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GATE 2015

MICROBIOLOGY - XL-K

K: MICROBIOLOGY

Q. 1 –	- Q. 10 carry one mark each.			
Q.1	Lophotrichous bacteria have(A) one flagellum(B) a cluster of flagella at one or both ends(C) flagella that are spread evenly over the(D) a single flagellum at each pole	whole surface		
Q.2	2.2 In aerobic respiration, the final electron acceptor is			
	(A) hydrogen (B) nitrogen	(C) sulfur (D) oxygen		
Q.3	A process in which fatty acids are shortene CoA is known as (A) photophosphorylation	hortened by two carbons at a time resulting in release of acetyl- (B) carboxylation		
	(C) β -oxidation	(D) oxidative phosphorylation		
Q.4	Limulus Amoebocyte Lysate (LAL) assay i	s used to identify the presence of		
	(A) endotoxin (B) exotoxin	(C) anthrax toxin (D) tetanus toxin		
Q.5	Q.5 Match scientists in Group I with terms related to their major scientific contribution			
	Group I (P) Sanger (Q) Watson and Crick (R) Waksman (S) Bordet	Group II (i) DNA double helix structure (ii) DNA sequencing (iii) Complement (iv) Streptomycin (v) Immune tolerance (B) P-ii, Q-iii, R-iv, S-v		
	(A) P-iii, Q-iv, R-ii, S-i			
	(C) P-iv, Q-i, R-ii, S-v	(D) P-ii, Q-i, R-iv, S-iii		
Q.6	Base-pair substitutions caused by the chemical mutagen ethyl methane sulfonate are a result of			
	(A) hydroxylation (B) alkylation	(C) deamination (D) intercalation		
Q.7	The classical way of representing taxono ORDER is	omic hierarchy of living organisms in ASCENDING		
	(A) genus, species, class, order, family	(B) species, genus, order, family, class		
	(C) species, genus, family, order, class (D) genus, species, order, class, family			
Q.8	Of the following, the most effective method to kill bacterial endospores is			
	(A) moist heat sterilization	(B) UV irradiation		



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Q.9	The class of enzymes, which catalyze addition of groups to double bonds and non-hydrolytic removal of chemical groups, is				
	(A) oxidoreductase (B) transferase	(C) hydrolase	(D) lyase		
Q.10	Anammox organisms carry out				
	(A) anaerobic reduction of NO_3^-	(B) anaerobic oxi	idation of NH ₄ ⁺		
	(C) aerobic oxidation of NH_4^+	(D) aerobic oxida	ation of NO_2^-		
0 11	- 0 20 carry two marks each				

- Q.11 Which combination of the following statements about specialized transduction is **TRUE**?
 - (P) Specialized transducing phages can transport only certain genes between bacteria
 - (Q) Specialized transducing phages can transport any gene between bacteria
 - (R) Phage P22 is a specialized transducing phage
 - (S) Phage lambda (λ) is a specialized transducing phage
 - (A) P and S only

(B) Q and R only

(D) Q and S only

- (C) P and R only
- Q.12 Which combination of profiles in the following figure accurately represents the transport rate of glycerol and oxygen into *E. coli* cells as a function of their extracellular concentration?



- Q.13 Which one of the following about the standard free energy change ($\Delta G^{\circ\prime}$) and the equilibrium constant (K_{eq}) of an exergonic reaction, at pH 7.0, is **TRUE**?
 - (A) $\Delta G^{\circ\prime}$ is positive and K_{eq} is less than one
 - (B) ΔG° is negative and K_{eq} is less than one
 - (C) $\Delta G^{\circ\prime}$ is negative and K_{eq} is greater than one
 - (D) $\Delta G^{\circ\prime}$ is positive and K_{eq} is greater than one
- Q.14 An oil immersion objective of a light microscope has a numerical aperture of 1.25. Using the Abbé equation, the maximum theoretical resolving power (in nm) of the microscope with this objective and blue light (wavelength = 450 nm) is _____

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- Q.15 The working volume (in liter) of a chemostat with 0.1 h^{-1} dilution rate and 100 ml/h feed flow rate is_____
- Q.16 If the decimal reduction time for spores of a certain bacterium at 121°C is 12 seconds, the time required (in minutes) to reduce 10¹⁰ spores to one spore by heating at 121°C is _____
- Q.17 The doubling time (in minutes) of a bacterium with a specific growth rate of 2.3 h⁻¹ in 500 ml of growth medium is _____
- Q.18 A bacterial culture is grown using 2.0 mg/ml fructose as the sole source of carbon and energy. The bacterial biomass concentrations immediately after inoculation and at the end of the growth phase are 0.1 mg/ml and 0.9 mg/ml, respectively. Assuming complete utilization of the substrate, the bacterial growth yield (*Y*) on fructose is _____
- Q.19 The volume (in ml) of a 1.0 mg/ml stock solution of ampicillin to be added to 0.1 liter of growth medium for achieving a final ampicillin concentration of 50 µg/ml is _____
- Q.20 An *E. coli* strain is grown initially on glucose as the sole carbon source. Upon complete consumption of glucose following 12 h of growth, lactose is added as the sole carbon source and the strain is further grown for 12 h. Assuming that the *E. coli* strain has a functional wild type *lac* operon, which one of the following profiles is the most **ACCURATE** representation of β -galactosidase (β -gal) expression (in arbitrary units)?



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