DCC-003-001527   Seat No. _____

Third Year B. Sc. (CBCS) (Sem. V) Examination

April / May – 2015

MB-503 : Microbiology

(Prokaryotic Metabolism)

Faculty Code : 003
Subject Code : 001527

Time : $2\frac{1}{2}$ Hours]   (Total Marks : **70**

Instructions : (1)   There are two sections. Both are compulsory.
(2)   Answers of Section-1 are to be written in main answer sheet only.
(3)   Numbers written on right indicate marks.

SECTION - I

1   Multiple choice questions :   **20**

(1)   Stigmasterol and Beta-sitosterol are the lipids associated with..

(A)   Bacterial cell membrane

(B)   Animal cell membrane

(C)   Plant cell membrane

(D)   All of above

(2)   Anion exchange band 3 protein is found on the membrane of _____ and is responsible for _____

(A)   Intestinal epithelium, Glucose uptake

(B)   RBC, Glucose uptake

(C)   Gm –ve bacteria, Iron uptake

(D)   RBC, Chloride shift

(3)   After getting charged by PMF, the TonB protein interacts with........

(A)   FepA   (B)   FepB

(C)   FepC   (D)   ExbD

(4) Which of the following enzyme kinetics equation is equivalent to the mathematical equation y = ax + b

   (A) Michaelis Menten equation

   (B) Briggs Haldane equation

   (C) LIneweaver Burke equation

   (D) (A) and (B)

(5) Which of the following enzyme is involved in glyoxylate bypass?

   (A) Isocitrate dehydrogenase

   (B) Isocitrate decarboxylase

   (C) Isocitrate kinase

   (D) Isocitrate lyase

(6) Oxygen containing carotenoids are

   (A) Carotenes   (B) Xanthophylls

   (C) Phycobilins   (D) Anthocyanins

(7) Make suitable pair

1	Emerson effect	a	Photolysis of water
2	Hill reaction	b	C4 cycle
3	Calvin's cycle	c	C3 cycle
4	Hatch and Slack cycle	d	Photosystem-I & II

   (A) 1-a, 2-b, 3-c, 4-d   (B) 1-a, 2-c, 3-d 4-a

   (C) 1-c, 2-d, 3-a, 4-b   (D) 1-d, 2-a, 3-c, 4-b

(8) Free energy difference becomes standard free energy difference in which situation ?

   (A) When [S] = [P]

   (B) When Temperature is 0 K

   (C) When Entropy is increased

   (D) When K eq becomes 0.1

(9) An example of the oxidative deamination is

(A) glutamate =.hexanoic acid + NH_3

(B) aspartate + α-ketoglutarate = glutamate + oxaloacetate

(C) glutamate = α-ketoglutarate + NH_3

(D) aspartate + hexanoic acid = glutamate + Oxaloacetate

(10) Which statement best describes the oxidation of odd chain fatty acids?

(A) Additional specific enzymes are needed for the oxidative process

(B) One carbon is removed in one cycle

(C) End product is propionyl co A

(D) Hydroxy fatty acids are produced

(11) The proper sequence of stages in glycolysis is

(A) oxidation, cleavage and rearrangement, ATP generation, glucose priming

(B) cleavage and rearrangement, glucose priming, ATP generation, oxidation

(C) glucose priming, oxidation, cleavage and rearrangement, ATP generation

(D) glucose priming, cleavage and rearrangement, oxidation, ATP generation

(12) Which of the following is true for an exergonic reaction ?

(A) $\Delta G = 0$ (B) $\Delta G > 0$

(C) $\Delta G < 0$ (D) $\Delta G = \infty$

(13) In non-cyclic photophosphorylation, the electron emitted by P_{680} is replaced by electron from

(A) NADP   (B) Water

(C) Ferridoxin   (D) Chlorophyll-a

(14) Which of the following condition favors purple membrane synthesis?

(A) Aerobic Condition and Light

(B) Anaerobic Condition and Light

(C) Anaerobic condition and Dark

(D) Aerobic condition and Dark

(15) In signal transduction pathway enzyme adenylate cyclase is responsible for the production of :

(A) Cell surface receptor

(B) Primary messenger

(C) Secondary messenger

(D) Signalling molecule

(16) During oxidative phosphorylation, the proton motive force that is generated by electron transport is used to:

(A) create a pore in the inner mitochondrial membrane.

(B) generate the substrates (ADP and Pi) for the ATP synthase.

(C) induce a conformational change in the ATP synthase.

(D) oxidize NADH to NAD+

(17) Which precursor is used for synthesis of aromatic amino acids?

(A) 6-P-gluconate   (B) Ribulose 5-P

(C) Xylulose 5-P   (D) Erythrose 4-P

(18) Find the correct equation for finding ΔG.

(A) $\Delta G = \Delta H - T \Delta S$

(B) $\Delta G = \Delta S - T \Delta H$

(C) $\Delta G = \Delta S + T \Delta S$

(D) $\Delta G = \Delta T - H \Delta S$

(19) Which of the following enzyme is involved in ED pathway?

(A) 2-keto-3-deoxyphosphogluconate aldolase

(B) Glucose-6-P decarboxylase

(C) Transketolase

(D) 6-phoshpho gluconate dehydrogenase

(20) Which of these cofactors, participates directly in most of the oxidation-reduction reactions in the fermentation of glucose to lactate?

(A) ATP

(B) FAD/FADH2

(C) Glyceraldehyde 3-phosphate

(D) NAD+/NADH

SECTION - II

2 (a) Write any **three** : 6

(1) Discuss the importance of ATP in metabolism.

(2) What is the role of Adenylate Cyclase in signal transduction ?

(3) Draw a labeled diagram of FoF1 ATPase.

(4) What are ion channels and ion pumps ?

(5) Explain double reciprocal plot.

(6) Explain the structure of Peptidoglycan.

(b) Write any **three** : 9

(1) Write a note on Glyoxylate cycle.

(2) Explain iron transport mechanisms.

(3) Explain Stickland reaction in brief.

(4) What is free energy difference ? How can it be measured ?

(5) Describe specialized metabolism of Nitrifying bacteria and Sulfur oxidizers.

(6) What are special metabolic strategies of Hydrogen bacteria ?

(c) Write any **two** :   10

    (1) Derive Michaelis Menten equation for non regulatory enzymes.

    (2) Discuss in detail – Phosphotransferase system.

    (3) Explain Kreb's cycle with regulation.

    (4) Write a note on bacterial photosynthetic pigments.

    (5) Explain the patterns of carbohydrate fermentation in lactic acid bacteria.

3 (a) Write any **three** :   6

    (1) Write examples of sulfur oxidizer and nitrifying bacteria.

    (2) Mention any four precursor metabolites with structure.

    (3) What are Siderophores ?

    (4) Write the reversible oxidation reduction reaction of quinones.

    (5) What is CAM ? Explain in brief.

    (6) Discuss the phosphorylation phase of glycolysis.

(b) Write any **three** :   9

    (1) Explain signal transduction cascade.

    (2) Write a note on Gm negative eubacteria.

    (3) Discuss the conformational changes in regulatory enzymes.

    (4) Explain C4 pathway in brief.

    (5) What is the use of mutants in studying metabolic pathways ?

    (6) Explain HMP shunt.

(c) Write any **two** : **10**

(1) Describe pathway of Peptidoglycan biosynthesis.

(2) Write a note on the concept of bioenergetics.

(3) Explain various modes of ATP generation.

(4) Describe the metabolism of any two chemo autotrophs.

(5) Explain the major components of cell membrane in detail.

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