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**PG CBCS**  
**M.Sc. Semester-IV Examination, 2022**  
**BOTANY**  
 PAPER: BOT 402D (SPL PAPER)  
**(MOLECULAR MICROBIOLOGY & GENETICS)**

Full Marks: 40

Time: 2 Hours

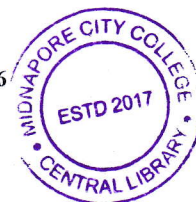
The figures in the right-hand margin indicate full marks.  
 Candidates are required to give their answers in their own words as far as practicable.

**GROUP-A**

- 1. Answer any two of the following:** **4 X 2=8**
- |   |     |
|---|-----|
| a) What is acid fastness? State the mechanism of acid staining. | 1+1 |
| b) What is prion?   | 2   |
| c) What is R-plasmid?   | 2   |
| d) What function do topoisomerases serve inside cell?           | 2   |
| e) Mention the special characters of Mycoplasma.                | 2   |
| f) What is plaque assay?  | 2   |
| g) What is c-DNA library?                                       | 2   |
| h) What is diauxic growth?                                      | 2   |

**GROUP-B**

- 2. Answer any four of the following:** **4 X 4=16**
- |  |     |
|--|-----|
| a) Describe the formation of biofilm.  | 4   |
| b) Describe the lysogenic life cycle of bacteriophage.   | 4   |
| c) Name the genes present in HIV genome and state their respective functions.  | 4   |
| d) Discuss about quorum sensing of <i>Vibrio harveyi</i> .   | 4   |
| e) What is enrichment culture? What culture conditions are employed for the isolation of nitrifying bacteria from soil?  | 2+2 |
| f) Define chemosynthesis. Differentiate between anoxygenic and oxygenic photosynthesis.                                  | 2+2 |
| g) Describe the genome of phage $M_{13}$ . How can $M_{13}$ virions are released without killing the infected host cell. | 1+3 |
| h) What is pure culture? How do you isolate a pure culture?  | 1+3 |

**GROUP-C**

- 3. Answer any two questions:** **8 X 2=16**
- |   |       |
|---|-------|
| a) Briefly describe the mechanism of biological nitrogen fixation with special reference to the nitrogenase structure. Mention the regulatory mechanism of <i>nif</i> .                                 | 5+3   |
| b) Prove that mean generation time is the reciprocal of the mean growth rate constant. Calculate mean doubling time where bacterial population increases from $10^3$ cells to $10^9$ cells in 10 hours. | 4+4   |
| c) State the working principles of phase contrast microscopy. Discuss the different parts of SEM. Mention the utilities of TEM.   | 3+2+3 |
| d) State the different way for viral entry to human cell. Differentiate between exotoxin and endotoxin. Why do acid fast bacteria need a special type of staining?                                      | 3+2+3 |

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