Duration: 3 Hours **Total marks: 100**

Instructions to the candidates:

1) All the questions are compulsory. Choice is internal.
2) Figures to the right indicate full marks.
3) All questions carry equal marks.
4) Draw flowcharts /diagrams wherever necessary.
5) Use of simple calculator is allowed.

Q1A) Fill in the blanks (<u>any three</u>): **3**

i) Ketone bodies include _____.
ii) Enzymes for the fatty acid oxidation are present in the _____.
iii) _____ is the end product of beta oxidation of even carbon saturated fatty acids.
iv) Acetyl CoA carboxylase adds a _____ group to acetyl CoA.
v) Synthesis of fatty acid is termed as _____.

Q1B) Answer in brief <u>any one</u> of the following: **3**

i) Discuss the contribution of Knoop to the field of lipid metabolism.
ii) Briefly explain the fate of glycerol obtained on breakdown of triglycerides.

Q1C) Attempt <u>any one</u> of the following: **6**

i) With the help of a schematic representation, explain how the carnitine shuttle plays an important role in determining the rate of beta oxidation. Emphasize on its significance in lipolysis.
ii) Explain in detail the structure and function of the multi-enzyme complex involved in synthesis of fatty acids.

Q1D) Answer <u>any one</u> of the following: **8**

i) With the help of structures and enzymes involved, explain the oxidation of Eicosanoic acid (C-20). Also, elaborate on the bioenergetics of the same.
ii) 'Diabetic individual usually excrete ketone bodies in their urine.' Elaborate in detail on the formation and utilization of ketone bodies by a diabetic individual.

Q2A) Fill in the blanks (<u>any three</u>): **3**

i) Aspartate Transaminase is the other name for _____.
ii) _____ is regenerated at the end of urea cycle.
iii) _____ functions as the secondary messenger.
iv) Congenital hypothyroidism is also known as _____.
v) _____ hormone causes suppression of immune system.

Q2B) Answer in brief <u>any one</u> of the following: **3**

i) Justify: Amino acid degradation is different from other catabolic processes.
ii) Explain the sequential process of insulin biosynthesis

Q2C) Differentiate between <u>any one</u> of the following : **6**

i) Type I and Type II diabetes mellitus

ii) Oxidative and non-oxidative deamination

Q2D) Write detailed answers to <u>any one</u> of the following: **8**

i) Discuss in detail thyroid hormones under the following headings: (a) chemistry (b) biosynthesis (c) physiological effects.

ii) With the help of structures, explain the final pathway of protein degradation. Also, mention the cellular location and trace the origin of the two nitrogen atoms.

Q3A) Fill in the blanks (<u>any three</u>): **3**

i) _____ wavelength range is associated with visible colorimeter.

ii) Desk top centrifuge has a capacity of _____ ml.

iii) The first fraction obtained at 600 rpm in differential centrifugation of liver homogenisation is _____.

iv) Unit of sedimentation coefficient is _____.

v) Rate of sedimentation is _____ proportional to viscosity of a medium.

Q3B) Attempt in brief <u>any one</u>: **3**

i) Explain the basic principle of sedimentation.

ii) A series of 3 colored glass plates of equal thickness are placed in a light beam. Each sheet absorbs one quarter of the light incident upon it. What is the intensity of the light transmitted by the third glass plate?

Q3C) Attempt <u>any one</u> of the following : **6**

i) Compare and contrast: Rate zonal and isopycnic centrifugation. Name any two examples of compounds used as density gradient materials.

ii) State Beer-Lambert's law and add a note in detail about deviation and limitation of the same.

Q3D) Write detailed answers of <u>any one</u> of the following: **8**

i) Write a detailed note on analytical ultracentrifugation.

ii) Explain construction of spectrophotometer with respect to following
a) Source of light b) wavelength selector
c) sample containers d) detector

Q4A) Fill in the blanks (<u>any three</u>): **3**

i) _____ dye is used to stain nucleic acids.

ii) High molecular weight particles travel _____ in a supporting medium with low porosity than low molecular weight components.

iii) Agarose gel has _____ molecular sieving effect.

iv) SDS is a/an _____ detergent.

v) Carbohydrates can be separated by electrophoresis using _____ buffer.

Q4B) Answer in brief <u>any one</u> of the following: **3**

i) Give a brief account on Native PAGE.

ii) An inert supporting medium is chosen for electrophoresis. How does it influence the movement of sample?

Q4C) Attempt <u>any one</u> of the following: **6**

i) Explain the effect of 1) composition 2) ionic strength and 3) pH of the buffer on the rate of migration of sample in electrophoresis.

ii) Elaborate on the characteristics and applications of 1) paper and 2) cellulose acetate as supporting media .

Q4D) Answer <u>any one</u> of the following: **8**

i) State True or False, giving reason: Pore size can be controlled in polyacrylamide gels. With the help of reaction explain the formation of the gel including the role of ammonium persulphate and TEMED.

ii) Justify: Electrophoresis has wide array of applications.

Q5A) Answer <u>any four</u> of the following: **16**

i) Discuss the formation of malonyl CoA. Elaborate on its significance to lipid metabolism

OR

i) Describe the pathophysiological conditions leading to ketone bodies and explain their effect on human physiology.

ii) Explain the physiological functions of glucocorticoids.

OR

ii) In detail, elaborate on the reaction mechanism of transamination reactions.

iii) Write a note on general properties of gradient material.

OR

iii) How would you estimate the unknown concentration of protein using colorimetric method?

iv) Briefly explain the working of type of electrophoresis that uses two different gels at a time.

OR

iv) Describe the principle of electrophoresis. Give any one example each of a buffer and a dye used for separation of protein.

Q5B) State true or false (<u>any four</u>): **4**

i) Lambda max is independent of concentration for a particular biomolecule

ii) Svedberg (S) is the unit in centrifugation.

iii) The coenzyme required for oxidative deamination is pyridoxal phosphate.

iv) Fatty acid synthase complex has a structural and functional division.

v) Intact protein molecules are separated using SDS-PAGE.

vi) pH of the stacking gel is 2 units higher than that of separating gel.

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