

SECTION I (BIOTECHNOLOGY)

1. NMR spectroscopy is a technique that exploits the magnetic properties of
 - A) electrons
 - B) nuclei
 - C) positrons
 - D) photons

2. Beer-Lambert Law states that
 - A) absorbance is proportional to both the path length and concentration of the absorbing substance
 - B) absorbance is proportional to the log of the concentration of the absorbing substance
 - C) absorbance is proportional only to the concentration of the absorbing substance
 - D) absorbance is proportional only to the path length of the absorbing substance

3. Which of the following microscopic techniques uses electrons reflected from the surface of a specimen to create image
 - A) Phase-contrast Microscope
 - B) Transmission Electron Microscope
 - C) Scanning Electron Microscope
 - D) Light Microscope

4. GENSCAN, and CONTRAST are *ab initio* methods for
 - A) Phylogenetic analysis
 - B) Multiple Sequence Alignment
 - C) Gene prediction
 - D) Primer designing

5. Who discovered the recombinant DNA technology
 - A) HG Khorana
 - B) JD Watson
 - C) Sutton and Boveri
 - D) Stanley Cohen and Herbert Boyer

6. Which of the following is used as a vector in SCID
 - A) Arbovirus
 - B) rotavirus
 - C) parovirus
 - D) retrovirus

7. Inserting a gene encoding a pathogenic microbe's surface protein into a harmless virus produces a
 - A) piggyback vaccine
 - B) Virulent virus
 - C) active disease-causing pathogen
 - D) pharmaceutical human protein

- 8 Restriction endonucleases:
 A) Are synthesized by bacteria as part of their defense mechanism
 B) Are used for in vitro DNA synthesis
 C) Are used in genetic engineering for ligation of two DNA molecules
 D) Are present in mammalian cells for degradation of DNA when the cell dies
- 9 In 3° structure of proteins, folding and shaping is done by
 A) hydrophobic interactions
 B) polar interactions
 C) hydrogen bonding
 D) base pairing
- 10 XY set of chromosomes are termed as
 A) allosomes
 B) autosomes
 C) anosomes
 D) hetrosomes
- 11 Ratio between different segregation types arising after sporulation is measure of
 A) tetatype
 B) linkage
 C) recombination
 D) replication
- 12 Differentiation potential of stem cells specifies
 A) stochastic differentiation
 B) asymmetric replication
 C) potency
 D) self renewal
- 13 Tendency of alleles that are located close together on chromosome to be inherited
 together during meiosis is
 A) genetic linkage
 B) genetic code
 C) inheritance
 D) gene expression
- 14 A process by which a protein structure assumes it's functional shape or conformation is
 A) denaturing
 B) folding
 C) synthesis
 D) hydrolysis
- 15 Any favorable movement of solute across membrane is called
 A) active transport
 B) passive transport
 C) solute transport
 D) solvent transport

- 16 Degeneracy results because there are more codons than
A) decodable amino acids
B) encodable amino acids
C) encodable DNA
D) encodable RNA
- 17 Pairing between two nucleotides in RNA that does not follow Watson-Crick base pair rules is called
A) degeneracy
B) base pairing
C) Lagervist pairing
D) wobble pairing
- 18 Enzyme that makes ATP by chemiosmosis is
A) ATP dehydrogenase
B) Gyraze
C) ATP synthase
D) dehydrogenase
- 19 In both meiotic and mitotic cells, recombination between homologous chromosomes is a common mechanism used in
A) DNA replication
B) transcription
C) DNA repair
D) translation
20. Addition or deletion of a nucleotide base pair involves
A) point mutation
B) silent mutation
C) nonsense mutation
D) frame shift mutation
- 21 Respiratory enzymes catalyze
A) hydrolysis
B) hydrogenases
C) redox reactions
D) polymerase reactions
- 22 Euchromatin is
A) lightly packed form of chromatin
B) tightly packed form of chromatin
C) concentrated form of chromatin
D) elongated form of chromatin
- 23 Alignment method suitable for aligning closely related sequences is
A) multiple sequence alignment
B) pairwise alignment
C) global alignment
D) local alignment

- 24 The computational method that tries to find the best matching between two molecule, a receptor and ligand is called
- A) Molecular matching
 - B) molecular docking
 - C) molecular fitting
 - D) molecular affinity checking
- 25 The process of finding relative location of genes on a chromosome is called
- A) gene tracing
 - B) genome mapping
 - C) genome walking
 - D) chromosome walking
- 26 In gas chromatography, the basis for separation of the components of the volatile material is the difference in
- A) partition coefficients
 - B) conductivity
 - C) molecular weight
 - D) molarity
- 27 Ion exchange chromatography is based on the
- A) electrostatic attractions
 - B) electrical mobility of ionic species
 - C) adsorption chromatography
 - D) partition chromatography
- 28 The speed of migration of ions in an electric field depends on
- A) magnitude of charge and mass of molecule
 - B) magnitude of charge and shape of molecule
 - C) shape and size of the molecule
 - D) magnitude of charge, shape and mass of molecule.
- 29 What is the role of SDS in SDS-PAGE
- A) protein denaturing and imparting net negative charge
 - B) imparting overall negative charge to the protein
 - C) imparting equal mass to proteins
 - D) protein unfolding and imparting net positive charge.
- 30 Process in which one stem cell develops in to two differentiated daughter cells , another stem cell undergoes mitosis and produces two identical stem cells is called
- A) stochastic differentiation
 - B) asymmetric replication
 - C) potency
 - D) self renewal
- 31 The process that produces a new individual with a known genetic makeup is called_____.
- A) regenerative medicine
 - B) induced pluripotent stem cells
 - C) therapeutic cloning

- D) reproductive cloning
- 32 Nobel prize in medicine to Tu Youyou was given for his discovery of
- A) RNAi
 - B) Autophagy
 - C) Artemisinin
 - D) stem cells from skin
- 33 RNA guided genome editing is possible through
- A) RNAi
 - B) CRISPR-Cas
 - C) activation tagging
 - D) knock outs
- 34 Which cell type would not be a direct target for gene therapy
- A) Red blood
 - B) Muscle
 - C) Liver
 - D) Endothelium
- 35 Which of the following viral vectors are most often used in clinical gene therapy trials?
- A) Lentiviral vectors
 - B) vaccinia vectors
 - C) adeno-associated viral vectors
 - D) adenoviral vectors
- 36 Chromatin consists of:
- A) histones only.
 - B) DNA and histones only.
 - C) histones and other proteins only.
 - D) DNA, histones, and other proteins.
37. HIV attacks:
- A) T helper cells.
 - B) T cytotoxic cells
 - C) B cells
 - D) Macrophages.
38. The two most common processes that lead to production of multiple functional proteins from the same DNA sequence are
- A) RNA editing and alternative splicing
 - B) Protein folding and posttranslational covalent modifications
 - C) Alternative splicing and posttranslational covalent modifications
 - D) Posttranslational covalent modification and transcriptional regulation
39. The Haber-Bosch process is important in the:
- A) Reduction of soil erosion.
 - B) Development of pesticides.
 - C) Manufacture of fertilizers.

D) Development of efficient irrigation systems.

40. The inability to distinguish between self and non-self cells may lead to :
- A) Hypersensitivity
 - B) Auto-immune diseases
 - C) Immunodeficiency
 - D) Tolerance
41. _____ is the principal source of nitrogen available to crop plants.
- A) Organic nitrogen
 - B) Nitrate
 - C) Ammonium
 - D) Glutamine
42. The test that is done prior to transplantation surgery to detect the compatibility of MHC proteins between donor and recipient is called
- A) MHC matching
 - B) MHC typing
 - C) Tissue typing
 - D) Blood HLA test
43. Androgenesis is production of:
- A) Triploids Plants
 - B) Virus free plants
 - C) Haploid Plants
 - D) VIGS
44. The Hybridomas are produced by
- A) Fusing T cells with myeloma cells
 - B) Fusing T helper cells with myeloma cells
 - C) Fusing B cells with myeloma cells
 - D) Fusing WBC with RBC
45. DNA replication takes place in
- A) Metaphase
 - B) Prophase
 - C) S Phase
 - D) G2 Phase
46. Which of the following can cross the placenta and provides passive immunity to new born
- A) IgM
 - B) IgG
 - C) IgA
 - D) IgE

- 47 Sigma factor is a component of
A) DNA topoisomerase
B) DNA ligase
C) RNA polymerase
D) DNA polymerase
- 48 Which method is used for cell line authentication
A) STR profiling
B) Microscopic observation
C) Subculture
D) Flow cytometry
- 49 What component helps in maintaining the pH of media in animal cell culture
A) Phenol red
B) Serum
C) Sodium bicarbonate
D) DMEM or RPMI
- 50 Which method is not used for inserting foreign DNA in animal cells
A) Heat shock method for transfection
B) Liposome mediated transfection
C) Electroporation
D) Virus mediated transfection

SECTION II (RESEARCH METHODOLOGY)

51. Research is
- A) Producing available knowledge again and again
 - B) Finding solution to any problem
 - C) Working in a scientific way to search for truth of any problem.
 - D) None of the above
52. Computed measure of how much scores vary around the mean score.
- A) range
 - B) standard deviation
 - C) normal curve
 - D) skewed distribution
53. Which of the following statements is true?
- A) The mean is a continuous variable.
 - B) The variance and standard deviation of a normal population are equal.
 - C) For large samples, the distribution of scores is approximately normal.
 - D) None of the above
54. Taking someone else's words or ideas and taking credit for them as your own.
- A) cite
 - B) plagiarism
 - C) paraphrase
 - D) credit
55. What steps are involved in a central tendency test?
- A) Addition, subtraction, and division.
 - B) Determination of mean, median, and mode.
 - C) Addition, subtraction, multiplication, and division.
 - D) None of the above
56. Random sampling is also called _____.
- A) Availability sampling
 - B) Probation sampling
 - C) Probability sampling
 - D) Prospect sampling
57. What is the Median of the following data sample?
2, 7, 4, 8, 9, 10, 6, 12, 13
- A) 8
 - B) 11
 - C) 9
 - D) 10
58. Which of the following statements is CORRECT?
- A) Research is a hurried activity.
 - B) Research starts with a problem and ends with a problem.
 - C) Research is not a contributing factor of progress.
 - D) Research is an investigation where you look for answers that are already there.

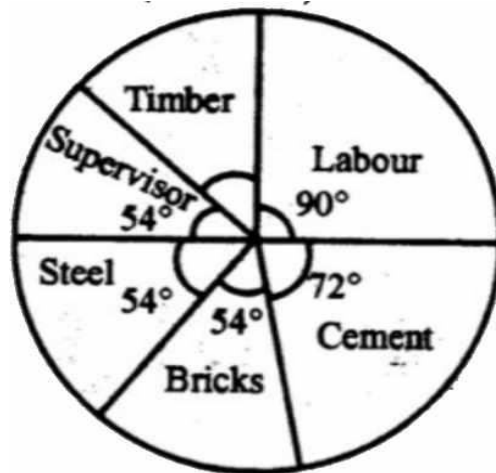
59. Which of the following has same mean median and mode?
- A) 6,5,2,4,3,4,1
 - B) 4,2,2,1,3,2,3
 - C) 2,3,7,3,8,3,2
 - D) 4,3,4,3,4,6,4
60. Resource libraries, economic census, trade shows & associations would be examples of what kind of data sources?
- A) Tertiary
 - B) Secondary
 - C) Primary
 - D) Unprofessional
61. The purpose of correlation research is to:
- A) study the relationship between two or more than two variables
 - B) predict the criterion variable on the basis of predictor variable
 - C) Both (1) and (ii)
 - D) Neither (i) Nor(ii)
62. It is sometimes called “central location” or just “center”. It is a way to describe what’s typical for a set of data. It is called.
- A) Middle destination
 - B) Center fold
 - C) Central Tendency
 - D) Mid frequency
63. Which is NOT a step of the scientific method?
- A) Hypothesis
 - B) Analyse data
 - C) Count items
 - D) Report Findings
64. In order to pursue the research, which of the following is priorly required?
- A) Developing a research design
 - B) Formulating a research question
 - C) Deciding about the data analysis procedure
 - D) Formulating a research hypothesis
65. Every person in the population has an equal chance of being selected -which sampling method
- A) Systematic sampling
 - B) Quota sampling
 - C) Volunteer sampling
 - D) Random sampling

66. When a distribution of scores is skewed, which of the following is the most representative measure of central tendency?
- A) Inference
 - B) Standard deviation
 - C) Mean
 - D) Median
67. An even spread of a variable that is symmetrical about the mean median and mode.
- A) bar graph
 - B) histogram
 - C) scatter graph
 - D) normal distribution
68. A diagram with rectangles showing values or numbers.
- A) Pictogram
 - B) Pie chart
 - C) Bar chart
 - D) Line graph
69. Type of research that solve practical issues is;
- A) Fundamental research
 - B) Exploratory research
 - C) Applied research.
 - D) Empirical research
70. What should not be included in the conclusion?
- A) literature review
 - B) summary
 - C) implication
 - D) major findings
71. A variable that is being manipulated is_____
- A) Independent variable
 - B) dependent variable
 - C) confounding variable
 - D) extraneous variable
72. What is qualitative research?
- A) Observation and description of activities, situations, attitudes, or behaviors of a specific group of people.
 - B) Analysis of numerical data.
 - C) Numerical comparisons and statistical inferences.
 - D) None of above
73. A standard deviation can never be
- A) positive
 - B) negative
 - C) zero
 - D) None

74. The sample standard deviation is denoted by:
- A) s
 - B) p
 - C) Σ
 - D) σ
75. First step of an investigation is _____ .
- A) collection of data.
 - B) presentation of data.
 - C) analysis of data.
 - D) explanation of data.
76. The sum of absolute deviations about median is _____.
- A) the least
 - B) the greatest
 - C) zero
 - D) equal
77. When the value of $r=0$, it is said to be _____.
- A) no correlation.
 - B) positive.
 - C) perfect positive.
 - D) perfect negative.
78. The straight-line trend is represented by the equation _____.
- A) $y=a+bx$
 - B) $y=mx$
 - C) $y=ax/ay$
 - D) $y=a*bx$
79. In discrete and continuous frequency distributions $N=$ ____ .
- A) the sum of frequency.
 - B) number of observations.
 - C) minimum value.
 - D) maximum value.
80. _____ is used to compare the variability of two or more than two series.
- A) Mean.
 - B) Standard deviation.
 - C) Coefficient of variation.
 - D) Mean deviation.
81. The simplest device for ascertaining whether two variables are related is to prepare a dot chart is called _____ .
- A) graphical method.
 - B) scatter diagram method.
 - C) method of least square.
 - D) concurrent deviation method.

82. A bag contains 10 black and 20 white balls; a ball is drawn at random. What is the probability that it is black?
- A) $\frac{1}{2}$
 - B) $\frac{1}{3}$
 - C) 0
 - D) 3
83. Diagrams are for _____
- A) the use of exports.
 - B) better quantitative picture.
 - C) better mental appeal
 - D) the use of imports.
84. Which of the following is not a type of research design?
- A) Experimental design
 - B) Descriptive design
 - C) Correlational design
 - D) Probability design
85. What is a research hypothesis?
- A) A tentative explanation for a phenomenon
 - B) A statement that is proven to be true
 - C) A prediction of what the researcher expects to find
 - D) A statement of fact
86. What is the purpose of a pilot study?
- A) To test the feasibility of the research design
 - B) To test the reliability and validity of the measures
 - C) To determine the appropriate sample size
 - D) To collect preliminary data
87. In five One-Day Internationals, a batsman has scored 31,97,112, 63, and 12 runs. the quality deviation of the info is-
- A) 21.78
 - B) 23.79
 - C) 25.79
 - D) 26.77
88. Determine the mode of the decision received seven days in a row: 11,13,13,17,19,23,25
- A) 11
 - B) 13
 - C) 17
 - D) 23

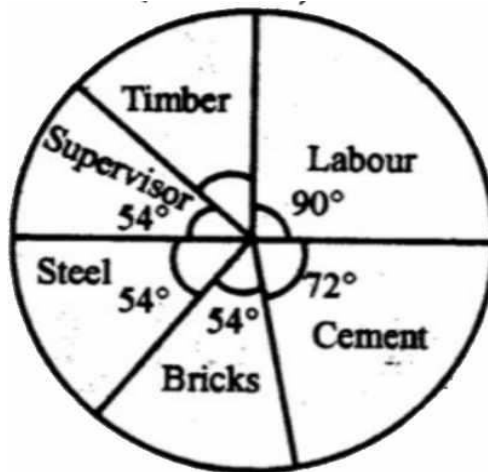
89. The following pie chart comprises the cost of constructing one house. The total cost was Rs. 6 lakhs



The amount spent on cement is

- A) Rs.2,00,000
- B) Rs.1,60,000
- C) Rs.1,20,000
- D) Rs.1,00,000

90. Referring to chart below,



the amount spent on cement, steel and supervision is what percent of the total cost of construction?

- A) 40%
- B) 45%
- C) 50%
- D) 55%

91. Table shows the mobile phones sold on different days by different sellers. Read the table carefully and answer the questions.

Mobiles Phones Sellers	Day						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
P	40	45	48	28	50	24	20
Q	90	92	27	12	16	98	26
R	80	36	30	13	28	62	47
S	60	46	12	64	52	34	76
T	48	18	58	69	70	10	15

Find the difference of mobile phones sold by P and R together on Monday to the mobile phones sold by S and T on Wednesday.

- A) 60
- B) 50
- C) 80
- D) 20

92. Referring to above table, Find the ratio of mobile phones sold by Q on Tuesday and Saturday together to the mobile phones sold by R on Thursday and Sunday together.

- A) 7 : 19
- B) 19 : 5
- C) 19 : 6
- D) 2 : 5

93. The frequency distribution of a numerical data can be graphically represented by a _____

- A) Histogram
- B) Telegram
- C) Monogram
- D) Anagram

94. Which one of the following is not the graphical representation of statistical data:

- A) Bar graph
- B) Histogram
- C) Frequency polygon
- D) Cumulative frequency distribution

95. In a histogram, each class rectangle is constructed with base as

- A) frequency
- B) class-intervals
- C) range
- D) size of the class

96. What does the command `\documentclass{article}` do in LaTeX?
- A) It sets the document class as an article
 - B) It creates a new section in the document
 - C) It sets the font style of the document
 - D) It creates a new document
97. What does the command `\begin{center}` do in LaTeX?
- A) It creates a new center-aligned section.
 - B) It sets the font size to center aligned.
 - C) It creates a new paragraph.
 - D) It centers the text or content.
98. Which of the following procedures would not be included in a programme of qualitative research?
- A) Assessment of effect size.
 - B) Development of appropriate research questions.
 - C) Clarification of the logic linking the data to research propositions.
 - D) Explanation of criteria for data interpretation.
99. What is the most common method of data collection in quantitative research?
- A) Interviews
 - B) Focus groups
 - C) Observation
 - D) Surveys/questionnaires
100. Which statistical test is used to determine if there is a significant difference between the means of two or more groups in quantitative research?
- A) t-test
 - B) ANOVA (Analysis of Variance)
 - C) Chi-square test
 - D) Regression analysis