

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2010

Ph.D. (BIOTECHNOLOGY)

COURSE CODE : 103



Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 103

Time : 2 Hours

Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. Receptors for signaling for steroid hormones are located at
 - (A) plasma membrane
 - (B) organelle membrane
 - (C) intracellular
 - (D) no receptor
2. Among closely lying cells signal are communicated by
 - (A) Neurotransmitters
 - (B) Hormones
 - (C) Gap junctions
 - (D) Cell membrane proteins
3. For enzyme catalyzed reactions exhibiting Michelis Menten equation what would be increase in substrate concentration to increase the rate of reaction from 10 % of V_{max} to 90% of V_{max}
 - (A) 80 fold
 - (B) 8 fold
 - (C) 4 fold
 - (D) 2 fold
4. In TCA cycle malonate is competitive inhibitor structurally similar to
 - (A) succinate
 - (B) fumarate
 - (C) oxaloacetate
 - (D) α -ketoglutarate
5. Which mineral ion play important role in functioning of photosystem II?
 - (A) Manganese
 - (B) Magnesium
 - (C) Iron
 - (D) Molybdenum
6. Primary acceptor of CO_2 in photosynthesis is
 - (A) Ribose
 - (B) Ribulose-5-P
 - (C) Ribulose 1,5-bis Phosphate
 - (D) 3-Phosphoglycerate
7. During cell cycle sister chromatid are pulled apart during
 - (A) Metaphase
 - (B) Anaphase
 - (C) Prophase
 - (D) Interphase
8. In chromosome 30 nm fibres during metaphase attach to
 - (A) Scaffold
 - (B) Centromere
 - (C) Nuclear matrix
 - (D) Nuclear lamina

9. Which of the following DO NOT bring variation in population
- (A) Random drift (B) Non-random mating
(C) Recombination (D) Natural selection
10. In *Drosophila* XO are male and XXY are female while in humans XX are female and XY are male. On the basis of given information which statement is NOT true
- (A) Y chromosome do not play any role in sex determination of *drosophila*
(B) Y chromosome is sex determinant in humans
(C) In humans sex determination is based on number of X chromosomes to sets of autosomes
(D) In *drosophila* sex determination is based on number of X chromosome to set of autosomes
11. During transposition transposons are excised by
- (A) Transposase (B) Nuclease
(C) Topoisomerase (D) Exonuclease
12. Which of the following regarding plasma cell is correct?
- (A) They are produced during secondary immune response
(B) They are mature antibody secreting cells
(C) They are involved in removal of intracellular viruses
(D) Involved in inflammatory responses
13. Immunological diversity in antibody is generated by
- (A) Rearrangement of immunoglobulin genes
(B) Alternative RNA processing
(C) Post transcriptional modification
(D) Post translational modification
14. Negative potential across plasma membrane is maintained by
- (A) Active transport (B) Passive transport
(C) Ion channels (D) Transporters

15. Receptor mediated endocytosis is carried from specific portions of membrane termed as
- (A) Coated vesicles (B) Coated pits
(C) Endocytosis (D) Exocytosis
16. Which of the following statement is correct with reference to replication in eukaryotes
- (A) Single origin and continuous replication
(B) Multiple origin and continuous and discontinuous replication
(C) Multiple origin and continuous replication
(D) Single origin and continuous and discontinuous replication
17. Gene for fungal resistance is found in cytoplasm. If a susceptible female and resistant male are crossed then progeny will exhibit
- (A) All resistance (B) All susceptible
(C) Half resistance and half susceptible (D) Cannot be predicted
18. Renaturation of human genome has revealed that it contains both repetitive and non-repetitive sequences. Which statement is incorrect.
- (A) Human have more unique sequences
(B) Repetitive sequences are located only is correct.
(C) Repetitive sequences renature fast
(D) Unique sequences renature fast
19. In India which conservation program is related with protection of entire "Tropic ladder"
- (A) Project Tiger (B) Project Elephant
(C) Ramsar sites (D) Biosphere reserve
20. Among the following which data alone are capable for preparing dendrogram from given operational taxonomic unit (OTU)
- (A) Mean of similarity (B) Similarity matrix
(C) Characters taken into account (D) Criteria for classification
21. In which of the following condition realized niche exceed over fundamental niche
- (A) Competition (B) Commensalism
(C) Ammensalism (D) Mutualism

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22. Which of the following is characteristic feature of climax community?
(A) Single food chain (B) High resilience
(C) High productivity (D) Narrow niche specialization
23. Cattle are known to be responsible for green house effect due to
(A) High respiration rate (B) More consumption of plant
(C) Fermentation in rumen (D) High reproductive rate
24. Gases used by Urey and Miller for experimentation of origin of life by Oparin and Haldane hypothesis was
(A) Hydrogen, methane and ammonia
(B) Hydrogen, methane and CO₂
(C) Hydrogen, methane, ammonia and CO₂
(D) Hydrogen, carboxylic acid and amino acids
25. Highest extinction during history of earth was observed during
(A) End of Permian (B) End of cretaceous
(C) End of Devonian (D) End of carboniferous
26. Bacteria cannot be classified as species by the biological species concept because they
(A) Asexually reproducing organisms
(B) High growth rate
(C) Exhibits little morphological variations
(D) Do not have nucleus
27. In eukaryotes shortening of chromosomes from ends is prevented by
(A) DNA polymerase (B) RNA polymerase
(C) Telomerase (D) Transposase
28. Organisms with high growth and production are
(A) Ectotherm (B) Endotherm
(C) Carnivore insects (D) Detrivores
29. On the molar basis if DNA has 20 % cytosine, then percentage of adenine would be
(A) 20% (B) 30% (C) 40% (D) 60%

30. The maximum BOD and minimum DO for pure drinking water should be
 (A) 25, 5 (B) 2, 5 (C) 3,9 (D) 0,6
31. Which of the following pair is isotones?
 (A) ^3H , ^4He (B) ^{15}N , $^{14}\text{N}_1$
 (C) ^{140}Ba , ^{140}Th (D) ^1H , ^3H
32. What would be energy released on breaking H-H covalent bond (generally energy of covalent bond lies in between 100-200 Kcal/mol)
 (A) $4.36 \times 10^5 \text{ J/mol}$ (B) $1 \times 10^{-19} \text{ J/mol}$
 (C) $5 \times 10^{-19} \text{ J/mol}$ (D) $8 \times 10^{19} \text{ J/mol}$
33. The mode of sex determination in humans is
 (A) Haploidy-Diploidy (B) XX-XY
 (C) ZZ-ZW (D) Genetic balance
34. The region of visible light which is most useful for photosynthesis is
 (A) Blue, red (B) Green, red
 (C) Violet, blue (D) Green, blue
35. Why the inner planet's surfaces are made up of rocky denser metals, whereas the outer planets are made up of mainly light gases which is lesser denser than the outer planets
 (A) Inner planets are formed earlier
 (B) Sun rays pushes gases far apart
 (C) Centrifugal force attract denser planet near sun
 (D) Inner planets are near to sun, thus high temperature has blown most of lighter gases
36. Uncoupling of oxidative phosphorylation in mitochondria generates
 (A) Entropy (B) Free energy
 (C) Heat (D) ATP
37. Among the following maximum reflectances (albedo effect) will be observed at
 (A) Ice covered land (B) Ocean
 (C) Vegetation land (D) Deserts

38. Among the following which salt occurs in human body
 (A) NaCl (B) KCN (C) HCN (D) H₂SO₄
39. If 7 g of NaOH is dissolved in 350 ml of water, the molarity of resultant solution will be
 (A) 0.5M (B) 2.5M (C) 50M (D) 25M
40. A bacterial population becomes half after one minute, the reduction in population depends on population at time 't', what would be remaining population after 2 min of original population
 (A) 1/4 (B) 1/2 (C) 1/8 (D) 1/16
41. Fog, which is commonly observed during winter and causes problem to flight take off mainly seen at
 (A) Low altitude with pollution (B) High altitude with no pollution
 (C) High latitude with pollution (D) Low latitude without pollution
42. An apple falls from a tree, to hit apple from a bullet gun fired (distance between apple & gun is 100 m both are at height 5 m)
 (A) exactly at apple
 (B) slightly above the apple
 (C) slightly beneath the apple
 (D) 1 m below original position of apple
43. Minimum daily variation in temperature will be observed at
 (A) Bangalore (B) Shimla (C) Cochin (D) Nagpur
44. In equation $\sin 2x$, value of x cannot be
 (A) 0 (B) -1 (C) 1 (D) 2
45. What would be effect of increasing humidity on rate of transcription?
 (A) Rate of transcription will decrease (B) Rate of transcription will increase
 (C) Initially low then it will be high (D) It will be unaffected
46. Maximum evaporation in ocean will occur at
 (A) Poles (B) Equator
 (C) Wetlands (D) Evenly at all places

47. If a rope is tied around the radius 'R' of earth if the rope has to be tied 1m above the ground then additional length of rope required would be
 (A) $R + 1$ (B) $R + 2$ (C) 2π (D) πR
48. Short wave can be received at longer distance during radio transition as compare to medium wave because
 (A) Short wavelength can be reflected by ionosphere
 (B) Medium waves are transmitted across space
 (C) Short wavelength are absorbed by ionosphere
 (D) Medium wavelength cannot be bend
49. Currently among the following which is used as a fuel for nuclear reactor
 (A) ^{232}Th (B) ^{238}Pu (C) ^{233}U (D) ^{238}U
50. NaCl can be electrolyzed on electrode, but ethanol cannot because
 (A) Ethanol has covalent bond (B) Ethanol is polar
 (C) Ethanol has hydrogen bonding (D) Ethanol is electrically neutral
51. Which of the following is most porous?
 (A) Sand (B) Clay (C) Loamy soil (D) Granite
52. The process of photosynthesis which leads to formation of glucose is a type of a
 (A) Oxidation (B) Reduction
 (C) Condensation (D) Fixation
53. The statistical test which can be utilized to validate the statement "Peoples having high cholesterol suffer more from hypertension"
 (A) Students t' test (B) Regression analysis
 (C) Pearson correlation coefficient (D) ANOVA
54. Defective gene in Amyotrophic lateral sclerosis is
 (A) Rb (B) p53 (C) bC12 (D) TGF
55. Vector for transmission of disease Kalazar is
 (A) Ades (B) Anopheles
 (C) Glossina (D) Phlebotomus

56. First successful vaccine against cancer has been prepared for
- (A) Oral cancer (B) Cervical cancer
(C) Breast cancer (D) Colon cancer
57. Atrial natriuretic factor secreted from atria is
- (A) Hormone (B) Neurotransmitter
(C) Enzyme (D) Growth factor
58. Substrate of angiotensinogenase is
- (A) Angiotensinogen (B) Angiotensin I
(C) Angiotensin II (D) Renin
59. Among the following which is not involved in plant defense signaling pathway
- (A) Gibberlic acid (B) Ethylene
(C) Salicylic acid (D) Jasmonic acid
60. Factor responsible for formation of early embryonic axis during early developmental pathway of plants is
- (A) Auxin gradient (B) Morphogens
(C) Orientation of embryo sac (D) Plane of cell division
61. During germination of barley seeds, enzymes for mobilization of reserve material to developing embryo are secreted from
- (A) endosperm (B) embryo
(C) aleurone layer (D) embryonic leaves
62. Electrical activity of brain during brain mapping can be recorded by
- (A) fMRI (B) ECG
(C) EEG (D) Polygraphy
63. Recently, gene therapy for mutated gene has been experimentally proven in mouse utilizing
- (A) Winged P elements (B) Cre-Lox system
(C) Non-homologous recombination (D) Ac-Ds elements

64. Which technique cannot be utilized for studying response mechanism for both B and T cell immune responses
- (A) Complement fixation (B) Western blotting
(C) Cytotoxicity assay (D) ELISA PLOT
65. Among the following which is not a cell adhesion protein
- (A) Cadherin (B) Integrin
(C) Selectin (D) Immunoglobulin
66. Which of the following is not coded by MHC genes?
- (A) Components of complement pathway (B) Immunoglobulin
(C) Glycoproteins (D) Antigen presenting proteins
67. Which is least likely to occur for removal of cancer cells?
- (A) T-cell based cytotoxicity (B) Complement fixation
(C) Autophagy (D) Phagocytosis
68. Leukemia inhibiting factor has been utilized in animal cell culture for
- (A) Stimulating growth of cell (B) Differentiation
(C) Morphogenesis (D) Arrest cells at mitosis
69. Dorsal lip of amphibian is equivalent to chicks
- (A) Hensen mode (B) Primitive mode
(C) Animal pole (D) Vegetal pole
70. Homeotic genes are responsible for
- (A) Maintaining gaps in segments
(B) Provide gradient in developing embryo
(C) Codes morphogens
(D) Mutation results in formation of organ at unusual locations
71. Mosaic developmental pattern is always
- (A) Autonomous (B) Non autonomous
(C) Conditional (D) Regulative

72. The specialized structure pecten for clear eye sight is characteristic feature of
(A) Birds (B) Amphibians
(C) Nocturnal animals (D) Aquatic mammals
73. Which of the following is not correctly matched?
(A) Chanocytes – Porifera (B) Malpighian tubules – Arthropods
(C) Citellum – Annelids (D) Cnidocytes – Mollusc
74. Cytoplasmic streaming results into mobility of substances and organelles involves interaction of
(A) Tubulin, kinesin (B) Tubulin, myosin
(C) Actin, kinesin (D) Actin, Myosin
75. The main force in membrane resealing of ruptured biomembrane in aqueous environment is
(A) Hydrophobic forces between membrane lipids
(B) Covalent forces between membrane lipids
(C) Force between protein and lipids
(D) Ionic interactions between membrane lipids
76. What would happen if lysosome membrane leaks its digestive enzyme in cytosol?
(A) Acid hydrolases will be inactivated
(B) Acid hydrolases will digest the cellular components
(C) pH of cell will increase
(D) It will cause I-cell disease
77. The maximum ionic interaction would be observed
(A) In presence of polar solvent
(B) In presence of mixture of water and alcohol
(C) Almost equal in all kinds of solvents
(D) When ionic compound is out of the solvents
78. Regulation of trp operon by binding of tryptophan to trp repressor is termed as
(A) Repression (B) Induction
(C) Anti termination (D) Attenuation

79. In salt tolerance plant the excess salt is transported to vacuole by
 (A) Na-H⁺ antiporter (B) Na-K⁺ pump
 (C) Na-Cl⁻ symporter (D) Na-H⁺ ase
80. Post translational modification take place in
 (A) Nucleus (B) Mitochondria
 (C) Ribosome (D) Endoplasmic reticulum
81. Which technique cannot be utilized for detection of microdeletion on Y chromosome?
 (A) Karyotyping (B) PCR
 (C) Microarray (D) Hybridization
82. Individuals having X chromosome and short arm of Y chromosome are Y is male while individuals having X chromosome and long arm of Y chromosome are female. This shows that
 (A) genes for maleness are located on short arm of Y chromosome
 (B) genes for maleness are located on longer arm of Y chromosome
 (C) genes for maleness are located on X chromosome
 (D) male determining gene are not located on Y chromosome
83. If a cell has 'c' as the DNA content of cell and 'n' as the number of chromosomes, then just immediately before the cell division in case of mitosis what would be value of 'c' and 'n'
 (A) 2c and 4n (B) 4c and 2n (C) 4c and 4n (D) 2c and 2n
84. Genetic disorder xeroderma pigmentosum is due to error in
 (A) Base excision repair mechanism
 (B) Nucleotide excision repair mechanism
 (C) Direct repair mechanism
 (D) DNA replication mechanism
85. In Lederbergs experiment which one of the following option they have used to prove their historical experiment
 (A) one auxotroph and one prototroph (B) two auxotroph and two prototroph
 (C) two auxotrophs (D) two prototrophs

86. Among the following which is the inhibitor of 80S ribosome
- (A) Tetracycline (B) Streptomycin
(C) Cyclohexamide (D) Chloromphenicol
87. Effect of release of IP3 during signal transduction pathway is
- (A) closure of Ca^{+2} channel in ER
(B) increase in intracellular Ca^{+2} level
(C) increase of extracellular Ca^{+2} level
(D) inactivation of calmodulin proteins
88. Dorsal mutant in *Drosophila* will result in
- (A) Dorsalization of ventral side
(B) Ventralization of dorsal side
(C) There would be no effect
(D) Anterior-posterior pattern formation will be affected
89. Intracellular negative potential and extracellular positive potential occurs in
- (A) In all cells (B) In neurons
(C) In kidney cells (D) In liver cells
90. A major functional difference between the succinyl-CoA synthetase of plant and animal cell mitochondria is that it
- (A) Does not produce ATP in plant cell
(B) Produce UTP in plant cell
(C) Produces ATP in plants and GTP in animal.
(D) Produces GTP in plants and ATP in animals
91. Among the following which is not monitored as daily potential pollutant
- (A) CO (B) CO_2 (C) SO_2 (D) NO_x
92. In plant lateral root initiates from
- (A) pericycle (B) cortex (C) pith (D) endodermis

93. Oxygenase activity of RUBISCO generates
- (A) Two molecules of PGA (3C)
 (B) Two molecules of Phosphoglycolate (2C)
 (C) One molecule each of PGA and phosphoglycolate
 (D) Two molecules each of PGA and phosphoglycolate
94. Plant family having characteristic umbel inflorescence is
- (A) Asteraceae (B) Acanthaceae
 (C) Apiaceae (D) Poaceae
95. Dendrogram in numerical taxonomy represents
- (A) Phenetic similarities (B) Phylogenetic similarities
 (C) Evolutionary similarities (D) No similarities
96. A plant with genotype r^+h^+/r^-h^- was test crossed. Out of total 280 progeny 260 are r^+h^+/r^-h^- and r^-h^-/r^-h^- . The recombination frequency will be
- (A) 92.8 (B) 46.4 (C) 7.2 (D) 3.6
97. Genetic mapping reveals that distance between two genes 'A' and 'B' is 10 cM. What is chance of getting Aabb progeny if AaBb is test crossed?
- (A) 5% (B) 10% (C) 45% (D) 90%
98. The regulators of circadian rhythms in plants is
- (A) Phycobillins (B) Phytochromes
 (C) Phototropins (D) Cryotophores
99. Quantitative inheritance defines
- (A) Variation in phenotype (B) Variation in genotype
 (C) Variation in environment (D) Variation in genes
100. Which of the following which is not intrinsic fluor?
- (A) Tryptophan (B) Phenyl alanine
 (C) Tyrosine (D) Histidine