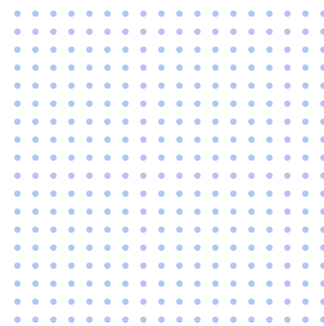




FOR KUET EXAM PREPARATION

KUET 2023

Question Paper · M.Sc. Biochemistry

EXAM	YEAR	TYPE	SUBJECT
KUET	2023	Question Paper	M.Sc. Biochemistry

Sr. No.

ENTRANCE TEST-2023**SCHOOL OF BIOLOGICAL SCIENCES****BIO-CHEMISTRY**

Question Booklet Series

A

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. :

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Instructions for Candidates :

1. Write your Entrance Test 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 the 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 Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be '**Negative Marking**' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer Sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. 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.

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☐**[Turn over**

1. Which of the following is a chiral molecule ?
 (A) Adenine
 (B) Glyceraldehyde 3-phosphate (GD3P)
 (C) Linolenic acid
 (D) Glycine
2. The following molecules are enantiomers of each other:
 (A) D-Glucose and L-Glucose
 (B) D-Glucose and D-Galactose
 (C) Lactose and Maltose
 (D) Pyruvate and Lactic acid
3. Which of the following is the weakest bond ?
 (A) Ionic bond
 (B) Covalent bond
 (C) Hydrogen bond
 (D) van der Waals interaction
4. Water has the property of being a "universal solvent" because:
 (A) It can dissolve salts, fats and oils
 (B) It has very high density
 (C) It is polar in nature
 (D) It can exist in solid, liquid and gaseous forms
5. Which of the following formulas correctly represents the change in Gibbs free energy:
 (A) $\Delta G = \Delta H - T\Delta S$
 (B) $\Delta H = \Delta G - T\Delta S$
 (C) $\Delta G = \Delta H - \Delta S$
 (D) $\Delta G + \Delta H = T\Delta S$
6. Non-polar substances like oils are insoluble in water because they:
 (A) Increase the entropy of surrounding water molecules
 (B) Decrease the entropy of surrounding water molecules
 (C) Increase both entropy and enthalpy of the surrounding water molecules
 (D) Have no effect on the entropy of water molecules
7. A buffer consists of:
 (A) A strong acid and its conjugate base
 (B) A weak acid and its conjugate base
 (C) A strong acid and a strong base
 (D) Two weak acids
8. Following is an example of biological buffer that helps maintain pH in our body at physiological conditions:
 (A) CH_3COOH and CH_3COONa
 (B) Citric acid and sodium citrate
 (C) NH_4OH and NH_4Cl
 (D) Na_2HPO_4 and NaH_2PO_4
9. The common mechanism between photophosphorylation in chloroplasts and oxidative phosphorylation in mitochondria is that:
 (A) PSI-PSII complex is involved in the synthesis of ATP in both the organelles
 (B) F_0-F_1 ATPase complex is involved for the synthesis of ATP in both mechanisms
 (C) A proton gradient is generated across the membranes of these organelles that is used for the synthesis of ATP
 (D) Complexes I-IV are involved in the synthesis of ATP in both the organelles
10. In cyclic photophosphorylation:
 (A) Only Photosystem I (PSI) is involved and only ATP molecules are synthesized
 (B) Only Photosystem II (PS-II) is involved and only NADPH molecules are synthesized
 (C) Both Photosystems I and II (PS-I and II) are involved and both ATP and NADPH are produced
 (D) Electrons are transferred in a cyclic manner between Photosystems I and II and no ATP is generated

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11. In photorespiration, also known as C_2 cycle:
 - (A) CO_2 is added to ribulose 1,5 biphosphate (RuBP) to form two molecules of 3-phosphoglycerate
 - (B) O_2 is added to ribulose 1,5 biphosphate (RuBP) to form one molecule of 2-phosphoglycolate and one molecule of 3-phosphoglycerate
 - (C) CO_2 is added to oxaloacetate to form citrate
 - (D) CO_2 is added to pyruvate to form ribulose 1,5 biphosphate
12. C_4 plants can carry out photosynthesis under:
 - (A) Very low amounts of CO_2 and under hot and dry conditions
 - (B) Very high amounts of CO_2 and abundant moisture
 - (C) Very high amounts of oxygen and high moisture
 - (D) In dark conditions
13. Which of the following nutrient cycles is an example of a sedimentary cycle ?
 - (A) Carbon cycle
 - (B) Nitrogen cycle
 - (C) Sulfur cycle
 - (D) Water cycle
14. In January 2023, Bill Gates announced to support research to design and manufacture dietary supplements that would help reduce the emission of the following gas which is produced by the grazing cattle and substantially contributes to global warming:
 - (A) CO_2
 - (B) Oxygen
 - (C) NO_3
 - (D) Methane
15. Which of the following strategies will help reduce the greenhouse effect and hence the global warming ?
 - (A) Increasing industrialization
 - (B) Switching to renewable sources of energy like solar and wind energy
 - (C) Increasing the use of chemical fertilizers
 - (D) By cooling our houses with air conditioners and storing food in refrigerators
16. Following is a modern scientific method of conservation of biodiversity:
 - (A) By preserving natural habitats for living organisms like national parks
 - (B) By creating special habitats like botanical gardens and zoological parks
 - (C) Using methods like recombinant DNA technology, gene/seed banks, tissue culture and cryopreservation
 - (D) By designing novel proteins that cannot be degraded by proteasomes
17. Bacteria uptake foreign genetic material naturally by the following method(s):
 - (A) Electroporation
 - (B) Operon regulation
 - (C) Lipofection
 - (D) Transformation, conjugation or transduction
18. The structure of viruses can be best described as:
 - (A) Nucleocapsids
 - (B) Proteoglycans
 - (C) Lipoproteins
 - (D) Phospholipids

19. During the stationary phase, bacterial growth and division are slowed down because:
 - (A) The nucleo-cytoplasmic shuttling of materials is inhibited
 - (B) The essential nutrients in the culture medium are exhausted
 - (C) Bacteria predominantly use the operon model for their metabolism
 - (D) Bacteria are killed by the expression of antibiotics
20. Probiotic bacteria have the following properties:
 - (A) They promote the infection of hosts by viruses
 - (B) They are very harmful bacteria that often cause sickness of hosts
 - (C) They are dead bacteria that are used for making vaccines and hence strengthen the immune system of the hosts
 - (D) They are live bacteria that are mostly beneficial and help in the digestion and absorption of food materials in the gut of hosts and also fight the harmful bacteria
21. The most common source of energy that is stored in animals and is readily available for energy production is:
 - (A) Starch
 - (B) Glucose
 - (C) Glycogen
 - (D) Fats
22. Fats are rich sources of energy because they have the following properties:
 - (A) Anhydrous and reduced
 - (B) Unsaturated and in cis-configuration
 - (C) Oxidized and hydrated
 - (D) Linear and phosphorylated
23. The secondary structure of proteins arises because of the following:
 - (A) Peptide bonds
 - (B) Hydrogen bonds
 - (C) Disulfide bonds
 - (D) Hydrophobic interactions
24. In the B-form of DNA, the distance between two adjacent base pairs is:
 - (A) $3.4\text{\AA}$
 - (B) 3.4nm
 - (C) 10nm
 - (D) 20nm
25. During the purification process, as we move towards more purity, the specific activity of an enzyme undergoes the following change:
 - (A) Decreases
 - (B) Remains unchanged
 - (C) Can both increase or decrease
 - (D) Increases
26. In non-competitive type of enzyme inhibition:
 - (A) K_m remains unchanged but V_{max} decreases
 - (B) K_m increases but V_{max} remains the same
 - (C) Both K_m and V_{max} increase
 - (D) K_m and V_{max} remain unchanged
27. Enzymes that are also regulated by sites other than the catalytic site are called:
 - (A) Isozymes
 - (B) Proteasomes
 - (C) Catalases
 - (D) Allosteric enzymes
28. Which of the following plots is best to determine V_{max} and K_m values, especially in the presence of various types of inhibitors ?
 - (A) Michaelis Menten plot
 - (B) Briggs Haldane plot
 - (C) Lineweaver-Burk plot
 - (D) Sigmoid curve

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29. The most common pathway for energy production in all living organisms is:
(A) Gluconeogenesis
(B) TCA cycle
(C) β -oxidation
(D) Glycolysis
30. During glycolysis, conversion of 1,3-bisphosphoglycerate to 3-phosphoglycerate is an example of:
(A) Oxidative phosphorylation
(B) Anaplerotic reaction
(C) Substrate level phosphorylation
(D) Allosteric regulation
31. The major source of energy currency that is produced in β -oxidation is:
(A) α -Ketoglutarate
(B) ATP
(C) NADH
(D) Pyruvate
32. In starvation, gluconeogenesis is most important metabolic pathway and hence major source of energy for which organ of the body ?
(A) Brain
(B) Liver
(C) Pancreas
(D) Kidneys
33. The most prominent feature that distinguishes a prokaryotic and eukaryotic cell is:
(A) Plasma membrane
(B) Nucleus
(C) Semi-conservative replication
(D) Glycolysis
34. The phospholipid bilayer of plasma membrane contains:
(A) Intrinsic proteins
(B) Nucleoporins
(C) F_0 - F_1 proteins
(D) Sodium dodecyl sulfate
35. Which of the following proteins is present in the mitochondria ?
(A) snRNPs
(B) Succinate dehydrogenase
(C) Hexokinase
(D) Microtubules
36. Chromatin is present in its most compact conformation in which of following stage of cell cycle in eukaryotic cells ?
(A) S-phase
(B) Metaphase
(C) Cytokinesis
(D) G_0/G_1 phase
37. Which group of scientists carried out the most authentic and conclusive set of experiments to prove that DNA is the genetic material of living organisms ?
(A) Temin and Baltimore
(B) Watson and Crick
(C) Avery, Macleod and McCarty
(D) Hershey and Chase
38. Solenoid can be defined as:
(A) Group of 6 nucleosomes in a loop forming a fibre of 30nm
(B) Two rounds of DNA wound around 4 pairs of histones forming a fibre of 10nm
(C) DNA at the centromeres of the chromosomes that link the two chromatids
(D) Multisubunit complexes of proteins at the replication fork

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[Turn over

39. The sequence on the DNA where RNA polymerase binds during transcription is called:
- UTR
 - Okazaki fragment
 - Enhancer
 - Promoter
40. Mutations that essentially result in the change in primary sequence of a polypeptide are called:
- Point mutations
 - Frame shift mutations
 - Palindromes
 - Codons
41. Absorption spectrophotometry is fundamentally based on:
- Kepler's laws
 - Beer Lambert's law
 - Avagadro's law
 - Laws of Thermodynamics
42. In gel exclusion chromatography, molecules are separated on the basis of:
- Ionic interactions
 - Hydrophobic interactions
 - Sizes of the molecules
 - Chemical reactivity
43. In native PAGE, proteins are separated based on:
- Shape and size
 - Charge
 - Hydrophobic interactions
 - DNA-protein interaction
44. A particular protein can be efficiently and specifically detected in minute quantities in plasma using the following technique:
- Western blotting
 - ELISA
 - RT-PCR
 - Spectrophotometry
45. Which of the following is a disease related to the circulatory system ?
- Tuberculosis
 - Diabetes
 - Stroke
 - Muscular dystrophy
46. In which part of the respiratory system, the gaseous exchange of O_2 and CO_2 takes place ?
- Bronchi
 - Bronchioles
 - Alveoli
 - Trachea
47. Peptic ulcers are most commonly caused by:
- Infection by *Helicobacter pylori*
 - Viral infection
 - Spicy foods and coffee
 - Acidic fruits
48. Which gland of the endocrine system controls the sleep cycle by regulating the secretion of the sleeping hormone melatonin ?
- Thyroid
 - Pituitary
 - Hypothalamus
 - Pineal
49. Which of the following vitamins can be stored in excess in the body and cause hyper-vitaminosis ?
- Vitamin D
 - Vitamin C
 - Vitamin B7
 - All of the above
50. The normal range of body mass index (BMI) of an adult person is:
- 15-20
 - 18-25
 - 25-30
 - >40

51. Higher levels of acid phosphatase (PAP) are used as a diagnostic marker for the following disease:
- Cystic fibrosis
 - Type I diabetes
 - Chronic Obstructive Pulmonary Disease (COPD)
 - Prostate cancer with metastasis
52. Lactate Dehydrogenase 1 (LDH1) is commonly used as a diagnostic marker for:
- Myocardial Infarction (MI)
 - Urinary tract infection (UTI)
 - Diabetes
 - Kidney malfunction
53. Antibodies are secreted by the following cells of the immune system:
- Helper T cells
 - Cytotoxic T cells
 - B Cells
 - Dendritic cells
54. Monoclonal antibodies are the antibodies that:
- Recognize a single epitope of an antigen
 - Recognize a single protein in a multisubunit complex
 - Are produced only once in the life time of an organism
 - Have a single heavy and a light chain
55. Antibody diversity in higher organisms is primarily generated by:
- Fusion of the B and T cells of an organism
 - Recombination of different V, D and J gene segments of Ig genes
 - Mixing of the IgM and IgE antibodies during viral infection
 - Chiasmata formation during meiosis
56. T cells of the immune system are named so because they are:
- Produced in the thymus
 - Generated in response to toxins
 - Produced in response to the tumors in the body
 - They have abundance of tyrosine receptors
57. The scientist who engineered the first recombinant DNA molecule was:
- Susumu Tonegawa
 - Kary Mullis
 - Paul Berg
 - Werner Arber
58. Restriction endonucleases type II are the enzymes that:
- Cut specific sequences on double stranded DNA by breaking the phosphodiester bonds
 - Join two double stranded DNA molecules
 - Cut dsDNA molecules randomly
 - Repair DNA cuts and nicks during DNA replication
59. *Cell lines* are the cells that can:
- Divide a few times and die
 - Are immortalized and hence divide indefinitely
 - Produce antibiotics for commercial use
 - Have the properties of cancer cells and make tumors when injected in mice
60. Cosmids are vectors that contain:
- Components from both animal and plant origin
 - Regions from Corona virus and Herpes virus
 - Components from both phages and plasmids
 - Sequences from two different plasmids

ROUGH WORK**SM-29587-A****8**
☐**100**