

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2012.

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. Which among the following enzymes incorporates one of the atoms of the molecular oxygen into the substrate?

(A) Oxidases	(B) Mixed function oxidases
(C) Dioxygenases	(D) Peroxidases

2. Which among the following cytochromes of the respiratory chain is NOT a dehydrogenase?

(A) b	(B) c	(C) c ₁	(D) aa ₃
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3. Which among the following enzymes catalyze the removal hydrogen from a substrate using oxygen as an acceptor?

(A) Oxidases	(B) Dehydrogenases
(C) Hydroperoxidases	(D) Oxygenases

4. Which among the following is a high-energy compound involved in the substrate level phosphorylation that takes place during the TCA cycle?

(A) Succinyl CoA	(B) Phosphoenol pyruvate
(C) Carbamoyl phosphate	(D) 1,3 bisphosphoglycerate

5. The ΔG° for the formation of creatine phosphate from creatine and ATP is +12.6kJ/mole. It can take place in the human body
 - (A) during vigorous muscular exercise.
 - (B) when ATP concentration increases
 - (C) when creatine concentration decreases
 - (D) during extra heat production in the body

6. Under biochemical standard conditions, which among the following favor a spontaneous forward reaction?

(A) ΔG° is positive	(B) ΔG° is zero
(C) ΔG° is negative	(D) K'_{eq} is less than 1

7. For an essential irreversible biochemical reaction, ΔG° is

(A) Positive and is of high magnitude	(B) Negative and is of high magnitude
(C) Positive and is of low magnitude	(D) Negative and is of low magnitude

8. Hyperhomocysteinemia is related to atherogenesis due to the following reasons EXCEPT that
 - (A) It causes aggregation of low density lipoproteins.
 - (B) It increases the serum cholesterol level.
 - (C) It enhances platelet aggregation.
 - (D) It brings about lipid peroxidation.

9. Which among the following statements is FALSE regarding homocystinuria type I?
- (A) Cyanide – nitropruside test will be positive in urine
 - (B) Subluxation of lens is a frequent clinical feature.
 - (C) Diet restriction in the form of low methionine and rich cysteine is harmful.
 - (D) In some cases, treatment with mega doses of vitamin B6 helps in correcting the defect.
10. Which among the following statements is FALSE?
- (A) Protein rich food causes wakefulness.
 - (B) After a protein rich food, the entry of tryptophan into the brain is slow.
 - (C) The insulin released following a carbohydrate rich meal enhances the plasma concentrations of amino acids.
 - (D) The bulkiness of tryptophan side chain makes its transport across the blood brain barrier sluggish in comparison to other amino acids.
11. Which among the following conditions is associated with pellagra like signs and symptoms?
- (A) Hartnup disease
 - (B) Phenyl ketonuria
 - (C) Pheochromocytoma
 - (D) Albinism
12. 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 outside the CNS.
 - (C) Decrease the toxicity of DOPA to the CNS.
 - (D) Minimize the cell degeneration of brain nuclei.
13. 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.
14. 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.

15. 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
16. 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.
17. 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
18. 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
19. 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
20. 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'

21. 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
22. Which antibiotic work by binding to 23S rRNA?
- (A) Puromycin
 - (B) Cycloheximide
 - (C) Chloromphenicol
 - (D) Tetracycline
23. 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
24. 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
25. 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
26. 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
27. 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

28. 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
29. 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
30. Which among the following statements is true regarding *RBI* gene, its product and the onset of retinoblastoma?
- (A) Gain of heterozygosity for *RBI* 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
31. Which among the following is false about Ames'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
32. 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
33. Which among the following statements is TRUE regarding xerodermapigmentosum?
- (A) An acquired disease
 - (B) Normal sensitivity to light
 - (C) Defective base - excision repair
 - (D) Neurological derangements are common

34. The mechanism of nucleotide excision repair involves
 (A) Methylation directed strand cutting (B) Abasic sugar removal
 (C) Synapsis formation (D) Removal of nucleotide oligomer
35. Catalysis by N-glycosylase is part of which type of DNA repair?
 (A) SOS (B) Mismatch
 (C) Base - excision (D) Nucleotide excision
36. Methylation directed strand cutting is part of which type of DNA repair?
 (A) Mismatch (B) Base - excision
 (C) Nucleotide - excision (D) Double strand break
37. 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
38. 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
39. 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
40. Which among the following drugs develop drug resistance due to increase in target enzyme?
 (A) Cytarabine (B) Cysplatin
 (C) Methotrexate (D) Cyclophosphamide
41. Which among the following is true regarding chronic myelogenous leukemia?
 (A) Reciprocal translocation between chromosomes 8 and 14
 (B) Activation of *src* gene & increased protein tyrosine kinase activity
 (C) Activation of *myc* gene & increased production of a DNA binding protein
 (D) Production of bcr-abl fusion protein with increased protein tyrosine kinase activity

42. Burkitt's lymphoma is characterized by the following EXCEPT:
- (A) Cancer of human B-lymphocytes
 - (B) Reciprocal translocation between chromosomes 8 and 14 are involved
 - (C) *c-myc* gene comes under the influence of immunoglobulin heavy chain enhancer sequences
 - (D) Increased synthesis of protein tyrosine kinase
43. Which among the following anticancer agent intercalates in DNA and stabilizes Topoisomerase II?
- (A) Doxorubicin
 - (B) Melphalan
 - (C) Vinblastin
 - (D) Fluorouracil
44. The following are biochemical changes observed in fast growing tumors EXCEPT
- (A) Increased activity of ribonucleotidreductase
 - (B) Synthesis of fetal proteins
 - (C) Gain of differentiated biochemical functions
 - (D) Inappropriate synthesis of growth factors
45. Which among the following statements is false regarding p53 gene and its product?
- (A) Causes G2 specific cell cycle arrest
 - (B) Binds viral proteins like SV40 large T antigen form inactive complexes
 - (C) Inhibits apoptosis
 - (D) Product is stabilized by DNA damage
46. Activation of *c-ras* proto-oncogene results in
- (A) Decreased adenylcyclase activity
 - (B) Frame shift mutation
 - (C) Increased GTPase activity of the product
 - (D) Increased activities of cAMP dependent protein kinases
47. Gene amplification is associated with the following EXCEPT:
- (A) Homogeneously staining regions
 - (B) Double-minute chromosomes
 - (C) *erbB-2* in breast & ovarian cancers
 - (D) Increased methotrexate sensitivity
48. The properties of cells in culture, which have undergone malignant transformation, include the following EXCEPT:
- (A) Rounder shape than control cells
 - (B) Loss of contact inhibition of growth
 - (C) Loss of anchorage dependence
 - (D) Increased requirement for growth factors

49. Which among the following human tumor virus is involved in the pathogenesis of Burkitt's lymphoma?
(A) T-cell leukemia (B) Epstein-Bar
(C) Hepatitis B (D) Human papilloma
50. Insertional mutagenesis is associated with the following EXCEPT:
(A) Promoter insertion (B) Gene amplification
(C) Enhancer insertion (D) Long terminal repeats
51. A Type II error is also known as a
(A) False positive (B) False negative
(C) Double negative (D) Positive negative
52. A statistical test used to compare 2 or more group means is know as
(A) One-way analysis of variance (B) Post hoc test
(C) T-test for correlation coefficients (D) Simple regression
53. The use of the laws of probability to make inferences and draw statistical conclusions about populations based on sample data is referred to as
(A) Descriptive statistics (B) Inferential statistics
(C) Sample statistics (D) Population statistics
54. A _____ is a range of numbers inferred from the sample that has a certain probability of including the population parameter over the long run.
(A) Hypothesis (B) Lower limit
(C) Confidence interval (D) Probability limit
55. What is the standard deviation of a sampling distribution called?
(A) Sampling error (B) Sample error
(C) Standard error (D) Simple error
56. What would happen (other things equal) to a confidence interval if you calculated a 99 percent confidence interval rather than 95 percent confidence interval?
(A) It will be narrower (B) It will not change
(C) The sample size will increase (D) It will become wider
57. If a distribution is skewed to the left, then it is
(A) Negatively skewed (B) Positively skewed
(C) Symmetrically skewed (D) Symmetrical

58. The _____ is often the preferred measure of central tendency if the data are severely skewed.
(A) Mean (B) Median (C) Mode (D) Range
59. Which of the following is used to explain or predict the values of a dependent variable based on the values of one or more independent variables?
(A) Regression analysis (B) Regression coefficient
(C) Regression equation (D) Regression line
60. The most frequently occurring number in a set of values is called the
(A) Mean (B) Median (C) Mode (D) Range
61. A graph that uses vertical bars to represent data is called
(A) Line graph (B) Bar graph
(C) Scatterplot (D) Vertical graph
62. What is the median of the following set of scores? 18,6,12,10,14
(A) 10 (B) 14 (C) 18 (D) 12
63. The Pearson product moment correlation measures the degree of _____ relationship present between two variables
(A) Curvilinear (B) Nonlinear
(C) Linear and quadratic (D) Linear
64. When a researcher starts with the dependent variable and moves backwards, it is called:
(A) Predictive research (B) Retrospective research
(C) Exploratory research (D) Descriptive research
65. The variable the researcher matches to eliminate it as an alternative explanation is called a(n) _____ variable.
(A) Matching (B) Independent (C) Dependent (D) Partial
66. A sequencing effect that occurs when performance in one treatment condition is influenced by participation in a prior treatment condition is known as
(A) Counterbalancing effect (B) Carryover effect
(C) Treatment effect (D) Order effect
67. The group that does not receive the experimental treatment condition is the
(A) Experimental group (B) Control group
(C) Participant group (D) Independent group

68. Analysis of covariance is:
- (A) A statistical technique that can be used to help equate groups on specific variables
 - (B) A statistical technique that can be used to control sequencing effects
 - (C) A statistical technique that substitutes for random assignment to groups
 - (D) Adjusts scores on the independent variable to control for extraneous variables.
69. Attrition generally occurs in research where
- (A) You do demographic research
 - (B) The study fails
 - (C) Some participants do not complete the study
 - (D) The study is very brief
70. An extraneous variable that systematically varies with the independent variable and also influences the dependent variable is known as a
- (A) Confounding variable
 - (B) Third variable
 - (C) Second variable
 - (D) Both (A) and (B) are correct
71. Which of the following statements is true?
- (A) A statistical relationship is sufficient evidence to infer causality
 - (B) Temporal order of the cause and effect is not important in inferring causality
 - (C) A statistical relation of X and Y is insufficient evidence for inferring causality
 - (D) Temporal order of cause and effect variables and statistical relation are only needed to infer causality
72. The process of drawing a sample from a population is know as:
- (A) Sampling
 - (B) Census
 - (C) Survey research
 - (D) None of the above
73. A number calculated with complete population data and quantifies a characteristic of the population is called which of the following?
- (A) A datum
 - (B) A statistic
 - (C) A parameter
 - (D) A population
74. If we took the 500 patients attending JIPMER Hospital, divided them by gender, and then took a random sample of the males and a random sampling of the females, the variable on which we would divide the population is called the
- (A) Independent variable
 - (B) Dependent variable
 - (C) Stratification variable
 - (D) Sampling variable

75. People who are available, volunteer, or can be easily recruited are used in the sampling method, called
- (A) Simple random sampling (B) Cluster sampling
(C) Systematic sampling (D) Convenience sampling
76. When each member of a population has an equally likely chance of being selected, this is called:
- (A) A non-random sampling method
(B) A quota sample
(C) A snowball sample
(D) An Equal probability selection method
77. Another name for a Likert Scale is a(n):
- (A) Interview protocol (B) Event sampling
(C) Summated rating scale (D) Ranking
78. Which of the following terms best describes data that were originally collected at an earlier time by a different person for a different purpose?
- (A) Primary data (B) Secondary data
(C) Experimental data (D) Field notes
79. Which of these is not a method of data collection?
- (A) Questionnaires (B) Interviews (C) Experiments (D) Observations
80. Which of the following is the correct order of Stevens' four levels of measurement?
- (A) Ordinal, nominal, ratio, interval (B) Nominal, ordinal, interval, ratio
(C) Interval, nominal, ordinal, ratio (D) Ratio, interval, nominal, ordinal
81. Which scale is the simplest form of measurement?
- (A) Nominal (B) Ordinal (C) Interval (D) Ratio
82. If a test measures a single construct then:
- (A) The items should correlate with the total score
(B) The items should not correlate with the total score.
(C) The test should not correlate with other measures of the same construct
(D) There must be a reliable alternative form
83. The research participants are described in detail in which section of the research plan?
- (A) Introduction (B) Method (C) Data analysis (D) Discussion

84. Which correlation is the strongest?
 (A) +.10 (B) -.95 (C) +.90 (D) -1.00
85. The strongest evidence for causality comes from which of the following research methods?
 (A) Experimental (B) Causal-comparative
 (C) Correlational (D) Ethnography
86. A positive correlation is present when
 (A) Two variables move in opposite directions
 (B) Two variables move in the same direction
 (C) One variable goes up and one goes down
 (D) Several variables never change
87. A condition or characteristic that can take on different values or categories is called
 (A) A constant (B) A variable
 (C) A cause-and-effect relationship (D) A descriptive relationship
88. Most common approach for allele sharing is
 (A) Affected sibling pair (ASP) (B) Calculating likelihood ratio
 (C) Calculating odds ratio (D) Calculating relative risk
89. LOD score is
 (A) \log_{10} of likelihood ratio (B) Increase of likelihood ratio
 (C) Score for calculating mortality rates (D) Score for calculating relative
90. The method(s) for detecting association in genetic diseases
 (A) Case - control studies
 (B) Family based controls
 (C) Transmission disequilibrium test
 (D) All of the above
91. Which of the following is NOT a statistical computing software?
 (A) Epi Info (B) Graphpad
 (C) SPSS (D) SCORE
92. Standard deviation is an example of
 (A) Central tendency (B) Significance testing
 (C) Normally distributed data (D) Dispersion of data

93. The method commonly used for reducing experimental bias
- (A) Sampling (B) Intervention
(C) Randomization (D) Estimation of mean
94. Cohort study includes
- (A) Comparison of individuals with and without disease
(B) Comparison of individuals exposed and not exposed to a risk factor
(C) Manipulation of a situation followed by measurement of the effects of manipulation
(D) Systematic collection and presentation of data to give a clear picture of a particular situation.
95. Normally distributed data is
- (A) Symmetrical and all values are close to each other
(B) Mean, median and mode are different
(C) Asymmetrical about its mean
(D) Total area is one square unit
96. 1% level of significance indicates
- (A) $M \pm SD$ (B) $M \pm 2SD$
(C) $M \pm 3SD$ (D) $M \pm 4SD$
97. The formula for sample size calculation when proportion is the parameter of study
- (A) $Z^2 \times S^2 / d^2$ (B) $Z^2 \times p \times q / d^2$
(C) $(Z_\alpha + Z_\beta)^2 p \times q \times 2 / d^2$ (D) $(Z_\alpha + Z_\beta)^2 \times S^2 \times 2 / d^2$
98. _____ results if you fail to reject the null hypothesis when the null hypothesis is actually false.
- (A) Type I error (B) Type II error
(C) Type III error (D) Type IV error
99. In a statistically sound study Type II error should be
- (A) $\leq 5\%$ (B) $\leq 10\%$ (C) $\leq 15\%$ (D) $\leq 20\%$
100. A Screening test should have
- (A) High sensitivity and high specificity
(B) Low sensitivity and Low specificity
(C) High sensitivity and Low specificity
(D) Low sensitivity and high specificity