

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

Ph.D. (CLINICAL BIOCHEMISTRY)

COURSE CODE : 164

Register Number :

*Signature of the Invigilator
(with date)*

COURSE CODE : 164

Time : 2 Hours

Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. In chymotrypsin molecule, if serine – 195 is substituted for alanine then:
 - (A) Chymotrypsin will not bind to substrate but will cleave the substrate
 - (B) Chymotrypsin will bind but will not cleave
 - (C) Chymotrypsin will neither bind to substrate nor cleave
 - (D) Chymotrypsin will bind and cleave both

2. Pyruvate can be converted directly into all the following except:
 - (A) Phosphoenol pyruvate
 - (B) Alanine
 - (C) Acetyl CoA
 - (D) Lactate

3. The rate-limiting enzyme in Glycolysis is:
 - (A) Phosphofruktokinase
 - (B) Glucose-6-dehydrogenase
 - (C) Glucokinase
 - (D) Pyruvate kinase

4. All are actions of insulin except:
 - (A) Gluconeogenesis
 - (B) Glycolysis
 - (C) Glycogenesis
 - (D) Lipogenesis

5. Insulin does not facilitate glucose uptake in the following except;
 - (A) Liver
 - (B) Heart
 - (C) RBC
 - (D) Kidney

6. Which helps in the transport of chylomicrons from intestine to liver:
 - (A) Apoprotein B
 - (B) Apoprotein A
 - (C) Apoprotein C
 - (D) Apoprotein E

7. Mechanism of action of Nitric oxide is through:
 - (A) cGMP
 - (B) cAMP
 - (C) Ca⁺⁺
 - (D) Tyrosine

8. DNA fragments formed by the action of Restriction Endonucleases, are separated by:
 - (A) Gel electrophoresis
 - (B) Agarose gel electrophoresis
 - (C) Paper Chromatography
 - (D) High pressure liquid chromatography

9. Regarding a crystal, the true statement is:
- (A) Molecules are arranged in same orientation with different confirmation
 - (B) Molecules are arranged in different orientation with different confirmation
 - (C) Molecules are arranged in same orientation and same confirmation
 - (D) Molecules are arranged in different orientation but with same confirmation
10. Regarding Newtonian force, true is:
- (A) Viscosity is directly proportional to velocity
 - (B) Viscosity is inversely proportional to velocity
 - (C) Viscosity is equal to the velocity
 - (D) There is no relation between the two
11. Optically inactive Amino Acid is:
- (A) Proline
 - (B) Glycine
 - (C) Lysine
 - (D) Leucine
12. True statement regarding Nitric oxide is:
- (A) NO is synthesized from arginine
 - (B) NO is spontaneous produced from NO_2
 - (C) NO causes vasoconstriction
 - (D) NO is released from mitochondria
13. Thiamine acts as a cofactor in:
- (A) Conversion of pyruvate to acetyl-CoA
 - (B) Transamination reactions
 - (C) Oxidation in respiratory chain
 - (D) Conversion of pyridoxal to pyridoxal phosphate
14. Following constitute dietary fibres except:
- (A) Pectin
 - (B) Cellulose
 - (C) Hemicellulose
 - (D) Riboflavin
15. Which of the following aminoacid is excreted in urine in maple syrup urine disease:
- (A) Tryptophan
 - (B) Phenylalanine
 - (C) Leucine
 - (D) Arginine

16. Ammonia is detoxified in brain to:
- (A) Urea (B) Glutamine
(C) GABA (D) Uric acid
17. Gaucher's disease is due to deficiency of enzyme:
- (A) Sphingomyelinase (B) β Glucosidase
(C) Hexosaminidase-A (D) β Galactosidase
18. Glucose can be synthesized from all of the following except:
- (A) Acetoacetate (B) Lactic Acid
(C) Glycerol (D) Amino Acid
19. True about polymerase chain reaction is:
- (A) Enzymatic DNA amplification
(B) Recombinant DNA amplification
(C) Separation of protein fragments in serum
(D) None
20. Translation occurs in:
- (A) Ribosomes (B) Mitochondria
(C) Nucleus (D) Cytoplasm
21. hn RNA is seen in:
- (A) Spinal muscular dystrophy (B) Sickle cell disease
(C) Hutchinson chorea (D) α Thalassemia
22. Restriction endonuclease is:
- (A) Break single stranded DNA (B) Break double stranded DNA
(C) Break peptide chain (D) Break RNA
23. The most important carrier of cholesterol in plasma is:
- (A) Chylomicrons (B) HDL
(C) VLDL (D) LDL
24. A protein estimation test is confused with
- (A) Phosphates (B) Nitrates
(C) Sulphates (D) Bile salts

25. Furasol DA is:
- (A) Free radical
 - (B) Artificial blood
 - (C) CO antagonist
 - (D) Used to increase O₂ delivery to tissue
26. Dietary fibre contains:
- (A) Colalgen
 - (B) Pectin
 - (C) Proteoglycans
 - (D) Starch
27. Biotins act on:
- (A) Carboxylation
 - (B) Oxidative phosphorylation
 - (C) Oxidative deamination
 - (D) Transmethylation
28. Vitamin B₁₂ is absorbed in the
- (A) Stomach
 - (B) Duodenum
 - (C) Ileum
 - (D) Colon
29. Cofactor associated with the enzyme Glutathione peroxidase is
- (A) Zinc
 - (B) Cadmium
 - (C) Molybdenum
 - (D) Selenium
30. Strongest bond amongst the following is
- (A) Hydrophobic
 - (B) Electrostatic
 - (C) Hydrogen bond
 - (D) Van der Waals
31. Gluconeogenesis occurs in all except
- (A) Glycerol
 - (B) Amino acid
 - (C) Lactic acid
 - (D) Palmitate
32. Apoprotein A is found in
- (A) Chylomicrons
 - (B) VLDL
 - (C) HDL
 - (D) LDL
33. Amino acid which lacks chirality is:
- (A) Lysine
 - (B) Leucine
 - (C) Histidine
 - (D) Glycine
34. An amino acid which does not participate by α helix formation is
- (A) Leucine
 - (B) Glycine
 - (C) Proline
 - (D) Lysine

35. Trans-amination of pyruvate and glutamic acid leads to the formation of
(A) Oxaloacetate (B) α -ketoglutarate
(C) Aspartate (D) Malate
36. Which form of DNA is predominantly seen
(A) A (B) C
(C) B (D) Z
37. Thermo-stability in DNA is contributed mostly by
(A) A=T (B) G=C
(C) Molecular base (D) Parallel arrangement
38. Okazaki fragment helps in
(A) DNA replication (B) Translation
(C) Protein synthesis (D) Transcription
39. Bromodeoxyuridine is related to DNA in
(A) Uracil (B) Adenosine
(C) Cytosine (D) Thymidine
40. The first step in fatty acid synthesis involves
(A) Acetyl CoA carboxylase (B) β Hydroxyl CoA dehydrogenase
(C) Acetyl dehydrogenase (D) Pyruvate kinase
41. Basic amino acids are:
(A) Aspartate and glutamate (B) Serine and glycine
(C) Lysine and arginine (D) None of the above
42. Amino acid with dissociation constant closest to physiological pH is:
(A) Serine (B) Histidine
(C) Threonine (D) Proline
43. Sources of the nitrogen in urea cycle are:
(A) Aspartate and ammonia (B) Glutamate and ammonia
(C) Arginine and ammonia (D) Uric acid

44. If urine sample darkens on standing: the most likely condition is:
- (A) Phenylketonuria (B) Alkaptonuria
(C) Maple syrup disease (D) Tyrosinemia
45. A baby presents with refusal to feed, skin lesions, seizures ketosis organic acids in urine with normal ammonia; likely diagnosis is:
- (A) Propionic aciduria (B) Multiple carboxylase deficiency
(C) Maple syrup urine disease (D) Urea cycle enzyme deficiency
46. Force not acting in an enzyme substrate complex:
- (A) Electostatic (B) Covalent
(C) Van der waals (D) Hydrogen
47. Cellular oxidation is inhibited by:
- (A) Cyanide (B) Carbon dioxide
(C) Chocolate (D) Carbonated beverages
48. Triple bonds are found between which base pairs:
- (A) A-T (B) C-G
(C) A-G (D) C-T
49. Which of the following RNA has abnormal purine bases:
- (A) tRNA (B) mRNA
(C) rRNA (D) 16S RNA
50. False regarding gout is:
- (A) Due to increased metabolism of pyrimidines
(B) Due to increased metabolism of purines
(C) Uric acid levels may not be elevated
(D) Has a predilection for the great toe
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(C) Hydrogen bond (D) Wan der wall's

61. Which among the following statements is true regarding *RB1* gene, its product and the onset of retinoblastoma?
- (A) Gain of heterozygosity for *RB1* gene occurs in retinoblastoma
 - (B) In sporadic cases of retinoblastoma, only one mutation need to take place in retinoblasts
 - (C) The phosphorylated form of pRB protein binds to the E2F transcription complex
 - (D) Viral proteins like SV40 large T antigen form complexes with hypophosphorylated pRB and inactivates it
62. Which among the following statements is FALSE regarding RNA transcription?
- (A) RNA polymerase does not require a primer
 - (B) The RNA product does not remain base-paired to the template DNA
 - (C) Multiple RNA polymerase molecules can transcribe the same gene
 - (D) Transcription is more accurate than replication
63. Which among the following is FALSE regarding α -Amanitin?
- (A) Responsible for fatal mushroom poisoning
 - (B) RNAP II is most sensitive to its inhibition
 - (C) Mitochondrial RNAP is insensitive to inhibition
 - (D) It decreases the affinity of RNAP with NTPs
64. Which among the following statements is true regarding 'wobble' in the genetic code?
- (A) The 5' nucleotide of the anticodon is not significant in base pairing
 - (B) The codon-anticodon interactions at 5' end of codon does not follow Watson-Crick rule
 - (C) For one codon in the mRNA there can be more than one tRNA with different anticodons
 - (D) The 'wobble' leads to mutations
65. Which among the following statements is FALSE regarding eIF-2?
- (A) It is a control point for protein synthesis initiation
 - (B) It undergoes reversible phosphorylation by protein kinases
 - (C) Under cellular stress its phosphorylation is increased
 - (D) Its phosphorylated form enhances the formation of 43S preinitiation complex

66. The number of high energy phosphate bonds subjected to hydrolysis during the formation of a peptide bond is
- (A) 1 (B) 2
(C) 3 (D) 4
67. Which among the following statements does not describe 'P bodies'?
- (A) They are the sites of translation repression
(B) They carry out mRNA decay
(C) They harbor RNA helicases and RNA exonucleases
(D) Only the mRNA destined for decay are incorporated into it
68. Tetracycline inhibits protein synthesis by
- (A) preventing the binding of aminoacyl-tRNAs to the bacterial ribosome A site
(B) by binding to 23S rRNA
(C) as a tyrosinyl-tRNA analog
(D) inhibiting peptidyltransferase of 60S ribosomal subunit
69. Which antibiotic work by binding to 23S rRNA?
- (A) Puromycin (B) Cycloheximide
(C) Chloromphenicol (D) Tetracycline
70. Which among the following statements is FALSE regarding '*lac* operon'?
- (A) It consists of structural genes, *lac* promoter and regulatory genes
(B) It codes for the synthesis of a polycistronic mRNA molecule
(C) The polycistronic mRNA has single common translation start and stop codons
(D) It allows for coordinate expression of 3 enzymes of lactose metabolism
71. Which among the following events take place in the regulation of '*lac* operon' when glucose concentration in the medium is low?
- (A) cAMP level in the bacterium decreases
(B) Inactivation of catabolite gene activator protein (CAP)
(C) CAP facilitates the binding of RNA polymerase to the promoter
(D) Decreased translation of '*lac* operon'

72. During vigorous muscular exercise, which amino acid is liberated from skeletal muscles in maximum amount into the circulation?
- (A) Glutamine (B) Glutamate
(C) Alanine (D) Branched chain amino acids
73. Which among the following statements is false regarding transamination processes?
- (A) There is no net deamination
(B) It is an example of a double displacement reaction
(C) Biochemical standard free energy change is zero
(D) Each transaminase is specific for both amino acid / keto acid pairs
74. Which among the following occurs in metabolic acidosis?
- (A) Liver glutaminase activity increases
(B) Rate of urea synthesis increases
(C) Less ammonia is excreted in urine
(D) Body shunts more glutamine from liver to kidney
75. Which among the following statements is false regarding treatment of leukemia with asparaginase?
- (A) Leukemic cells produce increased amounts of asparagine.
(B) The exogenous asparaginase hydrolyses blood - born asparagine on which leukemic cells rely.
(C) Asparagine is synthesized in the body from glutamine and aspartic acid.
(D) Normal cells survive the asparaginase treatment as they are capable of synthesizing asparagine..
76. Which among the following is NOT recommended in the therapy for hyperammonemia?
- (A) Intake of protein rich diet
(B) Treatment with antibiotics.
(C) Oral administration of Sodium benzoate
(D) Administration of lactulose
77. DOPA is an additional requirement in the treatment of type IV hyperphenylalaninemia because
- (A) Defective regeneration of tetrahydrobiopterin affects the formation of DOPA.
(B) Associated degeneration of substantianigra.
(C) Decreased production of tyrosine, the precursor of DOPA.
(D) High levels of phenylalanine inhibits the formation of DOPA.

78. Which among the following is NOT a feature of the phenylketonuria?
- (A) Mental retardation. (B) Positive urinary ferric chloride test.
 (C) Dark color of the skin. (D) Mousy odor.
79. Carbidopa is included in the treatment of Parkinson's disease in order to
- (A) Enhance the availability of Dopamine to the peripheral tissues.
 (B) Inhibit the activity of DOPA decarboxylase out side the CNS.
 (C) Decrease the toxicity of DOPA to the CNS.
 (D) Minimize the cell degeneration of brain nuclei.
80. Which among the following conditions is associated with pellagra like signs and symptoms?
- (A) Hartnup disease. (B) Phenyl ketonuria.
 (C) Pheochromocytoma. (D) Albinism.
81. Gout is a disorder of:
- (A) Purine metabolism (B) Pyrimidine metabolism
 (C) Oxalate metabolism (D) Protein metabolism
82. Best enzyme marker for chronic alcoholism is:
- (A) Gamma glutamyl-transferase (B) SGOT
 (C) SGPT (D) Aldolase
83. In cytochrom P-450, P stands for:
- (A) Structural protein (B) Polymer
 (C) Substrate protein (D) Pigment
84. Dietary cholesterol is delivered transported to extra hepatic tissue by:
- (A) VLDL (B) LDL
 (C) Chylomicrons (D) IDL
85. Leucine is a aminoacid with a
- (A) Nonpolar side chain (B) Polar side chain
 (C) Negatively charged side chain (D) Postively charged side chain

86. Most basic amino acid out of the following is:
- (A) Alanine (B) Arginine
(C) Histidine (D) Lysine
87. Transamination of pyruvate with glutamate produces:
- (A) Oxaloacetate and aspartate (B) Alanine and aspartate
(C) Oxaloacetate and α -ketoglutarate (D) Alanine and α -ketoglutarate
88. Selenium is co-factor for:
- (A) Glutathione peroxidase (B) Glutathione reductase
(C) Glutathione synthetase (D) Glutathione dehydrogenase
89. Malate shuttle is seen to occur in:
- (A) Glycolysis (B) Glycogenolysis
(C) HMP shunt (D) Gluconeogenesis
90. Glucose may be synthesized from:
- (A) Glycerol (B) Adenine
(C) Guanine (D) Palmitic acid
91. Which among the following drugs develop drug resistance due to increase in target enzyme?
- (A) Cytarabine (B) Cysplatin
(C) Methotrexate (D) Cyclophosphamide
92. Which among the following statements is FALSE regarding Acyclovir – the antiviral drug?
- (A) Thymine attached to an incomplete ribose ring
(B) It is phosphorylated by viral thymidine kinase
(C) Competitively inhibits the viral DNA polymerase more strongly than cellular enzymes
(D) It is a chain terminator when incorporated into DNA
93. The number of nucleotides added to the nascent chain before the polymerase disengages from the template is known as
- (A) Chain elongation rate (B) Processivity
(C) Proof reading (D) Catalytic efficiency

94. Which among the following is an inhibitor of eukaryotic topoisomerases used as anti-tumor agent?
- (A) Novobiocin (B) Nalidixic acid
(C) 6-mercaptopurine (D) Etoposide
95. Methylation directed strand cutting is part of which type of DNA repair?
- (A) Mismatch (B) Base – excision
(C) Nucleotide – excision (D) Double strand break
96. Catalysis by N-glycosylase is part of which type of DNA repair?
- (A) SOS (B) Mismatch
(C) Base – excision (D) Nucleotide excision
97. The mechanism of nucleotide excision repair involves
- (A) Methylation directed strand cutting (B) Abasic sugar removal
(C) Synapsis formation (D) Removal of nucleotide oligomer
98. Which among the following statements is TRUE regarding xeroderma pigmentosum?
- (A) An acquired disease
(B) Normal sensitivity to light
(C) Defective base – excision repair
(D) Neurological derangements are common
99. Which among the following statements is false regarding telomerase?
- (A) A reverse transcriptase
(B) Active in all the cells of the body
(C) Genomic stability in germ-line cells is maintained by Telomerase
(D) Has an internal RNA template
100. Which among the following is false about Ame's test for carcinogenicity?
- (A) Negative for carcinogens which require metabolic activation
(B) Specially designed strain of *Salmonella typhimurium* is used
(C) Histidine containing medium is used
(D) In the modified procedure, the carcinogen is first incubated with the S-9 fraction of liver