UNIVERSITY OF PUNE

[4364]-812

B. E. (Biotechnology) Examination - 2013

INSTRUMENTATION AND PROCESS CONTROL

(2008 Course)

Total No. of Questions : 12 **[Total No. of Printed Pages :5]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **three** questions from section I and **three** questions from section II.*

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Neat diagrams must be drawn wherever necessary.

(4) figures to the right indicate full marks.

(5) Use of electronic pocket calculator is allowed.

(6) Assume suitable data, if necessary.

SECTION-I

1. (a) Describe the principle, construction and working of a thermocouple used as a temperature measuring device. [8]

(b) Explain in brief the working of the following instruments: [8]

1) Thermistor

2) Shadow graph interferometer

OR

2. Write short notes on: [16]

1) Electromagnetic flow meter

2) Radiation pyrometer

3. (a) With the help of neat diagram, describe the characteristics of response of a first order system to a step input. [6]

(b) A thermometer having a time constant of 0.25 min is at a steady state temperature of 97°F. at time t = 0, the thermometer is placed in temperature bath maintained at 120°F. Determine the time needed for the thermometer to read 100°F. [4]

(c) In a typical mixing process, a stream of solution containing dissolved salt flows at a constant volumetric flow rate q into a tank of constant hold up volume V. the concentration of salt in the entering stream x (mass of salt/volumes) varies with time. Derive the transfer function for this process relating the outlet concentration y to the inlet concentration x. [6]

OR

4. (a) Derive the transfer function for a liquid level system having a linear resistance. How does the response of the above system change if it is having a constant flow output? [8]

(b) A process of unknown transfer function is subjected to a unit impulse input. The output of the process is measured accurately and is found to be represented by the function $y(t) = te^{-t}$, Determine the unit step response of this process. [8]

5. (a) Derive the transfer function for a two tank non-interacting system. How does this response differ from that of two interacting tank system? [9]

(b) Derive the response of a second order system for a step change in input. Based on the value of the damping coefficient ς, explain the different cases with the help of a graph. [9]

OR

6. (a) What are the characteristics of a second order system? State the transfer function of second order system and explain the significance of the constants appearing. Also give some examples of the second order systems. [6]

(b) With respect to a second order to a second order system, define the following terms: [6]

1) Overshoot

2) Decay ratio

3) Rise time

4) Period of oscillation

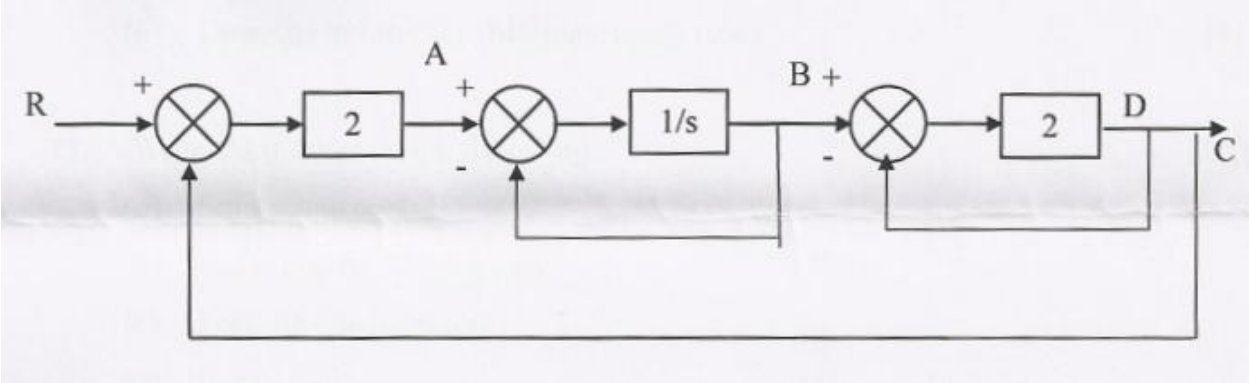
5) Ultimate response

(c) Explain the characteristics of response of a second order to impulse input. [6]

SECTION-II

7. (a) With the help of block diagram of a control system, derive the transfer function for a regulator problem. [6]

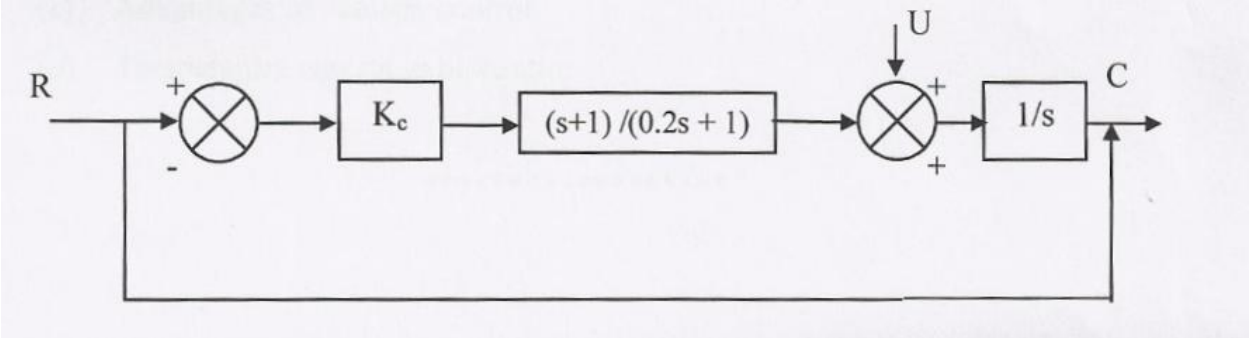
(b) For the control system shown in the figure, determine the transfer function C(s)/R(s). [6]



(c) Explain in brief the control action of a PI controller. [6]

OR

8. (a) For a control system shown in the figure below, find the closed loop transfer function C/U [6]



(b) A step input is given to a PI controller. Plot the output of the controller if K_c=2 and $\tau_I = 0.5$ min. [6]

(c) Explain in brief how a feedback system works [6]

9. (a) Determine the stability of the control system having the following characteristic equation using Routh's test: [7]

$$S^4 + 3s^3 + 5s^2 + 4s + 2 = 0$$

(b) Sketch the root locus plot for the following system: [9]

$$G(s) = \frac{K}{(s+1)(s+2)(s+3)}$$

OR

10. (a) What is Bode plot? Explain the procedure for plotting the Bode plot [8]

(b) Describe in brief the different tuning rules. [8]

11. Write short notes on the following : [16]

(a) Split range control

(b) Foam control in fermenter

(c) Feed forward control

(d) Fuzzy logic

OR

12. Write short notes on the following [16]

(a) Adaptive control

(b) Ratio control Advantages of cascade control

(c) Advantages of cascade control

(d) Temperature control in bioreactor

UNIVERSITY OF PUNE

[4364]-819

B. E. (Biotechnology) Examination, 2013

BIOMATERIALS (ELECTIVE-II)

(2008 Pattern)

[Total No. of Questions : 12] **[Total No. of Printed Pages :2]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) Answer three question from section-I and three question from section-II

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Neat diagram must be drawn wherever necessary.

(4) Figures to the right indicate full marks.

SECTION-I

Q1. Answer the following: (9 marks each) [18]

a) Explain the process of bioerosion. Add a note on classification of degradable medical implants?

b) Enlist FDA approved biodegradable polymer. Describe any two in details.

OR

Q2. Answer the following: (9 marks each) [18]

a) Discuss the mechanical properties of materials. Describe their importance for the application in biomaterials?

b) Explain processes for formation of biotextile with its application and importance?

Q3. Answer the following: (8 marks each) [16]

a) Describe Pullalan as a biomaterial. Explain its properties and biomedical application?

b) Discuss the structure, preparation and application of Xanthan?

OR

Q4. Write short notes on: (4 marks each) [16]

a) Chitin and chitosan b)Gellan

c) Dextran d) Biopolymers

Q5. Discuss the properties and functions of: (4 marks each) [16]

a) Polylactic acid
b) Biodegradable plastic.
c) Polycaprolactone.
d) Bioceramics.

OR

Q6. Answer the following: (8 marks each) [16]

a) Explain the synthesis of polyglycolide. Add a note on its properties and biomedical applications?
b) Describe the production of biodegradable polyesters from different microbial sources along with its application?

SECTION-II

Q7. Explain the configuration of biocatalytic membrane bioreactor. Describe different types of membrane bioreactor based on membrane arrangement along with its applications? [18]

OR

Q8. What are biocatalysts? Explain its application in agro food and pharmaceuticals. Compare the production of L-homophenylalanine by chemical and biocatalytic route? [18]

Q9. Answer the following: (8 marks each) [16]

a) Describe in details the applications of nonmaterial in biology and medicine?
b) Explain the evaluation of Biocompatibility according to USP?

OR

Q10**.** What are biocomposites? Explain different types of composite materials and its advantages? [16]

Q11. Answer the following: (8 marks each) [16]

a) Discuss the application of biomaterials in medicine, dentistry, biology?
b) Explain in vivo application of Biotextile. Add note a different method of its formation?

OR

Q12. Enlist the biomaterials with their properties which can be used for following application: (4 marks each) [16]

1) Skin repair
2) Tissue engineering scaffold
3) Bone plates
4) Cardiovascular devices

[Total No. of Questions: *12*] **[Total No. of Printed Pages: 2]**

UNIVERSITY OF PUNE

[4364]-821

B. E. (*Biotechnology***) (SEM-II) Examination - 2013**

PLANT ENGINEERING AND PROJECT COSTING (2008 Course)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 *Answer three questions from Section I and three questions from Section II*

2 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

3 *Draw neat diagrams wherever necessary.*

4 *Figures to the right indicate full marks.*

5 *Make necessary assumption wherever required.*

SECTION -I

Q.1	A	Discuss the importance of process flow diagram in plant design.	8
	B	Differentiate between Qualitative and Quantitative type of process flow diagram. Explain the combined detailed type of process flow diagram.	8
		OR	
Q.2	A	Draw the following symbols used in process flow diagram. i) Gas holders ii) Jacked kettle iii) open pan evaporator iv) Condenser	8
	B	What are the main factor consider in techno economic feasibility study? Explain in detail.	8
Q. 3	A	Explain various factors to be considered while selecting plant site for any biochemical plant.	10
	B	Explain scale of reactor, along with different scale up principles used.	8
		OR	
Q. 4	A	Discuss procedure for preparing plant layout.	8
	B	A project Engineer would like to choose a plant location for following manufacturing unit. Please help him during selection of proper site, giving justification. i) Penicillin production plant. Ii) Absolute alcohol plant	10
Q. 5	A	What are the factors to be considered for pipe design?	6
	B	Write short note on colour code of pipeline carrying utilities.	4
	C	Write short note on pipe routing and expansion.	6
		OR	

Q. 6	A	Write different steps of process piping design.	8
	B	Draw symbols for following used in engineering line diagram. i) Flow indicator ii) Level indicator iii) Flow Recorder iv) Pneumatic lines	8

SECTION II

Q. 7	A	Discuss about cost of finance and interest calculation.	9
	B	Write short Note on: i) CPM Technique ii) PERT Technique	9
		OR	
Q. 8	A	What are the factors affecting investment.	9
	B	Write short note on: i) Capital structure analysis ii) Fixed capital	9
Q. 9	A	What are taxes? Explain the purpose of taxes.	8
	B	Explain the concept of pay out period.	8
		OR	
Q. 10	A	List the various mathematical methods for profitability evaluation and explain any one of them in brief.	16
Q. 11	A	Discuss about following methods of determination of depreciation: i) Straight line ii) Sinking fund	16
		OR	
Q. 12	A	Define depreciation and what are the various methods used for determination? Explain.	16

[Total No. of Questions: 12] **[Total No. of Printed Pages:** 3]

UNIVERSITY OF PUNE

[4364]-827

B. E. (BIOTECHNOLOGY) (SEM-II) Examination - 2013

INDUSTRIAL ORGANISATION AND MANAGEMENT

(Elective-IV) (415468) (2008 Course)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions: *Answer any from each section.*

1 *Answer three questions from Section I and three questions from Section II*

2 *Answers to the two sections should be written in separate answer-books.*

3 *Neat diagrams must be drawn wherever necessary.*

4 *Figures to the right indicate full marks.*

5 *Assume suitable data, if necessary.*

SECTION -I

Q.1 A Explain the following principles of management: 8

i) Division of labour
ii) Authority and Responsibility

B i) Differentiate partnership and proprietorship as a form of business 5

ii) Explain Henry Fayol's theory of management. 5

OR

Q.2 A Define Management. Explain in detail various functions of management. State the role of managers in changing global business environment. 18

Q. 3	A	What is performance appraisal? Explain in detail.	8
	B	Explain the process of recruitment and types of recruitment.	8

OR

Q. 4	A	Discuss the role of Trade Unions in India.	8
	B	Discuss the objectives and functions of wage and salary administration.	8
Q. 5	A	Define Inventory. Explain the different methods of Inventory Management.	6
	B	Write short notes on i) Function of Storekeeper ii) Inspection and Quality Control	10

OR

Q. 6	A	What is inventory carrying and ordering cost? Explain how they are calculated.	8
	B	Explain the process of purchase through quotation, tender and comparative statement.	8

SECTION II

Q. 7	A	How will you carry out Market Research for selling biomedical products?	8
	B	Explain the following: i) Role of advertisement ii) Penetration prices and skimming prices	8

OR

Q. 8	A	Explain the role of advertisement and promotion for growth of business	8
	B	Explain various techniques of sales promotions.	8
Q. 9	A	State and explain Total Quality Management (TQM) and	8

quality circles.

	B	Explain necessity and advantages of ISO systems for Petrochemical Industry.	8

OR

Q. 10	A	Explain the role of export promotion council to boost foreign trade of India.	8
	B	Write a short note on	8
		i) MODVAT ii) Copyright	
Q. 11	A	Discuss the provisions in MRTP act.	9
	B	Explain the following	
		i) Sio chart	5
		ii) Work measurement	4

OR

Q. 12	A	What is flow diagram and flow process chart? Explain with an example.	9
	B	Write short note on:	
		i) FERA and FEMA	5
		ii) Concept of Motion and Time study	4

[Total No. of Questions: 12 **[Total No. of Printed Pages: *3*]**

UNIVERSITY OF PUNE

[4364]-824

B. E. (*Biotechnology*) Examination - 2013

Introduction To System Biology (2008 Course)

[Time: *3* Hours] **[Max. Marks: 100]**

Instructions:

1 *Answer three questions from section-I and three questions from section-II*

2 *Answers to the **two sections** should be written in **separate answer-books**.*

3 *Draw neat diagrams must be drawn wherever necessary.*

4 *Figures to the right indicate full marks.*

SECTION -I

Q.1 What is systems biology given an overview? What are components of system biology and describe the four distinct phases which lead to system level understanding. 18

OR

Q.2 Describe in detail Human Genome project. Which different fields got affected by Human Genome project? 18

Q. 3	Write briefly on the next generation sequencing methods.	16

OR

Q. 4	Describe the detail strategies for whole genome sequencing. Describe pyrosequencing and its significance.	16
Q. 5	How have microarrays impacted trascriptomics research? What are the different types of microarrays and their advantages?	16

OR

Q. 6	RNA interference is a technology of the future comment. Describe siRNA and miRNA, in detail.	16

SECTION II

Q. 7	What are the different types of epigenetic modifications? How is epigenetics changing approach towards cancer research.	18

OR

Q. 8	Write short notes on: (9 marks each) i) CHIP on CHIP assays ii) CpG island microarray	18
Q. 9	Write a note on drug metabolizing enzymes and genes.	16

OR

Q. 10	Write notes on : (8 marks each) i) Pharmacogenomics ii) Toxicogenomics	16

Q. 11	Write detailed note on any two : (8 marks each)	16
	i) Triple quadruple mass analysers	
	ii) MALDI-TOF analyzers	
	iii) Mass spectomentry	

OR

Q. 12	What is a proteome, and what is proteomics? What are the different applications of proteomics and its impact on drug discovery.	16

UNIVERSITY OF PUNE
[4364]-811
B. E. (Biotechnology), Examination - 2013
BIOSEPARATION II (415463)
(2008 Course)

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1)Answer **any three** questions from each section.*
*(2)Answers to the **two sections** should be written in **separate answer-books**.*
(3) Black figures to the right indicate full marks.
(4) Neat diagrams must be drawn wherever necessary.
(5) Use of logarithmic tables, slide rule, Mollier charts electronic pocket calculator and steam tables is allowed.
(6)Assume suitable data, if necessary.

SECTION I

Q.1) What is downstream processing? Explain in detail problems and requirements of bio-product purification. [16]

OR

Q.2) Describe in detail process design criteria for: [16]

a) High volume low value product

b) Low volume high value product

Q.3) Write in detail Beer- Lambert's Law. Explain spectrophotometry with the help of following points. [18]

a) Principle b) Instrumentations c) Applications d) case studies

OR

Q.4) Write short notes on: [18]

a) NMR

b) Atomic absorption spectroscopy

Q.5) Describe in detail reversed phase and hydrophobic interaction chromatography [16]

OR

Q.6) Explain Ion exchange Chromatography with the help of following points: [16]

a) Principle b) Retention c)Procedures d)materials and applications.

SECTION II

Q.7a) Differentiate between Gas and Liquid chromatography. [4]

Q.7b) Write importance of Guard column in HPLC. [4]

Q.7c) Draw chromatogram and explain each term involved in it. [8]

OR

Q.8) What are the salient features of liquid chromatography. Describe LC-MS in detail [16]

Q.9) Write short notes on: (Any 2, 9m each) [18]

a) Molecular sieves

b) Supercritical Fluid extraction

c) Precipitation

d) Aqueous two phase systems

Q.10) Describe the different bioseparation techniques applied for health care products with case study. [16]

OR

Q.11) Mention any one specialty bioproduct. Describe the downstream processing of that product in detail. [16]

UNIVERSITY OF PUNE

[4364]-813

B. E. (Biotechnology) (Semester - I)
Examination – May 2013
Bioprocess Equipment
Design (2008 Pattern)

[Time : 3 Hours] **[Max. Marks : 100]**
Total No. of Questions : 12 **[Total No. of Printed Pages :3]**

Instructions :

*(1) Answer **three** questions from each section I and Three question from section II.*
*(2) Answers to the **two sections** should be written in **separate answer-books**.*
(3) figures to the right indicate full marks.
(4) diagrams must be drawn wherever necessary.
(5) Make necessary Assumption Wherever required.

SECTION –I

Q.1.a) Explain maximum distortion energy and shear stress theory under static load (8)

b) Define mass movement of inertia and polar movement inertia (6)

c) Write short note on general design consideration (4)

Q.2.a) A bar of 2 m length, 20 mm width and 15 mm thickness is subjected to a tensile load of 30 kN. Find change in length, width, thickness and volume of the bar. Take μ = 0.25 and E = 2X 10^5 N/mm^2 (9)

b) Define principle planes and stresses. State their significance in design (6)

c) Define (3)

i) Poisson's ratio

ii) Elasticity

Q. 3.a) A horizontal pressure vessel having outer diameter 1.25 m and length of 4 m is subjected to an internal pressure of 1 MN/m^2.The vessel ha elliptical heads

(2:1) at both ends. Calculate the thickness of shall and head if weld joint efficiency is 85% and allowable stress for material is 100 MPa. (10)

b) Write a note on general design consideration (6)

OR

Q.4.a) A high pressure vessel fabricated by shrink fit construction has three concentric shell .The ratio of outer radius to inner radius for all the shell us 1.4. The vessel is subjected to an internal pressure of 150 kg/cm^2 pressure outside the vessel is atmospheric .Estimate.

i) The maximum combined stress at the interfaces of concentric shells.

ii) Interface pressure resulting internal pressure and shrinkage stresses.

Data – Modules if Elasticity, E= 2 X 10^6 Kg/cm^2 .

Internal Diameter of vessel is 400 mm. (10)

b) Explain various type of construction used to high pressure vessels. (6)

Q.5.a) Explain classification of agitators. (8)

b) Discuss various flow patterns in agitated vessels. (4)

c) Draw neat sketches of jackets and Coil for reaction vessel (4)

OR

Q.6.a) Comments on heat transfer in agitated vessels. (8)

b) In sugar industry for agitation the torque acting over the shaft is 110000 Kg-cm. while bending moment acting over shaft = 34600 Kg-cm^2. Ultimate tensile strength of shaft material = 6900 Kg-cm^2 . Ultimate shear stress is 70 % of ultimate tensile stress. Factor of safety is 6.0 calculate the diameter of shaft used in agitation system (8)

SECTION –II

Q.7.a) Write short note on: (16)

i) Basket type short tube vertical evaporator

ii) Spiral heat exchanger

OR

Q.8.a) Compare plate heat exchanger with shell and tube heat exchanger. (8)

b) Describe various type of baffles used for shell and tube heat exchanger. (8)

Q.9.a) Explain the following method of calculating plate and column Efficiencies (18)

i) O'Connells correlation

ii) Van winkles method

iii) AIChE method

Q.10 .a) Explain design variable in distillation. (6)

b) write short notes on (12)

i) Smoker equation

ii) Optimum sieve plate performance diagram

Q. 11. a) Classify cartridge filtration. Comments on his application in biotech industry. (8)

b) Explain filter integrity testing (8)

Q.12.a) Write short note on (16)

i) TFF System

ii) Validation of filter

iii) Stream sterilization procedure

UNIVERSITY OF PUNE
[4364]-814
B. E. (Biotechnology) Examination 2013
ENVIRONMENTAL BIOTECHNOLOGY(415461) (SEM –I) ELECTIVE I
(2008 Pattern)

[Total No. of Questions:12] **[Total No. of Printed pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **any three** questions from each section.*
(2) Net diagrams must be drawn wherever necessary.
(3) Figures to right indicate full marks.
(4) Assume suitable data, if necessary.

SECTION- I

Q.1 Answer the following : (9marks each) [18]

a) The $[BOD]_5$ of a waste has been measured as 350 mg/ lit Calculate ultimate BOD and $[BOD]_3$ at 27^0 c. (k= 0.12)

b) Define DO. Explain the factors affection DO content of natural water bodies along with diurnal variation of DO?

OR

Q.2 Answer the following : (9 marks each) [18]

a) What are the different sources of water pollution? Add a note on low cost waste water system?

b) Explain DO, BOD, COD as chemical characteristics of waste water?

Q.3 Discuss the principle, advantages and disadvantages of the following: [16]

a) Oxidation ditches.

b) Fluidized bed reactor.

OR

Q.4 Answer the Following: (8 marks each) [16]

a) With the help of neat labeled diagram explain the construction and working of a conventional trickling filter?

b) What are the limitations of conventional activated sludge process? Add a note on modification of activated sludge process?

Q.5 Explain the manufacturing process and sources of wastes for the following industries: [16]

a) Sugar Industry.

b) Cotton textile mill.

OR

Q.6 Write a short note on: [4 marks each] [16]

a) Sampling techniques used in waste water survey.

b) Pollutants in industrial waste water.

c) Chemical treatments of the industrial wastes.

d) Neutralization of waste water.

SECTION –II

Q.7 What are the methods used for air quality measurement. Enlist different states of air pollutant along with its unit of measurement. Add a note on air quality control techniques? [18]

OR

Q.8 Answer the Following: (9 marks each) [18]

a) What are primary and secondary air pollutants? Add note on effect of air pollution on plants and climate?

b) Explain the basic design and operating principle of spray tower?

Q.9 Answer the Following (8 marks each) [16]

a) Explain the different types of treatments of hazardous wastes. Add note on hazardous waste disposal?

b) Explain solid waste management . Add a note on control measures for urban and industrial wastes?

OR

Q.10 Explain briefly:[8 marks each] ` [16]

a) Types of biomedical waste and their treatment procedures.

b) Composting and Vermicomposting.

Q.11 What is liquid phase bioremediation? Add not on use of [16]

suspended bioreactors and membrane based bioreactors for waste water treatment?

OR

Q.12 Write a short note on: [4marks each] [16]

1. Wormicomposting
2. xenobiotic compounds
3. Bioaugmentation
4. Solid phase bioremediation.

UNIVERSITY OF PUNE

[4364]-816

B. E. Biotechnology (BTech Biotech Semester-I) Examination - 2013

BIOTHERAPEUTICS TECHNOLOGY (ELECTIVE-1) (2008 Pattern)

[Total No. of Questions:] **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **Q1 or Q2, Q3 or Q4, Q5 or Q6** from section I and **Q7 or Q8, Q9 or Q10, Q11 or Q12** from section II.*

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Neat diagrams must be drawn wherever necessary.

SECTION-1

Q1 Explain use of transgenic animals and plants for the biopharmaceuticals production. [18]

OR

Q2 Explain the principles of Cloning vectors and cloning strategies. [18]

Q3 Answer the following (8 marks each) [16]

i) Explain the terms: traditional pharmaceutical product, 'biologic' and 'biopharmaceutical'

ii) Explain the advantages of producing biopharmaceuticals by recombinant means.

OR

Q4 Answer the following (8 marks each) [16]

i) What are the host systems used in the production of approved therapeutic recombinant proteins. Explain.

ii) Schematically explain- A basic overview of the DNA cloning process.

Q5 Write short notes on (4 marks each) [16]

i) Glycosylation

ii) Post-translational modification

iii) Use of Expression Systems in Research and by the Pharmaceutical Industry

iv) Immortal Cell Lines

OR

Q6 Explain (8 marks each) [16]

i) The factors affecting transfection.

ii) Production of monoclonal antibodies by the hybridoma technology.

SECTION-II

Q7 Define validation and state how are pharmaceutical validation classified.[18]

OR

Q8 Explain the importance of Cleanroom applications in pharmaceutical [18] production

Q9 Answer the following (8 marks each) [16]

i) Give the definition of drug stability and drug kinetics

ii) Describe Mircobial degradationand its effects of Microbial Instability

OR

Q10 Answer the following (8 marks each) [16]

i) Explain the guiding principles of Good manufacturing practices

ii) Outline the upstream process involved in the production of a single batch of product.

Q11 Write notes on (4 marks each) [16]

i) Photolysis

ii) Routes of administration of drugs

iii) Master formulae

iv) USP Pure Water Systems

OR

Q12 Answer (8 marks each) [16]

i) Comment on- The active drug undergoes decomposition following reaction with the solvent present

ii) Explain – Master and working cell banking system

University of Pune
B.E. (Biotechnology), Examination – 2013
4364-817
Bioenergy and Renewable Resources
(2008 Pattern)

[Total No. of Questions : 12] **[Total No. of Printed Pages :2]**
[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **03 question from each section.***
*(2) Answers to the **two sections** should be written in **separate answer-books**.*
(3) Figures to the right indicate full marks.
(4) Neat diagrams must be drawn whenever necessary.
(5) Assume suitable data, if necessary.

Section I

Q1. A) Write primary and secondary sources of energy. [6]
B) Describe the principal of power generation in solar photovoltaic system [6]
C) Describe geothermal energy and classify. [6]

OR

Q2. A) Comments in details about Environmental impacts of the conventional and renewable sources. [10]
B) describe hydrogen generation system. [8]

Q3. A) How are wind energy component system classify? Discuss in brief. [10]
B) Enlist limitations of flashed-steam system. [6]

OR

Q4. Write detail note on: [16]
1. Wave and Tidal energy
2. Uses of geothermal energy and the geothermal power plants.

O5. A) Describe the principle of power generation in solar photovoltaic system [6]
B) With the help of neat sketch describe solar heating system using water heating solar collector. Give its advantages and disadvantages. [10]

OR

Q6. A) Describe passive solar space heating system. [6]
B) Describe briefly possibilities of utilizing following method of power generation
1. Solar cookers 2. Solar distillation [10]

Section II

Q7. A) With neat sketches explain the different types of photo bioreactor. [14]
B) Explain the advantages of microalgae as feed stock for biofuels. [4]

OR

Q8. A) What is the potential feed stock for biodiesel? [6]
B) Explain with neat flowchart the steps involved in biodiesel production at industrial level. [9]
C) What is biodiesel? [3]

Q9. A) What is detoxification? [3]
B) What are the advantages of butanol over ethanol as a biofuel? [4]
C) Explain transesterification process and process and problems face while implementing at industrial level [9]

OR

Q10. A) Explain the concept of bio refinery and its economics. [8]
B) Explain any two challenges in lignocelluloses to ethanol production process. [8]

Q11. A) What is bio digester? Explain advantages and disadvantages of plug flow bio digester. [8]
B) List and explain briefly the techniques suggested for biogas production and maintenance. [8]

OR

Q12. A) What is anaerobic digestion? What are the factors affecting the bio digestion? Explain briefly. [8]
B) How are the biogas plant classified? Explain each briefly with a diagram. [8]

UNIVERSITY OF PUNE
[4364]-820
B. E. BIOTECHNOLOGY (SEM II) Examination - 2013
(415469) BIO PROCESS MODELING AND SIMULATION
(2008 Pattern)

[Total No. of Questions: 12] **[Total No. of Printed Pages :2]**
[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answers three questions from **Sections I** and three questions from **Section II**.*
(2) Figures to the right indicate full marks.
(3) Use of Programmable calculator is not allowed.
(4) Assume suitable data, wherever necessary.

SECTION I

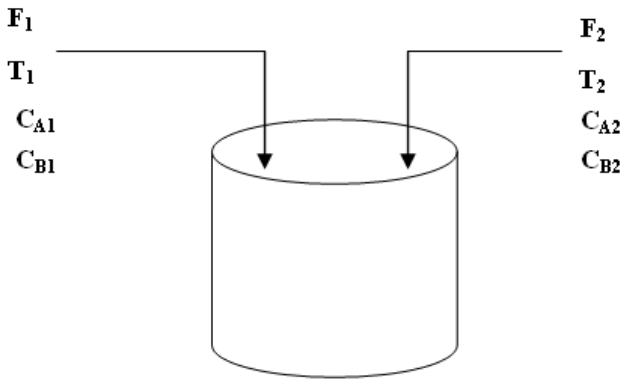
Q1 A Define the following terms 09
i. Model
ii. Mathematical Modeling
iii. Physical Modeling

B Briefly explain a Lumped parameter model, its general assumptions. Give a suitable example? 09

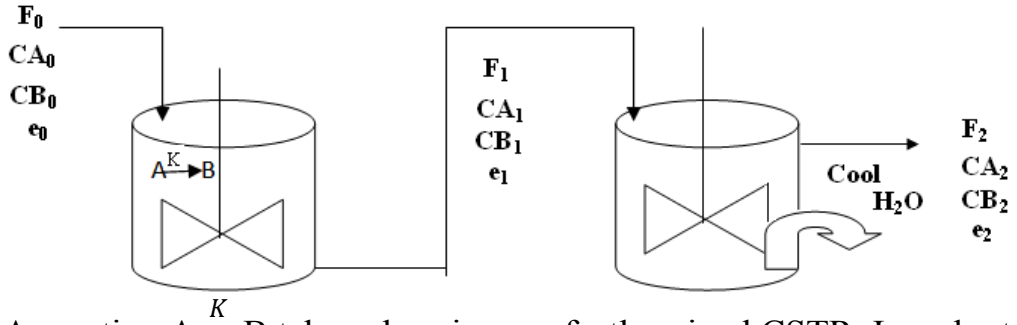
OR

Q2 Give detailed notes on problem definition and formulation in Model Building? 18

Q3 A Develop the state model for batch mixing shown below. Initially the tank is empty. The volume of the tank is V m3. The flow rates are volumetric and the concentrations are in moles/vol. How long does it take to fill up the tank? 08



B Model the below system and prove that the system is critically specified. 08



A reaction $A \xrightarrow{K} B$ takes place in a perfectly mixed CSTR. In order to prevent the formation of excess of B the contents of CSTR are sent into a 2nd CSTR where the reaction fluid is quenched by supplying cooling water inside a coil which will remove the heat of reaction.

OR

Q4 Model a PER with the following first order reactions taking place inside it. 16
i. Consecutive
ii. Parallel
iii. Reversible

Q5 Explain in detail the classification based on state of the process? 16

OR

Q6 Give a brief notes on Boundary conditions. Give suitable examples. What are the advantages of using boundary conditions? 16

SECTION II

Q7 Derive an expression for total Biomass amount in a mixed reactor under Fed batch mode of operation with necessary assumptions and neat sketch. 16

OR

Q8 Model a Chemostat operated as a continuous fermenter applying steady state mass balances on Biomass, Substrate and Product. 16

Q9 A Define the following terms 08
i. MLSS
ii. F/M
iii. SVI
iv. Sloughing

B Distinguish between Trickling bed filters and Activated sludge systems. 8

OR

Q10 Model an Activated sludge process with proper assumptions and a neat sketch. 16

Q11 Model a reactor with mass transfer and prove that the degree of freedom are zero. 18

OR

Q12 Model Multi component Batch Distillation Column. 18

[Total No. of Questions: *12*] **[Total No. of Printed Pages: 4]**

UNIVERSITY OF PUNE
[4364]-822
B. E. (*Biotechnology*) Examination - 2013
ELECTIVE-III FOOD BIOTECHNOLOGY (415467)
(2008 Course)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 ***Answer*** *three questions from section I and three questions from section II.*

2 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

3 *Neat diagrams must be drawn wherever necessary.*

4 *Black figures to the right indicate full marks.*

SECTION -I

Q.1 A Explain in brief how the following factors affect spoilage of food: [9]

i) pH and buffering capacity

ii) Nutrient content of food

iii) Relative humidity

B Discuss the effects which microbial spoilage has on different constituents of food. [7]

OR

Q.2 A Describe the following parameters with respect to microbial spoilage of food: [8]

i) Associative growth

ii) Symbiotic growth

iii) Antibiotic effect

iv) Synergistic effect

	B	Discuss the microbial spoilage of milk and milk products	[8]
Q.3	A	Discuss in detail the different high temperature techniques used in the industry for preservation of food.	[18]
		OR	
Q. 4	A	Write notes on the following: i) Extrusion cooking ii) Factors affecting effectiveness of effectiveness techniques. ii) Dielectric heating	[18]
Q. 5	A	Steam with 90% quality, at a pressure of 143.27 Kpa, is condensing in the outer annular space of a 5 m long double pipe heat exchanger. Liquid food is flowing at a rate of 0.5 kg/s in the inner pipe. The inner pipe has an inner diameter of 5cm. the specific heat of the liquid food is 3.9 kJ/ (kg°C). The inlet temperature of the liquid food is 40°C and the exit temperature is 80°C. i) Calculate the average overall heat transfer coefficient ii) If the resistance to conducive heat transfer caused by the inner steel pipe is negligible, and the convective heat transfer coefficient on the steam side is very large (approaches infinity), estimate the convective heat transfer coefficient for the liquid food in the inside pipe Give: From steam tables – steam temperature at 143.27Kpa =100°C	[10]

B Determine the amounts of lean beef, pork fat and water that must be used to make 100 kg of a frankfurter formulation. The composition of the raw materials and the formulations are [6]

Lean beef:14%fat, 67%water, 19%protein

Pork fat:89%fat, 8%water, 3%protein

Frankfurter: 20%fat, 65%water, 15% protein

OR

Q. 6 A Peas which have an average diameter of 6 mm are blanched to give a temperature of 85°C at the centre. The initial temperature of the peas is 15°C and the temperature of the blancher water is 95°C. Calculate the time required, assuming that the heat transfer coefficient is 1200 W/m^2K and for peas, the thermal conductivity is 0.35 W/mk, the specific heat is 3.3 kJ/ kgK and the density is 980Kg/m^3. Take Fourier number as 0.32 for the above conditions. [8]

B A process was calculated such that the probability of spoilage from an organism with a D_0 value of 1 min is 1 in 100,000 from an initial spore load of 100. To verify this process, an inoculated pack is made. Calculate the level of an organism having a D_0 value of 1.5 min that must be used on 100 cans such that a spoilage rate of 5 cans will be equivalent in lethality to the calculated process. [8]

SECTION II

Q. 7 A Describe the production and applications of xanthan gum in the food industry. [8]

	B	What are polyunsaturated fatty acids? Discuss the role of these in relevance to the food industry.	[8]

OR

Q. 8	A	Write notes on the following: i) General aspects of microbial fermentation for food production ii) Solid state bioprocessing	[16]
Q. 9	A	Discuss in detail the application of pectinases in the food industry.	[9]
	B	What are the different classes of industrially enzymes? Discuss in brief the application of each enzyme in the food industry.	[9]

OR

Q. 10	A	Explain the role of enzymes in beer mashing and chill proofing.	[9]
	B	What are the different types of proteases and their application in the food industry?	[9]
Q. 11	A	What are the different types of food wastes generated from the food industry? Discus the various methods for their treatment.	[16]

OR

Q. 12	A	Write notes on the following i) Difference between anaerobic and aerobic waste treatment methods ii) Chemical and physical methods of food waste treatment	[16]

[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *4*]

UNIVERSITY OF PUNE

[4364]-826

B. E. (Biotechnology) Examination - 2013

(IPR, Bioethics and Regulations)Elective iv(415468)

(2008 Pattern)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 ***Answer*** *three questions from section I and three questions from section II.*

2 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

3 *Neat diagrams must be drawn wherever necessary.*

4 *Black figures to the right indicate full marks.*

SECTION -I

Q.1 A As per ICMR guidelines what is the essential information must provide for prospective research participants? Explain in detail about the basic responsibilities of an Institutional Ethics Committee(IEC) [18]

OR

Q.2 A Write in detail about the principles of non-exploitation and principles of privacy and confidentiality defined by ICMR when humans are to be used as participant for research purpose. [18]

Q.3 A Answer the following [8 M each] [16]

1) What are the ethical issues involved in the use of genetic technology in agriculture?

2) Discuss in detail about ethics in medicine

OR

Q. 4 A Read the following case study and answer the questions [16]

Imagine that a large land-grant university has partnered with a major agricultural company to create a consortium to produce low cost, high quality phytopharmaceuticals. Phytopharmaceuticals are compounds that can be and are used as drugs, and can be natural products as well as genetically modified products derived from plants. In this case, corn was bioengineered to produce large quantities of a vital antibiotic: penicillin. The production of this crop containing the antibiotic in the seed will largely benefit developing nations of providing a steady, reliable supply of cheap product that can easily be consumed orally. Ultimately, the cost of the drug will be 10% of the cost of producing penicillin using current production methods. Storage and transportation of antibiotic will be simplified by eliminating the need to refrigerate the drug, The use of needles and their associated risks will also be removed. In the United

States, strict rules concerning genetically modified food crops exist and are routinely enforced. Presently, the USDA, FDA, and EPA have approved the modified maize for human consumption under prescription in the United States.

Opponents of the GM crop have raised the following issues. The potential for contamination of other, non-GM, crops is very high when a GM crop like corn expresses an allergenic compound. The reason is that corn is wind-pollinated. In addition to pollen drift, storage contamination and the potential for contamination through mixing of supplies raise serious risks for those allergic to antibiotics. Because for the seriousness of the consequences, it has been suggested that the risks be evaluated using the precautionary principle as opposed to risk assessment, the standard method currently relied on by regulatory agencies. Dosing and intake control have surfaced as major problems with consuming antibiotic in a food crop. Development of antibiotic resistance in infectious agents could pose serious risk. Potential environmental impacts include cross contamination of neighboring maize fields with the GM crop pollen. Isolation and refugia (a 'refuge ' of GM crop among non-GM crop) of the genetically modified maize crop becomes undisputedly necessary.

An anti-GM activist group advances the claim that the consortium if not proposing the new crop as an altruistic action. Rather, the consortium is proposing the new crop in order to make huge profits in the animal feed industry in the US. The idea is that the new crop would be grown primarily, on large acreages, in the US. The major use of new crop, in other words, would not really be for disease treatment in developing countries but rather for market animal growth promotion. in the US, low levels of antibiotics are used in animal feed. These antibiotics modify the microorganisms in the gut of the animal, thereby improving the animal's weight gain and feed efficiency.
Genetically modified 'traditional' pharmaceuticals are already in use and are widely accepted by consumers in the . US. These pharmaceuticals have been deemed safe by the relevant US regulatory agencies. Recombinant insulin, for example, is widely used by diabetics. As a result of GM in the medical industries, insulin is now much cheaper and in greater supply.
What ethical issues are at stake here?
Consider each of these potential complicating factors:
1) Wind pollination; humans with allergies; underlying issues of giving away the product, yet acquiring large profits from animal uses in the U.S.; dosing of the 'drug' and following up with taking entire prescription; control of who eats it and shares it; regulatory issues; issues surrounding growing the crop in developing nations, including use of

chemical and fertilizer inputs, intensive row cropping and weeding, to produce a sufficient quality and quantity of a crop for production to be profitable; resistance issues.
2) Should we be doing this?
3) How should it be regulated?
4) Will your agronomist become your pharmacist? Will your grocer become your pharmacist?
5) Should the GM maize be limited to human use? To animal use? How would such a limitation change the risks and benefits?
6) Is the opposition based on the actual risk implied or only on the alleged immorality of producing GM organisms?
7) Should the university receive benefits, financially or otherwise, from this product?
8) Should the consortium be allowed to patent, and thus control the product?
9) If industry won't support this type of, or exact research, should the federal government subsidize the research? It this is to help developing countries then are we morally obligated to do it? Should government support depend on industry support?
10) Should the targeted users/audience have a say in the process? Should it pass though international aid agencies or the governments of the developing countries?
11) Should U.S. agencies (USDA/FDA/EPA) or other agencies {for example the WHO (Would Health Organization) or FAO (Food and Agriculture Organization)} regulate the product?
12) What might the effects of different cooking/culinary methods on the antibiotic imply for the consumer who is ill and needs the full benefit of the drug?

Q. 5 A What is a patent? What is expected from patentee as an obligation to the state? What are the conditions to be satisfied by an invention to be patentable? What are the types of inventions which are not patentable in India? When should an application for a patent be filed? [16]

OR

Q. 6 A What do terms patent pending and patent applied for means? Why are patents granted? Can computer software and business methods be patented? What is the difference between non obviousness and inventive step? [16]

SECTION II

Q. 7 A Define copyright, trademark, and service mark. How long does a trademark registration last? What are the benefits of registration for a trademark? [18]

OR

Q. 8 A Describe in detail about the requirements for registration for a trademark? [18]

Discuss the consequences which happens due to infringement of copyright?

Q. 9 A What is cGMP? What is the significance of cGMP? What comes under cGMP? What are consequences of GMP violation? [16]

OR

Q. 10 A What is DCGI? Explain in detail about various roles of DCGI. [16]

Q. 11 A What is clinical trials? Why are clinical trials important? How are trials set up? Who can take part in clinical trials? [16]

OR

Q. 12 A What is clinical data management? Describe in detail about the challenges in clinical data management. [16]