



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2013-2014

Discipline : Horticulture (*Floriculture*)

Discipline Code : 13; *Sub code: 01*

Roll No.

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Please Note:

- (i) This question paper contains **12** pages. **Please check whether all the pages are printed in this set.** Report discrepancy, if any, **immediately** to the invigilator.
- (ii) **There shall be NEGATIVE marking for WRONG answers in the Multiple Choice type questions (No. 1 to 130) which carry one mark each. For every wrong answer 0.25 mark will be deducted.**

PART – I (General Agriculture)

Multiple choice questions (No. 1 to 30). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

1. Who is the present Chairman of Protection of Plant Varieties and Farmers' Right Authority (PPV&FRA)?
 - a) Dr. R.R. Hanchinal
 - b) Dr. P.L. Gautam
 - c) Dr. S. Nagarajan
 - d) Dr. Swapan K. Datta
2. Which among the following is another name for vitamin B₁₂?
 - a) Niacin
 - b) Pyridoxal phosphate
 - c) Cobalamin
 - d) Riboflavin
3. The largest share in India's farm export earning in the year 2011-12 was from
 - a) Basmati rice
 - b) Non-basmati rice
 - c) Sugar
 - d) Guar gum
4. The National Bureau of Agriculturally Important Insects was established by ICAR in _____, was earlier known as _____.
 - a) Bangalore; PDBC
 - b) New Delhi; National Pusa Collection
 - c) Ranchi; Indian Lac Research Institute
 - d) New Delhi; NCIPM
5. The most important sucking pests of cotton and rice are respectively
 - a) *Nilaparvata lugens* and *Aphis gossypii*
 - b) *Aphis gossypii* and *Thrips oryzae*
 - c) *Amrasca biguttula biguttula* and *Scirtothrips dorsalis*
 - d) *Thrips gossypii* and *Orseolia oryzae*
6. Which of the following microorganism causes fatal poisoning in canned fruits and vegetables?
 - a) *Aspergillus flavus*
 - b) *Penicillium digitatum*
 - c) *Clostridium botulinum*
 - d) *Rhizoctonia solani*
7. The cause of the great Bengal Famine was
 - a) Blast of rice
 - b) Brown spot of rice
 - c) Rust of wheat
 - d) Karnal bunt of wheat
8. Actinomycetes belong to
 - a) The fungi
 - b) Eukaryote
 - c) *Mycelia sterilia*
 - d) None of the above
9. A virus-free clone from a virus infected plant can be obtained by
 - a) Cotyledonary leaf culture
 - b) Axenic culture
 - c) Stem culture
 - d) Meristem tip culture
10. Which of the following is not an objective of the National Food Security Mission?
 - a) Sustainable increase in production of rice, wheat and pulses
 - b) Restoring soil fertility and productivity at individual farm level
 - c) Promoting use of bio-pesticides and organic fertilizers
 - d) Creation of employment opportunities

11. Agmarknet, a portal for the dissemination of agricultural marketing information, is a joint endeavour of
 - a) DMI and NIC
 - b) DMI and Ministry of Agriculture
 - c) NIC and Ministry of Agriculture
 - d) DMI and Directorate of Economics and Statistics
12. The share of agriculture and allied activities in India's GDP at constant prices in 2011-12 was
 - a) 14.1%
 - b) 14.7%
 - c) 15.6%
 - d) 17.0%
13. The average size of land holding in India according to Agricultural Census 2005-06 is
 - a) 0.38 ha
 - b) 1.23 ha
 - c) 1.49 ha
 - d) 1.70 ha
14. 'Farmers First' concept was proposed by
 - a) Paul Leagans
 - b) Neils Rolling
 - c) Robert Chamber
 - d) Indira Gandhi
15. In the year 2012, GM crops were cultivated in an area of
 - a) 150 million hectare in 18 countries
 - b) 170 million hectare in 28 countries
 - c) 200 million hectare in 18 countries
 - d) 1.70 million hectare in 28 countries
16. The broad-spectrum systematic herbicide glyphosate kills the weeds by inhibiting the biosynthesis of
 - a) Phenylalanine
 - b) Alanine
 - c) Glutamine
 - d) Cysteine
17. At harvest, the above ground straw (leaf, sheath and stem) weight and grain weight of paddy crop are 5.5 and 4.5 tonnes per hectare, respectively. What is the harvest index of paddy?
 - a) 45%
 - b) 50%
 - c) 55%
 - d) 100%
18. Crossing over between non-sister chromatids of homologous chromosomes takes place during
 - a) Leptotene
 - b) Pachytene
 - c) Diplotene
 - d) Zygotene
19. The term 'Heterosis' was coined by
 - a) G.H. Shull
 - b) W. Bateson
 - c) T.H. Morgan
 - d) E.M. East
20. When a transgenic plant is crossed with a non-transgenic, what would be the zygosity status of the F₁ plant?
 - a) Homozygous
 - b) Heterozygous
 - c) Hemizygous
 - d) Nullizygous
21. The highest per capita consumption of flowers in the world is in
 - a) The USA
 - b) India
 - c) Switzerland
 - d) The Netherlands
22. Which of the following is a very rich source of betalain pigment?
 - a) Radish
 - b) Beet root
 - c) Carrot
 - d) Red cabbage
23. Dog ridge is
 - a) Salt tolerant rootstocks of mango
 - b) Salt tolerant rootstocks of guava
 - c) Salt tolerant rootstocks of grape
 - d) Salt tolerant rootstocks of citrus
24. Which of the following micronutrients are most widely deficient in Indian soils?
 - a) Zinc and boron
 - b) Zinc and iron
 - c) Zinc and manganese
 - d) Zinc and copper
25. Which of the following fertilizers is not produced in India?
 - a) DAP
 - b) Urea
 - c) Muriate of potash
 - d) TSP
26. What is the estimated extent of salt affected soils in India?
 - a) 5.42 mha
 - b) 7.42 mha
 - c) 11.42 mha
 - d) 17.42 mha
27. Which of the following is not a feature of watershed?
 - a) Hydrological unit
 - b) Biophysical unit
 - c) Socio-economic unit
 - d) Production unit

28. Correlation coefficient 'r' lies between
 a) 0 and 1
 b) -1 and 1
 c) -1 and 0
 d) 0 and ∞
29. For the data 1, -2, 4, geometric mean is
 a) 2
 b) 4
 c) $-\frac{7}{3}$
 d) -2
30. The relationship between Arithmetic mean (A), Harmonic mean (H) and Geometric mean (G) is
 a) $G^2=AH$
 b) $G=\sqrt{A+H}$
 c) $H^2=GA$
 d) $A^2=GH$

PART – II (Subject Paper)

Multiple choice questions (No. 31 to 130). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

31. Which of the following is not valued for ornamental bracts?
 a) Bougainvillea
 b) Poinsettia
 c) Mussaenda
 d) Cyclamen
32. The following experimental design controls fertility variation in one direction only
 a) Completely Randomized Design
 b) Latin Square Design
 c) Randomized Block Design
 d) Split Plot Technique
33. Most potent surface sterilant used to establish axenic cultures of ornamental plants is
 a) 0.1% $HgCl_2$
 b) 10.00% $HgCl_2$
 c) 0.1% $KMnO_4$
 d) 0.1% H_3PO_4
34. Work on Hibiscus improvement and development of varieties was extensively carried at
 a) IARI, New Delhi
 b) NBRI, Lucknow
 c) IHR, Bengaluru
 d) YSRUHF, Solan
35. Bangkok Golden Apple is a variety of
 a) Guava
 b) Pineapple
 c) Avocado
 d) Pomegranate
36. 'Rajat Rekha' is a mutant of
 a) Rose
 b) Carnation
 c) Tuberose
 d) Chrysanthemum
37. The origin of the following annual is not India
 a) *Gomphrena globosa*
 b) *Impatiens balsamina*
 c) *Salvia splendens*
 d) *Vinca minor*
38. Which of the following pinching types extends the duration of flowering in carnation?
 a) Single pinching
 b) Pinch plus pull pinch
 c) Pinch & half
 d) Double pinching
39. 'Star Gazer' is a poplar variety of
 a) Tiger Lily
 b) Asiatic Lily
 c) Oriental Lily
 d) Torch Lily
40. Which of the following is propagated through bulbils?
 a) Tulip
 b) Lilium
 c) Gladiolus
 d) Crocosmia
41. _____ is the square root of variance
 a) Standard error
 b) Standard deviation
 c) Coefficient of variation
 d) Correlation coefficient
42. First interspecific hybrid in *Dianthus* was developed by
 a) William Sim
 b) Thomas Fairchild
 c) Montague Allwood
 d) Alphonse Alegatiere
43. Germplasm which is meant for Medium Term Storage (MTS) for a period of 10-15 years is referred as
 a) Working collections
 b) Base collections
 c) Active collections
 d) Secondary gene pool

44. Which of the following fragrant rose varieties is not figured in postage stamps of Dept. of Posts, Govt. of India released during 2007?
- Nurjehan
 - Delhi Princess
 - Bhim
 - Jawahar
45. Botanically Kentucky blue grass is
- Paspalum notatum*
 - Agrostis palustris*
 - Poa pratensis*
 - Festuca arundinacea*
46. Lawn mower was invented by _____ in 1830.
- Edwin Lutyens
 - Edwin Budding
 - J.B. Olcoth
 - William Robinson
47. The concept of bio-aesthetic planning was given by
- Le Corbuiser
 - M.S. Randhawa
 - Humphrey Repton
 - Lancelot Hogben
48. The book 'Gardens Through The Ages' is authored by
- M.S. Randhawa
 - G.S. Randhawa
 - B.P. Pal
 - T.K. Bose
49. Which of the following trees is effective against CO (carbon monoxide) in the atmosphere?
- Chlorophytum clatum*
 - Rhapis excelsa*
 - Ficus benzamina*
 - Trachypus fortune*
50. Dwarf species of chrysanthemum is
- C. frutescens*
 - C. coronarium*
 - C. moreifolium*
 - C. multicaule*
51. A typical Tetrapak has
- 6 layers comprising of polyethylene and aluminium layers
 - 6 layers comprising of polyethylene layers only
 - 4 layers comprising of polyethylene and aluminium layers
 - 4 layers comprising of polyethylene layers only
52. Which of the following is not native to India?
- Ficus religiosa*
 - Putranjiva roxuburghii*
 - Sterculia diversifolia*
 - Alstonia scholaris*
53. What do you mean about NGS?
- Next Generation Sequencing
 - Novel Gene Sequence
 - New Genomic Sequences
 - Novel Genomic Software
54. The perpetual flowering _____ is known as father of modern roses.
- Parson's Pink China Rose
 - Hume's Blush
 - Parks Tea China Rose
 - Slater's Crimson China Rose
55. Which of the following rootstocks are suitable for growing rose in sandy and clay soils, respectively?
- R. indica* var. *odorata* and *R. canina*
 - R. canina* and *R. indica* var. *odorata*
 - R. manetti* and *R. laxa*
 - R. laxa* and *R. manetti*
56. Bogota region of Columbia has ideal climate for the production of
- Rose
 - Carnation
 - Chrysanthemum
 - Gerbera
57. The range of deficiency and toxicity is narrow in which of the following micronutrients?
- Iron
 - Calcium
 - Molybdenum
 - Boron
58. In India, protection of varieties in which of the following crops may be sought from PPV&FRA at present?
- Rose and gladiolus
 - Rose and chrysanthemum
 - Gladiolus and chrysanthemum
 - Jasmine and tuberose
59. In orchids, it is difficult to germinate the seed as they have little or no endosperm, but _____ found that the orchid seed germinated readily in a glass flask containing nutrients and agar.
- Murashige and Skoog
 - Vacin and Went
 - Lewis Knudson
 - Gamborg

60. Lewis *et al.* (1972) divided the genus *Gladiolus* into 4 groups based on the number of
- Functional anthers
 - Well developed petals
 - Functional carpels
 - Well developed leaves
61. Snap dragon belongs to which family?
- Balsaminaceae
 - Malvaceae
 - Nyctaginaceae
 - Scrophularaceae
62. The precursor for ABA synthesis in plants is
- Methionine
 - Tryptophan
 - Acetyl CoA
 - Violaxantin
63. Terminal cuttings of carnation can be stored at ____°C temperature before root induction.
- 0 to 1
 - 2 to 5
 - 5 to 10
 - 20 to -10
64. Which of the following is a fragrant orchid?
- Peristeria elata*
 - Cymbidium aloefolium*
 - Paphiopedilum insigne*
 - Vanda coerulea*
65. Pyrethrum, an insecticide is extracted from the following chrysanthemum species
- C. carinatum*
 - C. cinerariifolium*
 - C. coronarium*
 - C. coronatum*
66. The UPOV (Union for the Protection of New Plant Varieties) headquarters is located in
- Geneva
 - Berne
 - Rome
 - Paris
67. In carnation, adequate level of following nutrient should be ensured as it has positive relationship with resistance to *Fusarium oxysporum* f.sp. *dianthi*
- Phosphorus
 - Potassium
 - Calcium
 - Boron
68. The following species of *Jasminum* produces yellow flowers except
- J. primulinum*
 - J. rex*
 - J. humile*
 - J. pubigerum*
69. In *Polianthes*, which of the following species produces deep red flowers?
- P. durangensis*
 - P. platyphylla*
 - P. graminifolia*
 - P. geminiflora*
70. Arka Surabhi, an improved variety of jasmine from IIHR, Bengaluru has a yield potential of
- 5 t/ha
 - 10 t/ha
 - 15 t/ha
 - 20 t/ha
71. 'Arka Flame' and 'Arka Krishika' are the first indigenously developed varieties of _____ and _____, respectively.
- Rose and carnation
 - Rose and gerbera
 - Carnation and gerbera
 - Carnation and crossandra
72. Kemin yellow oil from Kemin Industries, USA is the product of
- Rose
 - Carnation
 - Marigold
 - Calendula
73. The ideal angle between the spathe and spadix in anthurium is
- 45°
 - 75°
 - 90°
 - 180°
74. Lutein, an antioxidant is extracted from
- Tagetes erecta*
 - Tagetes patula*
 - Rosa hybrida*
 - Chrysanthemum coronarium*
75. Bird of Paradise, *Sterilitzia reginae* is native to
- Mexico
 - South Africa
 - Sri Lanka
 - Thailand
76. *Statice* (*Limonium*) belongs to
- Nyctaginaceae
 - Apocynaceae
 - Lathyraceae
 - Plumbaginaceae
77. Minimum isolation distance required for seed production in marigold
- 250 m
 - 500 m
 - 1000 m
 - 2000 m

78. Which of the following breeding methods is not suitable for asexually reproducing crops?
- Clonal selection
 - Pedigree breeding
 - Mass selection
 - Mutation breeding
79. 'Padmashree' has been awarded recently to
- Dr. K.L. Chadha
 - Dr. Vishnu Swarup
 - Dr. T.K. Bose
 - Dr. G.S. Randhawa
80. Which of the following Gladiolus species produces strange colours like green, brown and slate?
- G. cardinalis*
 - G. carneus*
 - G. dracocephalus*
 - G. stellatus*
81. Allah Din and Appledoon are the popular varieties of _____ and _____, respectively.
- Daffodil and liliium
 - Daffodil and tulip
 - Alstroemeria and liliium
 - Alstroemeria and tulip
82. Which of the following is scented and early blooming annual?
- Petunia
 - Sweet Alyssum
 - Antirrhinum
 - Coreopsis
83. The climber, *Campsis radicans* produces flowers in _____ colour.
- White
 - Orange
 - Yellow
 - Red
84. Carnation and chrysanthemum are typical example of _____ and _____ plants, respectively.
- Quantitative long day and qualitative short day
 - Quantitative long day and quantitative short day
 - Qualitative long day and qualitative short day
 - Qualitative long day and quantitative short day
85. An individual having chromosome number that is not an exact multiple of the basic chromosome number is called
- Heteroploid
 - Allopolyploid
 - Autopolyploid
 - Aneuploid
86. Cytoplasmic male sterility is found in
- Antirrhinum
 - Salvia
 - Petunia
 - Marigold
87. To ensure high degree of fidelity during DNA replication, the critical proof reading is carried out by
- 5'→3' exonuclease activity of DNA polymerase
 - 3'→5' exonuclease activity of DNA polymerase
 - Restriction endonucleases
 - Polynucleotide ligases
88. In order to promote environmentally sound cultivation practices of flowers and plants, the Dutch Floriculture Industries and the auction houses have started the following quality certification programme
- Milieu Project Sierteelt - MPS
 - EUREP - GAP
 - Flower Lable Programme (FLP)
 - Fair Flowers & Plants (FFP)
89. Which of the following trees is disliked by cattle and therefore easily get established while young?
- Pongamia pinnata*
 - Delonix regia*
 - Hibiscus tiliaceus*
 - Cassia fistula*
90. Which of the following ground covers is used as an evergreen lawn?
- Zoysia japonica*
 - Dichondra repens*
 - Wadelia chinensis*
 - Sedum reflexum*
91. Which of the following compounds are often referred as anti-auxins?
- 2,4-Dichlorophenoxy acetic acid and 2,4,5-T
 - MCPA and picloram
 - Phenyl acetic acid and 4-Chloroindole acetic acid
 - 2,3,5-Triiodobenzoic acid and α -Naphthylthalamic acid
92. 'Sea of Plastics', a 50,000 acre world's largest complex of a series of greenhouse is located at
- Alsmeer in The Netherlands
 - Shangai in China
 - Almeria in Spain
 - Hannover in Germany

93. The Ti plasmid of *Agrobacterium tumifaciens* contains an important gene that codes for the following enzyme that is involved in the rapid cell division
- Isopentenyl AMP synthase
 - ACC synthase
 - IAA oxidase
 - Cellulase
94. In which of the following groups of ornamental plants, ethylene is involved in induction of flowering?
- Ferns
 - Cacti and succulents
 - Bromeliads
 - Palms and cycads
95. The following compound in essential oil acts as very potential growth inhibitor?
- Jasmonic acid in oil of jasmine
 - Geraniol in oil of geranium
 - Citronellol in oil of lemon grass
 - Eugenol in oil of tuberose
96. Tip burning due to fluoride injury is observed in
- Gerbera
 - Carnation
 - Rose
 - Gladiolus
97. Which of the following trees exhibit nyctinastic movements?
- Garcinia indica*
 - Mimosops elengi*
 - Plumeria alba*
 - Samanea samano*
98. Which of the following trees produces silvery leaves that resemble fern leaves?
- Grevillea robusta*
 - Melia dubia*
 - Jacaranda acutifolia*
 - Lagerstroemia speciosa*
99. A measure of discrepancy existing between observed and expected frequencies is calculated by
- Student's 't' test
 - Chi-square test
 - Correlation
 - Regression
100. Arrangement of fruits and flowers is known as
- Ikenobo
 - Ikebana
 - Morimono
 - Moribana
101. The degree of peakedness of a distribution in relation to normal distribution is known as
- Kurtosis
 - Skewness
 - Moments
 - Coefficient of variation
102. Mutations that occur due to base pair additions and deletions are collectively referred as
- Transitions
 - Transversions
 - Point mutations
 - Frame-shift mutations
103. Which of the following biotech tools that is very specific, sensitive and reproducible is widely used to detect RNA viruses in ornamental plants?
- Real Time RT PCR
 - Enzyme Linked Immunosorbent Assay (ELISA)
 - Dot Immunobinding Assay (DIBA)
 - Tissue Blotting Assay
104. Inert medium widely used in West in hi-tech production of roses
- Vermiculite
 - Perlite
 - Cocopeat
 - Rock wool
105. Which of the following weedy grass is used as a ornamental potted plant?
- Cyperus alternifolium*
 - Panicum maximum*
 - Echinocola colona*
 - Pennisetum pedicellatum*
106. Which of the following trees is known as China Fern Palm?
- Thuja orientalis*
 - Cupressus sempervirens*
 - Cycas revoluta*
 - Araucaria bidwillii*
107. Which of the following new generation herbicides that is very effective to control *Cyprus rotendus* in lawn grass?
- Ethoxy sulfuron - Sunrice
 - Glyphosate - Roundup
 - Diuron - Klars
 - Glufosinate ammonium - Basta
108. The precursor for GA₃ biosynthesis is
- 3 Acetyl CoA
 - Tryptophan
 - Isopentenyl AMP
 - Methionine

109. Which of the following greenhouse styles do you recommend for hilly areas?
- Lean-to
 - Even-span
 - Uneven-span
 - Ridge-and-furrow
110. The ideal pH range for soil based and soil-less substrates for greenhouse cultivation of a majority of the flower crops is
- 4.5 to 5.8 and 4.5 to 5.5, respectively
 - 6.2 to 6.8 and 5.4 to 6.0, respectively
 - 7.0 to 7.5 and 7.0 to 7.1, respectively
 - 7.5 to 8.5 and 5.0 to 5.4, respectively
111. The earliest example of vertical garden is in
- Ryoan-ji gardens in Japan
 - Hanging gardens of Babylon
 - Villa Medici at Fiesole in Italy
 - Vaux-le-Vicomte in France
112. Hydro seedling is one of the latest methods for establishing
- Plug plants in portraits in huge greenhouses
 - Lawn in vast areas
 - Avenue trees on highways
 - Hedges over long stretch
113. For construction of greenhouses, which of the following cladding material has the highest light transmission (95%) that also has long life?
- Glass and polyethylene
 - Polyvinyl chloride film
 - Polyvinyl fluoride film
 - Ethylene tetrafluoroethylene
114. Which of the following Indian rose varieties is believed to have contributed chocolate brown colour to the present day roses?
- Pusa Muskan
 - Mohini
 - Mrinalini
 - Manmatha
115. Two natural hybrids in bougainvillea are
- B. × spectabilis* and *B. × peruviana*
 - B. × glabra* and *B. × peruviana*
 - B. × buttiana* and *B. × spectoglabra*
 - B. × spectoglabra* and *B. × peruviana*
116. The ideal droplet size for effective fogging system in polyhouses is
- 4000 microns
 - 400 microns
 - 40 microns
 - 4 microns
117. A popular lawn grass species *Zoysia japonica* is commonly known as
- Blue-green grass
 - Doob grass
 - Japanese grass
 - Nut grass
118. The following bioagent + fertilizer is used to rapidly decompose the coir dust to make an ideal soilless medium for flower crops
- Pleurotus + urea
 - Trichoderma + urea
 - Pleurotus + MOP
 - Trichoderma + MOP
119. Which of the following succulents looks like pebbles around them?
- Pachypodium lamerei*
 - Adenium obesum*
 - Lithops hookeri*
 - Beaucarnia recurvata*
120. The first rose variety developed by Dr. B.P. Pal through organized and systematic breeding is
- Delhi Princess
 - Panchu
 - Rose Sherbet
 - Banjaran
121. In a typical double stranded DNA molecule which are the double ring bases
- Adenine, guanine, thymine
 - Adenine, guanine
 - Cytocine, thymine
 - Adenine, uracil
122. If the soil pH is high in a greenhouse which of the following nutrients become deficient?
- N, P., K, Ca, Mg
 - Fe, Mn, Zn, Cu, B
 - Ca, Mg, Co, Si, S
 - P, Ca, Mg, Mo, Co
123. Which of the following cacti is almost spineless?
- Zygocactus
 - Opuntia
 - Haworthia
 - Echinopsis
124. Zen gardens are also known as
- Mughal gardens
 - English gardens
 - Japanese gardens
 - Italian gardens
125. Which of the following tall shrubs is widely propagated by seeds?
- Acalypha hispida*
 - Allamanda cathartica*
 - Putranjiva roxturghii*
 - Mussaenda erythrophylla*
126. Which of the following indoor plants is poisonous?
- Cordyline
 - Chlorophytum
 - Dieffenbachia
 - Draceana

127. Major constituent of rose oil
 a) Geraniol
 b) Citronellol
 c) Citral
 d) Rosal
128. Which of the following is desirable in rose production?
 a) Bull heads
 b) Bottom breaks
 c) Blind shoots
 d) Bent neck
129. The condition where flowers do not open is known as _____ which results in self-pollination.
 a) Cleistogamy
 b) Chasmogamy
 c) Dichogamy
 d) Herkogamy
130. Which of the following methods of breeding is used for transfer of disease resistance into a commercial variety?
 a) Pedigree method
 b) Bulk method
 c) Mutation breeding
 d) Backcross method

Matching type questions (No. 131 to 140); all questions carry equal marks. Choose the correct answer (a, b, c, d or e) for each sub-question (i, ii, iii, iv and v) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

131. Match the following with ploidy level
 i) *Dianthus chinensis* a) Trigeneric
 ii) *Rosa chinensis* b) Octaploid
 iii) *Dahlia variabilis* c) Tetraploid
 iv) *Tanakara* d) Diploid
 v) *Brilliandeara Gary* e) Sexageneric
132. Match the following conditions with crops
 i) Genetic male sterility a) Gladiolus
 ii) Self-incompatibility b) Salvia
 iii) Protandry c) Marigold
 iv) Self-pollination d) Primula
 v) Heterostyly e) Petunia
133. Match the following landscape architects with the gardens
 i) William Robinson a) French gardens
 ii) William Kent b) English gardens
 iii) Percy Lancaster c) Wild garden
 iv) Le Corbuiser d) Chandigarh city
 v) Le Notre e) Agri-horticultural Society gardens

134. Match the following disease and its casual organism
 i) Stem rot of tuberose a) *Fusarium oxysporum*
 ii) Grey mould of carnation b) *Phytophthora cryptogea*
 iii) Wilt in gladiolus c) *Leveillula taurica*
 iv) Foot rot of gerbera d) *Sclerotium rolfsii*
 v) Powdery mildew in marigold e) *Botrytis cinerea*
135. Match the following mutant varieties with their parent cultivar
 i) Madhosh a) Mrs. H.C. Buck
 ii) Shobha b) Ajay
 iii) Mary Palmer c) Gulzar
 iv) Birbal Sahni d) Wild Rose
 v) Pusa Anmol e) Nanako
136. Match the following chemical mutagen with its group
 i) Ethyl methane sulfonate (EMS) a) Acridine
 ii) 5-Bromouracil (5-BU) b) Base analogs
 iii) Proflavin c) Deaminating agents
 iv) Nitrous acid d) Alkalyting agent
 v) 2-Aminopurine e) Base analogs
137. Match the following trees with their respective common names
 i) *Kigeria africana* a) Copper pod
 ii) *Madhuca indica* b) African tulip tree
 iii) *Magnolia grandiflora* c) African sausage tree
 iv) *Peltophorum pterocarpum* d) Butter tree
 v) *Spathodia campanulata* e) Lily tree
138. Match the following chemicals and their brand names
 i) Abamectin a) Dursban
 ii) Diafenthiuron b) Nuvon
 iii) Chloropyriphos c) Ridomil
 iv) Dichlorvos d) Vertimec
 v) Metalaxyl e) Polo
139. Match the following predisposing conditions with the problems
 i) High temperature, low humidity a) Outbreak of powdery mildew
 ii) High temperature, high humidity b) Outbreak of *Agrobacterium* galls
 iii) Moist cloudy conditions c) Outbreak of dieback
 iv) Wound at the crown portion d) Outbreak of red spider mite
 v) Pruning of plants e) Outbreak of downy mildew
140. Match the following post-harvest chemicals with their applications
 i) 1-methylcyclopropane a) Acidifier
 ii) 8-Hydroxyquinoline citrate b) Pulsing
 iii) Potassium permanganate c) Slows down senescence
 iv) Citric acid d) Biocide
 v) 10% sucrose e) Antiethylene molecule

Short questions (No. 141 to 146); each question carries FIVE marks. Write answers, including computation / mathematical calculations if any, in the space provided for each question on the question paper itself.

141. What do you understand by the term DUS? How is it important? Explain in brief the DUS test procedure in rose.

142. What are nutraceuticals? How are they related to floriculture? Explain in brief the role played by nutraceuticals principles in human life.

143. Hybridization, seed set and germination are major challenges in rose breeding, substantiate.

144. What is bioaesthetic planning? Who pioneered it in India? Explain in brief the role of ornamental plants in our environment.

145. Protected cultivation succeeded in south, west and eastern parts of Indian but not in northern part of India. Substantiate.

146. What are the viable options for diversification that you can suggest to farmers and traders in flower *mandis* in case of glut in the market?