

**KONGUNADU ARTS AND SCIENCE COLLEGE**  
(AUTONOMOUS)

*[Re-accredited by NAAC with 'A' Grade 3.64 CGPA-(3<sup>rd</sup> Cycle)]*

**Coimbatore – 641 029**



**DEPARTMENT OF BIOCHEMISTRY (PG)**

**QUESTION BANKS**

## SUBJECTS

<b>S.No</b>	<b>Name of the Subject</b>
1.	Cell Biology
2.	Clinical Biochemistry
3.	Biostatistics And Research Methodology
4.	Environmental Toxicology

KASC-Biochemistry (PG)



**KONGUNADU ARTS AND SCIENCE COLLEGE  
(AUTONOMOUS),  
COIMBATORE – 641029.**

**DEPARTMENT OF BIOCHEMISTRY  
(PG AND RESEARCH)**

**M.Sc BIOCHEMISTRY**

**QUESTION BANK**

**ODD SEMESTER (2018-19)**

**C.P.4 CELL BIOLOGY**



**C.P.4- CELL BIOLOGY**

**SECTION – A**

**(Knowledge level K1 Remembering is to be followed in relation to Course Outcomes specified as per bloom's Taxonomy)**

**Choose the correct answer:**

1. Cerebroside is a  
a) phospholipid    b) sphingolipid    c) glycolipid    d) aminolipid
2. Movement of phospholipids from side to side is known as  
a) intracellular diffusion    b) extracellular diffusion  
c) flip flop    d) lateral diffusion
3. The main role of carbohydrates in the cell membranes is  
a) adhesion    b) recognition    c) locomotion    d) reception
4. Which protein on the plasma membrane of RBC malarial parasite uses as a receptor to enter into the cell?  
a) Band 3 proteins    b) glycophorins    c) spectrin    d) ankyrin
5. Which of the following functional processes results from the presence of protein within the plasma membrane?  
a) enzymatic activity    b) signal transduction  
c) intercellular joining    d) all of the above
6. Lipid bilayer is  
a) hydrophilic    b) hydrophobic  
c) hydrophilic and hydrophobic    d) depends upon the surrounding medium
7. The distribution of intrinsic proteins in the cell membrane is  
a) symmetric    b) asymmetric    c) random    d) uniform
8. Na<sup>+</sup> glucose transporter is an example of  
a) symport    b) antiport    c) osmosis    d) active transport
9. Carrier protein can  
a) Transport only one substance    b) Transport more than one substance  
c) Exchange one substance to another    d) Perform all of these functions
10. Glycosphingolipids are a combination of  
a) Ceramide with one or more sugar residues    b) Glycerol with galactose



22. Clathrin coated pits are associated with
- a) phagocytosis
  - b) pinocytosis
  - c) receptor mediated endocytosis
  - d) exocytosis
23. An example for active transport is
- a)  $\text{Ca}^{2+}$  ATPase
  - b)  $\text{Na}^+ \text{K}^+$  ATPase
  - c)  $\text{H}^+ \text{K}^+$  ATPase
  - d) all the above
24. Bulk uptake of liquid is an example of
- a) phagocytosis
  - b) pinocytosis
  - c) exocytosis
  - d) endocytosis
25. Any favorable movement of solute across membrane is called
- a) active transport
  - b) passive transport
  - c) solute transport
  - d) solvent transport
26. The principal intracellular cation is
- a)  $\text{Na}^+$
  - b)  $\text{Ca}^{2+}$
  - c)  $\text{K}^+$
  - d)  $\text{Cl}^-$
27. Solutes enter a cell when the solution surrounding that cell is
- a) Hypertonic
  - b) weak
  - c) concentrated
  - d) hypotonic
28. The movement of molecules into a cell through transport proteins in the cell membrane is a type of
- a) Osmosis
  - b) energy expenditure
  - c) facilitated diffusion
  - d) selective transport
29. The cellular organelles called “suicide bags” are
- a) Lysosomes
  - b) Ribosomes
  - c) Nucleolus
  - d) Golgi’s bodies
30. From the biological viewpoint, solutions can be grouped into
- a) Isotonic solution
  - b) Hypotonic solutions
  - c) Hypertonic solution
  - d) All of these
31. The digestive enzymes of cellular compounds are confined to
- a) Lysosomes
  - b) Ribosomes
  - c) Peroxisomes
  - d) Polysomes
32. If concentration of solute is same inside as well as outside cell than it is known as
- a) hypertonic solution
  - b) isotonic solution
  - c) hypotonic solution
  - d) concentrated solution

33. Energy required for passive transport is  
a) 5 Kcal                      b) 10 Kcal                      c) 0 Kcal                      d) infinite
34. Type of transport which always involves a protein is  
a) passive transport                      b) active transport  
c) lateral diffusion                      d) flip flop
35. ATP hydrolysis is coupled in  
a) primary active transport                      b) secondary active transport  
c) tertiary active transport                      d) none of above
36. If 3 Na<sup>+</sup> ions pumped out of cell and 2 K<sup>+</sup> pumped into cell than number of ATP molecules hydrolysed are  
a) 1                      b) 2                      c) 4                      d) 3
37. Bulk transport of large quantities of materials into cell is referred as  
a) Active transport                      b) Diffusion  
c) Bulk Transport                      d) Endocytosis
38. Sodium-potassium (Na<sup>+</sup> -K<sup>+</sup>) pump is a type of  
a) Carrier protein                      b) Enzyme                      c) Osmosis                      d) Catalyst
39. Which of the following process require membrane proteins?  
a) Phagocytosis                      b) endocytosis  
c) receptor mediated endocytosis                      d) exocytosis
40. Which of the following is an example of a primary active transport?  
a) Cl<sup>-</sup> - HCO<sub>3</sub><sup>-</sup> exchange                      b) Na<sup>+</sup> K<sup>+</sup> ATPase  
c) Na<sup>+</sup> - H<sup>+</sup> exchange                      d) Na<sup>+</sup>-Ca<sup>2+</sup> exchange
41. Secretory proteins are synthesized by  
a) free ribosome                      b) RER  
c) ribosomes on nuclear membrane                      d) all the above
42. Proteins tagged with mannose-6-phosphate are transported to  
a) nucleus                      b) lysosomes                      c) mitochondria                      d) golgi apparatus
43. Which of the following organelle is called as the 'sorting centre of the cell'?  
a) RER                      b) SER                      c) golgi apparatus                      d) nucleus
44. Function of golgi apparatus in animal cells include  
a) Sorting and packaging                      b) exocytosis of melanin granules

- b) exocytosis of thyroxine hormone                      d) all of these
45. Proteins directed to which of the following organelles are synthesized by ribosomes attached to the rough endoplasmic reticulum?
- a) Lysosomes    b) mitochondria  
c) Nucleus    d) peroxisomes
46. A C-terminal peptide sequence of four amino acids, Lys-Asp-Glu-Leu (KDEL) directs proteins to which of the following organelles?
- a) Endoplasmic reticulum                                      b) Mitochondria  
c) Nucleus     d) peroxisomes
47. In what form do proteins cross the mitochondrial membranes?
- a) Bound to an importin protein via a signal sequence  
b) In fully folded form  
c) In unfolded extended form attached to Hsp 70 chaperones  
d) In unfolded extended form without chaperones
48. What constitutes the driving force for transport of proteins into and out of the nucleus?
- a) ATP hydrolysis within the cytosol.  
b) ATP hydrolysis within the nucleus.  
c) GTP hydrolysis within the cytosol.  
d) GTP hydrolysis within the nucleus.
49. Which of the following signals directs a protein to the lysosomes?
- a) A lys-asp-glu- leu (KDEL) sequence in the protein.  
b) Dolichol phosphate.  
c) Attached carbohydrate with terminal mannose-6-phosphate.  
d) Attached carbohydrate with terminal mannose.
50. Vesicles leaving the *trans* Golgi carry on their surfaces a protein which targets them to the appropriate organelle. This protein is:
- a) t-SNARE                                      b) Coatomer                                      c) v-SNARE                                      d) Clathrin
51. Flow cytometry uses
- a) Radioactive elements                                      b) Heavy isotope  
c) Immunological techniques                                      d) Energy content



52. How are the cells sorted using flow cytometry?
- a) By dilution plating until there are only single cell in each well of microtiter plate
  - b) By the differential weight
  - c) By electrostatic force
  - d) By magnetic force
53. Which fluorescent dye can be used for red fluorescence?
- a) Rhodamine
  - b) Fluorescein
  - c) Carmine
  - d) DAPI
54. Post translational modification of many eukaryotic proteins begins in the
- a) endoplasmic reticulum
  - b) mitochondria
  - c) chloroplasts
  - d) nucleus
55. Nuclear localization signal is rich in
- a) tryptophan and histidine
  - b) serine and threonine
  - c) glutamine and asparagine
  - d) lysine and arginine
56. How many amino acid residues are there in ubiquitin?
- a) 72
  - b) 73
  - c) 75
  - d) 76
57. Protein insertion into the mammalian ER membrane is typically
- a) cotranslational
  - b) post-translational
  - c) pretranslational
  - d) quasitranslational
58. Proteins that do not fold properly in the ER lumen are degraded in the cytosol by
- a) the etiosome
  - b) the microsomes
  - c) the proteasome
  - d) the ribosome
59. N-linked oligosaccharides are:
- a) Added in the cis Golgi and modified in the trans Golgi
  - b) Added in the trans Golgi and modified in secretory vesicles
  - c) Added in the ER and modified in the Golgi
  - d) Added in the Golgi and modified in the ER
60. TIM stands for
- a) inner membrane translocase
  - b) outer membrane translocase
  - c) terminal inner membrane protein
  - d) terminal outer membrane protein
61. Tubulin protein is used by cells to
- a) to perform glycolysis
  - b) hold their shape

- c) function properly  
d) change their shape
62. Microfilaments are composed of  
a) actin protein  
b) chitin protein  
c) tubulin protein  
d) mosaic protein
63. Microfilaments are involved in  
a) cytokinesis  
b) amoeboid movement  
c) furrow formation during cell division  
d) all of these
64. Chromosome movement during cell division is regulated by  
a) microtubules  
b) microfilaments  
c) intermediate filaments  
d) all of these
65. Which of the following is a microtubule associated protein (MAPs)?  
a) 'Tus' protein  
b) 'Tau' protein  
c) 'rho' protein  
d) G protein
66. Which of the following comes under the category of cell surface receptor?  
a) enzyme linked receptors  
b) ion-channel linked receptors  
c) G-protein linked receptors  
d) all the above
67. Microtubules are made up of  
a) actin  
b) myosin  
c) tubulin  
d) troponin
68. Inactive Ras protein is bound to  
a) GDP  
b) AMP  
c) ADP  
d) GMP
69. During the Ras pathway  
a) cytoplasmic protein kinases are activated  
b) the growth factor receptor is dephosphorylated  
c) growth factors bind to receptors in the cytoplasm  
d) leads to the production of translation factors
70. The enzyme that catalyses the splitting of PIP<sub>2</sub> into two molecules of inositol triphosphate (IP<sub>3</sub>) and diacylglycerol in cell-signalling is  
a) Phosphokinase C  
b) phospholipase C  
c) Phosphodiesterase C  
d) lipokinase
71. Which of the following is a second messenger?  
a) inositol 1,4,5 triphosphate  
b) diacylglycerol  
c) phospholipase C  
d) both a) and b)

72. The hormone or ligand can be considered as
- a) first messenger
  - b) second messenger
  - c) both a) and b)
  - d) none of these
73. The following points about microfilaments are true except
- a) They form cytoskeleton with microtubules
  - b) They provide support and shape
  - c) They form intracellular conducting channels
  - d) They are involved in muscle cell contraction
74. Hormone that binds to intracellular receptor is
- a) Adrenocorticotrophic hormone
  - b) Thyroxine
  - c) Follicle stimulating hormone
  - d) Glucagon
75. Hormone receptors possess all the following properties except
- a) All of them are proteins
  - b) They possess a recognition domain
  - c) They bind hormones with a high degree of specificity
  - d) Number of receptors in a target cell is constant
76. Some hormones produce their intracellular effects by activating
- a) Phospholipase A1
  - b) Phospholipase B
  - c) Phospholipase C
  - d) All of these
77. G-proteins act as
- a) Hormone carriers
  - b) Hormone receptors
  - c) Second messengers
  - d) Signal transducers
78. Protein kinase C is activated by
- a) Cyclic AMP
  - b) Cyclic GMP
  - c) Diacyl glycerol
  - d) Inositol triphosphate
79. The nucleotide binding site of G-proteins is present on their
- a)  $\alpha$ -Subunit
  - b)  $\alpha$ -Subunit  $\beta$ - and  $\gamma$ -
  - c)  $\beta$ -Subunit
  - d)  $\gamma$ -Subunit
80. In catalytic receptors, activity initiator at extracellular surface is
- a) protein binding
  - b) ion binding
  - c) ligand binding
  - d) cell binding

81. A benign tumor is one in which the cancerous cells
- a) have an unusual number of chromosomes
  - b) can divide indefinitely if an adequate supply of nutrients is available
  - c) migrate from the initial site of transformation to other organs or
  - d) remain confined to their original site
82. The p53 gene
- a) is the most frequently mutated gene in human cancer
  - b) can lead to cell cycle arrest at the G1 checkpoint
  - c) can trigger apoptosis.
  - d) all of the above
83. What is true of proto-oncogenes?
- a) cells produce proto-oncogenes as a by-product of mitosis
  - b) proto-oncogenes are necessary for normal control of cell division
  - c) proto-oncogenes are genetic junk that has not yet been eliminated by natural selection
  - d) proto-oncogenes are unavoidable environmental carcinogens
84. Progression through the eukaryotic cell cycle is regulated by
- a) microtubules
  - b) the p53 gene
  - c) cyclin-dependent kinases
  - d) DNA ligase
85. Characteristics of cancer include
- a) self-sufficiency in growth signaling
  - b) evasion of apoptosis
  - c) insensitivity to anti-growth signals
  - d) all of the above
86. During which stage of prophase I the crossing over takes place?
- a) pachytene
  - b) leptotene
  - c) zygotene
  - d) diplotene
87. Cancer is caused due to
- a) Controlled mitosis
  - b) Uncontrolled mitosis
  - c) Controlled meiosis
  - d) Uncontrolled meiosis
88. Migration of cancerous cells from the site of origin to other part of the body forming secondary tumours is called



99. Which of the following statements about the Rb tumour suppressor protein is correct?
- a) Rb is activated when phosphorylated by Cdk.
  - b) Rb binds the transcription factor E2F and thus prevents the cell from entering S phase until a mitogenic signal is received.
  - c) Rb is a transcription factor.
  - d) When a mitogenic signal is received, Rb binds the transcription factor E2F and thus stimulates the cell to enter S phase
100. Which of the following types of protein could be coded by a tumour-suppressor gene?
- a) A protein that forms part of a growth factor signalling pathway.
  - b) A protein that codes for a DNA repair enzyme.
  - c) A protein that helps prevent apoptosis.
  - d) A protein that controls progression through the cell cycle.

KASC-Biochemistry (PG)

**(Knowledge levels K2 – Understanding, K3-Applying, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom's Taxonomy)**

**SECTION – B**

1. List the functions of plasma membrane.
2. Give the classification of membrane proteins.
3. Comment on membrane fluidity.
4. What is the Biochemical composition of lipid bilayer?
5. Write short notes on porins.
6. What are the vital roles of membrane proteins?
7. Add notes on RBC ghosts.
8. What are lectins? Give the types and functions of it.
9. Brief on the function of bacteriorhodopsin.
10. How are human blood group antigens synthesized?
11. Give an overview on membrane transport.
12. What is osmosis? Explain the types of osmosis.
13. How the substances are transported by facilitated diffusion?
14. Comment on Gastric  $H^+K^+$  ATPase.
15. Write short notes on mammalian MDR proteins.
16. Brief on carriers and ion channels.
17. Describe the process of Phagocytosis.
18. How the transport process is mediated by ion gradients?
19. Write about bacterial PM permeases.
20. Differentiate active transport from passive transport.
21. List the applications of flow cytometry.
22. What is cell sorting? Explain the types.
23. How are secretory proteins synthesized?
24. Brief on signal hypothesis of proteins.
25. Comment on post translational modifications of proteins.
26. Describe the process of protein glycosylation.
27. How are membrane proteins synthesized?

28. What are the proteins associated with mitochondrial protein traffic?
29. Sketch the instrumentation of flow cytometry.
30. Describe the secretory pathway of proteins.
31. Describe the structure and assembly of actin filaments.
32. Describe the organization of Microtubules.
33. List the functions of microtubules.
34. Describe the action of kinesin and dynein.
35. Give the organization of skeletal muscle.
36. Give a brief note on G-protein coupled receptor.
37. How neurotransmitters are transducing the signals?
38. Describe the cGMP cell transduction.
39. Comment on signal transduction by  $\text{Ca}^{2+}$ .
40. How different products of inositol phosphate transmit signals?
41. Describe the various phases of cell cycle.
42. Add short notes on cell cycle control.
43. Brief on programmed cell death.
44. List the properties of tumour cells.
45. What is cancer? Give the different types of cancer.
46. Describe the role of DNA viruses in tumour development.
47. What are the functions of tumour suppressor gene products.
48. Give the significance of p53 in tumour suppression.
49. How is apoptotic pathway regulated?
50. RNA viruses as transforming agents – Justify.





27. Sketch the secretory pathway of proteins with description.
28. Explain the events taking place in the lumen of ER.
29. Describe the experiments in support of the protein traffic and localization.
30. Explain the synthesis of nuclear coded and membrane proteins.
31. Describe the structure and assembly of microfilaments.
32. Explain the organization, dynamics and functions of microtubules.
33. Sketch the structure of a skeletal muscle and comment on its organization.
34. Outline the mechanism of muscle contraction.
35. Describe the functions of receptor tyrosine kinases.
36. Elaborate on MAP kinase signaling pathway.
37. Describe the Ras signaling pathway.
38. Explain the cAMP signal transduction pathways.
39. What are G-protein coupled receptors? Explain the mechanism of signal transduction.
40. Give a detailed account on the signaling molecules and their receptors.
41. Give the overview of cell cycle.
42. How the cell cycle is controlled in mammalian cells?
43. Explain the various checkpoints in cell-cycle regulation.
44. Explain the extrinsic pathway of apoptosis.
45. Describe on the genetic basis and onset of cancer.
46. Explain any two tumour causing viruses and their mode of action.
47. Explain the pathway and consequences of rb mutation in mammalian cells.
48. Elaborate on tumour suppressor gene products.
49. What is the importance of p53? Explain its mechanism of action.
50. What is the role of BRCA 1 and 2? What happens when they are mutated?

**SECTION – A**

**ANSWER KEY**

- 1) b) sphingolipid
- 2) d) lateral diffusion
- 3) b) recognition
- 4) b) glycoporphins
- 5) d) all of the above
- 6) c) hydrophilic and hydrophobic
- 7) b) asymmetric
- 8) a) symport
- 9) d) Perform all of these functions
- 10) a) Ceramide with one or more sugar residues
- 11) b) Both polar and nonpolar groups
- 12) d) cell membrane
- 13) b) intrinsic proteins
- 14) b) lipid bilayer
- 15) c) selectively permeable
- 16) c) flip flop diffusion
- 17) c) 1972
- 18) c) both A and B
- 19) a) Cholesterol
- 20) a) 2-10% by weight
- 21) a) Phagocytosis
- 22) c) receptor mediated endocytosis
- 23) d) all the above
- 24) b) pinocytosis
- 25) b) passive transport
- 26) c) K<sup>+</sup>
- 27) a) Hypertonic
- 28) c) facilitated diffusion

- 29) a) Lysosomes
- 30) d) All of these
- 31) a) Lysosomes
- 32) b) isotonic solution
- 33) c) 0 Kcal
- 34) b) active transport
- 35) a) primary active transport
- 36) a) 1
- 37) d) Endocytosis
- 38) a) Carrier protein
- 39) c) receptor mediated endocytosis
- 40) b) Na<sup>+</sup> K<sup>+</sup> ATPase
- 41) b) RER
- 42) b) lysosomes
- 43) c) golgi apparatus
- 44) d) all of these
- 45) a) Lysosomes
- 46) a) Endoplasmic reticulum
- 47) d) In unfolded extended form without chaperones
- 48) c) GTP hydrolysis within the cytosol.
- 49) c) Attached carbohydrate with terminal mannose-6-phosphate
- 50) c) v-SNARE
- 51) c) Immunological techniques
- 52) c) By electrostatic force
- 53) a) Rhodamine
- 54) a) endoplasmic reticulum
- 55) d) lysine and arginine
- 56) d) 76
- 57) a) cotranslational
- 58) c) the proteasome
- 59) c) Added in the ER and modified in the Golgi

- 60) a) inner membrane translocase
- 61) b) hold their shape
- 62) a) actin protein
- 63) d) all of these
- 64) a) microtubules
- 65) b) 'Tau' protein
- 66) d) all the above
- 67) c) tubulin
- 68) a) GDP
- 69) a) cytoplasmic protein kinases are activated
- 70) b) phospholipase C
- 71) d) both a) and b)
- 72) a) first messenger
- 73) c) They form intracellular conducting channels
- 74) b) Thyroxine
- 75) d) Number of receptors in a target cell is constant
- 76) c) Phospholipase C
- 77) d) Signal transducers
- 78) c) Diacyl glycerol
- 79) a)  $\alpha$ -Subunit
- 80) c) ligand binding
- 81) d) remain confined to their original site
- 82) d) all of the above
- 83) c) proto-oncogenes are genetic junk that has not yet been eliminated by natural selection
- 84) c) cyclin-dependent kinases
- 85) d) all of the above
- 86) a) pachytene
- 87) b) Uncontrolled mitosis
- 88) b) metastasis
- 89) a) immunotherapy
- 90) c) cytokines and growth factors

- 91) b) S phase
- 92) a) G1-S
- 93) c) mitochondria
- 94) d) virus infected cells
- 95) a) G1 to S
- 96) c) Bcl-2
- 97) b) RNA Tumor virus
- 98) a) DNA Tumor virus
- 99) b) Rb binds the transcription factor E2F and thus prevents the cell from entering S phase until a mitogenic signal is received
- 100) d) A protein that controls progression through the cell cycle.

KASC-Biochemistry (PG)



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**M.Sc BIOCHEMISTRY**

**QUESTION BANK**

**ODD SEMESTER (2018-19)**

**C.P.11 CLINICAL BIOCHEMISTRY (17PBC311)**







12. Major constituent of hemoglobin receives iron from  
a) Liver                                      b) Bolus                                      c) Chyme                                      d) Lungs
13. The normal range of hemoglobin in female is  
a) 1-4 g/dl                                      b) 30-40 g/dl                                      c) 40-50 g/dl                                      d) 12-15 g/dl
14. Oxygen combines with hemoglobin in blood and form  
a) Oxyhemoglobin                                      b) Deoxyhemoglobin  
c) Hemoglobin                                      d) Carbohemoglobin
15. Thalassemia is characterized by defect in production of  
a) Alpha globin chain                                      b) Beta globin chain  
c) Pyrrole                                      d) Alpha and beta globin chain
16. Beta thalassemia is also called as  
a) Hemoglobinopathies                                      b) Cooley anemia  
c) Sickle cell anemia                                      d) Alpha thalassemia
17. The globin chain composition HbF is  
a) Alpha<sub>2</sub> beta<sub>2</sub>                                      b) Alpha<sub>2</sub> gamma<sub>2</sub>                                      c) Alpha<sub>2</sub> delta<sub>2</sub>                                      d) Beta<sub>4</sub>
18. Hemoglobin is separated by using  
a) Electrophoresis                                      b) Chromatography                                      c) Centrifugation                                      d) Colorimetry
19. Life span of RBC is  
a) 50 days                                      b) 75 days                                      c) 100 days                                      d) 120 days
20. Porphyria that is caused due to defect in uroporphyrinogen I synthase is termed as  
a) Acute intermittent porphyrin                                      b) Porphyria cutanea tarda  
c) Hereditary corproporphyria                                      d) Variegate porphyria
21. Most of the volume of normal human blood is composed of  
a) Red cells                                      b) Hemoglobin                                      c) Plasma                                      d) White cells
22. Which vein is the first choice for primary vein selection for a venipuncture?  
a) Basilic                                      b) Cephalic                                      c) Median cubital                                      d) Hand vein
23. At what angle should you insert the needle?  
a) 15 degrees                                      b) 90 degrees                                      c) 25 degrees                                      d) 30 degrees
24. The anticoagulant used in arterial blood gas specimen collection is:  
a) EDTA                                      b) Heparin                                      c) Sodium citrate                                      d) Formalin

25. Which of the following is an acceptable range of needle gauges for arterial puncture?  
a) 16 to 21                      b) 18 to 23                      c) 20-25                      d) 23 to 28
25. The first choice location for performing arterial puncture is the:  
a) Brachial artery                      b) Ulnar artery                      c) Femoral artery                      d) Radial artery
26. The smallest veins of the human anatomy are known as  
a) Capillaries                      b) Arteries                      c) Venules                      d) Arterioles
27. Which colour evacuated tube used to collect for complete blood count?  
a) Green                      b) Lavender                      c) Orange                      d) Black
28. Anticoagulants are used to prevent  
a) Deep vein thrombosis                      b) Respiratory diseases  
c) Brain disease                      d) Acute renal failure
29. Normal urine primarily consist of  
a) Water, protein, and sodium                      b) Water, urea, and protein  
c) Water, urea, and sodium chloride                      d) Water, urea, and bilirubin
30. Considering normal urine composition, urea content is  
a) 7.7 g /L                      b) 8.7 g/L                      c) 9.3 g/L                      d) 10.2 g/L
31. The example for urine preservative is  
a) Thymol                      b) Glucose                      c) Acetone                      d) Ethanol
32. The normal range of urine pH is  
a) 9-10                      b) 4.5-8.0                      c) 2.0-4.0                      d) 10-13
33. The normal amount of glucose in urine is  
a) 0-0.8 mmol/L                      b) 2.0-3.0 mmol/L                      c) 2.5-6.0 mmol/L                      d) 7.0-8.0 mmol/L
34. CSF is produced in  
a) Heart                      b) Kidney                      c) Brain                      d) Adipose tissue
35. The daily turnover of CSF is about  
a) 1000 ml                      b) 500 ml                      c) 200 ml                      d) 1200 ml
36. In which lumbar puncture region used to collect CSF?  
a) L3 and L4                      b) L6 and L7                      c) L4 and L5                      d) L8 and L8
37. Amniotic fluid is produced in  
a) Liver                      b) Lung                      c) Amniotic sac                      d) Kidney

38. Amniocentesis is generally performed between  
a) 20 and 25 weeks      b) 50-60 weeks      c) 4-8 weeks      d) 15 and 18 weeks
39. The colour of amniotic fluid is  
a) Red brown      b) Colourless      c) Yellow      d) Dark green
40. AST is the marker for  
a) Kidney      b) Lung      c) Liver      d) Brain
41. Then number of carbon present in isoprene units are  
a) 50-60 U/L      b) 7-55 U/L      c) 20-40 U/L      d) 15-25 U/L
42. In which of the following conditions the level of creatinine kinase 1 increases?  
a) Myocardial ischemia      b) Brain ischemia      c) Kidney damage      d) Diabetes
43. The composition of LDH-2 subunits is  
a) H4      b) H3M      c) H2M2      d) HM3
44. The reference range of ACP is  
a) 10 ng/ml      b) 50 ng/ml      c) 2 ng/ml      d) 6 ng/ml
45. Isocitrate dehydrogenase is catalyzed the reaction called  
a) Isomerization      b) Phosphorylation  
c) Polymerization      d) Oxidative decarboxylation
46. Which of the following marker is used for the differential diagnosis of obstructive jaundice?  
a) LDH      b) 5'Nucleotidase      c) CK      d) Glucosidase
47. The normal range of 5' nucleotidase is  
a) 15-19 U/L      b) 1-2 U/L      c) 2-15 U/L      d) 30-35 U/L
48. Gamma glutamyl transferase is used to detect the disease of  
a) Liver      b) Brain      c) Kidney      d) Lung
49. The transfer of gamma glutamyl group from peptides to acceptor peptide molecules is catalyzed by the enzyme  
a) Lipase      b) Amylase      c) GGT      d) Esterase
50. In which condition the level of lipase is increased?  
a) Pancreatitis      b) Gastritis      c) Meningitis      d) Heart problem
52. Lipase is produced by  
a) Brain      b) Pancreas      c) Liver      d) Kidney

51. The normal range of lipase is  
a) 80-120 U/L                      b) 80-150 U/L                      c) 0-160 U/L                      d) 1-2 U/L
52. When does serum amylase rise in acute pancreatitis?  
a) 6 hours                              b) 24 hours                              c) 72 hours                              d) 3-5 days
53. How long does serum amylase remains elevated in acute pancreatitis?  
a) Less than 24 hours                      b) 1-3 days                              c) 5-14 days                              d) 2-4 weeks
54. In the intestine, trypsinogen is converted into trypsin by the action of  
a) Pepsin                                  b) Trypsin                                  c) Enterokinase                              d) Elastase
55. Chymotrypsin is an  
a) Endopeptidase                              b) Exopeptidase                              c) Exonuclease                              d) Endonuclease
56. The normal range of cholinesterase is  
a) 20-25 U/ml                              b) 8-18 U/ml                              c) 30-35 U/ml                              d) 40-50 U/ml
57. The level of thyroid hormone is decreased from the normal range is called  
a) Hyperglycemia                              b) Hypoglycemia                              c) Hypothyroidism                              d) Hyperthyroidism
58. The normal serum protein level is  
a) 6-8 g/dl                                  b) 9-10 g/dl                                  c) 12-14 g/dl                                  d) 15-20 g/dl
59. The normal range of total bilirubin is  
a) 5-10 mg/dl                                  b) 6-9 mg/dl                                  c) 11-15 mg/dl                                  d) 0.1-1.2 mg/dl
60. Jaundice is caused due to increase amount of  
a) Uric acid                                  b) Hemoglobin                                  c) Bilirubin                                  d) Potassium
61. Bilirubin is the waste product is released during the breakdown of  
a) Mast cell                                  b) RBC    c) WBC    d) Platelets
62. Late stage of chronic liver disease is called  
a) Cirrhosis                                  b) Liver failure                                  c) Fatty liver                                  d) Liver cancer
63. Cirrhosis is most accurately diagnosed by  
a) Eye exam                                  b) Blood test                                  c) Liver biopsy                                  d) Urine exam
64. Which of the following viral causes of hepatitis is transmitted by contaminated food or water?  
a) Hep D    b) Hep E    c) Hep C    d) Hep B
65. Hepatitis is caused due to the inflammation of  
a) Brain    b) Kidney    c) Pancreas    d) Liver



79. Apoptosis is defined as
- a) Programmed cell death
  - b) Non programmed cell death
  - c) Accidental cell death
  - d) Mitotic cell death
80. Which of the following is an anti apoptotic protein?
- a) BCL-Xs
  - b) Bfl 1
  - c) Bim
  - d) NOXA
81. Which of the following is an inhibitor of apoptosis?
- a) Caspase
  - b) SMAC
  - c) IAP
  - d) DIABLO
82. Caspase is activated by
- a) IAP
  - b) DNase
  - c) RNase
  - d) Cytochrome
83. Which type of epidermal growth factor receptor is over expressed in OSCC?
- a) ErbB-5
  - b) ErbB-6
  - c) ErbB-1
  - d) ErbB-3
84. The gene for Ki 67 is located on chromosome number
- a) 10q25
  - b) 13p30
  - c) 10p25
  - d) 13q30
85. The normal range of prostate stimulating antigen is
- a) 6 ng/ml
  - b) 1 ng/ml
  - c) 4 ng/ml
  - d) 8 ng/ml
86. BRCA 1 is a marker for
- a) Liver cancer
  - b) Breast cancer
  - c) Colon cancer
  - d) Skin cancer
87. The marker for colorectal cancer is
- a) CA 72-4
  - b) P53
  - c) CA 19.9
  - d) P21
88. The normal range of CA 72.4 is
- a) Less than 6 U/ml
  - b) More than 6 U/ml
  - c) 10 U/ml
  - d) Less than 1 U/ml
89. Low level of alfa fetoprotein is seen in
- a) Cystic fibrosis
  - b) Wilson's disease
  - c) Down syndrome
  - d) Hepatic cancer
90. Increased WBC content will leads to
- a) Lung cancer
  - b) Leukemia
  - c) Skin cancer
  - d) Sarcoma
91. Cancer is caused due to
- a) Controlled mitosis
  - b) Uncontrolled mitosis
  - c) Controlled meiosis
  - d) Uncontrolled meiosis
92. Which of the following is the most commonly mutated oncogene in cancer?
- a) p53
  - b) ABL
  - c) RAS
  - d) BRCA

93. Migration of cancerous cells from the site of origin to other part of the body forming secondary tumors is called
- a) Diapedesis                      b) Metastasis                      c) Proliferation                      d) Apoptosis
94. Mutation is caused by
- a) Carcinogen                      b) Mutagen                      c) Radiation                      d) Proliferation
95. From a single molecule of DNA, PCR can make
- a) One additional copy                      b) Hundreds of copies  
c) Thousands of copies                      d) Millions of copies
96. P53 is an
- a) Oncogene                      b) Cytotoxic protein  
c) Tumor suppressor protein                      d) Glycoprotein
97. A free radical has
- a) Unpaired electrons                      b) Paired electrons                      c) No electrons                      d) Even no. of electrons
98. The example of enzymatic antioxidant is
- a) Vitamin A                      b) Vitamin E                      c) Catalase                      d) Vitamin D

**(Knowledge levels K2 – Understanding, K3-Appling, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom's Taxonomy)**

**SECTION – B**

1. Write a note on C-reactive protein test.
2. Explain rheumatoid arthritis test.
3. What is hemoglobin? Explain its types.
4. What is thalassemia? Give the causes of thalassemia.
5. Summarize the clinical significance of hemoglobin.
6. Give an account on porphyrins.
7. Explain the types of porphyrias.
8. Describe the role of erythrocyte.
9. Give the clinical significance of prothrombin test.
10. Explain the procedure involved in coagulation test.
11. Differentiate serum and plasma.
12. How will you collect the blood using skin puncture method?
13. Write a note on anticoagulants and its uses.
14. Explain the types of preservative to preserve the urine specimen.
15. What is meant by ketone bodies? Give its clinical significance.
16. Write down the clinical significance of bilirubin.
17. Give a note on clinical findings of proteins.
18. Explain the clinical findings of sugars.
19. What are different types of methods adapted to measure glucose and protein level in urine?
20. What is CSF? Give its clinical findings.
21. Write a short note on principle of clinical enzymology.
22. Give a note on principle and clinical significance of AST.
23. Explain the principle and clinical findings of acid phosphatase.
24. Write about procedure and clinical significance of 5'-nucleotidase.
25. Explain the procedure for glutamate dehydrogenase.



26. How would you explain the procedure and clinical findings of glucose-6-phosphate dehydrogenase?
27. Write a note on any three enzymatic patterns of hepatobiliary diseases.
28. What is meant by steroid? Explain its clinical significance.
29. Give a note on clinical significance of protein.
30. What is meant by thyroid hormone? Give its clinical findings.
31. List out the functions of liver.
32. Explain the types of jaundice.
33. Give a note on liver function test.
34. Explain the causes, symptoms and diagnostic test for cirrhosis.
35. Write a short note on alcoholic and non-alcoholic fatty liver.
36. How will you diagnosis the glomerular disease.
37. Explain the pathophysiology, diagnosis and clinical features of type I renal tubular acidosis.
38. How will you collect gastric sample. Explain about Hollanders test.
39. Write a note on causes, symptoms and diagnosis of hypolipoproteinemia.
40. What is meant by lipoprotein? Explain its types.
41. Explain the application of biomarker in oral cancer.
42. Give a note on prostate specific antigen with its clinical findings.
43. Write a short note on carcino embryogenic antigen.
44. Explain the types of leukemia with its diagnostic findings.
45. What is cancer? Explain the properties of cancer.
46. What are tumor suppressor genes? Give its functions.
47. How will you diagnosis the cancer using PCR.
48. What are free radicals? Explain the mechanism of antioxidants to quenching free radicals.
49. Write down the mechanism of lipid peroxidation.
50. Give a note on principle of any two types of enzymatic antioxidants.

**(Knowledge levels K2 – Understanding, K3-Applying, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom’s Taxonomy)**

**SECTION – C**

1. Give a brief account on pregnancy test.
2. Enumerate on CRP and RA test.
3. Briefly explain CRP latex test.
4. Describe the principle, procedure and clinical significance of RA test.
5. How will you separate the hemoglobin using electrophoresis?
6. Explain briefly on types of thalassemia.
7. Describe about types, pathophysiology and clinical findings of hemoglobinopathies.
8. Enumerate on erythrocyte metabolic pathway.
9. Explain in detailed note on disorders of erythrocyte metabolic pathway.
10. Describe on types, causes and clinical findings of porphyrins.
11. Describe the detailed procedure involved in blood collection using vein puncture method.
12. How would you briefly summarize the collection of blood using arterial puncture.
13. Explain any two methods used to collect blood sample.
14. Enumerate on collection of timed urine specimen.
15. How could you explain the different methods used to test urinary compounds?
16. Briefly explain the clinical significance of urinary compounds.
17. Explain the collection and composition of CSF.
18. Give a brief account on origin, collection and composition of amniotic fluid.
19. Elaborate the types of chemical examination used with the help of CSF.
20. Briefly explain the analysis of amniotic fluid.
21. Elaborate the principle of diagnostic enzymology and write down the different factors that affect enzyme level in blood.
22. Explain the principle, assay and clinical significance of creatine kinase.
23. Briefly explain the principle, procedure and clinical findings of lactate dehydrogenase.
24. Give a brief account on principle, assay and clinical significance of isocitrate dehydrogenase.

25. Summarize about principle, procedure and clinical findings of gamma glutamyl transferase.
26. Describe the assay and clinical significance of amylase and trypsin.
27. Explain on principle, assay and clinical findings of trypsin and chymotrypsin.
28. Elaborate the principle, procedure and clinical significance of choline esterase.
29. Briefly explain the enzymatic pattern of myocardial infarction.
30. Enumerate on enzymatic pattern of hepatobiliary disease.
31. Briefly explain bilirubin metabolism.
32. Describe the causes, symptoms and diagnostic test with its clinical findings of hepatitis.
33. Enumerate briefly about gall stones.
34. Elaborate on renal function test.
35. Explain the causes, risk factors, symptoms and diagnostic test of acute kidney failure.
36. Summarize the chemical analysis of urinary calculi.
37. Explain on pancreatic function test.
38. Describe about gastric function test.
39. Elaborate the cause, symptoms and diagnostic test for hyperlipoproteinemia.
40. Give a brief account on diagnostic test for lipoprotein disorder.
41. Briefly explain intrinsic and extrinsic apoptotic pathway.
42. Describe about oral cancer marker.
43. Enumerate the marker for breast cancer.
44. Give a brief account on GI tract cancer biomarker.
45. Explain the structure, function and clinical findings of alpha fetoprotein.
46. Write a brief note on tumor suppressor genes and its functions.
47. Explain the mechanism of radiation that induces cancer.
48. Briefly explain the mechanism of chemical carcinogens.
49. What are free radicals and antioxidants? Explain its types.
50. Briefly summarize on production of haploid cells with its functions.

**SECTION – A**

**ANSWER KEY**

1. a) Liver
2. b) Below 2 mg/L
3. a) hCG
4. d) Urine
5. b) Immune system
6. d) Synovial tissues
7. b) 5-20 mm/hr
8. a) Sed rate test
9. b) Glycoprotein
10. b) 25-39 sec
11. c) Sodium citrate
12. a) Liver
13. d) 12-15 g/dl
14. a) Oxyhemoglobin
15. d) Alpha and beta globin chain
16. b) Cooley anemia
17. b) Alpha<sub>2</sub> gamma<sub>2</sub>
18. a) Electrophoresis
19. d) 120 days
20. a) Acute intermittent porphyrin
21. c) Plasma
22. c) Median cubital
23. d) 30 degrees
24. b) Heparin
25. c) 20-25
26. d) Radial artery
27. c) Venules
28. b) Lavender

29. a) Deep vein thrombosis
30. c) Water, urea, and sodium chloride
31. c) 9.3 g/L
32. a) Thymol
33. b) 4.5-8.0
34. a) 0-0.8 mmol/L
35. c) Brain
36. b) 500 ml
37. a) L3 and L4
38. c) Amniotic sac
39. d) 15 and 18 weeks
40. b) Colourless
41. c) Liver
42. b) 7-55 U/L
43. b) Brain ischemia
44. a) H4
45. c) 2 ng/ml
46. d) Oxidative decarboxylation
47. b) 5'Nucleotidase
48. c) 2-15 U/L
49. a) Liver
50. c) GGT
51. a) Pancreatitis
52. b) Pancreas
53. c) 0-160 U/L
54. b) 24 hours
55. b) 1-3 days
56. c) Enterokinase
57. a) Endopeptidase
58. b) 8-18 U/ml
59. c) Hypothyroidism

- 60. a) 6-8 g/dl
- 61. d) 0.1-1.2 mg/dl
- 62. c) Bilirubin
- 63. b) RBC
- 64. a) Cirrhosis
- 65. c) Liver biopsy
- 66. b) Hep E
- 67. d) Liver
- 68. d) Chronic alcoholism
- 69. a) Fat
- 70. b) Cholesterol stones
- 71. a) Gall bladder
- 72. b) 0.6–1.1 mg/dl
- 73. c) Decreased urine output
- 74. c) Filtration
- 75. a) Acidic
- 76. c) Calcium oxalate
- 77. d) Cystinuria
- 78. b) 1 L
- 79. b) 24 hrs
- 80. c) Lipoprotein lipase
- 81. a) Programmed cell death
- 82. b) Bfl 1
- 83. c) IAP
- 84. d) Cytochrome
- 85. c) ErbB-1
- 86. a) 10q25
- 87. c) 4 ng/ml
- 88. b) Breast cancer
- 89. c) CA 19.9

- 90. a) Less than 6 U/ml
- 91. c) Down syndrome
- 92. b) Leukemia
- 93. b) Uncontrolled mitosis
- 94. c) RAS
- 95. b) Metastasis
- 96. b) Mutagen
- 97. d) Millions of copies
- 98. c) Tumor suppressor protein
- 99. a) Unpaired electrons
- 100.c) Catalase

KASC-Biochemistry (PG)



**KONGUNADU ARTS AND SCIENCE COLLEGE  
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**DEPARTMENT OF BIOCHEMISTRY  
(PG AND RESEARCH)**

**M.Sc BIOCHEMISTRY**

**QUESTION BANK**

**ODD SEMESTER (2018-19)**

**C.P.12 - BIOSTATISTICS AND RESEARCH METHODOLOGY**

**(17PBC312)**





**C.P.12 - BIostatistics and Research Methodology**

**SECTION – A**

**(Knowledge level K1 Remembering is to be followed in relation to Course Outcomes specified as per Bloom's Taxonomy)**

**Choose the correct answer:**

- Which of the following is a continuous data?
  - Gender of a person
  - stages of cancer
  - cholesterol level
  - no. of children in a family
- Diagrams and graphs are tools of
  - Collection of data
  - analysis
  - presentation
  - summarization
- Column headings are called as
  - Captions
  - stubs
  - head note
  - foot note
- Angular diagram is
  - Pie diagram
  - simple bar diagram
  - multiple bar diagram
  - sub-divided bar diagram
- Diagrams such as cubes and cylinders are classified as
  - one dimension diagrams
  - two dimension diagrams
  - three dimensional diagrams
  - dispersion diagrams
- Discrete variables and continuous variables are two types of
  - open end classification
  - time series classification
  - qualitative classification
  - quantitative classification
- Classification method in which upper limit of interval is same as of lower limit class interval is called
  - exclusive method
  - inclusive method
  - mid-point method
  - ratio method
- When data are classified according to a single characteristic, it is called:
  - Quantitative classification
  - Qualitative classification
  - Area classification
  - Simple classification
- Classification of data according to location or areas is called:
  - Qualitative classification
  - Quantitative classification
  - Geographical classification
  - Chronological classification

10. When data are arranged at regular interval of time, the classification is called:  
a) Qualitative      b) Quantitative      c) Chronological      d) Geographical
11. The frequency distribution according to individual variate values is called:  
a) Discrete frequency distribution      b) Cumulative frequency distribution  
c) Percentage frequency distribution      d) Continuous frequency distribution
12. A frequency distribution can be:  
a) Qualitative      b) Discrete      c) Continuous      d) Both (b) and (c)
13. The grouped data are called:  
a) Primary data      b) Secondary data      c) Raw data      d) Difficult to tell
14. A series of data with exclusive classes along with the corresponding frequencies is called:  
a) Discrete frequency distribution      b) Continuous frequency distribution  
c) Percentage frequency distribution      d) Cumulative frequency distribution
15. The largest and the smallest values of any given class of a frequency distribution are called:  
a) Class Intervals      b) Class marks      c) Class boundaries      d) Class limits
16. The number of classes depends upon:  
a) Class marks      b) Frequency      c) Class interval      d) Class boundary
17. The arrangement of data in rows and columns is called:  
a) Classification      b) Tabulation  
c) Frequency distribution      d) Cumulative frequency distribution
18. Total angle of the pie-chart is:  
a)  $45^\circ$       b)  $90^\circ$       c)  $180^\circ$       d)  $360^\circ$
19. Histogram is a graph of:  
a) Frequency distribution      b) Time series      c) Qualitative data      d) Ogive
20. Ogive curve can be occurred for the distribution of:  
a) Less than type      b) More than type  
c) Both (a) and (b)      d) Neither (a) and (b)
21. Which of the following one is a related positional measure of median?  
a) Mean      b) range      c) deciles      d) weighted average
22. The mode can be located graphically by  
a) Ogives      b) histogram      c) frequency polygon      d) harmonic mean

23. The amount of change in one variable tends to bear constant ratio to the amount of change in another variable then the correlation is said to be
- a) Linear            b) positive            c) negative            d) curvilinear
24. Median of 7, 6, 4, 8, 2, 5, 11 is
- a) 6            b) 12            c) 11            d) 4
25. Number which occurs most frequently in a set of numbers is
- a) Mean            b) median            c) mode            d) None of above
26. If mean of 6 numbers is 41 then sum of these numbers is
- a) 250            b) 246            c) 134            d) 456
27. Distribution in which values of median, mean and mode are not equal is considered as
- a) experimental distribution            b) asymmetrical distribution  
c) symmetrical distribution            d) exploratory distribution
28. Extent to which values are dispersed around central observation is considered as
- a) Trailing            b) variation            c) extension            d) centralized valuation
29. Mode is best measure of tendency if analysis is
- a) Descriptive            b) exploratory            c) experimental            d) set of deciles
30. Standard deviation of population is denoted by
- a)  $\Omega$             b)  $\omega$             c)  $\sigma$             d)  $\Sigma$
31. If arithmetic mean is multiplied to coefficient of variation then resulting value is classified as
- a) coefficient of deviation            b) coefficient of mean  
c) standard deviation            d) variance
32. The measurements of spread or scatter of the individual values around the central point is called:
- a) Measures of dispersion            b) Measures of central tendency  
c) Measures of skewness            d) Measures of kurtosis
33. The measure of dispersion which uses only two observations is called:
- a) Mean            b) Median            c) Range            d) Coefficient of variation
34. If the dispersion is small, the standard deviation is:
- a) Large            b) Zero            c) Small            d) Negative

35. If there are ten values each equal to 10, then standard deviation of these values is:  
a) 100                      b) 20                      c) 10                      d) 0
36. The lower and upper quartiles of a distribution are 80 and 120 respectively, while median is 100. The shape of the distribution is:  
a) Positively skewed      b) Negatively skewed      c) Symmetrical      d) Normal
37. A process by which we estimate the value of dependent variable on the basis of one or more independent variables is called:  
a) Correlation                      b) Regression                      c) Residual                      d) Slope
38. In the regression equation  $Y = a + bX$ , the Y is called:  
a) Independent variable                      b) Dependent variable  
c) Continuous variable                      d) None of the above
39. A measure of the strength of the linear relationship that exists between two variables is called:  
a) Slope      b) Intercept                      c) Correlation coefficient      d) Regression equation
40. The term regression was used by:  
a) Newton                      b) Pearson                      c) Spearman                      d) Galton
41. Addition rule of probability applies to  
a) Independent events                      b) dependent events  
b) Mutually exclusive events                      d) mutually inclusive events
42. The mean of binomial distribution is  
a)  $npq$                       b)  $np$                       c)  $n$                       d)  $pq$
43. Each outcome of a random experiment is called  
a) compound event      b) simple event      c) primary event      d) derived event
44. The probability distribution expressing the probability of one set of dichotomous alternatives is  
a) binomial                      b) poisson                      c) normal                      d) multinomial
45. All the following are properties of normal curve except  
a) bell shaped                      b) unimodal                      c) discrete variable      d) asymptotic

46. If the probability of defective bolt is 0.2, find the standard deviation for binomial distribution of defective bolts in a total of 100
- a) 2                                      b) 4                                      c) 3                                      d) 8
47. In random experiment, observations of random variable are classified as
- a) Events                                      b) composition                                      c) trials                                      d) functions
48. In binomial distribution, formula of calculating standard deviation is
- a) square root of  $p$                                       b) square root of  $pq$   
c) square root of  $npq$                                       d) square root of  $np$
49. In binomial probability distribution, success and failure generated by trial is respectively denoted by
- a)  $p$  and  $q$                                       b)  $a$  and  $b$                                       c)  $p + q$                                       d)  $p - q$
50. Normal distribution is also classified as
- a) Gaussian distribution                                      b) Poisson distribution  
c) Bernoulli's distribution                                      d) weighted average distribution
51. In probability theories, events which can never occur together are classified as
- a) collectively exclusive events                                      b) mutually exhaustive events  
c) mutually exclusive events                                      d) collectively exhaustive events
52. Occurrence of two events in a way that events have some connection in between is classified as
- a) compound events                                      b) mutual events  
c) connected events                                      d) interlinked events
53. Method in which previously calculated probabilities are revised with new probabilities is classified as
- a) updating theorem                                      b) revised theorem  
c) Bayes theorem                                      d) dependency theorem
54. Probability of events must lie in limits of
- a) one to two                                      b) two to three                                      c) one to two                                      d) zero to one
55. Conditional probability of two independent events  $Y$  and  $Z$  can be written as
- a)  $P(Y - Z)$                                       b)  $P(Y * Z)$                                       c)  $P(Y|Z)$                                       d)  $P(Y + Z)$

56. Previous probabilities in Bayes Theorem that are changed with help of new available information are classified as
- a) independent probabilities
  - b) posterior probabilities
  - c) interior probabilities
  - d) dependent probabilities
57. Sample space for experiment in which two coins are tossed is
- a) 4
  - b) 8
  - c) 2
  - d) 10
58. If occurrence of one event affects or explains occurrence of other event then events are classified as
- a) known events
  - b) unknown events
  - c) independent events
  - d) dependent events
59. Discrete probability distribution in which outcome is very small with a very small period of time is classified as
- a) posterior distribution
  - b) cumulative distribution
  - c) normal distribution
  - d) Poisson distribution
60. Around central value of observations, extent to which values depart from normal distribution is classified as
- a) negative variation
  - b) positive variation
  - c) skewness
  - d) positive trailing
61. An experimental design is
- a) a graph
  - b) a size
  - c) an item
  - d) a plan of experiment
62. Appropriate statistical method to compare two means is
- a) Student's t-test
  - b) chi-square test
  - c) odds ratio
  - d) parametric sign test
63. Analysis of variance technique originated in
- a) Agrarian research
  - b) industrial research
  - c) biological research
  - d) social research
64. Local control in the field is maintained through
- a) Uniformity trails
  - b) randomization
  - c) replication
  - d) permutation
65. When observed and expected frequencies completely coincide, chi-square will be
- a) +1
  - b) zero
  - c) greater than 1
  - d) less than 1

66. What type of data do you need for a chi-square test?  
a) parametric                      b) categorical                      c) ratio                      d) scale
67. The assumption in analysis of variance is  
a) normality                      b) homogeneity  
c) independence of error                      d) all the above
68. What symbol is used to represent the chi-square test?  
a)  $\chi^2$                       b)  $\pi$                       c)  $\xi$                       d)  $\mu$
69. How many dependent variables are there in a two-way ANOVA?  
a) 1                      b) 2                      c) 3                      d) 4
70. Randomization in an experiment helps to eliminate  
a) Dependence among observations                      b) systematic influences  
c) human bias                      d) error
71. Which of the following is a non-parametric test ?  
a) F test                      b) t test                      c) chi square test                      d) z test
72. Any statement whose validity is tested on the basis of a sample is called  
a) Alternative hypothesis                      b) simple hypothesis  
c) statistical hypothesis                      d) null hypothesis
73. Analysis of variance technique was developed by  
a) Gosset                      b) Karl Pearson                      c) R.A.Fisher                      d) Laplace
74. The number of independent values in a set of values is called:  
a) Test-statistic                      b) Degree of freedom  
c) Level of significance                      d) Level of confidence
75. Student's t-statistic is applicable in case of:  
a) Equal number of samples                      b) Unequal number of samples  
c) Small samples                      d) All of the above
76. A statement about a population developed for the purpose of testing is called:  
a) Hypothesis                      b) Hypothesis testing  
c) Level of significance                      d) Test-statistic

77. Test to be applied when number of observations are less than 30 and variance is not known, is said to be
- a) Z-test                      b) T-test                      c) F-test                      d) Chi-square test
78. Which of the following approach should be used if you can't fix the variable ?
- a) randomize it      b) non stratify it      c) generalize it      d) none of the Mentioned
79. The purpose of hypothesis testing is to:
- a) test how far the mean of a sample is from zero  
b) determine whether a statistical result is significant  
c) determine the appropriate value of the significance level  
d) derive the standard error of the data
80. An experimental design where the experimental units are randomly assigned to the treatments are known as
- a) factor block design                      b) random factor design  
c) completely randomized design      d) none of these
81. Reports present conclusion based on
- a) intuition                      b) impression                      c) investigation                      d) belief
82. It is in this section that you fully interpret and evaluate your results.
- a) introduction      b) method                      c) result                      d) discussion
83. Which of the following abbreviations can be used in a research report?
- a) IQ                      b) sec. for second                      c) yr. for year                      d) mo. for month
84. Patent application can be filed in India by
- a) True and First Inventor                      b) Assignee of the inventor  
c) Legal representative of the inventor      d) All the above
85. Summary of an effective technical document, excluded;
- a) Definitions                      b) main idea  
c) introduction sentence                      d) title
86. Largest section of report in technical writing, termed as:
- a) conclusion/recommendation                      b) discussion  
c) heading                      d) footing





97. Which is the characteristic of research?
- a) Data are collected systematically
  - b) Data are interpreted systematically
  - c) There is a clear purpose to find out things
  - d) All the above
98. All of these may appear in a research proposal, but which will appear always?
- b) Business objective
  - b) Research objective
  - c) Creative objective
  - d) Marketing objective
99. The report is not
- c) A basis for decision making
  - b) Tangible evidence of a research report
  - c) Future secondary data
  - d) Research proposal
100. Graph which shows changes over a specific time period is called
- a) meridian graph
  - b) pie graph
  - c) line graph
  - d) bar graph

**(Knowledge levels K2 – Understanding, K3-Applying, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom’s Taxonomy)**

**SECTION – B**

- 1) List the functions of statistics.
- 2) What is histogram? How do you construct it?
- 3) State the essential characteristics of a good table.
- 4) Describe the types of classification of data
- 5) Write a short note on frequency curve and Ogive.
- 6) The following data relate to the monthly expenditure (In Rs.) of two families A and B.

Items of Expenditure	Expenditure	
	Family A	Family B
Food	1600	1200
Clothing	800	600
Rent	600	500
Light and fuel	200	100
Miscellaneous	800	600

Represent the above data by a suitable percentage diagram.

- 7) Add short notes on types of data.
  - 8) How data is collected through mailed questionnaire method?
  - 9) What are the sources of secondary data?
  - 10) Describe the types of table.
  - 11) From the following data compute arithmetic mean.
- |                        |      |       |       |       |       |       |
|------------------------|------|-------|-------|-------|-------|-------|
| <b>Marks</b>           | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
| <b>No. of Students</b> | 5    | 10    | 25    | 30    | 20    | 10    |
- 12) Blood serum cholesterol levels of 10 persons are as under:  
240, 260, 290, 245, 255, 288, 272, 263, 277, 251.  
Calculate standard deviation with the help of assumed mean.
  - 13) Add short notes of measures of variation.
  - 14) Define the following: i) quartile ii) decile iii) percentile iv) range
  - 15) A contractor employs three types of workers- male, female and children. To a male he pays Rs. 200 per day, to a female worker Rs.150 per day and to a child worker Rs.85 per day.  
What is the average wage per day paid by the contractor?
  - 16) Calculate the median for the following frequency distribution

<b>Marks</b>	45-50	40-45	35-40	30-35	25-30	20-25	15-20	10-15	5-10
<b>No. of students</b>	10	15	26	30	42	31	24	15	7

- 17) Calculate the lower and upper quartiles, third decile and 20<sup>th</sup> percentile from the following data.

<b>Central value</b>	2.5	7.5	12.5	17.5	22.2
<b>Frequency</b>	7	18	25	30	20

- 18) Compute coefficient of quartile deviation from the following data.

<b>Marks</b>	10	20	30	40	50	60
<b>No. of students</b>	4	7	15	8	7	2

- 19) Find the standard deviation from the following data.

<b>Age under</b>	10	20	30	40	50	60	70	80
<b>No. of persons dying</b>	15	30	53	75	100	110	115	125

- 20) Describe the scatter diagram method for studying correlation.
- 21) What are the properties of normal curve?
- 22) Write short notes on types of events.
- 23) Define probability and explain the laws of addition and multiplication in probability.
- 24) What is poisson distribution? Point out its rule.
- 25) Define mutually exclusive event, independent event and impossible events in probability.
- 26) The incidence of a certain disease is such that on the average 20% of workers suffer from it. If 10 workers are selected at random, find the probability that  
 (i) exactly 2 workers suffer from the disease  
 (ii) not more than 2 workers suffer from the disease.
- 27) The number of defects per unit in a sample of 330 units of manufactured product was found as follows.
- |                        |     |    |    |   |   |
|------------------------|-----|----|----|---|---|
| <b>No. of defects:</b> | 0   | 1  | 2  | 3 | 4 |
| <b>No. of units:</b>   | 214 | 92 | 20 | 3 | 1 |
- Fit a Poisson distribution to the data and test for goodness of fit. (Given  $e^{-0.439} = 0.6447$ )
- 28) A problem in statistics is given to 5 students A, B, C, D and E. Their chances of solving it are  $1/2, 1/3, 1/4, 1/5$  and  $1/6$ . What is the probability that the problem will be solved?
- 29) Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches. How many soldiers in a regiment of 1000 would you expect is be over six feet tall?
- 30) A bag contains 10 white and 6 black balls. 4 balls are successively drawn out and not replaced. What is the probability that they are alternately of different colours?
- 31) What is students 't' test? Explain its uses.
- 32) What is analysis of variance? Explain clearly the technique of variance for data with one-way classification.
- 33) Explain completely randomized design.
- 34) Describe the uses of chi-square test.
- 35) What are the advantages of a completely randomized experimental design?

- 36) Outline the steps involved in testing of statistical hypothesis.
- 37) In a sample of 500 people from a village in Tamilnadu, 280 are found to be rice eaters and the rest wheat eaters. Can we assume that both the food articles are equally popular?
- 38) Intelligence test on two groups of boys and girls gave the following results.

	<b>Mean</b>	<b>S.D</b>	<b>N</b>
<b>Girls</b>	75	15	150
<b>Boys</b>	70	20	250

Is there a significant difference in the mean scores obtained by boys and girls?

- 39) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.
- 40) A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine improved?
- 41) What are the components of the title page of a research paper?
- 42) Outline the steps involved in preparation of a manuscript.
- 43) Add notes on Displaying data tables, graphs and charts.
- 44) Comment on the role of hypothesis testing in a research report.
- 45) What is a patent? Write about the Indian Patent Act.
- 46) How to frame a study design?
- 47) Write about any two Indian funding agencies.
- 48) What are the steps involved in Publication of a research paper?
- 49) Add short notes on research opportunities in India.
- 50) List the steps involved in patent filing and granting.

**(Knowledge levels K2 – Understanding, K3-Applying, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom’s Taxonomy)**

**SECTION – C**

- 1) Explain the methods of collecting primary data.
- 2) Describe the classification of data.
- 3) Discuss on planning and execution of a statistical survey.
- 4) Give the different kinds of diagram. Explain with suitable examples.
- 5) What is a questionnaire? What are the characteristics of a good questionnaire?
- 6) Explain the important functions of statistics in science.
- 7) For a frequency distribution draw a histogram, frequency polygon and cumulative frequency curve.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	3	10	17	19	21	16	12	4

- 8) Explain the parts of a table.
- 9) Draw a pie diagram for the following data of sixth five-year plan public sector outlays.
 

Agriculture and rural development	12.9%
Irrigation, etc.	12.5%
Energy	27.2%
Industry and Minerals	15.4%
Transport, communication etc.	15.9%
Social services and others	16.1%

- 10) Present the following information in a suitable tabular form.  
 In 2005, out of a total of 1750 workers of a factory, 1200 were members of a trade union. The number of women employees was 200 of which 175 did not belong to trade union. In 2010 the number of union workers increased to 1580 of which 1290 were men. On the other hand, the number of non-union workers fell down to 208 of which 180 were men. In 2015, there were 1800 employees who belonged to a trade union and 50 who did not belong to a trade union. Of all the employees in 2015, 300 were women of whom only 8 did not belong to a trade union.

- 11) Define correlation analysis. Give the classification of Correlation.

- 12) The following table shows the ages (X) and blood pressure (Y) of 8 persons.

<b>X</b>	52	63	45	36	72	65	47	25
<b>Y</b>	62	53	51	25	79	43	60	33

Obtain the regression equation of Y on X and find the expected blood pressure of a person who is 49 years old.

- 13) Calculate arithmetic mean, median and mode from the following distribution.

Variable	Frequency	Variable	Frequency
10-13	8	25-28	54
13-16	15	28-31	36
16-19	27	31-34	18
19-22	51	34-37	9
22-25	75	37-40	7

- 14) Calculate mean and standard deviation of the following frequency distribution of marks.

Marks	No. of Students	Marks	No. of Students
0-10	5	40-50	50
10-20	12	50-60	37
20-30	30	60-70	21
30-40	45		

- 15) Calculate coefficient of correlation from the following data using Karl Pearson's method.

<b>X</b>	100	200	300	400	500	600	700
<b>Y</b>	30	50	60	80	100	110	130

- 16) Calculate the coefficient of correlation from the following data by the Spearman's correlation coefficient method.

Price of Tea (Rs.)	Price of Coffee (Rs.)	Price of Tea (Rs.)	Price of Coffee (Rs.)
75	120	60	110
88	134	80	140
95	150	81	142
70	115	50	100

- 17) Calculate the coefficient of correlation between X and Y from the following data and calculate probable error. Assume 69 and 112 as the mean value for X and Y respectively.

<b>X</b>	78	89	99	60	59	79	68	61
<b>Y</b>	125	137	156	112	107	136	123	108

- 18) Obtain regression equation of Y on X and estimate Y when X=55 from the following.

<b>X</b>	40	50	38	60	65	50	35
<b>Y</b>	38	60	55	70	60	48	30

- 19) Find the median and mean deviation of the following data:

Size	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	7	12	18	25	16	14	8

- 20) An incomplete distribution is given below

Variable	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	20	?	40	?	25	15

- i) You are given that the median value is 35. Find out the missing frequency (given the total frequency is 170)

- ii) Calculate the arithmetic mean of the completed table.
- 21) Explain the types of events in probability with examples.
- 22) Explain the following: i) Binomial distribution ii) Poisson distribution
- 23) Assume that a factory has two machines. Past records show that machine 1 produces 30% of the items of output and machine 2 produces 70% of the items. Further, 5% of the items produce by the machine 1 were defective and only 1% produced by machine 2 were defective. If a defective item is drawn at random, what is the probability that the defective item was produced by machine 1 or machine 2?
- 24) Eight coins are tossed at a time 256 times. Number of heads observed at each throw is recorded and the results are given below. Find the expected frequencies. What are the theoretical values of mean and standard deviation? Calculate also the mean and S.D of the observed frequencies.

No. of heads at a throw	Frequency	No. of heads at a throw	Frequency
0	2	5	56
1	6	6	32
2	30	7	10
3	52	8	1
4	67		

- 25) The following mistakes per page were observed in a book.

<b>No. of mistakes per page</b>	0	1	2	3	4
<b>No. of times the mistake occurred</b>	211	90	19	5	0

Fit a Poisson distribution to the given data.

- 26) The number of defects per unit in a sample of 330 units of manufactured product was found as follows.

<b>No. of defects</b>	0	1	2	3	4
<b>No. of units</b>	214	92	20	3	1

Fit a Poisson distribution to the data and test for goodness of fit. (given  $e^{-0.439} = 0.6447$ )

- 27) In an intelligence test administered to 1000 students the average score was 42 and standard deviation was 24. Find a) the number of students exceeding a score of 50 b) the number of students lying between 30 and 54. c) the value of score exceeded by the top 100 students.
- 28) The customer accounts at a certain departmental store have an average balance of Rs.480 and a standard deviation of Rs.160. Assuming that the account balances are normally distributed.
- What proportion of the accounts is over Rs.600?
  - What proportion of the accounts is between Rs.400 and Rs.600?



- iii. What proportion of the accounts is between Rs.240 and Rs.360?
- 29) Twelve dice were thrown 4096 times. Each 4, 5 or 6 spot appearing was considered to be a success while a 1, 2 or 3 spot was a failure. Calculate the theoretical frequencies for 0,1,2,..., 12 successes.
- 30) A bag contains 5 white and 8 red balls. Two drawings of 3 balls are made such that a) the balls are replaced before the second trial and b) the balls are not replaced before the second trial. Find the probability that the first drawing will give 3 white and second 3 red balls in each case.
- 31) Explain the technique of analysis of variance for a two-way classification.
- 32) Explain the principles of replications and local control and state their role in experimental design.
- 33) Write short notes on i) Duncan's Multiple Range Test ii) Randomized block design
- 34) The following table gives the number of refrigerators sold by 4 salesman in three months May, June and July.

Month	Salesman			
	A	B	C	D
May	50	40	48	39
June	46	48	50	45
July	39	44	40	39

- Is there a significant difference in the sales made by the four salesman?  
Is there a significant difference in the sales made during different months?
- 35) In a certain colony a drug was administered to 456 males out of the total 720 to test its efficacy against typhoid. The incidence of typhoid is shown below. Find the effectiveness of the drug against the disease.

	Fever	No fever
Drug given	144	312
Not given	192	72

$(V=1, \chi^2_{0.05}=3.84)$

- 36) The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data.
- |                     |     |     |     |     |     |     |     |     |     |     |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Item:</b>        | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
| <b>Life in '000</b> |     |     |     |     |     |     |     |     |     |     |
| <b>Hours:</b>       | 4.2 | 4.6 | 3.9 | 4.1 | 5.2 | 3.8 | 3.9 | 4.3 | 4.4 | 5.6 |
- Can we accept the hypothesis that the average life time of bulbs is 4000 hours?
- 37) A controlled experiment was conducted to test the effectiveness of a new drug. Under this experiment 300 patients were treated with new drug and 200 were not treated with the drug. The results of the experiment are given below.

Details	Cured	Condition wor sene d	No effect	Total
Treated with the drug	200	40	60	300
Not treated with the drug	120	30	50	200
<b>Total</b>	320	70	110	500

Use  $\chi^2$  and comment on the effectiveness of the drug.

- 38) The three samples below have been obtained from normal population with equal variances. Test the hypothesis that the sample means are equal.

A	B	C
8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

The table value of F at 5% level of significance for  $v_1=2$  and  $v_2=12$  is 3.88.

- 39) From the following data find out whether there is any relationship between sex and preference for colours.

Colour	Male	Female	Total
Green	40	60	100
White	35	25	60
Yellow	25	15	40
<b>Total</b>	100	100	200

- 40) A company is interested in finding out if there is any difference in the average salary received by managers of two divisions. Accordingly samples of 12 managers in the first division and 10 managers in the second division were selected at random. The results are given below.

	I Division	II Division
Sample size	12	10
Average monthly salary	12500	11200
Standard deviation	320	480

Apply t-test to find out whether there is a significant difference in the average salary.

- 41) Write about the different National funding agencies.  
 42) Describe in detail the principle and method of patenting.  
 43) Elaborate on the preparation of project proposal.  
 44) Explain the components of an effective thesis.

- 45) Brief on Publication in a Scientific Journal.
- 46) Describe the Preparation of abstract and manuscript.
- 47) Elaborate on International funding agencies.
- 48) What are the kinds of research program available in India.
- 49) Discuss on career development in laboratory research.
- 50) What type of research programs are available in abroad?

KASC-Biochemistry (PG)

**SECTION – A**

**ANSWER KEY**

- 1) b) stages of cancer
- 2) c) presentation
- 3) a) Captions
- 4) a) Pie diagram
- 5) c) three dimensional diagrams
- 6) d) quantitative classification
- 7) a) exclusive method
- 8) d) Simple classification
- 9) c) Geographical classification
- 10) c) Chronological
- 11) a) Discrete frequency distribution
- 12) d) Both (b) and (c)
- 13) b) Secondary data
- 14) b) Continuous frequency distribution
- 15) d) Class limits
- 16) c) Class interval
- 17) b) Tabulation
- 18) d) 360°
- 19) a) Frequency distribution
- 20) c) Both (a) and (b)
- 21) c) deciles
- 22) b) histogram
- 23) a) Linear
- 24) a) 6
- 25) c) mode
- 26) b) 246
- 27) b) asymmetrical distribution
- 28) b) variation

- 29) a) Descriptive
- 30) c)  $\sigma$
- 31) c) standard deviation
- 32) a) Measures of dispersion
- 33) c) Range
- 34) c) Small
- 35) d) 0
- 36) c) Symmetrical
- 37) b) Regression
- 38) b) Dependent variable
- 39) c) Correlation coefficient
- 40) d) Galton
- 41) b) dependent events
- 42) b) np
- 43) b) simple event
- 44) a) binomial
- 45) c) discrete variable
- 46) b) 4
- 47) c) trials
- 48) c) square root of npq
- 49) a) p and q
- 50) a) Gaussian distribution
- 51) c) mutually exclusive events
- 52) a) compound events
- 53) c) Bayes theorem
- 54) d) zero to one
- 55) c)  $P(Y|Z)$
- 56) b) posterior probabilities
- 57) a) 4
- 58) d) dependent events

- 59) d) Poisson distribution
- 60) c) skewness
- 61) d) a plan of experiment
- 62) a) Student's t-test
- 63) a) Agrarian research
- 64) b) randomization
- 65) b) zero
- 66) b) categorical
- 67) d) all the above
- 68) a)  $x^2$
- 69) a) 1
- 70) c) human bias
- 71) c) chi square test
- 72) c) statistical hypothesis
- 73) c) R.A.Fisher
- 74) b) Degree of freedom
- 75) d) All of the above
- 76) a) Hypothesis
- 77) b) T-test
- 78) a) randomize it
- 79) a) test how far the mean of a sample is from zero
- 80) c) completely randomized design
- 81) c) investigation
- 82) d) discussion
- 83) a) IQ
- 84) d) All the above
- 85) a) Definitions
- 86) b) discussion
- 87) d) Both (b) and (c)
- 88) a) Exclusive right

- 89) b) careers
- 90) a) Central government
- 91) a) 20 years
- 92) a) Whole of India
- 93) a) Department of Science and Technology
- 94) d) both a) and b)
- 95) b) applied research
- 96) d) A tentative statement about the relationship
- 97) d) All the above
- 98) b) Research objective
- 99) d) Research proposal
- 100) c) line graph

KASC-Biochemistry (PG)



**KONGUNADU ARTS AND SCIENCE COLLEGE  
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**DEPARTMENT OF BIOCHEMISTRY  
(PG AND RESEARCH)**

**M.Sc BIOCHEMISTRY**

**QUESTION BANK**

**ODD SEMESTER (2018-19)**

**NON-MAJOR ELECTIVE – I**

**ENVIRONMENTAL TOXICOLOGY (17PBC3N1)**





**E.P.1 ENVIRONMENTAL TOXICOLOGY**

**SECTION – A**

**(Knowledge level K1 Remembering is to be followed in relation to Course Outcomes specified as per bloom's Taxonomy)**

**Choose the correct answer:**

- Who is the founder of modern toxicology?
  - Paracelsus
  - Robert Brown
  - Landstainer
  - Watson
- The word toxicology is derived from the Greek word
  - Virion
  - Toxicon
  - Toxin
  - Toxic
- The example for phycotoxin is
  - Bacteria
  - Fungal
  - Animal
  - Algae
- Toxicity is characterized by
  - Instability
  - Volume
  - Temperature
  - Dosage
- Which are the units of LD<sub>50</sub>?
  - Milligrams/gram of animal body weight
  - Kilogram/gram of animal body weight
  - Milligrams/ kilogram of animal body weight
  - Gram/gram of animal body weight
- Example for lethal dose concentration is
  - 100
  - 50
  - 20
  - 75
- Major application of dose-response curve is to obtain
  - Toxin
  - Carcinogenesis
  - Mutagens
  - Threshold
- Which of the following terms is used to describe the dose of a drug required to produce a measurable effect in 50% of the animals tested?
  - LD<sub>50</sub>
  - LD<sub>1</sub>
  - ED<sub>50</sub>
  - ED<sub>99</sub>
- Which of the following terms is used to describe the dose of a drug required to kill 50% of a group of animals?
  - LD<sub>50</sub>
  - LD<sub>1</sub>
  - ED<sub>50</sub>
  - ED<sub>99</sub>
- A toxic substance produced by biological system is specially referred to as
  - Toxicant
  - Toxin
  - Xenobiotic
  - Poison
- Therapeutic index is the
  - Ratio of LD<sub>50</sub> to ED<sub>99</sub>
  - Ratio of LD<sub>50</sub> to ED<sub>50</sub>
  - Ratio of LD<sub>1</sub> to LD<sub>50</sub>
  - Ratio of ED<sub>99</sub> to ED<sub>50</sub>

11. Which of the following toxicity can occur due to single exposure?
- a) Acute toxicity
  - b) Sub acute toxicity
  - c) Subchronic toxicity
  - d) Chronic toxicity
12. The most common target organ of toxicity is the
- a) Heart
  - b) Lung
  - c) CNS
  - d) Skin
13. The LD50 is calculated from
- a) A quantal dose-response curve
  - b) A hormesis dose –response curve
  - c) A graded dose-response curve
  - d) A log-log dose-response curve
14. A U-shaped graded toxicity dose-response curve is seen in humans with
- a) Pesticides
  - b) Sedatives
  - c) Opiates
  - d) Vitamins
15. The TD1 / ED99 is called
- a) Margin of safety
  - b) Therapeutic index
  - c) Potency ratio
  - d) Efficacy ratio
16. All of the following are reasons for selective toxicity except
- a) Transport differences between cell
  - b) Biochemical differences between cell
  - c) Cytology of male neurons versus female neurons
  - d) Cytology of plant cells versus animal cells
17. The LD50 is best described as which of the following
- a) The dose at which 50 % of all test animals die
  - b) The dose at which 50 % of the animals demonstrate a response to the chemical
  - c) The dose at which all of the test animals die
  - d) The dose at which at least one of the test animals dies
18. The effective dose is best described as which of the following:
- a) The dose at which 50 % of all test animals die
  - b) The dose at which some of the animals demonstrate a response to the chemical
  - c) The dose at which all of the animals demonstrate a response to the chemical
  - d) The dose at which 50 % of all test animals demonstrate a response to the chemical
19. The most important factor that determine chemical toxicity is
- a) Potency
  - b) Partition coefficient
  - c) Dose
  - d) pH of the environment

20. Pest used to control plant pest is called  
a) Fungicides                      b) Herbicides                      c) Toxicols                      d) Weed agents
21. Pesticides designed to kill birds are called  
a) Aviacides                      b) Miticides                      c) Herbicides                      d) Birdicides
22. Which of the following pieces of information is not usually found on a pesticide label?  
a) Product name                      b) Directions for use                      c) Cost                      d) Caution
23. The use of legislative restriction to control pests is called  
a) Plant protection                      b) Plant law                      c) Plant quarantine                      d) Plant enclosure
24. Insecticides that act by permeating the entire plant are said to be  
a) Porous insecticides                      b) Systemic insecticides  
c) Contact poisons                      d) Penetrating pesticides
25. The compound responsible for the killing action of pesticides is called  
a) Lethal factor                      b) Toxic factor                      c) Active ingredient                      d) Killing agent
26. Pest control by changing crop spacing including crop rotation, pruning and weeding are part of the method of  
a) Cultural control                      b) Biological control  
c) Mechanical control                      d) Chemical control
27. The agent that cause mutation is called as  
a) Carcinogen                      b) Mutagen                      c) Teratogen                      d) Clastogen
28. The process of transfer of methyl group from organic compounds to metals is called  
a) Bioaccumulation                      b) Biomethylation                      c) Biomagnification                      d) Bioethylation
29. Cadmium is excreted in urine in the form of  
a) Cd-protein                      b) Cd-cysteine                      c) Cd-MT                      d) Cd-glutathione
30. The melting point of aluminium is  
a) 660°C                      b) 500°C                      c) 200°C                      d) 900°C
31. Aluminium oxide is obtained from  
a) Sodium sulphate                      b) Bauxite                      c) Calcium                      d) Chloride
32. Arsenic combine with oxygen to form  
a) Arsenic acid                      b) Arsenous acid                      c) Arsenic oxide                      d) Arsonalite
33. Arsenic is absorbed in  
a) GI tract                      b) Liver                      c) Kidney                      d) Pancreas

34. The drug used to remove cadmium toxicity is  
a) Paracetamol                      b) Doxorubicin                      c) Renamide                      d) Aceclofenac
35. Chromium is react with hot sulphuric acid to produce  
a) Chromic oxide                      b) Chromous salts                      c) Halides                      d) Chromium sulphate
36. Lead is extracted from  
a) Bauxite                      b) Galena                      c) Alumina                      d) Arsenic oxide
37. Lead is absorbed in  
a) Respiratory tract                      b) Intestine                      c) GI tract                      d) Liver
38. The example for chelating agent is  
a) NaOH                      b) KOH                      c) EDTA                      d)  $AlO_3$
39. The toxic substance present in shampoo is  
a) Triclosan                      b) Formaldehyde                      c) Parabens                      d) Glycols
40. The major detoxification reaction involved in phase I except  
a) Oxidation                      b) Reduction                      c) Hydrolysis                      d) Acetylation
41. The chlorinated organic compound present in refrigerator is  
a) Chlorinated fluocarbons                      b) Chlorinated hydrocarbons  
c) Carbon tetrachloride                      d) Perchloroethylene
42. Most xenobiotics are  
a) Absorbed in the stomach                      b) Excreted in expired air  
c) Metabolized in the liver                      d) Distributed via lymphatics
43. Smaller molecule xenobiotics include  
a) Industrial pollutants                      b) Pharmaceuticals                      c) Pesticides                      d) All the above
44. Which organ is used for detoxification reaction?  
a) Brain                      b) Kidney                      c) Liver                      d) Skin
45. The extent to which a material is found in organism tissue compared with background levels is known as:  
a) Contaminant                      b) Bioconcentration                      c) Bioaccumulation                      d) Toxic
46. Which of the following reactions is not a Phase I metabolic transformation?  
a) Ketone reduction                      b) Conjugation to alcohols  
c) Oxidation of alkyl groups                      d) Ester hydrolysis



59. Bioindicators are also known as
- a) Biomonitor
  - b) Ecological indicator
  - c) Biofertilizers
  - d) Biomagnifiers
60. When an organism accumulates a material in its body at a concentration greater than the environment is called
- a) Chemomagnification
  - b) Bioaccumulation
  - c) Biomagnification
  - d) Photosynthesis
61. The process of the concentration of a poison increasing as you move up the food web is known as
- a) Diffusion
  - b) Bioaccumulation
  - c) Biomagnification
  - d) Chemomagnification
62. The occurrence of pesticides like DDT in higher tropic level is called
- a) Bioremediation
  - b) Biomagnification
  - c) Biopollution
  - d) Bioevaluation
63. The extent to which a material is found in organism tissue compared with background levels is known as
- a) Contaminant
  - b) Bioaccumulation
  - c) Toxic
  - d) Bioconcentration
64. Biomagnification implies
- a) Food is magnified
  - b) Light is magnified
  - c) Toxic matters are magnified
  - d) Living beings are magnified
65. Biomagnification is caused mainly by
- a) Organochlorines
  - b) Neem oil
  - c) Organophosphates
  - d) Acetate
66. DDT is the
- a) Green house gas
  - b) Degradable pollutant
  - c) Non degradable pollutant
  - d) Polymer
67. Increase in the concentration of pollutants in higher trophic levels is known as
- a) Biomagnification
  - b) Biodegradation
  - c) Eutrophication
  - d) Recycling
68. Cell surface receptors may be any of the following except
- a) G protein linked
  - b) Enzymic receptors
  - c) Single-pass transmembrane proteins for neurotransmitters
  - d) Chemically-gated ion channels
69. The example of intracellular receptor is
- a) IP<sub>3</sub> receptor
  - b) Insulin receptor
  - c) Glucagon receptor
  - d) Thyroid hormone

70. Receptors that are recognized by the immune system except  
a) Immunoglobulins    b) Steroid receptor    c) T receptor    d) B receptor
71. Which of the following is not a G-protein coupled receptor?  
a) Glycine receptor    b) Adrenergic receptor    c) Glutamate receptor    d) Muscarinic receptor
72. A hormone or ligand can be considered as  
a) First messenger    b) Second messenger    c) Third messenger    d) Fourth messenger
73. GPCR is comprised of  
a) 8 transmembrane helices    b) 6 transmembrane helices messenger  
c) 7 transmembrane helices    d) 2 transmembrane helices
74. Which of the following is an active cell death process?  
a) Apoptosis    b) Necrosis    c) Senescence    d) Lysis
75. Which of the following is the inhibitor of apoptosis?  
a) Caspase    b) IAP    c) SMAC    d) DIABLO
76. Caspase can be activated by  
a) Cytochrome    b) DNase    c) RNase    d) IAP
77. Which of the following is not considered an adaptive response?  
a) Atrophy    b) Hyperplasia    c) Dysplasia    d) Metaplasia
78. All of the following are features of apoptosis except  
a) Cell shrinkage    b) No associated inflammation  
c) Intact cellular components    d) Karyolysis
79. Number of cells that are destroyed in adults by apoptosis are  
a) 20 to 35 billion cells    b) 50 to 70 billion cells  
c) 10 to 20 billion cells    d) 15 to 25 billion cells
81. Which of the following is not Phase-I reaction?  
a) Oxidation    b) Reduction    c) Hydrolysis    d) Conjugation
82. The main enzyme responsible for activation of xenobiotics is  
a) Cytochrome P-450    b) Glutathione S-transferase  
c) NADPH cytochrome P-450-reductase    d) Glucuronyl transferase
83. What is metabolized like xenobiotics?  
a) Myoglobin    b) Bilirubin  
c) Biliverdin    d) Hemoglobin

84. A toxic substance produced by biological system is specially referred to as a  
a) toxicant                      b) toxin                      c) xenobiotic                      d) poison
85. Which of the following toxicity can occur due to single exposure?  
a) Acute toxicity                      b) Sub-acute toxicity  
c) Sub-chronic toxicity                      d) Chronic toxicity
86. The most rapid exposure to a chemical would occur through which of the following routes?  
a) oral                      b) subcutaneous  
c) inhalation                      d) intramuscular
87. The LD<sub>50</sub> is calculated from  
a) a quantal dose-response curve                      b) a hormesis dose-response curve  
c) a graded dose-response curve                      d) a log-log dose-response curve
88. In the Ecological Risk Assessment process, data gathering occurs in which step(s)  
a) Problem formulation  
b) Problem Formulation and Analysis  
c) Analysis and Risk Characterization  
d) Problem Formulation, Analysis, and Risk Characterization
89. Small molecular weight xenobiotics are absorbed through the skin by  
a) phagocytosis                      b) diffusion  
c) oxidation                      d) all the above
90. Toxicokinetics is the study of the physiological processes associated with  
a) Effect of toxins on tissues                      b) Oxidative stress  
c) Cellular respiration                      d) Movement of toxins in the body
91. Most xenobiotics are  
a) absorbed in the stomach                      b) excreted in the expired air  
c) metabolized in the liver                      d) all the above



92. What is the aim of animal welfare act?
- a) to ensure that animals lead health and happy life.
  - b) to help animals in need.
  - c) to provide support for pet owners.
  - d) to get people into trouble.
93. Which of the following toxicity can occur due to single exposure?
- a) Acute
  - b) Subacute
  - c) Subchronic
  - d) Chronic
94. Hazard estimation in ecotoxicology is done based on
- a) Accumulation
  - b) Bioaccumulation
  - c) SARA
  - d) HWL
95. The xenobiotics are excreted via
- a) Urine
  - b) Bile
  - c) Sweat
  - d) Blood
96. The evaluation of environmental condition through the use of living organisms is called
- a) biomonitoring
  - b) biomagnification
  - c) bioaccumulation
  - d) bioconcentration
97. The LD<sub>50</sub> is best described as which of the following:
- a) the dose at which 50 % of all test animals die
  - b) the dose at which 50 % of the animals demonstrate a response to the chemical
  - c) the dose at which all of the test animals die
  - d) the dose at which at least one of the test animals dies
98. Extrapolation is best described as which of the following:
- a) using known information to reach a conclusion.
  - b) using known information to infer something about the unknown.
  - c) using speculative information to infer something about the known.
  - d) a "best guess" approach.
99. A concentration of 0.01 % is equivalent to how many parts per million (ppm)?
- a) 1 ppm
  - b) 10 ppm
  - c) 100 ppm
  - d) 1000 ppm
100. Which of the following is a direct toxic mechanism?
- a) Binding of the poison to cellular protein.
  - b) Inhibition of an enzyme.
  - c) Burning of the skin by a mineral acid.
  - d) Formation of a toxic metabolites.

**(Knowledge levels K2 – Understanding, K3-Applying, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom's Taxonomy)**

**SECTION – B**

1. Write short note on toxicology.
2. Give an account on probit analysis.
3. Write a note on LD<sub>50</sub> and LC<sub>50</sub>.
4. Explain dose response curve.
5. Explain the nature of toxicants in environment.
6. Define acute toxicity.
7. Explain sub-acute toxicity.
8. Describe about chronic toxicity.
9. Give a note on concentration response relationship.
10. Explain the biological factors that influence dose response relationship.
11. What are objectives involved in pest surveillance?
12. Add a note on pest and pesticides.
13. Write a note on toxic effects of insecticides towards man and mammals.
14. How cadmium is metabolized in human beings?
15. Explain mutagenesis with examples.
16. Describe on production of mercury.
17. Give an account on carcinogenesis.
18. How arsenic is metabolized in living beings?
19. List down the physical and chemical properties of lead.
20. Explain any two personal care products that cause environmental pollution.
21. Write a note on biological degradation.
22. Explain bioconcentration with examples.
23. Give an account on volatilization.
24. Write short note on detoxification.
25. Write a note on toxicity of short chain chlorinated hydrocarbons.
26. Give a note on environmental specimen banking.
27. Write a note on non-biological degradation.

28. What is PCB? Write about PCB toxicity.
29. Write a note on biomonitor.
30. Explain the occurrence of toxaphene.
31. Write a note on bioaccumulation.
32. Add a note on biomagnification.
33. Write about bioconcentration.
34. Summarize about mechanism of bioconcentration.
35. Explain the mechanism of biota.
36. Explain the role of soil invertebrates.
37. Give an account cell surface receptors.
38. Write a note on avian species.
39. What is apoptosis? Explain its mechanism.
40. Give a note on impact of chemicals in aquatic species.
41. Write notes on cytochrome P450 system.
42. Add short notes on the mode of action of xenobiotics.
43. Write on the Phase I biotransformation reactions.
44. Brief on fugacity models.
45. Describe the algal toxicity testing methods.
46. List the applications of multimedia models.
47. Comment on animal extrapolation.
48. What are the ethical practices to be followed by a researcher?
49. What do you mean by alternative toxicity testing methods?
50. How are the experimental animals managed during toxicological evaluation?

**(Knowledge levels K2 – Understanding, K3-Applying, K4-Analyzing and K5-Evaluating are to be followed in relation to Course Outcomes specified as per Bloom's Taxonomy)**

**SECTION – C**

1. Briefly explain the classification of environmental toxicants.
2. Summarize the origin and nature of toxicants in environment.
3. Enumerate on probit analysis with examples.
4. Explain acute, sub-acute and chronic toxicity.
5. Give a brief account on different route of drug administration.
6. Describe the laboratory determination of toxicity of chemicals.
7. Enumerate briefly on dose response relationship. Explain with its graph.
8. Explain briefly on factors that influence dose response relationship.
9. Describe the scientific basis of selective toxicity.
10. What is selective toxicity? Briefly summarize the advantages of selective toxicity.
11. What is pesticides and explain its classification
12. Elaborate on toxicity, production, metabolism, toxicology and therapy of aluminium.
13. Give a brief account on mercuric toxicity.
14. Describe the toxicity, production and metabolism of arsenic.
15. Enumerate briefly on toxicity, properties and production of cadmium.
16. Write a brief account on toxicity, production, metabolism and industrial uses of chromium.
17. Give a brief note on toxicity, production and metabolism of lead.
18. Explain how pharmaceuticals products will emerged in environment?
19. Briefly explain how personal care products pollutants will emerged in environment?
20. Describe any three case studies of carcinogenesis.
21. Briefly explain the chlorinated xenobiotics in environment.
22. Describe the toxicity of short chain chlorinated hydrocarbons.
23. Enumerate on biological and non-biological degradation.
24. Explain about occurrence and degradation of toxaphene.
25. Give a brief account on dioxins level, fate, toxicity of PCB.
26. What are bioindicators? Briefly explain its classification.

27. Summarize about phase I and II detoxification reaction.
28. Briefly explain the types of biodegradable products.
29. How microbes, plants and animals used as bioindicators? Explain
30. Elaborate in environmental specimen banking.
31. Describe in detail note on biomagnifications with examples
32. Enumerate on bioaccumulation and bioconcentration with examples.
33. Elaborate the intracellular fate of chemicals.
34. Briefly explain the mechanism and kinetics of bioconcentration.
35. Give a brief account on intrinsic apoptotic pathway.
36. Briefly explain the impact of chemicals in soil vertebrates.
37. How the cells are responding to chemical stress? Explain briefly.
38. Describe the impact of chemicals on avian species.
39. Summarize extrinsic apoptotic pathway.
40. Write about the impact of chemicals on living environment.
41. Elaborate on biotransformation of xenobiotics.
42. Describe the microbial toxicity testing methods.
43. Discuss about the multimedia mass balance models.
44. Discuss on legislative perspectives in ecotoxicology.
45. Explain about the animal management in toxicological evaluation.
46. Describe animal ethics in detail.
47. Discuss the toxicity testing methods for invertebrates.
48. Give an account on fugacity models.
49. Write about the enzymes involved in the biotransformation of xenobiotics.
50. Explain the future test strategies in ecotoxicology.

**SECTION – A**

**ANSWER KEY**

1. a) Paracelsus
2. b) Toxicon
3. d) Algae
4. d) Dosage
5. c) Milligrams/ kilogram of animal body weight
6. b) 50
7. d) Threshold
8. c) ED<sub>50</sub>
9. a) LD<sub>50</sub>
10. b) Toxin
11. b) Ratio of LD<sub>50</sub> to ED<sub>50</sub>
12. a) Acute toxicity
13. c) CNS
14. a) A quantal dose-response curve
15. d) Vitamins
16. a) Margin of safety
17. c) Cytology of male neurons versus female neurons
18. a) The dose at which 50 % of all test animals die
19. d) The dose at which 50 % of all test animals demonstrate a response to the chemical
20. c) Dose
21. b) Herbicides
22. a) Aviacides
23. c) Cost
24. c) Plant quarantine
25. b) Systemic insecticides
26. c) Active ingredient
27. a) Cultural control
28. b) Mutagen

29. b) Biomethylation
30. c) Cd-MT
31. a) 660°C
32. b) Bauxite
33. c) Arsenic oxide
34. a) GI tract
35. c) Renamide
36. d) Chromium sulphate
37. b) Galena
38. a) Respiratory tract
39. c) EDTA
40. c) Parabens
41. d) Acetylation
42. a) Chlorinated fluorocarbons
43. c) Metabolized in the liver
44. d) All the above
45. c) Liver
46. b) Bioconcentration
47. b) Conjugation to alcohols
48. c) Biodegradation
49. b) Non biodegradable
50. b) Plants
51. c) Plastics
52. b) *E. coli*
53. a) Breast milk
54. d) Chloracne
55. b) Low birth rate
56. c) Liver
57. b) 1990
58. c) Respiratory toxicity

59. a) Biomonitor
60. b) Ecological indicator
61. b) Bioaccumulation
62. c) Biomagnification
63. b) Biomagnification
64. d) Bioconcentration
65. c) Toxic matters are magnified
66. a) Organochlorines
67. c) Non degradable pollutant
68. a) Biomagnification
69. c) Single-pass transmembrane proteins for neurotransmitters
70. d) Thyroid hormone
71. b) Steroid receptor
72. a) Glycine receptor
73. a) First messenger
74. c) 7 transmembrane helices
75. a) Apoptosis
76. b) IAP
77. a) Cytochrome
78. c) Dysplasia
79. d) Karyolysis
80. b) 50 to 70 billion cells
81. d) Conjugation
82. a) Cytochrome P-450
83. b) Bilirubin
84. b) toxin
85. a) Acute toxicity
86. c) inhalation
87. a) a quantal dose-response curve
88. d) Problem Formulation, Analysis, and Risk Characterization



- 89. b) diffusion
- 90. d) Movement of toxins in the body
- 91. c) metabolized in the liver
- 92. a) to ensure that animals lead health and happy life.
- 93. a) Acute
- 94. b) Bioaccumulation
- 95. a) Urine
- 96. d) bioconcentration
- 97. a) the dose at which 50 % of all test animals die
- 98. b) using known information to infer something about the unknown.
- 99. c) 100 ppm
- 100. a) Binding of the poison to cellular protein.

KASC-Biochemistry (PG)