



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours Part-II Examination, 2020

MICROBIOLOGY

PAPER: MCBA-III (A+B)

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.*

GROUP-A

Question No. 1 is compulsory. Answer any two from the rest

1. Answer any *five* questions from the following: 1×5 = 5
 - (a) Mention the role of SSB protein in DNA replication.
 - (b) Name one antibiotic that inhibits transcription.
 - (c) What is cyclin?
 - (d) Name three termination codons.
 - (e) What is the significance of TATA box?
 - (f) Mention the role of DNA gyrase.
 - (g) What is antiport?
 - (h) What is the function of lac z in lac operon?

2. (a) What do you mean by nick translation? Show the process by diagram. State the enzyme responsible for it. 3+1
 - (b) Compare and contrast the role of DNA polymerase I and III in bacterial replication. 3
 - (c) What is primosome complex? 3

3. (a) Differentiate between 'flagella' and 'cilia'. 3
 - (b) What are ionophores? 2
 - (c) What is meant by membrane fluidity and on which factors does it depend? 2+3

4. (a) Describe the functions of the different subunits of bacterial RNA polymerase. 2½
 - (b) Describe the mechanism of rho-dependent transcription termination. 2½
 - (c) What are the different mating types of yeast? Briefly explain the mechanism of the mating type-switching. 2+3

5. (a) In bacteria transcription and translation are coupled process. — Explain. 2
 - (b) How in bacteria 30S initiation complex is formed during translation? 3
 - (c) What is anti-sense RNA? 2
 - (d) Describe the process of attenuation in *trp* operon with diagram. 3

GROUP-B

Question No. 6 is compulsory. Answer any *two* from the rest

6. Answer any *five* questions from the following: 1×5 = 5
- Define K_M of an enzyme.
 - Which enzyme is called ‘pacemaker’ of glycolysis?
 - What is the common structural feature of ATP, FAD and NAD^+ ?
 - What is glucogenic amino acid? Give one example.
 - What is ribozyme?
 - In which of the enzyme inhibition both K_M and V_{max} alters?
 - Name an enzyme present exclusively on glyoxylate cycle.
 - Name the TCA cycle intermediate produced in urea cycle.
7. (a) Illustrate the reactions with enzymes and coenzymes in TCA cycle that are involved in generation of NADH. 3
- (b) Name one inhibitor of glycolysis, TCA cycle and electron transport chain and corresponding reactions those are inhibited. $1\frac{1}{2}+3$
- (c) What is photophosphorylation? Distinguish photophosphorylation from oxidative phosphorylation. $1+1\frac{1}{2}$
8. (a) Briefly describe the role of carnitine in fatty acid metabolism. 3
- (b) Why do you think concentration of ketone bodies become higher in diabetes? 2
- (c) Calculate the ATP yield from mitochondrial beta oxidation of palmitate when TCA cycle is operative. (1 NADH = 2.5 ATP, 1 $FADH_2$ = 1.5 ATP) 5
9. (a) Which steps of urea cycle require ATP? 2
- (b) How does carbamoyl phosphate synthase I differ from carbamoyl phosphate synthase II? 3
- (c) Show transamination reaction of amino acids with necessary enzymes and coenzymes involved. 3
- (d) If glucose is in excess of normal demands, it is converted to glucose-6-phosphate specifically in liver. Justify the statement. 2
- 10.(a) What is feedback inhibition? Describe with suitable example. 3
- (b) What is non-competitive inhibition? How can non-competitive inhibitor be distinguished from competitive inhibitor? 2+2
- (c) Calculate K_I for a non-competitive inhibitor if $[I] = 2 \times 10^{-4}$ M, which yields 75% inhibition of an enzyme catalysed reaction. 3

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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