Sr. No. .....3012.....

Ph.D. ENTRANCE TEST-2023

SUBJECT (CLINICAL BIOCHEMISTRY)

Total Questions: 100
Time Allowed : 110 Minutes

Roll No. | | | | | | |

Instructions for Candidates

1. Write your roll number in the space provided at the top of this page of question booklet and fill up the necessary information in the spaces provided on OMR Answer sheet.
2. OMR Answer sheet has an original copy and a candidate's copy glued beneath it at the top. While making entries in the original copy, candidate should ensure that the two copies are aligned properly so that the entries made in the original copy against each item are exactly copied in the candidate's copy.
3. All entries in the OMR answers sheet including answers to questions are to be recorded in the original copy only.
4. Use only blue/ black ball point pen to darken the circle of correct / most appropriate response. In no ca gel/ ink pen or pencil should be used.
5. **Do not darken more the one circle of option for any question. A question with more than one darker response shall be considered wrong.**
6. **There will be no "Negative Marking" for wrong answers.**
7. Only those candidates who would obtain positive score in entrance test examination shall be eligible for admission
8. Do not make any stray mark on the OMR sheet
9. Calculators and mobiles shall not be permitted inside the examination hall
10. Rough work, if any, should be done on the blank sheets provided with the question booklet.
11. OMR answer sheet must be handled carefully and it should not be folded or mutilated in such case it will not be evaluated.
12. Ensure that your OMR Answer sheet has been signed by the invigilator and the candidate himself/herself.
13. At the end of the examination hand over the OMR answer sheet to the invigilator who will first tear off the original OMR sheet in presence of the candidate and hand over the candidate's copy to the candidate.
14. If any of the information in the response sheet/question paper has been found missing or not mentioned as stated above the candidate is solely responsible for that lapse.

SEAL

Part I (General Aptitude 2023)

1. Tariq wants to sell a watch at a profit of 20%. He bought it at 10% less and sold it at ₹ 30 less, but still he gained 20%. The cost price of watch is.....

   A. ₹ 250
   B. ₹ 225
   C. ₹ 240
   D. ₹ 220

2. If today is Sunday then three days from now will be....

   A. Saturday
   B. Friday
   C. Thursday
   D. Wednesday

3. Absar is brother of Mehdi. Iqra is sister of Gulshan. Mehdi is son of Iqra. How is Absar related to Iqra?

   A. Son
   B. Brother
   C. Nephew
   D. Father

4. Ankit can do a piece of work in 6 days and Basharat in 9 days. How many days will both take together to complete the work?

   A. 7.5 days
   B. 5.4 days
   C. 3.6 days
   D. 3 days

5. The book "To Hell and Back: Humans of COVID" is authored by?

   A. Kavitha Iyer
   B. Jhumpa Lahiri
   C. Barkha Dutt
   D. Arundhati Roy

6. If PARTICLE is coded RCTVKENG, then how is SCIENCE coded?

   A. TBJUOMF
   B. TDJFODF
   C. UEKGPEG
   D. QBSUDMF

7. Where is the headquarter of the United Nations Environment Programme (UNEP) located?

   A. Nairobi, Kenya
   B. Venice, Italy
   C. Munich, Germany
   D. Geneva, Switzerland

8. Two years ago, Jane's age was three times Sam's age. If Jane is now 18, how old is Sam?

   A. 6 years
   B. 8 years
   C. 10 years
   D. 12 years

9. If WORK is coded as 4-12-9-16, then how will WOMAN be coded?

   A. 4-12-14-26-13
   B. 4-26-14-13-12
   C. 23-12-26-14-13
   D. 123-15-13-1-14

10. Which of the following states is not included in the sixth schedule of Indian Constitution?

    A. Meghalaya
    B. Tripura
    C. Mizoram
    D. Manipur

11. Letter : Word

A. Homework : School

B. Club : People

C. Product : Factory

D. Page : Book

12. The speed of a bus is 54 km/h if we don't let it stop at any point. If the bus stops at the bus-stops, the speed of the bus is 45 km/h. What is the time that the bus stops for per hour?

A. 7 mins

B. 10 mins

C. 21 mins

D. 22 mins

13. Blood does not coagulate inside the body due to the presence of _____?

A. Fibrin

B. Haemoglobin

C. Heparin

D. Plasma

14. If a triangle has angles measuring 30 degrees, 60 degrees, and 90 degrees, what type of triangle is it?

A. Equilateral

B. Isosceles

C. Scalene

D. Right-angled

15. The ..... of the Minister's statement cannot be verified by people who have no access to official records.

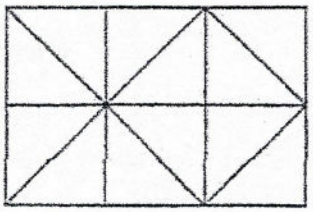
A. veracity

B. verbosity

C. ambiguity

D. validity

16. The number of squares in the given figure is.....



A. 7

B. 8

C. 9

D. 10

17. What is the percentage of profit if the cost price is 95% of the selling price?

A. 5%

B. 5.26%

C. 4%

D. 4.75%

18. If you start facing east and turn 135 degrees clockwise, which direction are you facing now?

A. North

B. West

C. North-East

D. South-East

19. Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY) has been extended till which year recently?

A. 2025

B. 2028

C. 2030

D. 2032

20. Who is the present chairman of ISRO?

A. Sh. Heeralal Samariya

B. Sh. Harsh Chouhan

C. Sh. Ravneet Kaur

D. Sh. S Somanath

End of Part I

Part-II (Basic Questions on Core Paper)

21. Whenever the cell's ATP supply is depleted, which of the following enzyme's activity is increased?

    a) Hexokinase
    b) Phosphofructokinase-1
    c) Phosphoglycerate Kinase
    d) Pyruvate kinase

22. Which form of DNA is described by Watson-Crick model?

    a) B-DNA
    b) Z-DNA
    c) A-DNA
    d) All of the above

23. The cholesterol serves as the precursor for the following biosynthetic pathways, EXCEPT

    a) Bile acid synthesis
    b) Steroid hormone synthesis
    c) Thyroid hormone synthesiss
    d) Aldosterone synthesis

24. Which of the following modifications to an enzyme-catalysed process will change the Vmax?

    a) Addition of a competitive inhibitor
    b) Addition of a non-competitive inhibitor
    c) Increasing substrate to supraphysiological concentrations
    d) None of these option

25. Pectinases belong to which class of enzyme?

    a) Ligases
    b) Hydrolases
    c) Lyases
    d) Transferases

26. To which of the following residues of the protein, the protein kinases do not add phosphate groups?

    a) cytosine
    b) serine
    c) threonine
    d) tyrosine

27. Which of the following is the characteristic of a cancer cell?
    a) Density dependent inhibition
    b) Contact inhibition
    c) Apoptosis
    D) Loss of anchorage dependence

28. The antiseptic method was first demonstrated by
    a) Lwanowski
    b) Beijerinck
    c) Edward Jenner
    d) Lord Lister

29. Which of the following virus have virions with internal lipid membranes?
    a) Ebola virus
    b) Influenza virus
    c) Rabies virus
    d) Iridovirus

30. Which of the following enzyme has a unique ability to introduce positive and negative supercoiling of the DNA and it is the target for antibacterial agents such as ciprofloxacin/quinolones?
    a) DNA protein
    b) DNA helicase
    c) DNA gyrase
    d) DNA polymerase

31. Which position of a codon is said to wobble?
    a) First
    b) Second
    c) Third
    d) Fourth

32. Monoclonal antibody production requires
    a) Mouse Splenic lymphocytes
    b) Mouse Myeloma Cells
    c) Both a and b
    d) None of the above

33. Vasodilation following a type I hypersensitivity reaction is principally caused by which molecule?
    a) Leukotriene
    b) Bradykinin
    c) Histamine
    d) Tryptase

34. The source of radiation used in Raman spectroscopy is
    a) Tungsten lamp
    b) Hollow cathode lamp
    c) Deutrium lamp
    d) Junable mercury–neon laser lamp

35. Which fluorescent dye can be used for red fluorescence?
    a) Fluorescein
    b) Rhodamine
    c) Carmine
    d) DAPI

36. The clusters of cells in the pancreas that produce hormones are the :
    a) Nodules.
    b) Islets of Langerhans.
    c) Pancreatic medulla.
    d) Pancreatic cortex.

37. Name the hormone, which is released by the posterior pituitary.
    a) Prolactin
    b) TSH
    c) ICSH
    d) Oxytocin

38. Serum from a man who has dermatomyositis had LDH isoenzymes analysed using thin-layer agarose gel electrophoresis. Which isoenzyme would be expected to have the highest peak?
    a) LD2
    b) LD3
    c) LD4
    d) LD5

39. In the diabetic patient, residual insulin secretion can be monitored by
    a) glucose tolerance test
    b) C-peptide levels
    c) pancreatic polypeptide levels
    d) insulin levels

40. Flammable materials, like alcohol, should never be dispensed or used near
    a) An Open door
    b) An open flame
    c) A sink
    d) All the above

41. Infertility is when a couple fails to conceive after
    a) 4 years of unprotected sex
    b) 3years of unprotected sex
    c) 2 years of unprotected sex
    d) 1 year of unprotected sex

42. Which does not cause a metabolic alkalosis?
    a) vomiting
    b) diarrohea
    c) loop diuretics
    d) thiazide diuretics

43. The marker for liver excretory function is,
    a) Albumin
    b) ALT
    c) Bilirubin
    d) AST

44. The following entity can cause both intrahepatic and extrahepatic cholestasis:
    a) Primary biliary cirrhosis
    b) Viral hepatitis
    c) Sarcoidosis
    d) Primary sclerosing cholangitis

45. This is an example of stretch reflex stimulated by passive muscle movement
    a) Patellar reflex
    b) Tendon reflex
    c) Flexor reflex
    d) Ipsilateral reflex

46. You are not an athlete and you are not physical fit. If you suddenly partake in physical exercise, then the increased demands of such vigorous exercise on your body are met primarily by:
    a) Increased stroke volume.
    b) Increased blood volume.
    c) Increased heart rate.
    d) All of above.

47. Recombinant plasmids are added to a bacterial culture that has been pretreated with _____ ions.

a) iodine
b) magnesium
c) calcium
d) ferric

48. The first protein synthesized by recombinant DNA technology was

a) Streptokinase
b) Human growth hormone
c) Tissue plasminogen activator
d) Human insulin

49. The mean of the 10 values is 20, if we add a value 10 in each observation then mean for the new value will be

a) 0
b) 10
c) 20
d) 30

50. Which of the following is an example of Homology and similarity tool?

a) RasMol
b) EMBOSS
c) BLAST
d) PROSPECT

Part-III Advanced (Higher Value Questions on Core Paper)

51. Which of the following enzymes leads to a glycogen storage disease known as Tarui's disease?
    (a) Glucokinase
    (b) Pyruvate Kinase
    (c) Phosphofructokinase
    (d) Phosphoglucomutase

52. Which of the following is not a symptom of hypokalemia?
    a) ileus
    b) constipation
    c) paralysis
    d) Seizures

53. Repeating units of hyaluronic acid are
    a) N-acetyl glucosamine and D-glucuronic acid
    b) N-acetyl galactosamine and D-glucuronic acid
    c) N-acetyl galactosamine and L- iduronic acid
    d) N-acetyl glucosamine and galactose

54. Which of the Following Glycolytic Enzymes is Inhibited by Accumulation of Long Chain Fatty Acid in the Liver?
    a) Glucokinase
    b) Hexokinase
    c) Phosphofructokinase
    d) Pyruvate kinase

55. The ratio of the distance moved by a compound to the distance moved by the solvent frent is known as its
    a) PI value
    b) Linking number
    c) Rf value
    d) Gold number

56. A purified DNA sample of human liver contains 30.0 mole of guanine. Calculate the approximate percentage of purine residues?
    a) 20%
    b) 30%
    c) 40%
    d) Cant be calculated

57. Sterol Regulatory Binding Protein increase the expression of HMG CoA reductase, and synthesis of cholesterol. What happens when there is the presence of a high cellular concentration of cholesterol?

a) Activates SREBP by inducing the conformational change
b) Inhibit SREBP by competitively binding to DNA binding site of SREBP
c) Decreases the proteolytic cleavage and release of SREBP from ER
d) Increases the proteolytic cleavage, release, and shuttling of SREBP into the nucleus

58. What is the Km of an enzyme hydrolyzing a substrate concentration of 0.025 mmol/L, the initial velocity was $1.5x10^{-3}$ mmol/L.min-1 and the maximum velocity was $4.5x10^{-3}$ mmol/L.min-1.

a) 0.050 mmol/L
b) 0.025 mmol/L
c) 0.075 mmol/L
d) 0.100 mmol/L

59. Which of the following is NOT a hallmark of cancer?

a) Ability to invade and metastasize
b) Ability to evade apoptosis
c) Ability to evade autophagy
d) All of the above

60. Asters are made of?

a) Collagen
b) Microtubules
c) Actin fibers
d) Intermediate filaments

61. Diphtheria is caused by

a) Streptococcus
b) Staphylococcus
c) Corynebacterium
d) Clostridium

62. In the presence of lactose, what happens to the lac repressor protein?

a) It binds to the operator.
b) It binds to CAP.
c) It undergoes an allosteric change.
d) It degrades.

63. The initial transesterification reaction occurring between the branch point site and the 5' splice site is a _____ reaction.
a) SN1
b) SN2
c) E2
d) None of the above

64. What is the role of acetylation in posttranslational modification?
a) Protein degradation
b) Protein stabilization
c) Regulation of gene expression
d) All of the above

65. The circulation of a two month old breast-fed baby will contain maternal
a) IgA
b) IgG
c) IgM
d) None of the above

66. For vaccination against mycobacterial diseases such as tuberculosis, the most important facet of the immune response to be stimulated is:
a) Macrophage-activating cell-mediated immunity
b) Cytotoxic T-cells
c) A high titer of antibody
d) None of the above

67. What is the significance of HLA matching in organ transplantation?
a) Enhancing the recipient's immune response
b) Preventing graft rejection
c) Identifying suitable organ donors
d) Inducing graft-versus-host reactions

68. Which type of data does RT-PCR generate in real-time?
a) Endpoint data
b) Kinetic data
c) Qualitative data
d) Static data

69. Lipoprotiens may be identified more accurately by means of
a) Electrophoresis
b) Ultra centrifugation
c) Centrifugation
d) Immunoelectrophoresis

70. What determines the elution order of ions in Ion exchange chromatography?
    a) Molecular weight
    b) Net charge
    c) Hydrophobicity
    d) pH of the elution buffer

71. Which endocrine disorder is characterized by an excess production of growth hormone in adults?
    a) Cushing's syndrome
    b) Diabetes insipidus
    c) Addison's disease
    d) Acromegaly

72. Which hormone plays a key role in regulating the body's response to stress by mobilizing energy reserves and increasing heart rate?
    a) Cortisol
    b) Epinephrine
    c) Thyroxine
    d) Insulin

73. Which technology is commonly employed for glucose measurement in a biochemistry analyzer?
    a) Nephelometry
    b) Colorimetry
    c) Amperometry
    d) Potentiometry

74. What is the purpose of quality control systems in automated clinical biochemistry?
    a) Reducing the accuracy of test results
    b) Monitoring and ensuring the reliability of test results
    c) Eliminating the need for instrument calibration
    d) Increasing the occurrence of errors

75. Which type of genetic variation involves the insertion or deletion of a small number of base pairs in the DNA sequence related to obesity?
    a) Single nucleotide polymorphism (SNP)
    b) Genetic drift
    c) Epigenetic modification
    d) Copy number variation (CNV)

76. Which renal clearance test provides an estimate of the overall filtration capacity of the glomeruli?
    a) Inulin clearance
    b) Creatinine clearance
    c) Urea clearance
    d) PAH (para-aminohippuric acid) clearance

77. Which of the following is a common conjugation reaction in Phase II drug metabolism?
    a) Hydroxylation
    b) Sulfation
    c) Acetylation
    d) Methylation

78. What is the primary characteristic that distinguishes Crohn's disease from ulcerative colitis?
    a) Presence of pseudopolyps
    b) Inflammation limited to the colon
    c) Skip lesions and transmural inflammation
    d) Continuous inflammation in the colon

79. What is the primary role of the Schilling test in diagnosing small bowel malabsorption?
    a) Assessing fat absorption
    b) Detecting folic acid malabsorption
    c) Measuring vitamin B12 absorption
    d) Evaluating protein digestion

80. What is the role of motor neurons in the neuromuscular system?
    a) Transmit sensory signals to the brain
    b) Transmit signals from the brain to muscles to initiate movement
    c) Control involuntary bodily functions
    d) Process visual stimuli

81. Which coronary artery is often referred to as the "widow-maker" due to its critical role in heart blood supply?
    a) Right coronary artery (RCA)
    b) Left circumflex artery (LCx)
    c) Left anterior descending (LAD) artery
    d) Posterior descending artery

82. What is the name of the condition where blood pressure readings are elevated only in a clinical setting but are normal in other settings?
    a) White-coat hypertension
    b) Masked hypertension
    c) Orthostatic hypotension
    d) Isolated systolic hypertension

83. What is the role of spike proteins in the SARS-CoV-2 virus?
    a) Replication of the virus
    b) Binding to host cells
    c) Immune response activation
    d) Oxygen transport

84. What is the term for a systematic error introduced during the data collection process?
    a) Bias
    b) Variance
    c) Outlier
    d) Standard deviation

85. Which bioinformatics tool is commonly used for predicting the three-dimensional structure of proteins?
    a) BLAST
    b) ClustalW
    c) Rosetta
    d) FASTA

86. What is the purpose of a confidence interval in biostatistics?
    a) To establish causation
    b) To estimate the range within which a population parameter is likely to fall
    c) To test hypotheses
    d) To describe the shape of the data distribution

87. What is the role of ExPASy in bioinformatics?
    a) Analyzing gene expression data
    b) Providing tools and resources for protein analysis
    c) Storing DNA sequences
    d) Predicting protein structures

88. What does the acronym "SWISS-MODEL" represent in the context of protein databases?
    a) A protein structure prediction method
    b) A database for protein-protein interactions
    c) A repository of protein sequences
    d) A tool for protein expression analysis

89. What does it indicate if a data point falls in the disallowed region of a Ramachandran plot?
    a) The protein is denatured
    b) The protein is in a stable conformation
    c) There is a potential error in the model or data
    d) The protein is highly flexible

90. Which enzyme is responsible for the synthesis of uridine monophosphate (UMP) in the de novo pyrimidine biosynthesis pathway?
    a) Thymidylate synthase
    b) Orotate phosphoribosyltransferase
    c) Carbamoyl phosphate synthetase II
    d) Ribonucleotide reductase

91. Which model describes allosteric enzymes as having multiple subunits and undergoes a conformational change upon binding of a regulatory molecule?
    a) Michaelis-Menten model
    b) Sequential model
    c) Concerted model
    d) Ping-Pong model

92. What is the main function of Bcl-2?
    a) Inducing apoptosis
    b) Promoting cell division
    c) Inhibiting apoptosis
    d) Enhancing DNA repair

93. What is the primary limiting factor for microbial growth in the death phase?
    a) Nutrient availability
    b) Accumulation of waste products
    c) Competition for space
    d) pH changes

94. What is the role of the RNA polymerase holoenzyme in transcription initiation?
    a) Synthesizing RNA
    b) Recognizing the promoter region
    c) Binding to enhancers
    d) Initiating translation

95. Which autoimmune disorder involves the immune system attacking the myelin sheath of nerve fibers in the central nervous system?
    a) Rheumatoid arthritis
    b) Hashimoto's thyroiditis
    c) Multiple sclerosis
    d) Celiac disease

96. Which mass spectrometry technique is commonly used for the identification of proteins and peptides?
    a) Gas chromatography-mass spectrometry (GC-MS)
    b) Liquid chromatography-mass spectrometry (LC-MS)
    c) Time-of-flight mass spectrometry (TOF-MS)
    d) Quadrupole mass spectrometry

97. Which hormone is responsible for the regulation of the sleep-wake cycle and circadian rhythms?
    a) Melatonin
    b) Insulin
    c) Thyroxine
    d) Estrogen

98. Which lipoprotein is often referred to as "good cholesterol" because it helps remove cholesterol from the bloodstream?
    a) HDL (High-Density Lipoprotein)
    b) LDL (Low-Density Lipoprotein)
    c) VLDL (Very Low-Density Lipoprotein)
    d) IDL (Intermediate-Density Lipoprotein)

99. Apart from cancer, what other conditions may cause elevated AFP levels in adults?
    a) Hypothyroidism
    b) Rheumatoid arthritis
    c) Pregnancy
    d) Multiple sclerosis

100. What is liver cirrhosis?
    a) Inflammation of the liver
    b) Scarring and fibrosis of the liver tissue
    c) Accumulation of fat in liver cells
    d) Viral infection of the liver