WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-II Examinations, 2018

MICROBIOLOGY-HONOURS

PAPER- MCBA-III

Time Allotted: 4 Hours | Full Marks: 100

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

Use Separate Answer Scripts for each Group and mention Group on Answer Scripts.

Group-A

Answer Question No. 1 and any *four* questions from the rest

1. Answer any ***five*** questions from the following: 2×5 = 10

   (a) What would happen for mutant cells that can not degrade cyclins?

   (b) Why is it more important for DNA to be replicated more accurately than transcribed accurately?

   (c) Why is membrane fluidity important to cell?

   (d) Define negative regulation of gene expression. Give one example where negative regulation takes place in *E.Coli*.

   (e) What are cdus?

   (f) What is symport? Give example.

   (g) What are class I and class II release factors?

   (h) What is processivity?

2. (a) What is the difference between operon and regulon? 2

   (b) Schematically represent the fate of tryptophan operon in presence or absence of tryptophan. 3

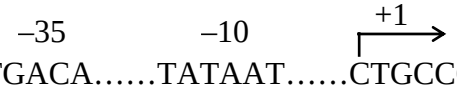
   (c) To activate lac operon, why IPTG instead of lactose is used as inducer molecule? What is the function of permease protein? 2+1

   (d) Why is glucose called “catabolic repressor”? 2

3. (a) What is the abortive initiation of transcript? 2

   (b) What is intrinsic termination of transcription? 2

   (c) What will be the sequence of the transcription that is coded from the gene given below: 2



(d) What is the function of σ factor? 2

(e) Describe the role of SSB protein. 2

4. (a) What is meant by cell cycle check point? What is its importance? 2+1

(b) Mention the function of Na^+/K^+ ATPase. 2

(c) Design an experiment to determine the mating type of a given yeast. 3

(d) What is meant by '9+2' structure of eukaryotic flagella and cilia? What kind of energy powers the movement of these appendages? 2

5. (a) How does the proofreading activity of aminoacyl tRNA synthetase increase the fidelity of protein synthesis? 3

(b) What is factor G? Describe the process where the factor is involved. 1+2

(c) How can you prove that DNA replication takes place in 5′-3′ direction? 3

(d) What is Aporepressor? 1

6. Write short notes on: 2.5×4 = 10

(a) ABC transporter

(b) Mode of action of chloramphenicol

(c) Signal peptide

(d) SSB protein.

7. (a) What is membrane potential and why is it important? State two important membrane proteins that are involved in establishing this potential. 2+2

(b) What is positive and negative control of Lac operon? 2+2

(c) What is Aporepressor? Why is it so called? 1+1

8. (a) Write the difference between passive and facilitated transport. 3

(b) What is the function of 'Shine-Dalgarno' sequence? 2

(c) Though $tRNA^{tyr}$ contains approximately 75 bases, it is extremely stable. Explain with reason. 2

(d) What are transposons? Give example. 1+2

Group-B

Answer Question No. 9 and any *four* questions from the rest

9. Answer any ***five*** questions from the following: 2×5 = 10

(a) State the significance of Pentose Phosphate pathway.

(b) What is Lineweaver-Burk plot? Comment on its advantages and disadvantages.

(c) Name two ATP requiring enzymes in TCA cycle.

(d) Define specific activity of an enzyme. Correlate this parameter to the purity of the enzyme.

(e) Mention two inhibitors of electron transport chain along with the steps that are inhibited.

(f) How does bicarbonate participate in the reaction catalyzed by acetyl CoA Carboxylase?

(g) Name the amino acid used to carry ammonium ions other than glutamine.

(h) What are Abzyme and Ribozyme?

10.(a) How does fructose enter the glycolytic pathway? 2

(b) Distinguish between β-oxidation of saturated and unsaturated fatty acids. 4

(c) Which steps of glycolysis are strictly irreversible? Discuss the significance of these steps. 2+2

11.(a) Define enzyme activity with its unit. 2

(b) What function of V_{max} will be observed when [S] = 6 K_m and [S] = 7 K_m? 2

(c) What are the assumptions of Michaelis Menten equation for initial velocity? 2

(d) What are the assumptions on which Haldane's modification of Michaelis Menten equation is based? 2

(e) Name the co-enzyme for transaminase or amino transferase. Mention the precursor vitamin of that co-enzyme. 2

12.(a) Under anaerobic condition, end product of glycolysis can have two consequences. Explain with example. 2

(b) How many ATPs are generated from the conversion of glucose to pyruvate? Show the reactions where ATPs are either required or generated. 2+2

(c) Explain the mechanism of feedback inhibition with an example. 2

(d) Distinguish between bacterial and animal aldolases. 2

13.(a) Calculate the ATP yield from mitochondrial β-oxidation of palmitate when TCA cycle is operative. (Take 1 NADH = 2.5 ATP and 1 $FADH_2$ = 1.5 ATP). 3

(b) In which step of urea cycle the second nitrogen of urea enters? Briefly explain the reaction step with the name of enzyme and coenzyme. 3

(c) Which steps of TCA cycle will be inhibited by excess of NADH? Give the names of the enzymes involved. 4

14.(a) During the reversal of glycolysis in gluconeogenesis, which steps of glycolysis are bypassed and how? 4

(b) What will be the role of inhibitors of glycolysis during gluconeogenesis? 2

(c) Justify why glutamic acid plays a pivotal role in amino acid metabolism. 3

(d) Name an enzyme present exclusively in glyoxylate cycle. 1

15.(a) How can you uncouple electron transport from oxidative phosphorylation? 2

(b) Isolated F_1 units of ATP synthase is capable of catalyzing the hydrolysis of ATP but not the reverse reaction. Explain. 4

(c) How can the sequence of electron carriers in mitochondrial electron transport chain be experimentally shown? 4

16.(a) What are the steps in glycolysis and TCA cycle that involve substrate level phosphorylation? Explain with the names of enzymes and co-enzymes involved. 3

(b) In energy metabolism, what is called 'futile cycle'? 2

(c) How does hexokinase differ from glucokinase? 2

(d) How does SO_4^{2-} ion act as an electron acceptor in anaerobic respiration? 3

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-II Examinations, 2018

MICROBIOLOGY-HONOURS

PAPER- MCBA-IV-A

Time Allotted: 2 Hours | Full Marks: 50

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

Answer Question. No. 1 and any *four* questions from the rest

1. Answer any ***five*** questions from the following: 2×5 = 10

   (a) Why using NO_3^- or NO_2^- as food preservative is questionable? 2

   (b) What is bacteroid? 2

   (c) What is putrefaction? 2

   (d) Stored grains are easily spoiled by molds. Why? 2

   (e) "Milk is an excellent media for growth". Justify the statement. 2

   (f) What is vermicomposting? 2

   (g) What is protocooperation? Give example. 2

   (h) What is the role of phosphate solubilizing microbes? 2

2. (a) What are the steps of root nodule formation in Rhizobium-Legume association? 4

   (b) What is nod gene? 1

   (c) What is Alternative nitrogenase? What is its role? 2+2

   (d) Site an example of non-leguminous association of Nitrogen fixation. 1

3. (a) Name the organisms responsible for spoilage of canned food. 2

   (b) What is flat sour spoilage? Name the organism responsible for flat sour spoilage. 2+2

   (c) Distinguish between food borne infection and food borne intoxication. 3

   (d) What is UHT? 1

4.	(a)	"Egg white has bactericidal property". Justify.	3
	(b)	What are roquefort and camembert cheese?	2
	(c)	Name the microorganism essential for yoghurt formation. What is their role in yoghurt preparation?	1+2
	(d)	Name one organic and one inorganic chemical preservatives.	2
5.	(a)	Microflora of meat and microflora of fruits are not the same always. Discuss.	3
	(b)	Define phyllosphere and rhizosphere.	4
	(c)	Describe the role of microbes in nitrogen cycle.	1.5
	(d)	What is mycorrhiza?	1.5
6.	(a)	What is humus? State its importance.	3
	(b)	Name two water borne microorganisms along with the diseases they cause.	4
	(c)	How is *E. Coli* detected in contaminated water?	3
7.	(a)	Why is it important to reduce the BOD of waste waters before they are discharged into rivers or lakes?	2
	(b)	Name the predominant microbes of anaerobic sludge digester. What reactions occur in anaerobic sludge digester?	1+2
	(c)	What is the causative agent, symptoms and treatment of cholera?	3
	(d)	How is nitrogenase protected in free living aerobic nitrogen fixers?	2
8.	(a)	Briefly describe the different microbial groups of soil.	4
	(b)	Give a brief account on competitive exclusion and parasitism.	4
	(c)	What are the different techniques of room sterilization?	2