Q.P. Code : 04583

(2½ Hours) **[Total Marks : 75**

N.B. : (1) **All** the question 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**.

1. (A) Choose the most appropriate answer (**any three**) : **3**

(i) A fatty acid with 16 carbon atoms will undergo _____ cycles of beta oxidation and results in _____ acetyl CoA molecules.
(a) 6, 7 (b) 7, 8 (c) 8, 7

(ii) The energy requiring step of fatty acid oxidation is catalysed by _____ enzyme?
(a) thiolase
(b) acyl CoA dehydrogenase
(c) thiokinase

(iii) All are conditions of ketosis except _____.
(a) starvation
(b) uncontrolled diabetes mellitus
(c) Von Gierke's Disease

(iv) The conversion of acetyl CoA to malonyl CoA requires which of the following ?
(a) ADP (b) Biotin (c) NADPH

(v) Which of the following statements best describes the fatty acid synthase complex?
(a) It is a dimer of similar units
(b) It is composed of 7 different proteins
(c) It dissociates into eight different proteins

(vi) NADPH required for fatty acid synthesis can be obtained from _____.
(a) HMP (b) Glycolysis (c) Kreb's Cycle

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(B) Attempt **any one** of the following : **2**

(i) Describe Knoop's contribution to fatty acid metabolism.

(ii) State the difference between beta oxidation of odd numbered and even numbered fatty acids.

(C) Attempt **any one** of the following : **4**

(i) Schematically depict lipogenesis

(ii) Write a note on carnitine shuttle

(D) Answer **any one** of the following : **6**

(i) Schematically represent mitochondrial reactions of beta-oxidation of a saturated fatty acid. How many molecules of ATP would be generated if a C20 saturated fatty acid was metabolised?

(ii) Elaborate on ketone bodies.

2. (A) Choose the most appropriate answer (**any three**) : **3**

(i) T3 and T4 combine with _____ and are transported in the blood.

(a) Thyroid-binding protein

(b) Thyroxine-binding globulin

(c) Thyroglobulin

(ii) A child suffers from an amino acid deficiency because of which he has low levels of melatonin. The deficient amino acid is _____.

(a) tyrosine (b) glutamic acid (c) phenylalanine

(iii) _____ is the compound shared by TCA and Urea Cycle?

(a) α-ketoglutarate (b) Fumarate (c) Oxaloacetate

(iv) A 15 year old boy with Type 1 diabetes faints on administration of insulin. He is administered glucagon and he recovers. Which enzyme did glucagon activate?

(a) Glycogen synthase

(b) Glycogen phosphorylase

(c) Glucokinase

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(v) Which of the following is NOT a water soluble hormone?
(a) Insulin (b) Oxytocin (c) Teraiodothyronine

(vi) A 55 year old man has been diagnosed with liver cirrhosis, ammonia is not getting detoxified and can damage the brain. Which one of the following amino acids can be used to store ammonia in a non toxic form?
(a) Aspartate (b) Serine (c) Glutamate

(B) Define / Explain the term **any one** : **2**
(i) Cretinism (ii) Ammonia intoxication

(C) Write a note on **any one** of the following : **4**
(i) Synthesis of thyroid hormones
(ii) Deamination reactions

(D) Write detailed answers to **any one** of the following : **6**
(i) Describe the physiological role of any two hormones involved in carbohydrate metabolism.
(ii) Depict Krebs-Henseleit cycle and give its significance in humans.

3. (A) Choose the most appropriate answer (**any three**) : **3**
(i) The light source is usually a _____ lamp for visible region.
(a) hydrogen (b) strontium (c) tungsten

(ii) In Beer's law, the intensity of transmitted light decreases exponentially as the _____.
(a) length of absorbing medium increases
(b) length of absorbing medium decreases
(c) concentration of absorbing medium decreases

(iii) The visible range of electromagnetic spectrum ranges between _____ to _____ nm.
(a) 390-700 nm (b) 420-750 nm (c) 300-600 nm

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(iv) What should be the molar extinction of the solute which shows absorbance of 0.3 at 6.0 mM concentration and path length of 0.01 m?
(a) 5×10^4 l / mol^{-1} / cm^{-1} (b) 501 / mol^{-1} / cm^{-1} (c) 51 / mol^{-1} / cm^{-}

(v) Estimation of protein with alkaline copper sulpahate is dependent on complex formation with _____ groups.
(a) C = O, NH (b) C = O, NH_2 (c) C - H, NO

(vi) A blank contains all except _____.
(a) diluent (b) analyte (c) colouring agent

(B) Define / Explain the term **any one** : **2**
(i) Nomogram (ii) Svedberg unit

(C) Write a note on **any one** of the following : **4**
(i) Colorimeter
(ii) Types of centrifuges

(D) Write detailed answers to **any one** of the following : **6**
(i) Professor Geeta seeks help to find the concentration of proteins and sugars in her plant extract. Write an informative note to solve her problem.
(ii) Elaborate on centrifugation techniques based on density gradient.

4. (A) Choose the most appropriate answer (**any three**) : **3**
(i) Full form of TEMED is _____.
(a) Triethyl methyl diamine
(b) Tetra methyl ethylenediamine
(c) Tetra ethylene methyldiamine

(ii) Agar consists of _____ and _____.
(a) galactose, glucose
(b) galactose, pectin
(c) agarose, agaropectin

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(iii) _____ introduced electrophoresis.
(a) Tswett (b) Tiselius (c) E. M. Southern

(iv) Gases produced on cathode and anode during electrophoresis are _____ & _____ respectively.
(a) CO_2, O_2 (b) H_2, O_2 (c) O_2, H_2

(v) _____ buffer can be used for separation of nucleic acid in electrophoresis.
(a) Barbitone (b) Tris EDTA (c) Acetate

(vi) The function of beta mercaptoethanol is _____.
(a) to give negative charges to amino acids in the proteins
(b) for the oxidation of disulfide bonds in the proteins
(c) for the reduction of disulfide bonds in the proteins

(B) Attempt **any one** of the following : **2**
(i) State the utility of APS in electrophoresis
(ii) Describe the underlying principle of electrophoresis

(C) Write a note on **any one** of the following : **4**
(i) Electrophoretic mobility of anion
(ii) SDS - PAGE

(D) Answer **any one** of the following : **6**
(i) Write a note on applications of electrophoresis.
(ii) Justify : "Electrophoresis is a technique that uses diverse materials for running the sample".

5. (A) Write short note on **any one** of the following : **3**
(i) Fatty acid synthase
(ii) Rate limiting step of fatty acid catabolism

(B) Write short note on **any one** of the following : **3**
(i) Differentiate between type-I and type-II diabetes mellitus
(ii) Write briefly on transaminases

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(C) Answer in brief **any one** of the following : **3**

(i) Derive a relationship between RCF and rpm

(ii) Schematically represent the separation of cell organelles using centrifugation technique.

(D) Answer in brief **any one** of the following : **3**

(i) Differentiate betwen stacking and resolving gel

(ii) Write a note on dyes used for visualization of biomolecules seperated by electrophoresis

(E) State True or False (**any three**) : **3**

(i) Urea cycle occurs in a single cellular compartment.

(ii) Oxytocin is a pitutary hormone.

(iii) Catabolism of fatty acids leads to formation of malonyl CoA.

(iv) Centripetal force acts away from the axis of rotation.

(v) Molar extinaction co-efficient has units mM/ min.

(vi) SDS is used as a cross-linking agent in electrophoresis.
