q. 1 – Q. 10 carry one mark****each.**

- Q.1 Which ONE of the following components is NOT an electron acceptor during anaerobic respiration?
(A) Lactate (B) Carbonate (C) Nitrate (D) Sulphate **A**
- Q.2 Bergey's Manual of Systematic Bacteriology groups bacteria into species according to their
(A) nutritional requirement
(B) phylogenetic relationships
(C) pathogenic properties
(D) morphology **B**
- Q.3 An auxotrophic mutant arises spontaneously in a wild type *E.coli* culture growing in a rich medium. Which ONE of the following techniques will ensure the isolation of the auxotrophic mutant?
(A) Replica plating (B) Streaking for single colonies
(C) Pour plating method (D) Direct microscopic observation **A**
- Q.4 Which ONE of the following mutants is used to carry out genetic analysis to determine the function of an essential gene?
(A) Knock out mutant (B) Deletion mutant **D**
(C) Insertion mutant (D) Temperature sensitive mutant
- Q.5 An *E.coli* mutant constitutive for the *lac* operon was mated with a wild type strain. The merodiploid thus obtained was inducible by lactose. This observation indicates that the original mutation is
(A) dominant (B) trans-dominant (C) recessive (D) cis-dominant **C**
- Q.6 A rich medium is inoculated with a bacterium that divides every 30 minutes. The number of bacteria at the end of 50 hours is
(A) 2×10^{10} (B) 2×10^{20} (C) 1×10^{50} (D) 1×2^{100} **D**
- Q.7 Which ONE of the following statements about *E.coli* is NOT true ?
(A) *E.coli* was the first disease-causing bacterium identified by Robert Koch
(B) *E.coli* is part of the normal microbiota of humans
(C) Certain *E.coli* strains can cause bloody diarrhoea **A**
(D) *E.coli* is beneficial to human
- Q.8 Antibody coated pathogens are recognized by effector cells through
(A) CD4 receptor (B) F_C receptor (C) CD8 receptor (D) IFN gamma receptor **B**

Q.9 Match the disease in **Group I** with their corresponding organism in **Group II**

Group I

- P. African sleeping sickness
- Q. Rocky mountain spotted fever
- R. Mumps
- S. Filariasis

Group II

- I. Rubulavirus
- II. Trypanosoma brucei
- III. Wuchereria bancrofti
- IV. Rickettsia rickettsii
- V. Leishmania donovani

- (A) P-III, Q-V, R-II, S- I
- (B) P-II, Q-I, R-III, S- IV
- (C) P-II, Q-IV, R-I, S- III
- (D) P-I, Q-V, R-II, S- IV

C

Q.10 Select the technique most appropriate to demonstrate that lactose induces the synthesis of β -galactosidase enzyme.

- (A) Northern Blot
- (B) Western Blot
- (C) Quantitative PCR
- (D) Southern Blot

B

Q. 11 - Q. 20 carry two marks each.

Q.11 Frederick Griffith used smooth (S) and rough (R) strains of *Streptococcus pneumoniae* in his classical experiment that showed DNA might be the genetic element. Which ONE of the following observations gave the clue for this discovery?

- (A) R strain became S strain when mixed with heat killed S strain
- (B) R strain remained R strain when mixed with heat killed S strain
- (C) S strain became R strain when mixed with heat killed R strain
- (D) R strain became S strain when mixed with live S strain

A

Q.12 Entry of λ phage lysogen to lytic phase is triggered by

- (A) mutation in the λ genome
- (B) loss of co-operativity in binding of λ repressor
- (C) increase in the λ repressor concentration
- (D) decrease in *recA* function

B

Q.13 Match the Phylum in **Group I** with their characteristic motility appendage listed in **Group II**

Group I

- P. Archaezoa
- Q. Amoebozoa
- R. Ciliophora
- S. Apicomplexa

Group II

- I. Flagella
- II. Fimbriae
- III. Pseudopods
- IV. Cilia
- V. Pili

- (A) P-V, Q-II, R-IV, S-IV
- (B) P-II, Q-I, R-IV, S-III
- (C) P-I, Q-III, R-IV, S-I
- (D) P-III, Q-II, R-IV, S-V

C

- Q.14 Ten bacteria were inoculated into a rich medium. If at the end of ten hours the total number of cells is 10^4 , then the number of elapsed generations and the generation time respectively is
(A) 10, 120 minutes (B) 10, 60 minutes (C) 20, 30 minutes (D) 40, 15 minutes **B**
- Q.15 The first step in the replication of a virus with the reverse transcriptase deals with the synthesis of
(A) complementary strand of RNA
(B) double stranded RNA
(C) complementary strand of DNA
(D) double stranded DNA **C**
- Q.16 An *E.coli* mutant defective for an enzyme is unable to grow on acetate but grows on glycerol as the sole carbon source. Which ONE of the following enzymes is likely to be defective in this mutant?
(A) Isocitrate dehydrogenase (B) Glyceraldehyde 3-phosphate dehydrogenase
(C) Pyruvate dehydrogenase (D) Isocitrate lyase **D**
- Q.17 Which one of the following pairs of bacterial species fixes atmospheric Nitrogen?
(A) *Clostridia* and *Rhizobia*
(B) *Clostridia* and *Lactobacillus*
(C) *Rhizobia* and *Enterococcus*
(D) *Actinomyces* and *Mycoplasma* **A**
- Q.18 Nalidixic acid inhibits gyrase activity. Resistance to this antibiotic arises mainly due to
(A) nonsense mutation in the gyrase gene (B) deletion mutation in the gyrase gene
(C) missense mutation in the gyrase gene (D) degradation of the gyrase gene product **C**
- Q.19 Transformation of normal cyanobacterial cells into heterocysts involves
(A) synthesis of nitrogenase and retention of photosystem I
(B) synthesis of nitrogenase and loss of photosystem I
(C) loss of nitrogenase but retention of photosystem I
(D) loss of both nitrogenase and photosystem I **A**
- Q.20 Methane belched (eructation) out by cattle arises from the carbon dioxide produced
(A) during normal respiration
(B) oxidation of food stuff occurring in mitochondria
(C) lactic acid fermentation occurring in muscles
(D) bacterial fermentation occurring in the gut **D**

END OF SECTION - K

L : ZOOLOGY**Q. 1 – Q. 10 carry one mark each.**

- Q.1 Trees in the equatorial region of earth supply oxygen into the atmosphere that sustains species living in distant polar regions. This relationship is called as
- (A) mutualism (B) symbiosis
(C) commensalism (D) parasitism
- Q.2 A swimmer is preparing to swim 'non-stop' across the English channel (a distance of 34 kilometers). Consumption of which of the following category of food/s should the swimmer increase to accomplish this feat?
- (A) Proteins (B) Fats
(C) Proteins and Carbohydrates (D) Carbohydrates
- Q.3 Some species of beetles and fishes can survive at sub freezing temperature. They accomplish this by maintaining cellular integrity using one of the following mechanisms.
- (A) Expressing anti-freeze proteins
(B) Accumulating fats
(C) Increasing accumulation of complex polyols
(D) Reducing the availability of total water in the body
- Q.4 Zygotic genes required for the formation of a group of adjacent segment in the developing *Drosophila* embryo is called
- (A) Maternal gene (B) Pair rule gene (C) Homeotic gene (D) Gap gene
- Q.5 A typical receptor senses extracellular stimuli by virtue of its localization on plasma membrane. The receptor to which of the following ligands is an exception to this rule?
- (A) γ -amino butyric acid (B) Acetylcholine
(C) Estrogen (D) Luteinizing hormone
- Q.6 The relationship between genes and enzymes was first suggested by the discovery of
- (A) in-born errors of metabolism in human
(B) sexual phenotype in insects
(C) metabolic pathways in fungi
(D) gene regulation in bacteria
- Q.7 The blind spot in the retina is blind because of which of the following reasons?
- (A) It is the region where the optical nerve leaves the retina.
(B) The opsin is not expressed in this region.
(C) It lies in the shadow of pupil.
(D) It is the junction between rods and cones.
- Q.8 Lamprey, a jawless fish, belongs to which one of the following 'Classes'?
- (A) Myxini (B) Cephalaspilomorphi
(C) Conodonts (D) Anaspida
- Q.9 Chorionic gonadotropin plays an important role in the establishment and maintenance of pregnancy and is synthesized in the placenta of
- (A) Cattle (B) Pigs (C) Mice (D) Human

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