

[50/59]

**SARDAR PATEL UNIVERSITY**  
**M. Sc. Biotechnology II<sup>nd</sup> Semester Examination**  
**PS02CMIC22 / PS02CBIT22: Microbial Genetics**  
**Tuesday, 29/12/2020**

Time: 10:00 a.m. to 12: 00 noon

Max. Marks: 70

Note: Figures on the right indicate marks.

- Q.1 Choose the most appropriate answer (08)
- (A)
- i Which of the following is used for isolation of auxotrophs?
- a) Fluctuation test                      b) Enrichment agar technique  
c) Selective culture technique        d) Replica plate technique
- ii The transversion type of base pair substitution may be caused by
- a) 5-BU                      b) EES                      c) ROS                      d) nitrous acid
- iii Plasmids which are maintained in very few copies per cell are known as
- a) stringent plasmids                      b) relaxed plasmids  
c) cryptic plasmids                      d) R plasmids
- iv Sister chromatid segregation occurs during
- a) first meiotic division                      b) second meiotic division  
c) during both divisions in meiosis        d) none of the above
- v The exchange of genetic material through conjugation in *E. coli* was discovered by
- a) Joshua Lederberg and Edward Tatum        b) Frederick Griffith  
c) Ellis and Delbruck                      d) N. Zinder and J. Lederberg
- vi The \_\_\_\_\_ is a sensor histidine kinase associated with competence development in *Bacillus subtilis*.
- a) ComX                      b) ComP                      c) ComK                      d) CSF
- vii In type II RM systems, the cleavage requires
- a) AdoMet                      b) ATP                      c) Mg<sup>++</sup>                      d) all of these
- viii The formation of co-integrate intermediate during transposition is a characteristic feature of
- a) Tn10                      b) Tn5                      c) Tn7                      d) Tn3

Q.1  
(B)

Do as directed:

(16)

- a) If  $2 \times 10^6$  bacterial cells are infected by 100 microlitres of lysate with a phage titre of  $10^8$  PFU/mL. Calculate the multiplicity of infection ratio.
- b) Which test is performed to determine the mutagenicity of a chemical agent?
- c) The defect in NER pathway in humans is often associated with a condition known as xeroderma pigmentosum. State true or false.
- d) Which DNA polymerase is a component of mismatch repair pathway in *E. coli*?
- e) Which protein in prokaryotes is implicated for direct repair of cyclobutyl pyrimidine dimers?
- f) Give an example of specialized transducing bacteriophage.
- g) The TraM is the main transcriptional activator of tra operon of F-plasmid. State true or false.
- h) Which method was used by Benzer to map mutations very near to each other on the same gene?
- i) The F-plasmid is an example of iteron plasmid. State true or false
- j) Who discovered transformation?
- k) Competent cells of *Bacillus subtilis* are biosynthetically latent. State true or false
- l) *E. coli* is capable of becoming competent naturally. State true or false
- m) Give an example of non-composite transposon.
- n) Who is credited with discovery of transposons?
- o) Give name of the organism that causes crown gall disease in plants.
- p) Who isolated and characterized the first Type II restriction endonuclease?

Q.2

Attempt any Seven of the following:

(14)

- a) Write in brief on: Point mutations
- b) Write in brief on: Nonsense Suppressors
- c) Explain the term: Mitotic nondisjunction
- d) Write in brief on functions of *finO* and *finP* genes encoded by F-plasmid.
- e) Explain the term: Competence
- f) What are F'-plasmids?
- g) Write in brief on: Integrons
- h) What are composite transposons?
- i) Explain the term: Addiction module

Q.3 How do prokaryotic cells safeguard their DNA from damage caused by reactive oxygen species? Explain in detail. (08)

OR

Discuss the genetic evidences for methyl directed nature of mismatch repair pathway in *E. coli*. (08)

Q.4 Write a note on: Tetrad Analysis (08)

OR

Explain two different models of plasmid segregation in bacteria giving example. (08)

Q.5 Discuss salient features of generalized transduction. Explain how it can be used for mapping of genes. (08)

OR

Write a note on: Mapping of genes using interrupted mating. (08)

Q.6 Write a note on: Retrotransposons (08)

OR

Write note on: Assays of transposition. (08)

—X—

