

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1888

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Unique Paper Code : 2533012004

Name of the Paper : Biotechniques and Instrumentation

Name of the Course : **B.Sc. (H) Microbiology**

Semester : IV – UGCF, Part II,

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. **All** questions carry equal marks.

Q1 a) Expand the following terms and mention their function (any **four**): 2.5 x 4 = 10
SDS, EtBr, TOF, HPLC, Rf

b) What do you understand by $\lambda_{\max}$? 2

Q2 Define the following terms (any **six**): 2 x 6 = 12

- i. Resolving power
- ii. Negative staining
- iii. Theoretical plates
- iv. Svedberg Coefficient
- v. RCF
- vi. Fluorochrome
- vii. Stationary phase

Q3 a) Why is polyacrylamide gel preferred over agarose for proteins? 2

b) Which centrifugation techniques shall be used for separating particles with similar size but different densities? Justify your answer. 2

c) What do you understand by molar absorptivity coefficient? 2

d) Draw a well labelled ray diagram of SEM. 4

e) What is Cryo-EM? 2

Q4 Differentiate between the following (any **three**): 4 x 3 = 12

- a) Bright field and Confocal microscopy

P.T.O.

- b) Gel-filtration chromatography and Affinity Chromatography
- c) Rate Zonal density gradient centrifugation and Isopycnic density gradient centrifugation
- d) XRD and NMR

Q5 a) Write the principle and applications of following techniques (any *two*): 5 x 2=10

- i. Phase Contrast Microscopy
- ii. CD
- iii. SDS-PAGE

b) A centrifuge must generate $20,000 \times g$ at radius 10 cm. Calculate required rpm. 2

Q6 a) Draw a well labelled ray diagram of fluorescence microscope and write the functions of its components. 5

b) A solution 'X' has absorbance 0.8, path length 1 cm, and $\epsilon = 200 \text{ L} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$. Calculate its concentration. If concentration is doubled, what happens to absorbance? 5

c) What do you understand by ion-exchange chromatography? 2