

M.Sc. (Biotechnology) (CBCS Pattern) Second Semester CBCS  
**PSBIT-108 - Industrial Biotechnology Paper-IV**

P. Pages : 1

Time : Three Hours



**GUG/W/18/11194**

Max. Marks : 80

Notes : 1. All questions are compulsory and carry equal marks.

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|-----------|--|----|
| 1.        | Describe various types of fermentation with examples.                        | 16 |
| <b>OR</b> |  |    |
|           | a) Write a note on fed batch reactors.                                       | 8  |
|           | b) Discuss design of fermentor.  | 8  |
| 2.        | Describe in detail up stream processes in fermentation.                      | 16 |
| <b>OR</b> |  |    |
|           | Write note on;   |    |
|           | a) Raw materials used in fermentation.                                       | 8  |
|           | b) Scale up.   | 8  |
| 3.        | Describe ion exchange and affinity chromatography in down stream processing. | 16 |
| <b>OR</b> |  |    |
|           | Write note on:   |    |
|           | a) Counter current extraction.   | 8  |
|           | b) Reverse Osmosis.  | 8  |
| 4.        | Describe in detail industrial production of penicillin antibiotic.           | 16 |
| <b>OR</b> |  |    |
|           | Write note on:   |    |
|           | a) Biosensor.  | 8  |
|           | b) Immobilization of enzyme.   | 8  |
| 5.        | Write short note on following.   |    |
|           | a) Fluidized bed reactors.   | 4  |
|           | b) KLa value.  | 4  |
|           | c) Solvent extraction.   | 4  |
|           | d) Crystallization of products.  | 4  |

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