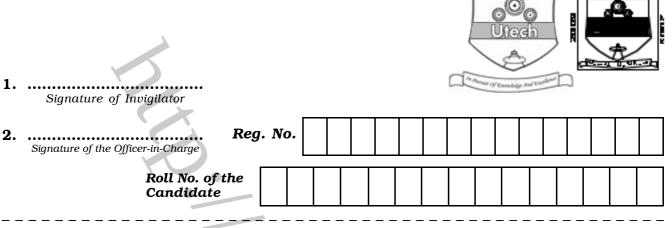
BIOSEPARATION TECHNOLOGY (SEMESTER - 6)

CS/B.TECH(BT-N)/SEM-6/BT-602/09



CS/B.TECH(BT-N)/SEM-6/BT-602/09 ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2009 BIOSEPARATION TECHNOLOGY (SEMESTER - 6)

Time: 3 Hours [Full Marks: 70

INSTRUCTIONS TO THE CANDIDATES:

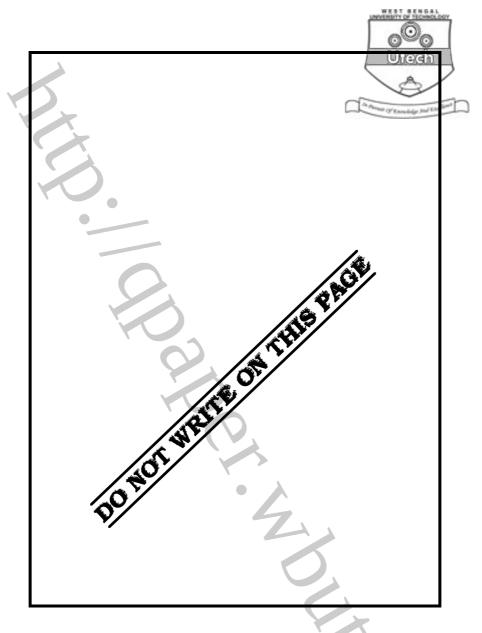
- 1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
- 2. a) In **Group A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
 - b) For **Groups B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group B** are Short answer type. Questions of **Group C** are Long answer type. Write on both sides of the paper.
- 3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
- 4. Read the instructions given inside carefully before answering.
- 5. You should not forget to write the corresponding question numbers while answering.
- 6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
- 7. Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.
- 8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
- 9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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6676 (05/06)







ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2009 BIOSEPARATION TECHNOLOG

SEMESTER - 6

Time: 3 Hours] Full Marks: 70

GROUP - A

			(Multiple Choice	Туре	Questions)	
1.	Cho	ose th	ne correct alternatives for any te	en of tl	ne following :	10 × 1 = 10
	i)	In g	gel filtration chromatographic s	eparat	ion, bio-molecules are sepa	rated based
		on v	what property of bio-molecules	?		
		a)	Size	b)	Charge	
		c)	Hydrophobic interaction	d)	Metal ion affinity.	
	ii)	To	purify Lac-repressor from	E. c	oli cell extract by affin	nity column
		chro	omatography, what type of lig	and n	nolecule will be immobilize	d to the gel
		mat	rix?	,		
		a)	Lac promoter RNA	b)	Lac operator DNA	
		c)	Lac Z mRNA	d)	Lac I mRNA.	
	iii)	By I	Ni-NTA-Agarose affinity column	chrom	atography what type of pro	tein can you
		pur	ify?			
		a)	GST-tagged protein	b)	6 X His-tagged protein	
		c)	Cys-tagged protein	d)	DNA binding protein.	
	iv)	Mol	ecular weight of a protein can b	e dete	rmined by	
		a)	Size exclusion chromatograph	ıy		
		b)	Ion-exchange chromatography	y		
		c)	Pseudo-affinity chromatograp	hy		
		d)	Affinity chromatography.			

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v)	Cell	disruption in homogenizer is ba	sed on	AMMERITY OF SECUNDAL COLY
	a)	applied voltage	b)	operating pressure
	c)	salt concentration	d)	osmosis.
vi)	Perv	vaporation involves change of		a Remove (I Finnishly Int William)
	a)	mass volume	b)	isoelectric pH
	c)	applied voltage	d)	Phase.
vii)	Bas	ic principle of centrifugation dep	oends o	on
	a)	concentration	b)	polarization
	c)	centripetal force	d)	pressure gradient.
viii)	In a	affinity chromatography, if the r	eactive	e group on the matrix is - OH group
	ther	n coupling agent is		
	a)	Bisepoxide	b)	Dichlorotriazine
	c)	Tricyclic chloride	d)	Cyanogen bromide.
ix)	Ultr	rafiltration is used for separation	with r	nolecular weight range from
	a)	0.1 – 10 μm	b)	10 – 100 μm
	c)	100 – 200 μm	d)	200 – 500 μm.
x)	Whi	ich method is commonly used	to sep	parate inhibitory fermentation produc
	suc	h as ethanol from fermentation b	oroth ?	
	a)	Aqueous two phase extraction	b)	Liquid-Liquid extraction
	c)	Adsorption	d)	Ultrafiltration.
xi)	In r	reverse osmosis, the deposition	of so	olute molecules on membrane surfac
	resi	ılts in large resistance for solver	nt flow.	This phenomenon is known as
	a)	Reflection coefficient	b)	Rejection coefficient
	c)	Break through point	d)	Concentration polarization.

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GROUP - B

(Short Answer Type Questions)

Answer any three of the following.



 $3 \times 5 = 15$

- 2. Discuss the downstream processing steps in the production of intracellular enzyme from fermentation broth.
- 3. Write a short note on Pseudo-affinity chromatography.

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- 4. Discuss the theoretical principles and practice of salting out of proteins by ammonium sulphate.
- 5. A centrifuge having a radius of bowl of 100 mm is rotating at 1000 r.p.m. Calculate the centrifugal force developed.
- 6. A mixture of two proteins A and B have to be separated by gel chromatography. The partition coefficient (K_D) for A is 0.5 and for B is 0.15. The void volume (V_o) in the column is 20 cm 3 and the included volume (V_i) within the gel particle is 30 cm 3 . The total volume of the column is 60 cm 3 . The flow rate of eluent is 100 cm 3 /h. Ignoring dispersion and other effects, how long will it take for A to exit the column? How long is for B?

GROUP - C

(Long Answer Type Questions)

Answer any three questions.

 $3 \times 15 = 45$

7. Write short notes on any three of the following:

 3×5

- a) Affinity chromatography
- b) Non-mechanical methods of cell disruption
- c) Hyper-filtration
- d) Pervaporation.
- 8. a) What do you mean by membrane separation? Name the different types of membrane separation processes. 1+2
 - b) Write short notes on any four of the following :

 4×3

- i) Reverse osmosis.
- ii) Ultra-filtration.
- iii) Membrane fouling.
- iv) Concentration polarization.
- v) Hollow fibre module.

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9. a) Describe different types of Chromatographic separation technique available for the separation of metabolic products present in fermentation broth.

b) What are the basic principles exploited for the separation of biomolecules by chromatographic process?

- 10. a) Aqueous two-phase extraction is used to recover alpha-amylase from solution.

 A polyethylene glycol-dextran mixture is added and the solution separates into two phases. The partition coefficient is 4.2. Calculate the maximum possible enzyme recovery when:
 - i) the volume ratio of upper to lower phases is 5.0 and
 - ii) the volume ratio of upper to lower phases is 0.5.

b) Cell free fermentation liquor contains $8 \times 10^{-5} \,$ mol / lit. immunoglobulin G. It is proposed to recover at least 90% of this antibody by adsorption on synthetic, non-polar resin. Experimental equilibrium data are correlated as follows :

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$$C_{AS}^* = 5.0 \times 10^{-5} C_A^{*0.30}$$

where C_{AS}^* is mol solute adsorbed per cm 3 adsorbent and C_A^* is liquid phase conc. in mol/lit. What minimum quantity of resin is required to treat 2 m 3 fermentation liquor in a single-stage mixed tank?

11. Describe in brief the operations involved for the isolation and purification of ethanol or any organic acid from commercial plant. (Complete flowchart is a must)

END