Post Graduate School
Indian Agricultural Research Institute, New Delhi

Examination for Admission to Ph.D. Programme 2011-2012

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. Which of the following crops have been approved for commercial cultivation in India?
a) Bt cotton and Bt brinjal
b) Bt cotton and Golden Rice
c) Bt maize and Bt cotton
d) Bt cotton only

2. This year (2010-11) the expected food grain production in India is
a) 212 million tonnes
b) 220 million tonnes
c) 235 million tonnes
d) 250 million tonnes

3. The genome of which of the following crops is still not completely sequenced?
a) Rice
b) Soybean
c) Sorghum
d) Wheat

4. According to the Approach Paper to the 12th Five Year Plan, the basic objective of the 12th Plan is
a) Inclusive growth
b) Sustainable growth
c) Faster, more inclusive and sustainable growth
d) Inclusive and sustainable growth

5. To address the problems of sustainable and holistic development of rainfed areas, including appropriate farming and livelihood system approaches, the Government of India has set up the
a) National Rainfed Area Authority
b) National Watershed Development Project for Rainfed Areas
c) National Mission on Rainfed Areas
d) Command Area Development and Water Management Authority

6. Which of the following sub-schemes are not covered under the Rashtriya Krishi Vikas Yojana?
a) Extending the Green Revolution to eastern India
b) Development of 60,000 pulses and oilseeds villages in identified watersheds
c) National Mission on Saffron
d) National Mission on Bamboo

7. The minimum support price for the common variety of paddy announced by the Government of India for the year 2010-11 was
a) ₹ 1030
b) ₹ 1000
c) ₹ 980
d) ₹ 950

8. According to the Human Development Report 2010 of the United Nations, India's rank in terms of the human development index is
a) 119
b) 134
c) 169
d) 182

9. Which of the following does not apply to SRI method of paddy cultivation?
a) Reduced water application
b) Reduced plant density
c) Increased application of chemical fertilizers
d) Reduced age of seedlings

10. Which organic acid, often used as a preservative, occurs naturally in cranberries, prunes, cinnamon and cloves?
a) Citric acid
b) Benzoic acid
c) Tartaric acid
d) Lactic acid

11. Cotton belongs to the family
a) Cruciferae
b) Anacardiaceae
c) Malvaceae
d) Solanaceae

12. Photoperiodism is
a) Bending of shoot towards source of light
b) Effect of light/dark durations on physiological processes
c) Movement of chloroplast in cell in response to light
d) Effect of light on chlorophyll synthesis

13. Ergot disease is caused by which pathogen on which host?
a) *Claviceps purpurea* on rye
b) *Puccinia recondita* on wheat
c) *Drechlera sorokiniana* on wheat
d) *Albugo candida* on mustard

14. Rocks are the chief sources of parent materials over which soils are developed. Granite, an important rock, is classified as
a) Igneous rock
b) Metamorphic rock
c) Sedimentary rock
d) Hybrid rock

15. Which one of the following is a *Kharif* crop?
a) Pearl millet
b) Lentil
c) Mustard
d) Wheat

16. The coefficient of variation (C.V.) is calculated by the formula
a) (Mean/S.D.) × 100
b) (S.D./Mean) × 100
c) S.D./Mean
d) Mean/S.D.

17. Which of the following is commonly referred to as muriate of potash?
a) Potassium nitrate
b) Potassium chloride
c) Potassium sulphate
d) Potassium silicate

18. Inbred lines that have same genetic constitution but differ only at one locus are called
a) Multi lines
b) Monohybrid
c) Isogenic lines
d) Pure lines

19. For applying 100 kg of nitrogen, how much urea would one use?
a) 45 kg
b) 111 kg
c) 222 kg
d) 333 kg

20. The devastating impact of plant disease on human suffering and survival was first realized by epidemic of
a) Brown spot of rice in Bengal
b) Late blight of potato in USA
c) Late blight of potato in Europe
d) Rust of wheat in India

21. The species of rice (*Oryza*) other than *O. sativa* that is cultivated is
a) *O. rufipugon*
b) *O. longisteminata*
c) *O. glaberrima*
d) *O. nivara*

22. The enzyme responsible for the fixation of CO_2 in mesophyll cells of C-4 plants is
a) Malic enzyme
b) Phosphoenol pyruvate carboxylase
c) Phosphoenol pyruvate carboxykinase
d) RuBP carboxylase

23. Which one of the following is a 'Vertisol'?
a) Black cotton soil
b) Red sandy loam soil
c) Sandy loam sodic soil
d) Submontane (Tarai) soil

24. What is the most visible physical characteristic of cells in metaphase?
a) Elongated chromosomes
b) Nucleus visible but chromosomes not
c) Fragile double stranded loose chromosomes
d) Condensed paired chromosomes on the cell plate

25. All weather phenomena like rain, fog and mist occur in
a) Troposphere
b) Mesosphere
c) Ionosphere
d) Ozonosphere

26. Which of the following elements is common to all proteins and nucleic acids?
a) Sulphur
b) Magnesium
c) Nitrogen
d) Phosphorous

27. Silt has intermediate characteristics between
a) Sand and loam
b) Clay and loam
c) Loam and gravel
d) Sand and clay

28. Certified seed is produced from
a) Nucleus seed
b) Breeder seed
c) Foundation seed
d) Truthful seed

29. Seedless banana is an
a) Autotriploid
b) Autotetraploid
c) Allotriploid
d) Allotetraploid

30. Which one of the following is used to test the goodness-of-fit of a distribution?
a) Normal test
b) t-test
c) Chi-square test
d) F-test

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. The ratio of the visible light reflected to the amount of incident upon is termed as
a) Reflection
b) Refraction
c) Albedo
d) Scattering

32. The inverse nitrogen yield concept was given by
a) Mitscherlich
b) Gregory
c) Radford
d) Wilcox

33. A strain resulting from exposure to a particular environment is termed as
a) Ecotype
b) Ideotype
c) Ecophone
d) Ecotone

34. Which of the following tillage operations is particularly beneficial under dry farming situations?
a) Planking
b) Harrowing
c) Dust mulching
d) Zero tillage

35. The practice of cross ploughing the young crop of rice to reduce weeds and vegetative growth of crop is called
a) Puddling
b) Beushening
c) Khelua
d) Taungya

36. Which of the following sub-specie of *Zea mays* is used as a popular snack food?
a) *indurata*
b) *averta*
c) *ceretina*
d) *amylacea*

37. What percent of total fatty acid as erucic acid does canola have?
a) <0.15%
b) <1.00%
c) <2.00%
d) <22 µmol

38. The staple length for long category of cotton is
a) 20.5 – 24.4 mm
b) 25.0 – 27.0 mm
c) 27.5 – 32.0 mm
d) 32.5 mm and above

39. To which family does cumin belong?
a) Compositae
b) Tiliaceae
c) Umbelliferae
d) Cruciferae

40. The concentration of HPO_4^{2-} and $H_2PO_4^-$ ions in solution is equal at a pH of
a) 5.6
b) 6.5
c) 7.2
d) 8.2

41. Which form of ion uptake requires energy?
a) Active transport
b) Passive transport
c) Diffusion
d) Mass flow

42. If two solutions having pH value of 5.0 and 6.0 are mixed in equal quantities, what shall be the pH of resultant mixture?
a) >5.5
b) 5.5
c) <5.5
d) Unpredictable

43. Which of the following diseases of cole crops is directly associated with lower pH of soils?
a) Clubroot
b) Damping off
c) Mildew
d) Wilt

44. Which of the following soils will have normal physical condition even at higher ESP (>15%)?
a) Saline
b) Sodic
c) Acid
d) Saline-sodic

45. In the process of nitrogen mineralization, the first step is called
a) Immobilisation
b) Ammonification
c) Aminization
d) Nitrification

46. Percent sulphur content in ammonium sulphate is
a) 12
b) 16
c) 24
d) 30

47. Whose deficiency weakens plasmalemma and loss of cell contents?
a) S
b) P
c) K
d) Ca

48. Which of the following is not a chelate compound?
a) EDTA
b) CDMA
c) DTPA
d) EDDHA

49. The crop highly sensitive to Mo deficiency
a) Cauliflower
b) Tomato
c) Carrot
d) Wheat

50. Which species of *Rhizobium* is suitable for fenugreek?
a) *meliloti*
b) *leguminosarum*
c) *phaseoli*
d) *trifoli*

51. Which micronutrient is usually deficient in calcareous soils?
a) Mn
b) Mo
c) Cu
d) B

52. An ultra low volume sprayer producing mist will have droplet size of
a) Upto 50 micron
b) 50-100 micron
c) 101-200 micron
d) 201-400 micron

53. As per Beer-Lambert's law, the relationship between optical density (OD) and transmittance (%T) of a coloured solution is given by
a) OD = log T
b) OD = log 2.0 - T
c) OD = 2.0 – log T
d) OD = log T - 2.0

54. If dry weight of weeds from weedy check, hand weeded plots and Metsulfuron treated plots were 400 kg, 4 kg and 100 kg/ha, respectively. The weed control efficiency of Metsulfuron will be
a) 60%
b) 75%
c) 85%
d) 90%

55. Water potential of pure water is
a) Zero
b) 1 bar
c) 100 bar
d) 10^6 bar

56. If bulk density and particle density of a soil is 1.5 and 3.0 g/cc, what will be its percent porosity?
a) 30
b) 40
c) 50
d) 60

57. In universal soil loss equation, what does K refer to?
a) Cropping management factor
b) Slope gradient factor
c) Soil erodibility factor
d) Rainfall factor

58. Electrical conductivity equivalent to 1 dS/m means a solution of soluble salts with concentration
a) 36 mg/l
b) 640 mg/l
c) 1 ppm/l
d) 1 Mol/l

59. Which fertilizer has lowest equivalent acidity?
a) Ammonium chloride
b) Ammonium sulphate
c) Ammonium sulphate-nitrate
d) Ammonium nitrate

60. The ratio between the water stored in root zone to the water delivered at the field is technically called
a) Water distribution efficiency
b) Water conveyance efficiency
c) Water application efficiency
d) Field irrigation efficiency

61. In which experimental design, there are three errors?
a) RBD
b) Split plot
c) Strip plot
d) None of the above

62. In the analysis of variance, the error degree of freedom must be at least
a) 6
b) 12
c) 20
d) 24

63. In which design, interaction of two factor has more precision than main effects?
a) RBD
b) Split plot
c) Strip plot
d) Latin square

64. Which of the following is not a commonly used technique for controlling experimental error?
a) Duncan's multiple range test
b) Blocking
c) Proper plot technique
d) Data analysis

65. Which of the following element is the part of urease enzyme?
a) Al
b) Co
c) Ni
d) Si

66. Availability of which of the following plant nutrients does not increase with decrease in soil pH?
a) Cu
b) Fe
c) Zn
d) Mo

67. Which of the following is Na liking crop?
a) Chickpea
b) Maize
c) Soybean
d) Sugarbeet

68. Bacteria *Thiobacillus thiooxidans* is involved in
a) Reduction of nitrogen to ammonia
b) Phosphorus solubilization
c) Oxidation of S in soil
d) Conversion of urea to ammonia

69. In cotton, Zn deficiency is known as
a) White bud
b) Little leaf
c) Mottle leaf
d) Fern leaf

70. Which is probably the most important growth limiting factor in acid soil with pH below 5.5?
a) P deficiency
b) Al toxicity
c) Fe toxicity
d) B deficiency

71. Consumptive use of water per kg of rice production approximately ranges between
a) 1000-2000 litres
b) 1500-3000 litres
c) 3000-5000 litres
d) 5000-7000 litres

72. How much time a water flow of 10 litre/second will take to apply irrigation of 60 mm over an area of one hectare?
a) 900 minutes
b) 1000 minutes
c) 1150 minutes
d) 1200 minutes

73. Brown manuring is generally recommended in which crop?
a) Wheat
b) Mustard
c) Rice
d) Potato

74. Which of the following crops has the highest percentage of irrigated area?
a) Rice
b) Cotton
c) Wheat
d) Sugarcane

75. Which of the following states/UTs has the highest use of NPK per hectare cropped area?
a) Punjab
b) Haryana
c) Pondicherry
d) Chandigarh

76. What will be ginning percentage of cotton variety producing seed cotton 30 quintal and cotton seed 20 quintal/hectare area?
a) 30.0%
b) 33.3%
c) 66.6%
d) 67.0%

77. The half life of ^{32}P is
a) 13.8 days
b) 14.3 days
c) 14.8 days
d) 27.6 days

78. Tensiometer can effectively measure the soil moisture content upto
a) 0.33 atm
b) 0.85 atm
c) 1.5 atm
d) 5.0 atm

79. The molarity of concentrated H_2SO_4 (AR grade) is
a) 10 M
b) 12 M
c) 16 M
d) 18 M

80. Most suitable crop for relay cropping in fallow rice in central and eastern part of India is
a) Linseed
b) Wheat
c) Pea
d) Barley

81. Negative nutrient balance per annum in Indian soil is approximately
a) 4.0 million tonnes
b) 10.0 million tonnes
c) 13.0 million tonnes
d) 15.0 million tonnes

82. *Phalaris minor* has developed resistance against which herbicide?
a) 2,4-D
b) Isoproturon
c) Sulfosulfuron
d) Oxadiazon

83. Activities of which hormone increases with moisture stress?
a) Gibberellic acid
b) Indoleacetic acid
c) Absciscic acid
d) Cytokinin

84. Which of the following diseases can be controlled by lowering the soil pH?
a) Scab of potato
b) Wilt of chickpea
c) Root rot of barley
d) Stalk rot in corn

85. The average annual rainfall of India
a) 900 mm
b) 1000 mm
c) 1100 mm
d) 1200 mm

86. Which of the following nutrients is involved in sugar and starch formation, lipid metabolism and N fixation?
a) Nitrogen
b) Phosphorus
c) Potassium
d) Sulphur

87. 'JS 335' is an high yielding variety of
a) Soybean
b) Sorghum
c) Sunflower
d) Safflower

88. Hydrocyanic acid in sorghum is synthesized in
a) Leaves
b) Stem
c) Root
d) Flower premordia

89. Van Bemmel factor for computing soil organic matter from soil organic carbon is
a) 6.250
b) 2.292
c) 1.724
d) 0.895

90. *Carthamus tinctorius* is a
a) Fodder crop
b) Tuber crop
c) Oilseed
d) Vegetable

91. Which of the following nutrients is responsible for pollen viability in wheat?
a) Zinc
b) Boron
c) Fe
d) Mn

92. P & K ions mainly move from soil to root of crops by
a) Root interception
b) Mass flow
c) Diffusion
d) Osmosis

93. To compare the two sample means we use
a) χ^2 test
b) F-test
c) t-test
d) Z-test

94. The nutrient elements which are constituent of nitrogenase enzyme
a) Fe + Co
b) Fe + Mo
c) Fe + Mn
d) Fe + Mg

95. In total N determination of a soil sample by Kjeldahl method, salicylic acid is added before digestion to include
a) NH_4-N
b) NO_3-N
c) Amide-N
d) Protein-N

96. The optimum stage of rice seedling for transplanting under irrigated condition during *Kharif* season is
a) Two leaf stage
b) Four leaf stage
c) Six leaf stage
d) Eight leaf stage

97. Which group of microorganisms is most active at the terminal stage of composting?
a) Actinomycetes
b) Bacteria
c) Fungi
d) Protozoa

98. Which one of the following is not a component of the moisture potential in soil?
a) Turgor potential
b) Osmotic potential
c) Gravity potential
d) Matric potential

99. The important soil organism responsible for the conversion of NH_4^+ to NO_2^- is
a) *Nitrosomonas*
b) *Nitrobacter*
c) *Azotobacter*
d) *Azospirillum*

100. Which of the following exhibit increase in concentration with advancement in crop age?
a) Fe
b) Mn
c) Zn
d) Cu

101. Highest of hydraulic conductivity is recorded in
a) Clay loam soil
b) Loam soil
c) Silty clay loam soil
d) Sandy loam soil

102. Soil-moisture characteristic curve depicts relationship between
a) Soil moisture and tension
b) Soil temperature and moisture
c) Soil moisture and bulk density
d) Soil texture and moisture

103. Norman E. Borlaug got Nobel Prize in the field of
a) Agriculture
b) Medicine
c) Peace
d) Economics

104. Akiochi disease in paddy is caused by
a) Reduction of sulphate to sulphide
b) Oxidation of S to SO_4
c) Transformation of H_2S into SO_2
d) Transformation of SO_2 into SO_4

105. Proteins content of milled rice is about
a) 4-5%
b) 6-7%
c) 9-10%
d) 12-13%

106. Study of agronomy dealing with the relationship of yield to the quantity of an added/available fertilizer element is called
a) Soil fertility
b) Agrobiology
c) Agrostology
d) Agrology

107. In how many classes did Krishnan and Singh (1972) divided the climate on the basis of moisture deficit index?
a) 10
b) 8
c) 6
d) 4

108. The process of K fixation in the soil is
a) Chemical
b) Mechanical
c) Biological
d) Both chemical and biological

109. Which of the following is an essential nutrient for higher plants?
a) Co
b) Si
c) Na
d) Ni

110. In India, the annual production of chillies is of the order of
a) 0.2 million tonnes
b) 1.2 million tonnes
c) 2.4 million tonnes
d) 3.6 million tonnes

111. The average efficiency of irrigation projects in India is
a) 25-30%
b) 40-50%
c) 50-60%
d) 80% and above

112. Who is known as father of agricultural chemistry?
a) Jethro Tull
b) Justus Von Liebig
c) J.H. Gilbert
d) J.B. Lawes

113. In which crop, response to Si application has been established widely?
a) Onion
b) Rice
c) Potato
d) Chickpea

114. Application of 2-4 D causes malformation in which variety of wheat?
a) HD 2009
b) HD 2285
c) HD 2687
d) WH 542

115. Maize grain is mainly used for
a) Poultry feed
b) Cattle feed
c) Food for human consumption
d) Starch making

116. In V-notch, which notation is used for measuring the water flow?
a) $q=0.0138\ H^{2.5}$
b) $q=0.0148\ H^{2.5}$
c) $q=0.0184\ H^{2.5}$
d) $q=0.0184\ LH^{2.5}$

117. What is the chemical formula of thiourea?
a) $NH_2\text{-}CS\text{-}NH_2$
b) $NH_2\text{-}CH_2\text{-}CS\text{-}NH_2$
c) $NH_2\text{-}CO\text{-}NH\text{-}CO\text{-}NH_2$
d) $NH_2\text{-}CH_2\text{-}CS\text{-}CH_3$

118. STP techniques of planting is used in
a) Sweet potato
b) Potato
c) Sugarcane
d) Jute

119. Legume crop which responds to N application as much as cereal crops
a) Fieldpea
b) Guar
c) Frenchbean
d) Cowpea

120. The first micronutrient reported deficient in Indian soil is
a) Zn
b) Mn
c) Fe
d) Mo

121. One micron is equal to
a) 10^{-5} m
b) 10^{-6} m
c) 10^{-9} m
d) 10^{-12} m

122. At the end point of titration for determination of organic carbon, colour changes from
a) Blue to red
b) Red to green
c) Green to blue
d) Blue to green

123. Which of the following weed is used as vegetable (Sag)?
a) *Chenopodium murale*
b) *Convolvulus arvensis*
c) *Avena sativa*
d) *Chenopodium album*

124. The value located in the middle of a series when observations are arranged in order of magnitude
a) Mean
b) Mode
c) Median
d) Standard deviation

125. *Boehmenia nivea* is botanical name of
a) Mesta
b) Indigo
c) Ramie
d) Buckwheat

126. Pigeonpea is categorized as
a) Self pollinated
b) Cross pollinated
c) Often self pollinated
d) Often cross pollinated

127. Optimum seed rate of sugarbeet (*Beeta vulgaris* L.) is
a) 8-10 kg/ha
b) 18-20 kg/ha
c) 28-30 kg/ha
d) 38-40 kg/ha

128. The empirical formula to compute PET, $e=1.6\ (10\ t/I)^a$ was proposed by
a) Penman (1948)
b) Thornthwait (1948)
c) Doorenbos and Pruitt (1975)
d) Christiansen (1968)

129. If L_1 and L_2 are leaf area and W_1 and W_2 are dry weight of leaves at time t_1 and t_2, respectively, then $[(W_2-W_1)\ (\log L_2-\log L_1)]\ /\ [(t_2-t_1)\ (L_2-L_1)]$ is
a) RGR
b) NAR
c) LAR
d) CGR

130. As per land capability classification, the classes of soils suitable for cultivation of crops are
a) Classes I-IV
b) Classes V-VI
c) Classes VII-VIII
d) All of the above

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.

Item	Increment in production since 1950-51
i) Egg	a) 4.5 times
ii) Fish	b) 6 times
iii) Foodgrain	c) 9 times
iv) Milk	d) 27 times
v) Oilseeds	e) 55 times

132.

Seed	Oil content (%)
i) Sesame	a) 18
ii) Niger	b) 36
iii) Castor	c) 30
iv) Soybean	d) 40
v) Safflower	e) 50

133.

i) Karl Fisher reagent	a) P determination
ii) EBT indicator	b) Available N estimation
iii) Ascorbic acid	c) Available Mo estimation
iv) Alkaline permanganate	d) Moisture determination in urea
v) Grigg's reagent	e) Ca estimation

134.

i) Cu	a) Greyspek
ii) Al	b) Alkanity
iii) Fe	c) Bronzing
iv) Na	d) Tea
v) Mn	e) Dieback

135.

i) Steel industry	a) Carnallite
ii) K	b) Fisher 1921
iii) Mg	c) Kieserite
iv) B	d) Solubor
v) RGR	e) Basic slag

136.

i) Quack grass	a) *Solanum nigrum*
ii) Black night shade	b) *Convolvulus arvensis*
iii) Field bind weed	c) *Cirsium arvensis*
iv) Canada thistle	d) *Amaranthus viridis*
v) Slender pig weed	e) *Agropyron repens*

137.

i) Phyllody	a) Suggary disease
ii) Ergot	b) Rice
iii) Head rot	c) Sesame
iv) Brown plant hopper	d) Sugarcane
v) Pyrilla	e) Sunflower

138. Match the following researchers with their contributions

i) Livingstone and Shreve (1921)	a) Quantitative agrobiology
ii) Wilcox (1937)	b) Theory of physiological limits
iii) Rubel (1935)	c) Theory of optima and limiting factor
iv) Shelford (1913)	d) Theory of factor replaceability
v) Blackman (1905)	e) General law of tolerance

139. Match the following compounds with their usages

i) Activated charcoal	a) Herbicide antidote
ii) NA	b) Dormancy
iii) Maleic hydrazide	c) Adsorbent
iv) Activator	d) Wetting agent
v) Teepol	e) Randox-T

140.

i) Sunflower	a) Man made cereal
ii) Buckwheat	b) Long day plant
iii) Triticale	c) Day neutral plant
iv) Ricebean	d) Pseudo-cereal
v) Barley	e) Epigeal germination

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. A soil analysis revealed that the saturation extract contained 20 meq Ca^{+2}/l, 12 meq Mg^{+2}/l and 100 meq Na^{+}/l. The EC_{se} = 2.2 dS/m, soil pH 8.6 and CEC=20 meq/100 g, identify the type of soil.

142. Gross command area of an irrigation canal is 60,000 ha, cultivable irrigated area is 60%. Intensity of irrigation is 30 and 50 percent for *Kharif* and *Rabi*, respectively. What is the discharge required at the head of canal, if the duty at its head is 600 and 1000 ha $cumec^{-1}$ for *Kharif* and *Rabi*, respectively?

143. Why urea is the best source of N for crops in general?

144. What are the problems associated with upland direct seeded rice cultivation?

145. What is factor productivity? Briefly explain, why there has been decline in it?

146. How agriculture is contributing to the phenomenon of climate change? Briefly suggest mitigation strategies to contain it.