

End Semester Examinations - Nov-Dec 2015 Exams

14BT2001 Basics of Biochemistry

Set A

Time : 3 hrs
Total Marks: 100

1. What is the difference between structural and stereoisomers? Illustrate with suitable sugar examples. (5)
Explain the different types of isomers seen in the monosaccharide with examples. (10)
How does the disaccharide maltose structure is formed? (5)

OR
2. Name the common disaccharides. Comment on their properties and functions. (9)
Why the sucrose is called as a non-reducing sugar? Justify it with its structure. (4)
What are mucopolysaccharides? Give their general properties and clinical significance. (7)
3. Write the physical properties of fatty acids. (5)
How a triglyceride is formed? Comment on the physical properties and saponification of fats or triglycerides. (15)

OR
4. Why the phospholipids are amphiphilic in nature? Justify it. (4)
What are the special functions of phospholipids? (12)
Write the significance of ether lipids with an example. (4)
5. Give the general structure of amino acid and indicate α - carbon in it. (4)
Classify the amino acids and give their structures. (16)

OR
6. Elaborate the functions of different proteins. (12)
Comment on the essential amino acids. (4)
How a peptide bond is formed? Illustrate it. (4)
7. Which are the nucleotides present in DNA? (4)
Comment on the properties of DNA Chargaff's rules on DNA base composition. (12)
How are the nucleotides connected in nucleic acids? (4)

OR
8. Give the structure and functions of different types of RNA. (8)
Give a detailed account on any 2 fat soluble Vitamins. (8)
Which are the Vitamins having anti-oxidant role? Comment on their deficiency symptoms. (4)
9. Describe the essentiality and source of Vitamin B-complex. (16)
Give the functions of any 4 minerals. (4)

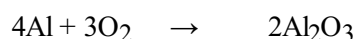
End Semester Examinations - Nov-Dec 2015 Exams

14BT2003 Principles of Chemical Engineering

Set B

Time : 3 hrs
Total Marks: 100

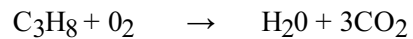
1. i) Convert the following: (5 x 2 = 10 marks)
- A. 10km to miles
 - B. 104 in³/ day to cm³ /min
 - C. 203 cm³/sec to in³/ hour
 - D. 2.1 m to yards.
 - E. 195 lbs/feet³ to gram/cm³
- ii) Imagine that you ride 10km in a bike from your hostel to garden city in 20 minutes. Calculate the average speed of your trip. a) km/hour b) m/sec (10 marks)
- OR**
2. i) Convert the following: (5 x 2 = 10 marks)
- A. 41km to miles
 - B. 200 in³/ day to cm³ /min
 - C. 563 cm³/sec to in³/ hour
 - D. 5.5 m to yards.
 - E. 371 lbs/feet³ to gram/cm³
- ii) A large ground area is 120 m long and 75 m wide. What are its dimensions in feet and inches? (10 marks)
- 3.
- A. Explain the Dalton's law and compose an equation to calculate its mole fractions. (5 marks)
 - B. How many atoms are present in 30 gm of MgO. (5 marks)
 - C. If you have a 50x stock solution. How much of the stock would be needed to make 150ml of 2x solution? 100 ml of 2x solution? 70 ml of 2x solution? (10 marks)
- OR**
- 4.
- A. Describe Gas law and deduce the equation for an ideal gas. (5 marks)
 - B. How many atoms are present in 80 gm of CuSO₄. (5 marks)
 - C. If you have a 70x stock solution. How much of the stock would be needed to make 250ml of 6x solution? 170 ml of 6x solution? 130ml of 6x solution? (10 marks)
- 5.
- A. Get into a distillation column where the feed is given as Phenol 200 kg, Water 200 kg, whereas in the top product stream the phenol contains 15 %, water 90% and the bottom product stream consist phenol 65%, water 40%. Compute the overall mass balance and component mass balance. (10marks)
 - B. Define Filtration and explain the types of filter. (10marks)
- OR**
- 6.
- A. Mention about the mechanism of drier and its characters with a refined sketch. (10 marks)
 - B. Define Evaporation and explain the types of evaporators with a neat well labelled diagram. (10 marks)
- 7.
- A. What mass of aluminium oxide will be formed when 30 grams of aluminium are burned in 40 grams of Oxygen. (10marks)



B. Discuss about the working of Semi-batch and batch Reactor with a neat diagram. (10marks)

OR

8. A. If 50 gram of C_3H_8 was added to 20 gram O_2 , what mass of CO_2 will be produced ? (10marks)



B. Write a short note on Trickle bed Reactor (with diagram) and Fluidised bed reactor. (10marks)

9. Air flows steadily at the rate of 0.3 kg/s through an air compressor, entering at 9m/s velocity, 250 kPa and 0.25 m³/kg. The internal energy of the air leaving is 80 KJ/Kg greater than that of air entering. Cooling water in the compressor jackets absorbs heat from the air at the rate of 60kW (a) compute the rate of shaft work input to the air in kW (b) find the ratio of the inlet pipe diameter to outlet pipe diameter. (20 Marks)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2004 Cell Biology

Set A

Time : 3 hrs
Total Marks: 100

1. Give an account of different models of plasma membrane, which model is more appropriate and why? (20 marks)

OR

2. Elaborate different phases of cell cycle and molecules that control cell cycle (20 marks)
3. Define cytoskeleton protein and give a detailed notes on microtubules for cell structure and cell movement (20 marks)

OR

4. Discuss in detail about extracellular matrix and basal lamina in the cell (20 marks)
5. Give a brief account of ligand gated and voltage gated channels against neuronal cell membrane (20 marks)

OR

6. Discuss in detail about endocrine molecule and its mode of action in cell signaling (20 marks)
7. Describe in detail about membrane bound receptor for cell signaling (20 marks)

OR

8. Give a brief account of inositol triphosphate (IP3) in signal transduction (20 marks)
9. Explain how cAMP and cGMP act as a second messenger in signal transduction (20 marks)
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End Semester Examinations - Nov-Dec 2015 Exams

14BT2005 Microbiology

Set A

Time : 3 hrs
Total Marks: 100

1. What is binomial nomenclature? Discuss in detail about the classification of microorganisms [20 Marks]
OR
 2. a) Define Numerical aperture. State the working principle of bright field microscope with a neat diagram [10 Marks]
b) With a neat diagrammatic representation, explain the working principle and uses of fluorescent microscope in detail [10 Marks]
 3. What is differential staining? With a neat flow chart, enumerate the principle, role of dyes and steps involved in Gram staining and Acid fast staining [20 Marks]
OR
 4. Explain in detail the methods used to quantitate bacterial growth. Mention its advantages and disadvantages [20 Marks]
 5. Illustrate the distinctive characteristics and mechanism of nutrient uptake by bacteria [20 Marks]
OR
 6. a) With a neat diagram, describe the structure, methods of reproduction, spores and importance of mold [12 Marks]
b) Describe the life cycle of yeast *Saccharomyces cerevisiae* in detail [8 Marks]
 7. Enumerate the types of physical methods used to control microorganisms in detail [20 Marks]
OR
 8. Define biogas. Explain in detail the methanogenesis and biogas production with a neat flow chart. [20 marks]
 9. a) What is biofertilizer? Describe host microbe interaction and production of Rhizobial fertilizer.[12 Marks]
b) Briefly discuss the steps involved in production of cyanobacterial inoculants.[8 Marks]
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End Semester Examinations - Nov-Dec 2015 Exams

14BT2007 Basic Industrial Biotechnology

Set A

Time : 3 hrs
Total Marks: 100

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1. List the Contributions and Achievement of various Scientists towards development of Microscopes as a build up to the exquisite Nobel Prize in 1986.

OR
 2. Describe in detail the Groups that provide Biocatalysts for Industrial processes.
 3. From the knowledge obtained by you on a survey of various bioproducts, what are the Applications of different Bioproduct Classes in Industry and Therapeutics.

OR
 4. A. What is the criteria that can be used to classify or characterize the wide range of bioprocesses by the products they produce?

B. List out various Bioproduct classes used in Industry and Therapeutics.
 5. Production of Ethanol with special mention of it's By products and its Recovery with a neat diagram.

OR
 6. Describe the Process model, Stoichiometry, Environmental and Economic Assessment of the Primary metabolite which is obtained as a monohydrate crystal.
 7. From the knowledge obtained by you from the work of Rahul Singh *et. al.*, 2014 explain the Production, Purification and Optimization of the Secondary metabolite which is a water soluble aminoglycoside.

OR
 8. From the knowledge obtained by you from the work of Akcan *et. al.*, 2012 describe in detail the Production and Optimization of the Industrial Enzyme Amylase using SSF.
 9. Explain in detail the impact of the microbial strain used on the Production, Recovery and Properties of Xanthan Gum, an important industrial biopolymer, on the basis of the work carried out by Garcia-Ochoa *et. al.*, 2000.

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2008 Metabolism and Bioenergetics

Set B

Time : 3 hrs
Total Marks: 100

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1. How pyruvate is produced? Discuss the reactions (20 Marks)
OR
 2. Explain the reactions of Hexose Monophosphate Pathway (20 Marks)
 3. Describe the degradative reactions of leucine and isoleucine (20 Marks)
OR
 4. Enumerate the biosynthesis of aromatic amino acids (20 Marks)
 5. How cholesterol is biosynthesized ? Explain (20 Marks)
OR
 6.
 - a. Discuss the regulation of cholesterol (10 Marks)
 - b. Draw the structure of cholesterol (3 Marks)
 - c. List the functions of cholesterol (7 Marks)
 7.
 - a. Elaborate on degradation of purines (10 Marks)
 - b. Give an account on the inborn errors of nucleic acid metabolism (10 Marks)
OR
 8.
 - a. Distinguish between nucleosides and nucleotides (10 Marks)
 - b. What is meant by salvage pathway and De novo pathway (5 Marks)
 - c. Draw the structure of nitrogenous bases (5 Marks)
 9. Discuss on bioenergetics and energy rich compounds with suitable examples (20 Marks)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2009 Bioprocess Principles

Set B

Time : 3 hrs
Total Marks: 100

1. Explain in detail various stages in development of fermentation industry also tabulate various process control, vessels used and modes of operation of these process (20 Marks)

OR

2. What is sampling? Explain various types of sampling with a neat diagram. (20 Marks)

3. Elaborately explain the process of medium formulation and the important constituents need to be added for medium formulation. (20 Marks)

OR

4. For the following data calculate the difference, average difference, mean square, experimental error and factors showing larger effect. (20 Marks)

Factors	Carbon	hormones	Vitamins	Minerals	precursor	Dummy-1	Dummy-2
$\Sigma(H)$	4.9	24.5	6.7	9.3	9.7	13	9.1
$\Sigma(L)$	14.9	11.3	9.3	9.8	5.3	10.8	9.6

5. Design the sterilization time for an industrial scale batch medium sterilization process. (20 Marks)

OR

6. Air is sterilized through a depth filter and is sent at an flow rate of $12 \text{ m}^3/\text{sec}$ for an fermentation process for 8 hours with an linear velocity of 0.17 m/s . the value of the rate constant is 1.7 cm^{-1} Calculate 1. Initial number of microorganism present in air. 2. Radius of the filter 3. Length of the filter 4. Cross sectional area of filter 5. X_{90} 6. Efficiency of filtration. (20 Marks)

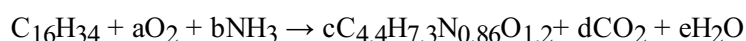
7. Elaborately explain the process of isolation of industrially important microorganisms. (20 Marks)

OR

8. Describe with a neat diagram the process of inoculum development for Baker's Yeast production. (20 Marks)

9. The experimental measurement of bakers yeast has shown that the carbon source is converted to biomass. For the following reaction the RQ is 0.44. (20 Marks)

Calculate:



a. Stoichiometric coefficients a, b, c, d and e.

b. Degrees of reduction for substrate and biomass.

c. Biomass, Nitrogen and CO₂ yield coefficient.

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2011 Molecular Biology

Set A

Time : 3 hrs
Total Marks: 100

1. Describe the Avery MacLeod experiment to prove that DNA is the genetic material (10)
Detail the process of conjugation. Comment on F-prime factor and Hfr? (10)

OR
2. Illustrate the transformation principle through Frederick Griffith's experiment. (10)
What is the difference between generalized and specialized transductions? Explain. (10)
3. What are the properties of DNA polymerase-I present in *E. coli*? Describe it. (8)
Write the process of replication in *E. coli* with neat diagrams. (12)

OR
4. How do the DNA polymerases of eukaryotes differ from that of prokaryotes? (6)
Describe the process of replication in eukaryotes with neat illustrations. (14)
5. What are the different types of DNA repair systems available in prokaryotes? Explain. (15)
Write a note on the telomere replication in prokaryotes. (5)

OR
6. Give the features of enhancer and comment on its structure. (8)
Describe the process of transcription and the post transcriptional processing in *E. coli*. (12)
7. How was the genetic code determined? Give its salient features. (15)
Mention the names of inhibitors of protein synthesis in prokaryotes. (5)

OR
8. Write the process of translation in eukaryotes. (10)
Detail the gene regulation in *lac* operon (10)
9. Discuss about the genome arrangement in eukaryotes (10)
Comment on *trp* operon function. (10)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2012 Genetic Engineering and Bioethics

Set A

Time : 3 hrs
Total Marks: 100

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1. A.Name the extrachromosomal element used in genetic Engineering-(1 Mark)
B. Write the recognition sequence of the restriction enzyme EcoRI (1 mark)
C. Give a detailed note on Restriction and Modifying enzymes used in genetic engineering with suitable examples(18 marks)
- OR**
2. A.Restriction enzymes capable of making internal cuts in a DNA molecule is _____(1 mark)
B.A phage injects DNA into a bacterium, Phage DNA is cleaved but bacterial DNA is not cleaved by the restriction enzymes – Give reason with a diagram (2 marks)
C. Write a detailed note on Linkers,Adapters and Homopolymer tailing with examples and respective diagrams.(17 marks)
3. A. Write the properties of a ideal Plasmid vector (5 marks)
B Write short note on Expression vector (3 marks)
C.What is pUC Vector (2 marks)
D. Write the Geneology and origin of pBR322 and draw a neat diagram of pBR322 and label it (10 Marks)
- OR**
4. A.What is F- Plasmid write the significance of F plasmid (4 mark)
B. Identify the following recognition sequence and report whether it produces Blunt end or sticky ends (2 marks)
1. GAATTC, 2. CAGCTG
C. What is Insertional Inactivation; elaborate the method of recombinant selection using antibiotic replica plate method (14 Marks)
5. A. What is a probe (2 Marks)
B. What is an suitable temperature for annealing in PCR (2 marks)
C. What are the ingredients needed and write the different steps involved PCR program with necessary illustrations. (16 Marks)
- OR**
6. A. Write Short note on Molecular Beacons (4 Marks)
B. Elaborate the various steps and the significance of Inverse PCR and Nested PCR (6 marks)
C. Explain the Hybridization technique used to identify the recombinant DNA in transgenic plant (10 marks)
7. A. Define somatic cell therapy & Germ line therapy (4 Mark)
B. Write Short notes on Gene Knockout Animals (4 Marks)

C.Describe the non viral methods used to transfer the gene (12 Marks)

OR

8. A.Define Biofarming (2 Mark)
- B.What is Trangenesis (2 Mark)
- C.What is Golden rice, explain the pathway for the production of Provitamin A in golden rice and Write a note on transgenic tobacco plant (16marks)
9. A.Write in detail about Biopharming and its advantages and disadvantages (10 Marks)
- B. Discuss about the ethical issue in genetic engineering (10 marks)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT3014 Research Methodology

Set A

Time : 3 hrs
Total Marks: 100

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1. Give a detailed account on sample design and its types with examples
OR
 2. Write in detail about measurement scales, classification and its design
 3. Give brief notes on: a.Measures of central tendency with example (10)
b.Correlation analysis and its importance in multiple variable studies with example (10)
OR
 4. Enumerate the different methods of collecting data. Explain its merits and demerits
 5. Write in brief about a. Impact factor of journals (10)
b. Types of research reports (10)
OR
 6. Give a brief account on steps involved in thesis writing with necessary examples.
 7. Describe the safety measures related to laboratory safety, bio-safety, recombinant safety with suitable examples
OR
 8. Write in detail about regulations of human and animal research and its ethics
 9. Compulsory:
Describe in detail the different steps involved in research process and design

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14BT2015 Bioreactor Engineering

Set A

Time : 3 hrs
Total Marks: 100

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1. Assume that experimental measurement for a certain organism have shown that cells can convert 2/3 substrate carbon to biomass.
- a) Calculate the stoichiometric coefficients for following biological reactions:
- $$C_6H_{12}O_6 + aO_2 + bNH_3 \rightarrow cC_{4.4}H_{7.3}N_{0.86}O_{1.2} + dH_2O + eCO_2$$
- $$C_{16}H_{34} + aO_2 + bNH_3 \rightarrow cC_{4.4}H_{7.3}N_{0.86}O_{1.2} + dH_2O + eCO_2$$
- Calculate the yield coefficients biomass with respect to substrate and oxygen supply for both the reactions. Also, comment on the differences.
- OR**
2. a) Find the stoichiometric coefficients for the given biological reaction when $RQ = 1.44$? (15 marks)
- $$C_6H_{12}O_6 + aO_2 + bNH_3 \rightarrow cC_6H_{10}NO_3 + dCO_2 + eH_2O$$
- b) Find the theoretical growth and product yield coefficient for ethanol fermentation as represented by the following reaction: $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
- Assume: 2 moles of ATP formed for 1 mole of glucose (5 marks)
3. Explain the growth pattern of microorganism with suitable diagram and derivation?
- OR**
4. a) Derive the expression for non-competitive product inhibition on cell growth? (10 marks)
- b) Derive the expression for un-competitive toxic compound inhibition? (10 marks)
5. a) Derive the expression for OTR. (15 marks)
- b) Discuss about the foam formation in bioreactor and prevention method? (2 marks)
- c) What are the disadvantages of batch reactor? (3 marks)
- OR**
6. Explain in detail about Oxygen balanced out techniques to determine the $k_L a$?
7. Derive the performance equation for chemostat with recycle?
- OR**
8. a) Explain the Air lift reactor with neat sketch and its types. (10 marks)
- b) Explain in detail about packed bed bioreactor and its application, Advantages and Disadvantages of packed bed bioreactor? (10 marks)
9. Write in detail about basic configuration of fermenter and its ancillaries.
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14BT2016 Enzyme Engineering

Set A

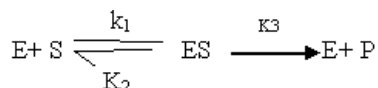
Time : 3 hrs
Total Marks: 100

1. Describe in detail about the following mechanisms of substrate binding with enzyme? (20 Marks)
 - i) Lock & Key model
 - ii) Induced fit hypothesis
 - iii) Transition state stabilization theory

OR

2. Describe the IUM-MB classification of enzymes in detail. (20 Marks)

3. The following data have been obtained for the enzymatic reaction. Calculate and compare MM parameters using LB plot, HW plot, EH plot and MM plot. (20 Marks)



V	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3
S	20	15	11.2	9.1	8.0	6.9	4.8	3.5	2.0

OR

4. Derive Michealis Menten equation for single substrate reaction without inhibition and What are the methods available to estimate MM parameters explain in detail. (20 Marks)
5. Enzyme –A is present in a crude extract and having net positive charge at pH 4.5. Discuss a suitable chromatographic technique to purify that enzyme? (20 Marks)

OR

6. Elaborately explain the steps involved in isolation and purification of a membrane bound enzyme. (20 Marks)
7. Write a detailed note on various methods of enzyme immobilization. Discuss the advantages and disadvantages of enzyme immobilization (20 Marks)

OR

8. For the following data determine MM parameters and inhibitor constant k_i using LB plot. (20 Marks)

Substrate concentration	0.2 M		0.02 M	
	1/V	I	1/V	I
	0.22	0	0.68	0
	0.33	0.0012	1.02	0.0012
	0.51	0.0027	1.5	0.0022
	0.76	0.0044	1.83	0.0032
	0.88	0.0061	2.04	0.0037

	1.1	0.0080	2.72	0.0044
	1.15	0.0093	3.46	0.0057

9. Explain in detail the working principle and applications of calorimetric biosensor and amperometric biosensor (20 Marks)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2017 Immunology

Set A

Time : 3 hrs
Total Marks: 100

1. Draw and describe the structure of the various classes of Immunoglobulin.
OR
 2. Illustrate in detail the steps involved in the production of monoclonal antibodies.
 3. Describe any two autoimmune diseases in detail.
OR
 4. Differentiate between MHC Class I and MHC Class II pathway of antigen presentation.
 5. Describe two secondary lymphoid organs with suitable diagrams.
OR
 6. Describe the Classical and alternate pathway of complement activation
 7. Describe the method manufacture of vaccines using R-DNA Technology.
OR
 8. Describe T-dependant and T-independent pathway of B-cell activation
 9. Write a detailed account on biochemical communication between immune cells through cytokines
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End Semester Examinations - Nov-Dec 2015 Exams

14BT2043 Human Physiology

Set B

Time : 3 hrs
Total Marks: 100

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1. What is the role of cell membrane in conduction of nerve impulse for action? Explain the resting and action potential of nerve cell. (8 marks)

What is meant by osmosis? Detail the diffusion and transport mechanisms of cell membrane with suitable examples. (12 marks)

OR
 2. Compare and contrast the neuronal and hormonal actions. Illustrate it. (6 marks)

What are the components of central nervous system? Explain its functions. (14 marks)
 3. Comment on the nervous system involved in neural communication. (6 marks)

Elaborate the physiology of peripheral nervous system with suitable examples. (14 marks)

OR
 4. Name the endocrine organs and glands. List out the hormones released by each of them. (10 marks)

Give a detailed account on the physiology of reproductive system. (10 marks)
 5. Describe the structural organization of skeletal muscle and detail the mechanism of its contraction. (14 marks)

What is the role of Ca^{2+} in skeletal muscle contraction? Illustrate it. (6 marks)

OR
 6. What are the components and functions of circulatory system? (6 marks)

Mention the three types of blood circulation and define each of them. (6 marks)

Detail the mechanism of blood circulation in human with a diagram. (8 marks)
 7. What are the main and accessory organs of digestive system? (6 marks)

Write the activities of digestive system and explain the process of digestion. (14 marks)

OR
 8. Give the structure of a human cell and explain the physiological functions of each organelle of it. (15 marks)

Comment on the locomotion action of human cells with suitable examples. (5 marks)
 9. What are the organs involved in the respiratory system? Explain the physiology of respiratory system in detail. (20 marks)
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End Semester Examinations - Nov-Dec 2015 Exams

14BT2045 Biopharmaceutical Technology

Set A

Time : 3 hrs
Total Marks: 100

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- | | | | |
|----|---|-----------|--|
| 1. | Describe in detail the various routes of administration. | OR | |
| 2. | Describe the outline recombinant therapeutic protein production. | | |
| 3. | Explain pharmacokinetics and describe any four phase-II reactions | OR | |
| 4. | Write an account on the various Solid dosage forms. | | |
| 5. | Explain in detail the preparation of topical semisolid dosage forms. | OR | |
| 6. | i) Explain the types and role of H ₂ blockers and Proton pump inhibitors.
ii) Describe strong analgesics in detail. | | |
| 7. | Describe the method manufacture of vaccines using R-DNA Technology. | OR | |
| 8. | Describe the process of ADME in Detail adding a note on First Pass. | | |
| 9. | Write a detailed account on Clinical Drug Trails. | | |
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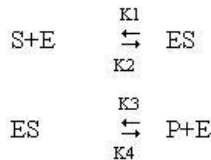
End Semester Examinations - Nov-Dec 2015 Exams

14BT2047 Biochemical Engineering

Set B

Time : 3 hrs
Total Marks: 100

1. (i) When glucose is converted to fructose by glucose isomerase, the slow product formation step is also reversible as



Derive the rate equation by employing (a) the Michaelis Menten. (7Marks)

(b) Briggs Haldane approach. (7 Marks)

(c) Explain when the rate equation derived by the Briggs Haldane approach can be simplified to that derived by Michaelis Menten approach (2 Marks)

(ii) State the assumptions for unstructured distributed model for growth. (4 marks)

OR

2. (i) What is an inhibitor in an enzymatic reaction system? (7 Marks)

(ii) Derive the rate equation for uncompetitive inhibition. (7 Marks)

(iii) Justify the significance of Effectiveness factor of immobilized enzyme (6)

3. (i) Compare the different process factors that affect growth kinetics. (14 Marks)

(ii) Define Biochemical engineering and what is the role of a biochemical engineer in bioprocess / biotechnology industry. (6 Marks)

OR

4. (i) Urea dissolved in aqueous solution is degraded to ammonia and CO₂ by the enzyme urease immobilized on the surface of nonporous polymeric beads. Conversion rate is controlled by transfer of urea to the surface of the beads through liquid film, and the conversion takes place on the surface of the beads. The following parameters are given for the system

$$K_s = 0.2 \text{ cm/s}; K_m = 200 \text{ mg/L}; V_{\max} = 0.1 \text{ mg urea/cm}^2 \text{ support surface.s}; S_b = 1000 \text{ mg urea/l}$$

a) Determine the surface concentration of urea. (8 marks)

b) Determine the rate of urea degradation under mass transfer controlled conditions. (7 marks)

(ii) State the importance of Thiele Modulus. (5 marks)

5. (i) What are the various models for cell growth kinetics (6 marks)

(ii) Immobilized Cellulase enzyme is used in the pretreatment of cellulose to give glucose which is further used in food industry. The following data gives the initial velocity for hydrolysis of cellulose with cellulase enzyme in the free state and immobilized form at pH=6.5 and temperature 30°C

V_0 (mmol hydrolysed /l min)		
Free Enzyme	Immobilized enzyme	S_0 (mol/l)
0.083	0.056	0.01
0.143	0.098	0.02
0.188	0.127	0.03
0.222	0.149	0.04
0.25	0.168	0.05
0.33	0.227	0.1
0.408	0.290	0.29

a) Find the Michaelis Menon Constants for both cases (10marks)

(b) Do the data indicate any diffusion limitation in the immobilized form (4 marks)

OR

6. (i) Effect on intra and inter phase mass transfer on enzyme kinetics (14 marks)

(ii) Derive the Growth model for filamentous organism (6 marks)

7. (i) How do we determine oxygen requirement in fermentation. (14 marks)

(ii) Explain Static Gassing out method for the determination of $K_L a$ (6marks)

OR

8. Compare different methods for determination of $K_L a$. (20 marks)

9. (i) Explain the following different types of reactors

(a) Air lift Bioreactor (5 marks)

(b) Bubble column bioreactor (5 marks)

(ii) Describe the Factors affecting $K_L a$ values in fermentation vessels. (10 marks)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2052 Industrial Safety & Hazard Analysis

Set A

Time : 3 hrs
Total Marks: 100

-
1. (i) Comment on the various health and safety training given to the employees (14 marks)
(ii) What are the methods followed for the safety training (6 marks)
OR
 2. (i) Briefly explain the first aid practices (12 marks)
(ii) What are the contents in a first aid box (8 marks)
 3. (i) Describe health provisions in factory act 1948 (14 Marks)
(ii) How do you protect against short circuit (6 Marks)
OR
 4. (i) Review the provisions related to hazardous process in Factories act 1948 (12marks)
(ii) Evaluate various methods in overload protection (8 marks)
 5. (i) Explain various methods of electrical hazard protection (12 marks)
(ii) Compile the powers of an inspector in an industry (8 marks)
OR
 6. (i) Compare the various types of plant layout (10 marks)
(ii) Suggest which type is most suitable for an automobile industry and justify the same (3 marks)
(iii) Explain the various factors affecting plant layout design (7 marks)
 7. (i) Explain primary and secondary voltage protection (8 Marks)
(ii) Briefly explain Benefits of employee state insurance act (12 marks)
OR
 8. (i) Comment on the Gratuity act and provident fund act (14marks)
(ii) Compare various methods of earthing (6)
 9. Summarize the Child Labour Act of 1986 (20 marks)
-

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End Semester Examinations - Nov-Dec 2015 Exams

14BT2059 Cell Biology and Microbiology

Set A

Time : 3 hrs
Total Marks: 100

-
1. Illustrate the History of Cell Biology with special mention of the Cell Theory. Add a note on scientific minds associated with it?

OR
 2. Mitochondria is the power house of energy- Substantiate it. Add a note on their morphology and distribution
 3. Describe Cytoskeletal Proteins and motor proteins and their importance in cell with suitable diagrams.

OR
 4. Explain the structure and function of the organelle involved in Lipid biosynthesis with labelled diagram.
 5. Describe and distinguish whether proper folding of proteins is essential for biological activity? Illustrate the significance of mRNA, nascent polypeptide, misfolded proteins and molecular chaperones and chaperonins in the folding of proteins.

OR
 6. Describe the architecture of Eukaryotic cell and list the functions of various organelles with a suitable diagram
 7. Give an account on the three classes of Lipids found in Biomembranes. Explain them with a special mention about the major Lipid composition in Human Erythrocytes and Neurons.

OR
 8. a) Elucidate the four basic molecular genetic mechanisms with a neat diagram and also justify the molecular definition of a Gene. (12 Marks)

b) Compare and contrast Symporters, uniporters and Antiporters. (8 Marks)
 9. Plasma membrane is a semi permeable membrane- Justify with suitable illustrations. Also explain how they prevent the entry of toxic materials from outside the cell and the exit of important metabolites from inside the cell.
-

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End Semester Examinations - Nov-Dec 2015 Exams

14BT3001 Applied Biochemistry

Set B

Time : 3 hrs
Total Marks: 100

-
1. a) What are the different ways in which glycans can mediate or modulate biological functions? (10)
b) How are glycoproteins classified based on their linkages? Explain the most important functional features of a typical secreted mucin. (10)
- OR
- OR**
2. a) Differentiate glycoproteins and proteoglycans. Explain their distinctive functions with examples.(10)
b) Carbohydrates serve as informational molecules or the sugar code. Bring out the reasons to explain the above statement. (10)
3. a) Elaborate on the role of glycans in biotechnology and pharmaceutical industries.(10)
b) Conceptualize how blood group antigenic epitopes variants are formed with respect to glycan composition. (10)
- OR
- OR**
4. a) What are lectins? How do they mediate cell to cell recognition and adhesion? (10)
b) Compare N and O linked glycans in terms of their structure and function. (10)
5. a) The shape of hair is determined by the pattern of disulphide bonds in Keratin. How can curls be introduced ? (10)
b) Amyloid fibril formation is observed due to misfolding of proteins. What are the biological consequences of amyloid fibril formation? (10)
- OR
- OR**
6. a) Highlight the structural features of muscular (motor) proteins. (10)
b)How do amniocentesis and biopsy techniques aid in disease diagnosis.(10)
7. a) How are free radicals generated from cellular sources? Highlight the biological implications of ROS (15)
b) Hypothesize the relationship between free radicals and aging. (5)
- OR
- OR**
8. What are antioxidants ? Discuss the various defensive actions of antioxidants against free radicals induced oxidative damage. (20)
9. a) With specific examples, illustrate the mechanism of actions of hormones that bind intracellular receptors. (15)
b) Highlight the applications of Hormone therapy. (5)
-

End Semester Examinations - Nov-Dec 2015 Exams

14BT3003 Advanced Bioprocess Engineering

Set B

Time : 3 hrs
Total Marks: 100

-
1. 1. (a) Detail on plant cell cultures compared to microbes (15)
(b) Brief on the economics of plant cell tissue cultures (5)
- OR**
2. 2. (a) Give an explanation on reactors using cell immobilization (12)
(b) What is organ culture? and write its limitations (8)
3. 3. (a) Explain on bioreactors for organised tissues (15)
(b) List the potential advantages of organ culture (5)
- OR**
4. 4. (a) Explain on the potential choice of using an Insect cell Baculovirus system (15)
(b) Give a general overview on choosing a proper host vector system (5)
5. 5. Discuss on the guidelines for choosing host vector systems and explain on genetic instability (20)
- OR**
6. 6. (a) Detail on choosing Gram positive bacteria for molecular studies (10)
(b) Give a summary on Lower eukaryotic cells (10)
7. 7. (a) Explain process constraints and segregational loss of plasmids (15)
(b) What are plasmids? What do you understand by plasmid structural instability (5)
- OR**
8. 8. (a) Explain on selecting mammalian cells for expression studies. (10)
(b) Define, (5 x 2 =10)
1. FDA GRAS
2. What is a transformed cell line?
3. DIP's
4. How can scale up be accomplished using plant cell culture.
5. Difference between high copy number and low copy number plasmids.
9. 9. Explain biological waste water treatment ; Give an example of Industrial utilization of mixed cultures (20)
-

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End Semester Examinations - Nov-Dec 2015 Exams

14BT3006 Advances in Recombinant DNA Technology

Set A

Time : 3 hrs
Total Marks: 100

-
1. A. What is Genomic library? (5 marks)
- B. What are the different methods used to construct a Genomic Library? What are the vectors used to construct a genomic library? What are the advantages and disadvantages of genomic library (15 marks)
- OR**
2. Write short notes on the following:
- a) Properties of an ideal cloning vector or a plasmid vector (5 marks)
- b) What is an expression vector? Explain with a neat diagram (5marks)
- c) What are a Bacterial Artificial Chromosome and Yeast Artificial Chromosome? add note on their significance (10 marks)
3. Write short notes on the following physical and chemical gene transfer methods:
- A. Electroporation (4 marks)
- B. Microinjection (4 marks)
- C. Particle Bombardment (4 marks)
- D. Sonoporation (4 marks)
- E. lipofection (4 marks)
- OR**
4. Write a note on the following recombinant screening methods.
- A. Screening by DNA hybridization (10 marks)
- B. Screening by gene expression methods : immunological screening and functional hybridization (10marks)
5. .A. Write a detailed note on the Bio-pharming-plant as bioreactors (20 marks)
- OR**
6. Explain the following methods of creating transgenic animals
- A. Retroviral mediated gene transfer (5marks)
- B. Embryonic stem cell technology (5marks)
- C. Nuclear transfer (5marks)
- D. Sperm as vector (5marks)
7. What is a Human genome project? mention the systematic steps in Human genome project add a note on its uses/applications (20marks)
- OR**
8. Write a detailed note on the different forensic applications of r DNA technology (20marks).
9. . What is gene therapy? Write the different types of gene therapy add note on its advantages and disadvantages (20marks)

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End Semester Examinations - Nov-Dec 2015 Exams

14BT3008 Biopharmaceutical Technology

Set B

Time : 3 hrs
Total Marks: 100

1. a) Give an account on development and the scope of Biopharmaceutical Industry with suitable examples. **(10 marks)**
b) Explain in detail about the various steps and phases of the drug development process. **(10 marks)**
OR
2. a) Discuss in detail about the phase I and phase II reactions with appropriate examples. **(15 marks)**
b) Write a detailed notes on the different bioactive compounds from plants used in pharmaceutical Industry with five example of the products derived from them. **(5 marks)**
3. a) Role of nanobiotechnology in Biopharmaceutical industry. **(8 marks)**
b) What are Liposomes? Write a note. **(4 marks)**
c) Mention the types of capsules and explain each? **(4 marks)**
d) What are aerosols? Give an example. **(4 marks)**
OR
4. a) What are ointments? **(2 marks)**
b) Mention the different bases used for Ointment preparation with proper examples. **(6 marks)**
c) Write in detail about the Parenteral drug solutions. **(12 marks)**
5. a) write about the liposome drug delivery system **(6 marks)**
b) Write about the working method of HPTLC and its application in Biopharmaceutical industry **(4 marks)**
c) Write short notes on various routes of drug excretion **(10 marks)**
OR
6. a) Mention about the types of capsules and Gelatins. Explain each. **(10 marks)**
b) Types of excipients **(5 marks)**
c) Mention any two advantages and disadvantages of capsules **(5 marks)**
7. a) Describe about the techniques of tissue Engineering and Regenerative medicine **(10 marks)**
b) Write short notes on the following
i) Pharmacogenomics **(5 marks)**
ii) Parenteral solutions **(5 marks)**
OR
8. a) Explain in detail the factors involved in immunogenicity. **(6 marks)**
b) Write short notes on Recombinant DNA Technology in Biopharmaceutical technology. **(8 marks)**
c) Explain in detail "Pharmacovigilance". **(6 marks)**

9. a) Elucidate the basic science of stem cells and its application in Pharmaceutical Industry. **(10 marks)**
- b) What is the role of pharmacopoeia? **(5 marks)**
- c) Describe about the process and validation methods of Ayurvedic medicines when you visited Coimbatore Arya Vaidya pharmacy **(5 marks)**

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End Semester Examinations - Nov-Dec 2015 Exams

14BT3013 Entrepreneurship, IPR and Biosafety

Set B

Time : 3 hrs
Total Marks: 100

1. a. Justify the need for entrepreneurship in a developing country like India. (5 marks)
b. Elaborate the functions of entrepreneurs with case studies (15 marks)

OR

OR

2. a. Explain in detail guidelines of DBT for formulating Biotechnology related projects. (15 marks)
b. As a biotechnologist how will you implement the DBT guidelines in your future endeavors. (5 marks)
3. a. What does a patent application contain? (5marks)
b. What are the essential patent documents to be generated and submitted by a potential patentee? (10marks)
c. Comment on Patent specifications. (5marks)

OR

OR

4. a. Comment on different types of Patents? (10marks)
b. What are the broad categories of patent law? (5marks)
c. What are the types of inventions which are not patentable in India? (5marks)
5. a. Elaborate the Biosafety guidelines put forth by DBT (10marks)
b. Comment on the role of IBSC in Academic Institutions (10 marks)

OR

OR

6. a. Analyze various Biosafety levels (10 Marks)
b. Elaborate Biosafety guidelines for biotechnology related research (10 Marks)
7. a. Comment on the Role of Biosafety committee (5marks)
b. What are the functions of Risk Groups and factors to be considered during evaluation of risks in Biotechnology research. (15marks) OR
- OR**
8. a. Elaborate the function and significance of WTO and WIPO (10 marks)
b. Establish the correlation between GATT & TRIPS and their significance. (10 marks)
9. a. Discuss details of Biological material transfer procedures stipulated by DBT (15marks)

marks) b. Differentiate between GMOs and LMOs and their significance. Cite examples for both . (5

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End Semester Examinations - Nov-Dec 2015 Exams

15BT2001 Medical Biochemistry

Set A

Time : 3 hrs
Total Marks: 100

-
1.
 - a) List all the organelles present in an animal cell. (2 marks)
 - b) Describe the process of sub-cellular fractionation. (5 marks)
 - c) Give the diagrammatic representation of animal cell. (6 marks)
 - d) Explain in brief: Phagocytosis, pinocytosis and osmosis. (7 marks)
 - OR**
 2.
 - a) Define glycolysis and list out the steps involved in it. (4 marks)
 - b) Describe the process of membrane transport with example. (8 marks)
 - c) Discuss in detail about types of diabetes mellitus. (8 marks)
 3.
 - a) Describe the various classification systems of proteins with examples. (7 marks)
 - b) Discuss the general properties of proteins. (4marks)
 - c) Explain the biomedical importance of proteins (4 marks)
 - d) Explain in detail the different types of glucose tolerance tests. (5 marks)
 - OR**
 4.
 - a) Discuss in detail about classification of lipids giving examples. (10 marks)
 - b) Write a note on storage lipids. (5 marks)
 - c) Write a note on structural lipids. (5 marks)
 5.
 - a) Explain in brief the sources, biosynthesis and degradation of cholesterol. (10 marks)
 - b) Discuss in detail about the biomedical importance of essential fatty acids. (10 marks)
 - OR**
 6.
 - a) Give an account on electrophoresis. (7 marks)
 - b) What is chromatography? (3 marks)
 - c) How to identify proteins by electrophoresis and chromatography? (10 marks)
 7.
 - a) Write a detailed note on gastric function tests. (12 marks)
 - b) Discuss in detail about the structure functions and dietary sources of vitamin C. (8 marks)
 - OR**
 8.
 - a) Define renal threshold of a substance. (1 mark)
 - b) Write a brief note on renal clearance tests. (3 marks)
 - c) Write a brief note on fractional test meal analysis. (6 marks)
 - d) Explain the different liver function tests. (10 marks)
 9.
 - a) Classify vitamins. Give a brief account in fat soluble vitamins. (8 marks)

b) Explain in detail about Vitamin B complex. (12 marks)

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End Semester Examinations - Nov-Dec 2015 Exams

15BT2003 Human Physiology and Anatomy

Set B

Time : 3 hrs
Total Marks: 100

1. a) Draw the structure of a living cell of our body and explain its constituents.(10)
b) Discuss the different ways of transport of ions through the cell membrane. (10)

OR

2. a. Differentiate between anatomy and physiology. (3)
b. What are the various organelles present in a cell? (3)
c. What are resting and action potentials? (7)
d. Write short notes on the origin of cell membrane potential.(7)

3. a. Mention the constituents of blood plasma. (4)
b. Sketch the parts of glomerulus and glomerular capsule (4)
c. List the functions of plasma membrane. (2)
d. Draw the diagram of a nephron and explain. (10)

OR

4. a. Draw the structure of kidney explain its anatomy. (10)
b. Explain the mechanism of urine formation. (10)
5. a. Explain the mechanism of breathing. (7)
b. Write short notes on the following topics related to respiration:
(i) Blood Supply (4)
(ii) Muscles Involved (3)
c Define Dalton's law. (2)
d. With a neat sketch explain the internal respiration. (4)

OR

6. a. Find the cardiac output for a patient whose heart rate is 60 BPM if the stroke volume is 50 ml per beat. (2)
b. Draw the ECG waveform relating the electroconduction system. (2)
c. What are the factors which affects the heart rate? (2)
d. Narrate the origin of heart sounds. (4)
e. With a neat sketch narrate the structure of Cardiac Muscle. (10)
7. a. List the types of blood vessels and their functions. (3)
b. Mention the structures involved in urinary system. (3)

- c. Explain the factors which regulate the blood flow. (4)
- d. Elaborate the constituents of blood and their functions. (10)

OR

- 8. Explain the autonomic nervous system and its functions.(20)
- 9.
 - a. Explain the physiology of sight. (10)
 - b. Compare the features of rods and cones.(5)
 - c. Write short notes on Electroencepalogram.(5)

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