



Register Number:

Date:

**ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU -27**  
**M.Sc. MICROBIOLOGY – I SEMESTER**  
**SEMESTER EXAMINATION – OCTOBER 2019**  
**MB 7418: MICROBIOLOGICAL TECHNIQUES**

**Time: 2 ½ hours**

**Max. Marks: 70**

**This paper contains 2 printed pages and 4 parts**

**I. Answer any Five of the following**

**5x3=15**

1. Define /Explain the following terms: i) Minimum inhibitory concentration, ii) Lyophilization, iii) Phenol coefficient.
2. Identify the conjugate acids and bases in the following pairs of substances:
  - a.  $(\text{CH}_3)_3\text{NH}^+ / (\text{CH}_3)_3\text{N}$
  - b.  $^+\text{H}_3\text{N}-\text{CH}_2\text{COOH} / ^+\text{H}_3\text{N}-\text{CH}_2-\text{COO}^-$
  - c.  $^-\text{OOC}-\text{CH}_2-\text{COOH} / \text{HOOC}-\text{CH}_2-\text{COOH}$
3. How is dark field effect created in a dark field microscope?
4. What are the variables that influence the settling of a particle in a centrifuge?
5. Why is moist heat more effective than dry heat for sterilization?
6. What are the different diffusion methods for antimicrobial testing?
7. Draw the Jablonski diagram to explain the phenomenon of fluorescence.

**II. Answer any Five of the following**

**5x5=25**

8. Why do some chemicals dissolve in water while others do not?
9. Describe the chemical structure of stain with an example.
10. Explain image formation in confocal microscope.
11. Explain the different types of relaxation processes in NMR spectroscopy.
12. Explain with the help of a diagram how size-exclusion chromatography separates analytes of differing size.
- 13 a. Why is 70% alcohol more effective in killing microorganisms than absolute alcohol? 2  
b. Explain the mode of action of i) Non ionizing radiation, ii) Phenolic compounds 3

14. Describe how preparative centrifugation is used in separation of tissues, cells, subcellular structures and membrane vesicles.

**III. Answer any Two of the following**

**2x10=20**

- 15 a. Explain the production of positive phase contrast and negative phase contrast in Phase Contrast microscope. 7  
b. What are the conditions essential to obtain the best resolution in light microscopy? 3
- 16 a. What kind of transitions happen in IR spectroscopy? How does an IR spectroscopy differ from an UV-Vis spectroscopy? 6  
b. Explain hypochromicity and hyperchromicity of nucleic acids? 4
17. How is Denaturing-gradient gel electrophoresis (DGGE) used in phylogenetic identification of microbial population?

**IV. Answer the following**

**1x10=10**

- 18 a. DNA can be labeled by incubating cells with dyes which fluoresce when bound to DNA. Identify the techniques that can be used to quantify the DNA with these labeling method. Discuss the advantages and disadvantages of the technique. 4
- b. Why can't you use Gram staining for staining *Mycobacterium*? Which staining technique is use to stain *Mycobacterium*? Explain 6