

V-14

ENTRANCE EXAMINATION-2011

M.Sc Molecular Microbiology

Time: 2 hours

Maximum Marks: 100

HALL TICKET NO.

INSTRUCTIONS

Please read carefully before answering the questions:

1. Enter your Hall ticket number both on the top of this page and on the OMR answer sheet without fail.
2. Answers are to be marked only on the OMR answer sheet following the instructions provided there upon.
3. Hand over both the question paper booklet and OMR answer sheet at the end of examination.
4. The question paper contains **100** questions (**Part- A:** Question Nos. **1-25** and **Part-B:** Question Nos. **26-100**) of multiple choice typed in **20** pages, including this page. One OMR answer sheet is provided separately. **Please check.**
5. The marks obtained in **Part-A** will be used for resolving the tie cases.
6. Each question carries one mark.
7. There is **negative marking** for wrong answers in **PARTS A and B**. For each wrong answer, 0.33 of a mark will be deducted.
8. Calculators and mobile phones are not allowed.

PART-A

1. A reddish blue-green algae that occasionally grows in great abundance, impacts a red color to water -the red sea is so named for this
 - A. *Trichodesmium erythraeum*
 - B. *Synechocystis* sp. PCC6803
 - C. *Nostoc punctiforme*
 - D. *Prochlorococcus* sp.
2. The mRNA codons of amino acids coding for a part of a polypeptide chain are 5'-UGU-GAU-CAC-UAG-GAU-AAG-CAC-3'. Which DNA base sequence would provide the code for this section of polypeptide?
 - A. 5'-ACA-CTA-GTG-ATC-CTT-TTC-GTG-3'
 - B. 5'-ACA-CTA-GTG-ATC-CTT-TTC-GTC-3'
 - C. 5'-TCT-CTT-GTG-TTC-CTT-TTC-GTG-3'
 - D. 5'-ACA-CTA-GTG-ATC-CTA-TTC-GTG-3'
3. The IUPAC name of the compound with chemical formula given as **HO-CH₂-CH₂-CH₂-OH** is
 - A. 1,2,3-Propanediol
 - B. 1,2,3,-Ethanediol
 - C. 1,3-Propanediol
 - D. 1,2,3-propanetriol
4. Which among the following is not a characteristic of photosynthesis in plants?
 - A. The oxygen evolved is derived from photolysis of water
 - B. Light energy is first captured by PS-I and electrons are then passed to PS-II
 - C. ATP is synthesized by an electron transport chain connecting PS-I and PS-II
 - D. Light-dependent reactions generate ATP and NADPH and light-independent reactions use energy-rich molecules to reduce CO₂
5. Formation of 'ossicles' to produce a tough endoskeleton is a general structural feature of
 - A. Molluscs
 - B. Arthropods
 - C. Echinoderms
 - D. Water bugs

6. The union of a hypha with another hypha resulting in intercommunication of their genetic material is called as
- Anastomosis
 - Anamorphosis
 - Anthracnosis
 - Acervulensis
7. In human ABO blood group system, there are six possible genotypes but only four phenotypes. An explanation of this is ABO blood groups are controlled by
- One gene locus with three co-dominant alleles
 - One gene locus with two co-dominant alleles and one recessive allele
 - One gene locus with two dominant alleles and one recessive allele
 - One gene locus with three dominant alleles
8. To prepare a solution of 50 mM Tris (pH 8.0) and 1mM EDTA, the stock solutions of 2 M Tris (pH 8.0) and 500 mM EDTA should be mixed as shown in
- 25 ml of 2 M Tris and 0.2 ml of 500 mM EDTA in 1000 ml
 - 2.5 ml of 2 M Tris and 0.2 ml of 500 mM EDTA in 100 ml
 - 2.5 ml of 2 M Tris and 2 ml of 500 mM EDTA in 1000 ml
 - 5 ml of 2 M Tris and 0.2 ml of 500 mM EDTA in 100 ml
9. Which of the following is true of a species that has a chromosome number of $2n = 16$?
- The species has 16 different types of chromosomes
 - A gamete from this species has 8 chromosomes
 - The species has 16 homologous pairs
 - All of the above
10. Match the following vitamins listed as L, M N & O with the symptoms associated with their deficiencies given as A, B, C & D.
- | | |
|---------------------|------------------------------------|
| L. Vitamin- E | 1. Liver degeneration |
| M. Vitamin -C | 2. Xerophthalmia |
| N. Pantothenic acid | 3. Scurvy disease |
| O. Vitamin-A | 4. Fatty acid oxidation deficiency |
- L-4, M-3, N-1, O-2
 - L-2, M-4, N-1, O-3
 - L-1, M-3, N-2, O-4
 - L-1, M-3, N-4, O-2

11. Microcosms refer to
- A. DNA fragments of microorganisms
 - B. A laboratory system that attempts to stimulate a natural habitat
 - C. A system where microorganisms are grown in space
 - D. Small changes that occur in microorganisms due to toxic chemicals
12. In order to convert a mRNA to a copy of cDNA in molecular biology experiments this enzyme is frequently used
- A. RNA dependent RNA polymerase
 - B. DNA dependent DNA polymerase
 - C. T4 DNA Kinase
 - D. Reverse Transcriptase
13. Which of the following compound has a chiral structure?
- A. CH_3CHOH
 - B. $\text{CH}_2=\text{CH}-\text{CHCH}_3-\text{NH}_3$
 - C. $\text{CH}_3\text{CH}_2\text{CHCH}_2\text{CH}_3-\text{Br}$
 - D. $(\text{C}_2\text{H}_5)_2\text{CH}-\text{Br}$
14. At night, transpiration usually does not occur because most plants have their stomata closed. When soil moisture level is high, water will enter plant roots, because the water potential of the roots is lower than that of the soil solution. The root pressure forces some water to exude through special leaf tips. This process is called as..... and is occurring through special structures called as.....
- A. Hydrolysis and xylem vessels
 - B. Transpiration and stroma
 - C. Guttation and hydathodes
 - D. Gummosis and xylem vessels
15. A transitional fossil which formed a link between a dinosaur and a bird is
- A. Deinonydrosaurus
 - B. Archaeopteryx
 - C. Pteranodon
 - D. Brachylophosaurus

16. Identical antibodies produced by a single clone of lymphocytes which are reacting only with one of the antigenic determinants of a pathogen or protein
- Immunoglobulins
 - Polyclonal antibodies
 - Monoclonal antibodies
 - Mimotopes
17. 'Katte disease' of cardamom, 'kadang kadang' disease of coconut, 'laughing death' disease of animals and 'Witch's broom' disease of higher plants are caused respectively by
- Bacteria, Viroid, Prion and Phytoplasma
 - Virus, Viroid, Prion, and Phytoplasma
 - Phytoplasma, Viroid, Virus, and Bacteria
 - Prion, Virus, Phytoplasma and Viroid
18. Differentiation of a vegetative shoot meristem into a floral meristem in a temperate plant is mediated by an external stimulus and the process is called vernalization. Which among the following stimuli leads to the process of vernalization?
- Abscission of apical meristems to induce flowering
 - Bahar treatment by excision of roots
 - Chilling of apical meristems preceding anthesis
 - Heat shock treatment of apical meristems preceding anthesis
19. A radially symmetrical relaxation and contraction movement of muscles which propagates in a wave like motion in smooth muscles of digestive tract is called
- Peristalsis
 - Gastrostalsis
 - Epistalsis
 - Hyperstalsis
20. The free energy change of a reaction at equilibrium is
- Is always positive
 - Is always zero
 - Is always negative
 - Positive, negative or zero

21. When a mustard plant showing sporophytic type of self incompatibility mating system produces multiple alleles S1, S2 and S3 with an order of dominance given as $S1 > S2 > S3$, which type of mating among the following combinations would be highly incompatible?
- A. Pollen grain has S1 allele and ovary has S1S2 alleles
 - B. Pollen grain has S1 allele and ovary has S2S3 alleles
 - C. Pollen grain has S2 allele and ovary has S1S3 alleles
 - D. Pollen grain has S3 allele and ovary has S1S2 alleles
22. The famous Irish famine of 1840's was caused by the fungal pathogen
- A. *Pernospora parasitica*
 - B. *Plasmopara viticola*
 - C. *Phytophthora infestans*
 - D. *Cladosporium fulvum*
23. ABC model has been demonstrated to regulate different whorl formation during floral development in *Arabidopsis thaliana*, a model plant. The three homeotic genes A, B and C are required for the development of a normal flower. Identify the gene or gene combination that should express for normal development of stamens.
- A. A and B
 - B. B and C
 - C. C alone
 - D. A and C
24. When salicylic acid is heated with acetyl chloride or acetic anhydride in the presence of phosphoric acid, the product formed is acetyl salicylic acid, which is used in medicine as
- A. Analgesic compound
 - B. Anaesthetic compound
 - C. Insecticide
 - D. Sedative and hypnotic medicine
25. Carbon dioxide, methane and chloro- fluoro compounds are considered as green house gases because they can absorb
- A. Ultraviolet radiation
 - B. X-ray radiation
 - C. Visible light radiation
 - D. Long wave infrared radiation

PART-B

26. Largest and most complex sea weeds belong to one of the following groups
- A. Red algae
 - B. Brown algae
 - C. Green algae
 - D. Dinoflagellates
27. Dark phenolic compounds extracted from bark and leaves of oak plants are used to render leather in leather industry. They are
- A. Resins
 - B. Terpenes
 - C. Alkaloids
 - D. Tannins
28. Which among the following is a micronutrient required for plant growth?
- A. Chlorine
 - B. Sodium
 - C. Potassium
 - D. Zinc
29. The five-carbon sugar of Calvin-Benson cycle that originally captures CO₂ is
- A. Pyruvate
 - B. Phosphoglyceric acid
 - C. Phosphoglyceraldehyde
 - D. Ribulose bisphosphate
30. Chromosome compliment with $2n - 1$ number of chromosomes is called
- A. Trisomy
 - B. Nullisomy
 - C. Monosomy
 - D. Tetrasomy
31. Which among the following genera is not a primary producer?
- A. Chlorella
 - B. Rhodospirillum
 - C. Rhodococcus
 - D. Spirulina

32. What is the ploidy level of an endosperm of maize?
- A. $2n$
 - B. $3n$
 - C. n
 - D. $4n$
33. Name the economically important part of cotton plant
- A. Stem
 - B. Flower
 - C. Boll
 - D. Fuzz
34. A stem parasite among the following is
- A. Striga
 - B. Cuscuta
 - C. Orabanche
 - D. Silver oak
35. During which stage of cell division the genetic material gets duplicated along with its associated nuclear proteins?
- A. G1 phase of Interphase
 - B. G2 phase of Interphase
 - C. S phase of Interphase
 - D. Metaphase I
36. 'Microphylls' in Lycopodium, a club moss are miniature structures of
- A. Leaves
 - B. Male sporangia
 - C. Female sporangia
 - D. Corm like stem
37. Pteridophytes are vascular cryptograms which contain in their life cycle
- A. A haploid prothallium and a diploid sporophyte
 - B. A diploid prothallium and a haploid sporophyte
 - C. A haploid prothallium and a haploid sporophyte
 - D. A diploid prothallium and a diploid sporophyte

38. Epiphylls are
- A. Openings in the bark of stem
 - B. Moss growing on leaves
 - C. Rock-borne cryptograms
 - D. Vents in the leaves
39. A plant's overgrowth due to increased cell division and abnormal cell enlargement are respectively called as
- A. Hyperplasia and hypertrophy
 - B. Hypertrophy and hyperplasia
 - C. Hypertrophy and hypervirulence
 - D. Hyperplasia and hypervirulence
40. Phytochrome in plants is sensitive to
- A. Red light
 - B. Green light
 - C. Yellow light
 - D. Red and far red light
41. Algae and other submerged aquatic plants float in water during day time but sink at night
- A. They loose weight at night because fishes eat them
 - B. They become buoyant in light due to oxygen bubbles accumulated by photosynthesis but at night this oxygen is used up in respiration.
 - C. They becomes light due to consumption of food by photorespiration
 - D. They come up to enjoy sunshine
42. Which among the following is a thigmotropic response in plant
- A. Growth of roots towards water
 - B. Curling of a tendril to the support
 - C. Orientation of shoot to sun
 - D. Peg formation in peanut
43. The male inflorescence of a maize plant is called as
- A. Cob
 - B. Ear
 - C. Tassel
 - D. Androdioecium

44. Match the type of cell listed as L, M, N and O to the tissue or part of the cell given as A, B, C and D.

- L. Tracheid
- M. Sieve element
- N. Parenchyma
- O. Stone cell

- 1. Phloem
- 2. Meristematic tissue
- 3. Cell wall of fruit
- 4. Xylem

- A. L-4; M-1, N-2, O-3
- B. L-1, M-4, N-2, O-3
- C. L-2, M-4, N-3, O-1
- D. L-1, M-4, N-3, O-2

45. A cephalopod mollusc among the following is

- A. Cuttle fish
- B. Ray fish
- C. Starfish
- D. Sea horse

46. Polychaetes and oligochaetes belong to one of the following groups

- A. Annelids
- B. Orthopods
- C. Molluscs
- D. Millipeds

47. Presence of an exoskeleton, a segmented body and jointed appendages are characteristic features of

- A. Annelids
- B. Chordates
- C. Echinoderm
- D. Arthropods

48. The book 'Origin of Species' was written by

- A. Alfred Russel Wallace
- B. Lamarck
- C. Gregor Johann Mendel
- D. Charles Robert Darwin

49. The enzyme present in saliva is
- A. Pepsin
 - B. Trypsin
 - C. Ptyalin
 - D. Myonin
50. The well known phrase "Ontogeny recapitulates phylogeny" describing stages of animal development going through adult stages of distant ancestors was given by
- A. Robert Koch
 - B. Theodar Schwann
 - C. Sutton and Boveri
 - D. Ernest Haeckel
51. Match the following
- | | |
|--------------|------------------------|
| L. Anthrax | 1. Hormone |
| M. Rabies | 2. <i>Bacillus sp.</i> |
| N. Hepatitis | 3. Zoonotic disease |
| O. Humulin | 4. Recombinant vaccine |
- A. L-2; M-3; N-4; O-1;
B. L-4; M-2; N-3; O-1;
C. L-2; M-3; N-1; O-4;
D. L-3; M-4; N-2; O-1;
52. Trypanosomiasis is a disease transmitted by
- A. Mosquito
 - B. Fire-fly
 - C. May-fly
 - D. Tsy-tsy
53. A light receptor in certain bacteria resembles to that found in the eyes of animals. What is the bacterial light receptor called?
- A. Photochrome
 - B. Opsin
 - C. Bacteriorhodopsin
 - D. Rhodopsin

54. A protein whose absence causes a cell to get transformed into cancerous cell is referred as
- A. Tumor suppressor protein
 - B. Oncoprotein
 - C. Apoptotic protein
 - D. Tumor necrosis factor
55. Commensalism is
- A. A type of symbiosis in which one individual gains from the association and the other is neither harmed nor benefited
 - B. A type of symbiosis in which one individual gains from the association by harming the other
 - C. A type of symbiosis in which neither of the individuals gains from each other nor is harmed
 - D. A type of symbiosis in which both the individuals gain from each other but finally harm one other
56. Birds replace their feathers periodically in a process called
- A. Shedding
 - B. Migration
 - C. Preening
 - D. Molting
57. Vaccination is an example of
- A. Naturally acquired active immunity
 - B. Artificially acquired active immunity
 - C. Naturally acquired passive immunity
 - D. Synthetic acquired passive immunity
58. Most naked animal viruses penetrate a host cell by
- A. Encapsidation
 - B. Exocytosis
 - C. Endocytosis
 - D. Endosome fusion
59. Epinephrine is secreted from
- A. Hypothalamus
 - B. Posterior Pituitary
 - C. Adrenal medulla
 - D. Anterior pituitary

60. The science dealing with study of fishes is called
- A. Ornithology
 - B. Ichthyology
 - C. Bryology
 - D. Fisheries
61. A mollusc is a source for one of the following luxury goods
- A. Pearl
 - B. Sea silk
 - C. Imperial dye
 - D. All the above
62. Stiff bristles present on the body of an earthworm to attach to a support in order to prevent back sliding are called
- A. Septae
 - B. Setae
 - C. Cilia
 - D. Cirri
63. An organism being borne as a male but later changes into a female is referred as
- A. Androdioecious
 - B. Protandric
 - C. Gynandric
 - D. Gynomonoecious
64. The most abundant organic compound in the biosphere
- A. Pectins
 - B. Cellulose
 - C. Starch
 - D. Glycogen
65. An unbranched form of glucose polymer present in starch molecule is called
- A. Amylopectin
 - B. Amylose
 - C. Amylase
 - D. Maltose

66. Sterol campesterol derived plant growth regulator which could stimulate cell division and elongation in plants even at low levels are
- A. Polyamines
 - B. Cytokinins
 - C. Gibberellins
 - D. Brassinosteroids
67. Match the following hormones listed as L, M, N and O to their roles in plant growth and development given as A, B, C and D.
- | | |
|------------------|--------------------|
| L. Cytokinin | 1. Cell elongation |
| M. Ethylene | 2. Dormancy |
| N. Auxins | 3. Cell division |
| O. Abscisic acid | 4. Fruit ripening |
- A. L-1; M-4; N-3; O-2
 - B. L-3; M-2; N-1; O-4
 - C. L-3; M-4; N-1; O-2
 - D. L-1; M-2; N-4; O-3
68. The process by which Adenosine triphosphates (ATPs) are synthesized from Adenosine diphosphates (ADPs) using proton motive force that get pumped through the intermembrane spaces of mitochondria is by the process called
- A. Reductive phosphorylation
 - B. Oxidative carboxylation
 - C. Oxidative phosphorylation
 - D. Reductive carboxylation
69. What kind of reaction performs both synthesis and decomposition?
- A. Endergonic reaction
 - B. Fusion reaction
 - C. Fission reaction
 - D. Exchange reaction
70. Glyphosate is a
- A. Fertilizer
 - B. Antibiotic
 - C. Herbicide
 - D. Hormone

71. For separation of protein molecule Polyacrylamide gels are commonly used. During preparation of gels APS and TEMED are used. What are APS and TEMED?

- A. Ammonium persulphate and trichloroethelenemonoethylidiamine
- B. Ammonium persulphate and tetramethylethylenediamine
- C. Amino acid with pure sulphur and tetramethylethylenediamine
- D. Ammonium persulphate and TEMED is not an abbreviated term, rather it itself is a name of a compound.

72. Identify the one among the following which is not used as food preservative

- A. Ethyl acetate
- B. Sodium diacetate
- C. Benzoic acid
- D. Sodium nitrite

73. In which of the following processes metabolic substrates and end products are organic molecules

- A. Respiration
- B. Photosynthesis
- C. Fermentation
- D. Photolysis of water

74. What is a Coenzyme?

- A. Synonym for an enzyme
- B. Antonym for an enzyme
- C. Protein in nature and is a substrate for an enzyme
- D. Nonprotein organic molecule and is a helper of an enzyme

75. Cephalosporins inhibit

- A. Nucleic acid synthesis
- B. Protein synthesis
- C. Peptidoglycan synthesis
- D. Cytoplasmic membrane potential

76. Beta particles have

- A. +ve charge and negligible mass
- B. +ve charge and some mass
- C. -ve charge and negligible mass
- D. -ve charge and some mass

77. Which of the following pairs is mismatched?
- A. Metachromatic granules – stored phosphates
 - B. Sulfur granules – energy reserve
 - C. Lipid inclusions – poly β -hydroxybutyric acid
 - D. Polysaccharide granules – stored starch
78. The precursor for fatty acid biosynthesis is
- A. Histidine
 - B. Phenylalanine
 - C. Malonyl CoA
 - D. Acetyl CoA
79. Which among the following is not a C4 compound
- A. Malate
 - B. Oxaloacetate
 - C. Isocitrate
 - D. Fumarate
80. Nickel is a component of the enzyme:
- A. Urease
 - B. Amylase
 - C. Nitrogenase
 - D. Nitrate reductase
81. One of the following is an essential amino acid for humans
- A. Glutamic acid
 - B. Proline
 - C. Threonine
 - D. Serine
82. White rust of crucifer is the disease caused by the genus
- A. Alternaria
 - B. Phytophthora
 - C. Albugo
 - D. Claviceps

83. An organism partly or totally deficient of a substance, the addition of which significantly promotes the growth of the organism is termed as

- A. Biotroph
- B. Auxotroph
- C. Heterotroph
- D. Anamorph

84. The swollen tip of a fungal hyphae which helps in the attachment and penetration of the germ tube is called

- A. Ascocarp
- B. Haustorium
- C. Appressorium
- D. Acervulus

85. Inability of a pathogen to infect a plant because the plant is not a host of the pathogen either due to lack of something in the plant that the pathogen needs or the presence of substances which are incompatible with the pathogen is called as

- A. Acquired resistance
- B. Non-host resistance
- C. Plant Pathogenesis
- D. Systemic acquired resistance

86. Gas vacuoles are present in

- A. *Anabaena flos-aquae*
- B. *Bacillus subtilis*
- C. *Acanthurus nigrofuscus*
- D. *Mycobacterium tuberculosis*

87. Geosmins are

- A. A group of antibiotics produced by Streptomyces
- B. Streptomyces metabolites that give characteristic earthy odor of soil
- C. Polyenes produced by Streptomyces
- D. A group of Streptomyces which are useful for mining

88. World environment day is celebrated on

- A. 8th May
- B. 5th June
- C. 13th August
- D. 9th September

89. A subunit of virus's protein coat is called as
- Capsid
 - Nucleocapsid
 - Icosahedran
 - Capsomere
90. Pencillin acts as an antibiotic in susceptible bacteria by interfering with
- Cell wall formation
 - Protein synthesis
 - Electron transport chain
 - DNA synthesis
91. Molecular chaperones are class of proteins that facilitate
- Proper folding of newly synthesized proteins
 - Unfolding of newly synthesized proteins
 - Degradation of newly synthesized proteins
 - Targeting of newly synthesized proteins
92. Which of the following hormone is produced by *Agrobacterium* during tumor gall formation
- Abscissic acid
 - Ethylene
 - Gibberellic acid
 - Cytokinins
93. Genetic material in eukaryotes and some prokaryotes are mostly made up of DNA. However, we can see diverse genetic materials like single stranded linear and circular DNA (ssDNA), double stranded RNA (ds RNA), positive sense RNA (+ve RNA) negative sense RNA (-ve sense) and ambisense RNA as genetic material in one of these organisms
- Viroids
 - Micoplasmas
 - Viruses
 - Prions
94. Microorganisms growing on very high nutrient are referred as
- Oligotrophus
 - Lithotrophs
 - Copiotrophus
 - Autotrophs

95. A person heterozygous for the recessive gene for cystic fibrosis marries a person who does not carry or possess the trait (ie., homozygous dominant). What is the probability that the couple's first child will have cystic fibrosis?

- A. 0.0
- B. 0.25
- C. 0.5
- D. 1.0

96. The evidence that DNA is the genetic material came from the experiments of

- A. Morgan
- B. Griffith
- C. Watson and Crick
- D. Avery, Macleod and McCarty

97. How many gametes are produced by a diploid individual which is heterozygous for 5 genes?

- A. 8
- B. 16
- C. 32
- D. 64

98. When two genes are situated very close together in a chromosome

- A. Percentage of crossing over between them is very high
- B. Hardly any linkage is detected
- C. No crossing over can ever take place between them
- D. Only double crossovers can take place between them

99. When a pea plant with yellow endosperm as a dominant trait was mated with another pea plant with a recessive green endosperm, the resultant F_1 showed both yellow and green endosperm in the ratio of 1:1 respectively. What would be the genotype of the parents used in the cross?

- A. One of the parents is heterozygous dominant with yellow endosperm and the other parent is a recessive homozygote with green endosperm
- B. One of the parents is homozygous dominant with yellow endosperm and the other parent is homozygous recessive with green endosperm
- C. Both the parents have homozygous yellow endosperm
- D. Both the parents have homozygous green endosperm

V-14

100. There can be characters in children which are different from either of their parents. This is due to the phenomenon called

- A. Replication
- B. Variation
- C. Heredity
- D. Inheritance