



PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed. Use Blue/Black ball point pen for attempting the questions.
- All questions are compulsory. No negative marking for wrong answers.
- To attempt a question, make a tick mark (✓) at the right option/answer.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

Life Sciences

Discipline

Bio-Technology

Name

Father's Name

Roll No.

Date: **15-01-2011**

Signature of Candidate

Signature of Invigilator

1. Capsid, structure found in viruses is formed of :

- (a) Proteins
- (b) Protein and carbohydrates
- (c) Proteins and DNA
- (d) Proteins and RNA

2. Nitrogenous base not found in DNA is :

- (a) Adenine
- (b) Cytosine
- (c) Thymine
- (d) Uracil

3. Which of the following is a protein structure database?

- (a) PDB
- (b) GEO
- (c) TrEMBL
- (d) GSS

4. The term Bioinformatics was coined by

- (a) Walter Fries
- (b) Paulien Hogeweg
- (c) Fries Walter
- (d) Paulien Hoge

5. Haemoglobin oxygen dissociation curve is

- (a) Hyperbolic
- (b) Sigmoid
- (c) Constant
- (d) Straight

6. Role of spleen in mammals is to :

- (a) Act as haematopoietic organ
- (b) Assist kidneys
- (c) Assist liver
- (d) Control blood pressure

7. Urea is breakdown product of :

- (a) Fatty acids
- (b) Amino acids
- (c) Glucose
- (d) Fats

8. Which of the following is not a steroid hormone:

- (a) Aldosterone
- (b) Androgen
- (c) Estrogen
- (d) Thyroxine

9. Antiserum is the serum containing :

- (a) Antigens
- (b) leucocytes
- (c) antibodies
- (d) none of these

10. Western blotting is used to detect :
- (a) Fats
 - (b) DNA
 - (c) Proteins
 - (d) RNA
11. Estrogen hormone is similar in structure to :
- (a) Tyrosine
 - (b) Coenzyme
 - (c) Cholesterol
 - (d) Tryptophan
12. The portion of antigen that binds to antibody is called :
- (a) Paratope
 - (b) FAB fragment
 - (c) Fc region
 - (d) Epitope
13. PERL stands for
- (a) Programming Extraction and Report Language
 - (b) Practical Extraction and Recent Language
 - (c) Practical Extraction and Report Language
 - (d) Programming Extracted and Report Language
14. CD8 molecules are receptors for :
- (a) Natural killer cells
 - (b) Lymphocytes
 - (c) T Helper cells
 - (d) Cytotoxic T lymphocytes
15. Which of the following is the optimal temperature for DNA synthesis by Taq DNA polymerase in polymerase chain reaction?
- (a) 93°C
 - (b) 37°C
 - (c) 45°C
 - (d) 72°C
16. Genome database of *Arabidopsis*
- (a) GenBank
 - (b) Gramene
 - (c) TAIR
 - (d) PlantGDB
17. Which of the enzymes can be used for removing the 5' end of a nick in the double stranded DNA?
- (a) Klenow
 - (b) *E. coli* DNA polymerase (holoenzyme)
 - (c) Terminal transferase
 - (d) DNA dependent RNA polymerase
18. cDNA clone lacks the following
- (a) Exons
 - (b) Both exons and introns
 - (c) Introns
 - (d) 5' Untranslated sequence
19. An *E. coli* cell transformed with a plasmid expressing β -lactamase gene will acquire resistance against:
- (a) Tetracycline
 - (b) Kanamycin
 - (c) Ampicillin
 - (d) Chloramphenicol
20. KEGG is a
- (a) resource for pathway study
 - (b) database of transcription factors
 - (c) tool for protein alignment
 - (d) software for structure visualization
21. Which of the following are abiotic factors?
- (a) Temperature, rainfall, pH, food
 - (b) Temperature, rainfall, pathogens
 - (c) Temperature, rainfall, pH, nutrients
 - (d) None of the above
22. Among the following which is a biopolymer
- (a) Nucleic acid
 - (b) Polystyrene
 - (c) Polyethylene
 - (d) Nylon
23. Which of the following are abiotic factors?
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 - (c) Temperature, rainfall, pH, nutrients
 - (d) Temperature, rainfall, pH, viruses

24. Among the following which is a biopolymer
- (a) Nucleic acid
 - (b) Polystyrene
 - (c) Polyethylene
 - (d) Nylon
25. Among following which will be basic in nature
- (a) Lemon juice
 - (b) Ammonium chloride in water
 - (c) Baking soda in water
 - (d) Vinegar in water
26. Why air is cooler at high altitudes such as mountains than at lowlands
- (a) Low density of air at altitudes
 - (b) Heat of air is due to reflected radiation from earth
 - (c) Higher pressure at high altitudes
 - (d) Lesser oxygen
27. BT cotton contains a gene for insect resistance derived from:
- (a) Bacterium
 - (b) Virus
 - (c) Nematode
 - (d) Wheat
28. Golden rice is rich in:
- (a) Vitamin B
 - (b) Iron
 - (c) Vitamin A
 - (d) Vitamin C
29. Reverse transcriptase enzymes are a type of
- (a) Nuclease
 - (b) DNA polymerase
 - (c) RNA polymerase
 - (d) Ligase
30. If parents with genotype AABBBccddeeff and aabbCCDDEEeff are crossed, the genotype of resulting progeny will be
- (a) AABBBccDDeeFf
 - (b) AaBbCcDdEeFf
 - (c) aaBBccDDeeFF
 - (d) AaBbCcDdEeFf
31. Major weight of human body is due to
- (a) C
 - (b) P
 - (c) N
 - (d) O
32. Red wine and red grapes are important source of which anti-tumor agent
- (a) Taxol
 - (b) Vincristine
 - (c) Resveratrol
 - (d) Bradystanin
33. Which of the following is NOT a property of an enzyme
- (a) Form complex with substrate
 - (b) Decrease activation energy
 - (c) Decrease Gibb's free energy
 - (d) Increase rate of reaction
34. Which kinase activity is associated with phytochrome photoreceptors responsible for Red/Far red response?
- (a) Histidine
 - (b) Tyrosine
 - (c) Aspartate
 - (d) Ser/Thr Kinase
35. Introns are present in the genes of
- (a) Prokaryotes
 - (b) Eukaryotes only
 - (c) Eukaryotes and Archaeobacteria
 - (d) Archaeobacteria only
36. Alleles for same traits occupy
- (a) Same locus on different chromosome
 - (b) Same locus on homologous chromosome
 - (c) Different loci on same chromosome
 - (d) Different loci on heterologous chromosome

37. Proline is a ----- amino acid.
- (a) An aromatic
 - (b) A basic
 - (c) An acidic
 - (d) A heterocyclic
38. Which of the following forms a RNA nucleotide
- (a) Thymine, deoxyribose and phosphoric acid
 - (b) Thymine, ribose and phosphoric acid
 - (c) Uracil, deoxyribose and phosphoric acid
 - (d) Uracil, ribose and phosphoric acid
39. One of the major green house gas CH_4 is produced by
- (a) Burning of coal
 - (b) Decomposition of paddy fields
 - (c) Automobiles
 - (d) Industries
40. Secondary structure of protein is a result of
- (a) Covalent bond between different carbon atoms
 - (b) Peptide bonds
 - (c) Disulfide bonds
 - (d) Hydrogen bonds
41. Genetic material of an organism can only be
- (a) Protein
 - (b) RNA
 - (c) DNA
 - (d) None of the above is absolutely correct
42. The branch system of the shoot bearing a group of flowers is called as :
- (a) Placentation
 - (b) Venation
 - (c) Inflorescence
 - (d) Phyllotaxy
43. Scutellum is part of :
- (a) Embryo
 - (b) Endosperm
 - (c) Seed coat
 - (d) Pericarp
44. When castor seeds are placed in a suitable medium for germination, by which of the following first process water enters into the seed coat ?
- (a) Osmosis
 - (b) Imbition
 - (c) Absorption
 - (d) Root pressure
45. Which of the following is used to determine the rate of the transpiration in plants ?
- (a) Porometer
 - (b) Potometer
 - (c) Auxanometer
 - (d) Tensiometer
46. Nitrogen fixing enzyme in root nodule is :
- (a) Nitrase
 - (b) Nitrogenase
 - (c) Nitrosomonas
 - (d) Nitrogen esterase
47. Which of the following is not a part of the *lac* operon of *E. coli*?
- (a) Genes for inducible enzymes of lactose metabolism
 - (b) Gene for RNA polymerase
 - (c) The promoter, RNA polymerase binding site
 - (d) The operator, repressor binding site
48. Gene transfer from one bacterium to another by a virus (phage) is called:
- (a) Conjugation
 - (b) Transformation
 - (c) Transduction
 - (d) Transportation
49. A ribozyme is a
- (a) Protein
 - (b) Peptide
 - (c) DNA
 - (d) RNA

50. Mutations generally produce genes which are :
- (a) Recessive
 - (b) Polygenes
 - (c) Lethal
 - (d) Dominant
51. Which of the following structures is used in determining if an organism is Gram-negative or Gram-positive?
- (a) Flagella
 - (b) Cell wall
 - (c) Ribosomal structure
 - (d) Chromosomes
52. A disarmed Ti plasmid does not consist of the following:
- (a) T-DNA
 - (b) Left and right border repeats
 - (c) Genes for phytohormones
 - (d) Origin of replication
53. Which pair of amino acids absorbs the most UV light at 280nm?
- (a) Thr and His
 - (b) Trp and Tyr
 - (c) Cys and Asp
 - (d) Phe and Pro
54. Which of the following is spread by way of nerves?
- (a) Varicella-zoster
 - (b) Rabies
 - (c) Herpes simplex
 - (d) All
55. For a bacterial pathogen to be successful in growth and reproduction, it must find which of the following?
- (a) Appropriate pH and redox potential
 - (b) Appropriate nutrients
 - (c) Appropriate temperature
 - (d) All
56. Which of the following statements regarding a double-helical molecule of DNA is true? (a) All hydroxyl groups of pentoses are involved in linkages
- (b) Bases are perpendicular to the axis
 - (c) Each strand is identical
 - (d) Each strand has parallel, 5'to 3'direction
57. Radiation therapy is employed for many cancers, including irradiation of the central nervous system to destroy lymphoblasts in leukemia. Which of the following accounts for the destruction of rapidly growing cells?
- (a) Cross-linking of DNA
 - (b) Disruption of purine rings in DNA
 - (c) Demethylation of DNA
 - (d) Cleavage of DNA double strands
58. A promoter site on DNA:
- (a) Transcribes repressor
 - (b) Initiates transcription
 - (c) Codes for RNA polymerase
 - (d) Translates specific proteins
59. The western blot use what type of probe?
- (a) Antibody
 - (b) mRNA
 - (c) Products of polymerase chain reaction (PCR)
 - (d) cDNA
60. The greatest buffering capacity at physiologic pH would be provided by a protein rich in which of the following amino acids?
- (a) Lysine
 - (b) Histidine
 - (c) Aspartic acid
 - (d) Valine

61. In tissue culture experiment, to initiate shoots from undifferentiated mass of cell the medium must contain
- (a) Low auxin and high cytokinin
 - (b) High auxin and high cytokinin
 - (c) High auxin and low cytokinin
 - (d) Low auxin and low cytokinin
62. Among the following which is not a function of hydrogen peroxide released during plant stress response
- (a) Crosslinking glycans in cell wall
 - (b) Production of jasmonic acid
 - (c) Production of ethylene and salicylic acid
 - (d) D Lignin deposition
63. In contrast to DNA polymerase, RNA polymerase
- (a) Fills in the gap between Okazaki fragments
 - (b) Edits as it synthesizes
 - (c) Adds nucleoside monophosphates to the growing polynucleotides
 - (d) Synthesizes RNA primer to initiate DNA synthesis
64. Biomacromolecules have molecular weight ranging between
- (a) 18 to 800 Dalton
 - (b) 1 to 10 Dalton
 - (c) Both
 - (d) None
65. Genome of virus is made up of
- (a) DNA
 - (b) RNA
 - (c) DNA or RNA
 - (d) Proteins
66. Secondary structure of RNA is stabilized by hydrogen bonding between
- (a) GC and AU
 - (b) GC and AT
 - (c) GC, AU and GU
 - (d) GC only
67. Prolamellar body are present in
- (a) Etioplast
 - (b) Leucoplast
 - (c) Chloroplast
 - (d) Chromoplast
68. Under which stage of bacterial growth bacteria increases in size but donot divide
- (a) Lag
 - (b) Log
 - (c) Stationary phase
 - (d) Death phase
69. Transport of ions across membrane depends on
- (a) Concentration gradient
 - (b) Membrane potential
 - (c) Concentration gradient and membrane potential
 - (d) Independent of both
70. Toll like receptors are a type of pattern recognition receptor (PRR) and recognize molecules that are broadly shared by pathogens but distinguishable from host molecules , collectively referred to as pathogen- associated molecular patterns. They are
- (a) Present only in mouse
 - (b) Present on membrane of ER
 - (c) Are transmembrane proteins
 - (d) Present on cytosolic face of plasma membrane

71. If a plant genotype AaBb is self-pollinated, where A and B are not linked, then the probability of getting AABB genotype will be
- $\frac{1}{4}$
 - $\frac{1}{8}$
 - $\frac{1}{16}$
 - $\frac{1}{2}$
72. A metagenome refers to
- a large genome in an organism
 - the genome of a metazoan
 - two identical genomes in different species
 - the collective genomes of many organisms
73. Polygenic traits in crops can be identified by
- QTL mapping
 - Cluster analysis
 - Tandem array analysis
 - Gene mapping
74. Bending of coleoptiles tip of oat towards source of unilateral light of wavelength 454nm is due to
- Polar transport of auxin
 - Degradation of auxin towards light
 - Synthesis of auxin in shaded area
 - Lateral distribution of auxin toward shaded area
75. Which of the following RNA is involved in regulation of gene expression?
- mi RNA
 - rRNA
 - 5SRNA
 - tRNA
76. Which of the following is NOT involved in regulating the synthesis of RNA in the eukaryotic nucleus?
- Active genes in euchromatin, and inactive genes in heterochromatin
 - Amplification of some genes such as rRNA genes
 - Use of different RNA polymerases to transcribe different classes of RNA
 - Spliceosomes that stimulate synthesis of intron-containing hnRNAs
77. The enzyme responsible for indefinite growth of human cancer cells is
- Telomerase
 - DNA polymerase I
 - RNA polymerase
 - Reverse transcriptase
78. Which of the following secondary metabolites is NOT an anti-cancer drug?
- Paclitaxel
 - Podophyllotoxin
 - Atropine
 - Vincristine
79. Among the following which antibody will inhibit protein synthesis in chloroplast?
- Cyclohexamide
 - Chloramphenicol
 - Rifampicin
 - Ricin
80. What is the molarity of a solution that contains 125 g NaCl in 4.00 L solution?
- 0.535 M
 - 2.14 M
 - 8.56 M
 - 31.3 M

81. Which solution is most concentrated ?
(a) 1 mole of solute dissolved in 1 liter of solution
(b) 2 moles of solute dissolved in 3 liter of solution
(c) 6 moles of solute dissolved in 4 liters of solution
(d) 4 moles of solute dissolved in 8 liter of solution
82. What is the pH of a 10^{-4} M HCL solution?
(a) 4.0
(b) -4.0
(c) 0.4
(d) 11.0
83. Which formula represents a salt ?
(a) KOH
(b) KCL
(c) CH₃OH
(d) CH₃COOH
84. Which of the following is true
(a) HF is a stronger acid than HI, because F is more electronegative than I
(b) HF is a stronger acid than HI, because HF bond is weaker than HI bond
(c) HF is a weaker acid than HI, because I is more electronegative than F
(d) HF is a weaker acid than HI, because the HF bond is stronger than the HI bond
85. What is the half life (in min) of a first-order reaction for which the rate constant is $1.3 \times 10^{-3} \text{ s}^{-1}$?
(a) 0.0054 min
(b) 0.15 min
(c) 1.5 min
(d) 5.3×10^2 min
86. The probability of getting an even prime number on rolling a dice
(a) 1/3
(b) 2/5
(c) 1/6
(d) 3/5
87. The surface area of sphere whose diameter is 10 cm
(a) 314 sq cm
(b) 3.14 sq cm
(c) 31.4 sq cm
(d) 0.314 sq cm
88. The phenomenon in which white light splits into seven color is called as
(a) Spectrum
(b) Refraction
(c) Interference
(d) Dispersion
89. Loudness is a sensation depending upon
(a) Time period
(b) Frequency
(c) Intensity
(d) None
90. A magnet loses its property when they are
(a) Charged
(b) Heated
(c) Rubbed
(d) Chilled to -20 degree Celsius