



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2011-2012

Discipline : Plant Pathology

Discipline Code : 17

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?
- Reduced water application
 - Reduced plant density
 - Increased application of chemical fertilizers
 - Reduced age of seedlings
10. Which organic acid, often used as a preservative, occurs naturally in cranberries, prunes, cinnamon and cloves?
- Citric acid
 - Benzolic acid
 - Tartaric acid
 - Lactic acid
11. Cotton belongs to the family
- Cruciferae
 - Anacardiaceae
 - Malvaceae
 - Solanaceae
12. Photoperiodism is
- Bending of shoot towards source of light
 - Effect of light/dark durations on physiological processes
 - Movement of chloroplast in cell in response to light
 - Effect of light on chlorophyll synthesis
13. Ergot disease is caused by which pathogen on which host?
- Claviceps purpurea* on rye
 - Puccinia recondita* on wheat
 - Drechlera sorokiniana* on wheat
 - 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
- Igneous rock
 - Metamorphic rock
 - Sedimentary rock
 - Hybrid rock
15. Which one of the following is a *Kharif* crop?
- Pearl millet
 - Lentil
 - Mustard
 - Wheat
16. The coefficient of variation (C.V.) is calculated by the formula
- $(\text{Mean}/\text{S.D.}) \times 100$
 - $(\text{S.D.}/\text{Mean}) \times 100$
 - $\text{S.D.}/\text{Mean}$
 - $\text{Mean}/\text{S.D.}$
17. Which of the following is commonly referred to as muriate of potash?
- Potassium nitrate
 - Potassium chloride
 - Potassium sulphate
 - Potassium silicate
18. Inbred lines that have same genetic constitution but differ only at one locus are called
- Multi lines
 - Monohybrid
 - Isogenic lines
 - Pure lines
19. For applying 100 kg of nitrogen, how much urea would one use?
- 45 kg
 - 111 kg
 - 222 kg
 - 333 kg
20. The devastating impact of plant disease on human suffering and survival was first realized by epidemic of.
- Brown spot of rice in Bengal
 - Late blight of potato in USA
 - Late blight of potato in Europe
 - Rust of wheat in India
21. The species of rice (*Oryza*) other than *O. sativa* that is cultivated is
- O. rufipugon*
 - O. longisteminata*
 - O. glaberrima*
 - O. nivara*
22. The enzyme responsible for the fixation of CO_2 in mesophyll cells of C-4 plants is
- Malic enzyme
 - Phosphoenol pyruvate carboxylase
 - Phosphoenol pyruvate carboxykinase
 - RuBP carboxylase
23. Which one of the following is a 'Vertisol'?
- Black cotton soil
 - Red sandy loam soil
 - Sandy loam sodic soil
 - Submontane (Tarai) soil
24. What is the most visible physical characteristic of cells in metaphase?
- Elongated chromosomes
 - Nucleus visible but chromosomes not
 - Fragile double stranded loose chromosomes
 - Condensed paired chromosomes on the cell plate

25. All weather phenomena like rain, fog and mist occur in
- Troposphere
 - Mesosphere
 - Ionosphere
 - Ozonosphere
26. Which of the following elements is common to all proteins and nucleic acids?
- Sulphur
 - Magnesium
 - Nitrogen
 - Phosphorous
27. Silt has intermediate characteristics between
- Sand and loam
 - Clay and loam
 - Loam and gravel
 - Sand and clay
28. Certified seed is produced from
- Nucleus seed
 - Breeder seed
 - Foundation seed
 - Truthful seed
29. Seedless banana is an
- Autotriploid
 - Autotetraploid
 - Allotriploid
 - Allotetraploid
30. Which one of the following is used to test the goodness-of-fit of a distribution?
- Normal test
 - t-test
 - Chi-square test
 - 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 activity of antagonistic fungi is more in
- Sick soil
 - Suppressive soil
 - Non-suppressive soil
 - Normal field soil
32. Guidelines and procedures for pest risk analysis for quarantine pests including analysis of environmental risk and living modified organisms is related with ISPM No.
- 10
 - 11
 - 15
 - 21
33. The International Plant Protection Convention (IPPC) was established in the year
- 1952
 - 1989
 - 1992
 - 1995
34. Specific regions of viral antigens that induce and interact with specific antibodies are termed as
- Titre
 - C-terminal
 - N-terminal
 - Epitopes
35. *Tobacco streak virus* is a type member of
- Tobravirus
 - Illavirus
 - Tobamovirus
 - Tombusvirus
36. *Dahlia mosaic virus* is an example of
- dsDNA
 - ssDNA
 - dsRNA
 - ssRNA
37. The black bodies formed on potato tubers infected with scurf are
- Sclerotia
 - Conidia
 - Discoloured skin
 - Dead tissues
38. Which one is an example of host specific toxin?
- Tabotoxin
 - Fusaric acid
 - Piricularin
 - Victorin
39. Which one is the source of autonomous dispersal of plant pathogens?
- Insects
 - Water
 - Seeds
 - Air
40. What is the shape of pathogenic secondary sporidia of *Tilletia indica*?
- Filiform
 - Allantoid
 - Straight
 - Fusiform
41. Conidia are arranged in acropetal chain in
- Albugo*
 - Aspergillus*
 - Fusarium*
 - Alternaria*

42. Teliospores remain always sub-epidermal in genus
- Melampsora*
 - Puccinia*
 - Uromyces*
 - Hemileia*
43. Fungal wilting in guava is more prominent during
- Rainy season
 - Dry season
 - Summer season
 - Winter season
44. Powdery mildew is favoured by
- Dry weather
 - Wet weather
 - Cloudy weather
 - Cool weather
45. National Pest Risk Analysis Centre in India has been established in
- Delhi
 - Mumbai
 - Kolkata
 - Chennai
46. Early defoliation of lower leaves is effective for the management of
- Rust of maize
 - Banded and sheath blight of maize
 - Red rot of sugarcane
 - Wilt of sugarcane
47. The cause of black heart of potato is
- Lack of oxygen
 - Lack of light
 - Fungus
 - Low temperature
48. Aplanospores are produced by
- Pythium*
 - Albugo*
 - Phytophthora*
 - Rhizopus*
49. Conidiophores in genus *Cercospora* are
- Clavate
 - Dichotomously branched
 - Geniculate
 - Simple
50. The first avirulence gene 'avrg' was isolated from *Cladosporium fulvum* by
- P.J.G.M. De Wit
 - D.F. Klessing
 - J. Ryals
 - S.P. Briggs
51. Which one of the following stages is lacking in demicyclic forms of rust?
- Telial
 - Basidial
 - Uredial
 - Aecial
52. Cleistothecium with single ascus and mycelial type appendages is common in genus
- Erysiphe*
 - Podosphaera*
 - Sphaerotheca*
 - Eveillula*
53. The process of reduction in horizontal resistance in course of breeding for vertical resistance is called
- Vertical effect
 - Vertifolia effect
 - Horizontal effect
 - Breeding effect
54. Mixed cropping of cotton and moth bean reduces the incidence of dry root rot of cotton due to
- Low temperature
 - High moisture
 - High temperature
 - Low temperature and high moisture
55. Moko disease of banana is caused by
- Erwinia amylovora*
 - Ralstonia solanacearum*
 - Fusarium oxysporum* f.sp. *cubense*
 - Pseudomonas solanacearum*
56. Chrysanthemum stunt is caused by
- Virus
 - Viroid
 - Spiroplasma
 - Bacteria
57. Anastomosis grouping is common in genus
- Rhizoctonia*
 - Puccinia*
 - Erysiphe*
 - Taphrina*
58. Differential resistance is
- Race specific
 - Durable
 - Race non-specific
 - Partial
59. Tyndallisation is performed at
- 100°C for 20 min. for 2 days
 - 100°C for 20 min. for 3 days
 - 121°C for 20 min. for 2 days
 - 121°C for 20 min. for 3 days

60. K.O. Muller and H. Borger defined
- PR protein
 - Salicylic acid
 - Victorin
 - Phytoalexin
61. Commonly used percentage of NaOCl₂ for surface disinfection is
- 0.1%
 - 0.5%
 - 1.0%
 - 3.0%
62. Flagellar arrangement of *Erwinia* is
- Monotrichous
 - Amphitrichous
 - Lophotrichous
 - Peritrichous
63. Downy mildew is caused by the members of the family
- Pythiaceae
 - Albuginaceae
 - Peronosporaceae
 - Moniliaceae
64. 'Katte' disease is also known as
- Yellow mosaic
 - Marble mosaic
 - Bunchy top
 - Little leaf
65. Wound hormone is
- Pisatin
 - Osmotin
 - Traumatin
 - Auxin
66. β -1,5-glucanase is a
- PR protein-2
 - PR protein-3
 - PR protein-5
 - Phytoalexin
67. RNA induced silencing complex (RISC) was produced by the combination of
- Si (ssRNA) + protein
 - Si (dsRNA) + protein
 - Si (dsDNA) + fatty acid
 - Si (ssRNA) + fatty acid
68. Coconut root wilt is caused by
- Virus
 - Spiroplasma
 - Phytoplasma
 - Viroid
69. Agar-agar is produced from
- Nostoc
 - Gelidium
 - Yeast
 - Oscillatoria
70. Parthenogenetically developed zygospores are known as
- Parthozygospores
 - Azygospores
 - Conidia
 - Sporangiospores
71. Beet necrotic yellow vein virus is transmitted by
- Polymyxa graminis*
 - Polymyxa betae*
 - Olipidium betae*
 - None of the above
72. The number of amino acids in the protein subunit of TMV is
- 58
 - 100
 - 150
 - 158
73. 'Hartig nets' are found in
- Ectomycorrhiza
 - Endomycorrhiza
 - Oomycetous fungi
 - Ascomycetous fungi
74. 'Parasexuality' was first discovered in
- Aspergillus clavatus*
 - Aspergillus nidulans*
 - Aspergillus niger*
 - Aspergillus flavus*
75. Sex pilus is formed in bacteria during
- Conjugation
 - Transduction
 - Transformation
 - Lysogeny
76. Simple interest disease over time produces
- Hyperbolic curve
 - Saturation curve
 - Sigmoid curve
 - Straight line
77. ELISA plate is made up of
- Nitrocellulose
 - Plastic
 - Polystyrene
 - Polypropylene
78. In oomycetes, metalaxyl interferes with
- Activity of RNA polymerase
 - DNA synthesis
 - Protein synthesis
 - None of the above
79. Low volume sprayer contains water about
- 25 litres
 - 100 litres
 - 500 litres
 - 700 litres

80. Ring spot symptoms observed on papaya fruits are caused by a
- Potyvirus*
 - Cucumovirus*
 - Comovirus*
 - Alfamovirus*
81. Huanglongbing or greening disease of citrus is transmitted by
- Aphid
 - Psyllid
 - Leaf hopper
 - Whitefly
82. Which of the following mode of transmission is generally not associated with viroids?
- Vector
 - Mechanical
 - Graft
 - Cultural practices
83. Satellite RNAs have not been reported in
- Cucumber mosaic virus*
 - Peanut stunt virus*
 - Tobacco ring spot virus*
 - Tobacco mosaic virus*
84. Virus free seed certification programme was developed in
- Cucumber
 - Potato
 - Tomato
 - Brinjal
85. Banana bunchy top virus has a genome of
- Single stranded RNA
 - Double stranded RNA
 - Single stranded DNA
 - Double stranded DNA
86. Which of the following enzyme is used in c-DNA synthesis?
- Polymerase
 - Transcriptase
 - Reverse transcriptase
 - Reverse polymerase
87. Polyprotein strategy for protein synthesis is adopted by
- Potyvirus*
 - Wound tumour virus
 - Tobacco mosaic virus
 - None of the above
88. Parasitic organism which depends on host cell for enzymatic apparatus is called
- Prototroph
 - Paratroph
 - Hyphotroph
 - Organotroph
89. Cell wall of Oomycota organisms is composed primarily of
- Beta-glucan
 - Chitin
 - Cellulose
 - Hydroxyproline
90. Bimodal transmission is seen in case of
- Geminivirus
 - Caulimovirus
 - Bromovirus
 - Tobamovirus
91. Co-translational disassembly with + strand RNA virus is seen in
- Potex virus
 - Potyvirus*
 - TMV
 - Cowpea mosaic virus
92. Simple spray of water can reduce
- Bacterial disease
 - Powdery mildew disease
 - Alternaria* leaf spot disease
 - Downy mildew disease
93. Stripe rust of wheat occurs commonly in
- Central India
 - North India
 - South India
 - Throughout India
94. Which of the viruses has been most commonly used as vehicle/vector of useful genes in genetic engineering?
- CMV
 - TMV
 - PVX
 - CaMV
95. Who first demonstrated the transmissible nature of TMV?
- Beijernick
 - Iwanowski
 - Mayer
 - Stanley
96. In the absence of host, the *Synchytrium endobioticum* can survive in soil upto
- More than 10 years
 - 8 years
 - 2 years
 - 1 year
97. Spores that are formed by budding are
- Conidia
 - Oidia
 - Blastospores
 - Phialospores

98. Rice tungro disease is caused by
- A mixture of spherical and flexuous viruses
 - A bacilliform virus alone
 - A mixture of bacilliform and flexuous viruses
 - A mixture of spherical and bacilliform viruses
99. Rod shaped morphology of TMV by electron microscopy was given by
- Bert (1936)
 - Bernal and Fankuchen (1937)
 - Kausche *et al* (1939)
 - Williams & Wycoff (1944)
100. Majority of the systemic fungicides are transported in plants in
- Symplast
 - Apoplast
 - Chloroplast
 - Leucoplast
101. More number of spores of *Venturia inaequalis* causing scab disease of apple is discharged during day than in night because
- Darkness inhibits spore germination
 - Temperature plays an important role
 - Leaf wetting is essential for spore release
 - Dew provides free moisture
102. *Puccinia graminis tritici* can not cause infection on oat because
- It cannot germinate on this host
 - It is non-pathogenic
 - It is highly host specific
 - Uredospores require longer time than required
103. Conidia of *Erysiphe graminis* germinate in low moisture because
- It has adapted to stress condition
 - It has its own moisture
 - It contains lipid layer in the outer wall of the cell
 - It absorbs moisture from the atmosphere
104. Some bacterial strains produce proteinaceous antagonistic substances that are lethal to the other strains of the same or closely related species are called
- Biotrophs
 - Bacteriocins
 - Bacterioalleles
 - Bactericides
105. The process of identifying plant disease is called
- Detection
 - Analysis
 - Diagnosis
 - Inoculation
106. Who established that the nucleic acid alone in plant viruses is the infectious agent?
- W.M. Stanley
 - Gierer and Schramm
 - Bawden and Pirie
 - Gibbs and Harrison
107. An example of mycorrhizal fungus is
- Penicillium* sp.
 - Peziza* sp.
 - Glomus* sp.
 - Erysiphe* sp.
108. Fungi belonging to which of the order are obligate parasites
- Agaricales
 - Taphrinales
 - Ustilaginales
 - Plasmodiophorales
109. An example of autoecious rust is
- Stem rust of wheat
 - Bajra rust
 - Apple rust
 - Linseed rust
110. Teleutospores are many celled in
- Puccinia* sp.
 - Phragmidium* sp.
 - Uromyces* sp.
 - Urocystis* sp.
111. BLITECAST-a predictive model was developed for epidemics of
- Early blight of potato
 - Early blight of tomato
 - Late blight of potato
 - Paddy blast
112. Cross-protection is effective in controlling which of the following virus in citrus?
- Badnavirus
 - Tobamovirus
 - Mandarivirus
 - Closterovirus
113. If a resolution of human eye is 0.2 mm then the magnification of the object will be 1 X. If the optimum resolution of a light microscope is 0.2 μ m, what will be the magnification?
- 10 X
 - 100 X
 - 1000 X
 - 10000 X
114. Giemsa stain is used for staining of
- Mycobacterium* spp.
 - Free spores in bacteria
 - Rickettsia and some protozoa
 - Bacterial flagella

115. Which of the following enzymes is not used in ELISA technique?
- Penicillinase
 - Alkaline phospholase
 - Protease
 - Horse-radish peroxidase
116. As a routine, buffer used for grinding of virus-infected material is
- Sodium citrate buffer
 - Potassium acetate buffer
 - Potassium phosphate buffer
 - Sodium phosphate buffer
117. *Bemisia tabaci*, a virus vector is also popularly known as
- Sweet potato whitefly
 - Greenhouse whitefly
 - Potato whitefly
 - Tomato whitefly
118. The aphid specificity of potyviruses is located in
- N-terminal part of coat protein
 - C-terminal part of coat protein
 - Nucleic acid binding protein
 - Movement protein of virus
119. The common range of sedimentation coefficient (S) for viruses is
- 100-200 S
 - 25-100 S
 - 4-18 S
 - More than 1000 S
120. The measurement of colour development of chromogenic substrate (p-nitrophenyl phosphate) for ELISA in a spectrophotometer is done at
- 505 nm
 - 405 nm
 - 305 nm
 - 205 nm
121. The rod like structure of potato spindle tuber viroid measures
- 20 nm
 - 50 nm
 - 75 nm
 - 100 nm
122. The 3' non-translated region of many viruses plays role in
- Movement of RNA
 - Coat protein assembly
 - Initiation of negative strand RNA synthesis
 - Folding of RNA
123. Plant virus database of VIDE is located in
- USA
 - Japan
 - UK
 - Australia
124. Screens with opening of which of the following will keep insect vectors out of screen house?
- 30-60 mesh
 - 60-110 mesh
 - 100-200 mesh
 - 200-300 mesh
125. Gram positive bacteria belong to the group
- Gracillicutes
 - Firmicutes
 - Tenevicutetes
 - Mendosicutes
126. Which of the following diseases is caused by fastidious bacterium?
- Citrus canker
 - Blight of paddy
 - Cabbage rot
 - Citrus greening disease
127. Diameter of the perforated filter in the laminar flow is about
- 2.0 μm
 - 0.2 μm
 - 0.02 μm
 - 0.002 μm
128. The extra chromosomal DNA in bacteria may code for
- Host degrading enzyme
 - Synthesis of antibiotic
 - Host specificity
 - Disease induction
129. Acid fast staining is used to identify
- Mycobacterium
 - Xanthomonas
 - Cynobacterium
 - Bacteriophage
130. Whiteflies transmit plant viruses in
- Non-persistent and semi-persistent manner
 - Non-persistent and persistent manner
 - Semi-persistent and persistent manner
 - Only persistent manner

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) <i>Rhizoctonia solani</i> | a) <i>Hypocrea rufa</i> |
| ii) <i>Fusarium moniliforme</i> | b) <i>Mycosphaerella berkeleyi</i> |
| iii) <i>Bipolaris oryzae</i> | c) <i>Gibberella fujikuroi</i> |
| iv) <i>Phaeoisariopsis personata</i> | d) <i>Cochliobolus miyabeanus</i> |
| v) <i>Trichoderma viride</i> | e) <i>Thanatephorus cucumeris</i> |

132.

- | | |
|-----------------------|-------------------------------|
| i) <i>Loranthus</i> | a) Anisogamous planogametes |
| ii) <i>Striga</i> | b) Alternation of generation |
| iii) <i>Allomyces</i> | c) Phanerogamic root parasite |
| iv) <i>Opidium</i> | d) Metalaxyl |
| v) <i>Pythium</i> | e) Mango trees |

133.

- | | |
|---------------|---|
| i) EPIDEM | a) <i>Mycosphaerella</i> |
| ii) EPIVEN | b) <i>Puccinia graminis</i> f.sp. <i>striformis</i> |
| iii) EPIDEMIC | c) <i>Venturia inaequalis</i> |
| iv) EPICORN | d) <i>Alternaria solani</i> |
| v) MYCOS | e) <i>Helminthosporium maydis</i> |

134.

- | | |
|------------------------|--------------|
| i) MLO | a) Lindgren |
| ii) Local lesion assay | b) Doi |
| iii) Cotton plug | c) Holmes |
| iv) hrp genes | d) Staskawic |
| v) avr genes | e) Schroeder |

135.

- | | |
|---------------------------------|---------------------|
| i) First generation fungicide | a) Oxathin |
| ii) Second generation fungicide | b) Sulphur dust |
| iii) Third generation fungicide | c) Strobilurin |
| iv) New generation fungicide | d) Copper fungicide |
| v) Fungicide cum acaricide | e) Metalaxyl |

136.

- | | |
|--|------------------------------|
| i) <i>Coprinus</i> spp. | a) Defoliation of tomato |
| ii) <i>Septoria</i> spp. | b) Muriform conidia |
| iii) <i>Alternaria alternata</i> | c) Weed of mushroom beds |
| iv) <i>Xanthomonas campestris</i> pr. <i>polaris</i> | d) Gray mold of chickpea |
| v) <i>Botrytis cinerea</i> | e) Vascular wilt of geranium |

137.

- | | |
|--|----------------------------|
| i) <i>Cucumber mosaic virus</i> | a) Nanovirus-like-molecule |
| ii) <i>Cotton leaf curl virus</i> | b) CARNA-5 |
| iii) <i>Potato leaf roll virus</i> | c) Satellite virus |
| iv) <i>Rice tungro bacilliform virus</i> | d) Luteovirus |
| v) <i>Tobacco necrosis virus</i> | e) Dependent transmission |

138.

- | | |
|----------------------|--|
| i) Rigid rod | a) <i>Cacao swollen shoot virus</i> |
| ii) Bacilliform | b) <i>Cucumber green mottle mosaic virus</i> |
| iii) Enveloped virus | c) <i>Papaya ring spot virus</i> |
| iv) Flexuous rod | d) <i>Cucumber mosaic virus</i> |
| v) Icosahedran | e) <i>Groundnut bud necrosis virus</i> |

139.

- | | |
|-------------------|--|
| i) M.J. Narsimhan | a) Toxins of fusarial wilt of cotton |
| ii) B.L. Chona | b) Bacterial blight of cotton |
| iii) B.B. Mundkar | c) Establishment of Indian Phytopathological Society |
| iv) J.P. Verma | d) Red rot of sugarcane |
| v) T.S. Sadasivan | e) Control of Koleroge diseases of arecanut |

140.

- | | |
|------------------|------------------------|
| i) F.C. Bawden | a) Phenolic resistance |
| ii) J.H. Craigie | b) Viral nucleoprotein |
| iii) J.C. Walker | c) Bacteriophage |
| iv) E. Luria | d) Cross protection |
| v) McKinney | e) Sexuality in rust |

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 the role of RNA silencing in disease resistance in plants.

142. The fungal diseases of plants are so much more common in India now than they were 50 years ago. Why?

143. The ripened fruits are infected easily while the green fruits show resistance to infection by the post-harvest pathogens. Why?

144. Chemical control increases the non-persistent viral diseases. Why? What are the other alternate methods to reduce the disease?

145. Mango malformation is more than 100 years old and the etiology is not fully understood. Discuss our understanding on the etiology of the disease.

146. Discuss the characteristics of viroids. Write three important diseases caused by them.