Discipline : Genetics

Discipline Code : 11

Roll No.

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. A mutation that changes a UGC codon to UAG is called
a) Missense
b) Nonsense
c) Frameshift
d) Silent

32. Interphase is
a) Lag phase and log phase
b) Between cell division and cytokinesis
c) A combination of G1, S and G2 .
d) The time that RNA polymerase stops transcription

33. White eye colour in fruit flies is X linked and recessive to red eye. If white eyed females are crossed to red eyed males, what percent female offspring will have white eyes?
a) 100%
b) 75%
c) 50%
d) 0%

34. Linkage is very tight near the centromere because
a) Genes are very close together
b) Centromere prevents crossing
c) DNA repair cannot occur
d) Consequence of crossing is same as linkage

35. A cross between two true breeding plants with blue and white flowers produced light blue F_1. F_1 on selfing shows 1:2:1 ratio of dark blue : light : blue : white. The genetic phenomenon in this cross is
a) Epistasis
b) Incomplete dominance
c) Co-dominance
d) Inbreeding depression

36. Independent assortment is
a) Expression of traits at same stage of development
b) Unlinked transmission of genes due to location on different chromosomes or far apart on the same chromosome
c) Association of a RNA and a protein implying related function
d) Independent location of genes from each other in an interphase cell

37. Mendel's law of segregation as applied to chromosome behaviour in meiosis means that
a) Pairing of homologs will convert one allele to another
b) Alleles of a gene separate from each other in meiosis-I
c) Genes on same chromosomes show 50% recombination
d) Alleles of a genes are linked and passed together in meiosis

38. In meiosis, chromosomes pair and crossover during
a) Prophase I
b) Prophase II
c) Metaphase I
d) Metaphase II

39. The wobble hypothesis explains
a) How different rRNAs are associated with one type of amino acid
b) How multiple stop codons associate with the same release factor
c) How multiple tRNAs associate with same codon
d) How one tRNA can associate with multiple codons

40. Factors for CMS are
a) Inherited through cytoplasmic mRNA
b) Inherited through maternal organelles
c) Controlled by nuclear genes
d) Post zygotically modified

41. Euploidy refers to
a) Extra copies of a gene adjacent to each other on a chromosome
b) An individual with complete extra set of chromosome
c) A chromosome that has replicated but not divided
d) An inversion that does not include the centromere

42. A mutation in a codon that leads to amino acid substitution is called
a) Nonsense mutation
b) Missense mutation
c) Frameshift mutation
d) Promoter mutation

43. Which of the following is true: Johanssen's experiments (1903) for selection of seed weight in beans showed that a variety of self-pollinated crop is composed of
a) A mixture of hybrid lines. Diversity or variation is between lines and not within lines
b) A mixture of pure lines. Diversity or variation is between lines and not within lines
c) A mixture of cross-pollinating lines. Diversity is between lines and not within them
d) A mixture of pure lines. Diversity or variation is within lines and not between them

44. The phenomenon of heterosis
a) is due to heterozygous advantage
b) results in increased homozygosity
c) is maternally controlled
d) is environmentally controlled

45. If 40% of an organism's DNA is Guanine, then Adenine would be
a) 0%
b) 10%
c) 20%
d) 30%

46. Red eye × white eye mice gave red eye F_1. On intermating the F_1s, 36 red and 13 white eye F_2 were obtained. Based on this
a) White eye is an X linked recessive gene
b) White eye is an X linked dominant gene
c) Red eye is maternally controlled
d) White eye is an autosomal recessive gene

47. Long ear mouse × short ear gave 12 long, 10 short ear F_1. The long eared F_1 on selfing gave 36 long, 13 short ear F_2 mice. Based on this data
a) Parental long ear mouse is heterozygous
b) Long and short are codominant
c) Long eared F_1 mice are heterozygous
d) They are duplicate genes

48. Heterochromatin
a) Contains highly repetive DNA
b) Active segment of DNA near centromere
c) Replicated fast in interphase
d) Contains introns

49. DNA can be
a) Detected by northern blotting
b) Digested to 20 bp length by restriction endonucleases
c) Mutated and always give rise to altered amino acids
d) Mutated but need not always give rise to altered amino acids'

50. A plant with basic chromosome number of 5
a) Can have 15 primary trisomics
b) 5 primary trisomics
c) 10 primary trisomics
d) Only 3 primary trisomics

51. The germplasm theory was proposed by
a) Lamarck
b) Darwin
c) Mendel
d) Weissman

52. Which of the following is likely to be found in an example of an X linked genetic disorder such as hemophilia?
a) Male to male transmission
b) Female to female transmission
c) Female to male transmission
d) Germinal mosaicism

53. Which is true about an organism with 2n=16 chromosomes?
a) The species has 16 different types of chromosomes
b) There are 16 homologous pairs
c) There are 32 chromosomes
d) A gamete has 8 chromosomes

54. If 50% of the offspring from a test cross display the recessive phenotype then the unknown parent has
a) Identical alleles
b) A homozygous genotype
c) A heterozygous genotype
d) A high frequency of crossing over

55. Based on recombination frequencies between genes on the same chromosome, determine the correct order of genes. X-A=25%, E-A=50%, M-A=30%, X-E=25%, M-E=80%
a) MAEX
b) EXAM
c) AMXE
d) EMAX

56. A 9:3:3:1 phenotypic ratio is expected in the F_2 generation if a dihybrid cross involving
a) 2 pairs of codominant genes
b) Four different pairs all linked
c) 2 pairs of linked genes
d) 2 unlinked pairs with each pair showing a dominance recessive relationship

57. Mutations which occur in body cells which do not go on to form gametes can be classified as
a) Auxotrophic mutations
b) Autosomal mutations
c) Somatic mutations
d) Oncogenes

58. The component of (transcribed) RNA in eukaryotes that is present in the initial transcript but is removed before translation is
a) Intron
b) 3' poly A tail
c) 5' cap
d) Ribosome biding site

59. Assuming Hardy-Weinberg equilibrium, the genotype frequency of heterozygotes, if the frequency of the two alleles at the gene being studies are 0.6 and 0.4 will be
a) 0.64
b) 0.48
c) 0.32
d) 0.16

60. The likelihood of an individual in a population carrying two specific alleles of a human DNA marker each of which has a frequency of 0.2 will be
a) 0.32
b) 0.16
c) 0.08
d) 0.04

61. An increase in inbreeding coefficient 'F' is likely to result in
a) Higher proportion of linked genes
b) Reduce likelihood of heterozygotes in a population
c) Higher level of genes
d) Higher levels of introns

62. Most new mutations appear to be
a) Beneficial
b) Neutral or deleterious
c) Present as homozygotes
d) Present in inversion

63. The following genotypes are found in a population

AA	Aa	aa
70	50	20

What are the allele frequencies of A and a?
a) A = 0.68   a = 0.32
b) A = 0.63   a = 0.36
c) A = 0.32   a = 0.68
d) A = 0.36   a = 0.63

64. In eukaryotes, RNA polymerase I synthesizes
a) mRNA
b) tRNA
c) rRNA
d) RNAi

65. Which of the following in humans is due to a chromosomal aberration?
a) Haemophilia
b) Turner's syndrome
c) Phenyl ketonuria
d) Osteoporosis

66. The correct structure of a nucleotide is
a) Phosphate-ribose-adenine
b) Phosphate-sugar-base
c) Phosphate-sugar-phosphate
d) Adenine-thymine OR guanine-cytosine

67. Synaptonemal complex is found in
a) Polytene chromosomes
b) Four stranded stage at pairing
c) in E.coli
d) During Neurospora ascospore formation

68. Polymerase chain reaction was invented by
a) Sanger
b) Kary Mullis
c) Craig Venter
d) Gary Adams

69. If in a Mendelian population, A=q=0.9 and a=1-q=0.1, the frequency of the three genotypes will be which of the following?
a) 0.80 AA + 0.18 Aa + 0.02 aa
b) 0.81 AA + 0.18 Aa + 0.01 aa
c) 0.81 AA + 0.18 Aa + 0.1 aa
d) 0.81 AA + 0.18 Aa + 0.001 aa

70. The following are the cells present in embryo sac
a) Egg cell, two antipodal cells, a secondary nucleus and two synergids
b) Three antipodal cells, two synergids, one egg cell and one 2n secondary nucleus
c) Egg cell, two synergids and a secondary nucleus
d) A 2n secondary nucleus, one egg cell and three antipodal cells

71. Addition and substitution lines are produced through
a) Recurrent selection
b) Backcross selection
c) Doubled haploid method
d) Pedigree method

72. The competition between the cells carrying the mutant allele and the normal cells of an apical meristem since mutation occurs only in a part of the meristem, in expression of the mutant allele is called
a) Haplontic selection
b) Diplontic selection
c) Germinal mutation
d) Micro mutation

73. The phenomenon of some of the progeny of an aneuploid plant becoming aneuploid for a different chromosome as compared to the parent plant is termed as
a) Univalent creation
b) Univalent shift
c) Trivalent shift
d) Bivalent shift

74. An RNA-dependent DNA polymerase used to obtain complementary DNA from RNA is known as
a) Transcriptase
b) Taq polymerase
c) Reverse transcriptase
d) RNA polymerase

75. Linkage equilibrium can be achieved by
a) Random mating
b) Selfing
c) Sibling
d) Crossing

76. Which of the following crosses would produce Transgressive segregants in the F_2 generation?
a) aa bb × AA BB
b) aa BB × AA BB
c) AA bb × AA BB
d) AA bb × aa BB

77. Phosphodiester bond forms between which of the following?
a) 2'C and 1'C
b) 3'C and 1'C
c) 5'C and 2'C
d) 5'C and 3'C

78. In eukaryotes, which of the following factors directly binds to the TATA box during transcription initiation?
a) TF II A
b) TF II B
c) TF II D
d) TF II E

79. In F_2 of a trihybrid cross, which of the following will be the phenotypic ratio assuming complete dominance at all loci?
a) 27:9:9:9:3:3:1
b) 27:9:9:9:3:3:3:1
c) 27:9:9:9:3:3:3:3:3:1
d) 18:9:9:9:9:3:3:3:3:1

80. If the genotype of an individual is AaBBddEeFf, the different types of gametes produced would be
a) 4
b) 8
c) 16
d) 32

81. Genetic assortative mating is commonly called as
a) Out crossing
b) Panmixis
c) Amphimixis
d) Inbreeding

82. Heterosis will become fixed if it is mainly due to
a) Additive × dominance effects
b) Additive and additive × additive effects
c) Dominance effects
d) Dominance and dominance × dominance effects

83. A variety is called tolerant to disease if it shows as compared to the susceptible control, a
a) Noticeably lower disease score
b) Lower reproduction rate of pathogen
c) Significantly lower reduction in yield at the same level of disease symptoms
d) A lower rate of disease spread

84. Which type of gluten strength is suitable for chapati making?
a) Weak
b) Strong
c) Medium strong
d) Both b) and c) of the above

85. The colour of tag used for breeder seed is
a) Blue
b) Yellow / Golden
c) Red
d) White

86. The anticodon 3'-AUC-5' will base pair with which of the following?
a) 3'-GAU-5' codon
b) 5'-UAG-3' codon
c) 3'-UAG-5' codon
d) Both a) and b) of the above

87. The maximum heterosis is likely to be manifested in a
a) Single cross
b) Double cross
c) Three way cross
d) Double top cross

88. Endosperm balance number is related to
a) Embryo development
b) Endosperm development
c) Endosperm and seed development
d) Seed development

89. A mutational event that does not lead to a change in the phenotype specified by the wild type allele is termed as
a) Neomorph
b) Neutral mutation
c) Silent mutation
d) Plasmagene mutation

90. Which of the following events do not occur during interphase?
a) Chromatin condensation
b) DNA replication
c) Organelle replication
d) Protein synthesis

91. In case of haplodiploidy mode of sex determination in the order hymenoptera
a) Males are diploid and females are haploid
b) Males are haploid and females are diploid
c) Both males and females are haploid
d) Both males and females are diploid

92. The two strands of DNA double helix are
a) Identical
b) Parallel
c) Similar
d) Complementary

93. DNA synthesis during replication proceeds in
a) 3'→5' direction
b) 5'→3' direction
c) Any direction
d) Depends on environmental conditions

94. Proof reading mechanism necessary for high fidelity of DNA replication is by
a) 5'→3' exonuclease activity
b) 3'→5' exonuclease activity
c) 5'→3' endonuclease activity
d) 3'→5' endonuclease activity

95. A+T/C+G ratio in one strand of DNA is 0.7, what will be this ratio in the complementary strand?
a) 0.3
b) 0.7
c) 1.0
d) 1.4

96. By the process of transcription, _____ will be formed.
a) mRNA
b) rRNA
c) tRNA
d) All three

97. Frameshift mutations are caused by
a) Transition
b) Transversion
c) Addition
d) Substitution

98. 'Okazaki fragments' are produced during
a) Recombination
b) DNA replication
c) DNA repair
d) DNA digestion

99. Which of the following is a sense codon?
a) UAA
b) UAG
c) UGA
d) AUG

100. A chromosomal aberration, with the help of crossing over within the aberration can lead to breakage fusion bridge cycle is
a) Pericentric inversion
b) Paracentric inversion
c) Interchange
d) All of the above

101. The Renner complex found in O. lamarkiana is
a) Rigens-Velans
b) Rigens-Curvans
c) Guadens-Velans
d) Guadens-Curvans

102. Reverse transcriptase is produced by
a) Bacterial plasmids
b) Transposons
c) Bacteriophages
d) Retroviruses

103. What proportion of F_2 plants would show the heterozygous pattern for a RFLP marker and presence of band for a RADP marker, if the two markers are independent and polymorphic between parents?
a) 1/16
b) 2/16
c) 3/16
d) 6/16

104. In which of the following approaches of QTL mapping/identification, a major QTL may be identified as a minor QTL, if marker-QTL linkage is not very tight?
a) Single marker analysis
b) Interval mapping
c) Composite interval mapping
d) Advanced-backcross QTL method

105. With the advance of generation, variation between families
a) Increases
b) Decreases
c) Remains constant
d) None of the above

106. The difference between the means of selected individuals and base population mean is known as
a) Genetic advance
b) Selection differential
c) Selection intensity
d) Inbreeding coefficient

107. At a single locus, variance components of the two backcrosses, $VB_1 + VB_2$ are equal to
a) $\frac{1}{2}D + \frac{1}{2}H$
b) $\frac{1}{2}D + \frac{1}{4}H$
c) $\frac{3}{4}D + \frac{1}{4}H$
d) $D + \frac{1}{2}H$

108. In Wr-Vr approach (Hayman, 1954), presence of complete dominance is indicated when regression line
a) Passes through the point of origin
b) Passes above the point of origin
c) Passes below the point of origin
d) Touches the limit of parabola

109. DNA as genetic material in T-2 phase virus, was established by
a) Frankel and Singer
b) Hershey and Chase
c) Giererad and Schramn
d) Oswald and Avery

110. Monosomic analysis has been extensively used for gene mapping and substitution line production in
a) Barley
b) Soybean
c) Tomato
d) Wheat

111. Acrocentric chromosomes are
a) Inversions, that include the centromere within inverted region
b) Chromosomes with more terminally placed centromeres
c) When centromere appear to be at the very tip of chromosome
d) When centromere is in the middle of the chromosome

112. Nullisomes have highest survival value in
a) *Oryza sativa*
b) *Lycopersicon esculentum*
c) *Triticum dicoccum*
d) *Hordeum vulgare*

113. The human beings of B blood group can donate blood only to individuals of
a) A and B blood groups
b) O and B blood groups
c) B and AB blood groups
d) A and AB blood groups

114. Which one of the following is an alkylating agent mutagen?
a) 5-Bromouracil
b) Hydroxyl amine
c) Ethyl methane sulphonate
d) Sodium azide

115. In Bt transgenic cotton, the boll borer insects are unable to damage the crop because
a) They are detracted from the transgenic plants because of gossypol production
b) Insects die due to midgut damage after consuming *Cry* protein from plants
c) They become infertile after consuming plant parts
d) Due to increasing hardness of the plant tissue, insects are unable to invade the plants

116. A white eyed female *Drosophila melanogaster* is crossed with red eyed male. A subsequent random mating in F_1 will produce in F_2
a) All females and males white eyed
b) All females white eyed and males red eyed
c) 50% females and males white eyed and 50% females and males red eyed
d) All the females and 50% males white eyed

117. Arrangement of gene order is reversed in case of
a) Inversion
b) Translocation
c) Deletion
d) Duplication

118. Presence of two or more genetically different nuclei within single cell of a fungal mycelium is called
a) Heterozygous
b) Heterokaryosis
c) Heterothallic
d) Polyploidy

119. Which one of the following involve multilocus gene arrangement?
a) Multiple allelism
b) Linkage drag
c) Pleiotropy
d) Co-dominance

120. The base Uracil in mRNA is complementary to which one of the following bases in DNA nucleotide?
a) Adenine
b) Thymine
c) Cytocine
d) Guanine

121. Breeders' seed has less purity than
a) Certified seed
b) Foundation seed
c) Nucleus seed
d) Farmers' saved seed

122. The gametes of one of the following are polyploids
a) Oryza nivara
b) Aegilops squarrosa
c) Hordeum vulgare
d) Triticum aestivum

123. The recurrent selection operating on both the additive and non-additive components of genetic variation is
a) Recurrent selection for gca
b) Reciprocal recurrent selection
c) Recurrent selection for sca
d) Selfed progeny recurrent selection

124. Heterosis is the product of directional dominance (d) and initial gene frequency difference (y) in the two parental lines presented by $HF_1=\Sigma dy^2$. It is easier to increase heterosis through
a) Increasing directional dominance (d)
b) Building up of y in any of two parents
c) Search of new parental combination
d) Replacement of the poor general combination parent with better one

125. Linkage disequilibrium in a segregating F_2 population of a digenic cross AABB×aabb is apparent when
a) (AB+ab) = (Ab + ab)
b) (AB + ab) > (Ab + ab)
c) (AB + ab) < (Ab + ab)
d) AB + ab = 0

126. Which one of the following will not have gamete function through meiosis?
a) A diploid
b) A haploid
c) A tetraploid
d) An allopolyploid

127. DNA fingerprinting is
a) Estimation of total genetic DNA
b) Multilocus DNA profiling
c) DNA based sequencing
d) DNA analysis from human fingers

128. The nucleic acids RNA and DNA acquire their acidic property of their structure because of the presence of
a) Ribose or deoxyribose sugars
b) Phosphate group
c) Pyrimidine rings
d) Purine rings

129. The meiotic chromosomes of one of the following do not have crossing over
a) Female Drosophila melanogaster
b) Red eyed female Drosophila melanogaster
c) Male Drosophila melanogaster
d) Wingless female Drosophila melanogaster

130. The mean number of seeds produced per plant by two inbred lines are 69.8 and 45.4, respectively, and their F_1 hybrid produced 76.8 seeds plant. The heterosis over mid parent is
a) 19.2%
b) 20%
c) 33.3%
d) 57.6%

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) Texas cytoplasm
ii) Golden Rice
iii) Bacillus thuringiensis
iv) Ph locus

v) Ac-Ds

a) β-carotene
b) Transposable elements
c) CMS maize
d) Cotton bollworm resistance
e) Pairing of homeologous chromosomes

132.
i) Nucleoside
ii) Nucleotide
iii) Centimorgan
iv) Heterochromatin
v) RNAi

a) Map unit
b) Inactive genes
c) Gene silencing
d) Sugar + base + phosphate
e) Base + sugar

133.
i) Stop codon   a) UUU
ii) Transition mutation   b) AUG
iii) Phenylalanine   c) Purine to purine
iv) Initiation codon   d) Purine to pyrimidine
v) Transversion mutation   e) UGA

134.
i) Total variance   a) Mean of squares of deviation from the mean
ii) Trisomic   b) Prevention of cytokinesis
iii) Colchicine   c) Sum of all sources of genetic and environmental variation
iv) Variance   d) An organism with three sets of chromosomes
v) Triploid   e) A diploid organism with an extra copy of one of the chromosomes

135. Match the methods of genetic analysis with the name of associated scientists
i) Graphical analysis   a) Kearsey and Jinks (1968)
ii) Partial diallel analysis   b) Kempthorne (1957)
iii) Triple test cross analysis   c) Kempthorne and Curnow (1961)
iv) LxT analysis   d) Hayman (1954)
v) Varietal cross diallel   e) Gardner and Eberhart (1966)

136. Match the specific features of flowers/ modes of reproduction with respective crops
i) Protandry   a) Pea
ii) Cleistogamy   b) Rapeseed
iii) Protogyny   c) Banana
iv) Self-incompatibility   d) Maize
v) Parthenocarpy   e) Pearlmillet

137.
i) Leucoplasts   a) Protein synthesis
ii) Chromoplasts   b) Synthesis of carotenoid pigments
iii) Lysosomes   c) Grana and stroma lamella
iv) Ribosomes   d) Synthesis of starch
v) Chloroplasts   e) Digestion of intracellular and extra cellular particles

138.
i) Single seed descent   a) Doubled haploids
ii) Backcrossing   b) F_2
iii) Anther culture   c) RILs
iv) Bulk segregant analysis   d) SSRs
v) Microsatellites   e) NILs

139.
i) D^2 statistics   a) Influence of independent variables over dependent variables
ii) Mapping function   b) Genetic analysis of quantitative trait
iii) Interval mapping   c) Diversity analysis
iv) Path analysis   d) Recombination frequency and cM
v) Generation means   e) QTL analysis

140.
i) T_4 bacteriophage   a) A. Garrod
ii) Drosophila   b) E.R. Sears
iii) Rice breeding   c) Sturtevant
iv) Wheat genome   d) S. Benzer
v) Human metabolism   e) G.S. Khush

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. How is genetic distance measured by the test cross method?

142. In a population with 80 red and 20 white flowered plants, calculate the chi-square value to test if the segregation is in 3:1 ratio, chi-square value at 1 d.f (5% significance) is 3.84.

143. Logically and logistically describe the methodology you would adopt to transfer a gene KS1 from variety Donor 1 and KS2 from variety Donor 2 in the genetic background of Recipient 1 in 5 years with 2 crops per year.

144. RNA is considered as the progenitor of life. What are the possible evidences that support this hypothesis?

145. Indicate the genetic segregation ratio for following marker-population pair and explain why do you expect the respective segregation ratio:

    a) RFLP – DHS   b) AFLP – F_2s   c) RAPD – NILs – F_2s

    d) Microsatellite – RILs   e) CAPS – F_2s

146. Molecular divergence in general may not be a true reflection of hybrid performance, why? How do you think the molecular divergence based prediction of hybrid performance can be improved?