Post Graduate School
Indian Agricultural Research Institute, New Delhi

Examination for Admission to Ph.D. Programme 2013-2014

Discipline : Horticulture (*Vegetable Science*)

Discipline Code : 13, *Sub code : 03* 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. The type of germination in garden pea is
a) Epigeal
b) Hypogeal
c) Hypo-epigeal
d) Epi-hypogeal

32. The heat tolerant variety of potato is
a) Kufri Sindhuri
b) Kufri Badshah
c) Kufri Sutlej
d) Kufri Surya

33. The two gene pair heterozygous hybrids will produce double recessive homozygous in a perfect population size of sixteen
a) Once
b) Twice
c) Thrice
d) Quadruple

34. The gene(s) reported for powdery mildew resistance in pea
a) One recessive
b) One dominant
c) Two dominant
d) Two recessive

35. The probable progenitor of cauliflower is
a) *Brassica rupestris*
b) *Brassica cretica*
c) *Brassica montana*
d) *Brassica insularis*

36. The formula used for determining compactness in cabbage and cauliflower is
a) $Z = C/W\times100$
b) $Z = C/W^2\times100$
c) $Z = C/W^3\times100$
d) $Z = C^3/W\times100$

37. Homeostasis operates in the resistance mechanism known as
a) Active resistance
b) Field resistance
c) Horizontal resistance
d) Vertical resistance

38. The wild species of potato carrying resistance to all the pathotypes of potato cyst nematode
a) *Solanum acaule*
b) *Solanum leptophyes*
c) *Solanum spegazzinii*
d) *Solanum vernei*

39. Napiform roots are found in
a) Onion
b) Sweet potato
c) Garden beet
d) Mint

40. The low water requiring vegetables are
a) Ridge gourd, brinjal, winged bean, pumpkin
b) Watermelon, cluster bean, garden pea, wax gourd
c) Rutabaga, brinjal, muskmelon, winged bean
d) Watermelon, muskmelon, cluster bean, wax gourd

41. The maximum moisture for safe sealed storage of allium seeds is
a) 5.5%
b) 6.5%
c) 7.5%
d) 8.0%

42. The appropriate time for application of fertilizers in most fruit crops is
a) February - March
b) May - June
c) August - September
d) November - December

43. The genetic constitution of haploid set of *Brassica oleracea* is
a) AABBCCDEF
b) AABCDDEFF
c) ABCDDEFF
d) ABBCCDEEF

44. Which of the following vegetable crops is most tolerant to saline soil?
a) Sweet pepper
b) Radish
c) Palak
d) Snake gourd

45. During fruit ripening, usually organic acids decline with the exception in
a) Guava
b) Tomato
c) Banana
d) Mango

46. Which of the following annuals is cultivated mainly for its dry flowers?
a) Lobelia
b) Marigold
c) Statice
d) Corn flower

47. The shrub of which flowers change colour during different times of the day
a) *Caesalpinia pulcherrima*
b) *Hibiscus mutabilis*
c) *Brunfelsia americana*
d) *Bougainvillea spectabilis*

48. The basic chromosome number of *Amaranthus* are
a) x = 14 and 15
b) x = 15 and 16
c) x = 16 and 17
d) x = 17 and 18

49. Mass selection is a form of
a) Family selection
b) Within family selection
c) Progeny selection
d) Combined selection

50. Which of the following tomato varieties is not a direct introduction in India?
a) Marglobe
b) Sioux
c) Roma
d) Sweet-72

51. Sengi (*Melilotus alba*) is a objectionable weed for which of the following vegetable seed crop?
a) Spinach
b) Beet leaf
c) Fenugreek
d) Lettuce

52. Approximate number of seeds per gram in cucumber is
a) 10-12
b) 30-35
c) 50-60
d) 90-95

53. Which of the following freshly harvested seeds has dormancy?
a) Cabbage
b) Onion
c) Okra
d) Cucumber

54. Which fungicide is most effective for controlling powdery mildew in pea crop?
a) Captan
b) Mancozeb
c) Karathane
d) Thiram

55. L.S.D. is suitable for comparing which of the following?
a) 3 treatments
b) 2 to 4 treatments
c) 5 to 12 treatments
d) 15 treatments

56. Hisar Unnat is a variety of which of the following vegetables?
a) Tomato
b) Chilli
c) Okra
d) Cowpea

57. How many number of tomato plants can be adjusted in 1000 m^2 greenhouse area for maximum yield and optimum crop management?
a) 1000-1200
b) 2400-2600
c) 3800-4000
d) 6000-8000

58. Which of the following is the optimum thickness of the plastic used for mulching purposes in vegetables?
a) 180-200 micron
b) 100-120 micron
c) 80-100 micron
d) 20-25 micron

59. The photoperiodic response of spinach is
a) Short day
b) Long day
c) Day neutral
d) Intermediate type

60. Bud necrosis of watermelon is a viral disease, which is transmitted by
a) Aphids
b) Thrips
c) Whitefly
d) Jassids

61. The fruit in amaranth is known as
a) Regma
b) Samra
c) Cypsella
d) Utricle

62. Which of the following vegetables is cross pollinated due to Protandry condition?
a) Leek
b) Cabbage
c) Radish
d) Turnip

63. Which of the following variety of lettuce is most acceptable for fast food centres?
a) Great Lakes
b) Chinese Yellow
c) Slow Bolt
d) Iceberg

64. How much quantity of seed will be required for planting one hectare of tomato, if the spacing is 60×45 cm and one gram of tomato seed contains approximately 300 seeds?
a) 400 gram
b) 300 gram
c) 250 gram
d) 150 gram

65. For increasing fruit set in tomato crop, a farmer wants to spray N.A.A. @100 ppm at flowering stage in one hectare area. How much N.A.A. will be required if 500 litre of water is sufficient for spraying the above crop?
a) 5 gram
b) 25 gram
c) 50 gram
d) 100 gram

66. In 1000 m^2 greenhouse, the total tomato yield was 21.0 tons and the water productivity was 70.0 kg/cubic meter of water. Which of the following was the total quantity of water applied in the greenhouse tomato crop for getting above production?
a) 30 m^3
b) 300 m^3
c) 3000 m^3
d) 30000 m^3

67. Which of the following cucurbit has pinnatified leaves?
a) Cucumber
b) Watermelon
c) Muskmelon
d) Pumpkin

68. Male sterility in muskmelon is governed by which of the following?
a) Single dominant gene
b) Single recessive gene
c) Cytoplasm
d) Cytoplasm and nuclear genes

69. Which of the following bean is also known as butter bean?
a) *Phaseolus coccineus*
b) *Phaseolus acutifolius*
c) *Phaseolus lunatus*
d) *Phaseolus vulgaris*

70. The number of domesticated species in *Capsicum* are
a) 5
b) 7
c) 8
d) 9

71. 'Manjari Gota' variety of brinjal is popular in
a) Punjab
b) Maharashtra
c) Rajasthan
d) Uttar Pradesh

72. Disruptive selection results in
a) Breakdown of linkage
b) Decrease in genetic flexibility
c) Genetic heterogeneity decreases
d) Merging of populations

73. One of the progenitor of cultivated okra is
a) *Abelmoschus crinitus*
b) *Abelmoschus angulosus*
c) *Abelmoschus caillei*
d) *Abelmoschus tuberculatus*

74. Average productivity (per hectare) of kharif onion in India is
a) 20 tonnes
b) 18 tonnes
c) 15 tonnes
d) 10 tonnes

75. According to law of independent assortment of Mendel
a) Alleles separate from each other independently during gamete formation and pass on to different gametes
b) Dominant and recessive genes alleles do not blend
c) Two genes entering into F_1 combination exhibit independent dominant behaviour
d) Expression of one gene in F_1 is independent of the presence or absence of another gene in an individual

76. 'White heart' is a physiological disorder of
a) Carrot
b) Beet root
c) Muskmelon
d) Watermelon

77. The species which has contributed to the development of variety 'Arka Abhay' is
a) *Abelmoschus tetraphyllus*
b) *Abelmoschus manihot*
c) *Abelmoschus tuberculatus*
d) *Abelmoschus angulosus*

78. Composites and synthetics are
a) Homogeneous populations
b) Heterogeneous populations
c) Homozygous populations
d) Heterozygous populations

79. Which of the following is a triploid seedless watermelon?
a) Arka Madhura
b) Arka Muthu
c) Arka Akash
d) Arka Aishwarya

80. India's share of world vegetable production is
a) 25%
b) 20%
c) 18%
d) 14%

81. Minimum isolation distance for certified seed production of okra is
a) 200 m
b) 400 m
c) 800 m
d) 1000 m

82. In gametophytic system of self-incompatibility (SI)
a) SI is controlled by the genotype of pollen producing plant sporophyte
b) Reciprocal differences are not observed
c) Crosses would be either fully sterile or fully fertile
d) Permits production of some homozygotes

83. Icebox is a fruit type of
a) Potato
b) Carrot
c) Watermelon
d) Tomato

84. Lettuce drop is caused by
a) *Sclerotina*
b) *Bremia lactucae*
c) *Phytoplasma*
d) Lettuce mosaic virus

85. Shoot and fruit borer in okra is
a) *Leucinodes orbonalis*
b) *Earias vittella*
c) *Amarasca biguttula biguttula*
d) *Helicoverpa armigera*

86. Fluted pumpkin is
a) *Cucumis metuliferous*
b) *Cucurbita ficifolia*
c) *Cucurbita argyrosperma*
d) *Telfaria occidentalis*

87. The number of linkage groups in table beet are
a) 7
b) 9
c) 11
d) 12

88. The chromosome number (2n) in *Cucumis hytivus* is
a) 14
b) 26
c) 28
d) 38

89. Which of the following year was named as "International Year of the Potato" by United Nations?
a) 2008
b) 2009
c) 2010
d) 2011

90. The raised bed in BBF method is recommended for production of
a) Potato
b) Carrot
c) Tomato
d) Kharif onion

91. A semi-underground double-walled greenhouse working on the principle of zero energy chamber is called
a) Polytrench greenhouse
b) Trench greenhouse
c) Polyench greenhouse
d) Polycarbonate greenhouse

92. The term 'cucurbits' is coined by
a) L.H. Bailey
b) Decandolle
c) Naudin
d) N.I. Vavilov

93. Potato varieties for processing into French fries should have dry matter content
a) Less than 10%
b) 15-20 %
c) More than 20%
d) 10-15 %

94. The Ty-1 gene conferring resistance to Tomato yellow leaf curl virus is derived from
a) *Solanum habrochaites*
b) *Solanum pennelii*
c) *Solanum chilense*
d) *Solanum lycopersicum*

95. The red skin potato variety is
a) Kufri Arun
b) Kufri Sadabahar
c) Kufri Surya
d) Kufri Girdhari

96. Number of ovules in the placentae of chayote is
a) One
b) Two
c) Three
d) Four

97. For processing white onion varieties, the TSS requirement is
a) 10-13%
b) 13-15%
c) 15-18%
d) More than 18%

98. Which of the following varieties of radish is having shortest period to reach edible maturity stage after sowing?
a) Pusa Himani
b) Pusa Chetki
c) Pusa Mridula
d) Japanese White

99. Coefficient of determination is a square of
a) Correlation coefficient
b) Regression coefficient
c) Mean
d) Variance

100. Xishuangbanna gourd belongs to
a) *Cucumis sativus*
b) *Cucumis melo*
c) *Cucurbita moschata*
d) *Cucurbita pepo*

101. Maximum sweet potato producing state in 2010-11 is
a) Uttar Pradesh
b) Tamil Nadu
c) West Bengal
d) Odisha

102. Which of the following is a member of secondary gene pool of common bean?
a) *Phaseolus lunatus*
b) *Phaseolus coccineus*
c) *Phaseolus acutifolius*
d) *Phaseolus filiformis*

103. ETL level of thrips population per plant in onion is
a) 5
b) 10
c) 20
d) 30

104. The headquarter of AVRDC is located in
a) United States of America
b) United Kingdom
c) Taiwan
d) Philippines

105. Corky peduncle of mature fruit is a characteristic feature of
a) *Cucurbita pepo*
b) *Cucurbita maxima*
c) *Cucurbita moschata*
d) *Cucurbita ficifolia*

106. In India, the area under protected cultivation is presently around
a) 20,000 ha
b) 25,000 ha
c) 35,000 ha
d) 40,000 ha

107. 'Svalbard Global Seed Vault' is located in
a) Sweden
b) Finland
c) Denmark
d) Norway

108. Average productivity of potato in 2010-11 was highest in
a) Punjab
b) West Bengal
c) Uttar Pradesh
d) Jharkhand

109. Storing potato tubers at high temperature of 35-40^{o}C may develop
a) Black heart
b) Hollow heart
c) Greening
d) Internal brown spot

110. 'Sree Padma' is an improved variety of
a) Greater yam
b) Lesser yam
c) Elephant foot yam
d) White yam

111. During 2010-11, the average productivity of onion was maximum in
a) Gujarat
b) Maharashtra
c) Karnataka
d) Tamil Nadu

112. Extrafloral nectaries are common in
a) Sponge gourd
b) Bitter gourd
c) Watermelon
d) Muskmelon

113. If the yield of okra is measured in kilograms, the unit of coefficient of variation is
a) Unit free
b) Kilograms
c) $(\text{Kilogram})^2$
d) Quintal

114. Cluster bean variety 'Pusa Navbahar' is a cross between which of the following?
a) Pusa Mausami × Pusa Sadabahar
b) Sharad Bahar × Pusa Mausami
c) Sharad Bahar × Pusa Sadabahar
d) IC-11388 × Sharad Bahar

115. Pigweed is a objectionable weed for which of the following vegetable seed crop?
a) Amaranthus
b) Carrot
c) Radish
d) Beet leaf

116. Which of the following vegetables is highly susceptible to boron deficiency in soil?
a) Beet root
b) Watermelon
c) Cucumber
d) Okra

117. Cucumber mosaic virus (CMV) in cucumber is transmitted by which of the following insect vectors?
a) Aphids
b) Mites
c) Thrips
d) Hoppers

118. For application of 105 kg of potash in one hectare of onion bulb crop as basal dose, how much muriate of potash (MOP) will be required?
a) 125 kg
b) 150 kg
c) 175 kg
d) 190 kg

119. The standard petals of papilionaceous corolla is also known as
a) Vexillum
b) Wing petal
c) Sword petal
d) Keel petal

120. The homozygous genotypes from a cross of two individuals heterozygous for two gene pairs will be
a) Two
b) Four
c) Six
d) Eight

121. Which vegetable seeds the term 'schizocarp' associated?
a) Tomato
b) Radish
c) Cabbage
d) Carrot

122. The desirable acidity level in tomato should be
a) 0.1%
b) 0.2%
c) 0.3%
d) 0.4%

123. Male sterility due to sterile cytoplasm and two recessive genes is found in
a) Onion
b) Carrot
c) Beet root
d) Cauliflower

124. Number of stamens present in a flower of onion are
a) 2
b) 4
c) 6
d) 8

125. Who gave the term 'genotype' and 'phenotype'?
a) Mendel
b) Morgan
c) Jenson
d) Johannsen

126. Optimum temperature for maximum tuber production in potato is
a) 18-20^{o}C
b) 16-18^{o}C
c) 14-16^{o}C
d) 12-14^{o}C

127. The chromosome number (2n) of drumstick is
a) 14
b) 24
c) 28
d) 32

128. The headquarter of 'National Biodiversity Authority' is located at
a) Bangalore
b) Chennai
c) New Delhi
d) Kolkata

129. Central Potato Research Institute (CPRI) was established in the year
a) 1935
b) 1949
c) 1953
d) 1960

130. In India, the average productivity of cassava is maximum in
a) Andhra Pradesh
b) Kerala
c) Meghalaya
d) Tamil Nadu

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 terminology

i) Double haploid	a) Morgan
ii) Foreign DNA	b) Seed
iii) Linkage	c) Calcium deficiency
iv) Cavity spot	d) Immortal
v) Tetrazolium	e) Transgenic

132. Match the chemical with their trade name

i) Copper oxychloride	a) Confidor
ii) Imidachlorpid	b) Sevin
iii) Phorate	c) Thimet
iv) Carbofuran	d) Furadan
v) Carbaryl	e) Blitox

133. Match the diseases and vegetable crops

i) Bud necrosis	a) Muskmelon
ii) Tospo	b) Tomato
iii) *Fusarium* wilt	c) Cowpea
iv) Golden yellow mosaic	d) Cauliflower
v) Downy mildew	e) Watermelon

134. Match the eminent scientists of taxonomy & systematics and the vegetable crops they worked in

i) J.G. Hawkes	a) *Abelmoschus*
ii) Richard N. Lester	b) Melons
iii) J.S. Siemonsma	c) Potato
iv) Cesar Gomez-Campo	d) Brinjal
v) K.I. Pangalo	e) *Brassica*

135. Match the vegetable crop and their time of anthesis

i) Cucumber	a) Early morning
ii) Ridge gourd	b) Afternoon
iii) Snake gourd	c) Early evening
iv) Bottle gourd	d) Night
v) Cauliflower	e) Late morning

136. Match the vegetable crop and insect

i) Cabbage	a) *Spodoptera litura*
ii) Potato	b) *Earias vittella*
iii) Onion	c) *Cylas formicarius*
iv) Okra	d) *Thrips tabaci*
v) Sweet potato	e) *Phthorimaea operculella*

137. Match the vegetables and their inflorescence

i) Racemose	a) Onion
ii) Terminal raceme	b) Beet root
iii) Spike	c) Sponge gourd
iv) Umbel	d) Radish
v) Axillary Peduncle raceme	e) Garden pea

138. Match the following statistic parameters

i) Least significant difference	a) $\frac{n(n-1)}{2}$
ii) Partial diallel	b) $\sqrt{\frac{H_1}{D}}$
iii) Homozygosity	c) $\left(\frac{2^m-1}{2^m}\right)^n$
iv) Average degree of dominance	d) $\frac{S.D.}{Mean} \times 100$
v) Coefficient of variation	e) $SE_d \times$ t value at error d.f.

139. Match the vegetable and chromosome number (2n)

i) Ash gourd	a) 16
ii) Fenugreek	b) 14
iii) Pointed gourd	c) 24
iv) Spinach beet	d) 18
v) Cucumber	e) 22

140. Match the vegetable crop and minimum isolation distance required for certified seed production

i) Cabbage	a) 250 m
ii) Brinjal	b) 500 m
iii) Okra	c) 150 m
iv) Carrot	d) 800 m
v) Cucumber	e) 1000 m

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. Discuss the role, mode of action and limitations of different growth regulators recommended for maintenance of gynoecious lines of cucumber. Enumerate the problem associated with development of F_1 hybrids utilizing gynoecious lines.

142. Recurrent selection is more efficient in the improvement of cauliflower and cabbage as compared to cucurbit vegetables. Justify.

143. A thorough knowledge of breeding system is essential to decide the breeding methods in vegetable crops. Justify with suitable examples.

144. What is QTL? How it is significant for vegetable breeding?

145. Discuss the concept and objectives of forward breeding and reverse breeding.

146. How precision farming technologies in vegetable crops can play a major role to meet the future demands of high yield and superior quality vegetables?