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FOR KUET EXAM PREPARATION

# KUET 2022 Question Paper · M.Sc. Biochemistry

| EXAM | YEAR | TYPE | SUBJECT |
| --- | --- | --- | --- |
| KUET | 2022 | Question Paper | M.Sc. Biochemistry |

Sr. No. 037

# ENTRANCE TEST-2022

## SCHOOL OF BIOLOGICAL SCIENCES

## BIOCHEMISTRY

**Total Questions** : 60
**Time Allowed** : 70 Minutes

**Question Booklet Series** A

**Roll No. :** | | | | | | |

### 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.

SEAL



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1. Which of the following is incorrect ?
   (A) A pi bond is formed after sigma bond formation takes place
   (B) Rotation of orbitals is ceased after the pi bond is formed
   (C) A pi bond is more stable than a sigma bond due to multiple contacts of the orbitals
   (D) All alkanes, alkenes, and alkynes exhibit sigma bond formation

2. Following elements are arranged in increasing order of their electronegativity. Pick up the correct order of elements arranged by their electronegativity :
   (A) F < S < P < N < O
   (B) P < S < N < O < F
   (C) N < O < F < P < S
   (D) N < P < S < F < O

3. A pair of molecules that are mirror images of each other but cannot be superimposed one upon the other are called :
   (A) Enantiomers
   (B) Conformers
   (C) Diastereomers
   (D) Positional isomers

4. Pick up the weakest and the strongest bonds :
   i. Ionic bonds
   ii. Metallic bonds
   iii. Covalent bonds
   iv. van der Waals forces
   v. Hydrogen bond
   (A) v and i
   (B) ii and v
   (C) iv and i
   (D) iv and iii

5. The first step in photosynthesis is :
   (A) Formation of reduced carbon compounds
   (B) The excitement of an electron of chlorophy by a photon of light
   (C) Formation of ATP
   (D) Splitting of a water molecule

6. The dark reaction is also called :
   (A) Biosynthetic phase
   (B) Blackman's reaction
   (C) Calvin cycle
   (D) All of the above

7. SI unit of entropy is :
   (A) J/K
   (B) J/S
   (C) J
   (D) J/C

8. The most abundant enzyme on earth – Rubis stands for :
   (A) Ribose-1,5-bisphosphate carboxyla oxygenase
   (B) Ribulose-1,5-bissulplate carboxyla oxygenase
   (C) Ribulose-1,5-bisphosphate carboxyl oxygenase
   (D) Rubisco-1,5-bisphosphate reducta oxygenase

SEAL

9. Provide the correct match of the statements in Column A from Column B below :

| Column A | Column B |
|---|---|
| i. The most common way for nitrogen fixation is by | a. Denitrification |
| ii. Organic nitrogen is converted back to inorganic nitrogen like ammonium, through the process of | b. Nitrogen oxides |
| iii. Eutrophication can cause an increase in | c. Decay |
| iv. Which process releases dinitrogen gas ($N_2$) back into the atmosphere | d. Fixed nitrogen (Ammonium) |
| v. Synthetic fertilizers add | e. Nitrogen-fixing bacteria |
| vi. Which of the following is a component of acid rain | f. Harmful algal blooms |

(A) i-e, ii-c, iii-f, iv-a, v-d, vi-b
(B) i-c, ii-e, iii-f, iv-a, v-d, vi-b
(C) i-e, ii-c, iii-a, iv-f, v-d, vi-b
(D) i-e, ii-c, iii-f, iv-a, v-b, vi-d

10. Which of the metals (Hg, Pb, Cr, Cd and As) cause gastrointestinal toxicity ?
(A) Hg and Cr
(B) Hg, Pb and Cr
(C) Hg, Pb, Cr, Cd and As
(D) Hg, Pb, Cr and Cd

11. Which of the following contributes to global warming ?
(A) Methane
(B) Carbon dioxide
(C) Nitrous oxide
(D) All of the above

12. Among the following four copper-dependents enzymes, three are placed against the enzyme class they belong to, pick up the one which is assigned to the wrong class of enzymes ?
(A) Oxidoreductase – ascorbate oxidase
(B) Monooxygenase – multicopper ferroxidase
(C) Electron transferring – cytochrome c oxidase
(D) Oxidase – Laccase

13. The pathogen of COVID-19 disease is :
(A) Severe acute respiratory syndrome coronavirus 1
(B) South Asian respiratory syndrome coronavirus 1
(C) Severe acute respiratory syndrome coronavirus 2
(D) South Asian respiratory syndrome coronavirus 2

14. Which of the following types of vaccines are being tested or used against Covid-19 disease ?
(A) Messenger RNA vaccine
(B) Vector vaccines
(C) Protein component vaccine
(D) All of the above



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15. D type amino acids are found in :
    (A) Nervous system and endocrine system
    (B) The nervous system, endocrine system and bacterial cell wall
    (C) Bacterial cell wall
    (D) Nervous system

16. When NADH reduces pyruvate, the product is :
    (A) Lactic acid
    (B) Alcohol
    (C) Dihydroxyacetone
    (D) Both d- and l-glyceraldehyde

17. Which class of carbohydrates is considered non-sugar ?
    (A) Monosaccharides
    (B) Disaccharides
    (C) Polysaccharides
    (D) Oligosaccharides

18. The net charge on a protein will be zero, positive and negative when the pH of a solution is :
    (A) Above its pl, below its pl, and at its pl respectively
    (B) At its pl, below its pl and above its pl respectively
    (C) At its pl, above its pl and below its pl respectively
    (D) All the above statements are incorrect

19. Which of the following is the Chylomicron component ?
    (A) Cholesterol
    (B) Triglyceride
    (C) Apolipoprotein B48
    (D) All of the above

20. The enzyme responsible for the removal of supercoiling in replicating DNA ahead of the replication fork is :
    (A) Primase
    (B) DNA polymerase
    (C) Helicase
    (D) None of the above

21. Compare the enzyme class with the reaction they catalyze :

| | | | |
|---|---|---|---|
| a. | Oxidoreductases | i. | Group transfer reactions |
| b. | Transferases | ii. | Hydrolysis reactions |
| c. | Hydrolases | iii. | Transfer of electrons |
| d. | Lyases | iv. | Formation of bods by condensation reactions coupled to ATP cleavage |
| e. | Isomerases | v. | Addition of groups to double bonds |
| f. | Ligases | vi. | Transfer of groups with in molecules |

    (A) a-i, b-ii, c-iii, d-iv, e-v, f-vi
    (B) a-iii, b-i, c-ii, d-v, e-vi, f-iv
    (C) a-iv, b-i, c-ii, d-v, e-vi, f-iii
    (D) a-iii, b-i, c-v, d-ii, e-vi, f-iv

22. Reversile inhibition can be :
    (A) Competitive and uncompetitive
    (B) Competitive only
    (C) Uncompetitive only
    (D) Competitive, uncompetitive and mixed



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23. High levels of acids phosphate are indicators of :
    (A) Stomach cancer
    (B) Prostate cancer
    (C) Brain tumour
    (D) None of the above

24. Which of the following can bind to haem ?
    (A) Oxygen
    (B) CO
    (C) NO
    (D) All of the above

25. Which of the following enzyme catalyze the rate-limiting step in the pentose phosphate pathway ?
    (A) Transketolase
    (B) Glucose-6-P dehydrogenase
    (C) Transaldolase
    (D) Phosphogluconate dehydrogenase

26. The urea cycle is linked to :
    (A) Citric acid cycle
    (B) Glycolysis
    (C) Pentose Phosphate Pathway
    (D) Beta oxidation

27. How many ATP molecules are produced in a citric acid cycle for every glucose molecule ?
    (A) 30
    (B) 15
    (C) 4
    (D) 2

28. Which citric acid cycle enzyme uses FAD+ ?
    (A) Malate dehydrogenase
    (B) Succinate dehydrogenase
    (C) Citrate synthase
    (D) Alpha-Ketoglutarate dehydrogenase

29. Ribosomes are present on :
    (A) Endoplasmic reticulum
    (B) Nuclear membrane
    (C) Both of the above
    (D) Both (A) and (B) are incorrect

30. Which of the following do not share similarities or are not linked to one another ?
    (A) Prokaryotic cell-chloroplast-mitochondria
    (B) Beta oxidation-Nucleus-Lysosome
    (C) Endoplasmic reticulum-Golgi complex-Transporting vesicle
    (D) Glycolysis-Urea cycle-Citric acid cycle

31. Which of the following does not contain any membrane ?
    (A) Ribosome
    (B) Plant vacuole
    (C) Endosome
    (D) Vesicle

32. Which of the histones binds to the linker DNA (DNA that links two adjacent histones) ?
    (A) H4
    (B) H3
    (C) H2A
    (D) H1



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33. Beads-on-string (nucleosome) structure has an average diameter of :

(A) 10 nm

(B) 15 nm

(C) 20 nm

(D) 25 nm

34. Which of the following proteins recognize the origin of replication and is called the E-coli licencing factor ?

(A) DnaA

(B) DnaB

(C) DNA Polymerase III

(D) Topoisomerase I

35. What was the main limitation of Marshall Nirenberg's findings on genetic code ?

(A) Triplet concept of a codon was missing

(B) Compositions of codons were not known

(C) The sequence of codons for different amino acids was not known

(D) None of the above

36. Which of the post-translational modifications can happen to chromatin histones ?

(A) Methylation and acetylation

(B) ADP-ribosylation and phosphorylation

(C) Glycosylation, SUMOylation and ubiquitination

(D) All of the above

37. Two different proteins with the same molecular weight traverse different distances when run together in a native PAGE in a cold room. The possible reason is/are :

(A) The two proteins experience the different magnitude of resistance in their movement as possess different shapes

(B) The two proteins possess different amino acid sequences

(C) They have no different interactions with polyacrylamide gel

(D) All of the above

38. For gel filtration chromatography of proteins, which of the following is true ?

(A) Large or elongated proteins enter the pores in the beads

(B) Small proteins enter the pores in the beads

(C) Large or elongated proteins elute from the bottom of the column later

(D) Small proteins elute from the bottom of the column first

39. The movement of proteins in SDS-PAGE and gel filtrations can be described as :

(A) Larger proteins follow the smaller proteins in both the resolving techniques

(B) Smaller proteins follow the larger proteins in both the resolving techniques

(C) Smaller protein will move first in SDS-PAGE and later in gel filtration

(D) Smaller protein will move later in SDS-PAGE and first in gel filtration

40. Which technique is used to assay drug concentration in plasma ?
(A) IR spectroscopy
(B) UV spectroscopy
(C) Non-aqueous titration
(D) RIA

41. Which statement/s holds good for ELISA ?
(A) Can be used to detect both antigen and antibody
(B) It is very sensitive and can detect less than a nanogram of a protein
(C) Enzyme-linked to an antibody can be monoclonal or polyclonal
(D) All of the above are correct

42. Fe in the hemoglobin is in a ferrous state and the oxygen molecule binds at :
(A) $6^{th}$ coordination site
(B) Its $1^{st}$ coordination site
(C) $3^{rd}$ coordination site
(D) $4^{th}$ coordination site

43. Which of the following is correct ?
(A) Only 50% of the oxygen carried by hemoglobin can be released in absence of a change in pH
(B) When pH changes to 7.2 only 40% of its oxygen is released
(C) Hydrogen ions and carbon dioxide increases oxygen affinity of Haemoglobin
(D) None of the above

44. The test for checking mean plasma glucose concentration over the previous 8-10 weeks is :
(A) Fasting plasma glucose concentration for two days
(B) Haemoglobin A1c
(C) Oral glucose tolerance test
(D) 2-hour postprandial glucose concentration

45. Which diseases cause elevated SGOT and SGPT in the blood ?
(A) Hepatitis A or B or C or chronic viral hepatitis
(B) Cirrhosis of the liver or liver damage from alcohol
(C) Hemochromatosis
(D) All of the above

46. In which of the following clinical conditions, the activity of creatine kinase is not seen ?
(A) Muscular dystrophy
(B) Muscle disease
(C) Pancreatitis
(D) Myocardial infarction

47. Which of the following enzymes hydrolyses alpha-1,4 linkages in starch and glycogen to yield maltose ?
(A) Alpha-amylase
(B) Sucrase
(C) Lactase
(D) All of the above



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48. What is a xenobiotic ?

(A) A nutrient

(B) Metabolizable chemical substances but not a nutrient

(C) Non-Metabolisable and but can be used as a nutrient

(D) Metabolisable nutrient

49. Innate immunity does not include :

(A) Anatomic and physiologic barriers

(B) Endocytic and phagocytic barriers

(C) Inflammatory barriers

(D) None of the above

50. Adaptive immune responses are characterized by :

i. Specificity

ii. Diversity

iii. Memory

iv. Self/non-self recognition

(A) i and ii

(B) i, ii and iii

(C) i, ii, iii and iv

(D) ii, iii and iv

51. The major effector function/s that enable antibodies to remove antigens and kill pathogens is/are :

(A) Opsonization

(B) Complement activation and antibody-dependent cell-mediated cytotoxicity

(C) Both (A) and (B)

(D) Neither (A) nor (B)

52. Match the two columns correctly :

| | | | |
|---|---|---|---|
| i. | Type I Hypersensitivity | a. | Transfusion reaction and hemolytic disease of a newborn are its examples |
| ii. | Type II Hypersensitivity | b. | Involve $T_H1$ cells |
| iii. | Type III Hypersensitivity | c. | Result in Arthus reaction |
| iv. | Type IV Hypersensitivity | d. | Mediated by IgE antibodies |

(A) i-a, ii-b, iii-c and iv-d

(B) i-a, ii-d, iii-b and iv-c

(C) i-d, ii-c, iii-a and iv-b

(D) i-d, ii-a, iii-c and iv-b

53. A large quantity of a genome or a piece of DNA is needed for laboratory purposes. It can be obtained by :

(A) The growing large number of cells in a cell culture

(B) By cloning

(C) By polymerase chain reaction

(D) All of the above

54. The type of restriction enzyme used in rDNA technology is :

(A) Type I

(B) Type II

(C) Type III

(D) All of the above



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55. Which of the following is the most important discovery that led to the discovery of recombinant DNA technology ?
(A) Discovery that DNA is the genetic material
(B) Discovery of DNA structure
(C) Deciphering of genetic code
(D) Discovery of restriction enzymes

56. Choose the incorrect statement for YAC vectors :
(A) The YAC molecule is approximately 10 kb in size
(B) It contains both yeast origin of replication and prokaryotic origin of replication
(C) It doesn't contain the ampicillin-resistant gene
(D) It contains TEL sequence

57. The heat given to an ideal gas in isothermal conditions is used to :
(A) Increase temperature
(B) Do external work
(C) Increase temperature and in doing external work
(D) Increase internal energy

58. Calculate the Gibbs free energy for the reaction of conversion of ATP into ADP, at 293 Kelvin, the change in enthalpy is 19.07 Kcal and the change in entropy is 90 cal per Kelvin :
(A) 7.3 cal
(B) –5.3 Kcal
(C) 7.3 Kcal
(D) –7.3 Kcal

59. The melting of ice into liquid water is an example of tube _____ reaction.
(A) endergonic
(B) exergonic
(C) exothermic
(D) endothermic

60. What is the reverse process of Neutralization ?
(A) Formation
(B) Hydrolysis
(C) Reaction
(D) Splitting