Register Number:……..

KUMARAGURU
college of technology
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B.TECH DEGREE EXAMINATIONS: MAY 2017

(Regulation 2015)

Fourth Semester

BIOTECHNOLOGY

U15BTT402: Biotechniques

COURSE OUTCOMES

CO1: Explain the basics of measurements and different extraction methodologies, and their applications in biotechnology
CO2: Describe the instrumentation and applications of specialized molecular spectroscopic techniques
CO3: Demonstrate the principles and techniques of chromatography, and electro-analytical methods and their applications in biotechnology
CO4: Explain the various electrophoretic and thermal techniques and their applications in biotechnology
CO5: Distinguish and interpret the various structural elucidation
CO6: Describe the basics of radiation and radioisotope methods

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. Match type of electromagnetic ray with wavelength: CO2 [K_2]

List I	List II
A. X ray	i. 10 – 310 nm
B. UV	ii. 400 – 700 nm
C. Visible	iii. 0.1 – 10 nm
D. Gamma	iv. < 10 nm

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2. Doubling the Column's length in gas chromatography increases resolution by a factor of CO3 [K_1]

a) 2 b) $(2)^{0.5}$
c) 4 d) $(4)^{0.3}$

3. Identify the instrumental methods based on measurement property. CO1 [K_2]

1. Spectroscopy, 2. Thermal conductivity, 3. Transformation, 4. Coagulation.

a) 1,3 b) 1,4

c) 1,2 d) 2,3

4. Where does a carbonyl (C=0) stretch appear in an IR spectrum? CO2 [K_3]

a) 1740-1720 Cm-1 b) 1870-1650 Cm-1

c) 3640-3250 Cm-1 d) 160-110 Cm-1

5. Assertion (A): In SDS-PAGE, the protein sample is first treated with a reducing agent and then with anionic detergent followed by fractionation by electrophoresis. CO4 [K_2]

Reason (R): In SDS-PAGE, the protein sample is first fractionated by electrophoresis then treated with an oxidizing agent followed by anionic detergent.

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

6. An isocratic elution in HPLC is one in which the composition of the solvent_____ CO3 [K_2]

a) Remains constant b) Changes continuously

c) Changes in a series of steps d) Changes rapidly

7. In neutral solvents, the adsorption affinity of various classes of compounds are separated. CO5 [K_1]

Identify the correct sequence of separation for the following compounds.

1. Hydrocarbon, 2. Nitro compounds, 3. Ethers, 4. Tertiary amines.

a) 2-3-4-1 b) 1-3-2-4

c) 3-4-2-1 d) 4-1-3-2

8. Electrophoresis of histones and myoglobin under non-denaturing conditions (pH = 7.0) results in CO4 [K_4]

a) Both proteins migrate to the anode b) Histones migrate to the anode and myoglobin migrates to the cathode

c) Both proteins migrate to the cathode d) Histones migrate to the cathode and myoglobin migrates to the anode

9. Assertion (A): It is generally preferable to use absorbance as a measure of absorption rather than % transmittance, because absorbance is directly proportional to the concentration of the analyte, whereas %T is not CO2 [K4]

Reason (R): It is generally preferable to use absorbance as a measure of absorption rather than % transmittance, because %T is dependant on the power of the incident radiation

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

10. NMR shielding means_____. CO5 [K_2]

a) Using a curved piece of metal to block an opponents attack

b) Putting metal around an R_f source

c) When the magnetic moment of an atom blocks the full induced magnetic field from surrounding nuclei

d) Blocking parts of a molecule from R_f radiation

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Distinguish between accuracy and precision. CO1 [K_2]

12. State the law of distribution of a solute between two immiscible liquids. CO1 [K_2]

13. Discuss the limitations of flame photometry. CO2 [K_2]

14. What are the applications of circular dichroism spectroscopy? CO2 [K_2]

15. What do you understand by capacity factor? CO2 [K_2]

16. Write the significance of plate theory. CO3 [K_2]

17. Name the factors that affect thermo gravimetric curves. CO4 [K_2]

18. Write the role of sodium dodecyl sulphate in SDS-PAGE. CO4 [K_2]

19. What are the two requirements of an inlet system in mass spectroscopy and how is each requirement met in practice? CO5 [K_2]

20. How is the short wavelength region of 62 kV X-ray tube calculated? CO5 [K_3]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Describe the sequence of extraction process and explain the theory of extraction of solids and liquids with suitable examples. CO1 [K_2]

22.	i) Enumerate the various calibration methods with suitable examples.	(10)	CO1	[K_2]
	ii) What is error in analytical instruments? Explain its types.	(4)	CO1	[K_2]
23.	i) Describe how IR is useful in relevant to biological research with appropriate instruments.	(10)	CO2	[K_3]
	ii) What are the different types of transitions that take place during absorption of energy in UV- visible region? Give an example for each type.	(4)	CO2	[K_2]
24.	i) With a neat schematic diagram explain the operation of gas chromatography.	(10)	CO3	[K_2]
	ii) Explain various types of detector in HPLC.	(4)	CO3	[K_2]
25.	i) Describe in detail about principle and instrumentation of isoelectric focusing with their applications.		CO4	[K_2]
26.	When does nuclear magnetic resonance occur? Explain the working principal of NMR spectrometer with a schematic diagram.		CO5	[K_6]
27.	Explain scintillation counters with apt instrumentations.		CO6	[K_2]

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