

Duration: 3 Hrs

Total marks: 75

N.B. : 1. All questions are compulsory
2. Figures to right indicate full marks

Q. 1 Choose appropriate option for following multiple choice based questions. 20

- 1 _____ is the amino acid containing imine functional group.
 - a Leucine
 - b Proline
 - c Histidine
 - d Lysine

- 2 The linkage in sucrose is _____ glycosidic linkage.
 - a C1-C1
 - b C1-C2
 - c C1-C4
 - d C1-C6

- 3 _____ is a C18 saturated fatty acid.
 - a Stearic acid
 - b Linolenic acid
 - c Linoleic acid
 - d Oleic acid

- 4 The conversion of _____ into pyruvate is an example of substrate-level phosphorylation in glycolysis.
 - a Phosphoenolpyruvate
 - b 2-phosphoglycerate
 - c Glyceraldehyde 3-phosphate
 - d Oxaloacetate

- 5 The first committed step in TCA cycle is _____.
 - a Oxaloacetate to Citrate
 - b Citrate to Isocitrate
 - c Isocitrate to α -Ketoglutarate
 - d α -ketoglutarate to Succinyl CoA

- 6 Glucose 6-phosphate dehydrogenase catalyzes a key regulatory step in _____.
 - a Glycogenesis
 - b Glycogenolysis
 - c Pentose phosphate pathway
 - d Gluconeogenesis

- 7 _____ can catalyse the synthesis of a linear unbranched molecule containing α -1,4 glycosidic linkages only.
- a Glycogen phosphorylase
 - b Glucosyl α -4,6 transferase
 - c Glycogen synthase
 - d Glucose-6-phosphatase
- 8 _____ is the only electron carrier containing heme iron which can directly react with molecular oxygen.
- a Cytochrome a and a_3
 - b Cytochrome b
 - c Cytochrome c
 - d CoQ
- 9 A defect in the _____ enzyme causes Lesch-Nyhan syndrome.
- a HGPRT
 - b ARPT
 - c ATCase
 - d CPS II
- 10 Gout is a metabolic disease associated with overproduction of _____.
- a Uric acid
 - b Orotic acid
 - c Propionic acid
 - d Lactic acid
- 11 The gaps between DNA segments on the lagging stand produced by restriction enzymes are joined by _____.
- a DNA Phosphorylase
 - b DNA Helicase
 - c DNA Topoisomerase
 - d DNA Ligase
- 12 AUG serves as _____.
- a Anticodon
 - b Non-sense codon
 - c Stop codon
 - d Start codon
- 13 The amino acids involved in pyrimidine De novo synthesis are _____.
- a Aspartate and Glutamine
 - b Asparagine and Glutamate
 - c Aspartate and Serine
 - d Glutamate and Glycine

- 14 Acyl CoA dehydrogenase catalyzes conversion of acyl CoA to _____.
a trans- Δ^2 enoyl CoA
b cis- Δ^2 enoyl CoA
c trans- Δ^3 enoyl CoA
d cis- Δ^3 enoyl CoA
- 15 Ketone bodies cannot be utilized in the liver due to absence of _____ enzyme.
a Thiophorase
b Thiolase
c β -hydroxybutyrate dehydrogenase
d HMG CoA lyase
- 16 _____ form of energy is required for fatty acid biosynthesis.
a NADPH
b ATP
c NADH
d FADH₂
- 17 _____ enzyme is involved in urea cycle.
a Ornithine transcarbamoylase
b Asparaginase
c Glutamate synthase
d Glutamine transaminase
- 18 Acetyl CoA is carboxylated to _____ by the enzyme acetyl CoA carboxylase.
a Lactate
b Glycerol
c Malonyl CoA
d Pyruvate
- 19 Hexokinase enzyme belongs to _____ class according to IUB.
a Oxidoreductase
b Hydrolase
c Transferase
d Lyase
- 20 In _____ type of inhibition, V_{max} and K_m decreases.
a Non-competitive
b Competitive
c Uncompetitive
d Irreversible

- Q. 2 Answer any two questions 20**
- a**
- i) Explain in detail, competitive, non-competitive and uncompetitive reversible inhibitors w.r.t. enzyme kinetics, plots and one example each. **5**
 - ii) Write the complete reactions for the regulatory steps of Glycolysis. Explain Proton Motive Force. **5**
- b**
- i) Discuss the conversion of acetyl CoA to mevalonate in cholesterol biosynthesis. Diagrammatically represent transport of acetyl CoA from mitochondria to cytosol in the biosynthesis of fatty acids. **5**
 - ii) Write the reactions involved in biosynthesis of AMP and GMP from its parent purine nucleotide. Name any two disorders of purine metabolism. **5**
- c**
- i) Give an outline of Urea cycle and give its linkage with TCA cycle. **5**
 - ii) Discuss the process of replication in prokaryotes. **5**
- Q. 3 Answer any seven questions 35**
- i)** Draw structure of Maltose and Stearic acid. Explain mutarotation.
 - ii)** Write a note on secondary structure of proteins. Give structure of cholesterol.
 - iii)** Give the names and structures of substrate and product for the following enzyme catalysed reactions:- i) Pyruvate carboxylase ii) Xanthine oxidase
 - iv)** Explain the four reactions involved in β - oxidation of Palmitic acid and give the bioenergetics.
 - v)** Discuss transamination reactions of amino acid metabolism. Explain thermodynamically favourable reaction.
 - vi)** Classify enzymes as per IUB system of nomenclature with suitable example for each.
 - vii)** Write the salvage pathway for biosynthesis of purines. Give an outline of oxidative phase of Pentose Phosphate Pathway.
 - viii)** Define the term epimer. Write a note on Glycogenolysis.
 - ix)** Classify lipids with suitable examples. Write the reactions for utilization of ketone bodies.

Time- 3 hrs

Marks 75

Q. I	MCQ	Mark
1	In case of mitochondrial damage, the cells start producing ATP from glucose by which of the following process?	1
a	Anaerobic Glycolytic Pathway	
b	Aerobic Glycolytic Pathway	
c	Urea Cycle	
d	Beta Oxidation of Fatty acid	
2	Leukocytes are attracted to the chemoattractants and travel to the site of inflammation. This process is called as	1
a	Local invasion	
b	Phagocytosis	
c	Pinocytosis	
d	Chemotaxis	
3	Which of the following is growth factor involed in angiogenesis?	1
a	Matrix metalloproteinases	
b	Vascular cell adhesion molecule 1	
c	Vascular Endothelial Growth Factor	
d	Proteases	
4	Increased sensitivity to pain is called as	1
a	Hyperalgesia	
b	Hypoalgesia	
c	Analgesia	
d	Algesia	
5	Reduced blood flow to an organ or any part of the body is called as	1
a	Ischemia	
b	Hypovolemia	
c	Hypervolemia	
d	Angina	
6	A condition of the lungs characterized by irreversible enlargement of the airspaces distal to the terminal bronchiole, accompanied by destruction of their walls is called	1
a	Emphysema	
b	Asthma	
c	Chronic Bronchitis	
d	Acute Bronchitis	
7	Which of the following term refers to chesty pain brought on by physical or emotional stress and relieved by rest/medication	1
a	Angina Pectorice	
b	Atherosclerosis	
c	Atheroma	
d	Ischemia	

- 8 According to the degree of thickness of ventricular wall involved in myocardial infarction, the infarcts are classified as: 1
- a Septal and Lateral
 - b Transmural and Laminar
 - c Anteroseptal and anterolateral
 - d Anterior and Posterior
- 9 Full form of COPD which represents disease of respiratory system is 1
- a Cirrhotic Obstructive Pulmonary Disease
 - b Chronic Obstructive Pulmonary Disease
 - c Chronic Obstructive Plural Disease
 - d Chronic Osteoporotic Pulmonary Disease
- 10 In distinguishing acute from chronic renal failure, which of the following is the most reliable evidence of CKD? 1
- a History of increased serum creatinine
 - b History of increased BUN
 - c Above-normal plasma sodium
 - d Above-normal serum calcium
- 11 Peptic ulcer occurs due to disruption of _____ which is required in the maintenance of the integrity of the gastric mucosa 1
- a Muscularis mucosa
 - b Endoplasmic reticulum
 - c Vaginal Mucosa
 - d Pericardium
- 12 Which of the following is the cause of α -thalassemia? 1
- a Excess of alpha gene
 - b Deletion of beta gene
 - c Deletion of alpha gene
 - d Single amino acid substitution in alpha chain
- 13 Alzheimer disease is the most common form of which of these? 1
- a Dementia
 - b Malnutrition
 - c Fatigue
 - d Psychosis
- 14 Diabetes mellitus is a disease caused by 1
- a Increase in the effectiveness of endogenous insulin
 - b Deficiency or diminished effectiveness of endogenous insulin
 - c Age
 - d A reduction of glucose
- 15 Which of the following is the most common symptoms of PCOS? 1
- a Less menses
 - b Regular menses
 - c Painful menses
 - d Irregular menses

- 16 Rheumatoid arthritis (RA) is different from some other forms of arthritis because it... 1
- a Is more painful than other forms
 - b Is symmetrical, affecting the right and left sides of the body
 - c Occurs below the waist
 - d Generally, occurs above the waist
- 17 Cancer is often the result of activation of _____ and the inactivation of _____ 1
- a Proto-suppressor genes, oncogenes
 - b Oncogenes, Proto-oncogenes
 - c Oncogenes, tumour-suppressor genes
 - d Tumor suppressor genes, proto-oncogenes
- 18 Which one of the following is not a property of cancerous cells, whereas the remaining three are? 1
- a They compete with normal cells for vital nutrients
 - b They do not remain confined in the area of formation
 - c They divide in an uncontrolled manner
 - d They show contact inhibition
- 19 _____ is an infection and inflammation of the fluid and membranes surrounding the brain and spinal cord. 1
- a Meningitis
 - b Pneumonia
 - c Hepatitis
 - d Necrosis
- 20 Gonorrhoea is spread through _____ with an infected person 1
- a indirect contact
 - b fecal-oral transmission
 - c sexual contact
 - d Airborne transmission
- II. Long Answers (Answer 2 out of 3) 2 x 10 =20
- A Write a short note on the reactions of blood vessels in acute inflammation. Explain the mechanism of increased vascular permeability during inflammation
 - B Enlist the Risk factors and Briefly outline the pathogenesis of Hypertension and Atherosclerosis.
 - C Discuss in detail signs and symptoms, etiology and pathogenesis of Parkinson's disease.
- III. Short Answers (Answer 7 out of 9) 7 x 5 =35
- A Write a short note on Cell swelling and Intra cellular accumulation.
 - B Explain the signs and symptoms, etiopathogenesis and types of emphysema
 - C Write a note on pathogenesis of thalassemia.
 - D Discuss signs, symptoms and etiology of depression
 - E Discuss etiology of Peptic Ulcer. Give Distinguishing factors of Duodenal and Gastric ulcers
 - F Write briefly about different types of neoplasm. Write a brief on carcinogenesis

- G What is Jaundice? Explain symptoms and pathogenesis of Jaundice.
- H Discuss transmission and pathogenesis of tuberculosis.
- I Write a note on etiology, transmission, and symptoms of Syphilis

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Q1. Choose the appropriate option for following multiple choice based questions. 20M

- 1 Which neuroglial cells function as phagocytes in the CNS?
 - a Microglia
 - b Oligodendrocyte
 - c Ependymal cells
 - d Astrocytes

- 2 Each peristaltic wave moves gastric contents from the body of the stomach down into the antrum, by a process known as _____.
 - a Digestion
 - b Propulsion
 - c Retropulsion
 - d Migrating motility complex

- 3 Which of the following is the correct pathway through which air travel in the respiratory system?
 - a Nose, Pharynx, Trachea, Lungs
 - b Nose, Trachea, Lungs, Pharynx,
 - c Trachea, Pharynx, Lungs, Nose
 - d Nose, Trachea, Pharynx, Lungs

- 4 _____ carries out the conversion of angiotensinogen, which is released by the liver, to angiotensin I
 - a Aldosterone
 - b Renin
 - c Calcitriol
 - d Erythropoietin

- 5 _____ is a water soluble amine hormone.
 - a Testosterone
 - b Aldosterone
 - c Epinephrine
 - d Nitric oxide

- 6 _____ hormone produced by the placenta during pregnancy is believed to establish the timing of birth.
 - a Relaxin
 - b Corticotropin-releasing hormone
 - c Human placental lactogen
 - d Progesterone

- 7 _____ is the motor area of the cerebral cortex.
- a Primary auditory area
 - b Wernicke's area
 - c Broca's speech area
 - d Primary gustatory area
- 8 The _____ regulates the movement of food from the pharynx into the esophagus.
- a Pyloric sphincter
 - b Upper esophageal sphincter
 - c Lower esophageal sphincter
 - d Ileocecal sphincter
- 9 The right and left primary bronchi divides into _____.
- a Lobar bronchi
 - b Segmental bronchi
 - c Carina
 - d Terminal bronchioles
- 10 When _____ cells are relaxed, surface area is maximal and glomerular filtration rate is high.
- a Nephron
 - b Mesangial
 - c Detrusor
 - d Juxtaglomerular
- 11 Which of the following is the action of parathormone in the human body?
- a decreases blood sodium level
 - b increases blood sodium level.
 - c decreases blood calcium level
 - d increases blood calcium level
- 12 _____ refers to the external genitals of the female.
- a Mons pubis
 - b Vulva
 - c Perineum
 - d Vestibule
- 13 _____ lines the uterine cavity and sloughs off during menstruation.
- a Perimetrium
 - b Myometrium
 - c Stratum functionalis
 - d Stratum basalis

- 14 _____ is an inhibitory neurotransmitter.
- a GABA
 - b Aspartate
 - c Glutamate
 - d Epinephrine
- 15 Pancreatic juice is drained in _____ part of the small intestine.
- a Duodenum
 - b Ileum
 - c Jejunum
 - d cecum
- 16 _____ performs only respiration functions.
- a Nasopharynx
 - b Oropharynx
 - c Laryngopharynx
 - d Esophagus
- 17 The process of release of sperms from their connections to Sertoli cells, is known as _____.
- a Spermiation
 - b Spermiogenesis
 - c Capacitation
 - d Spermatogenesis
- 18 _____ cells in testes secrete testosterone.
- a Sustentacular
 - b Sertoli
 - c Leydig
 - d Primordial germ
- 19 Glucocorticoids are secreted mainly by _____ cells of adrenal cortex.
- a Chromaffin
 - b Zona glomerulosa
 - c Zona reticularis
 - d Zona fasciculata
- 20 _____ is the site of sperm maturation.
- a Vas deferens
 - b Epididymis
 - c Rete testis
 - d Spermatic cord

Q2. Attempt the following (Any TWO). 20M

- a. Explain in detail the anatomy of the cerebrum and add a note on sensory areas of the cerebrum.
- b. Define pulmonary ventilation, explain in detail inhalation and exhalation and factors affecting pulmonary ventilation.
- c. Describe the structure of adrenal cortex and add a note on Glucocorticoids and its regulation.

Q3. Attempt the following (Any SEVEN). 35 M

- a. Draw a neat labelled diagram of internal anatomy of spinal cord.
- b. Write a note on Diencephalon.
- c. Explain in detail functions of the liver.
- d. Explain the composition and functions of pancreatic juice.
- e. Write a short note on respiratory volume and capacities.
- f. With the help of labelled diagram explain internal anatomy of kidney.
- g. Explain the roles of calcitonin , parathyroid hormone , and calcitriol in calcium homeostasis.
- h. Draw a neat labelled diagram of internal structure of Testes.
- i. Describe the process of oogenesis.

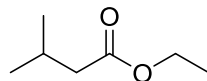
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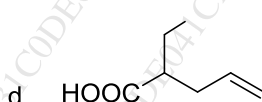
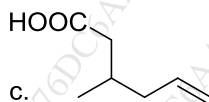
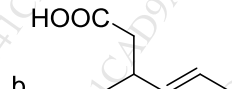
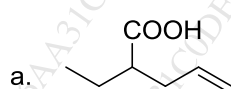
Q. 1 Choose appropriate option for following multiple choice based questions. **20**

1 What is the IUPAC Name for the following compound?



- a ethyl propanoate
b 3-methylbutane ethanoate
c ethyl 3-methylbutanoate
d 2-methylbutane ethanoate

2 Identify the correct structure for 3-methylhex-5-enoic acid



- a a
b b
c c
d D

3 But-1-en-1-amine can exhibit.....

- a Imine enamine tautomerism
b Keto-enol tautomerism
c Chain isomerism
d Metamerism

4 Which of the following statement is incorrect for ethanoic acid and methyl methanoate

- a Both compounds have the molecular formula $C_2O_2H_4$
b These compounds exhibit metamerism
c These compounds exhibit functional isomerism
d These compounds have different chemical properties.

5 Select correct IUPAC nomenclature for β -methyl- β -phenylbutyraldehyde.

- a 2-methyl-2-phenylbutanal
b 3-methyl-3-phenylbutanal
c 2-methyl-2-phenylpropanal
d 3-methyl-3-phenylbutaraldehyde

- 6 Paraffin waxes are graded by its
- melting point
 - specific gravity
 - ductility
 - Viscosity
- 7 In the chlorination of alkanes the first step in which chlorine free radicals are produced is called
- initiation
 - activation
 - propagation
 - Deactivation
- 8 Why isotope effect is observed in E2 reaction?
- because it is bi molecular reaction
 - because it is second order reaction
 - because breaking of B carbon-hydrogen occur in rate determining step
 - none of these
- 9 Propene reacts with HBr in presence of peroxide to give
- n propyl bromide
 - alkyl bromide
 - isopropyl bromide
 - vinyl bromide
- 10 Which of the following is the rate -limiting step for the hydrolysis of tertiary-butyl bromide?
- loss of water from the carbocation
 - dissociation of the alkyl halide into a carbocation and bromide ion
 - addition of water to the carbocation
 - reaction of the carbocation with the bromide ion
- 11 Which of the following statements regarding the S_N2 mechanisms is wrong?
- It has a one-step mechanism
 - It has unimolecular rate-determining transition state
 - It does not involve carbocation rearrangement
 - Primary alkyl halides are more reactive than tertiary alkyl halides.
- 12 Which one of the following alcohols cannot be oxidized to carbonyl compound?
- 3-methyl-3-pentanol
 - Propanol
 - 2-butanol
 - 2-pentanol
- 13 Which of the following solvents is preferred for bimolecular nucleophilic substitution reaction?
- DMSO
 - Water
 - Ethanol
 - Methanol

- 14 Which of the following reagents will react with both aldehydes & ketones?
a Grignard reagent
b Tollen's reagent
c Fehling's reagent
d Benedict's reagent
- 15 The carbon atom of a carbonyl group is
a sp hybridised
b sp² hybridised
c sp³ hybridised
d None
- 16 Which of the following does not give Aldol condensation reaction?
a Formaldehyde
b Acetyldehyde
c Dimethyl ketone
d Propionaldehyde
- 17 Perkin reaction is a _____ reaction
a Neutralization
b Condensation
c Hydrolysis
d Acid-base
- 18 Amides can be converted to amines by a reaction named after
a Hoffmann Bromamide
b Claisen condensation
c Perkin condensation
d Kekule
- 19 Which of the following compound is expected to be most basic?
a Aniline
b Methylamine
c Hydroxylamine
d Ethylamine
- 20 _____ is commonly used as a food preservative
a Sodium benzoate
b Potassium benzoate
c Terephthalic acid
d Acetic acid

Q. 2 Answer any TWO questions

20

1. a) An organic Compound (A) on Ozonolysis gives acetone and formaldehyde. What is the Structure of (A)? Write the complete mechanism for this reaction.
b) When 2-Chloro, 3,3 dimethyl butane is heated with ethanol. Predict all the possible product/s. Identify Major and Minor products and justify. Comment on the factors affecting this reaction.

10

2. a) Following is the list of four halides. Select correct sequence of decreasing order of reactivity for S_N1 reaction. Justify the order and explain the mechanism for most reactive compound. $C_6H_5CH(CH_3)Br$, $C_6H_5CH(CH_3)I$, $C_6H_5CH_2I$, $C_6H_5CH_2Br$. **10**
 b) With suitable examples discuss and differentiate the stereochemistry of S_N1 and S_N2 reactions.
3. a) An organic compound with a molecular formula $C_9H_{10}O$ forms a 2, 4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro's reaction. On rigorous oxidation, it gives 1, 2- Benzene dicarboxylic acid. Identify the compound. **10**
 b) Explain Aldol Condensation in detail.
- Q.3 Answer any SEVEN questions **35****
1. Give the products for the following. **5**
 1. Acetone + Phenyl hydrazine
 2. Acetaldehyde + Semicarbazide
 3. Benzaldehyde+ 2,4-dinitrophenylhydrazine
 4. Acetone +Hydroxylamine
 5. Acetaldehyde + Ethyl magnesium bromide
2. Arrange the given molecules in increasing order of basicity in both solution phase and gaseous phase and justify the order. N,N-dimethyl ethanamine, ethanamine, N-methyl ethanamine **5**
3. A. Draw a structures for the following compounds. (Any 3) **5**
 1. hexane-2,4-dione
 2. 3-fluoro-2-methylpropanal
 3. 2-bromo-4-ethyl-3-methoxyheptane
 4. Benzoic ethanoic anhydride
 B. Draw the structures of the tautomer for 3-pentanone and cyclohexanone.
4. Name the reaction when tert-butyl alcohol reacts with hydrogen bromide. **5**
 Predict the product/s this reaction.
 Comment on the oxidation of alcohol.
5. Give the name of reagents to carry out following conversions. **5**
 1. 3,3-dimethyl-2butanol to 2,3-dimethyl-2-butene
 2. 1-methyl-1-cyclohexanol to 1-chloro-1-methyl cyclohexane
 3. 2-bromohexane to 2-hexene
 4. Propene to 2-bromopropane
 5. Ethyl bromide to ethyl alcohol
6. What is Hyperconjugation? Explain the stabilities of alkenes based on it. **5**
7. Write a note on halogenation of alkanes and elaborate on reactivity verses selectivity using suitable halogens. **5**
8. Give simple chemical tests to distinguish between the following (1) Propanal & Propanone (2) Acetophenone & Benzophenone **5**
9. Explain the factors affecting the acidity of Carboxylic acids. Write the structures & uses of (1) Tartaric acid (2) Salicylic Acid **5**
