



Test Registration No. _____



The Maharaja Sayajirao University of Baroda
Faculty of Science
M.Sc. ENTRANCE EXAMINATION

SUBJECT: BOTANY
DAY: MONDAY

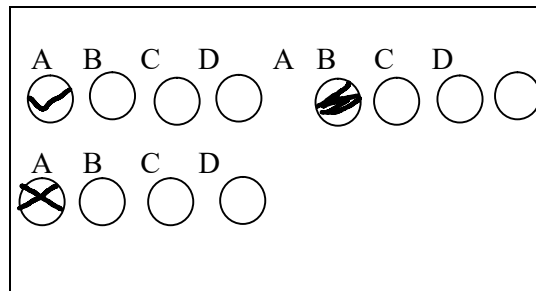
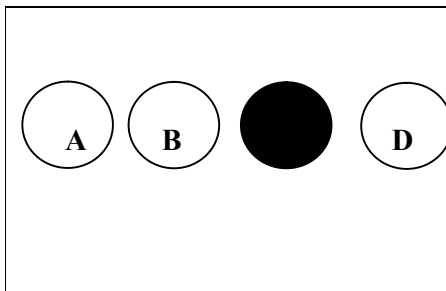
TIME : 10:00AM TO 11:30 AM
DATE : 26/06/2023

Important Instructions:

1. This test booklet is to be opened only when instructed by the invigilators to do so.
2. This booklet carries **100** questions in **13** printed pages. All questions carry equal marks.
3. For every correct answer, candidate will earn **1** mark, for every wrong answer 25% mark will be deducted.
4. Test Registration Number must be entered correctly in the OMR answer sheet, as advised by the invigilators. The Question Booklet code (A/B/C/ D) must also be mentioned on the OMR answer sheet (if not printed already) as instructed.
5. Answers must be marked in the OMR answer sheet using a black or dark blue ball point pen only. The circle should be filled in completely, leaving no gaps.
6. Gadgets (Mobile phones, pagers, ear phones, music players, calculators smart watches etc.) are strictly prohibited in the exam hall. If any candidate is found in possession of any of these at his/her exam seat, he/she is liable to be disqualified.
7. In case of tie in the marks the merit will be considered based on total marks in qualifying examination.

Correct way of marking answer:

Incorrect way of marking answer:



Invigilator's Signature: _____

The Maharaja Sayajirao University of Baroda

Department of Botany, Faculty of Science

M.Sc. ENTRANCE EXAMINATION 2023

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Note: 1. Write your answers in the given OMR sheet

2. There is negative marking in this examination. For each wrong answer 0.25 marks will be deducted.

1 X 100 = 100 Marks

- Two genes, anthocyanin-less (*a*) and super-sweet (*sh*) are tightly linked on a chromosome of maize. With 0.001 recombination frequency, the genes rarely separate with each other. The genetic map distance between the gene *a* and *sh* is _____
 - 0.01 centi-Morgan
 - 1 centi-Morgan
 - 0.1 centi-Morgan
 - 10 centi-Morgan
- Which of the following is/are common to both prokaryotic and eukaryotic gene expression?
 - Coupled transcription and translation
 - Post-translational modification
 - Genetic code
 - 1 only
 - 3 only
 - 2 and 3
 - 1, 2 and 3
- The organization of a eukaryotic gene is given below.

Promotor – 5 kb; 5' UTR – 0.4 kb; Exon I – 7 kb; Intron – 1 kb; Exon II – 6 kb; 3' UTR – 0.6 kb

What will be the size of mature mRNA generated by the transcription

 - 7 kb
 - 14 kb
 - 13 kb
 - 19 kb
- The frequency of a homozygous dominant genotype in a randomly mating population is 0.09. If the population is in Hardy-Weinberg equilibrium, what is the frequency of the recessive allele?
 - 0.3
 - 0.9
 - 0.7
 - 0.1

5. An example of aneuploidy is
- (a) $2n + n$ (c) $n + n$
 (b) $4n$ (d) $2n + 2$
6. Which one of the following proteins is NOT a positively charged core histone protein of nucleosome?
- (a) H1 (c) H2A
 (b) H3 (d) H4
7. Splicing of nuclear pre-mRNAs is catalyzed by the spliceosome that splices two of the
- (a) 3' UTRs (c) 5' UTRs
 (b) Exons (d) Introns
8. A mechanism that can cause a gene to move to non-homologous chromosome is
- (a) Translocation (c) Inversion
 (b) Cross over (d) Duplication
9. A collection of genetic resources of a crop for its breeding, research and conservation efforts is referred as
- (a) Gene library (c) Herbarium
 (b) Germplasm (d) Genome
10. Among the following, which mutagen induces formation of thymidine dimers in DNA?
- (a) Nitrous oxide (c) Ethyl methyl sulfate
 (b) Ethidium bromide (d) UV rays
11. Within a protein, which bond links multiple amino acids together allowing them to form a long chain?
- (a) Peptide bond (c) Phosphodiester bond
 (b) Ester bond (d) Glycosidic bond
12. Which of the following is the melting temperature of sequence ATCTAGGATTGG.
- (a) 30°C (c) 43°C
 (b) 34°C (d) 45°C
13. Polysaccharides made up of many units of one monosaccharide are referred as
- (a) Homo-polysaccharides (c) Hetero-polysaccharides
 (d) Iso-polysaccharides (d) Polyols
14. Which of the following is a trisaccharide?
- (a) Glucose (c) Galactose
 (b) Dextrose (d) Raffinose

15. Which of the following statements are true for molecular chaperones?
- A. It mediates the formation of large proteins aggregates in cells
 B. It helps prevent incorrect associations with nearby proteins
 C. It uses energy from ATP to bind and release polypeptides throughout the protein folding
 D. It is only present in eukaryotic cells
 E. It helps in repairing the damaged structures of existing proteins
- (a) A, B, C, & E (c) A, C, & D
 (b) A & D (d) B, C, & E
16. How many binding site/s a ribosome has for mRNA and tRNA molecules respectively?
- (a) 0,3 (c) 1,3
 (b) 3,1 (d) 0,1
17. Chlorophyll is excited by UV light and emits strongly with maxima at 685 and 720–730 nm. What will be the colour of the emission?
- (a) Blue (c) Green
 (b) Red (d) Violet
18. What will be the size of the image of a 5-micron diatom produced by a light microscope, equipped with a 15x ocular lens and 10x objective lens?
- (a) 0.75 mm (c) 0.75 μm
 (b) 0.125 mm (d) 0.125 μm
19. Arrange the following light waves in increasing order of their wavelengths.
- A. UV B. Visible light C. X-ray D. IR
- (a) CABD (c) ABDC
 (b) CDBA (d) DBAC
20. If D1 is the distance travelled by a particular solute of interest and D2 is the distance travelled by the solvent (mobile phase), how will you calculate the Rf of the solute?
- (a) $D1/D2 \times 100$ (c) $D2/D1 \times 100$
 (b) $D1/D2$ (d) $D2/D1$
21. Which of the following medicinal plants is known as “sleep inducing”?
- (a) *Butea monosperma* (c) *Gymnema sylvestre*
 (b) *Withania somnifera* (d) *Zingiber officinale*
22. Which plant extensively used in COVID-19 was recently found to be hepatotoxic, causing herb induced liver injury?
- (a) *Tinospora cordifolia* (c) *Ocimum sanctum*
 (b) *Withania somnifera* (d) *Tecomella undulata*

23. Which part of the medicinal plant *Rauwolfia serpentina* is used for its therapeutic properties?
- (a) Stem (c) Leaf
(b) Flower (d) Root
24. Which protein protects the sister chromatid cohesion during anaphase?
- (a) Cohesin (c) Shugoshin
(b) Heat shock protein (d) Caspase-3
25. Which of the following techniques is NOT used for extraction of volatile essential oils?
- (a) Steam distillation (c) Soxhlet extraction
(b) Maceration (d) Supercritical fluid extraction
26. Which of the following medicinal plants is NOT a part of Ayurvedic polyherbal formulation, Triphala churna?
- (a) *Phyllanthus emblica* (c) *Terminalia chebula*
(b) *Terminalia bellerica* (d) *Terminalia catappa*
27. The oyster mushroom belongs to which Genus?
- (a) *Agaricus* (c) *Pleurotus*
(b) *Volveriella* (d) *Morchella*
28. In differential extraction method, which of the following is expected to contain the highest amount of flavonoids?
- (a) Water (c) Hexane
(b) Chloroform (d) Ethyl acetate
29. The Wagner's test is used to screen the herbal extracts for which of the following classes of secondary metabolite?
- (a) Alkaloids (c) Phenolics
(b) Terpenoids (d) Saponins
30. Which of the following polysaccharides is NOT present in the eukaryotic plant cell wall?
- (a) Cellulose (c) Pectin
(b) Chitin (d) Hemicellulose
31. Vesicular-arbuscular mycorrhiza (VAM) represents a beneficial association between plant roots and fungus, where fungus assists plants in obtaining _____ from the soil.
- (a) Iron (c) Zinc
(b) Sulphate (d) Phosphate

32. Water Use Efficiency (WUE) can be calculated based on the _____ produced per unit of water consumed by crops.
- (a) Total biomass (c) Carbon
(b) Photosynthate (d) Oxygen
33. Salt-sensitive plants that do not grow in soil or water with high salinity are called _____.
- (a) Glycophytes (c) Halophytes
(b) Heliophytes (d) Sciophytes
34. Which of the following elements helps the plant to deal with heat stress?
- (a) Copper (c) Calcium
(b) Iron (d) Manganese
35. _____ is the substrate for phytochelatin biosynthesis.
- (a) Glutathione (c) Tyrosine
(b) Aspartic acid (d) Tryptophan
36. IPR protects the use of information and ideas that are of _____ value.
- (a) Ethical (c) Monetary
(b) Social (d) Commercial
37. After applying statistical test, a researched gets the 'p value' as 0.01. What does it means?
- (a) The probability of finding a significant difference is 1%
(b) The probability of declaring a significant difference, when there is truly no difference, is 1%
(c) The difference is not significant 1% times and significant 99% times
(d) The power of the test used is 99%
38. Which is the first example of successfully challenging a patent based on the traditional knowledge of India?
- (a) Kava (c) Haldi
(b) Basmati (d) Neem
39. What is the full form of RDAC?
- (a) Regional DNA Advisory Committee
(b) Recombinant DNA Advisory Committee
(c) Restriction DNA Advisory Council
(d) Regional DNA Authority Center

40. Pseudoelaters are characteristics of the sporophyte of _____.
- (a) *Funaria* (c) *Marchantia*
 (b) *Anthoceros* (d) *Polytrichum*
41. Which of the following is not under the power of the State Biotechnology Co-ordination Committee (SBCC)?
- (a) To inspect, investigate and to take punitive action in case of violations of statutory provisions through the State Pollution Control Board (SPCB) or the Directorate of Health etc.
 (b) To review developments in biotechnology at national and international levels.
 (c) To review periodically the safety and control measures established at various institutions handling GE organisms.
 (d) To act as a nodal agency at the State level to assess the damage, if any, due to the release of GE organisms and to take on-site control measures.
42. In *Selaginella* the spores are _____.
- (a) Homosporous (c) Heterosporous
 (b) Both a and b (d) None of these
43. Three chambered sporangium is present in _____.
- (a) *Pteris* (c) *Psilotum*
 (b) *Selaginella* (d) *Equisetum*
44. Resin is obtained from _____.
- (a) *Pinus* (c) *Cycas*
 (b) *Gingko* (d) *Gretum*
45. Transfusion tissue is seen in the leaves of _____.
- (a) *Dryopteris* (c) *Cycas*
 (b) *Ephedra* (d) *Ginkgo*
46. In the fallow agriculture land two annual plants *Setaria faberii* and *Polygonum pensylvanicum* occupy the same niche. The roots of the *Setaria* are growing superficially in upper 20 cm area of soil whereas the roots of *Polygoonum* are growing deep inside soil up to depth of 1 m. Name this mechanism of competition.
- (a) Altruism (c) Character displacement
 (b) Resource partitioning (d) Competitive exclusion

47. Ms. Shreeya is eating yoghurt or curd. For this food intake in a food chain she should be considered as occupying _____ trophic level.

- (a) First
- (b) Second
- (c) Third
- (d) Fourth

48. There is 78% of nitrogen gas in the atmosphere, yet nitrogen is one of the limiting factor for the growth of plants. Select an appropriate reason for this.

- (a) The atmospheric form of nitrogen cannot be used by plants.
- (b) Nitrifying bacteria remove usable nitrogen from the soil more rapidly that plants can absorb it.
- (c) Atmospheric nitrogen dissolves readily in the soil but is washed out with every rainfall.
- (d) Plants must absorb nitrogen through their roots, which are not in contact with the atmosphere.

49. A researcher wants to estimate the biomass of *Sida acuta*. He collected data of height and biomass for 30 plants and calculated correlation coefficient (r). The value of r calculated was 0.88. What is the inference of this “r” value?

- (a) Highly negative correlation
- (b) Moderately positive correlation
- (c) Moderately negative correlation
- (d) Highly positive correlation

50. Which one of the following represents the databases involved in the International Nucleotide Sequence Database Collaboration (INSDC)?

- (a) DDBJ, ENA and NCBI-GENEBANK
- (b) PDB, SWISS PORT and PROSITE
- (c) DDBJ, SWISS PORT and PROSITE
- (d) DDBJ, SWISS PORT and NCBI GENE BANK

51. A population of mosquito increases suddenly during rainy season and disappear at the end of the season. What will be the shape of the population growth curve?

- (a) S- shape
- (b) J-shape
- (c) Parabola curve
- (d) Zig zag curve

52. In which of the following conference, industrialized nations committed to reduce greenhouse gas emissions?

- (a) Montreal Protocol
- (b) UNECD earth summit
- (c) Kyoto protocol
- (d) Alma Atta conference

53. Which of the following one is not a type of measure of dispersion?
 (a) Range (c) Mean
 (b) Standard deviation (d) Mean deviation
54. What is the square of standard deviation?
 (a) Range (c) Variance
 (b) Mean absolute deviation (d) Quartile deviation
55. Which of the following test is commonly used in ANOVA ?
 (a) T-test (c) F- test
 (b) Z-test (d) Chi-square test
56. A disaccharide is formed when two monosaccharides are bonded together by _____ bond.
 (a) Glycosidic (b) Peptide (c) Ionic (d) Phosphodiester
57. Sucrose (cane sugar) is a disaccharide. One molecule of sucrose on hydrolysis gives
 (a) 2 molecules of glucose
 (b) 2 molecules of glucose + 1 molecule of fructose
 (c) 1 molecule of glucose + 1 molecule of fructose
 (d) 2 molecules of fructose
58. Nucleic acids are the polymers of _____.
 (a) Nucleosides (b) Nucleotides (c) Bases (d) Sugars
59. _____ is NOT the character of the guard cell.
 (a) Thickened inner wall (c) Does not have chloroplast
 (b) Connected end to end (d) Radial micellation
60. _____ is the specialized structure from where guttation takes place.
 (a) Stomata (b) Hydathodes (c) Guard cell (d) Lenticels
61. Which of the following is a bacterial disease of plants?
 (a) Rust (b) Anthracnose (c) Crown gall (d) Smut
62. Which of the following method is suitable for combining the desirable characters of two plants together in a single plant?
 (a) Cutting (b) Layering (c) Grafting (d) All of these
63. Seed dormancy allows the plants to
 (a) Develop healthy seeds (c) Overcome unfavourable climatic conditions
 (b) Reduce viability (d) Prevent deterioration of seeds

64. The type of stomata where stoma remains surrounded by a limited number of subsidiary cells which are quite alike the remaining epidermal cells is called

- (a) Anomocytic
- (b) Anisocytic
- (c) Paracytic
- (d) Diacytic

65. _____ is the father of Taxonomy.

- (a) Gorge Bentham
- (b) Carolus Linnæus
- (c) Joseph Dalton Hooker
- (d) Theophrastus

66. APG stands for _____.

- (a) Angiosperm Plant Group
- (b) Angiosperm Phylogenetic Group
- (c) Angiosperm Phylogeny Group
- (d) All Plant Group

67. Sweet Pea (*Pisum sativum* L.) belongs to _____ family.

- (a) Malvaceae
- (b) Solanaceae
- (c) Fabaceae
- (d) Lamiaceae

68. MS in MS media stands for _____.

- (a) Murashige and Skoog
- (b) Murashige and Sanchen
- (c) Maheswari and Skoog
- (d) Multi Stem

69. Which of the following restriction enzyme is obtained from *E. coli* ?

- (a) HindII
- (b) SamIII
- (c) EcoRI
- (d) EcoIII

70. sRNA stands for _____.

- (a) Small RNA
- (b) Small Interfering RNA
- (c) Silencing RNA
- (d) Selective RNA

71. Dinucleotide is obtained by joining two nucleotides together by phosphodiester linkage.

Between which carbon atoms of pentose sugars of nucleotides are these linkages present?

- (a) 5' and 3'
- (b) 1' and 5'
- (c) 5' and 5'
- (d) 3' and 3'

72. Which of the following does NOT take part in the biosynthesis of terpenes?

- (a) Mevalonic acid
- (b) Methylerythritol phosphate
- (c) Acetyl-COA
- (d) Phenol

73. What is an Isozyme?

- (a) Same structure, different function
- (b) Different structure, the same function
- (c) Same structure, the same function
- (d) Different structure, different function

84. In Ti plasmid, T-DNA region is defined by _____.
- (a) Auxin and Cytokinin (c) Oncogenes and Opine
(b) Left Border and Right Border (d) MCS and Vir gene
85. _____ are restriction enzymes that recognize the same nucleotide sequence as their prototype but cleave at a different site.
- (a) Isoschizomers (c) Paraschizomers
(b) Neoschizomers (d) Heteroschizomers
86. Which of the following reaction is catalyzed by Lyase?
- (a) Breaking of bonds (c) Intramolecular rearrangement of bonds
(b) Formation of bonds (d) Transfer of group from one molecule to another
87. Mark the CORRECT function of enzyme, Peptidase?
- (a) Cleave phosphodiester bond (c) Remove phosphate from a substrate
(b) Cleave amino bonds (d) Removal of H₂O
88. . Which one of the following plants has a bisporic, 8-nucleated bipolar embryo sac development?
- (a) *Oenothera* (b) *Penaea* (c) *Plumbago* (d) *Allium*
89. Name the term which is given to the plants that grow at right angles to the direction of gravity.
- (a) Diagravitropic (c) Negaitve gravitropism
(b) Positive gravitropism (d) Plagiogravitropic
90. _____ controls the distribution of auxin in the roots.
- (a) LEAFY (c) PIN
(b) IAA (d) AP2
91. Which of this features not true for chlorophyll?
- (a) It has Mg²⁺ as the central metal ion
(b) It has cyclopentanone ring fused with a pyrrole ring
(c) It has a planar tetrapyrrole ring structure
(d) It is water-soluble pigment
92. Identify the mismatched pair from the following
- (a) Root knot disease - *Meloidogyne javanica*
(b) Smut of bajra - *Tolysporium penicillariae*
(c) Covered smut of barley - *Ustilage nuda*
(d) Late blight of potato - *Phytophthora infestans*

93. The evolution of seeds allowed plants to
- (a) Reproduce asexually (c) Disperse more widely
 (b) Photosynthesize more efficiently (d) Survive in extreme environments
94. Ecological diversity is
- (a) Less in India compared to Scandinavian countries like Norway.
 (b) More in Australia comparative to India.
 (c) More in India compared to Scandinavian countries like Norway.
 (d) More in France compared to India
95. Apomixis is a form of
- (a) Vernalization (b) Parthenogenesis (c) Parthenocarpy (d) Vivipary
96. Based on ABC model during flower development, loss of class A activity results in the formation of only stamen and carpel. Which of the following floral organ identity genes controls the class A activity?
- (a) *APETALA1* and *APETALA2* (c) Only *PISTILLATA*
 (b) *APETALA 3* and *PISTILLATA* (d) Only *AGAMOUS*
97. Which one of the following statements about *LEAFY*(LFY), a regulatory gene in *Arabidopsis thaliana* is correct?
- (a) *LEAFY*(LFY) is involved in floral meristem identity
 (b) *LEAFY*(LFY) is involved in leaf expansion.
 (c) *LEAFY*(LFY) is responsible for far red light mediated seedling growth
 (d) *LEAFY*(LFY) is involved in root meristem identity
98. Which of the following name is incorrect according to IUCN rules?
- (a) *Malus malus* (c) *Eclipta alba*
 (b) *Areca catechu* (d) *Lipochaeta lobata* subsp.*lobata*
99. The antisense strand of template ATTGCCGGAAT is _____.
- (a) TAACGGCCTTA (c) ATTGCCGGAAT
 (b) UAACGGCCUUA (d) AUUGCCGGAU
100. The restriction enzyme EcoRI cuts DNA at the sequence GTTAAC, On average, how frequently will the enzyme cut double-stranded DNA?
- (a) 4096 kb (c) 4096 bp
 (b) 1296 kb (d) 1296 bp

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

ALL THE BEST

The Maharaja Sayajirao University of Baroda

Department of Botany, Faculty of Science

M.Sc. ENTRANCE EXAMINATION 2023

ANSWER KEY SET-A

SUBJECT: BOTANY TIME : 10:00AM TO 11:30 AM

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SR. NO.	SET A
1	c
2	b
3	c
4	c
5	d
6	a
7	b
8	a
9	c
10	d
11	a
12	b
13	a
14	d
15	d
16	c
17	b
18	a
19	a
20	b
21	b
22	a
23	d
24	c
25	b
26	d
27	c
28	d
29	a
30	b
31	d
32	a
33	a
34	c
35	a
36	d
37	b

38	c
39	b
40	b
41	b
42	c
43	c
44	a
45	c
46	b
47	c
48	a
49	d
50	a
51	b
52	c
53	c
54	c
55	c
56	a
57	c
58	b
59	c
60	b
61	c
62	c
63	c
64	a
65	b
66	c
67	c
68	a
69	c
70	a
71	a
72	d
73	b
74	b

75	c
76	d
77	a
78	d
79	b
80	d
81	b
82	d
83	d
84	b
85	b
86	a
87	b
88	d
89	a
90	c
91	d
92	c
93	c
94	c
95	b
96	a
97	a
98	a
99	d
100	c