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 An example of saturated fatty acid is _____.
a Palmitic acid
b Oleic acid
c Linoleic acid
d Arachidonic acid

2 α(1→4) glycosidic bond is present in_____.
a Lactose
b Maltose
c Sucrose
d Cellobiose

3 The process of change in optical rotation from dextrorotatory (+) to levorotatory (-) is referred to as ____.
a Mutarotation
b Epimerization
c Racemization
d Inversion

4 Which of the following kinetic effect is true for competitive inhibition?
a It decreases both Km and Vmax
b It increases both Km and Vmax
c It decreases Km without affecting Vmax
d It increases Km without affecting Vmax

5 The conversion of alanine to glucose is termed as _____.
a Glycolysis
b HMP shunt
c Glycogenesis
d Gluconeogenesis

6 The cycle involving the synthesis of glucose in liver from the skeletal muscle lactate and the reuse of glucose by the muscle is known as ____.
a Cori cycle.
b Glucose-alanine cycle
c Urea cycle
d TCA cycle

7 Example of xanthine oxidase inhibitor is_____.
a Allopurinol
b Methotrexate
c Trimethoprim
d Puromycin

X997Y771EABX997Y771EABX997Y771EABX997Y771EAB

8 Glucose should be derivatized to _____ for glycogenesis,
a glucuronic acid
b pyruvic acid
c UDP glucose
d Sorbitol

9 Bile acids are derived from_____.
a Fatty acids
b Cholesterol
c Bilirubin
d Proteins

10 _____ is a termination codon in translation.
a UAG
b UUA
c UUG
d AUA

11 Transcription of _____strand of DNA results in mRNA formation.
a Template
b Anti-template
c Coding
d Transcript

12 Conversion of α-ketoglutarate to succinyl CoA occurs through_____.
a oxidative decarboxylation
b oxidative phosphorylation
c oxidative dephosphorylation
d Phosphorylation

13 _____ is an enzyme of purine salvage pathway and its defect causes Lesch-Nyhan syndrome.
a Xanthine Oxidase
b Hypoxanthine guanine phosphoribosyl transferase
c Adenine phosphoribosyl transferase
d Adenosine deaminase

14 _____ is the cofactor involved in regulatory step of fatty acid synthesis.
a Biotin
b Pyridoxal phosphate
c Ascorbate
d Aspartate

15 _____ is C-4 epimer of Glucose.
a Galactose
b Mannose
c Ribose
d Fructose

X997Y771EABX997Y771EABX997Y771EABX997Y771EAB

16 Cys-SH site of fatty acid synthase complex accepts_____.

a Acetyl CoA

b Malonyl CoA

c Propionyl CoA

d Succinyl CoA

17 Gout is characterized by increased plasma level of_____.

a Creatine

b Uric acid

c Urea

d Creatinine

18 Okazaki fragment is related to_____.

a DNA synthesis

b Protein synthesis

c mRNA formation

d tRNA formation

19 In ____ type of inhibition, the inhibitor binds covalently with enzyme and inactivates it.

a Competitive

b Uncompetitive

c Non-competitive

d Irreversible

20 Lipase enzyme belongs to _____ class according to IUB.

a Oxidoreductase

b Transferase

c Hydrolase

d Lyase

X997Y771EABX997Y771EABX997Y771EABX997Y771EAB

Q. 2 A Answer any two questions. **20**

a i) Explain glycogenesis with respect to names of the intermediates, enzymes and cofactors. 4

ii) Describe the three rate limiting steps for reversal of glycolysis with respect to gluconeogenesis. 4

iii) Explain reactions of PDH complex. 2

b i) Discuss the synthesis of AMP and GMP from IMP with respect to name and structures of intermediates and enzymes involved. 4

ii) Explain the steps involved in prokaryotic replication in brief. 4

iii) Name any two regulatory enzymes of Kreb's cycle. 2

c i) Discuss enzyme inhibition with respect to Michealis plot along with suitable examples. 5

ii) Explain the degradation of Purine Nucleotides. 5

Q. 2 B Answer any seven questions **35**

i) Explain Oxidative and Non oxidative deamination reaction of amino acid metabolism.

ii) Outline conversion of Isoprene to cholesterol and discuss drug modulating lipid metabolism.

iii) Give the names and structures of substrate and product for the following enzyme catalysed reactions: a) Aconitase b) Malate dehydrogenase

iv) Explain multiprotein complexes in ETC in detail.

v) Give the four steps involved in Beta oxidation of saturated fatty acid.

vi) Explain Salvage pathway of Purines and Pyrimidines.

vii) Classify enzymes based on the IUB system with suitable examples.

viii) Give the classification of amino acids on the basis of structure (one structure for each class)

ix) Explain the formation of ketone bodies. Explain negative and positive ΔG.

****

X997Y771EABX997Y771EABX997Y771EABX997Y771EAB

Time: 3hours **Marks: 75**

N.B: 1. All questions are compulsory.

2. Draw the diagram wherever necessary.

Q I. Choose the correct alternative for the following **20 Marks**

1. Which division of the autonomic nervous system is responsible for "fight or flight" responses?
   A. Parasympathetic
   B. Somatic
   C. Enteric
   D. Sympathetic

2. MALT present in lamina propria is _____.
   A. Muscle associated lymphatic tissue
   B. Muscular and lymph tissue
   C. Mucosa associated lymphatic tissue
   D. Mucosa associated lung tissue

3. The correct sequence of different layers of the tracheal wall, from deep to superficial, are _____.
   A. Mucosa, Submucosa, Hyaline cartilage and Adventitia
   B. Adventitia, Mucosa, Submucosa and Hyaline cartilage
   C. Mucosa, Adventitia, , Submucosa and Hyaline cartilage
   D. Hyaline cartilage , Adventitia, Mucosa and Submucosa

4. _____ is the area present between two renal pyramids in the kidney.
   A. Major calyx
   B. Renal Column
   C. Medulla
   D. Hilum

5. In a 28 day female reproductive cycle _____ phase lasts from day 6 to 13.
   A. Menstrual
   B. Post ovulatory
   C. Pre ovulatory
   D. Ovulation

6. _____is a bundle of axons that is located in the PNS.
   A. Nucleus
   B. Ganglion
   C. Cyton
   D. Nerve

X997Y4313B7X997Y4313B7X997Y4313B7X997Y4313B7

7. Select the lipid soluble hormone from the following
   A. Nitric Oxide
   B. Adrenaline
   C. Insulin
   D. Oxytocin

8. _____ is the process by which the fetus is expelled from the uterus through the vagina.
   A. Implantation
   B. Parturition
   C. Gestation
   D. Embryogenesis

9. _____ is a basic unit of inheritance, controlling a particular trait.
   A. Chromosome
   B. Gene
   C. Nucleotide
   D. DNA

10. _____ is the characteristic movement occuring in the large intestine.
   A. Haustral movement
   B. Peristaltic movement
   C. Segmentation
   D. Migrating motility complex

11. Which hormone contributes to setting the body's biological clock?
   A. Oxytocin
   B. Aldosterone
   C. Insulin
   D. Melatonin

12. The scrotum is separated into lateral portions by a median ridge called the _____.
   A. Dartos
   B. Cremaster
   C. Raphe
   D. Corpora Cavernosa

13. Which of the following works by filtering out and keeping the dirt and mucus away from the lungs?
   A. Bronchioles
   B. Alveoli
   C. Cilia
   D. Trachea

X997Y4313B7X997Y4313B7X997Y4313B7X997Y4313B7

14. _____ generates ATP by transferring a high-energy phosphate group from an intermediate phosphorylated metabolic compound directly to ADP.
    A. Substrate-level phosphorylation
    B. Oxidative phosphorylation
    C. Photophosphorylation
    D. Autophosphorylation

15. Fertilization of a secondary oocyte by sperm usually occurs in the _____.
    A. Ampulla
    B. Infundibulum
    C. Fimbriae
    D. Isthmus

16. _____ prevents the entry of food into the windpipe.
    A. Pharynx
    B. Larynx
    C. Alveoli
    D. Epiglottis

17. Diabetes insipidus is due to defects in receptors for _____ or an inability to secrete it.
    A. Parathyroid hormone
    B. Human Growth hormone
    C. Antidiuretic hormone
    D. Thyroid stimulating hormone

18. Which of the following neuroglia is present in the peripheral nervous system?
    A. Satellite cells
    B. Astrocytes
    C. Oligodendrocytes
    D. Ependymal cells

19. _____ is the process of synthesis of proteins from RNA occuring in the ribosomes.
    A. Translation
    B. Transcription
    C. Replication
    D. Crossing-over

20. Net filtration pressure (NFP), the total pressure that promotes filtration in glomerulus, is determined as _____.
    A. NFP = GBHP + CHP + BCOP
    B. NFP = GBHP - CHP - BCOP
    C. NFP = GBHP + CHP - BCOP
    D. NFP = GBHP - CHP + BCOP

X997Y4313B7X997Y4313B7X997Y4313B7X997Y4313B7

Q II. Answer any **TWO** of the following. **20 Marks**

1) Explain in detail the anatomy of the cerebrum and add a note on sensory areas of the cerebrum.
2) A) Draw a neat labeled diagram of internal anatomy of Kidney.
   B) Explain in detail the structure of Lungs.
3) Explain in detail the formation and functions of thyroid hormone.

Q III. Answer any **SEVEN** of the following. **35 Marks**

1) Explain the protective coverings of the brain and write the importance of the blood–brain barrier.
2) Describe the anatomy and histology of the stomach with a neat labeled diagram.
3) Explain the factors affecting oxygen transport in the respiratory system.
4) Explain the mechanisms that regulate glomerular filtration rate.
5) Write a note on regulation of calcitonin and parathyroid hormone secretion.
6) Draw a neat labeled diagram of histology of Ovary.
7) With the help of a neat labeled diagram, explain signal transmission at a chemical synapse in the nervous system.
8) Explain the accessory sex glands of the male reproductive system and give the composition of semen.
9) Explain chemical digestion of carbohydrates, and proteins occurring in the small intestine.

X997Y4313B7X997Y4313B7X997Y4313B7X997Y4313B7

Time- 3 Hours **Marks- 75**

Q. I	**MCQ**	
1	Which of the following is a physical agent of inflammation?	1
a	Bacteria	
b	Toxins	
c	Radiation	
d	Foreign bodies	
2	VEGF stands for	1
a	Varicose epithelial growth factor	
b	Vasoactive epidermal growth factor	
c	Vascular endothelial growth factor	
d	Versatile epidermal growth factor	
3	Identify cell derived mediators of inflammation?	1
a	Histamine	
b	Anaphylatoxins	
c	Kinin system	
d	Membrane Attack complex	
4	Name the first manifestation of reversible cell injury?	1
a	Cellular swelling	
b	Swollen mitochondria	
c	Dilated endoplasmic reticulum	
d	Pale cytoplasm	
5	In calcification, which of the two processes are related to each other to calcium phosphate?	1
a	Initiation and propagation	
b	Translation and Transduction	
c	Initiation and Elongation	
d	Exudation and propagation	
6	At what condition person going through hypertension	1
a	SBP and DBP over 120 and 80	
b	SBP and DBP over 137 and 80	
c	SBP and DBP over 140 and 90	
d	SBP and DBP over 210 and 120	
7	Which of the following is a cause of myocardial hypertrophy?	1
a	Decreased size of the heart chambers	
b	Reduced myocardial mass.	
c	Increased thickness of the heart muscle wall	
d	Lower cardiac output	
8	Which of the following is a hallmark symptom of chronic bronchitis?	1
a	Persistent cough with sputum production	
b	Wheezing only during exercise	
c	Chest pain exacerbated by deep breathing.	
d	Sudden onset of shortness of breath	

X997Y529DE4X997Y529DE4X997Y529DE4X997Y529DE4

9	Which of the following is a characteristic feature of acute tubular necrosis?	1
a	Elevated serum creatinine and blood urea nitrogen (BUN)	
b	Decreased urine output.	
c	Normal electrolyte levels	
d	Hypotension	
10	Glomerulonephritis is characterized by.	1
a	A type of bacterial infection affecting the gastrointestinal tract	
b	extensive proliferation of epithelial cells in the glomerulus	
c	A form of cancer in the urinary bladder	
d	Chronic obstruction of the ureters leading to kidney damage	
11	Hageman factor protein is synthesized by	1
a	Liver	
b	Pancreas	
c	Intestine	
d	Gallbladder	
12	Insulin deficiency is associated with	1
a	Reduced lipolysis	
b	Increased ketogenesis	
c	Reduced gluconeogenesis	
d	Reduced proteolysis	
13	Depression is an?	1
a	Emotional disorder	
b	Mood disorder and mental illness	
c	Personality disorder	
d	Psychotic disorder	
14	What is Gynecomastia?	1
a	inflammation of breasts	
b	inflammation of uterine tubes	
c	proliferation of breast in men	
d	infection of penis	
15	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	
16	Cancer cells are not recognized as foreign by the immune system because they do not have:	1
a	Signalling receptors	
b	Chemical mediators	
c	A specific antigen	
d	Cytokines release	
17	These factors increase risk of osteoporotic fracture:	1
a	High bone mineral density	
b	Poor muscle strength	
c	High body weight	
d	High lean mass	

X997Y529DE4X997Y529DE4X997Y529DE4X997Y529DE4

18	Jaundice in sickle cell anaemia can be classified under	1
a	Hepatocellular	
b	Congenital hyperbilirubinemia	
c	Haemolytic	
d	Obstructive	
19	Salmonella enterica typhi is a	1
a	A gram-positive, coccus-shaped bacteria.	
b	A gram-positive, rod-shaped bacteria.	
c	A gram-negative, coccus-shaped bacteria.	
d	A gram-negative, rod-shaped bacteria.	
20	A chancre is _____most commonly formed during the primary stage of syphilis	1
a	a painless genital ulcer	
b	a pus cell in urine	
c	a bloody patch on hands	
d	rash on throat and chest area	

II. Long Answers (Answer 2 out of 3)

A	i) Discuss reversible and irreversible types of cell injury.	5 M
	ii) Explain the concept and pathogenesis of mitochondrial and ribosomal damage of cell injury.	5 M
B	Explain in detail Etiopathogenesis and Complications of Myocardial Infractions and Hypertension	10 M
C	Discuss pathophysiology and signs and symptoms of depression, schizophrenia and Alzheimer's Disease	10 M

III. Short Answers (Answer 7 out of 9)

A	Explain the process wound healing	5 M
B	Explain the signs, symptoms, etiopathogenesis of emphysema.	5 M
C	Write a note on Gastrointestinal peptic ulcer.	5 M
D	Write a note on Beta-thalassemia and Sickle cell anemia.	5 M
E	Define and Classify cancer. Write the pathogenesis of Cancer.	5 M
F	Discuss Various symptoms, causes and pathogenesis of rheumatoid arthritis	5 M
G	What is Jaundice? Give pathophysiologic classification of jaundice	5 M
H	Write about etiology, pathogenesis and treatment of Tuberculosis	5 M
I	Discuss causes, signs and symptoms of Syphilis and Gonorrhoea.	5 M

X997Y529DE4X997Y529DE4X997Y529DE4X997Y529DE4

Duration: 3 hours **Total marks: 75**

N.B: 1. All questions are compulsory.

2. **Figures to right indicate full marks**

QI. Choose the appropriate option from the following: **(20)**

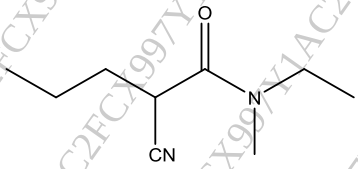
1. Propanoic acid and methyl acetate are the type of _____ isomerism.

A. Geometrical B. Positional C. Chain D. Functional group

2. _____ does not exhibit keto-enol tautomerism.

A. Benzaldehyde
B. Cyclopentanone
C. Butanal
D. But-2-en-2-ol

3. Choose the correct IUPAC nomenclature for the given structure below:



A. 5-Cyano-N-ethyl-N-methylpentanamide
B. 2-Cyano-N-ethyl-N-methyl-hexanamide
C. 3-Cyano-1-ethy-2-keto-1-methyl-hexane
D. 2-Cyano-N-ethyl-N-methylpentanamide

4. Which of the following synthesis will lead to the formation of n-butane from ethyl chloride?

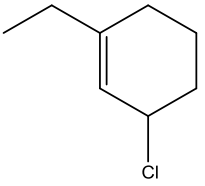
A. Reduction of alkyl halide
B. Hydrolysis of Grignard reagent
C. Corey-House synthesis
D. Decarboxylation of carboxylic acid

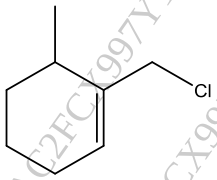
5. Benzaldehyde reacts with one mole of methanol in alkaline conditions to form _____.

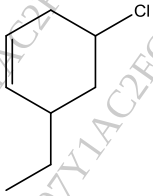
A. Acetal
B. Benzoic acid
C. Hemiacetal
D. Benzyl alcohol

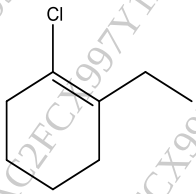
X997Y1AC2FCX997Y1AC2FCX997Y1AC2FCX997Y1AC2FC

6. Identify the correct structure for 1-Chloro-2-ethylcyclohex-1-ene

A. 

B. 

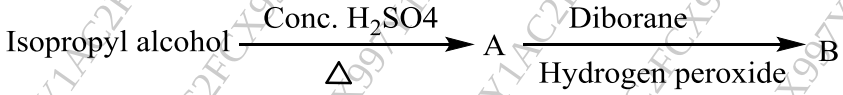
C. 

D. 

7. Carbonation of ethyl magnesium bromide gives _____.

A. Propanol
B. Glycerol
C. Cetosteryl alcohol
D. Propanoic acid

8. Predict compounds A and B in the given reaction.



A. Propene, n-Propyl alcohol
B. Propene, 2-Propanol
C. Propane, 2-Propanol
D. Propane, n-Propyl alcohol

9. Which of the following alkyl halides most substituted alkenes upon dehydrohalogenation.
i. 2-bromo-2,3-dimethylbutane ii. 3-bromo-2,2-dimethylbutane
iii. 1- bromo butane iv. 2-bromo-3-methylbutane.
A. ii, iv B. ii, iii C. i, ii D. i, iv

10. The reaction of methyl iodide and aqueous potassium hydroxide is favorable in _____ s olvent.
A. Ethanol
B. Water
C. DMSO
D. Acetic acid

11. Propanol can be oxidized by pyridinium-1-chlorochromate to produce

A. Propanal
B. Propionic acid
C. Propanone
D. No product

X997Y1AC2FCX997Y1AC2FCX997Y1AC2FCX997Y1AC2FC

12. Identify the use of carbon tetrachloride.

A. Antiseptic
B. Local anesthetic
C. Fire extinguisher
D. Anti-inflammatory

13. Which statement best describes the mechanism of S_N1 reaction?

A. Concerted reaction with partial racemization
B. Carbocation formation with retention in configuration
C. Carbocation formation with partial racemization
D. Concerted reaction with retention

14. The test to distinguish between 2-hexanone and 3-hexanone is _____.

A. Fehling's test
B. Tollens' test
C. Iodoform test
D. 2,4-DNP test

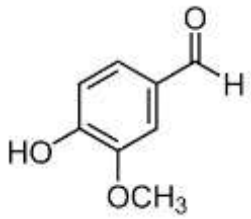
15. Acetaldehyde and acetone in presence of alcoholic NaOH give _____.

A. 3-hydroxybutanal
B. 3-hydroxy-3-methyl pentanal
C. 4-hydroxy-4-methyl-butane-2-one
D. Pent-3-en-2-one

16. Addition of hydrogen bromide to 1-butene in presence of peroxide gives _____.

A. 2-Bromobutane
B. 1-Bromobutane
C. 2-Bromo-2-methylpropane
D. 1-Butanol

17 Identify the structure of the following compound?



A. Paraldehyde
B. Cinnamaldehyde
C. Vanillin
D. Methyl salicylate

X997Y1AC2FCX997Y1AC2FCX997Y1AC2FCX997Y1AC2FC

18. Identify the strongest acid amongst the following.

A. $ClCH_2COOH$ B. CF_3COOH C. $HOCH_2COOH$ D. CH_3COOH

19. Predict the product of Hell-Volhard-Zelinsky reaction on propanoic acid.

A. 3-Bromo propanoic acid
B. 2-Hydroxy propanoic acid
C. 2-Bromo propanoic acid
D. 3-Hydroxy propanoic acid

20. The following reactions will lead to the formation of amines except…….
A. Reduction of nitroalkane
B. Carboxylic acid + ammonia
C. Reduction of alkyl cyanide
D. Alkyl Bromide + ammonia

QII Solve any two of the following

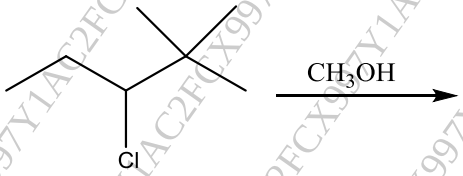
1. A) Predict the product/s of the following reactions. Discuss the mechanism and orientation of any one of the given reactions.

a) 2-Pentyl trimethyl ammonium bromide $\xrightarrow{NaOEt/\ EtOH}$

b) 2-Bromo-3-methylpentane $\xrightarrow{NaOEt/\ EtOH}$

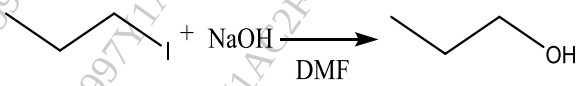
B) Depict the mechanism for **any two** of the following:
i. Perkin condensation
ii. Benzoin condensation
iii. Aldol condensation

2. A. Predict the product of the following reaction and discuss the mechanism for the same.



B. Predict the suitable reagents for the following conversions.
i) Toluene to Benzoic acid
ii) 2-Butanone to 2-Methy-2-butanol
iii) 1-Pentene to Butanoic acid

3. A. Give a detailed account of halogenation of propane.
B. Depict the mechanism and answer the questions for the reaction given below:



i. Identify whether the given reaction is unimolecular or bimolecular.
ii. Discuss the impact of changing the solvent from DMF to ethanol.
iii. Predict the effect on rate of the reaction if the substrate is changed to n-Propyl fluoride.

X997Y1AC2FCX997Y1AC2FCX997Y1AC2FCX997Y1AC2FC

QIII. Solve any 7 questions from the following.

1. Discuss any one method each for the synthesis of aldehyde and ketone. Depict the reaction of acetaldehyde with semicarbazide, phenyl hydrazine and hydroxylamine.
2. Arrange the following compounds in increasing order of basicity and justify the order. Propylamine, N-methyl ethanamine, N-ethyl-N-methylpropan-1-amine. Give any one distinguishing test for primary, secondary, and tertiary amines.
3. A. Draw the structures for the following compounds (any 3)
   a) Cyclohexanecarbaldehyde
   b) 2-bromo-3-oxobutanoic acid
   c) Ethyl propanoate
   d) 3-methoxybutanamide

   B. Draw the tautomeric structure of the following
   i) N-methyl acetamide ii) 4-hydroxy pent-3-en-2-one
4. A. Discuss the reaction of 1,3-butadiene with hydrogen bromide highlighting the preferred product under varying temperature conditions.

   B. An alkene C_7H_{14} after ozonolysis yielded two products A and B. Both compounds gave 2,4-DNP test positive. Compound A gave Tollen's test positive. Compound B gave both Tollen's test and the Iodoform test negative. Identify the structures of A and B with suitable justification.
5. Give the mechanism for Reimer Tiemann reaction and Kolbe Reaction.
6. Discuss the method for synthesis of primary, secondary, and tertiary alcohol using Grignard's reagent; Discuss the test to distinguish the above alcohols.
7. Identify the reagents and reaction conditions for the following conversions (any 5)
   1. 1-Iodopropane to propane
   2. Propene to 1,2-Propane diol
   3. Butanoic acid to 2-Bromo butanoic acid
   4. Cyclohexanol to cyclohexene
   5. Isobutyl alcohol to isobutyric acid
   6. 1-Butene to 1-Butanol
8. Give the mechanism for Hoffmann degradation of amides. Give the structure and uses of amphetamine and acetyl salicylic acid.
9. Depict any two methods for the preparation of carboxylic acid. Discuss the reaction conditions and reagents for the conversion of carboxylic acid to acid chloride, ester, and amide.

X997Y1AC2FCX997Y1AC2FCX997Y1AC2FCX997Y1AC2FC