

ENTRANCE EXAMINATION – 2019**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 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 **16** 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.

PART - A

1. Which of the following statements is **not** correct regarding Spirochetes?
 - A. They have endoflagella between the outer membrane and the protoplasmic cylinder; thus they are located in the periplasmic space of the cell
 - B. Spirochetes like other bacteria swim best in media of low viscosity
 - C. They are best viewed using dark-field microscopy
 - D. Spirochetes have an ability to twist or contort their shape due to the occurrence of a special kind of flagella termed periplasmic flagella

2. Ionic radii are
 - A. greater than the respective atomic radii of elements in general
 - B. greater than the respective atomic radii of electropositive elements
 - C. less than the respective atomic radii of electropositive elements
 - D. greater than the respective atomic radii of electronegative elements

3. An epidemic disease of paddy that caused the Bengal famine is
 - A. Blast disease of rice by *Pyricularia*
 - B. Khaira disease of rice by mineral deficiency
 - C. Brown spot disease of rice by *Helminthosporium*
 - D. Bacterial blight of rice by *Xanthomonas*

4. Which of the following are functions of 'maintenance media'?
 - A. used for assay of vitamins, amino acids
 - B. used for determining the bacterial content
 - C. used for determining the type of growth produced by bacteria
 - D. used for conservation of the viability and physiological characteristics

5. Curdlan is
 - A. polymer of β -(1,3)-linked glucose residues
 - B. polymer of β -(1,4)-linked glucose residues
 - C. polymer of β -(1,3)-linked galactose residues
 - D. polymer of β -(1,4)-linked galactose residues

6. Kelps are which of the following type of algae?
 - A. Red algae
 - B. Yellow algae
 - C. Brown algae
 - D. Green algae

7. Anthramycin, tomaymycin and neothramycin are which of the following type of antibiotics?
- A. Antiviral
B. Antitumor
C. Antifungal
D. Antibacterial
8. Which of the following bacteria requires nicotinic acid as a growth factor in their media?
- A. *Proteus vulgaris*
B. *Nitrosomonas* sp
C. *Escherichia coli*
D. *Leuconostoc mesenteroides*
9. Which of the following reagent information is correct regarding "Lucas Reagent"?
- A. A mixture of concentrated HCl and anhydrous Zinc Chloride and used for distinguish three types of alcohol
B. An alkalic solution of K_2HgI_4 used for detecting ammonia
C. $CuSO_4 \cdot 5H_2O$ solution with sodium carbonate and sodium citrate used for detecting aldehyde group
D. It is a mixture of copper sulphate solution (solution A) and alkaline sodium-potassium tartrate solution (solution B) and used for detecting aldehyde group
10. What is perisperm?
- A. It is the defected sperm which loses its ability to penetrate outer covering of egg
B. The layer of nutritive tissue, derived from the nucellus, that surrounds the embryo of a seed in some angiosperms
C. It is the movement of sperm in female genital tract
D. It is the internal part of pollen grain in the zygomorphic flower
11. Which of the following statements is **incorrect** of conjugation in bacterium?
- A. Cells with F plasmid produces sex pili through which DNA is transferred from donor to recipient cells during conjugation
B. In Hfr cells, bacterial genes close to the origin are transferred first to the recipient cells
C. In F' cells, F-factor genes along with bacterial genes are transferred to the recipient cells
D. Both DNA strands of the F-plasmid are first replicated, then nicked and finally transferred to the recipient cells
12. Meso form of tartaric acid is
- A. Dextrorotatory
B. Laevorotatory
C. Neither laevo nor dextro rotatory due to internal compensation
D. A mixture of equal quantities of dextro and laevo forms

13. A reaction in which two σ -bonds are lost and a new π -bond is formed is an example of
- A. Rearrangement reaction
B. Substitution reaction
C. Elimination reaction
D. Addition reaction
14. *Chromatium okenii* uses which of the following compound as electron donor for photoautotrophic growth?
- A. Hydrogen sulphide
B. Fatty acids
C. Alcohol
D. Succinate
15. In the structural formula of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- A. five molecules of water are coordinated to the central Cu^{2+} ion
B. four molecules of water are coordinated to the central Cu^{2+} ion and one is hydrogen bonded to the sulphate group
C. three molecules of water are coordinated to the central Cu^{2+} ion and two are hydrogen bonded to the sulphate group
D. two molecules of water are coordinated to the central Cu^{2+} ion and three are hydrogen bonded to the sulphate group
16. The compound that would produce a silver mirror with Tollen's reagent is
- A. HCOOH
B. CH_3COOH
C. $\text{C}_2\text{H}_5\text{OH}$
D. $\text{C}_6\text{H}_5\text{OH}$
17. The broad-spectrum digestive enzyme formulation designed to support optimal breakdown and absorption of proteins, fats, and carbohydrates is known as
- A. Allozymes
B. Isozymes
C. Protozymes
D. Novozymes
18. The bioluminescent dinoflagellates are
- A. *Noctiluca* and *Gonyaulax*
B. *Gymnodinium* and *Cerastium*
C. *Dinobryon* and *Distephanus*
D. *Pinnularia* and *Acetabularia*
19. One of the following is **not** a member of *Enterobacteriaceae*
- A. *Serratia*
B. *Shigella*
C. *Klebsiella*
D. *Stigmatella*

20. The stage in the life history of *Plasmodium* which can be found both in the primary and secondary host is

- A. Merozoite B. Trophozoite C. Ookinete D. Gametocyte

21. Identify the **mismatch** below

Inhibitor

1. Malonate
2. Cyanide
3. Oligomycin
4. Rotenone

Function

- Prevents oxidation of succinate in Krebs cycle
 Inhibits cytochrome oxidase in ETC
 Inhibits ATP synthase
 Blocks complex-III in ETC

- A. Both 1 & 4 B. Both 2 & 4
 C. Both 1 & 3 D. 4 Only

22. All of the following events occur during meiosis-I **except**?

- A. Homologous pairs of chromosomes synapse and crossing over occurs
- B. Separation of homologous chromosomes
- C. Sister chromatids of each homologous chromosome separate and migrate toward different poles
- D. Cytoplasm divides to produce two cells

23. Which of the following methods can be utilized for removing peripheral proteins of the cytoplasmic membrane?

- A. Treatment by detergents B. Osmotic shock
 C. Heat application D. Destruction of the membrane

24. Which among the following develop in the upper portion of the Winogradsky column?

- A. Sulfate-reducing bacteria B. Green-sulfur bacteria
 C. Purple-sulfur bacteria D. Thiobacilli

25. If the GC content of a DNA molecule is 54 percent, than the content of A and T in this molecule is

- A. 27 percent and 27 percent, respectively
- B. 23 percent and 23 percent, respectively
- C. 46 percent and 54 percent, respectively
- D. 27 percent and 23 percent, respectively

PART – B

26. The xanthophyte walls are typically made of
- A. Chitin only
B. Cellulose only
C. Cellulose and Pectin
D. Starch and Cellulose
27. The bacteria which causes soil to lose their fertility is
- A. *Bacillus ramosus*
B. *Nitrobacter*
C. *Rhizobium leguminosarum*
D. *Bacillus denitrificans*
28. Which of the following bacteria can grow both as chemolithotrophs and as chemoorganotrophs?
- A. *Pseudomonas pseudoflava*
B. *Nitrobacter sp*
C. *Rhodospirillum rubrum*
D. *Chromatium okenii*
29. NADH + H⁺ are formed during the conversion of
- A. Glucose-6-phosphate to Fructose-6-phosphate
B. 3-Phosphoglyceraldehyde to Phosphoglycerate
C. Phosphoglycerate to Pyruvate
D. Fructose-1, 6, diphosphate to two triose isomers
30. Which of the following is the relationship between optical density and cell mass?
- A. Exponentially proportional
B. Linearly proportional
C. Inversely proportional
D. Not related
31. Sabin vaccine is given to offer
- A. Innate immunity
B. Passive immunity
C. Active immunity
D. Auto immunity
32. Tornaria larva is found in the development of stages of
- A. Starfish
B. Cockroach
C. Frog
D. Balanoglossus
33. Which among the following support lithoautotrophic growth of microorganisms
- A. H₂S + CO₂
B. H₂S + glucose
C. Glucose + CO₂
D. CO₂ + Pyruvate

34. Which of the following types of association is present among *Staphylococcus aureus* and *Aspergillus terreus*?
- A. Antagonism
B. Mutualism
C. Parasitism
D. Commensalism
35. Cord factor is a
- A. Protein
B. Teichoic acid derivative
C. Mycolic acid derivative
D. Carbohydrate
36. What are the characteristics of rough pneumococci strain?
- A. Noncapsulated and Pathogenic
B. Noncapsulated and Nonpathogenic
C. Capsulated and Pathogenic
D. Capsulated and Nonpathogenic
37. Prosthecae helps in
- A. Motility
B. Human infection
C. Nutrient absorption and attachment to surfaces
D. Protection from environment
38. The genetic make-up of human disease "Sickle Cell Anemia" is very much studied. This disease occurs due to
- A. Synonymous SNP in β -globin gene at 6th amino acid position
B. Non-synonymous SNP in β -globin gene at 6th amino acid position
C. Variable no. of tandem repeats in β -globin gene at 6th amino acid position
D. Microsatellite in β -globin gene at 6th amino acid position
39. Which of the following characteristics gives to the enzyme its specificity?
- A. Hydrogen ion specificity
B. High molecular weight
C. Distinct surface configuration
D. The constituent co-enzyme
40. Identify the **wrong** statement about aldehydes and ketones
- A. They cannot form any intermolecular hydrogen bonds
B. The lower members are soluble in water
C. They are polar compounds
D. The intermolecular attraction in them are stronger than in the alcohols of similar molecular weights

48. Which one of the following is a hyaluronidase that may aid invasiveness of *Clostridium perfringens*?
- A. α -toxin B. β -toxin C. μ -toxin D. θ -toxin
49. In the *lac* operon, the absence of Y-cistron results in the non-synthesis of
- A. β -galactosidase B. Transacetylase
C. Permease D. RNA polymerase
50. Organisms that live inside rocks or in pores between mineral grains are called as
- A. Endoliths B. Extremophiles
C. Psychrophiles D. Mesophiles
51. The 'bast' fibres are
- A. Xylem B. Phloem fibres C. Sclereids D. Sieve tubes
52. Which one of the following chromosomal aberrations is known to act as cross-over suppressor
- A. Duplication B. Deletion C. Inversion D. Translocation
53. Peripatus is called the connecting link between
- A. Annelida and Mollusca
B. Annelida and Arthropoda
C. Arthropoda and Mollusca
D. Arthropoda and Echinodermata
54. Phage display technique makes use of which of the following vectors?
- A. BAC B. Lambda C. M13 D. 2 micron circle
55. When a gamete that is n-1 fuses with another gamete that is n-1, the resulting organism is
- A. Tetrasomic B. Monosomic C. Trisomic D. Nullisomic
56. Nutmeg botanical name is
- A. *Syzygium aromaticum* B. *Cinnamomum zeylanicum*
C. *Myristica fragrans* D. *Cinnamomum tamala*

57. A disease cycle in which a pathogen that takes several years to initiate new infection is called
- A. Monocyclic cycle
 - B. Polycyclic
 - C. Polyetic cycle
 - D. All of these
58. For any color to be developed in the aleurone layer of corn kernels, the dominant alleles at two loci plus the recessive condition at the third locus (A-R-ii) must be present. Any other genotypes will produce colorless aleurone. What phenotypic ratio of colored: colorless would be expected in the progeny from matings between parental plants of genotype AaRrli?
- A. 8 colored : 56 colorless
 - B. 9 colored : 55 colorless
 - C. 58 colored: 6 colorless
 - D. 52 colored : 12 colorless
59. "Laughing sickness or kuru" disease of human's is thought to be caused by
- A. Prions
 - B. Viruses
 - C. Viroids
 - D. Virusoid
60. Biparental transmission of plastids was demonstrated by Baur in which of the following
- A. *Mirabilis jalapa*
 - B. *Pelargonium zonale*
 - C. *Chlamydomonas*
 - D. Maize
61. Why do geneticists rely on mitochondrial DNA (mtDNA) to study the relatedness of animal populations?
- A. mtDNA mutates at a slower rate than nuclear DNA
 - B. mtDNA is maternally inherited and is free from recombination
 - C. It has few single nucleotide polymorphisms in the hypervariable, noncoding regions
 - D. All mitochondrial proteins are coded by mitochondrial genome
62. Identify the mismatch
- A. *Bifidobacterium* – produces acetic acid
 - B. *Frankia* – fixes nitrogen
 - C. *E. coli* – Methyl red positive
 - D. *Enterobacter* – H₂S positive
63. A metabolic pathway that results in the generation of glucose from non-carbohydrate carbon substrates such as lactate, glycerol and glucogenic amino acids is
- A. Glycolysis
 - B. Gluconeogenesis
 - C. Glycogenolysis
 - D. Respiratory oxidative burst

64. Heparin is a

- A. Mucopolysaccharide
- B. Disaccharide
- C. Phosphoprotein
- D. Lipoprotein

65. Paraffin wax is

- A. Ester
- B. Alcohol
- C. Unsaturated hydrocarbon
- D. Saturated hydrocarbon

66. Among the nitrogenous fertilizers one containing the highest percentage of nitrogen is

- A. Calcium ammonium nitrate
- B. Urea
- C. Calcium cyanamide
- D. Ammonium sulphate

67. Which of the following statement is true for "Succus entericus"?

- A. It is an acidic fluid produced from Brunner's gland of intestine
- B. It is an alkaline fluid produced from Brunner's gland of intestine
- C. It is the name of acidic bacteria found in large intestine
- D. It is the name of alkaline mucus found in brain during Alzheimer's condition

68. Hypo is used in photography because of its

- A. Reducing behaviour
- B. Oxidizing behaviour
- C. Complex forming behaviour
- D. Reaction with light

69. Which of the following statements are **correct** about nodules formation by *Rhizobium* sp.?

- (i) Nodules formation requires participation of both plant's nodulin genes and rhizobial nodulational genes
- (ii) Nod factors synthesized by nodulation genes are lipochitin oligosaccharides
- (iii) Infection thread forms during nodule formation is an internal tubular extension of the plasma membrane that is produced by the fusion of Golgi-derived membrane vesicles
- (iv) Nodules formation in non-leguminous plants are mainly mediated by *Rhizobium* sp

- A. (i) and (ii) Only
- B. (i) and (iii) Only
- C. (i), (ii) and (iii)
- D. (ii), (iii) and (iv)

70. A mixture of CuSO_4 and $\text{Ca}(\text{OH})_2$ used as a fungicide is known as

- A. Gypsum
- B. Caliche
- C. Kieselguhr
- D. Bordeaux mixture

71. Characteristics that distinguish arthropods from annelids and molluscs are

- (i) Absence of a trochophore larva
- (ii) An external skeleton made of chitin
- (iii) Subdivision of the legs into movable segments
- (iv) Distinct mandibles

- A. (i) and (ii) Only
- B. (ii) and (iii) Only
- C. (i) and (iii) Only
- D. (i), (ii), (iii) and (iv)

72. Saliva of Leeches contains an anticoagulant called

- A. Anti-histamine
- B. Hirudin
- C. Heparin
- D. Ptyalin

73. *Escherichia coli* DNA ligase uses NAD^+ as a cofactor. During the actual ligation reaction (joining of the 5' phosphate and 3' hydroxyl to form a phosphodiester bond), the leaving group is

- A. NAD^+
- B. NMN
- C. ATP
- D. AMP

74. Match the following using the codes given below:

- | | |
|------------------|------------------------------------|
| 1. Camalexin | (a) a lactone |
| 2. Ipomoeamarone | (b) bicyclic sesquiterpene alcohol |
| 3. Isocoumarin | (c) Indolic secondary metabolite |
| 4. Rishitin | (d) Abnormal sesquiterpenoid |
- A. 1-(a), 2-(d), 3-(b), 4-(c)
 - B. 1-(d), 2-(a), 3-(c), 4-(b)
 - C. 1-(c), 2-(d), 3-(a), 4-(b)
 - D. 1-(b), 2-(c), 3-(d), 4-(a)

75. Pick up the odd among the following TCA cycle intermediates

- A. Malate
- B. Succinate
- C. Fumarate
- D. Citrate

76. Hexacanth embryo is found in the life cycle of

- A. *Wuchereria bancrofti*
- B. *Ascaris lumbricoides*
- C. *Taenia solium*
- D. *Entamoeba histolytica*

77. Match the following using the codes given below:

- | | |
|-------------|--------------|
| 1. Mumps | (a) Bacteria |
| 2. Syphilis | (b) Fungus |
| 3. Ringworm | (c) Protozoa |
| 4. Malaria | (d) Helminth |
| | (e) Virus |

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

78. Lateral root primordia arise by localized cell divisions in the

- | | |
|--------------|---------------|
| A. Pericycle | B. Endodermis |
| C. Epidermis | D. Cortex |

79. Which of the following is not a product of noncyclic photophosphorylation?

- | | | | |
|----------|--------|--------------------|-------------------|
| A. NADPH | B. ATP | C. CO ₂ | D. O ₂ |
|----------|--------|--------------------|-------------------|

80. Match the following using the codes given below:

- | | |
|----------------------|-----------------------------------|
| 1. Garner & Allard | (a) Duplication of DNA |
| 2. Bateson & Punnett | (b) Chromosome theory of heredity |
| 3. Sutton & Boveri | (c) Photoperiodism |
| 4. Meselson & Stahl | (d) Linkage |
| | (e) Bacterial conjugation |

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

81. Which of the following is *the least* mobile nutrient element in plants

- | | |
|---------------|--------------|
| A. Phosphorus | B. Potassium |
| C. Iron | D. Nitrogen |

82. Members of Deuterostomia are

- | | |
|----------------------------|--------------------------|
| A. Echinoderms & Chordates | B. Arthropoda & Mollusca |
| C. Mollusca & Echinoderms | D. Vertebrates Only |

89. *Artemisia maritima* yields a drug called santonin. It is used as an
- A. antidote to snake poison B. antacid
C. antiseptic D. anthelmintic
90. Dihydrouridine is a
- A. modified amino acid found in nuclear membrane
B. purine nucleoside found in DNA
C. pyrimidine nucleoside found in tRNA
D. conjugated lipid found in plasma membrane
91. The non-leguminous genus known to form root nodules with a rhizobic symbiont is
- A. *Phaseolus* B. *Hibiscus* C. *Parasponia* D. *Nicotiana*
92. Proteasomes are protein complexes, which
- A. fold and stabilize proteins B. degrade damaged proteins
C. transport proteins within a cell D. cargo of metabolites
93. Which of the following enzymes, although absolutely vital to vertebrate life, had never been developed in vertebrates during the course of their evolution?
- A. Lactase B. Peptidase
C. Cellulase D. Nuclease
94. Pollens in pollinia is a characteristic feature of family
- A. Orchidaceae B. Euphorbiaceae C. Acanthaceae D. Rubiaceae
95. Metridium is
- A. Sea cucumber B. Sea Fan C. Sea pen D. Sea anemone
96. Which of the following alkenes can show *cis-trans* isomerism?
- A. $\text{CH}_3\text{CH}_2\text{Cl} = \text{CH}_2$ B. $\text{ClCH} = \text{CHCH}_3$
C. $\text{ClBrC} = \text{C}(\text{CH}_3)_2$ D. $(\text{CH}_3)_2\text{C} = \text{CHCl}$
97. Radioactive isotope employed by Calvin for tracing the path of carbon in photosynthesis was
- A. ^{11}C B. ^{14}C C. ^{18}O D. ^{35}P

98. Etiolation in plants is caused by

- A. Iron deficiency
- B. Magnesium deficiency
- C. Growing in dark
- D. Virus infection

99. Klenow fragment

- A. phosphorylates 5' ends of DNA molecules
- B. ligates DNA fragments
- C. has endonuclease activity
- D. has 5' to 3' DNA polymerase activity

100. Octyl glucoside is used to

- A. dye and visualize DNA in agarose gels
- B. dye and visualize proteins in polyacrylamide gels
- C. solubilize membrane proteins
- D. stabilize membrane lipids

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1	B	26	C	51	B	76	C
2	D	27	D	52	C	77	C
3	C	28	A	53	B	78	A
4	D	29	B	54	C	79	C
5	A	30	B	55	D	80	B
6	C	31	C	56	C	81	C
7	B	32	D	57	C	82	A
8	A	33	A	58	B	83	C
9	A	34	A	59	A	84	D
10	B	35	C	60	B	85	B
11	D	36	B	61	B	86	A
12	C	37	C	62	D	87	A
13	C	38	B	63	B	88	B
14	A	39	C	64	A	89	D
15	B	40	D	65	D	90	C
16	A	41	A	66	B	91	C
17	C	42	A	67	B	92	B
18	A	43	B	68	C	93	C
19	D	44	A	69	C	94	A
20	D	45	D	70	D	95	D
21	D	46	C	71	D	96	B
22	C	47	B	72	B	97	B
23	B	48	C	73	D	98	C
24	D	49	C	74	C	99	D
25	B	50	A	75	D	100	C