

**MODEL QUESTION PAPERS  
FOR  
FIRST DEGREE PROGRAMME IN BIOCHEMISTRY  
UNDER CBCSS  
W.E.F 2010**

**Core Course I**  
**Course Title: Perspectives, Methodology and Introduction to Biochemistry**

**Section A**

Objective questions, Answer **all 16** questions

- I. 1. Two stereoisomers of a given sugar that differs only in the configuration about the Carbonyl carbon atoms are known as  
a) Asymmetric carbon atom                      b) Anomers  
c) Enantiomers                                      d) Cis-trans isomers
2. Shingosine is the backbone of all the following except  
a) Cerebroside      b) Ceramide      c) Sphingomyelin      d) Lecithin
3. The vitalistic theory became untenable by the works of  
a) Wohler      b) Lavoisier      c) Scheele      d) Helmont
4. Which among the following is a non-essential fatty acid?  
a) Oleic acid      b) Linoleic acid      c) Arachidonic acid      d) Linolenic acid.
- II. 5. Which among the following is not a polymer of glucose?  
a) Cellulose      b) Inulin      c) Glycogen      d) Dextrin
6. An idea which is still under the process of active testing, which may or may not be correct is called a  
a) Hypothesis      b) Law      c) Theory      d) Model
7. Mucic acid is produced by the oxidation of  
a) Glucose      b) Galactose      c) Fructose      d) Mannose
8. A glycosaminoglycan which serves as a lubricant  
a) Hyaluronic acid      b) Chondroitin Sulphate      c) Keratan Sulphate      d) Heparin
- III 9. Esterification of cholesterol occurs at carbon position  
a) 1      b) 2      c) 3      d) 4
10. Precision is  
a) Correctness of a result      b) Reproducibility of a result  
c) Both a) & b)      d) None
11. Which among the following is a Trisaccharide?  
a). Lactose      b) Cellulose      c) Gentibiose      d) Melezitose
12. Which among the following gives the same osazone?  
a) Glucose, Galactose, Xylose      b) Glucose, Galactose, Maltose  
c) Glucose, Fructose, Mannose      d). Glucose, Sucrose, Lactose

- IV
13. The common precursor for prostaglandins, thromboxanes and leukotrienes is  
a) Stearate   b) Palmitate   c) Arachidonate   d) Oleate
  14. The linkage region between glycosaminoglycan and protein consists of  
a) Glu-Gal-Gal   b) Xyl-Gal-Gal   c) Asp-Glu-Gal   d) Gal-Xyl-Gal
  15. Calculate the pH of  $10^{-5}$  N HCl  
a) 3   b) 5   c) 2.5   d) 1.5
  16. Iodine value of fat/oil indicates:  
a) Proportion of unsaturated acid radical   b) estimate of non-fatty impurities  
c) Amount of free fatty acid present   d) none of the above

### Section-B (Short Answer Questions)

Answer any **eight** questions

17. Define acids and bases according to Bronsted theory?
18. Explain mutarotation.
19. Define molality and molarity.
20. What happens when a cell is placed in a) hypertonic b) isotonic solution?
21. What is acid value and its significance?
22. Give the structure of lactose and sucrose?
23. Distinguish between lyophilic and lyophobic colloids
24. Differentiate between theory and hypothesis.
25. What are phospholipids and their biological functions?
26. What are essential fatty acids?
27. State Vant-Hoff's law of osmotic pressure.
28. How are sugar acids formed?

### Section-C (Short Essay)

Answer any **five** questions

29. Write short note on types of knowledge?
30. Explain hypothetico-deductive model.
31. Explain Donnan-membrane equilibrium and its biological significance.
32. Write a short essay on lipoproteins?
33. What are the requirements for planning an experiment?
34. Describe the chemistry and functions of cholesterol.
35. Distinguish between starch and glycogen.
36. Write a short note on prostaglandins?

### Section-D (Long Essay)

Answer any **two** questions

37. Elaborate on the various experimental approaches to study biochemical process?
38. Give an account of the classification and biological functions of lipids?
39. Describe the chemistry and functions of glycosaminoglycans

## SEMESTER II

### Foundation Course-II (Core related) Course Title: General Informatics and Bioinformatics

#### Section A

Objective questions, Answer **all 16** questions

I.

1. The commonly used tool for searching sequence data base is  
a) FASTA    b) SCOP    c) Genbank    d) BLAST
2. What is a PROSITE?  
a) Data base of protein structure                      b) Data base of interacting structures  
c) Database of protein motifs                              d) a search tool
3. Two main features of any phylogenetic trees are  
a) Clades and nodes    b) topology and branch length    c) clades and root    d) all of the above
4. Which protocol is used by browsers to communicate between two machines?  
a) Ftp    b) ssl              c) tcp              d) http

II

5. The following is a non-protein amino acid  
a) Ornithine                                      b) Homocysteine  
c) Histamine                                      d) all of the above
6. Which of the following is a nucleoprotein?  
a) Hemoglobin              b) Histones    c) Rhodopsin    d) Ferritin
7. The three dimensional arrangement of all atoms in a protein constitute  
a) Primary    b) Secondary    c) Tertiary    d) Quaternary
8. Sanger's reagent is  
a) Chloro benzene    b) 2, 4-DNFB              c) Dansyl chloride    d) none of the above

III

9. Adenosine is a  
a) Base    b) Nucleoside              c) Nucleotide              d) Nucleic acid
10. Left handed helical DNA is  
a) A-form    b) B-form    c) Z-form    d) cDNA
11. The amino acid which is optically inactive  
a) Valine    b) Glycine    c) Arginine    d) Leucine
12. The imino acid found in protein structure is  
a) Arginine    b) Proline    c) Histidine    d) Lysine

IV

13. Which of the following is a dipeptide?

- a) Glutathione b) Oxytocin c) Homocysteine d) Anserine
14. Which among the following is an oligomeric protein?  
a) Myoglobin b) Hemoglobin c) Albumin d) Urease
15. The only amino acid having buffering capacity at physiological pH is  
a. Alanine b. Glutamate c. Histidine d. Tryptophan
16. The alphabet 'Q' stands for which amino acid?  
a. Glutamate b. Asparagine c. Tryptophan d. Glutamine

**Section-B (Short Answer Questions)**

Answer any **eight** questions

17. How are peptide bonds formed? Illustrate with an example.
18. Give the structure of GTP.
19. What is the significance of T<sub>m</sub> value?
20. Name four unusual bases?
21. What are conjugated proteins? Give two examples?
22. What is IPR?
23. What is plagiarism?
24. What are zwitterions? Illustrate the zwitter ion form of any two amino acids.
25. State Chargaff's rule of base equivalence.
26. What is Swissprot?
27. What is correlation coefficient and its significance?
28. Give the structural details of tRNA?

**Section-C (Short Essay)**

Answer any **five** questions

29. Write short note on academic search engines?
30. What are cot curves and their significance?
31. Write short note on nucleic acid databases?
32. Give a brief account of organism specific databases?
33. Explain the features of Watson Crick model of DNA.
34. Write short note on plasma proteins?
35. Write a short essay on educational softwares?
36. Write a short note on Hemoglobin?

**Section-D (Long Essay)**

Answer any **two** questions

37. Explain the different modes of representation of statistical data.
38. Give a detailed account of the different types of databases?
39. Discuss on the different levels of structural organization of proteins..

## SEMESTER-III

### Core Course II Course Title: Cellular Biochemistry

#### Section A

Objective questions, Answer **all 16** questions

#### I.

1. Which of these organelles is involved in hydrolyzing activity?  
a. Peroxisome                      b. Lysosomes                      c. Glyoxisomes                      d. Ribosome
2. Common feature of prokaryotes and eukaryotes include  
a. mitochondria                      b. chloroplast                      c. ER                      d. Genetic material
3. The protein involved in vesicle transport  
a. Dyneins                      b. Tubulin                      c. Actin                      d. kinesins
4. Plasma membrane has the following feature except  
a. it has a lipid bilayer                      b. it is involved in transport of ions  
c. it is symmetric in nature                      d. it consists of protein

#### II.

5. Membrane fluidity is increased by  
a. increase in long chain fatty acids                      b. increase in cholesterol  
c. increase in unsaturated fatty acids                      d. Decrease in unsaturated fatty acids
6. The following has ATPase activity except is  
a. Myosin                      b. Dyneins                      c. Kinesins                      d. Subfibre B
7. Defect in which of the following components of ECM results in Ehler Danlor syndrome (Estrogen imperfecta)  
a. Fibronectin                      b. Collagen                      c. Laminin                      d. Proteoglycan
8. Non-fibrous gel matrix in cell wall consists of the following except  
a. Protein                      b. Cellulose                      c. Hemicellulose                      d. Pectin

#### III.

9. One of the following is an antiapoptotic member  
a. Bax                      b. Bcl-2                      c. Bcl-x<sub>L</sub>                      d. Bcl W
10. Which of the following is a reductional division?  
a. Mitosis                      b. Meiosis                      c. Cytokinesis                      d. Prophase
11. Binding of insulin to its receptor initiates a signal transduction pathway resulting in all of the following except  
a. Glucose uptake                      b. glycogen synthesis                      c. glycogen breakdown                      d. gluconeogenesis
12. cAMP activates  
a. protein kinase A                      b. protein kinase B                      c. protein kinase C                      d. protein kinase D



39. Write an essay on signaling pathways involving protein kinases A, B and C?  
**SEMESTER-IV**

**Core Course III**  
**Course Title: Techniques in Biochemistry**

**Section A**

Objective questions, Answer **all 16** questions

**I.**

- 1) The size of the colloidal particles can be determined by  
(a) Dialysis (b) Centrifugation (c) Ultrafiltration (d) Chromatography
- 2) The technique used for understanding cellular function and metabolism by studying sub cellular organelles  
(a) Microscopy (b) Lyophilization (c) Homogenization (d) Centrifugation.
- 3) In gel filtration chromatography, particles are separated based on  
(a) Size and Shape (b) Charge (c) Number (d) density
- 4) A technique which uses high pressure for the separation of molecule is  
(a) TLC (b) GLC (c) HPLC (d) Paper chromatography

**II.** 5) UV rays fall in the range of

- (a) 180-400 nm (b) 400-800 nm (c) > 800 nm (d) < 180 nm

6) Spectrophotometer is used for measuring

- (a) Colourless substance (b) Coloured substance (c) Both A and B (d) None

7) In flame photometry air with propanol mixture is used for the separation of

- (a) K (b) Ca (c) Mg (d) Fe

8) Equation for disintegration constant

- (a)  $\lambda = 2.303 \log(N/N_0)/t$  (b)  $\lambda = 2.303 \log(N_0/N)/t$   
(c)  $\lambda = t/2.303 \log N_0/N$  (d)  $\lambda = t/2.303 \log N/N_0$

**III.** 9) Commonly used radioactive isotope for the diagnosis of hyper and hypothyroidism

- (a)  $^{24}\text{Na}$  (b)  $^{131}\text{I}$  (c)  $^{34}\text{P}$  (d)  $^{42}\text{K}$

10) The phenomenon of radioactivity was discovered by

- (a) Rutherford (b) Henry Becquerel (c) Curie (d) Roentgen

11) Radiocarbon dating is done with the help of

- (a)  $^{14}\text{C}$  (b)  $^{238}\text{U}$  (c)  $^{15}\text{N}$  (d)  $^3\text{H}$

12) Equation for half-life period

- (a)  $t_{1/2} = 0.693/\lambda$  (b)  $t_{1/2} = \lambda/0.693$  (c)  $t_{1/2} = 6.93/\lambda$  (d)  $t_{1/2} = 69.3/\lambda$

**IV.** 13) In Isopycnic centrifugation molecules are separated based on

- (a) Charge (b) Size (c) Density (d) Shape

- 14) An agent which denature protein in SDS-PAGE  
 (a) SDS (b) Amidoblack (c) Sephadex (d) Dowex 50
- 15) Ionizing radiations when absorbed by a tissue increases the temperature, this effect is  
 (a) Photoelectric effect (b) Photographic effect  
 (c) Calorigenic effect (d) Chemical effect
- 16) Radioactive isotope used for knowing the formation of antibody in the Reticuloendothelial system  
 (a)  $^{34}\text{P}$  (b)  $^{24}\text{Na}$  (c)  $^{42}\text{K}$  (d)  $^{59}\text{Fe}$

### Section-B (Short Answer Questions)

Answer any **eight** questions

- 17) Name any two detectors used in spectrophotometer.  
 18) Define quanta efficiency  
 19) List the factors affecting electrophoretic mobility in electrophoresis  
 20) What is the difference between stacking gel and separating gel in PAGE.  
 21) What are the applications of Ultracentrifugation?  
 22) What is isoelectric focusing?  
 23) Define sedimentation co-efficient.  
 24) What is the basic principle of flame photometer?  
 25) What are the biological applications of radioisotopes?  
 26) State Beer-Lamberts law.  
 27) Define half-life of radioactive isotopes with two examples  
 28) What is the principle behind chromatographic techniques?

### Section-C (Short Essay)

Answer any **five** questions

- 29) Write notes on fluorimetry.  
 30) Outline the principle of paper chromatography. Explain its applications.  
 31) Briefly explain electron microscopy.  
 32) Explain the methods used in tissue homogenization.  
 33) Explain the working of confocal microscope.  
 34) Differentiate Scintillation counter from GM Counter.  
 35) Write short note on affinity chromatography?  
 36) Give an account of two-dimensional electrophoresis?

### Section-D (Long Essay)

Answer any **two** questions

- 37) Discuss in detail about the principle, procedure and applications of Zone electrophoresis.  
 38) Explain:-  
 a) Calorimeter. b) Differential Centrifugation  
 b) Isotopes used in tracer study d) Determination of molecular mass by gel filtration  
 39) What are the biological hazards of radiations and explain the safety measures in handling the radioisotopes.

**SEMESTER-V**

**Core Course-V**  
**Course Title: Physiology & Immunology**

**Section A**

Objective questions, Answer **all 16** questions

- 1) 1. A small molecule which can act as an epitope but is incapable of itself eliciting an immune response is called  
(a) Haptens (b) Kinins (c) Interferons (d) Perforins
2. The most important diffusible ion in the establishment of the membrane potential is  
a.  $K^+$  b.  $Na^+$  c.  $Ca^{2+}$  d.  $Cl^-$
3. The movement of water across a plasma membrane occurs by  
a. active transport. b. facilitated diffusion. c. simple diffusion (osmosis). d. all of these.
4. Depolarization of an axon is produced by  
a. inward diffusion of  $Na^+$ . b. active extrusion of  $K^+$ .  
c. outward diffusion of  $K^+$  d. inward active transport of  $Na^+$ .
- II.
5. A drug that inactivates acetyl cholinesterase  
a. inhibits the release of ACh from presynaptic endings.  
b. inhibits the attachment of ACh to its receptor protein.  
c. increases the ability of ACh to stimulate muscle contraction.  
d. does all of the these.
6. The hormone primarily responsible for setting the basal metabolic rate and for promoting the maturation of the brain is  
a. Cortisol. b. ACTH. c. TSH. d. thyroxine.
7. Human Chorionic Gonadotropin (hCG) is secreted by  
a. the anterior pituitary b. the posterior pituitary c. the placenta d. the thymus
8. The energy for muscle contraction is most directly obtained from  
a. phosphocreatine. b. ATP. c. anaerobic respiration. d. aerobic respiration.
- III.
9. When a muscle is stimulated to contract,  $Ca^{2+}$  binds to  
a. myosin. b. tropomyosin. c. actin. d. troponin.
10. Which Ig is involved in allergic reactions?  
(a) Ig M (b) Ig E (c) Ig A (d) Ig D
11. The maximum amount of air that can be expired after a maximum inspiration is  
a. the tidal volume. b. the forced expiratory volume.  
c. the vital capacity. d. the maximum expiratory flow rate.



### Section-D (Long Essay)

Answer any **two** questions

37. Describe the sequence of events that cause air to move into the lungs during inspiration and out of the lungs during expiration. Diagram the changes in intrapleural pressure and alveolar pressure.
38. Describe the salient features of the different types of Immunoglobulins giving details of heavy and light chains.
39. Illustrate the sequence of events when peptide and steroid hormones bind to their receptors.

### SEMESTER-V

### Core Course VI

### Course Title: Bioenergetics and Carbohydrate Metabolism

#### Section A

Objective questions, Answer **all 16** questions

I

1. Following are high energy compounds except  
a) ATP      b) PEP      c) Glucose-6-phosphate      d) Creatinine phosphate
2. A reaction is spontaneous when  
a)  $\Delta G$  is -ve      b)  $\Delta G$  is +ve      c)  $\Delta G$  is 0      d) not dependent on  $\Delta G$
3. In eukaryotes Glycolysis occurs in  
a) Endoplasmic Reticulum      b) Cytosol      c) Mitochondria      d) Golgibodies
4. Rate limiting enzyme in glycolysis is  
a) Hexokinase      b) Glucokinase      c) Phosphofructokinase      d) Pyruvate Kinase

II

5. Gluconeogenesis involve the following enzymes except  
a) Glucose-6- phosphatase      b) PEP carboxykinase  
c) Fructose-1, 6- bis phosphatase      d) Glyceraldehyde-3-phosphatase
6. Glyoxalate cycle occurs in  
a) Peroxisome      b) Glyoxisomes      c) Lysosomes      d) Microsomes
7. Which of the following disease is not a glycogen storage disease?  
a) Her's disease      b) McArdle's disease      c) Addison's disease      d) Pompe's disease
8. The coenzyme for Transketolase is  
a) PLP      b) CoA      c) TPP      d) Lipoic acid

### III

9. Complex in Electron transport chain that has Copper  
a) Complex I                      b) Complex II                      c) Complex III                      d) Complex IV
10. Complexes of Electron Transport Chain are situated in  
a) Outer mitochondrial membrane      b) Inner mitochondrial membrane  
c) Matrix                                      d) Inter membrane space
11. Disease occurring due to mitochondrial dysfunction  
a) Alkaptonuria                      b) LHON                      c) Beri beri                      d) Scurvy
12. ATP yield by the complete oxidation of glucose to CO<sub>2</sub> is  
a) 30                      b) 25                      c) 20                      d) 15

### IV

13. Dehydrogenases involved in HMP shunt are specific for  
a) NADP<sup>+</sup>                      b) NAD<sup>+</sup>                      c) FMN                      d) FAD
14. Which of the following glycolytic enzyme is inhibited by fluoride?  
a) Pyruvate kinase                      b) Enolase                      c) Aldolase                      d) Hexokinase
15. McArdle's disease is due to the deficiency of  
a) Branching enzyme                      b) Muscle Phosphorylase                      c) Glu-6-phosphatase                      d) Acid maltase
16. In normal resting humans, majority of blood glucose is used as fuel by  
a) Liver                      b) Brain                      c) Kidney                      d) Muscles

### Section-B (Short Answer Questions)

Answer any **eight** questions

17. Differentiate standard free energy change and actual free energy change
18. Why is ATP considered a high energy compound?
19. Write down the equation for any one of the irreversible reactions of glycolysis?
20. Comment on the Hexokinase and Glucokinase with reference to their K<sub>m</sub> for Glucose.
21. Schematically represent Cori's cycle.
22. Comment on Anapleurotic reaction.
23. Differentiate between oxidative and substrate level phosphorylation.
24. Schematically indicate the site of action of any two inhibitors of Electron transport chain.
25. Calculate the energy yield in anaerobic breakdown of Glucose
26. Which metabolic defect causes galactosemia?
27. What is the role of Ca<sup>2+</sup> in glycogen metabolism?
28. Write down the steps involved in NADPH synthesis in HMP shunt pathway?

### Section-C (Short Essay)

Answer any **five** questions

29. How are reducing equivalents generated during glycolysis shuttled from cytosol to mitosol?

30. How does fructose-2, 6- bis phosphate act as a regulator of glycolysis?
31. Give the steps involved in synthesis of glucose from fructose.
32. Explain the action of glucagon on glycogenesis and glycogenolysis.
33. Which are the complexes involved in Electron transport chain?
34. Make a schematic representation of Glyoxalate cycle.
35. Comment on the metabolic fate of pyruvate
36. Explain Chemiosmotic hypothesis.

**Section-D (Long Essay)**

Answer any **two** questions

37. Write note on Glycogen storage diseases.
38. Describe with reaction the steps involved in TCA cycle.
39. What are high energy compounds? Explain.

**SEMESTER-V**

**Core Course VII**

**Course Title: Analytical Biochemistry**

**Section A**

Objective questions, Answer **all 16** questions

- I.
  1. Major portion of the digestion occurs in
    - a. the mouth. b. the stomach. c. the small intestine. d. the large intestine.
  2. Saccharine is
    - a. potassium meta benzene nitroxide. b. sodium orthobenzene sulphonamide. c. sodium dinitro benzene. d. sodium orthobenzene sulphoxide.
  3. Eggs are excellent source of
    - a. Vit A. b. Vit K. c. Vit C. d. Vit E.
  4. Name the selenium containing enzyme
    - a. hexokinase b. superoxide dismutase c. glutathione peroxidase d. enolase
- II.
  5. Canning is a process of food
    - a. preservation. b. adulteration. c. grading. d. concentration.
  6. Salivary amylase becomes inactive in stomach primarily due to
    - a. inactivation by low pH. b. degradation by gastric pepsin. c. inhibition by  $Cl^-$ . d. inhibition by peptides.
  7. The most potent inhibitor of electron transport chain is
    - a. nitric acid. b. cyanide. c. ethyl alcohol. d. nitrous oxide
  8. CO combines with hemoglobin to form

a. methemoglobin b. carboxy hemoglobin c. myoglobin d. haptoglobin

III.

9. Which one of the following is a preservative?

a. calcium sulphate. b. benzoic acid. c. calcium carbonate. d. sodium epoxide.

10. Iron in the mucosal cells binds with the protein.

a. transferrin. b. ferritin. c. ceruloplasmin. d. hemosiderin.

11. Which of the following microorganisms is used for the acid production in mesophilic milk fermentation process?

a. *Lactococcus lactis* b. *Clostridium botulinum* c. *Escheria coli* d. *Bacillus cereus*

12. A nutritional disorder due to protein energy malnutrition is

a. scurvy. b. kwashiorkor. c. tetany. d. beriberi.

IV.

13. Which one of the following is a micronutrient?

a. phosphorous b. calcium c. chromium d. sodium

14. Which of the following is most important essential fatty acid in the diet

a. linoleic acid b. palmitic acid. c. stearic acid. d. oleic acid

15. BMR is increased in

a. hyperthyroidism. b. hypothyroidism. c. marasmus. d. Bloom syndrome.

16. The essential amino acid limiting in rice

a. methionine b. tryptophan c. lysine d. histidine

### Section-B (Short Answer Questions)

Answer any **eight** questions

17. Which are the major ingredients of soft drinks?

18. What is pasteurization?

19. Explain chemical oxygen demand?

20. What is the physiological effect of barbiturate?

21. Give two examples for food preservation.

22. Give the mode of action of lead and mercury as a poison?

23. What are artificial sweeteners? Give two examples.

24. How is arsenic detected?

25. Write a note on BMR?

26. Write any one function of copper and zinc?

27. Write brief notes on enterohepatic circulation?

28. Describe the process of fat emulsification.

### Section-C (Short Essay)

Answer any **five** questions

29. Write a note on food flavours?

30. Identify the enzymes involved in carbohydrate digestion and the mechanism of carbohydrate absorption in the small intestine.
31. Write the composition of (a) Bengal gram (b) Green gram?
32. What is the mode of organophosphorous insecticide? How are they detected?
33. Write a brief account of water pollution?
34. Write a note on CO poisoning/.
35. Indicate different dairy products and their chemical nature?
36. Write the composition of bile?

**Section-D (Long Essay)**

Answer any **two** questions

37. Write the importance of microorganisms in water and food microbiology?
38. Explain the different methods used in preservation of food?
39. Discuss the importance of trace elements in human nutrition?

**SEMESTER-V**

**Core Course -VIII**  
**Course Title: METABOLISM - II**

**Section A**

Objective questions, Answer **all 16** questions

I.

1.  $\beta$ -oxidation of odd chain fatty acid produces  
a) Succinyl CoA    b) Propionyl CoA    c) Acetyl CoA    d) all the above.
2. Carnitine is synthesized from  
a) Lysine                    b) Serine                    c) Arginine                    d) Choline
3. Photosynthetic pigments found in chloroplast occur in  
a) Thylakoid membrane                    b) Plastoglobules                    c) matrix                    d) chloroplast envelope
4. The key enzyme regulating fatty acid synthesis is  
a) Acetyl CoA carboxylase                    b) fatty acid synthase  
c) HMG CoA synthase                    d) acyl CoA dehydrogenase

II.

5. The rate limiting step in cholesterol biosynthesis is  
a) HMG CoA reductase                    b) HMG CoA synthase                    c) Mevalonate kinase                    d) none
6. Which among the following is the biological precursor of glycine?  
a) alanine                    b) serine                    c) glutamate                    d) aspartate
7. Which of the following amino acid produces vasodilator on decarboxylation?  
a) Histidine                    b) Glutamate                    c) Ornithine                    d) Cysteine
8. Where is the acyl CoA formed in the cytosol transported for oxidation?

- a) mitochondrial matrix      b) microsomes      c) ER      d) remains in the cytosol

III.

9. The product that accumulates in Refsum's disease is  
a) cholesterol      b) linoleic acid      c) phytanic acid      d) palmitic acid
10. The first major common intermediate formed during biosynthesis of purines is  
a) inosinic acid      b) adenylosuccinate      c) xanthylate      d) None
11. Which of the following is not a source of carbon atoms of the purine ring?  
a) glycine      b) aspartate      c) carbon dioxide      d) acetyl CoA
12. The first cyclic metabolic pathway to be discovered is  
a) Krebs's cycle      b) glyoxylate pathway      c) urea cycle      d) None

IV.

13. The  $\Delta G^0$  for ATP hydrolysis is \_\_\_\_\_ kcal/mol.  
a) +7.3      b) -7.3      c) 0      d) None
14. Phenylketonuria is due to the deficiency of  
a) Phenylalanine hydroxylase      b) Transaminase      c) Isomerase      d) Decarboxylase.
15. In humans the principle breakdown product is  
a) Ammonia      b) Urea      c) Uric acid      d) Allantoin
16. Nicotinamide is detoxicated by  
a) Active sulphate      b) methylation      c) acetylation      d) Glucuronic acid.

### Section-B (Short Answer Questions)

Answer any **eight** questions

17. What is salvage pathway? Give its significance.
18. Name any four inborn disorders of metabolism.
19. Which are the steps involved in the  $\beta$ -oxidation of fatty acids?
20. Define transamination. Give Examples?
21. What is the role of high energy phosphates in energy transfer?
22. Point out two differences between oxidative phosphorylation and photophosphorylation.
23. Which is the committed step in the biosynthesis of cholesterol?
24. Write the reaction catalyzed by Rubisco?
25. Liver cannot utilize ketone bodies. Why?
26. Outline the sources of carbon and nitrogen atoms of purine ring
27. What is gout?
28. What is Alkaptonuria and Phenylketonuria?

### Section-C (Short Essay)

Answer any **five** questions

29. Explain the role of P<sub>450</sub> in detoxification?

30. Explain the biosynthetic pathway of pyrimidine nucleotides.
31. Briefly discuss how ATP is generated during electron transport.
32. What are Ketone bodies? Explain their significance.
33. Differentiate between C3 and C4 plants.
34. Explain Urea cycle?
35. Give the  $\beta$ -oxidation pathway of saturated fatty acids?
36. Outline the pathway for the catabolism of purines

#### **Section-D (Long Essay)**

Answer any **two** questions

37. Explain the cytoplasmic system of Fatty acid biosynthesis.
38. Discuss in detail the catabolism of phenylalanine. Indicate the inborn errors involved in the pathway.
39. Briefly explain the electron transport pathway, indicating the complexes concerned.

### **SEMESTER-VI**

## **Core Course-X** **Course Title: Clinical Biochemistry**

### Section A

Objective questions, Answer **all 16** questions

I.

1. Which one is the most preferred anti-coagulant for blood glucose determination?  
a) EDTA      b) Heparin      c) Sodium Citrate      d) Fluoride Oxalate mixture
2. Ehrlich's reagent is used to detect the following in urine  
a) Bile pigment      b) Bile salt      c) Urobilinogen      d) Acetone
3. Benzidine reaction is used to detect  
a) Ketone bodies      b) Bile pigment      c) Occult blood      d) Urea
4. Which one is not a Liver Function Test.?  
a) Total protein      b) Alkaline phosphatase      c) Acid phosphatase      d) Transaminase

II

5. The normal value of cholesterol in blood is  
a) 150-250 mg/dl      b) 50-125 mg/dl      c) 80-120 g/dl      d) 150-250 g/dl
6. Which of the following antibiotic inhibit cell wall synthesis?  
a) Penicillin      b) Streptomycin      c) Tetracycline      d) Chloramphenicol
7. Which one is a gram positive bacterium?  
a) E. Coli      b) Pseudomonas      c) P. Vulgaris      d) S. Aureus
8. Wintrob's method is used for the determination of

- a) ESR      b) PCV      c) ESR & PCV      d) PT
- III
9. Direct bilirubin is  
 a) Conjugated bilirubin    b) Unconjugated bilirubin    c) Total bilirubin    d)  $\alpha$ - bilirubin
10. Jafee's reaction is used to determine  
 a) Urea      b) Creatinine      c) Glucose      d) Ketone bodies
11. An abnormal constituent of urine is  
 a) Ketone bodies      b) Creatinine    c) Urea      d) Uric acid
12. Normal value of Hb in male is  
 a) 14-16 gm%      b) 14-16 mg%      c) 24-26 gm%      d) 24-26 mg%

IV

13. M. Tuberculosis is identified by  
 a) Gram staining      b) Acid fast staining    c) Albert staining      d) Leishmann staining
14. Sterilization by dry heat is used in  
 a) Autoclave    b) Pasteurization      c) Steamer      d) Hot air oven
15. GOD/POD is the method for the estimation of  
 a) Glucose    b) Urea      c) Creatinine      d) Bilirubin
16. Normal value of blood glucose  
 a) 80-120 mg/dl      b) 50-100 mg/dl      c) 100-160 mg/dl      d) 20-80 mg/dl

**Section-B (Short Answer Questions)**

Answer any **eight** questions

17. What is MSDS?  
 18. Differentiate between plasma and serum  
 19. What are anticoagulants?  
 20. Write the clinical significance of ESR  
 21. What is A/G ratio? Write its clinical significance  
 22. What is urea clearance?  
 23. What is Haematuria? Write its clinical significance  
 24. Name two gram negative microorganisms  
 25. What is a differential media? Give one example  
 26. Write the role of agar in culture media  
 27. Write the general mode of action of penicillin  
 28. What is pasteurization?

**Section C Section-C (Short Essay)**

Answer any **five** questions

29. Describe the method of sterilization by autoclaving  
 30. Discuss the various types of hazards encountered in a clinical laboratory  
 31. Discuss the routine examination of CSF

32. Describe the principle of determination, clinical significance and normal values of CPK and acid phosphatase
33. Discuss Thyroid function tests
34. Discuss the adverse responses and side effects of drugs
35. Describe the principle of determination, clinical significance and normal values of total and conjugated bilirubin
36. Discuss on TC/DC

**Section-D (Long Essay)**

Answer any **two** questions

37. Explain the principle, procedure and clinical significance of Glucose tolerance test.
38. Describe the principle, clinical significance and normal values of Liver Function Tests.
39. Discuss the different characteristics used for the identification of bacteria

**SEMESTER VI**

**Core Course XI**

**Course Title: Classical and Molecular Genetics**

**Section A**

Objective questions, Answer **all 16** questions

- I
  1. A man who is affected with phenylketonuria marries a woman who is heterozygous at that locus. What is the probability that their first child will have phenylketonuria?  
a) 1/4      b) 1/8      c) 1/2      d) 0
  2. The genetic disorder sickle-cell anaemia is an example of  
a) Penetrance   b) Epistasis   c) Heterozygous dominance   d) Homozygous dominance
  3. F<sub>2</sub> ratio of Mendelian dihybrid cross is  
a) 9:3:3:2      b) 3:3:3:1      c) 9:1:3:3      d) 9:3:3:1
  4. Down Syndrome results from  
a) Polyploidy   b) Aneuploidy   c) Triploidy   d) Diploidy
- II
  5. During the transcription of a certain protein, an extra cytosine was placed into a gene region, throwing off the correct amino acid sequence. What type of mutation occurred?  
a) Frame shift   b) Transition   c) Transversion   d) Nonsense
  6. Histones are functionally involved in  
a) Chromosome packing   b) Replication   c) Transcription   d) Translation
  7. Genetic recombination in bacteria mediated by bacteriophage is called  
a) Transformation   b) Transposition   c) Transduction   d) Transportation
  8. Jumping genes are called  
a) Replicons      b) transposons      c) Replisoms      d) Jumposons

- III 9. Which of the following is a transcription inhibitor?  
a) Puromycin b) Rifampicin c) Streptomycin d) Tetracycline
10. Replacement of a purine by a pyrimidine is called  
a) Transition b) Transversion c) Transformation d) Transposition
11. DNA replication is  
a) Conservative b) Semi conservative c) Dispersive d) Distributive
12. Topological crisis during replication of DNA is overcome by  
a) Primase b) Gyrase c) SSB protein d) Helicase

IV

13. Transcription and translation in prokaryotes are  
a) Coupled by space and time b) Coupled by time  
c) Coupled by space d) Not coupled
14. Which of the following do not undergo post transcriptional modification in prokaryotes?  
a) mRNA b) tRNA c) rRNA d) nil
15. Tryptophan in Tryptophan operon is  
a) Co repressor b) Repressor c) Inducer d) Activator
16. Which tool of recombinant DNA technology is incorrectly paired with its use?  
a) Restriction enzyme: production of RFLPs (restriction fragment length polymorphism)  
b) DNA ligase: enzymes that cut DNA, creating sticky ends  
c) DNA polymerase: used in PCR to amplify sections of DNA  
d) Reverse transcriptase: production of cDNA from mRNA

### Section-B (Short Answer Questions)

Answer any **eight** questions

17. Differentiate co-dominance and incomplete dominance
18. What is Law of Independent assortment?
19. Give two examples for condition resulting from chromosomal aberration.
20. What is conjugation?
21. Define mutation. Give an example for a mutagen.
22. What is the function of H1?
23. Which are the promoters involved in prokaryotic transcription?
24. What is siRNA?
25. Differentiate between missense and nonsense mutation.
26. What is light dependent repair?
27. What is the significance of telomere?
28. Give a diagrammatical representation of chromosomal organization in prokaryotes.

### Section-C (Short Essay)

Answer any **five** questions

29. Explain with example gene interaction.
30. How is sex determined in drosophila and human?

31. How are transposons involved in multiple drug resistance?
32. Describe the rearrangements of chromosome structure with diagram.
33. What is Cot curve? Explain.
34. Make a schematic representation of Excision repair.
35. What are the post transcriptional modifications in eukaryotes?
36. What is attenuation? Explain.

**Section-D (Long Essay)**  
Answer any **two** questions

37. Write an essay on rDNA technology.
38. Give the steps involved in translation in prokaryotes.
39. Write note on *lac* operon.

## Semester-V

### OPEN COURSE-I

#### Course Title: Clinical Diagnosis of Common Diseases

##### Section A

Objective questions, Answer **all 16** questions

I.

1. Serum Glutamate Oxaloacetate Transaminase (SGOT) is present in abundance in  
a. Cardiac muscles    b. Kidney    c. Erythrocytes    d. Liver
2. The condition in which increased serum glucose level is noted.  
a. Hypoglycemia    b. Glycosuria    c. Hyperglycemia    d. Diabetes
3. Albumin is synthesized in the  
a. Liver    b. RBC    c. Muscles    d. Heart
4. Bilirubin originates from the breakdown of  
a. Monocytes    b. Platelets    c. RBC    d. Basophils

II.

5. An increase bilirubin in blood results in a clinical condition known as  
a. Diabetes    b. Obesity    c. Jaundice    d. Atherosclerosis
6. The main constituent of urine is  
a. Urea    b. Uric acid    c. Albumin    d. Water
7. Normal random blood sugar level is  
a. 10-20 mg/dl    b. 80-120 mg/dl    c. 180-200 mg/dl    d. 50-100 mg/dl)
8. Amylase is an enzyme which has the ability to split  
a. Cholesterol    b. Starch    c. Urea    d. Protein

III.

9. Increased amount of albumin in urine is referred to as  
a. Hypoalbuminuria    b. Hyperalbumin    c. Hypoalbuminuria    d. Albuminuria
10. Of the following which is an abnormal constituent of urine

- a. Chlorides                      b. Uric acid      c. Blood              d. Creatinine
11. Thrombocytes are also known as
- a. RBC              b. Monocytes              c. Neutrophil      d. Platelets
12. The metal present in hemoglobin is
- a. Mg              b. Mn              c. Fe              d. Se

IV.

13. Westergren's method can be used for the measurement of
- a. PCV              b. Blood group              c. ESR              d. WBC count
14. The increased level of WBC is known as
- a. Anemia      b. Leukemia      c. Cytopenia      d. Cytosis
15. The concentration of creatinine in blood will increase with decreased --- function.
- a. Heart              b. Liver              c. Kidney              d. Muscle
16. The basic ABO blood group system in humans was first discovered by
- a. Leeuwenhoek              b. Karl Landsteiner              c. Robert Hook              d. T.H. Morgan

**Section-B (Short Answer Questions)**

Answer any **eight** questions

17. List any four functions of liver?
18. What are Transaminases? Give two examples?
19. What is the clinical significance of albuminuria?
20. What do you mean by hemolytic disease of new born?
21. What is Icteric Index and its significance?
22. What is A/G ratio and its significance?
23. What are the tests included under the liver function tests?
24. Write down the difference between bleeding time and clotting time?
25. Name the enzymes which are elevated after acute MI?
26. What do you mean by random and post prandial blood sugar level?
27. What is the significance of CRP?

28. What are the causes of fatty liver?

**Section-C (Short Essay)**

Answer any **five** questions

29. Write a note on plasma proteins?

30. Describe the components and functions of blood.

31. Elaborate the pathological states of liver and liver function test.

32. Give an account of routine hematological tests.

33. Write a short note on clinical significance of urea and its normal values.

34. Write notes on i) SGPT ii) SGOT iii) LDH iv) CK (CPK)

35. Write a short note on the analysis of Ketone bodies and Bile salts in urine?

36. Write short note on the types of Jaundice?

**Section-D (Long Essay)**

Answer any **two** questions

37. Comment on the importance of blood transfusion and give an account of various blood transfusion reactions

38. Discuss on the abnormal constituents of urine and the pathological conditions associated with them

39. Give an account of

i) Urine analysis

ii) Body fluid analysis

iii) Clinical significance of Hb concentration and RBC count.



14. Which of the following enzyme is considered the key regulator of apoptosis?  
a) Telomerase b) caspase c) aldolase d) catalase
15. Which of the following is not used in the identification of a DNA at crime scenes?  
a) PCR b) western blot c) sequencing d) hybridization
16. What is an example of an effector molecule for riboswitches?  
a) Cyclic nucleotides b) oligonucleotides c) some proteins d) all of the above

### **Section-B (Short Answer Questions)**

Answer any **eight** questions

17. What is the use of ligase enzyme in recombinant technology?
18. What are the features of expression vectors?
19. What is a ribozyme?
20. What is the difference between siRNA and miRNA?
21. What is coimmunoprecipitation?
22. Comment on cDNA library.
23. What is the use of genetically modified mosquitoes?
24. What is the difference between transgenic mice and knockout mice?
25. Give two examples of  $\beta$ -lactam antibiotics.
26. What is the use of ribozymes in gene therapy?
27. Name four genetically modified molecules used for therapy?
28. What is a riboswitch?

### **Section-C (Short Essay)**

Answer any **five** questions

29. How DNA isolates and purified from an organism?
30. What are the uses of chemical tagging with biotin?
31. Explain chain termination method of sequencing.
32. Explain the use of apoptosis to treat cancer.
33. What are the uses of antisense RNA in gene regulation?
34. Explain DNA microarray with an example.
35. Explain the expression of eukaryotic proteins in bacteria
36. Explain the use of thalose in transgenic plants.

### **Section-D (Long Essay)**

Answer any **two** questions

37. Explain the expression of proteins by yeast, insect and mammalian cells.
38. Explain the engineering and applications of ribozymes and riboswitches.
39. Explain the construction and screening of genomic and cDNA library.

## SEMESTER-VI

### Elective Course

### Course Title: Immunology and Immunological Techniques

#### Section A

Objective questions, Answer **all 16** questions

#### I.

1. Plasma cells are  
(a) Memory cells (b) Phagocytic cells (c) Antibody secreting cells (d) Antigen Presenting cells.
2. A small molecule which can act as an epitope but is incapable of itself eliciting an immune response is called  
(a) Haptens (b) Kinins (c) Interferons (d) Perforins
3. Which Immunoglobulin passes through the placenta?  
(a) IgA (b) IgD (c) IgG (d) IgE
4. Thymus is a  
(a) Endocrine gland (b) Exocrine gland (c) A Lymphoid organ (d) none

#### II.

5. What is an epitope?  
(a) Antigen binding site (b) Antibody binding site (c) Receptor (d) Ligand
6. SLE is a  
(a) Immunodeficiency disease (b) Autoimmune disease  
(c) A type of allergy (d) A metabolic disorder
7. Lymphocytes originates from  
(a) Liver (b) Thymus (c) Bone marrow (d) Spleen
8. CD 8 is expressed on  
(a) Helper T-cell (b) Cytotoxic T-Cell (c) NK-Cell (d) Suppressor T- Cell

#### III.

9. Which Ig is involved in allergic reactions?  
(a) IgM (b) IgE (c) IgA (d) IgD
10. Humoral Immunity is  
(a) Innate immunity (b) Cell Mediated immunity  
(c) Antibody mediated immunity (d) none of these.
11. Immunogen is a chemical substance which has  
(a) Immunogenicity only (b) Reactivity only (c) Both (d) None
12. The most abundant phagocytic cell in the body is  
(a) Neutrophil (b) Dendritic cell (c) Basophils (d) Macrophages

#### IV.

13. Cytokines are

- (a) An antiviral protein (b) An antibacterial protein  
 (c) Soluble molecule which communicates between cells (d) T-cell suppressive drug.
14. What is allergy?  
 (a) A failure to make an immune response (b) An altered immune response  
 (c) A hypersensitive reaction (d) A heightened immune response.
15. A substance that non-specifically enhance the immune response to an antigen is called  
 a) Haptens (b) Adjuvant (c) Carrier (d) Allergen.
16. Anaphylotoxin is a  
 (a) Complement peptide (b) An antibiotic (c) Signaling molecule (d) Lymphokines

### **Section-B (Short Answer Questions)**

Answer any **eight** questions

- 17) What are NK cells?  
 18) Give any two functions of spleen?  
 19) Compare antibody mediated and cell mediated immune response?  
 20) What is immunological memory?  
 21) Write short note on immunoprecipitation?  
 22) What are haptens and immunogens?  
 23) What is auto-immunity? Give two examples.  
 24) What do you understand by primary and secondary immune response?  
 25) What are APC?  
 26) What are cytokines?  
 27) What are vaccines?  
 28) What are primary lymphoid organs?

### **Section-C (Short Essay)**

Answer any **five** questions

- 29) Describe the structure of T-cell receptor?  
 30) Explain ELISA technique.  
 31) Define inflammation. Describe the principal symptoms associated with inflammation.  
 32) Write short note on immunodeficiency disorders?  
 33) Differentiate between MHC I and MHC II.  
 34) How are monoclonal antibodies produced?  
 35) Write short note on autoimmune diseases?  
 36) Give a concise account of the nature of different types of vaccines.

### **Section-D (Long Essay)**

Answer any **two** questions

- 37) Describe the salient features of the different types of Immunoglobulins giving details of heavy and light chains.  
 38) What is hypersensitivity? Give an account on immediate and delayed type hypersensitivity.  
 39) Write short notes on:-  
 A) RIA. B) Immunodiffusion C) Immunofluorescence.