E-14

ENTRANCE EXAMINATION – 2014

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.

2. Answers are to be marked only on the **OMR answer sheet** following the instructions provided there upon.

3. Hand over the OMR answer sheet to the Invigilator before leaving the examination hall.

4. The question paper contains **100** questions (**Part-A**: Question Nos. **1-25** and **Part-B**: Questions Nos. **26-100)** of multiple-choice printed in **15** 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 mark will be deducted.

8. Calculators and mobile phones are NOT allowed.

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PART - A

1. Which of the following plant's genome is **NOT** sequenced?

   A. *Oryza sativa* B. *Arabidopsis thaliana*
   C. *Populus trichocarpa* D. *Pisum sativum*

2. Hemophilia is a sex-linked recessive trait in humans. If a father and a son are affected with hemophilia, but the mother is normal, her genotype must be:

   A. X^hX^h B. X^HX^h C. X^HX^H D. X^HO

3. The vegetative hyphae with several haploid nuclei in each of its segments combine with other hyphae to form 'heterokaryons' through the phenomenon called

   A. Epistomosis B. Anastomosis C. Hyperstomosis D. Endostomosis

4. Identify the **odd** combination of dyes

   A. Methylene blue, crystal violet, malachite green
   B. Eosin, rose bengal, acid fuchsin
   C. Methylene blue, rose bengal, crystal violet
   D. Crystal violet, Safranin, Malachite green

5. Bial reagent (orcinol, ethanol, $FeCl_3$, HCl) is used for the analysis of

   A. DNA B. RNA C. Steroids D. Peptide bonds

6. A dihybrid cross **SStt** x **ssTT** is made in which '**S**' is dominant but there is no dominance between '**T**' and '**t**'. Assuming independent assortment, how many phenotypic classes are expected in F_2?

   A. 3 B. 4 C. 6 D. 9

7. Axial fibrils are present among the members of

   A. Spirochaetes B. Bacterioidetes C. Protozoa D. Fungi

8. Guard cells in lower epidermis of leaves contain

   A. Nucleus B. Chloroplasts
   C. Mitochondria D. All the three organelles

9. The scientists listed in **Panel A** have made a significant contribution to our understanding of the molecular nature of the gene. Match the name of scientists in **Panel A** with his or her major contribution indicated in **Panel B**

Panel A	**Panel B**
(a) A. Rosalind Franklin	(i) Found that genes affect individual steps in metabolic pathways
(b) M. W. Nirenberg	(ii) showed that enzymes are missing in inborn errors of metabolism
(c) G. Beadle	(iii) Elucidated the triplet nature of genetic code
(d) A. Garrod	(iv) Used X-ray analysis to investigate the structure of DNA

A. a-iv; b-iii; c-ii; d-i
B. a-iii; b-iv; c-ii; d-i
C. a-iv; b-iii; c-i; d-ii
D. a-iii; b-iv, c-i; d-ii

10. Molarity of pure water is

A. 55.6 B. 12.4 C. 44.3 D. 34.1

11. Which among the following support lithoautotrophic growth of microorganisms

A. $H_2S + CO_2$ B. H_2S + glucose C. Glucose + CO_2 D. $CO_2 + H_2S$

12. Which of the following **<u>can not</u>** be used for delivering foreign genes into higher plant cells

A. *Agrobacterium*
B. Microprojectile
C. Biolistics
D. Electrophoresis

13. In phytoextraction, plants are used

A. for extracting medicines
B. as pollution indicators
C. for removing dangerous elements or compounds
D. in the treatment of infected plants

14. "Geosmins" are

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

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15. Match the following and choose the correct answer given below

1. Non-sister chromatids cross-over	(a). Diplotene
2. Synapsis of homolgous chromosomes	(b). Leptotene
3. Condensed bivalent formation	(c). Pachytene
4. Thin-thread like chromosomes	(d). Zygotene

A. 1(d), 2(c), 3(b), 4(a)
B. 1(c), 2(d), 3(a), 4(b)
C. 1(b), 2(c), 3(d), 4 (a)
D. 1(a), 2(b), 3 (c), 4(d)

16. Which **ONE** of the following mutants is used to carry out genetic analysis to determine the function of an essential gene?

A. Knock out mutant
B. Deletion mutant
C. Insertion mutant
D. Temperature sensitive mutant

17. The high-efficiency particulate air (HEPA) filters used in laminar flow chambers can filter particles upto ..... μm.

A. 0.05 B. 0.2 C.0.01 D. 0.3

18. In an endergonic reaction $\Delta G^{\circ\prime}$ is positive and the equilibrium constant is .....

A. >1 B. =1 C. <1 D. 0

19. Compared to bacterial genome (example *E. coli*), human genome is approximately ..... (kb) times more.

A. Ten B. Hundred C. Thousand D. Ten thousand

20. Positional cloning refers to

A. Using a selection procedure to clone a cDNA
B. Cloning a portion of a gene using PCR
C. Isolating a gene by PCR using primers from another species
D. Mapping a gene to a chromosomal region and then identifying and cloning a genomic copy of the gene from the region

21. Which of the following statement about gibberellin is **FALSE**?

A. Maize plants carrying dwarf mutation would be expected to have higher levels of gibbberellin in their stem than normal plants
B. If the gibberellin is applied to stem of dwarf maize plants, the stem elongates so that the plant reaches normal height
C. Dwarf maize plants have a mutation in the gibberellin biosynthetic pathway
D. Some of the gibberellin deficient maize mutants are male sterile

22. When sulfate acts as an electron acceptor it is called as

A. Assimilatory sulfate reduction
B. Sulfate assimilation
C. Sulfate dissimilation
D. Dissimilatory sulfate reduction

23. Reactions that replace cycle intermediates are called

A. Anaplerotic reactions.
B. Amphibolic reactions
C. Cycle intermediates
D. None given above

24. ClB method proposed by H.J. Muller is used to detect

A. Autosomal recessive mutants
B. Sex-linked recessive mutants
C. Sex-linked dominant mutants
D. Developmental mutants

25. What is the enzyme involved in producing glucose-6-phosphate

A. Glucose-6-kinase
B. Glucose-6-phosphatase
C. Hexokinase
D. Glucose Kinase

PART - B

26. The number of different haploid gametes produced by the genotype, AaBBCcEeFFGgHH is

A. 8 B. 12 C. 16 D. 32

27. Toxoplasmosis is a disease caused by

A. Protozoan B. Algae C. Fungi D. Bacteria

28. These are some of the important biomolecules, identify their corresponding match

L. Cytochrome P450	1. Thiol tripeptide
M. Ascorbic acid	2. Superoxide dismutase
N. Glutathione	3. Glycoprotein
O. H_2O_2	4. Antioxidant
	5. Heme-protein complex
	6. Glycolipid

A. L=6; M=5; N=4; O=3
B. L=2; M=3; N=1; O=4
C. L=5; M=4; N=1; O=2
D. L=5; M=3; N=6; O=2

29. Winogradsky column is used as an enrichment vehicle for the isolation of ..... microorganisms

A. Aerobic B. Anaerobic C. Microaerobic D. Parasitic

30. Bioplastics can be prepared from

A. Poly-hydroxyalkanoate granules
B. Cyanophycin granules
C. Glycogen granules
D. Poly phosphate granules

31. Which of the following experiments or discoveries did **NOT** help to identify the "triplet nature" of the DNA code?

A. Frameshift mutations B. Anticodons
C. RNA homopolymers D. Universality of the genetic code

32. Identify the mismatched pair among the following:

A. Willow – cricket bat
B. Teak – Furniture
C. Givotia – Toys
D. Jetropa – Railway tracks

33. One of the following common name does not match with its botanical name, identify:

A. *Abelmoschus esculentus* – Okra
B. *Piper betel* – Black pepper
C. *Ananas comosus* – pineapple
D. *Physalis peruviana* – Gooseberry

34. Classification based on genetic and evolutionary relationships among the taxa is called

A. Artificial B. Natural C. Phylogenetic D. Sexual

35. Any suspected organism is finally accepted as the cause of a specific disease when it fulfills certain criteria formulated by Koch. Koch's postulates are:

I. The organism must be consistently associated with the disease in question
II. The organism must be isolated from diseased plant in pure culture
III. The organism of pure culture must be capable of mutation
IV. The organism of pure culture when inoculated back into healthy plant, must be capable of reproducing the symptoms of the disease

A. I and II are correct
B. I,II and III are correct
C. I,II and IV are correct
D. All are correct

36. Which of the following statements is **INCORRECT**?

A. Transcription occurs in the nucleus in prokaryotes
B. Usually monocistronic mRNA is produced in eukaryotes
C. In prokaryotes the primary mRNA transcription undergoes splicing
D. Sigma subunit of RNA polymerase recognizes the promoter

37. Bryophytes are

A. Atracheophytic cryptogams
B. Tracheophytic amphibious cryptogams
C. Tracheophytic cyptogams
D. Atracheophytic amphibious cryptogams

38. When black female guinea pig is crossed with a recessive white male guinea pig, the resultant litter would be a mixture of black and white offspring. The genotype of female parent guinea pig would be

A. BB B. Bb C. B- D. bb

39. Identify the **mismatch**

A. Rhizome – Diageotrophic
B. Stilt roots – Sugarcane
C. Imbricated bulb – Lilium
D. Prop roots of ficus – Positive heliotrophic

40. The infrared portion of the electromagnetic spectrum is usually divided into three regions; the near-, mid- and far- infrared, named for their relation to the visible spectrum. The wavenumbers are

A. 14000–4000 cm^{-1}; 4000–400 cm^{-1} and 400–10 cm^{-1}, respectively.
B. 14000–5000 cm^{-1}; 5000–500 cm^{-1} and 500–50 cm^{-1}, respectively.
C. 12000–4000 cm^{-1}; 4000–400 cm^{-1} and 400–10 cm^{-1}, respectively.
D. 12000–6000 cm^{-1}; 6000–600 cm^{-1} and 600–60 cm^{-1}, respectively.

41. One of the following is a geocarpic fruit

A. Walnut B. Peanut C. Jackfruit D. Brazil nut

42. Beer-Lambert law states

A. that there is a logarithmic dependence between the transmission (T), of light through a substance and the product of the absorption coefficient of the substance, α, and is independent of the distance the light travels through the material (i.e., the path length), ℓ.
B. that there is a logarithmic independence between the transmission (T), of light through a substance and the product of the absorption coefficient of the substance, α, and a dependence of monochromatic light.
C. that there is a logarithmic dependence between the transmission (T), of light through a substance and the product of the absorption coefficient of the substance, α, and the distance the light travels through the material (i.e., the path length), ℓ.
D. that there is a logarithmic dependence between the transmission (T), of light through a substance and is independent of the distance the light travels through the material (i.e., the path length), ℓ.

43. "Phytol" chain of chlorophyll is a

A. Sugar B. Protein C. Terpenoid D. Fatty acid

44. A species with an extremely low (~20%) GC-content is

A. *Plasmodium falciparum*
B. *Streptomyces coelicolor*
C. *Arabidopsis thaliana*
D. *Saccharomyces cerevisiae*

45. The transcriptional product of a structural gene may be converted into more than one kind of functional RNA or polypepetide chain and is referred as

A. Polycistronic
B. Monocistronic
C. Multiple allelic
D. Inter allelic

46. Thin layer chromatography (TLC) is a chromatography technique used to separate

A. Non-volatile mixtures
B. Volatile mixtures
C. Both volatile and non-volatile mixtures
D. Gaseous mixtures

47. The "Father of the Green Revolution" is

A. M.S. Swaminathan
B. Norman Borlaug
C. Verghese Kurien
D. Rajagopal Chidambarum

48. With regard to bacterial transcription, which of the following statements is **correct**

A. Like in eukaryotes, bacterial transcription and translation cannot occur simultaneously.
B. Bacterial transcription occurs in the cytoplasm alongside translation as observed in eukaryotes.
C. Bacterial transcription occurs in the cytoplasm alongside translation. Unlike in eukaryotes, bacterial transcription and translation can occur simultaneously.
D. None of the above

49. One of the following element is very important in the biophotolysis of water

A. Copper B. Magnesium C. Manganese D. Iron

50. Lipids are insoluble in water because lipid molecule are

A. Hydrophobic B. Neutral C. Zwitter ion D. Hydrophilic

51. An important peptide involved in scavenging superoxide radicals in plants is

A. Insulin B. Glutathione C. β-carotene D. Ascorbate

52. The nick name "botanical snakes" is given for

A. Bryophytes B. Pteridophytes C. Gymnosperms D. Angiosperms

53. "*Tag Pol*" is obtained from

A. Bacterium B. Fungi C. Algae D. Plant

54. "Death valley" is a desert valley located in

A. Australia B. Africa C. Asia D. America

55. *Dunaliella* is an alga which is used for the production of

A. Cheese B. Pigments C. Glycerol D. Ethanol

56. Water splitting process in light reaction is called

A. Chemiosmosis B. Photolysis C. Photobiology D. Photosystems

57. Which among the following is a non-polluting and renewable fuel

A. Ethanol B. Methane C. Hydrogen D. Glycerol

58. Oxidative photosynthetic carbon cycle is also called as

A. C2 photosynthesis
B. C3 photosynthesis
C. C4 photosynthesis
D. C1 photosynthesis

59. Assume that a cross is made between **AaBb** plants and **aabb** plants and the offspring occur in the following numbers: **106 AaBb**; **48 Aabb**; **52 aaBb**; **94 aabb**. These results are consistent with following circumstance.

A. Linkage with 50% crossing over
B. Linkage with approximately 33 map units between two gene loci
C. Independent assortment
D. Linkage with approximately 17 map units between two gene loci

60. Cell fusion is promoted by

A. Sendai virus
B. Potato ring spot virus
C. Tobacco Mosaic Virus
D. Ligase

61. Identify the mismatch

A. Nickel – Catalase
B. Iron – Cytochrome
C. Cobolt – Vitamin B_{12}
D. Megnesium – Isocitrate lyase

62. A **microbiome** is

A. An ecological community of pathogenic microorganisms that literally share a host
B. An ecological community of commensal, symbiotic, and pathogenic microorganisms that share our body space
C. An ecological community of symbiotic microorganisms that share with plants
D. An ecological community of commensal microorganisms that share will living systems

63. Polysorbate 80 is a/an

A. Deodorant
B. Nonionic surfactant and emulsifier
C. Sterilizing agent
D. Organic carbon source used for preserving microorganisms

64. δ-Aminolevulinic acid is the precursor for the biosynthesis of

A. Purine
B. Pyrimidine
C. Pyrrole
D. Steroid

65. Dicer is an

A. Exoribonuclease
B. Endoribonuclease
C. Exo and endoribonuclease
D. Alternate name for RNAi

66. Which of the following statements are **TRUE** for auxins?

A. Indoleacetic acid is the first plant growth regulator discovered
B. Auxins were first discovered by F. Skoog and C. Miller
C. Auxins move only by polar transport
D. Auxins are often used in agriculture as herbicides

67. Swollen and spongy petioles are characteristic of

A. *Trapa* B. *Wolffia* C. *Ceratophyllum* D. *Limnophila*

68. A chemical used in artificial polyploidy

A. Polyethylene glycol
B. Sodium alginate
C. Acenapnthene
D. Sodium hypochlorite

69. Pyrimidine dimers can be induced in DNA by

A. Temperature B. IR C. pH D. UV

70. Triacylglycerol contains fatty acids and

A. Glucose B. Glycogen C. Glycerol D. Guanine

71. The property of a system in which variables are regulated so that internal conditions remain stable and relatively constant is called

A. Osmosis B. Homeostasis C. Enantiostasis D. Apoptosis

72. Abiogenesis is

A. the natural process by which life arose from non-living matter such as simple organic compounds
B. a process in synthetic biology for the creation of new life
C. an artificial process of creation of new life
D. a process of creating new life forms using bio-robotics

73. Galactolipids are found in membranes of

A. Plasmalemma
B. Chloroplasts
C. Mitochondria
D. Peroxisomes

74. The scientific name of clove is

A. *Cinnamomum aromaticum*
B. *Syzygium aromaticum*
C. *Geum japonicum*
D. *Piper nigrum*

75. Which is the precursor for citric acid cycle?

A. Glucose B. Fumaric Acid C. Succinyl CoA D. Acetyl CoA

76. An important gene used for the identification of bacteria

A. 23S rRNA B. 5S rRNA C. 16S rRNA D. 32S rRNA

77. *Arabidopsis thaliana* was the first plant to have its genome sequenced, and is a popular tool for understanding the molecular biology of many plant traits, including flower development and light sensing. The genome size of this plant is _____ Mbp.

A. 63.4 B. 135 C. 149 D. 211

78. Anoxygenic phototrophs lack

A. Photosystem-II (PSII) B. Photosystem-I (PSI)
C. Both PSII and PSI D. Electron transport system

79. Which of the following is a simple sugar or monosaccharide?

A. Sucrose B. Lactose C. Galactose D. Maltose

80. Given the diploid chromosome number of garden pea as 14, the number of possible double-trisomics are

A. 7 B. 14 C. 21 D. 15

81. Identify the **mismatch**

A. Biosafety level 1 – Working with pathogenic microorganisms
B. Biosafety level 2 – Working with mild disease causing microorganisms
C. Biosafety level 3 – Working with lethal disease causing microorganisms
D. Biosafety level 4 – Working with high risk of aerosol-transmitted laboratory infections

82. Which of the following statements is **false**

A. Food chains are inter connected in a ecosystem
B. Energy is completely utilized from one trophic level to another
C. Oligotrophic lakes are mainly found in temperate climates
D. Algal blooms leads to eutrophication

83. Embryo development from an unfertilized egg following pollination but without the involvement of male gamete is

A. Pseudogamy B. Semigamy C. Apogamy D. Androgamy

84. Hormone which prevent precocious germination of seeds

A. Auxin B. Ethylene C. ABA D. Gibberellin

85. In RNA, Thymine is replaced by

A. Adenine B. Guanine C. Cytosine D. Uracil

86. Glyphosate is a

A. Fertilizer B. Antibiotic C. Herbicide D. Hormone

87. Which of the following is **TRUE**?

A. Cells in angular collenchyma are with thickened corners and intercellular spaces
B. Cells in lacunar collenchyma are without intercellular spaces and thickened corners
C. Cells in lamellar collenchyma are thickened radial walls than tangential walls.
D. None of the above.

88. The DNA modification generally used by bacteria to prevent digestion of the genophore by the cell's own endonucleases is

A. Methylation B. Glycosylation
C. Phosphorylation D. Deamination

89. Phosphorylation-dephosphorylation of proteins is an important mechanism of enzyme

A. Synthesis B. Begradation C. Regulation D. Turnover

90. Which of the following statements is **TRUE** regarding introns?

A. Introns are the part of the mRNA that are translated
B. Introns have no function
C. Human genes have fewer introns than genes of other organisms
D. Introns may be involved in exon shuffling

91. Ringworm in a kitten is due to

A. *Microsporum canis* B. *Aspergillus flavus*
C. *Claviceps purpurea* D. *Rhizoctonia*

92. A greenish zone of incomplete hemolysis indicate

A. α-hemolysis B. β-hemolysis C. γ-hemolysis D. δ-hemolysis

93. Proteins produced by microbial pathogens to suppress or modulate host defense responses are referred as

A. Ligands B. Elicitors C. Receptors D. Effectors

94. The conversion of nitrogen to ammonia or nitrogenous compounds is called as

A. Nitrogen assimilation .
B. Nitrogen fixation
C. Denitrification
D. Nitrification

95. 2,4-Dinitrosalicylic acid is used in the estimation of

A. Lipids B. Proteins C. Alcohols D. Sugars

96. An essential macronutrient which functions as a secondary messenger during signal transduction is

A. Lithium B. Sodium C. Potassium D. Calcium

97. Haploid and monoploid chromosome number are same in

A. *Triticumaestivum*
B. *Tricalehexaploide*
C. *Nicotianatabacum*
D. *Oryza sativa*

98. The distances between bacterial genes as determined from interrupted conjugated experiments are measured in units of

A. Recombination
B. Nucleotide pairs
C. Minutes
D. Percentage of genophore

99. Maltose is composed of which two sugars?

A. Glucose and Glucose
B. Glucose and Galactose
C. Glucose and Fructose
D. Fructose and Galactose

100. The study of quantitative trait locii in a large panmictic population is usually presented as a typical bell-shaped curve due to

A. Normal distribution
B. Chi-square analysis
C. Linkage analysis
D. Binomial distribution

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