

Code Number: H-12

**ENTRANCE EXAMINATION – 2015**  
**M.Sc. Plant Biology & Biotechnology**

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 **19** 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 amino acid's oxidative/reductive state determines a protein's migration on SDS-PAGE?
  - A. Methionine
  - B. Tryptophan
  - C. Cysteine
  - D. Tyrosine
  
2. The 1<sup>st</sup> step in photosynthesis is
  - A. attachment of CO<sub>2</sub> to a 5-C sugar
  - B. formation of ATP
  - C. ionization of molecules of water
  - D. excitement of an electron of chlorophyll 'a' by photon of light
  
3. Cork cambium gives rise to
  - A. xylem and phloem
  - B. cortex and pith
  - C. cork towards outside and secondary cortex towards inside
  - D. cork towards inside and secondary cortex towards outside
  
4. Apical dominance means
  - A. suppression of growth of apical bud by axillary buds
  - B. suppression of growth of axillary buds by the presence of apical bud
  - C. inhibition of growth of axillary buds by removal of apical bud
  - D. stimulation of growth of apical bud by removal of axillary buds
  
5. One of the following common names does **NOT** match with its botanical name, identify the mismatch
  - A. *Abelmoschus esculentus* – Okra
  - B. *Piper betel* – Black pepper
  - C. *Ananas comosus* – Pineapple
  - D. *Physalis peruviana* – Gooseberry
  
6. Which is **NOT** found in a monocot (*e.g.* corn) vascular bundle?
  - A. Metaxylem
  - B. Protoxylem lacuna
  - C. Cambium
  - D. Metaphloem

7. Identify the mismatch

- A. *Dracaena* – *Liliaceae*
- B. *Physalis* – *Solanaceae*
- C. *Derris* – *Fabaceae*
- D. *Sida* – *Asteraceae*

8. Match the following:

- |                   |                  |
|-------------------|------------------|
| L. Hydathodes     | 1. Phloem        |
| M. Xylem          | 2. Xylem rays    |
| N. Ray parenchyma | 3. Water stomata |
| O. Leptome        | 4. Hydrome       |

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

9. In Maize,  $\text{CO}_2$  is first fixed by

- A. Ribulose-bis-phosphate carboxylase
- B. Phosphoenolpyruvate carboxylase
- C. Acetyl-CoA carboxylase
- D. Sucrose synthase

10. Which of the following lists represent bonding interactions in their general order of strength on a "per bond" basis from lowest to highest?

- A. hydrogen, ionic, hydrophobic, covalent
- B. hydrogen, hydrophobic, ionic, covalent
- C. ionic, hydrophobic, hydrogen, covalent
- D. hydrophobic, hydrogen, ionic, covalent

11. If a pair of homologous chromosomes fails to separate during anaphase of meiosis I, what will be the chromosome number of the four resulting gametes with respect to the normal haploid number ( $n$ )?

- A.  $n-1$ ;  $n-1$ ;  $n$ ;  $n$
- B.  $n+1$ ;  $n+1$ ;  $n$ ;  $n$
- C.  $n+1$ ;  $n-1$ ;  $n$ ;  $n$
- D.  $n+1$ ;  $n+1$ ;  $n-1$ ;  $n-1$

12. The steps involved in gene cloning and expression are given below

- (i) Insertion of isolated gene to the vector
- (ii) Introduction of recombinant vector to the host
- (iii) Isolation of desired gene
- (iv) Extraction of recombinant gene product
- (v) Expression of recombinant gene in host

The correct sequence of steps involved is

- A. i; iii; ii; v; iv
- B. i; iii; ii; iv; v
- C. iii; i; ii; v; iv
- D. iii; i; ii; iv; v

13. Which of the following best describes the complete sequence of steps occurring during every cycle of Polymerase Chain Reaction?

- (i) the primers hybridize to the target DNA
- (ii) the PCR mixture is heated to a high temperature to denature the double stranded target DNA
- (iii) fresh DNA polymerase is added
- (iv) DNA polymerase extends the primers to make a copy of the target DNA

- A. ii, iii, i, iv
- B. iii, iv, i, ii
- C. ii, i, iv
- D. iii, ii, iv, i

14. Chromosomes primarily consist of DNA and proteins. These proteins are of two major classes called Histones and Non-Histone chromosomal protein. Histone proteins are rich in which amino acid/s ?

- A. Lysine & Arginine
- B. Serine & Histidine
- C. Glutamic Acid & Aspartic Acid
- D. Alanine & Aspartic Acid

15. Genes located on Y-chromosome in humans and transmitted from father to son are known as

- A. Supplementary genes
- B. Holandric genes
- C. Complementary genes
- D. Duplicate genes

16. How does Carbon 14 differ from Carbon 12 ?

- A. C14 has more neutrons
- B. C14 has more electron
- C. C14 has more protons
- D. C14 is an ion

17. Match the organisms listed in the left panel with the fermentation products listed in the right panel and tick appropriate answer in the parenthesis to generate a sequence and link it to one of the options:

I. <i>Lactobacillus</i>	I. Ethanol	[ ]
II. <i>Saccharomyces</i>	II. Butyric acid	[ ]
III. <i>Propionibacterium</i>	III. Lactic acid	[ ]
IV. <i>Clostridium</i>	IV. Propionic acid	[ ]

- A. I, II, III, IV
- B. II, III, IV, I
- C. II, IV, I, III
- D. III, IV, I, II

18. Palmella stage is found in which of the following alga

- A. *Nitella*
- B. *Vaucheria*
- C. *Chara*
- D. *Chlamydomonas*

19. Phenol reacts with bromine water in carbon disulphide at low temperature to give

- A. o- Bromophenol
- B. o- and p-Bromophenol
- C. p-Bromophenol
- D. 2,4,6-Tribromophenol

20. Tyndall effect in colloidal solution is due to

- A. scattering of light
- B. reflection of light
- C. absorption of light
- D. presence of electrically charged particles

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21. *Escherichia coli* belongs to the class
- A. Alphaproteobacteria
  - B. Betaproteobacteria
  - C. Gammaproteobacteria
  - D. Deltaproteobacteria
22. Those viruses which infect blue-green algae are known as
- A. Cyanophages
  - B. Bacteriophage
  - C. Reoviridae
  - D. Adenoviruses
23. A bacterium having doubling time of 20 minutes, fills a cylindrical vessel completely in 4 hours. How much time will it take to fill half of the vessel ?
- A. 120 minutes
  - B. 220 minutes
  - C. 320 minutes
  - D. 40 minutes
24. An unusual infectious agent composed of protein in misfolded form is known as
- A. Prion
  - B. Paranemic
  - C. Prodom
  - D. Processed pseudogene
25. Cholera is an infection of small intestine caused by *Vibrio cholerae*. What is this *Vibrio cholerae* and what type of shape it has?
- A. It is bacterium and has comma shape
  - B. It is virus and has polyhedral shape
  - C. It is virus and has octahedral shape
  - D. It is parasitic protozoa and has spherical shape

Cont.....

**PART-B**

26. Phloem of gymnosperm differs from angiosperm in
- A. having parenchyma
  - B. having no companion cells
  - C. having no sieve tubes
  - D. having no sclerenchyma
27. Insect pollinated flowers usually possess
- A. dry pollen with smooth surface
  - B. sticky pollen with rough surface
  - C. large quantities of pollen
  - D. brightly colored pollen
28. Which of the following is a natural cytokinin?
- A. Zeatin
  - B. Thidiazuron
  - C. 6-Benzylaminopurine
  - D. 1,3-Diphenylurea
29. Vascular cambium is an example of
- A. secondary meristem
  - B. intercalary meristem
  - C. lateral meristem
  - D. primary meristem
30. Plant group with largest ovule, largest tree and largest gametes
- A. Pteridophyte
  - B. Angiosperm
  - C. Gymnosperm
  - D. Bryophyte
31. Fungi often colonize lesions due to other causes. Which of the following is least likely to be present as colonizer?
- A. *Candida*
  - B. *Sporothrix*
  - C. *Mucor*
  - D. *Aspergillus*

32. Aspergillosis is recognized in tissue by the presence of
- A. Metachromatic granules
  - B. Pseudohyphae
  - C. Septate hyphae
  - D. Budding cells
33. All the populations of all the species occupying a particular place are called
- A. The biocoenose
  - B. A population
  - C. An ecosystem
  - D. A community
34. To which kingdom do all the eukaryotic, single-celled organisms belong?
- A. Archaeobacteria
  - B. Plants
  - C. Monera
  - D. Protista
35. Turmeric belongs to family
- A. Zingiberaceae
  - B. Myristicaceae
  - C. Liliaceae
  - D. Asteraceae
36. How do millets differ from major cereals?
- A. They are smaller, rounded and coarse
  - B. They are larger and softer
  - C. They provide better nutrition
  - D. They have greater palatability as they are infant foods
37. Which among the following heavy metals are NOT plant nutrients ?
- A. Mg, Zn, Mo
  - B. Pb, Cd, Hg
  - C. Co, Fe, Mn
  - D. Co, Al, Zn



38. Nastic movements differ from tropic movements in being
- A. directional with respect to stimulus
  - B. non-directional with respect to stimulus
  - C. controlled by chemicals
  - D. controlled by turgor pressure
39. Which is the most appropriate reason for storing green colored apples at low temperature?
- A. the rate of photosynthesis is reduced
  - B. respiration and photosynthesis are completely inhibited
  - C. the rate of respiration is reduced
  - D. the rate of photosynthesis and respiration are reduced
40. One of the following is **NOT** a member of the family Solanaceae
- A. *Atropa*
  - B. *Withania*
  - C. *Hyoscyamus*
  - D. *Dracaena*
41. The waxy substance associated with the wall of cork cells is
- A. Suberin
  - B. Cutin
  - C. Lignin
  - D. Hemicellulose
42. What is the function of the Golgi apparatus?
- A. It controls the cell's activities and stores its DNA
  - B. It is the site of protein synthesis
  - C. It is the site for lipid synthesis
  - D. It labels proteins with a signal sequence, which determines their final destination
43. What is primarily found in transfusion tissue?
- A. Sclerenchyma
  - B. Collenchyma
  - C. Vessel members
  - D. Tracheids

44. Choose the CORRECT statements from the below.

- A. Stalk holding the whole inflorescence – Rachis
- B. Stalk of each single flower – Pedicel
- C. Main stem holding the flowers or more branches within the inflorescence – Peduncle
- D. All the above

45. Thick, leathery exocarp, mesocarp and juicy, pulpy endocarp with axile placentation is characteristic feature of

- A. Berry
- B. Hesperidium
- C. Pome
- D. Etario of berries

46. Two different strains of *Drosophila*, strain A and strain B, each has a recessive mutation that results in abnormally bright red eye color (Wild type flies have brownish red eye color). When a homozygous strain A fly is crossed with a homozygous strain B fly, all the progeny have the dominant wild-type eye color. The most likely genetic information for the above result is

- A. co-dominant alleles
- B. epistasis
- C. epigenetic inheritance
- D. polygenic inheritance

47. A plant with the genotype  $Ab/aB$  is testcrossed. If the two loci were 25 m.u. apart, what proportion of progeny will be  $AaBb$ ?

- A. 12.5%
- B. 25%
- C. 50%
- D. 37.5%

48. Physiological xerophyte is

- A. *Rhizophora*
- B. *Hydrilla*
- C. *Opuntia*
- D. *Neerium*

49. Bryophytes are

- A. atracheophytic cryptogams
- B. tracheophytic amphibious cryptogams
- C. tracheophytic cryptogams
- D. atracheophytic amphibious cryptogams

50. The persisting embryonic tissue in the plant body is called

- A. Permanent tissue
- B. Meristematic
- C. Parenchyma
- D. Xylem

51. This floating plant in rice fields serves as a biofertilizer

- A. *Wolffia*
- B. *Azolla*
- C. *Salvinia*
- D. *Lemna*

52. Peroxisomes are mainly concerned with

- A. Respiration
- B. Photosynthesis
- C. Photorespiration
- D. Photolysis

53. Radiant energy is transformed into chemical energy in

- A. mitochondria
- B. chloroplast
- C. endoplasmic reticulum
- D. golgi complex

54. Nodules producing organism in non-leguminous plants are

- A. *Rhizobium*
- B. *Azotobacter*
- C. *Frankia*
- D. *Azospirillum*

55. The cotyledon of grass embryo is generally called
- A. Coleorhiza
  - B. Kernel
  - C. Scutellum
  - D. Coleoptile
56. Seed germination found in mangroves is
- A. Vivipary
  - B. Both epigeal and hypogeal
  - C. Epigeal only
  - D. Hypogeal only
57. Trees have a large amount of
- A. starch
  - B. cellulose
  - C. lignocellulose
  - D. chitin
58. The phenomenon where one allele masks the morphological expression of other allele is known as
- A. Inheritance
  - B. Dominance
  - C. Limiting factor
  - D. Segregation
59. Cinnabar eyes is a sex-linked recessive characteristic in fruit flies. If a female having cinnabar eyes is crossed with a wild-type male, what percentage of the  $F_1$  males will have cinnabar eyes?
- A. 25%
  - B. 50%
  - C. 75%
  - D. 100%
60. Identify the statement that is **INCORRECT**
- A. X-linked characters can be passed from father to son
  - B. Reciprocal crosses produce different phenotypic ratios for X-linked recessive genes
  - C. X-linked genes are transferred from females to males
  - D. X-linked recessive characters are more common in males

61. Which of the following is **NOT** correctly matched?
- A. Meristem culture – Virus free plants
  - B. Zygotic embryo culture – Overcoming post-fertilization barriers
  - C. Unfertilized ovule culture – Triploid production
  - D. Axillary bud culture – Micropropagation
62. Which statement is **NOT** an assumption of the Hardy-Weinberg law?
- A. the allelic frequencies (p and q) are equal
  - B. the population is randomly mating
  - C. the population is large
  - D. natural selection has no effect
63. A baby is born with one extra copy of chromosome 21 (trisomy). The baby is suffering from which of the following syndrome
- A. Turner Syndrome
  - B. Down Syndrome
  - C. Edward Syndrome
  - D. Klinefelter Syndrome
64. Which of the following organisms is suitable for ordered tetrad analysis?
- A. *Neurospora crassa*
  - B. *Saccharomyces cerevisiae*
  - C. *Chlamydomonas reinhardtii*
  - D. *Aspergillus nidulans*
65. What is the original source of all variations in heritable traits ?
- A. Human selection
  - B. Artificial selection
  - C. Mutation
  - D. Gene flow
66. In young leaves, the ratio of carotene to xanthophyll is
- A. 1:2
  - B. 2:1
  - C. 3:1
  - D. 1:3

67. What is an adaptive trait ?

- A. Any trait that can be passed on to the next generation
- B. Any trait that remains constant over time
- C. Any trait that helps an organism survive and reproduce
- D. Any trait that cannot be changed by mutation

68. Anticodon is located on

- A. m-RNA
- B. r-RNA
- C. t-RNA
- D. All of these

69. Genetic code is given by

- A. Watson and Crick
- B. Nirenberg
- C. Beadle & Tatum
- D. Mendel

70. Which of the following is derived from sugar?

- A. Vitamin D
- B. Vitamin C
- C. Vitamin E
- D. Folate

71. DNA replication is one of the most important cellular activity. At what stage the replication of DNA takes place?

- A. during prophase 1 of meiosis
- B. during metaphase of mitosis
- C. during interphase of two mitotic cycle
- D. during G1 phase of cell cycle

72. Gregor Mendel was very popular scientist in genetics. Which of the following plants he used for his experiments

- A. Pea
- B. Rice
- C. Apple
- D. Potato

73. When the active site of an enzyme is blocked, it is called

- A. allosteric inhibition
- B. feedback inhibition
- C. competitive inhibition
- D. non-competitive inhibition

74. Starch and glycogen are both polymers of

- A.  $\alpha$ -D-glucose
- B.  $\beta$ -D-glucose
- C. glucose-1-phosphate
- D. sucrose

75. Which of the following is the best evidence for template theory of enzyme action?

- A. compounds similar in structure to the substrate inhibit the reaction
- B. enzymes speed up the reaction by definite amounts
- C. enzymes are found in living organisms and increase the rate of certain reactions
- D. enzymes determine the direction of a reaction

76. Certain restriction enzymes produce cohesive (sticky) ends. This means that they

- A. cut in regions of high GC content, leaving ends that can form more hydrogen bonds than ends of high AT content
- B. make a staggered double-strand cut, leaving ends with a few nucleotides of single-stranded DNA protruding
- C. cut both DNA strands at the same base pair
- D. stick tightly to the ends of the DNA it has cut

77. Which of the following is an epimeric pair?

- A. D-glucose and D-mannose
- B. D-lactose and D-maltose
- C.  $\alpha$ -maltose and  $\alpha$ -cellobiose
- D. L-mannose and L-fructose

78. Which of these statements about the composition of membranes is generally **TRUE** ?

- A. The lipid composition of all membranes of eukaryotic cells is essentially the same
- B. All biological membranes contain cholesterol
- C. Free fatty acids are major components of all membranes
- D. The inner and outer membranes of mitochondria have different protein compositions

79. Which of the following amino acids is the most soluble in water at pH 7.0?
- A. Glutamate
  - B. Tryptophan
  - C. Leucine
  - D. Tyrosine
80. Sodium chloride is an example of which of the following ?
- A. An element
  - B. An ion
  - C. An isotope
  - D. A compound
81. Nathans, Smith and Arber were given with Nobel prize in 1971 for the discovery of one the following in bacteria.
- A. Transposons
  - B. Restriction enzymes
  - C. Regulation of protein synthesis
  - D. Chemiosmotic mechanism
82. Discoveries made by two microbiologists in the 19<sup>th</sup> century have formed the basis of today's understanding of how the bacteria help recycle vital elements between the soil and atmosphere. One of them was
- A. Alexander Flemming
  - B. Antonie van Leeuwenhoek
  - C. Martinus Beijerinck
  - D. Louis Pasteur
83. The formation of acetyl coenzyme A from pyruvic acid is the result of its
- A. reduction
  - B. dehydration
  - C. dephosphorylation
  - D. oxidative decarboxylation
84. One of the following is an essential amino acid for humans
- A. Glutamic acid
  - B. Proline
  - C. Threonine
  - D. Serine



85. The precursor for fatty acid biosynthesis is

- A. Histidine
- B. Phenylalanine
- C. Malonyl CoA
- D. Acetyl CoA

86. Which of the following enzymes is **NOT** the part of glycolysis cycle ?

- A. hexokinase
- B. enolase
- C. acotinase
- D. phosphoglycerate kinase

87. Which of the following defines the role of eIF2 ?

- A. eIF2 is the 'cap' binding protein
- B. eIF2 mediates the formation of the 80S initiation complex
- C. eIF2 binds mRNA and delivers it to the 40S ribosomal subunit
- D. eIF2 binds met-tRNA and delivers it to the 40S ribosomal subunit

88. Loss of a  $\beta$ -particle is equivalent to

- A. Decrease of one proton only
- B. Increase of one neutron only
- C. Increase of one proton and decrease of one neutron
- D. Increase in one neutron and decrease in one proton

89. During stationary phase of microbiological growth

- A. Balance between cell division and cell death occur
- B. Cell division is more than cell death
- C. Cell death is more than cell division
- D. Cell division is completely inhibited and cell death occurs

90. Most of the microscopes used in microbiology labs have oil immersion objective that helps in observing bacteria at a higher magnification because

- A. Bacteria can easily be mounted in oil
- B. Microbes like to form colonies in oil
- C. Microbial cells will get fixed at one place on the slide in viscous oil
- D. Oil helps in preserving the direction of light rays at the highest magnification

91. Match the discoveries made by the scientists listed in the left panel with the discoveries listed in the right panel and tick appropriate answer in the parenthesis to generate a sequence and link it to one of the options:

I.	Louis Pasteur	I.	Reverse transcriptase	[ ]
II.	Baltimore	II.	Phagocytosis	[ ]
III.	Delbruck and Luria	III.	Fermentation	[ ]
IV.	Ehrlich	IV.	Viral infection of bacteria	[ ]
V.	Metchnikoff	V.	Theory of Immunity	[ ]

- A. I, II, III, IV, V  
 B. II, III, V, I, IV  
 C. II, V, I, III, IV  
 D. V, IV, I, II, III

92. In bacterial staining process, often a chemical solution is added to intensify the stain. Such chemical is referred to as

- A. Fluorescent brightener  
 B. Mordant  
 C. Counter stain  
 D. Positive stain

93. Spirochetes are a group of bacteria that have unique structure and motility. One of the best known spirochetes is *Treponema pallidum* the causal agent of syphilis. The uniqueness of their motility could be due to

- A. The bundle of flagella at one end of the spirochetes  
 B. Screw like flagella all over the body of the spirochetes  
 C. Bundles of fibrils that arise beneath an outer sheath and spiral around the spirochetes  
 D. Single flagellum drives the spirochetes as a propeller from one end

94. Role of mycorrhiza is to increase the availability of this nutrient

- A. Phosphorous  
 B. Potash  
 C. Nitrogen  
 D. Calcium

95. The group of organisms which uses light as the energy source and CO<sub>2</sub> as the principal carbon source is called
- A. Photoheterotrophs
  - B. Chemoautotrophs
  - C. Chemoheterotrophs
  - D. Photoautotrophs
96. Pili represent
- A. Extra chromosomal genetic elements
  - B. Protoplasmic outgrowths of recipient cells
  - C. Hair like appendages found on the surface of many bacteria
  - D. Special bacteria cilia
97. The disease "Kalazar" is characterized by enlargement of spleen, irregular fever and anaemia. This is caused by which of the following microorganism
- A. *Trypanosoma gambiense*
  - B. *Entamoeba gingivalis*
  - C. *Leishmania donovani*
  - D. *Plasmodium falciparum*
98. When viral genome is integrated into host DNA, this is known as
- A. Temperate phage
  - B. Zoophage
  - C. Plaque
  - D. Provirus
99. The characteristics common between cell wall of gram positive and gram negative bacteria are
- A. Rigid activity of peptidoglycan
  - B. Peptide cross-links between polysaccharides
  - C. Equal susceptibility to hydrolysis by lysozyme
  - D. Greater resistance to drying than vegetative cells
100. A disease that can be transmitted by an infectious agent from one individual to another was called
- A. Epidemic
  - B. Pandemic
  - C. Communicable
  - D. None of these