S - 13

ENTRANCE EXAMINATION-2010

M.Sc. Plant Biology and Biotechnology

05-06-2010

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 both the question paper booklet and OMR answer sheet at the end of the examination.
4. The question paper contains **100** questions (**Part-A**: Question Nos. **1-25** and **Part-B**: Question Nos. **26-100**) of multiple choice typed 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 of a mark will be deducted.
8. Calculators and mobile phones are not allowed.

PART-A

1. Science that involves the extraction and analysis of the DNA from all microorganisms living in a particular environmental sample without the need to culture them is

   A. Genomics
   B. Eugenomics
   C. Hologenomics
   D. Metagenomics

2. Which of the following plant groups lacks lignified cell walls in its cellular structure?

   A. Bryophytes
   B. Halophytes
   C. Pteridophytes
   D. Spermatophytes

3. When 20% of chiasma are formed between two loci, A and B among the tetrads of an individual of the genotype AB/ab, the percent of gametes expected to be 'Ab' are

   A. 5
   B. 10
   C. 20
   D. 40

4. A common symptom in plants caused by the deficiency of P, K, Ca and Mg is

   A. The formation of anthocyanins
   B. The bending of leaf top
   C. The poor vasculature
   D. The development of necrotic areas

5. The role of a "Flag leaf" is to

   A. provide nourishment to the growing inflorescence
   B. enhance the nitrogen fixation
   C. prevent the stomatal opening
   D. provide a means of vegetative reproduction

6. Polynucleotide ligase joins two DNA molecules together by forming a covalent bond between

   A. two OH groups of adjacent strands
   B. a 3'OH group and a 5'PO_4 group
   C. a 3'PO_4 group and a 5'OH group
   D. two carbon atoms of adjacent nucleotides on the same strand

7. One of the rudimentary leaves that precede a stage of growth

A. Protophyll
B. Cataphyll
C. Stipule
D. Primary leaf

8. The correct sequence of taxonomic categories is

A. phylum – class – family – order – genus - species
B. phylum – class – order – family – genus - species
C. phylum – order – class – family – genus - species
D. class – phylum – order – family – genus - species

9. Which of the following is a differential staining that is preferably used by microbiologists to identify pathogens whose cell walls are known to have high lipid content

A. Gram staining
B. Acid Fast staining
C. Negative staining
D. Positive staining

10. Match the parasitic plants listed in the left panel with the type of parasitism from the right panel and choose the correct answer

Name of the parasitic plant	**Type of the parasitism**
L. *Santalum album*	I. Total root parasite
M. *Orobanche*	II. Partial stem parasite
N. *Loranthus*	III. Total stem parasite
O. *Cuscuta*	IV. Partial root parasite

A. L-IV; M-I; N-III; O-II
B. L-III; M-I; N-IV; O-II
C. L-IV; M-I; N-II; O-III
D. L-II; M-III; N-IV; O-I

11. Identify the **INCORRECT** statement about ABO blood type alleles in humans

A. It has three common alleles
B. Type O Blood can be used in transfusion for individuals of any blood type
C. It controls the type of glycolipids found on the surface of erythrocytes
D. Individuals with blood type AB have anti-A and anti-B antibodies in their blood serum

12. In 1933, Hitler became the chancellor of Germany and the same year a major invention changed the face of microbiology. Select the closest landmark discovery, among the following, that had a great impact on development of microbiology.

A. Walksman discovered streptomycin
B. Felming discovered penicillin
C. Ruska developed electron microscope
D. Griffith discovered bacterial transformation

13. Which of the following is **NOT TRUE** with regard to imprinted genes?

A. They provide an example of epigenetic inheritance
B. Are near differentially methylated regions
C. Their expression is determined by the parent that contributes them
D. They are heritable phenotypes in which the genotype plays an important role

14. Rubisco, the most abundant protein present on earth is part of

A. Calvin cycle
B. Glycolysis
C. Krebs cycle
D. Cell cycle

15. *Ficus elastica*, the latex of which is used in the manufacture of Indian rubber, belongs to the family

A. Moraceae
B. Asteraceae
C. Apocynaceae
D. Meliaceae

16. One of the research scholars has isolated a novel protein from a medicinal plant which enhances the immunity in humans. After isolation, he purified the protein by a protein purification method in which he used Sephadex G-100. Which technique he has used for the purification of novel protein?

A. Sodium Dodecyl Sulphate-Polyacrylamide Gel Electrophoresis
B. Pulse Field Gel Electrophoresis
C. Counter Immuno Electrophoresis
D. Gel Filtration Chromatography

17. The source of *Cry1Ac* gene which has been used for engineering resistance to lepidopteran insects in cotton is

A. *Bacillus subtilis*
B. *Bacillus amyloliquefaciens*
C. *Bacillus thuringiensis*
D. *Bacillus circulans*

18. Ammonia oxidation to nitrate depends on the following two bacteria

A. *Nitrosomonas-Nitrosospira*
B. *Nitrobacter-Nitrococcus*
C. *Nitrosospira-Nitrococcus*
D. *Azospirillum-Pseudomonas*

19. Which of the following pairs is **NOT** correctly matched?

A. Cutin: Consists of long chain fatty acids and polyhydroxy derivative of these fatty acids
B. Pectin: Methylated polymer of galacturonic acid
C. Lignin: Formed by condensation of coniferyl alcohol
D. Callose: Glycosylated aliphatic acid

20. The 2009 Nobel Prize in Chemistry was awarded to Ada E. Yonath, Thomas A. Steitz and Venkatraman Ramakrishnan for

A. studies of the structure and function of the ribosome
B. discovery of "Split gene"
C. discovery of telomers and telomerase
D. discovery of RNA interference – gene silencing by double-stranded RNA

21. Which of the following was used for the 'Green Revolution' in the country?

A. Basmati rice
B. Dwarf variety of wheat
C. Hybrid sugarcane
D. C S H-5 Jowar

22. The drug chloramphenicol blocks

A. cell wall formation
B. transcription
C. polypeptide chain initiation
D. polypeptide chain elongation

23. 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 rate of a reaction

24. Match the common names of the plants listed in the left panel with their scientific names from the right panel and choose the correct answer.

Common name	**Scientific name**
L. Finger millet	I. *Avena sativa* L
M. Foxtail millet	II. *Pennisetum glaucum* L.
N. Pearl millet	III. *Eleusine coracana* L.
O. Oat	IV. *Setaria italica* L.
	V. *Secale cereale* L.

A. L-V; M-IV; N-II; O-I
B. L-III; M-V; N-II; O-I
C. L-III; M-IV; N-II; O-I
D. L-V; M-IV; N-I; O-III

25. There are different geographic modes of speciation in nature, based on the extent to which speciating populations are geographically isolated from one another. Identify the description from the Column-B that matches the different forms of speciation given in the Column-A and mark the correct answer

Column-A		**Column-B**
L. Allopatric	I.	Organisms whose geographical ranges do not significantly overlap but are immediately adjacent to each other.
M. Peripatric	II.	Organisms whose geographical ranges overlap or are even identical, so that they occur together at least in some places.
N. Parapatric	III.	Organisms whose geographical ranges are closely adjacent but do not overlap, being separated by a natural barrier.
O. Sympatric	IV.	Organisms whose geographical ranges are entirely separate, so that they do not occur in any one place together.

A. L-IV; M-III; N-II; O-I
B. L-IV; M-III; N-I; O-II
C. L-III; M-IV; N-II; O-I
D. L-III; M-I; N-II; O-IV

PART-B

26. Copper, an essential micronutrient, is present in which of the following molecule

A. Plastoquinone
B. Chlorophyll
C. Plastocyanin
D. Thioredoxin

27. In the absence of a transilluminator, RNA in an agarose gel can be visualized with a naked eye by this staining

A. Coomassie brilliant blue R 250
B. Crystal violet
C. Ethidium bromide
D. Toluidine blue 'O'

28. All of the following features enable the red algae to grow to greater depths than brown and green algae **EXCEPT**

A. Carotenoids
B. Phycobilins
C. Chlorophyll a and c
D. Laminarins

29. The sequence of a protein can be determined using several methods. The preferred method, which labels and releases the N-terminal residue, is called

A. Sanger method
B. Edman degradation
C. CNBr cleavage
D. Ninhydrin method

30. All of the following are examples of lipids **EXCEPT**

A. phospholipids
B. chitin
C. waxes
D. cholesterol

31. The leaf powder of the following plant is commonly used for treating diabetes.

A. *Azadirachta indica*
B. *Ocimum sanctum*
C. *Terminalia arjuna*
D. *Gymnema sylvestre*

32. Fragmentation of filamentous cyanobacteria can generate small, motile fragments called

A. Akinetes
B. Hormogonia
C. Trichomes
D. Heterocysts

33. The following compounds are isomers

A. ethanol and dimethyl ether
B. ethanol and acetone
C. acetic acid and oxalic acid
D. ethanol and acetic acid

34. Match the phenomena listed under the left panel with the ratio of epistasis given in right panel and choose the right option

Type of epistasis	**Ratio of epistasis**
L Dominant epistasis	I. 9: 7
M. Recessive epistasis	II. 12:3:4
N. Complementary epistasis	III. 13:3
O. Inhibitory epistasis	IV. 9:3:4

A. L-II; M-III; N-IV; O-I
B. L-III; M-II; N-IV; O-I
C. L-IV; M-II; N-I; O-III
D. L-II; M-IV; N-I; O-III

35. Evidence indicating that chloroplasts were originally free living prokaryotes that subsequently evolved a symbiotic relationship with a eukaryotic host includes all of the following **EXCEPT** the

A. similarities of rRNA sequences between chloroplasts and free-living prokaryotes
B. similarities in structure between the chloroplasts and some contemporary free-living prokaryotes
C. ability of chloroplasts to synthesize all their own proteins
D. presence of circular DNA in chloroplasts and in free-living prokaryotes

36. Gametophyte is least developed in

A. bryophytes
B. pteridophytes
C. algae
D. fungi

37. Role of mycorrhiza is to increase

A. phosphorous availability
B. potash availability
C. nitrogen availability
D. calcium availability

38. Thermophiles have temperature optima between

A. 45-50°C
B. 55-65°C
C. 70-85°C
D. 80-90°C

39. Endospores are

A. certain fungal spores, enable their species to survive in adverse conditions
B. certain bacterial spores, enable them to survive in adverse conditions
C. certain protozoan fruiting bodies, enable them to survive in adverse conditions
D. non-living viral capsules, capable of infecting eukaryotic cells

40. A graduate student had to investigate the light intensity dependant changes in the PEP carboxylase enzyme levels in the leaves of *Amaranthus hypochondriacus*. Therefore, the student grew the *Amaranthus hypochondriacus* plants and exposed fully expanded leaves to series of light intensities (low, medium and high) and prepared the samples for an appropriate assay. Which of the following techniques should be used by the student to investigate light dependent changes in the PEP carboxylase enzyme?

A. Transformation
B. Northern blotting
C. Immuno blotting
D. Southern blotting

41. Which of the following is **NOT TRUE** with regard to replication cycles used in Polymerase Chain Reaction

A. 90-96°C – DNA is denatured into single strands
B. 50-60°C – The primers anneal to their complementary sequences
C. 72°C – The polymerase binds and extends a complementary DNA strand from each primer
D. 80°C – The polymerase adds dNTP's from 3'- 5' reading the template from 5'- 3'

42. Which of the following characteristic is **UNDESIRABLE** in a cloning vector?

A. Control their own replication
B. High copy number
C. Small in size
D. Vulnerable at several sites to a restriction enzyme

43. The assimilatory power in plants refers to

A. splitting of water
B. reduction of CO_2
C. production of ATP and NADPH
D. production of NADH and Oxygen

44. Select the scientist who has discovered that soil bacteria could oxidize iron, sulfur and ammonia to obtain energy

A. Elie Metchinkoff
B. Sergei Wingradsky
C. Martinus Beijerinck
D. Emil von Bhering

45. Match the type of bond with their role below and choose the correct answer

Bond type		**Role**	
L.	phosphodiester	I.	links base to pentose in nucleotide
M.	N-glycosidic	II.	joins adjacent nucleotides in one strand
N.	phosphate ester	III.	joins complementary nucleotides in two strands
O.	hydrogen	IV.	difference between a nucleoside and nucleotide

A. L-II ; M-I; N-IV; O-III
B. L-IV; M-I; N-II; O-III
C. L-III; M-I; N-IV; O-II
D. L-IV; M-II; N-I; O-III

46. Which of the following plants is used as a model system for studies on somatic embryogenesis?

A. *Zea mays* L.
B. *Nicotiana tabacum* L.
C. *Daucus carota* L.
D. *Gossypium hirsutum* L.

47. Which of the following is **NOT** an intermediate of the TCA (Tricarboxylic acid) cycle?

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

48. Which of the following acts as a tag to lysosomal enzymes?

A. Mannose-6-phosphate
B. Pentose-6-phosphate
C. Fructose-6-phosphate
D. Glucose-6-phosphate

49. Which one of the following reactions, cycles, or pathways is **NOT** found in plant systems?

A. The urea cycle
B. The glyoxalate cycle
C. The rubisco reaction
D. The gluconeogenesis pathway

50. Which of the following statements is **INCORRECT** about sex determination in *Drosophila*?

A. The flies with a Y chromosome but no X chromosome do not survive
B. The female determiners are located on the X-chromosomes and male determiners on the autosomes
C. The XO flies are sterile males
D. The combination of two X chromosomes and two sets of autosomes produces a normal diploid female

51. The Scientific names of medicinal plants are given in Column-A. Identify the family to which they belong from the Column-B and mark the correct answer.

Column-A	**Column-B**
L. *Hemidesmus indicus*	I. Lamiaceae
M. *Ocimum sanctum*	II. Asclepiadaceae
N. *Rauvolfia serpentina*	III. Rubiaceae
O. *Centella asiatica*	IV. Apocynaceae
	V. Apiaceae

A. L-II; M-I; N-V; O-III
B. L-II; M-I; N-IV; O-V
C. L-III; M-V; N-IV; O-II
D. L-II; M-III; N-IV; O-V

52. The high-efficiency particulate air (HEPA) filters used in laminar flow chambers can filter particles up to

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

53. Which among the following support lithoautotrophic growth of microorganisms?

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

54. Breaking the seed dormancy by low temperature treatment is called

A. Scarification
B. Stratification
C. Vernalization
D. Lyophylization

55. The assimilation of CO_2 into organic compounds (triose phosphates) in green plants:

A. results in the production of ATP
B. takes place at equal rates in light and darkness
C. requires NADPH
D. involves condensation of the two-carbon compound acetate with CO_2 to form 3-phosphoglycerate

56. Water moves from the roots to the leaves of plants. In this regard, one of the following statements is **NOT** true?

A. water is pushed by solutes
B. capillary action pulls the water molecules like a chain
C. evaporation at the leaves pulls on the water
D. waters cohesion causes it to pull towards the leaves

57. Which of the following halogens are arranged in the order of electronegativity?

A. Cl > F > I > Br
B. Cl > Br > I > F
C. F > Cl > Br > I
D. B > F > Cl > I

58. Polysomes are

A. complexes of endosomes
B. complexes of lysosomes
C. complexes of free ribosomes in the cytosol of an eukaryotic cell
D. complexes of ribosomes bound together by a single mRNA

59. Which of the following releases most energy when completely oxidized in the body?

A. One gram of glucose
B. One gram of protein
C. One gram of alcohol
D. One gram of palmitic acid

60. C_4 plants possess a characteristic leaf anatomy called "Kranz". Which of the following is missing in Kranz anatomy?

A. Bundle sheath
B. Palisade mesophyll
C. Spongy mesophyll
D. Stomata

61. Gram negative pathogenic bacteria secrete important virulent factors using this secretion pathway

A. Tat pathway
B. Type V secretion pathway
C. Type VI secretion pathway
D. ABC pathway

62. Which of the following statements is **NOT** true about apomixis?

A. It is asexual reproduction through seeds without fertilization
B. In gametophytic apomixis, the embryo sac has the same number of chromosomes as the mother plant
C. In sporophytic apomixis, an embryo is formed directly from nucellus or integument tissue
D. Apomictically produced offspring are genetically different from the parent plant

63. Match the biological term in the Column-A with the matching description in the Column-B and mark the correct answer

Column-A		**Column-B**	
L.	Conjugation	I.	Plasmid gets integrated into chromosome.
M.	Transformation	II.	Process in which any gene may be transferred from one bacterial cell to another by a virus.
N.	Generalized transduction	III.	Bacterium takes up DNA from the medium in which it is growing.
O.	Specialized transduction	IV.	Genetic material passes directly from one bacterium to another.
		V.	Bacterial genes near the site of prophage insertion are transferred to another bacterium.

A. L-III; M-IV; N-II; O-V
B. L-III; M-IV; N-I; O-II
C. L-IV; M-III; N-II: O-V
D. L-IV; M-III; N-I; O-II

64. One of the following is **NOT** a member of Enterobacteriaceae

A. *Serratia*
B. *Shigella*
C. *Klebsiella*
D. *Stigmatella*

65. The type of plumage found in mallard ducks is determined by three alleles at a single locus; M^R, which encodes restricted plumage; M, which encodes mallard plumage; and m^d, which encodes dusky plumage. The restricted phenotype is dominant over mallard and dusky; mallard is dominant over dusky ($M^R > M > m^d$). What is the expected phenotypes and proportions of offspring produced in the cross M^RM X Mm^d?

A. ½ restricted, ¼ mallard, ¼ dusky
B. ½ restricted, ½ mallard
C. ¼ restricted, ¼ mallard
D. ¼ restricted, ½ mallard, ¼ dusky

66. Promoter is

A. upstream RNA sequence of a mRNA, which is recognized by translation initiation factors in order to initiate translation
B. upstream DNA sequence of a gene, which is recognized by RNA polymerase in order to initiate transcription
C. sequence of amino acids in a protein, which promote catalysis of an enzyme
D. sequence of amino acids in a protein, which specifically promote oxidative/reductive reactions

67. Counting of bacterial cell numbers has been with the help of an electronic device called coulter counter. In the recent years, an alternative and more precise instrument has become available. Identify that instrument from the following

A. GM counter
B. pH counting chamber
C. Flow cytometer
D. Nephelometer

68. "Vanillin" a popular flavoring agent for ice cream, is obtained from

A. leaf
B. latex
C. bark
D. fruit

69. Protein contamination of a DNA preparation is checked by calculating ratio of absorbance at wavelengths

A. 280/260 nm
B. 260/280 nm
C. 230/280 nm
D. 230/260 nm

70. Blocking the active site of an enzyme is a kind of

A. competitive inhibition
B. allosteric inhibition
C. non-competitive inhibition
D. feed back inhibition

71. Restriction enzyme recognition site refers to

A. specific base sequence of a DNA, which is recognized by a restriction enzyme for its action
B. specific sites in a cell, where restriction enzymes are translated and find their site of action on DNA
C. specific site on a restriction enzyme, which recognizes a specific DNA sequence for its action
D. specific sites on rough endoplasmic reticulum, where riobosomes will bind for cotranslational translocation of a protein targeted to endoplasmic reticulum.

72. Match the plant growth regulators from left panel to their effects listed in right panel and mark the correct answer

Plant growth regulator	**Effects**
L. Auxins	I. breaking dormancy of seeds
M. Cytokinins	II. promotes senescence of flowers
N. Gibberellic acid	III. inhibits the outgrowth of axillary buds
O. Ethylene	IV. prevention of senescence

A. L-III; M-IV; N-I; O-II
B. L-III; M-IV; N-II; O-I
C. L-II; M-III; N-IV; O-I
D. L-IV; M-III; N-I; O-II

73. During which phase of the growth of microorganisms the number of dividing cells equal the number of resting cells

A. Log
B. Lag
C. Stationary
D. Death

74. Isotopes have

A. same number of protons but different number of neutrons
B. same number of neutrons but different number of protons
C. same number of neutrons but different number of electrons
D. same number of protons and neutrons

75. Fluorescein diacetate is used to test pollen viability based on the activity of which one of the following enzymes?

A. Catalase
B. Amylase
C. Esterase
D. Callose

76. Kinase reactions involve the

A. addition or removal of a ketone group
B. addition or removal of a phosphate group
C. addition or removal of an amino acid to a polypeptide chain
D. involve the transfer of hydrogen atoms

77. Bacteria belonging to the genera *Myxococcus*, *Mycobacterium* and *Streptomyces* have one thing in common with reference to the G+C content

A. Low G + C content among bacteria
B. High G + C content among bacteria
C. 50% G + C content
D. >85% G + C content

78. Two-dimensional (2-D) gel electrophoresis is a powerful and widely used method for the analysis of complex protein mixtures extracted from biological samples. This technique can be used to separate proteins according to which of the following properties.

	First Dimension	**Second Dimension**
A.	SDS-PAGE	Density
B.	Density	Charge
C.	SDS-PAGE	Isoelectric focusing
D.	Isoelectric focusing	SDS-PAGE

79. Meselson and Stahl used an isotope to demonstrate semi-conservative nature of DNA replication. Which isotope did they use?

A. ^{14}C
B. ^{32}S
C. ^{32}P
D. ^{15}N

80. Evolution of CO_2 is more than intake of oxygen when

A. Sucrose is respired
B. Glucose is respired
C. Organic acids are respired
D. Fats are respired

81. The first reaction in the pentose phosphate shunt is

A. the oxidation of 6-phosphogluconic acid
B. the oxidation of ribose-5-phosphate
C. the oxidation of fructose-6-phosphate
D. the oxidation of glucose-6-phosphate

82. A plant disease in which the pathogen is seen as a cottony growth on the surface of the host is called

A. rust
B. downy mildew
C. powdery mildew
D. smut

83. A lot of starch is deposited in a banana fruit as it matures. Which of the following explains how the starch gets there?

A. Starch solution passes through cells such as companion cell to fruit
B. Starch grains pass through cells from xylem to fruit
C. A sugar solution passes through cells such as companion cells to the fruit where it is changed to starch
D. Starch solution passes through cells from phloem to fruit

84. The drug heroin is prepared by reacting natural product morphine with

A. acetone
B. acetic acid
C. acetic anhydride
D. acetamide

85. Speciation, the process of species formation from an ancestral population, is hastened when

A. the ancestral population remains genetically uniform
B. the ancestral population is genetically diverse
C. when gene flow between two descendent populations is blocked
D. when the two descendent populations continue to interbreed

86. In *Drosophila* (fruit flies), eye colour is sex-linked and red eye colour is dominant to white eye colour. Which of the following are **NOT** possible in a cross between a red-eyed male and a heterozygous female?

A. Red-eyed males
B. White-eyed males
C. Red-eyed females
D. White-eyed females

87. Cyanogen bromide is a pseudohalogen compound with a formula CNBr is used to cut protein molecules at the C-terminus of

A. Arginine
B. Lysine
C. Glutamic acid
D. Methionine

88. Virus accumulations in a host can be studied by tagging its genes by fusing with a reporter gene called Green Fluorescent Protein and can be visualized by using this instrument

A. Common Microscope
B. Ultra Centrifuge
C. Scanning Electron Microscope
D. Confocal Laser Scanning Microscope

89. Which of the following plants has developed a way to circumvent the problems of photorespiration?

A. Wheat
B. Barley
C. Sugarbeet
D. Sugarcane

90. Sulfonamides or sulfa drugs, are structurally related sulfanilamide which is an analog of one of the following compounds involved in folic acid biosynthesis in bacteria

A. Quinolone
B. PABA
C. β-lactam
D. Pentamidine

91. Which of the following occurs in the sporangia of mosses?

A. Spores germinate into protonemata
B. Sperm cells are produced in rows just beneath the surface of the antheridiophore
C. Sporocytes undergo meiosis to produce spores
D. The zygote develops into a multicellular embryo

92. The end product of glycolysis or EMP (Embden-Meyerhof-Parnas) pathway and the end product of anaerobic catabolism of carbohydrate is

A. Glucose-1-phosphate
B. Fructose-1-phosphate
C. Acetyl Co-A
D. Pyruvic acid

93. The nucleic acid molecule which acts as a 'dual adaptor' is

A. DNA
B. mRNA
C. rRNA
D. tRNA

94. The tissue that makes up most of the wood of a tree is

A. vascular cambium
B. secondary xylem
C. primary xylem
D. secondary phloem

95. The age of cycas plant can be determined by its

A. growth rings
B. size of its crown
C. amount of corolloid roots
D. leaf base system

96. Organisms whose requirement for salt exceeds that of other organisms

A. Alkalophilic
B. Xerophilic
C. Chlorophilic
D. Halophilic

97. Growth rings can be seen in plants that grow in

A. Temperate and cold regions
B. Tropical and sub-tropical regions
C. Hot and dry regions
D. Rocky snow clad regions

98. Aspirin and its relatives have been used widely for treatment of fever, pain and inflammation. Chemically aspirin is

A. Paracetamol
B. Acetylsalicylic acid
C. Acetaminophen
D. Ibuprofen

99. Pollen grains with both a distinct furrow and pore are termed as

A. Colporate
B. Porate
C. Colpate
D. Synporate

100. Shikonin, the first plant secondary metabolite produced on industrial scale from plant cell cultures is obtained from

A. *Morinda citrifolia*
B. *Hyoscyamus niger*
C. *Linum flavum*
D. *Lithospermum erythrorhizon*