



**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours 4th Semester Examination, 2024

**MCBACOR08T-MICROBIOLOGY (CC8)**

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.  
Candidates should answer in their own words and adhere to the word limit as practicable  
All symbols are of usual significance.*

**Question No.1 is compulsory and answer any four from the rest**

Answer any **four** questions from the following:

2×4 = 8

- (a) What is frameshift infidelity of DNA Polymerase?
- (b) What do you mean by Zygotic induction?
- (c) What is Weigle reactivation?
- (d) Define Phenotypic lag.
- (e) If two plasmids cannot be maintained in a single cell, what property is common to the plasmids? Explain your answer briefly.
- (f) What is meant by intrastrand cross link damage in DNA?
- (g) Name the molecules that act as pheromone in transformation of *Bacillus subtilis*.
- (h) What is a Composite transposon?

2. (a) Define Recombination repair.

2+2+2+2

(b) State different types of Recombination repair.

(c) What is DSGR?

(d) A mutation is isolated that cannot be induced to revert. What types of molecular changes might be responsible?

3. (a) In the Tn3 system which enzyme is responsible for the formation of a cointegrate? 1+2+(1+2)+2

(b) Which base sequences are duplicated when transposition occurs in Prokaryotes?

(c) What are Inverted repeats? Why are they common in most of the bacterial transposons?

(d) Name atleast four genetic phenomenon that are mediated by transposable elements.

4. What is self transmissible plasmid? Differentiate it from mobilizable plasmid. Why F<sup>+</sup> cells are unable to pair with another F<sup>+</sup> cell for conjugation? What is Hfr strain?

2+2+2+2

5. (a) Differentiate between HFT (High Frequency Transducing lysate) and LFT (Low Frequency Transducing lysate). 3+2+2+1
- (b) Why are  $\lambda$  specialized-transducing particles generated only by induction rather than by lytic infection?
- (c) Genes  $p$ ,  $f$  and  $q$  have times of entry of 7, 11 and 19 minutes respectively. What is the gene order and what are the map distances in time units, w.r.t. the transfer origin?
- (d) What is the function of a counterselective marker in a  $Hfr \times F^-$  mating?
5. (a) Experimentally prove that in natural transformation, only double stranded DNA can attach and single stranded DNA can enter the cytoplasm of a cell. 4+(1+2)+1
- (b) What is Artificial transformation? How it can be achieved?
- (c) What do you mean by natural competence?
7. (a) Mention the lesions in DNA which will be repaired by the following repair mechanisms (1×3)+2+2+1
- (i) Uracil DNA glycosylase
- (ii) MutY glycosylase
- (iii) Alkyltransferase.
- (b) What do you mean by Intergenic suppression?
- (c) Does a frameshift mutation always cause a phenotypic change? Give reasons for your answer.
- (d) What are Col Plasmids?
8. (a) What are episomes? Give one example. 2+(1+2)+3
- (b) Define copy number of a Plasmid. How can you regulate the copy number of a plasmid?
- (c) Briefly describe the regulatory mechanism of transformation in *Bacillus subtilis*.

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**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours 4th Semester Examination, 2024

**MCBACOR09T-MICROBIOLOGY (CC9)**

Time Allotted: 2 Hours

Full Marks: 40

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All symbols are of usual significance.*

**Question No. 1 is compulsory and answer any *four* questions from the rest**

1. Answer any *four* questions from the following: 2×4 = 8
  - (a) What is a satellite virus? Give example.
  - (b) Why does lambda infection gives opaque plaques while T4 infection gives clear ones?
  - (c) A phage is infecting bacterial host at an M.O.I of 10. What is its significance?
  - (d) What is TCID<sub>50</sub> value of a viral suspension?
  - (e) How many genes are there in M-13 genome? Among them which one is non essential?
  - (f) Why HIV is known as an oncogenic virus?
  - (g) What is the significance of segmented genome in certain viruses?
  - (h) What do you understand by the term "Super-Infection Immunity"?
2. (a) How T4 phage uses host RNA Polymerase to transcribe its own genome? 2+2+1+2+1
  - (b) What is Recombination dependent replication of T4 phage?
  - (c) Name the major antiterminator protein of lambda phage that controls the switching between lytic lysogenic cycle.
  - (d) If  $\lambda$  cI<sup>-</sup> strain is mixed with true  $\lambda$  phage and then allowed to infect *E. coli* cells, which type of plaques will be generated?
  - (e) What is the role of 'S' protein in lambda phage?
3. (a) How does TMV propagate within the plant system? How the arrangement of asymmetrical TMV Capsomeres gives rise to a symmetrical Capsid? (2+2)+2+2
  - (b) Why animal oncogenic viruses show Cancerous cell growth only within their non permissive hosts?
  - (c) Schematically show at least one mechanism by which tumour cells survive apoptosis.
4. (a) During excision of  $\lambda$  phage genome from *E. coli* chromosome, both integrase and excisionase enzymes are synthesized, but during integration only integrase enzyme is produced why? 3+1+2+2



- (b) How HIV infection causes Immunodeficiency?  
 (c) How EBV causes Cancer?  
 (d) What is Cytopathic effect?
- (a) Suppose you are suffering from fever. How you can confirm that the fever is caused by the infection of influenza virus? Design the experimental strategy.  $3+(2+1)+2$   
 (b) What is alternative splicing? Give example of virus show alternative splicing.  
 (c) Why enveloped viruses are often called "ether sensitive"?
5. (a) Describe the mode of action of Remdisivir.  $2+2+2+2$   
 (b) What is terminal redundancy?  
 (c) Why vaccine preparation against RNA viruses is difficult?  
 (d) Why common corona virus vaccines were developed targeting the S protein instead of the RdRP?
7. (a) Why Poliovirus cannot infect a wild type mice?  $2+3+2+1$   
 (b) Rifampicin does not inhibit the activity of "Polioviral RNA polymerase"—Explain.  
 (c) What is the role of IRES in Poliovirus?  
 (d) The pathogenicity of *Corynebacterium diphtheriae* is due to Corynebphage beta—Explain.
8. (a) Briefly describe the end point dilution assay for viral titre determination.  $3+2+2+1$   
 (b) Define oncogenes and Proto oncogenes.  
 (c) What do you understand by horizontal and vertical mode of transmission?  
 (d) Name the families of virus that belong to the order ligamenvirales according to ICTV classification.
9. (a) What do you mean by receptor mediated endocytosis? Name one animal virus that enters into its host via this mechanism.  $(2+1)+2+1+2$   
 (b) What is Zygotie induction?  
 (c) What is burst size?  
 (d) How bacteriophage can be purified from host bacterial cells?

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**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours 4th Semester Examination, 2024

**MCBACOR10T- MICROBIOLOGY (CC10)**

Time Allotted: 2 Hours

Full Marks: 40

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**Question No. 1 is compulsory and answer any four questions from the rest**

1. Answer any **four** questions from the following:

2×4 = 8

- (a) What are bacteriocins? Give example.
- (b) What do you mean by single cell protein? Give example.
- (c) Pasteurization is not a method of sterilization. Justify.
- (d) What is salting in sauerkraut production?
- (e) How organic acids and their esters are used in food preservation?
- (f) What is HACCP?
- (g) Why is milk considered as an excellent medium for bacterial growth?
- (h) Mention the mode of transmission of salmonellosis.

2. (a) How metabolic activities of microorganisms lead to food spoilage?

2+(1+1+1+1)+2

(b) Mention the microorganisms responsible for the following spoilage:

- (i) Black rot in egg
- (ii) Ropiness in milk
- (iii) Bulging of canned food
- (iv) Putrefaction of meat

(c) Why fresh meat has more risk to be spoiled with bacteria?

3. (a) Mention the symptoms of Shigellosis and botulism.

3+3+2

(b) State the differences between Shigatoxin and Cholera toxin.

(c) What are the pathogenic strains of *E. coli*?

4. (a) How would you determine the efficiency of pasteurization?

2+2+2+2

(b) What is the significance of carbon dioxide in carbonated beverages and soft drinks?

(c) Name the starter culture used in making of cheese and acidophilus milk.

(d) What is the role of renin in cheese making?

5. Write short notes on:

2×4 = 8

(a) Traveler's Diarrhoea

(b) Canning

(c) Probiotics

(d) Toxins produced by *Bacillus cereus* and their effects.

6. (a) Why butter is generally unfavourable for growth of microorganisms?

2+2+2+2

(b) How would you determine quality of a given milk sample?

(c) What are indicator microorganisms used in quality control of food products? Give example.

(d) Why water activity of food products are important factor for food preservation?

7. (a) What is appertization?

2+(2+1)+1+2

(b) What is food intoxication? Give examples of two bacteria that cause food intoxication.

(c) Name two antimicrobial agents present in milk.

(d) How is irradiation involved in food preservation?

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