

A-62

ENTRANCE EXAMINATION - 2012
Ph.D. Plant Sciences

Time: 2 hours

Maximum Marks: 75

HALL TICKET NO.

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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 examination.
4. The question paper contains **75** questions **Part-A**: Question Nos. **1-25** and **Part-B**: Questions Nos. **26-75** of multiple-choice printed in **15** 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. An increase in some phenomenon at a constant rate over a specified time period.
 - A. Geometric growth
 - B. Exponential
 - C. Arithmetic growth
 - D. Non-linear

2. Which of the following plant hormones is incorrectly paired with its function?
 - A. cytokinin – promotes senescence
 - B. gibberellin – stimulates seed germination
 - C. abscisic acid – promotes seed and bud dormancy
 - D. ethylene – promotes fruit ripening

3. A mixture containing the following compounds is passed through a column in a gel filtration chromatography, which excludes all protein of MW 100,000 and higher: protein A MW = 30,000, protein B MW = 200,000, protein C MW = 90,000, protein D MW = 50,000, protein E MW = 250,000. What will be the order of elution of these proteins ?
 - A. Protein E, Protein B, Protein C, Protein D, Protein A
 - B. Protein E + Protein B, Protein C, Protein D, Protein A
 - C. Protein A, Protein D, Protein C, Protein B, Protein E
 - D. Protein E + Protein B, Protein A, Protein D, Protein C

4. Verticillaster inflorescence is a feature of
 - A. Malvaceae
 - B. Liliaceae
 - C. Labiatae
 - D. Cruciferae

5. Which of the following regarding epigenetic inheritance is **false**?
 - A. It does not involve changes in DNA sequence
 - B. It involves functionally relevant modifications to the genome such as histone modification
 - C. Epigenetic changes are not preserved when cells divide
 - D. Epigenetic inheritance can be reset during gametogenesis

6. If you could connect an active xylem vessel from a shoot to an active phloem sieve-tube member from a leaf using a "micropipe," which way would the solution flow between the two?
- A. The solution would flow from xylem to phloem.
 - B. The solution would flow from phloem to xylem.
 - C. The solution would flow back and forth from one to another.
 - D. The solution would not flow between the two.
7. If the map distance between genes A and B is 5 map units and the map distance between B and C is 15 map units, what is the map distance between A and C?
- A. 5 map units
 - B. 10 map units
 - C. 20 map units
 - D. Either 10 map units or 20 map units depending on the order of genes
8. If a cell with a solute potential of -0.2 MPa and a pressure potential of 0.4 MPa is placed in a chamber filled with pure water that is pressurized with 0.5 MPa, what will happen?
- A. Water will flow out of the cell.
 - B. Water will flow into the cell.
 - C. The cell will be crushed.
 - D. The cell will explode.
9. The fungus that causes southern corn leaf blight is known to produce this host specific toxin.
- A. HT toxin
 - B. HV toxin
 - C. HC toxin
 - D. HS toxin
10. Primitive bryophytes are called
- A. Club mosses
 - B. Horse tails
 - C. Liver worts
 - D. Ferns

11. The bioluminescent dinoflagellates are
- A. *Noctiluca* and *Gonyaulax*
 - B. *Gymnodinium* and *Cerastium*
 - C. *Dinobryon* and *Distephanus*
 - D. *Pinnularia* and *Acetabularia*
12. Which one of the following is living but non-nucleated:
- A. Sieve tube
 - B. Companion cells
 - C. Phloem fibre
 - D. Phloem parenchyma
13. Uranyl acetate is used as a negative stain in this technique
- A. Confocal microscopy
 - B. Epifluorescence
 - C. Electron microscopy
 - D. Compound microscope
14. Protoplasts can be made from the plant cells using these enzyme combinations
- A. Cellulase and Pectinase
 - B. Replicase and Ligase
 - C. Protease and Chitinase
 - D. DNase and RNase
15. A large ecosystem that has distinct climate, geology, and organisms; e.g., desert, tundra, grassland, savanna, woodland, coniferous forest, temperate deciduous forest, and tropical rain forest.
- A. Ecotone
 - B. Microcosm
 - C. Global ecosystem
 - D. Biome
16. Roger Beachy is known for this landmark discovery in plant pathology.
- A. Transgenic plants resistant to insects
 - B. Transgenic plants resistant to fungal pathogens
 - C. Transgenic plants resistant to bacterial pathogens
 - D. Transgenic plants resistant to plant viruses

17. During Calvin cycle, the last enzyme involved in RuBP regeneration is
- A. phosphoribulokinase
 - B. Rubisco
 - C. phosphopentosepimerase**
 - D. phosphopentoseisomerase
18. A local movement that began in India in the early 1980s and is opposed to governmental deforestation programs.
- A. Green movement
 - B. Afforestation
 - C. Heat Island
 - D. Chipko movement
19. Salicylic acid is known to induce systemic acquired resistance SAR in plants. Identify one among the following, which is also known to induce SAR.
- A. Succinic acid
 - B. Gluconic acid
 - C. 2,6-dichloroisonicotinic acid
 - D. Chorismic acid
20. A major route for biosynthesis of secondary products in plants is
- A. C₄ pathway
 - B. Shikimate pathway
 - C. CAM pathway
 - D. GS-GOGAT system
21. Number of 'High Energy P' bonds are required to translate a 279 aa protein
- A. 279
 - B. 558
 - C. 837
 - D. 1116
22. One of the following proteins is positioned as the tip of the pilus formed between the Agrobacterium and plant cell
- A. VirB1
 - B. VirB11
 - C. VirB5
 - D. VirA

23. A reaction medium of 500 ml containing 20 mM Tris-HCl buffer pH 7.5, 0.5 mM MgCl₂ and 0.05% NaN₃ has to be prepared using the stock solutions of 1 M Tris HCl pH 7.5; 100 mM MgCl₂ and 5% NaN₃ solution. The volumes of stocks should be mixed as
- A. 10 ml of Tris-HCl, 5 ml of MgCl₂ and 2.5 ml of NaN₃ in 482.5 ml of ddH₂O
 - B. 50 ml of Tris-HCl, 5 ml of MgCl₂ and 2.5 ml of NaN₃ in 442.5 ml of ddH₂O
 - C. 10 ml of Tris-HCl, 2.5 ml of MgCl₂ and 5 ml of NaN₃ in 482.5 ml of ddH₂O
 - D. 50 ml of Tris-HCl, 2.5 ml of MgCl₂ and 5 ml of NaN₃ in 442.5 ml of ddH₂O
24. Which of the following is a marker gene in chloroplast transformation studies
- A. Phosphomannose isomerase
 - B. Xylose isomerase
 - C. Chloramphenicol acetyl transferase
 - D. Aminoglycoside adenyl transferase
25. Primary amino sequence of a protein from five plant species is given to you. Which of the following tools would you use to know the homology between the sequences?
- A. BLAST
 - B. TargetP
 - C. CLUSTALW
 - D. Primer Express

PART - B

26. The largest family in the flowering plants is
- A. Graminae
 - B. Compositae
 - C. Orchidaceae
 - D. Leguminosae
27. What is "Phosgene" ?
- A. It is a type of pseudo gene which is predicted by a software
 - B. It is type a gene which is rich in phosphoric acids
 - C. It is colorless poisonous gas
 - D. It is a type antibiotic which inhibits bacterial gene expression
28. The practice of reducing or eliminating tillage operations and leaving crop residues on the soil to prevent erosion.
- A. Green manure
 - B. Biofertilizer
 - C. Conservation tillage
 - D. Green revolution
29. One of enzymes highly sensitive to and is inhibited by oxygen is
- A. Rubisco
 - B. cytochrome oxidase
 - C. polyphenol oxidase
 - D. nitrogenase
30. Fraction I protein in plants is also known as
- A. bovine serum albumin
 - B. seed protein
 - C. protein fraction
 - D. Rubisco
31. The following gives rise to the endomembrane system in a cell
- A. Plasma membrane
 - B. Mitochondria
 - C. Endoplasmic Reticulum
 - D. Golgi Apparatus

32. Recently, which company's GM-Brinjal has not been given permission for commercial cultivation
- A. Nuzvid seeds
 - B. Advanta India
 - C. Raas Seeds
 - D. Mahyco
33. One of the following statements related to 'Phytoene' is wrong
- A. Belongs to the class of terpenoids
 - B. Precursor of Carotenoids
 - C. Synthesised from two molecules of geranylgeranyl diphosphate
 - D. Precursor of phospho-*enol*-pyruvate
34. Fertilization in Pteridophytes is
- A. Apogamy
 - B. Syngamy
 - C. Apospory
 - D. Siphonogamy
35. Find out the **mismatch** for the following enzymes and their products
- A. Pyruvate dehydrogenase – Acetyl CoA, CO₂, NADH
 - B. Pyruvate decarboxylase – Acetaldehyde, CO₂
 - C. Pyruvate-formate lyase – Acetyl CoA, Formate, NAD
 - D. Pyruvate oxidase – Acetyl PO₄, CO₂, FADH
36. Cinchona plant belongs to
- A. Apocyanaceae
 - B. Asteraceae
 - C. Rubiaceae
 - D. Lamiaceae
37. Biological modification that allows species to better exist in a specific environment for short term.
- A. Ecotype
 - B. Ecad
 - C. Acclimation
 - D. Adaptation

38. In tetrad analysis, non-parental ditype asci can result from:
- A. single crossovers between linked genes
 - B. single crossovers between a gene and a centromer
 - C. double crossovers between linked genes
 - D. double crossovers between a gene and a centromere
39. A mixture of several herbicides that is considered to be a carcinogen because it is contaminated with dioxin.
- A. Agent orange
 - B. Multi-Weedicide
 - C. Pesticide
 - D. Chlorofluorocarbons CFCs
40. Which one of the following statements about the epidermis is **false**?
- A. On the plant body, only leaves are covered by a cuticle
 - B. The vast majority of epidermal cells are parenchymatous
 - C. Guard cells are normally the only epidermal cells to have well developed chloroplasts
 - D. Subsidiary cells are associated with guard cells in many plant groups
41. An organism with two different alleles is called
- A. homozygous for that trait
 - B. homologous for the allele
 - C. heterozygous for that trait
 - D. heterologous for the allele
42. In higher plants, cytochrome c is typically located in
- A. plasma membrane
 - B. chloroplasts
 - C. mitochondria
 - D. cytoplasm
43. In a cross involving polygenic inheritance, only $1/1024$ of the offspring in F_2 generation were as extreme as one of the parents. How many gene pairs are involved?
- A. 3
 - B. 4
 - C. 5
 - D. 6

44. Designated sites that have been abandoned or underused because of real or perceived environmental contamination/pollution are called as
- Green field
 - Brown field
 - White field
 - Red field
45. A column chromatography method that makes use of a specific ligand molecule that is attached to an insoluble matrix, and is capable of binding to the molecule being purified is known as
- Ion exchange chromatography
 - Partition chromatography
 - Gel filtration chromatography
 - Affinity chromatography
46. Match the following diseases in group A with their causative agent in group B.

<u>Group A</u>	<u>Group B</u>
K. Histoplasmosis	1. Virus
L. Encephalitis	2. Tapeworm
M. Cysticercosis	3. Fungi
N. Leishmaniasis	4. Bacteria
	5. Protozoa

- K-4; L-1; M-2; N-5
 - K-2; L-4; M-1; N-5
 - K-3; L-1; M-2; N-5
 - K-3; L-1; M-5; N-2
47. The alleles **A**, **B** and **C** are on the same maternal chromosome and **a**, **b** and **c** are on the same paternal chromosome. The only way that heterozygote will produce a gamete with alleles **a**, **b** and **C** is through
- nondisjunction
 - the laws of segregation
 - the law of independent assortment
 - crossing over

48. When leaves become water-stressed, they wilt, because.....
- A. increased ABA levels have caused the stomata to close
 - B. phloem transport has ceased leading to increased sugar levels
 - C. their mesophyll cells are no longer turgid
 - D. their guard cells are no longer turgid
49. Restoring a natural area by the addition of living organisms e.g., plants or bacteria.
- A. Bioremediation
 - B. Phytoremediation
 - C. Phycoremediation
 - D. Rhizoremediation
50. Husk of coconut is made of:
- A. Schlerenchyma
 - B. Parenchyma
 - C. Collenchyma
 - D. Prosenchyma
51. Identify the mismatch
- A. Selective medium – Bismuth sulfite agar
 - B. Differential medium – MacConkey agar
 - C. Enrichment medium – Lysine iron agar
 - D. Characteristic medium – Sulfide, indole, motility SIM medium
52. A part of the biosphere that absorbs more carbon dioxide than it releases; e.g., oceans and rain forests.
- A. Carbon sink
 - B. Acid mine
 - C. Peat bog
 - D. Alkaline soil
53. In *Arabidopsis*, expression of one of the genes was suppressed by RNA interference technology. The following technique **can not** be used for testing the levels of that specific gene product in the mutant series:
- A. Northern analyses with total RNA of mutants
 - B. Southern analyses with genomic DNA of mutants
 - C. RT-PCR analyses with cDNA prepared with total RNA of mutants
 - D. Western analyses with total protein isolated from mutants

54. Which of the following is a symptom of magnesium deficiency?
- A. Yellowing of younger leaves' prior to yellowing of older leaves.
 - B. Enhanced plant growth, since magnesium is toxic to plants.
 - C. Chlorosis
 - D. decreased transpiration
55. One of the following member **do not** belong to the family *Enterobacteriaceae*
- A. *Proteus*
 - B. *Yersinia*
 - C. *Citrobacter*
 - D. *Vibrio*
56. Fatty acyl CoA in cytoplasm is transported to outer mitochondrial membrane for Beta-oxidation as
- A. Glycolipids
 - B. Acyl carnitine
 - C. Acetyl CoA
 - D. Malonyl-CoA
57. Identify the mismatch
- A. Bacitracin – inhibits cell wall synthesis
 - B. Fusidic acid – Binds to EF-G and blocks translocation
 - C. Dapsone – Interferes with folic acid synthesis
 - D. Polymyxin B – Inhibits the synthesis of the mycolic acid “cord factor”
58. Ammonia oxidation to nitrate depends on the following two bacteria
- A. *Nitrosomonas-Nitrospira*
 - B. *Azospirillum-Pseudomonas*
 - C. *Nitrobacter-Nitrococcus*
 - D. *Nitrospira-Nitrococcus*
59. Seed dormancy inhibited mechanically by causing seed coat injury is called as:
- A. Stratification
 - B. Scarification
 - C. Vernalization
 - D. Bahar treatment

60. Eukaryotic and multicellular body patterns are not found in
- A. Monera
 - B. Protista
 - C. Fungi
 - D. Animalia
61. Gene-for-gene hypothesis was given by:
- A. Gregor Johann Mendel
 - B. Darwin
 - C. Robert Koch
 - D. Harold Henry Flor
62. Presently, there are lot more variants of 'Green fluorescent proteins' are available and are used in *in vivo* imaging, However, the basic protein is isolated from
- A. *Gloriosa superba*
 - B. *Aequorea Victoria*
 - C. *Thermus aquaticus*
 - D. *Microsporilla gramina*
63. Tabtoxin is toxic to plant cells because it inactivates the enzyme glutamine synthetase, which leads to depletion of glutamine levels, and accumulation of
- A. Aspartate
 - B. Ammonia
 - C. Acetic acid
 - D. Benzoic acid
64. The two-carbon compound which acts as substrate for photorespiration is
- A. glycine
 - B. glycolate
 - C. acetyl CoA
 - D. malate
65. NADP-malic enzyme is located in the following compartment of bundle sheath cells
- A. chloroplast
 - B. mitochondria
 - C. peroxisome
 - D. cytoplasm

66. Mutations that involve a change in single nucleotide resulting in a codon that code for a different amino acid are
- A. missense mutation
 - B. nonsense mutation
 - C. frameshift mutations
 - D. transversions
67. Ferredoxin can be called as a
- A. iron-sulphur protein
 - B. porphyrin protein
 - C. sulphur-magnesium protein
 - D. non-haem protein
68. One of the following proteins of virulence region on the Ti Plasmid is autokinase
- A. VirA
 - B. VirD4
 - C. VirB8
 - D. VirH
69. A few fungi accumulate this metabolite during maturation of the aspersorium, which allows drawing of more water to build hydrostatic pressure.
- A. Galaturonic acid
 - B. Strigol
 - C. Glycerol
 - D. Cutin
70. One of the following Scientists is associated with the development of gene gun
- A. Hargobind Khorana
 - B. D. Baltimore
 - C. Eric Reeves
 - D. J.C. Sanford
71. Golden age of Gymnosperms
- A. Paleozoic era
 - B. Mesozoic era
 - C. Coenozoic era
 - D. Devonian period

72. An organism that lives part of its life as a parasite on another organism and the other part as a saprophyte is called
- A. Hemibiotroph
 - B. Biotroph
 - C. Halophyte
 - D. Lithophyte
73. Bulbosum system employed in barley for production of haploids involved all of the following **except**:
- A. Wide hybridization
 - B. *In vitro* immature zygotic embryo culture
 - C. Elimination of the chromosomes of vulgare
 - D. Elimination of the chromosomes of bulbosum
74. Phaseollin is a very important compound that has great significance in deciding the fate of the host-pathogen interactions. This compound is
- A. Produced by the pathogen
 - B. Produced by the host
 - C. Chemical fungicide
 - D. Biological weedicide
75. The entry of most of the bacterial pathogens into the plants occurs through the following.
- A. Direct penetration of the cell walls
 - B. Enter through the wounds made by vectors
 - C. Physical contact with the infected plant
 - D. Natural openings of the plants
