

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO

Question Booklet No.

100005

**DESCRIPTIVE & OBJECTIVE TYPE (MCQ)
SUBJECT : BOTANY**

Roll No.

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Full Marks : 200 (100 Descriptive & 100 MCQ)

Time : 3 Hours

CANDIDATES SHOULD READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTIONS :

1. The Question Booklet has a seal pasted on it. Candidates should break open the seal only when they are asked to do so by the invigilators.
2. Immediately after breaking open the seal, candidates must check that the Question Booklet contains 100 marks for Section 'A' (Descriptive Type) and 100 marks for Section 'B' (MCQ). If any discrepancy is found, immediately report to the invigilator for changing of the Question Booklet.
3. Candidates must take care to fill up all the required particulars at the appropriate places marked on the Question Booklet as well as on the Answer Booklet. Do not write anything in the spaces provided for office use.
4. For answering Section 'A' questions candidates must answer in Answer Booklet provided.
5. For answering Section 'B' questions candidates must use OMR answer sheet.
 - (i) Each question in Section 'B' has 4 (four) alternative answers given as 1, 2, 3, 4 on the OMR answer sheet. Choose the one which you consider to be the best alternative answer and shade the appropriate bubble on the OMR answer sheet.
 - (ii) Each question carries 1 (one) mark with no negative marking.
 - (iii) Use **only blue or black ball point pen only**.
 - (iv) The OMR answer sheet will be processed by electronic means using scanner. Hence, any irrelevant/stray marking, incorrect/multiple shadings, faulty erasing of answers or any damage to the OMR answer sheet will be the sole responsibility of the candidate.
6. Page(s) for Rough Work is provided at the end of the Question Booklet.
7. Candidates must hand over the Answer Booklets and OMR answer sheets before leaving the examination hall. They may take away the Question Booklet.
8. Mobile phones and electronics devices are strictly prohibited. Any candidate found in possession of mobile phone in the examination hall will be immediately disqualified and expelled from the examination.
9. Any misconduct or indiscipline in the examination hall/resorting to any form of unfair means/failure to follow the examination rules will result in disciplinary action as deemed fit by the Commission.
10. The decision of the Commission on all matters is final.

Correct Method

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BOTANY
SECTION – A (DESCRIPTIVE)

1. Answer any 2(two) of the following questions. (2 × 20) = 40 marks
- (i) With help of a pair of homologous chromosomes, draw various stages of meiosis and write distinctive features of each stage.
 - (ii) Explain how the ends of chromosome are replicated during DNA replication.
 - (iii) Describe signaling pathway in stomatal guard cells due to ABA accumulation.
 - (iv) With examples describe different types of Placentation present in angiosperms.
2. Answer any 2(two) of the following questions. (2 × 10) = 20 marks
- (i) Distinguish between the following:
 - Short Day Plants and Long Day Plants
 - Prions and Virioids
 - (ii) Explain events that help in modification of eukaryotic mRNA.
 - (iii) Discuss various morphological and anatomical survival strategies developed by plants due to water stress.
3. Answer any 8(eight) of the following questions. (8 × 5) = 40 marks
- (i) DNA barcoding as a tool for species identification in plants
 - (ii) Environmental Impact Assessment
 - (iii) Arabidopsis as a model organism.
 - (iv) Applications of Plant Tissue Culture
 - (v) Pseudo-cereals with at least four examples
 - (vi) Sustainable Agriculture
 - (vii) Genome organization in viruses
 - (viii) Challenges of e-waste management in India
 - (ix) Development of male gametophyte in Angiosperms
 - (x) Endosymbiont hypothesis

SECTION – B OBJECTIVE (MCQ)

1. Arbuscular Mycorrhiza is an association between
 - (1) Bacteria and roots of higher plants
 - (2) Fungus and roots of higher plants
 - (3) Algae and roots of higher plants
 - (4) Fungus and Algae
2. Virulence genes in Ti plasmid are activated by
 - (1) Octopine (2) Nopaline
 - (3) Acetylcholine (4) Acetosyringone
3. Prokaryotic cell which becomes temporarily diploid for a portion of genome is called
 - (1) Zygote (2) Endozygote
 - (3) Exozygote (4) Merozgote
4. Which of the following hormone is involved in Systemic Acquired Resistance (SAM) in plants
 - (1) Salicylic Acid (2) Jasmonic Acid
 - (3) Ethylene (4) Gibberellic Acid
5. Viruses can be cultured on
 - (1) LB medium
 - (2) MS medium
 - (3) Plasma clot
 - (4) Czapek-Dox agar
6. Which of the following is not correct for Chemolithoautotrophs
 - (1) Use chemical energy source
 - (2) Use light energy source
 - (3) CO₂ is the carbon source
 - (4) Use Inorganic electron donor
7. Presence of a transgene in a genetically modified organism can be validated through one of the following technique:
 - (1) Southern Blotting
 - (2) Western Blotting
 - (3) DNA extraction and quantification
 - (4) Northern Blotting
8. Reverse Transcriptase synthesises
 - (1) DNA from RNA
 - (2) Protein from DNA
 - (3) RNA from DNA
 - (4) Protein from RNA
9. Amino acids in a protein are linked by
 - (1) Phosphodiester bond
 - (2) Ester linkage
 - (3) Peptide bond
 - (4) Glycosidic linkage
10. Gynandrosporous filaments of Oedogonium have
 - (1) Antheridia
 - (2) Oogonia & Antheridia
 - (3) Oogonia & Androsporangia
 - (4) Oogonia
11. Iodine is obtained from
 - (1) Sea weed (2) Fungi
 - (3) Pinus (4) Nostoc
12. Ascocarp of Claviceps is
 - (1) Perithecium (2) Pericarp
 - (3) Cystocarp (4) Ascothecium

13. Fungi have following reserve food material
 (1) Glucose (2) Oil
 (3) Starch (4) Glycogen
14. Which of the following is an aquatic fungi
 (1) *Sargassum* (2) *Saprolegnia*
 (3) *Aspergillus* (4) *Rhizopus*
15. Retort cells are found in
 (1) *Riccia* (2) *Sphagnum*
 (3) *Porella* (4) *Pellia*
16. Bryophytes are called as plant amphibians because
 (1) They can grow only on land
 (2) They can survive only in water
 (3) They do not require water for fertilization
 (4) They require water for fertilization
17. Development of sporophyte from gametophyte without formation of gametes is called
 (1) Apogamy
 (2) Apospory
 (3) Parthenogenesis
 (4) Heterospory
18. Telome theory was proposed by
 (1) Zimmermann (2) Druery
 (3) Lang (4) Farlow
19. *Puccinia* produces aecial cups containing aeciospores on
 (1) *Sorghum* leaves
 (2) *Triticum* leaves
 (3) *Citrus* leaves
 (4) *Berberis* leaves
20. Oldest era in geological time line is
 (1) Palaeozoic era
 (2) Archaeozoic era
 (3) Mesozoic era
 (4) Coenozoic era
21. In which of the fossils, external form of the plant is preserved as a cast but internal structure is destroyed:
 (1) Petrification fossils
 (2) Impression fossils
 (3) Compressed fossils
 (4) Incrustation fossils
22. In *Lycopodium*, sporangium is borne by
 (1) Spore (2) Sporophyll
 (3) Microphyll (4) Root
23. A stele without a central pith is called
 (1) Actinostele (2) Solenostele
 (3) Protostele (4) Siphonostele
24. Endosperm in gymnosperm is
 (1) Haploid (2) Diploid
 (3) Triploid (4) Tetraploid
25. Which of the following technique can be used to study an unstained cell.
 (1) Electron Microscopy
 (2) Light Microscopy
 (3) Phase contrast Microscopy
 (4) Fluorescence Microscopy
26. Ovules of *Cycas* are
 (1) Anorthotropous
 (2) Orthotropous
 (3) Isotropous
 (4) Monotropous

27. Formation of "Annual rings" during secondary growth of stem is attributed to
 (1) Formation of phellogen
 (2) Formation of cortex
 (3) Contrasting seasonal variations
 (4) Unequal quantities of xylem and phloem
28. Mass spectrometry technique analyses ionized samples in gaseous form and measures _____
 (1) Length
 (2) Size
 (3) Mass to charge ratio
 (4) Distance between two molecules
29. The flowers which never open are called
 (1) Chasmogamous
 (2) Cleistogamous
 (3) Dichogamous
 (4) Homogamous
30. Stem holding whole inflorescence is called
 (1) Pedicel (2) Peduncle
 (3) Rachis (4) Bract
31. Caruncle is an outgrowth of
 (1) Capsule (2) Nucellar
 (3) Embryo sac (4) Integument
32. DNA binding proteins are called
 (1) Histones (2) Chromatin
 (3) Promoters (4) Adenine
33. At one or more loci the pollen wall is very thin, these regions are called
 (1) Tapetum (2) Anthesis
 (3) Germ Pore (4) Endothecium
34. Ubisch bodies in the cytoplasm of Tapetal cells are coated with
 (1) Pollen Kitt (2) Sporopollenin
 (3) Sexine (4) Nexine
35. Synergids are found in
 (1) Micropylar end of embryo sac
 (2) Antipodal end of embryo sac
 (3) Egg cell
 (4) Polar nuclei
36. Gametophytic self-incompatibility is determined by
 (1) Genotype of male gametophyte
 (2) Phenotype of male gametophyte
 (3) Genotype of sporophytic tissue of the plant from which pollen is derived
 (4) Phenotype of sporophytic tissue of the plant from which pollen is derived
37. Portion of embryonal axis above the level of cotyledons is called
 (1) Hypocotyl (2) Radical
 (3) Plumule (4) Epicotyl
38. Disaccharide Maltose consists of
 (1) Glucose $1\alpha - 2$ Fructose
 (2) Glucose $1\alpha - 4$ Glucose
 (3) Glucose $1\beta - 1$ Lactose
 (4) Galactose $1\beta - 4$ Glucose
39. In wheat grain, plumule is surrounded by a sheath called
 (1) Coleorhiza (2) Nucellus
 (3) Coleoptile (4) Scutellum

40. Geographical region with high level of endemic, rare and threatened species is known as
 (1) Biosphere Reserve
 (2) Protected Area
 (3) National Reserve
 (4) Hotspot
41. High gene density is a feature of
 (1) Prokaryotic genome
 (2) Viral genome
 (3) Eukaryotic genome
 (4) Bacteriophage
42. In *Allium* type of embryo sac, the embryo sac is derived from
 (1) Micropylar dyad cell
 (2) Micropylar megaspore of tetrad
 (3) Chalazal dyad cell
 (4) Chalazal megaspore of tetrad
43. Which of the following is a calcium binding protein
 (1) RuBisCO (2) Chitin
 (3) Calmodulin (4) Chromatin
44. Root nodules contain which of the following oxygen binding heme protein which imparts pink colour to the nodules
 (1) Zeatin (2) Nitrogenase
 (3) Leucoplast (4) Leghemoglobin
45. _____ microbodies are present in abundance in oil rich seeds
 (1) Glyoxysomes
 (2) Peroxisomes
 (3) Lysosomes
 (4) Residual bodies
46. Sugar molecule in Adenosine Triphosphate (ATP) is
 (1) Deoxyribose
 (2) Glucose
 (3) Ribose
 (4) Xylose
47. Which of the following statement is not correct for microtubules?
 (1) These are solid cylinders having no polarity
 (2) These are hollow cylinders having polarity
 (3) These have a diameter of about 25nm
 (4) These are unbranched filaments
48. Which of the following is a motor protein for tubulin filaments which helps in intracellular transport and mobility
 (1) Myosin (2) Clathrin
 (3) BIP (4) Kinesin
49. _____ is a non-membranous cell organelle
 (1) Lysosome
 (2) Ribosome
 (3) Glyoxysome
 (4) Chloroplast
50. Which of the following are converted to ribozyme after cleavage
 (1) Internal Guide Sequence
 (2) Exon
 (3) Group I introns
 (4) Group II introns

51. In case of non-competitive enzyme inhibition, following is affected by the presence of the inhibitor
- (1) V_{max} is not altered but K_m is decreased
 - (2) V_{max} is not altered but K_m is increased
 - (3) V_{max} is decreased but K_m remains the same
 - (4) V_{max} is increased but K_m remains the same
52. Enzyme which introduced negative supercoils in DNA is
- (1) DNA ligase
 - (2) DNA Gyrase
 - (3) DNA polymerase
 - (4) Primase
53. How many amino acids are present on the tail of RNA polymerase II
- (1) Seven
 - (2) Three
 - (3) Eleven
 - (4) Nine
54. Which of the following is not a channel of open complex formed by RNA polymerase
- (1) NTP-channel
 - (2) DT-channel
 - (3) T-channel
 - (4) RNA exit-channel
55. Darkly stained region of chromatin which is genetically inactive is called
- (1) Euchromatin
 - (2) Heterochromatin
 - (3) Interband region
 - (4) Linker DNA
56. Histones are
- (1) Positively charged
 - (2) Negatively charged
 - (3) Amphipathic in nature
 - (4) Uncharged
57. A nucleotide consists of
- (1) Phosphate + sugar
 - (2) Phosphate + sugar + nitrogen base
 - (3) Sugar + nitrogen base
 - (4) Phosphate + nitrogen base
58. If the number of chromosomes in the root tip of a flowering plant is 24, what would be the number of chromosomes in its endosperm.
- | | |
|--------|--------|
| (1) 24 | (2) 36 |
| (3) 48 | (4) 72 |
59. Meristematic tissue that arises within the cortex is
- (1) Vascular cambium
 - (2) Pith cambium
 - (3) Cork cambium
 - (4) Cortex cambium
60. Complementation test is done to determine whether two mutations occur within the same gene or not. If the trans-heterozygote shows wild-type phenotype, it implies:
- (1) Two mutations have occurred in the same gene.
 - (2) Two mutations have occurred in two different genes.
 - (3) Two mutations have not occurred simultaneously.
 - (4) Mutations have not affected the individual.

61. A cross of an organism with an unknown genotype, to known homozygous recessive organism is called
 (1) Reverse cross
 (2) Test cross
 (3) Reciprocal cross
 (4) Back cross
62. Microtubules which extend outward from centromere to the cell periphery are
 (1) Chromosomal
 (2) Kinetochore
 (3) Astral
 (4) Polar
63. The telomeric DNA is synthesized under the influence of
 (1) Telomerase
 (2) DNA Polymerase
 (3) RNA Polymerase
 (4) Primase
64. N-Glycosylation of proteins occurs in
 (1) Golgi body
 (2) Cytoplasm
 (3) Rough Endoplasmic Reticulum
 (4) Smooth Endoplasmic Reticulum
65. X-linked traits can be easily identified in a Pedigree because
 (1) The trait typically skips generations
 (2) The trait always appear in each generation
 (3) Females are affected with high probability than males
 (4) The trait shows criss-cross pattern of inheritance
66. _____ is a Literature Database of maintained by NCBI
 (1) MMDDB (2) ChemNC
 (3) PubMed (4) PubChem
67. How many gametes can be produced by individual with genotype AaBBcc
 (1) Two (2) Four
 (3) Eight (4) Thirty two
68. Characteristic respiratory rise before the fruit ripening is called
 (1) Epinasty
 (2) Climacteric
 (3) Photorespiration
 (4) Phosphorylation
69. Epiphyllous bud differentiation is observed in leaves of
 (1) *Solanum* (2) *Rosa*
 (3) *Kalanchoe* (4) *Begonia*
70. _____ is a mode of reproduction which does not involve formation of zygote through gameticfussion.
 (1) Apogamy
 (2) Apospory
 (3) Adventive embryony
 (4) Apomixis
71. Which of the following is a unique feature of plant citric acid cycle which enables plant mitochondria to operate alternative pathways for metabolism of PEP.
 (1) Oxaloacetate
 (2) Malic enzyme
 (3) Ubiquinone
 (4) Gamma-aminobutyric acid

72. Anti-malarial drug Quinine is obtained from
 (1) *Rauvolfiaserpentina*
 (2) *Colchicum autumnale*
 (3) *Catharanthus roseus*
 (4) *Cinchona officinalis*
73. Sclerenchymatous tissue consisting of long, elongated cells with pointed ends is called
 (1) Fibers (2) Collenchyma
 (3) Sclereids (4) Rod cells
74. Which of the following is not a xerophytic characteristic
 (1) Cutinised epidermal cells
 (2) Sunken stomata
 (3) Aerenchyma
 (4) Well-developed root system
75. Apple fruit is a
 (1) Pome (2) Berry
 (3) Hesperidium (4) Drupe
76. Cloves are dried
 (1) Styles (2) Shoot buds
 (3) Leaves (4) Flower buds
77. Jute fibres are
 (1) Stem fibres
 (2) Bast fibres
 (3) Surface fibres
 (4) Ground fibres
78. Pigeon Pea is
 (1) *Cajanus cajan*
 (2) *Phaseolus mungo*
 (3) *Pisum sativum*
 (4) *Lathyrus sativus*
79. Halophytes are native to which of the following environment
 (1) Aquatic (2) Saline soil
 (3) Desert (4) High Light
80. The negative impact of non-living factors on the living organisms in an environment is called
 (1) Fecundity
 (2) Biotic stress
 (3) Abiotic stress
 (4) Stratification
81. Oxidative stress is caused by generation of
 (1) Reactive Oxygen species
 (2) Reactive Carbon species
 (3) Reactive Nitrogen molecule
 (4) Reactive Hydrogen molecule
82. _____ tissue develops in root cortex in response to hypoxia
 (1) Sclerenchyma
 (2) Collenchyma
 (3) Parenchyma
 (4) Aerenchyma
83. Which of the following can increase freezing tolerance in plants
 (1) Sugars
 (2) Antifreeze proteins
 (3) Abscissic acid
 (4) All of the above
84. In plants showing Crassulacean Acid Metabolism, stomata
 (1) Open during day
 (2) Open during night
 (3) Never open
 (4) Always remain open

85. In plant cells, the space outside the plasma membrane through which water can diffuse across is called
 (1) Apoplast
 (2) Symplast
 (3) Plasmodesmata
 (4) Leucoplast
86. Routinely used method for estimating primary productivity of a pond involves measuring
 (1) CO₂ released
 (2) Biomass
 (3) Organic carbon
 (4) Oxygen released
87. Which of the following refers to number of organisms per unit of habitat space
 (1) Gross Density
 (2) Crude Density
 (3) Ecological Density
 (4) Net Density
88. Ion exchange chromatography separates proteins according to
 (1) Charge (2) Size
 (3) Solubility (4) Affinity
89. Beneath fresh litter, a layer of litter of previous season is present called
 (1) Humus (2) Duff
 (3) Peat (4) Soil
90. The water held between spaces of soil particles and angles between them is called
 (1) Capillary water
 (2) Combined water
 (3) Hygroscopic water
 (4) Gravitational water
91. Successful establishment of a species in a barren area is known as
 (1) Nudation (2) Climax
 (3) Invasion (4) Coaction
92. Species diversity within habitat or community is called
 (1) Alpha Diversity
 (2) Beta Diversity
 (3) Gamma Diversity
 (4) Differentiating Diversity
93. The RNA induced silencing complex (RISC) contains the following catalytic protein
 (1) ARGONAUTE
 (2) EIN
 (3) DELLA
 (4) CRYSTAL
94. Which of the following is a non-protein amino acid found in certain leguminous plants
 (1) Tryptophan (2) Selenocysteine
 (3) Canavanine (4) Isoleucine
95. Most abundant plant protein RuBisCO is localised in
 (1) Cytoplasm (2) Peroxisome
 (3) Vacuole (4) Chloroplast
96. Which of the following molecule is CO₂ acceptor in C4 plants
 (1) RuBisCO
 (2) Malate
 (3) PEP carboxylase
 (4) Pyruvate

97. The difference between the energy levels of the ground state and the transition state of the enzyme is called
- (1) Transition energy
 - (2) Activation energy
 - (3) Binding energy
 - (4) Conversion energy
98. Which of the following is not an intracellular messenger
- (1) IP_3
 - (2) DAG
 - (3) Calcium
 - (4) Trypsin
99. Which of the following modification is responsible for DNA inactivation
- (1) Methylation
 - (2) Glycosylation
 - (3) Nitrosylation
 - (4) Nitration
100. Number of proteins in a eukaryotic cell is far more than number of genes. This can be attributed to:
- (1) Errors during translation
 - (2) Alternative splicing
 - (3) Transposable elements
 - (4) Gene silencing