Discipline : Agronomy

Discipline Code : 07   Roll No. ☐☐☐☐☐☐☐

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 B_{12}?
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 F_1 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. If C:N and N:P (ratios) of a soil are 10:1 each, its C:N:P ratio would be
a) 100:100:1
b) 100:10:1
c) 10:10:1
d) None of the above

32. The test weight of sunflower seed ranges from
a) 30-40 g
b) 40-50 g
c) 50-60 g
d) 60-70 g

33. The weed index (WI) value for weed-free check treatment is
a) 0
b) 1
c) -1
d) ±1

34. Photosynthetically active radiation (PAR) is measured by
a) Thermosensor
b) Aldedometer
c) Quantum sensor
d) None of the above

35. The actual K content (%) of a fertilizer sample having 1% K_2O will be
a) 0.63
b) 0.73
c) 0.83
d) 0.93

36. The critical pH for availability of P to plants is
a) 5.7
b) 6.7
c) 7.7
d) 8.7

37. The general value of the proportionality factor C in Mitscherlich's equation is
a) 0.122
b) 0.314
c) 0.301
d) 0.601

38. If grains per earhead are 50, test weight 40 g and wheat yield is 50 q/ha, the number of ear-bearing tillers (EBT) per m^2 will be
a) 200
b) 225
c) 250
d) 275

39. Continuous zero-tillage in the crop field encourage the preponderance of
a) Annual weeds
b) Biennial weeds
c) Perennial weeds
d) Parasitic weeds

40. The planting value (%) of a seed lot having purity 90% and germination 80% will be
a) 52
b) 62
c) 72
d) 82

41. The queen of cereal is
a) Rice
b) Wheat
c) Maize
d) Pearlmillet

42. Udbatta disease is associated with which of the following crops?
a) Sorghum
b) Pearlmillet
c) Rice
d) Cotton

43. Acid soils, as per USDA, are those which, in 1:1 soil water suspension, have pH less than
a) 5.5
b) 6.0
c) 6.5
d) 7.0

44. The unit for crop growth rate (CGR) is
a) g/m^2 (leaf area) / day
b) g/g/day
c) g/m^2 (land area) / day
d) g/day

45. The error degrees of freedom of an experiment undertaken in a randomized block design with 12 treatments and 3 replications will be
a) 20
b) 22
c) 24
d) 26

46. Statistical transformation of data is advised before analysis of variance to make data follow which distribution
a) Normal
b) Binomial
c) Chi-square
d) Poisson

47. The amount of solar radiation continuously emitted by sun is
a) 2.0 $cal/cm^2/min$
b) 2.0 cal/min
c) 1.94 $cal/cm^2/min$
d) 1.94 cal/min

48. The resistance of *Phalaris minor* to isoproturon is due to
a) Target-site alteration
b) Sequestration & compartmentation
c) Enhanced degradation
d) All of the above

49. The equivalent acidity of $(NH_4)_2 SO_4$ fertilizer is
a) 100
b) 110
c) 115
d) 118

50. An annual sedge found in rice is
a) *Cyperus rotundus*
b) *Cyperus esenlentus*
c) *Cyperus iria*
d) *Cyperus bulbosus*

51. The pH of 0.1N NaOH solution would theoretically be
a) 14
b) 13
c) 12
d) 11

52. Irrigation water is not suitable for irrigation if it contains boron (ppm) greater than
a) 1.00
b) 1.25
c) 1.50
d) 2.50

53. Stomp (Pendimethalin 30 EC) required for 3 ha of field at 0.75 kg pendimethalin/ha is
a) 2.25 kg
b) 7.0 kg
c) 7.5 kg
d) 9.0 kg

54. The base temperature of rice for calculating GDD is
a) 4.5^oC
b) 5^oC
c) 8^oC
d) 10^oC

55. A film-forming anti-transpirant used in dryland agriculture is
a) Kaolin
b) Atrazine
c) Mobileaf
d) PMA

56. A narrow-leaf dicotyledonous weed is
a) *Sphenoclea zeylanica*
b) *Spergula arvensis*
c) *Conyza canadiensis*
d) *Asphodelus tennifolins*

57. The microorganism, constituting the largest share in the total microbial population in soil is
a) Nematodes
b) Fungi
c) Bacteria
d) Actinomycetes

58. A broad-leaved monocot weed is
a) *Stellaria indica*
b) *Heliotropium indicum*
c) *Melilotus indica*
d) *Eichhornia crassipes*

59. Economic optimum dose of a nutrient is calculated if the yield response is
a) Quadratic
b) Exponential
c) Linear
d) None of the above

60. One Baule unit of P (lb P_2O_5/acre) corresponds to
a) 55
b) 50
c) 45
d) 40

61. The value of 'K' (lb/acre) used in the Wilcox's 'Inverse-yield N' law is
a) 218
b) 318
c) 418
d) 518

62. An irrigation water with EC 1.0 ds/m would have total soluble salt concentration (mg/litre or ppm)
a) 32
b) 64
c) 320
d) 640

63. The indicator plant for B deficiency in soil is
a) Soybean
b) Rice
c) Mustard
d) Sunflower

64. What kind of parasitic weed, the Orobanche is?
a) Holo-root
b) Hemi-root
c) Holo-stem
d) Hemi-stem

65. The 'Akiochi' disease of rice is due to
a) B deficiency
b) Al toxicity
c) Fe toxicity
d) H_2S poisoning

66. The diameter (in mm) of the soil particles which are carried away due to saltation mode of soil erosion is
a) 0.02 - 0.2
b) 0.01 - 0.1
c) 0.1 - 0.5
d) 0.5 - 1.0

67. A highly beneficial and essential element for rice along with other macro- and micro-nutrients is
a) Co
b) V
c) Ni
d) Si

68. Agronomic efficiency is expressed as
a) kg/kg
b) kg/ha
c) kg/ha/day
d) kg/day

69. One Angstrom is a unit of length equal to
a) 10^{-2} cm
b) 10^{-4} cm
c) 10^{-8} cm
d) 10^{-10} cm

70. Pendimethalin belongs to which group of herbicide?
a) 2,4-dinitrophenols
b) 2,6-dinitroanilines
c) Nitrophenyl ethers
d) Phenylureas

71. *Chenopodium album* is a pollution indicator plant for
a) H_2S
b) SO_2
c) Both H_2S and SO_2
d) None of the above

72. If the field capacity is 18% and permanent wilting point is 6%. The 50% of the available soil moisture will be
a) 6%
b) 8%
c) 10%
d) 12%

73. If a crop is to be irrigated at 0.6 IW/CPE ratio with 6 cm depth, it should be irrigated after
a) 10 mm CPE
b) 60 mm CPE
c) 100 mm CPE
d) 600 mm CPE

74. Darcy's law is valid for
a) Only saturated flow
b) Only unsaturated flow
c) Both saturated and unsaturated flow
d) None of the above

75. The Dapog method of raising rice nursery was introduced in India from
a) Myanmar
b) Japan
c) China
d) Philippines

76. Which part of the leaf is present in wheat but not in the grassy weeds such as *Phalaris minor*, wild oats?
a) Auricle
b) Ligule
c) Both auricle and ligule
d) None of the above

77. An imaginary line drawn on a map connecting the points of equal rainfall is called
a) Isotherm
b) Isobath
c) Isohyet
d) Isobar

78. Which of the following is called "Green Gold"?
a) Green gram
b) Sisal
c) Bamboo
d) None of the above

79. Drought avoidance mechanism in found in
a) Barley
b) Pearlmillet
c) Sorghum
d) Maize

80. Seed viability can be tested by using the solution of
a) Tetrazolium chloride
b) Hydrochloride
c) Potassium chloride
d) Tetrazolium nitrate

81. The most common growth limiting factor in acid soil is
a) Sodium
b) Calcium
c) Aluminium
d) Potassium

82. Sesamum belongs to the family
a) Papilionaceae
b) Pedaliaceae
c) Crucifere
d) Chinipodeacea

83. Growing degree day concept is useful in forecasting of
a) Rainfall
b) Drought
c) Crop harvest dates
d) Frost

84. Well decomposed compost have C:N ratio of
a) 10-15:1
b) 20-25:1
c) 30-35:1
d) 40-45:1

85. Rotational intensity of maize-barley-late potato-mungbean (first year) and rice-potato-wheat-black gram (second year) calculated as
a) 800%
b) 600%
c) 400%
d) 200%

86. Crop logging has been most widely used for nutrient management in
a) Cotton
b) Rice
c) Sugarcane
d) Alfalfa

87. Browning of curd of cauliflower is due to the deficiency of
a) Iron
b) Manganese
c) Boron
d) Copper

88. CAM system is prevalent in
a) Arid legumes
b) Cactus
c) Pearlmillet
d) Sorghum

89. The optimum temperature for wheat at flowering is
a) 15^oC
b) 20^oC
c) 25^oC
d) 30^oC

90. Recommended herbicide for weed control in chickpea is
a) Fluchloralin
b) Butachlor
c) Isoproturon
d) 2,4-D

91. An inter-cropping can be beneficial if it has LER
a) =1.0
b) <1.0
c) >1.0
d) Zero

92. Pungency in mustard oil is due to
a) Glucoside
b) Glucosinolates
c) Prussic acid
d) Glucosinic acid

93. In general, irrigation is given to a crop when the available soil moisture in root zone is depleted by
a) 1-10%
b) 10-25%
c) 50-75%
d) 80-90%

94. Contour bunds are effective when slope of the land is
a) Upto 6%
b) Upto 16%
c) Upto 20%
d) Upto 50%

95. Rock phosphates are generally used in soils which are
a) Strongly acidic
b) Strongly alkaline
c) Neutral soils
d) Saline soils

96. Growing of annual crops in between the perennial crop is
a) Relay cropping
b) Inter-cropping
c) Alley cropping
d) Multiple cropping

97. Percent calcium content in single superphosphate is
a) 12
b) 16
c) 20
d) 24

98. *Eruca sativa* is a
a) Pulse crop
b) Tuber crop
c) Oilseed
d) Vegetable

99. White tip of maize is caused due the deficiency of
a) Cu
b) Mo
c) Zn
d) Fe

100. The biological control of *Parthenium* using a Mexican beetle
a) *Zygogramma bicolorata*
b) *Epiblema strenuana*
c) *Agromyza lantanae*
d) *Thecla echion*

101. Which design is suitable when fertility gradient is in two directions?
a) R.B.D.
b) L.S.D.
c) Split-plot design
d) C.R.D.

102. What is the chemical formula of slaked lime?
a) $CaCO_3$
b) CaO
c) $CaMg(CO_3)_2$
d) $Ca(OH)_2$

103. Percent area treated with fertilizers in India is maximum in
a) Paddy
b) Wheat
c) Sugarcane
d) Cotton

104. Annual export of soymeal fetches foreign currency of about
a) `5000 crore
b) `6000 crore
c) `7000 crore
d) `8000 crore

105. Per hectare consumption of $N+P_2O_5+K_2O$ in India is about
a) 90 kg/ha
b) 102 kg/ha
c) 117 kg/ha
d) 147 kg/ha

106. The reflection of solar radiation reaching the earth surface back into the space is called
a) Lux
b) Albedo
c) Net radiation
d) Phototaxis

107. Which type of water is readily available to plants?
a) Gravitational water
b) Capillary water
c) Hydroscopic water
d) All of the above

108. The ratio between the irrigated area and the volume of water used is known as
a) Delta of water
b) Duty of water
c) Base of water
d) Water course

109. The sensitivity of tensiometer is only up to
a) 0.50 atm
b) 0.65 atm
c) 0.85 atm
d) 1.00 atm

110. Movement of P and K from soil to the root surface take place due to
a) Root interception
b) Diffusion
c) Mass flow
d) Osmosis

111. Which one of the following weeds is used as vegetable?
a) *Setaria glauca*
b) *Vicia hirsuta*
c) *Amaranthus edulis*
d) *Amaranthus viridis*

112. Biuret content of urea should more appropriately be
a) <0.5%
b) <1.0%
c) <2.0%
d) <3.0%

113. Which rice variety is suitable for direct seeding?
a) PRH-10
b) IR-64
c) Pusa Basmati 1121
d) Pusa Basmati 1

114. Which is a C_4 plant?
a) Rice
b) Wheat
c) Soybean
d) Maize

115. Nursery area required for one hectare rice transplanting is
a) 0.05 ha
b) 0.10 ha
c) 0.15 ha
d) 0.20 ha

116. MSP for wheat is
a) 1000 Rs/q
b) 1050 Rs/q
c) 1080 Rs/q
d) 1350 Rs/q

117. The observation that occurs with maximum frequency in a set of observation refers to
a) Mean
b) Median
c) Mode
d) Standard deviation

118. The onset of competition among crop plants can be delayed by adopting
a) Wider rows and wider intra row spacing
b) Wider rows and closer intra row spacing
c) Closer rows and wider intra row spacing
d) Closer rows and closer intra row spacing

119. The first mustard variety developed by somatic hybridization is
a) Pusa Bold
b) Pusa Jaikisan
c) Pusa Agrani
d) Pusa Kalyani

120. Biosuper is
a) Rock phosphate + S-oxidizing bacteria
b) Rock phosphate
c) Rock phosphate + S + Zn
d) Rock phosphate + S + *Thiobacillus*

121. The average rainfall of India is about
a) 1630 mm
b) 1450 mm
c) 1290 mm
d) 1120 mm

122. Which test is used for comparing two populations variance?
a) F-distribution
b) t-distribution
c) Normal distribution
d) Binomial distribution

123. Semi-arid climate has a moisture index of
a) -80 to -100
b) -40 to -80
c) -33.3 to -66.7
d) 0 to 20

124. Which one of the following indices is used to assess the inter-cropping systems?
a) Leaf area index
b) Land equivalent ratio
c) Land utilization index
d) Multiple cropping

125. Which of the following herbicides has the longest persistence?
a) Dinoseb
b) Chlorfenac
c) Glyphosate
d) 2,4-D

126. Which of the following methods is most widely used for estimation of PET?
a) Modified Penmann method
b) Thornthwaite formula
c) Penmann equation
d) Blaney Criddle method

127. Which degradation plays a major role in the persistence and behaviour of herbicides in soil?
a) Physical
b) Chemical
c) Microbial
d) Thermal

128. The optimum temperature for nitrification is
a) 10-20°C
b) 20-25°C
c) 25-30°C
d) 30-35°C

129. The triazine group of herbicides act by
a) Inhibiting root and shoot growth
b) Developing albino leaves
c) Disrupting membrane integrity
d) Inhibiting photosynthesis

130. In which region, Hopkins (1938) bioclimatic law is mainly applicable?
a) Temperate
b) Arid
c) Tropical
d) Semi-arid

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.
i) CO_2 a) Ozone layer depletion
ii) N_2O b) Acid rain
iii) O_2 c) Green house warming
iv) CH_4 d) Respiration
v) NH_3 e) Anaerobic decomposition of organic matter

132.
i) Father of tillage   a) Garber
ii) Father of modern agronomy   b) Jethro Tull
iii) Father of zero tillage   c) Masanubo Fukuoka
iv) Father of organic farming   d) Pietro de Crescenzi
v) Father of minimum tillage   e) E.H. Faulkner

133.
i) Cud weed   a) *Xanthium strumarium*
ii) Witch weed   b) *Cirsium arvense*
iii) Swine cress   c) *Guaphaleum luteo-album*
iv) Common cocklebur   d) *Striga asiatica*
v) Canada thistle   e) *Coronopus didymus*

134.
i) Mustard   a) Pusa Vishal
ii) Mungbean   b) Pusa Vijay
iii) Rice   c) WR 544
iv) Maize   d) PRH-10
v) Wheat   e) Rattan

135.
i) Green ear disease   a) Wheat
ii) Tikka disease   b) Rice
iii) Karnal Bunt   c) Sesame
iv) Bakane disease   d) Pearlmillet
v) Phyllody disease   e) Groundnut

136. Match the herbicide with their Trade name
i) Diuron   a) TOK E 25
ii) Glyphosate   b) Reglone
iii) Diquat   c) Goal
iv) Oxyfluorfen   d) Roundup
v) Nitrofen   e) Karmex

137.
i) Tobacco   a) Nipping
ii) Jute   b) Batoning
iii) Tea   c) Retting
iv) Sunflower   d) Firing
v) Chickpea   e) Curing

138. Match the elements essentiality established by
i) Nitrogen   a) J.S. McHargue
ii) Sulphur   b) E. Gris
iii) Iron   c) K. Warington
iv) Boron   d) Sachs Knop
v) Manganese   e) Theodore de Saussure

139. Match the crop with their disease
i) Sugarcane   a) Wilt
ii) Pearlmillet   b) Blast
iii) Chickpea   c) Loose smut
iv) Rice   d) Ergot
v) Wheat   e) Red rot

140. Match the scientists with their contribution
i) Israelsen and West   a) Field capacity
ii) Taylor *et al.*   b) Tensiometer
iii) Richards and Gardner   c) Ultimate wilting point
iv) Richards and Fireman   d) Permanent wilting point
v) Briggs and Shantz   e) Pressure plate apparatus

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. Explain briefly, how the critical period/period threshold of weed competition is a dynamic concept?

142. The nitrogen use-efficiency of rice crop hardly goes above 40% under low-land transplanted situation. How can this be improved?

143. Conservation agriculture holds enough promise for climate change mitigation and adaptation. Explain.

144. What is plant ideotype? Briefly explain their role in improving the productivity of rainfed areas.

145. Grain and straw samples of rice in a study contained 0.17% and 0.15% sulphur, respectively. If the grain yield was 5.7 tonnes/ha and straw yield 6.2 tonnes/ha, calculate the total sulphur removed in terms of kg/ha by the rice crop.

146. How agriculture is contributing to global warming?