

ENTRANCE EXAMINATION – 2014**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 **14** 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

- Which of the following is **NOT** the function of carotenoids in chloroplasts?
 - Provide coloration to plastid
 - Act as an accessory pigment
 - Protect chlorophyll from photo-oxidation
 - Make pigment protein complex
- α -D-(+)-glucose and β -D-(+)-glucose are
 - Conformers
 - Epimers
 - Anomers
 - Enantiomers
- Terpenoid lipids are part of cell membranes of
 - Bacteria
 - Archaea
 - Fungi
 - Protozoa
- Among the following mixtures, dipole-dipole as the major interaction, is present in
 - Benzene and ethanol
 - Acetonitrile and acetone
 - KCl and water
 - Benzene and carbon tetrachloride
- Author of binomial system of nomenclature
 - Linnaeus
 - Cronquist
 - Hooker
 - Bentham
- The condition when the forward and reverse reaction rates are equal and the concentrations of the products remain constant.
 - Hydrolysis
 - Catalysis
 - Compensation reaction
 - Chemical equilibrium
- How many EDTA (ethylenediaminetetraacetic acid) molecules are required to make an octahedral complex with a Ca^{2+} ion?
 - Six
 - Three
 - One
 - Two
- Dipicolinic acid is associated with bacterial
 - Endospores
 - Exospores
 - Flagella
 - Cyst

9. The study of the distribution of plants and animals across the Earth.

- | | |
|-----------------|-------------------|
| A. Zoogeography | B. Phytogeography |
| C. Biogeography | D. Paleogeography |

10. Which of the following oxides is amphoteric in character?

- | | | | |
|--------|--------------------|---------------------|---------------------|
| A. CaO | B. CO ₂ | C. SiO ₂ | D. SnO ₂ |
|--------|--------------------|---------------------|---------------------|

11. Chrysolaminarin is a storage product of some

- | | |
|-------------|-----------|
| A. Algae | B. Fungi |
| C. Bacteria | D. Plants |

12. Hydrogen bomb is based on the principle of

- | | |
|--------------------|-----------------------------|
| A. Nuclear fission | B. Natural radioactivity |
| C. Nuclear fusion | D. Artificial radioactivity |

13. Which among the following species of *Plasmodium* do not cause malaria

- A. *P. falciparum*
- B. *P. vivax*
- C. *P. ovale*
- D. None of the above

14. Which of the following is a polyamide?

- | | |
|-------------|---------------|
| A. Teflon | B. Nylon – 66 |
| C. Terylene | D. Bakelite |

15. One of the following is not a food preservative, identify,

- | | |
|---------------------|----------------------|
| A. Sodium diacetate | B. Caprylic acid |
| C. Sodium Nitrite | D. None of the above |

16. Due to the presence of an unpaired electron, free radicals are

- | | |
|------------------------|------------------------|
| A. Chemically reactive | B. Chemically inactive |
| C. Anions | D. Cations |

17. A large-scale grouping that includes many communities of a similar nature.
- A. Ecosystem
C. Population
- B. Biome
D. Community
18. The product of nitrogen fixation is
- A. Nitrogen
C. Nitrite
- B. Nitrate
D. Ammonia
19. Which of the following is not found in an active chromosome
- A. DNA
C. Proteins
- B. RNA
D. Lipids
20. The study of how organisms interact with each other and their physical environment.
- A. Ecobiome
C. Microcosm
- B. Noosystem
D. Ecosystem
21. The products of assimilatory and dissimilatory nitrate reduction are
- A. NH_3 and N_2
C. N_2 for both
- B. N_2 and NH_3
D. NH_3 for both
22. A lateral meristem in plants
- A. Pericycle
C. Cortex
- B. Casparian strip
D. Cambium
23. Roots that develop from the stem following the death of the primary root are known as
- A. Adventitious roots
C. Tap root
- B. Secondary root
D. Stilt root
24. The blood group in human beings is determined by 3 alleles namely A, B and O. The possible number of genotypes for the observed phenotypes are
- A. 3
B. 9
C. 6
D. 4
25. Liebermann-Burchardt reagent (acetic anhydride, H_2SO_4 and chloroform) is used for the analysis of
- A. Sterols
B. Amino acids
C. Sugars
D. Proteins

PART - B

26. Identify the odd combination of microbial interactions

- A. Mutualism, Protocooperation, Commensalism
- B. Predation, Parasitism, Amensalism
- C. Parasitism, Amensalism, Competition
- D. Mutualism, Amensalism, Commensalism

27. The processors for the biosynthesis of pyrimidine are

- A. Glycine and aspartate
- B. Glycine, aspartate and folic acid
- C. Glutamate
- D. Glutamate and carbamoyl phosphate

28. The full form of "FPLC" is

- A. Fraction Precipitate Liquid Chromatography
- B. Functional Protein Liquid Chromatography
- C. Fast Protein Liquid Chromatography
- D. Fast Pours Liquid Chromatography

29. In $\text{Fe}(\text{CO})_5$, the Fe - C bond possesses

- A. π -Character only
- B. Both σ and π characters
- C. Ionic character
- D. σ -Character only

30. The original genetic code of DNA cannot be figured out from the polypeptide chain because

- A. Uracil replaces thymine
- B. Redundancy of the genetic code
- C. Introns have been removed
- D. a and c are correct

31. The ionic mobility of alkali metal ions in aqueous solution is maximum for

- A. K^+
- B. Rb^+
- C. Li^+
- D. Na^+

32. Protistan division includes the diatoms that is referred to as the golden brown algae are

- A. Cryptophytes
- B. Chrysophytes
- C. Phreatophyte
- D. Phanerophytes

33. The process of determining the age of a tree or wood used in structures by counting the number of annual growth rings.

- A. Dendroclimatology
- B. Dendropyrochronology
- C. Dendrohydrology
- D. Dendrochronology

34. Term applied to plants having separate male and female plants.

- A. Monoecious
- B. Monogamous
- C. Polygamous
- D. Dioecious

35. The disappearance of all individuals in a group is called

- A. Expression
- B. Expansion
- C. Extension
- D. Extinction

36. Brown accessory pigment found in and characteristic of the brown algae.

- A. Fucoxanthin
- B. Zeaxanthin
- C. Neoxanthin
- D. Heteraxanthin

37. Recently declared biosphere reserve in Andhra Pradesh is

- A. Nallamali
- B. Rajiv Gandhi National Park
- C. Seshachalam hills
- D. Araku Valley

38. Subject that study the factors that affect the earth and air pollution is termed as

- A. Dendroclimatology
- B. Dendroecology
- C. Dendrohydrology
- D. Dendrochronology

39. An abandoned, idled, or polluted site is called

- A. Whitefield
- B. Blackfield
- C. Brownfield
- D. Redfield

40. Grain is a simple fruit categorized as

- A. Achene
- B. Cypsella
- C. Caryopsis
- D. Samara

41. The relationship between genes and enzymes was first suggested by the discovery of
- In-born errors of metabolism in human
 - Sexual phenotype in insects
 - Metabolic pathways in fungi
 - Gene regulation in bacteria
42. P.D.Noyer is awarded the Noble Prize for the demonstration of the mechanism of
- Protein synthesis
 - ATP formation
 - Chemiosmosis
 - Photoperiodism
43. Tobacco belongs to the family
- Asteraceae
 - Malvaceae
 - Solanaceae
 - Brassicaceae
44. The substrate for peroxisomal photorespiration is
- Phosphoglycolate
 - Glycolate
 - Phosphoenolpyruvate
 - Citrate
45. The male gametophyte liberated from the anther usually contains
- One cell
 - Two cells
 - Three cells
 - Four cells
46. Scales are modified
- Leaves
 - Petioles
 - Flowers
 - Stems
47. Euglena belongs to
- Protista
 - Monera
 - Animalia
 - Plantae
48. Identify the statements that are **TRUE** for the plasmids and choose the most appropriate answer.
- F plasmids enable bacterial conjugation
 - Plasmids carry essential genes for survival of the organism
 - Plasmids are found only in bacteria and not in eukaryotes
 - Some plasmids, called episomes, can integrate into the host chromosomes
- i, iii
 - i, ii, iv
 - i, iii, iv
 - i, iv

49. The biggest flower in plant kingdom is of

- A. Rafflesia
 B. Banana
 C. Anthocephalus
 D. Potamogeton

50. Among the following acids, which has the lowest pKa value?

- A. CH_3COOH
 B. HCOOH
 C. $(\text{CH}_3)_2\text{COOH}$
 D. $\text{CH}_3\text{CH}_2\text{COOH}$

51. Pyrenoids contain

- A. Proteins
 B. Lipids
 C. Flavonoid pigments
 D. Starch

52. Boraginaceae is included in the order

- A. Polymoniales
 B. Personales
 C. Rosales
 D. Passiflorales

53. Vascular bundles are bicollateral in

- A. Poaceae
 B. Anonaceae
 C. Boraginaceae
 D. Malvaceae

54. During photosynthesis, water is oxidized primarily with the help of

- A. PSI
 B. PSII
 C. Plastocyanin
 D. Ferredoxin

55. Match the names of the scientists in the **Panel A** with their contributions in **Panel B** and choose the correct answer

Panel A	Panel B
(a) Walter Sutton	(i) Discovered r-DNA
(b) Stanley Cohen	(ii) Developed the first genetic map of a chromosome
(c) Thomas Hunt Morgan	(iii) Discovered the chromosomal basis of heredity
(d) Alfred Sturtevant	(iv) Discovered the phenomena of linkage

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

56. The spice cinnamom is obtained from
- | | |
|-----------|------------|
| A. Leaves | B. Rhizome |
| C. Bark | D. Fruits |
57. Clove is obtained from
- | | |
|------------------------|----------------|
| A. Folded leaves | B. Ripe fruits |
| C. Unopened flower bud | D. Roots |
58. The characteristic color of ripe tomato is due to
- | | |
|-------------|----------------|
| A. Carotene | B. Lycopene |
| C. Auxin | D. Anthocyanin |
59. Which of the following plant organ is the main site of transpiration
- | | |
|--------------|---------|
| A. Lenticels | B. Stem |
| C. Root | D. Leaf |
60. Which of the following ions is an integral part of the enzyme cytochrome oxidase
- | | |
|--------------|-----------|
| A. Calcium | B. Copper |
| C. Magnesium | D. Iron |
61. Leaf tendrils are found in
- | | |
|-------------|------------------|
| A. Clematis | B. Pisum |
| C. Gloriosa | D. All the above |
62. An example of non-protein amino acid
- | | |
|-------------------|---------------|
| A. Arginine | B. Canavanine |
| C. Hydroxyproline | D. Histidine |
63. DCMU, or diuron, is an inhibitor of photosynthetic
- | | |
|------------------|-----------------------|
| A. ATP formation | B. Energy dissipation |
| C. Electron flow | D. Proton efflux |
64. Triploid water melons contain
- | |
|---|
| A. No seeds and are called seedless |
| B. Less number of seeds but called seedless |
| C. No pollen in their flowers |
| D. No ovules in their flowers |

65. Match the gene mutations indicated in the **Panel A** with the description given in the **Panel B** and choose the correct answer

Panel A	Panel B
(a) Missense mutation	(i) Disrupts the triplet reading frame
(b) Nonsense mutation	(ii) Converts a codon into a stop codon
(c) Frameshift mutation	(iii) Results in a codon that codes for a different amino acid
(d) Silent mutations	(iv) Do not cause a change in the amino acid sequence

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

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

66. Environmental protection and reclamation using plants is called

- A. Plant biotechnology
- C. Enology

- B. Phytoremediation
- D. Vermiculture

67. Viviparous mutants arise due to deficiency in

- A. Gibberellic acid
- C. Jasmonic acid

- B. Abscisic acid
- D. Auxin

68. Mycorrhizae do not

- A. Fix nitrogen
- B. Facilitate nutrient absorption
- C. Receive organic compounds from their host plants
- D. Form a symbiotic relationship with plants

69. Which of the following is **NOT** present in plant cells?

- A. Microtubules
- C. Centriole

- B. Peroxisomes
- D. Plasmodesmata

70. The chemical signal from roots to nitrogen-fixing microbes in rhizosphere is believed to be

- A. Alkaloid
- C. Flavonoid

- B. Nitrogen
- D. Urea

71. Taxa distributed to restricted region/area are called

- A. Holotype
- C. Endemic

- B. Ecotype
- D. Biotype

72. Which plant cell corresponds functionally to the primary spermatocyte?

- A. Pollen grain
- C. Microspore mother cell

- B. Megaspore mother cell
- D. Tapetum cell

73. There are 40 chromosomes in a somatic cell of a house mouse. How many autosomes are present in somatic cells of a female mouse?

- A. 20 B. 19 C. 40 D. 38

74. Removal of male organs from a hermaphrodite flower is referred as

- A. Hybridization B. Emasculation
C. Fertilization D. Pollination

75. The characteristic of a panmictic population is

- A. Large size B. Random mating
C. Allelic equilibrium D. All the above

76. Four chromosomes synapse into a cross-shaped configuration during meiotic prophase, then the organism is heterozygous for

- A. Pericentric inversion B. Deletion
C. Translocation D. Paracentric inversion

77. Alternative forms of a cistron that differ at the same nucleotide site are referred as

- A. Heteroalleles B. Homoalleles
C. Pseudoalleles D. Extragenic elements

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

- | | |
|-------------|-------------------------------------|
| 1. Inbred | (a). Vegetatively propagated plants |
| 2. Pureline | (b). First Filial Progeny |
| 3. Clone | (c). Self pollinated plant progeny |
| 4. Hybrid | (d). Cross-pollinated plant progeny |

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

79. Two true-breeding stocks of pea plants are crossed. One parent has red, axial flowers and the other has white, terminal flowers; all F_1 individuals have red, axial flowers. If 1600 F_2 offspring resulted from the cross, approximately how many of them would you expect to have red, terminal flowers? (Assume independent assortment).

- A. 1200 B. 900 C. 300 D. 100

80. Male bees are known to develop without fertilization of the eggs and are haploid. The condition is described as

- A. Dosage compensation
- B. Arrhenotoky
- C. Incompletely sex-linked
- D. Holandric

81. The physiologically receptive state in which a bacterial cell is able to be transformed is called

- A. Competent
- B. Lysogenic
- C. Activated
- D. Induced

82. A Punnet square shows all of the following **EXCEPT**

- A. All possible results of a genetic cross
- B. The genotypes of the offspring
- C. The alleles in the gametes of each parent
- D. The actual results of a genetic cross

83. Which of the following describes the overall three-dimensional folding of a polypeptide?

- A. Primary structure
- B. Secondary structure
- C. Tertiary structure
- D. B and C

84. Which parts of amino acids are involved in peptide bonds?

- A. The carboxyl group on one amino acid and the side chain on the other
- B. The carboxyl group on both amino acids
- C. The amino group on one amino acid and the carboxyl group on the other
- D. The amino group on both amino acids

85. An example of Monosaccharide

- A. Lactose
- B. Sucrose
- C. Fructose
- D. Maltose

86. The sugar in RNA is _____, the sugar in DNA is _____

- A. Deoxyribose, ribose
- B. Ribose, deoxyribose
- C. Ribose, phosphate
- D. Ribose, uracil

87. The glycosidic bonds in DNA and RNA

- A. Connect the sugar to the base
- B. Can be hydrolyzed by OH⁻ ion
- C. Stabilize Watson-Crick H-bonds
- D. Are free to rotate over about 180°

88. A nucleotide consists of

- A. A sugar, a base and a phosphate
- B. A sugar and a phosphate
- C. Paired bases
- D. A sugar, a base and three phosphate

89. It was important that Mendel examined not just the F_1 generation in his breeding experiments, but the F_2 generation as well, because

- A. He obtained very few F_1 progeny, making statistical analysis difficult
- B. Parental traits that were not observed in the F_1 reappeared in the F_2 suggesting that the traits did not truly disappear in the F_1
- C. Analysis of the F_1 progeny would have allowed him to discover the laws of segregation but not the law of independent assortment
- D. All of the above

90. Which of the following does NOT apply to an enzyme

- A. Catalyst
- B. Inorganic
- C. Protein
- D. Active site

91. Which types of isomerism is shown by 2,3-dichlorobutane?

- A. Diastereo
- B. Optical
- C. Geometric
- D. Structural

92. When an enzyme catalyzes a reaction

- A. Substrate(s) bind in the active site
- B. Products bind in the active site
- C. The shape of the enzyme remains unchanged
- D. The enzyme is consumed by the reaction

93. What is NOT true of chlorophyll and other accessory pigments in plants?

- A. Plant pigments absorb solar energy.
- B. Chlorophyll provides electrons that will be used to produce ATP.
- C. Chlorophyll absorbs light of specific wavelengths.
- D. Chlorophyll is packed in thylakoid membranes.

94. What organisms are capable of photosynthesis?

- A. Plants only
- B. Plants and algae only
- C. Plants and some bacteria only
- D. Plants, algae, and some bacteria

95. Which steps in glycolysis require the input of energy?

- A. The glucose priming steps
- B. The phosphorylation of glucose
- C. The phosphorylation of fructose 6-phosphate
- D. All of these steps requires the input of energy.

96. In *Drosophila melanogaster*, the genes A and B are linked. Flies of genotype AB/AB and ab/ab are crossed and an F₁ obtained. The F₁ allele arrangement is called

- A. Recombinant
- B. Complementary
- C. Coupling (*cis*)
- D. Repulsion (*trans*)

97. Alkyl halides react with dialkyl copper reagents to give

- A. Alkenes
- B. Alkyl copper halides
- C. Alkanes
- D. Alkenyl halides

98. Which one of the following pairs of species have the same bond order?

- A. CN⁻ and NO⁺
- B. CN⁻ and CN⁺
- C. O⁻ and CN⁻
- D. NO⁺ and CN⁺

99. Match the parental genotype crosses in the Panel A to the offspring phenotypic ratio in the Panel B.

Panel A	Panel B
(a) homozygous recessive X homozygous recessive	(i) dominant phenotypes to recessive phenotypes in 3:1 ratio
(b) homozygous recessive X heterozygous	(ii) all dominant phenotypes
(c) heterozygous X heterozygous	(iii) dominant phenotype to recessive phenotype in 1: 1 ratio
(d) homozygous dominant X homozygous recessive	(iv) all recessive phenotypes

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

100. The major site of anaerobic respiration within the plant cell is

- A. Mitochondria
- B. Golgi Complex
- C. Cytoplasm
- D. Peroxisome
