ENTRANCE EXAMINATION – 2014
M.Sc. Plant Biology & Biotechnology

Time: 2 hours

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

1. Which of the following is NOT the function of carotenoids in chloroplasts?
   A. Provide coloration to plastid
   B. Act as an accessory pigment
   C. Protect chlorophyll from photo-oxidation
   D. Make pigment protein complex

2. α-D-(+)-glucose and β-D-(+)-glucose are
   A. Conformers
   B. Epimers
   C. Anomers
   D. Enantiomers

3. Terpenoid lipids are part of cell membranes of
   A. Bacteria
   B. Archaea
   C. Fungi
   D. Protozoa

4. Among the following mixtures, dipole-dipole as the major interaction, is present in
   A. Benzene and ethanol
   B. Acetonitrile and acetone
   C. KCl and water
   D. Benzene and carbon tetrachloride

5. Author of binomial system of nomenclature
   A. Linnaeus
   B. Cronquist
   C. Hooker
   D. Bentham

6. The condition when the forward and reverse reaction rates are equal and the concentrations of the products remain constant.
   A. Hydrolysis
   B. Catalysis
   C. Compensation reaction
   D. Chemical equilibrium

7. How many EDTA (ethylenediaminetetraacetic acid) molecules are required to make an octahedral complex with a Ca^{2+} ion?
   A. Six
   B. Three
   C. One
   D. Two

8. Dipicolinic acid is associated with bacterial
   A. Endospores
   B. Exosporos
   C. Flagella
   D. 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. CO₂
    C. SiO₂
    D. SnO₂

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  B. Biome
   C. Population  D. Community

18. The product of nitrogen fixation is
   A. Nitrogen  B. Nitrate
   C. Nitrite  D. Ammonia

19. Which of the following is not found in an active chromosome
   A. DNA  B. RNA
   C. Proteins  D. Lipids

20. The study of how organisms interact with each other and their physical environment.
   A. Ecobiome  B. Noosystem
   C. Microcosm  D. Ecosystem

21. The products of assimilatory and dissimilatory nitrate reduction are
   A. NH₃ and N₂  B. N₂ and NH₃
   C. N₂ for both  D. NH₃ for both

22. A lateral meristem in plants
   A. Pericycle  B. Casparian strip
   C. Cortex  D. Cambium

23. Roots that develop from the stem following the death of the primary root are known as
   A. Adventitious roots  B. Secondary root
   C. Tap 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, H₂SO₄ 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 Fe(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

A. In-born errors of metabolism in human
B. Sexual phenotype in insects
C. Metabolic pathways in fungi
D. Gene regulation in bacteria

42. P.D.Noyer is awarded the Noble Prize for the demonstration of the mechanism of

A. Protein synthesis
B. ATP formation
C. Chemiosmosis
D. Photoperiodism

43. Tobacco belongs to the family

A. Asteraceae
B. Malvaceae
C. Solanaceae
D. Brassicaceae

44. The substrate for peroxisomal photorespiration is

A. Phosphoglycolate
B. Glycolate
C. Phosphoenolpyruvate
D. Citrate

45. The male gametophyte liberated from the anther usually contains

A. One cell
B. Two cells
C. Three cells
D. Four cells

46. Scales are modified

A. Leaves
B. Petioles
C. Flowers
D. Stems

47. Euglena belongs to

A. Protista
B. Monera
C. Animalia
D. Plantae

48. Identify the statements that are **TRUE** for the plasmids and choose the most appropriate answer.

i. F plasmids enable bacterial conjugation
ii. Plasmids carry essential genes for survival of the organism
iii. Plasmids are found only in bacteria and not in eukaryotes
iv. Some plasmids, called episomes, can integrate into the host chromosomes

A. i, iii  B. i, ii, iv  C. i, iii, iv  D. 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. CH₃COOH  B. HCOOH  C. (CH₃)₂COOH  D. CH₂CH₂COOH

51. Pyrenoids contain

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

52. Boraginaceae is included in the order

A. Personales  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

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

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

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

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

66. Environmental protection and reclamation using plants is called

A. Plant biotechnology  B. Phytoremediation
C. Enology             D. Vermiculture

67. Viviparous mutants arise due to deficiency in

A. Gibberellic acid  B. Abscisic acid
C. Jasmonic 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  B. Peroxisomes
C. Centriole  D. Plasmodesmata

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

A. Alkaloid  B. Nitrogen
C. Flavonoid  D. Urea

71. Taxa distributed to restricted region/area are called

A. Holotype  B. Ecotype
C. Endemic  D. Biotype

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

A. Pollen grain  B. Megasporang mother cell
C. Microspore 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 F1 individuals have red, axial flowers. If 1600 F2 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 F1 generation in his breeding experiments, but the F2 generation as well, because
   A. He obtained very few F1 progeny, making statistical analysis difficult
   B. Parental traits that were not observed in the F1 reappeared in the F2 suggesting that the traits did not truly disappear in the F1
   C. Analysis of the F1 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.

<table>
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<tbody>
<tr>
<td>(a) homozygous recessive X homozygous recessive</td>
<td>(i) dominant phenotypes to recessive phenotypes in 3:1 ratio</td>
</tr>
<tr>
<td>(b) homozygous recessive X heterozygous</td>
<td>(ii) all dominant phenotypes</td>
</tr>
<tr>
<td>(c) heterozygous X heterozygous</td>
<td>(iii) dominant phenotype to recessive phenotype in 1:1 ratio</td>
</tr>
<tr>
<td>(d) homozygous dominant X homozygous recessive</td>
<td>(iv) all recessive phenotypes</td>
</tr>
</tbody>
</table>

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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

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