

(To be filled up by the candidate by blue/black ball-point pen)

Roll No.

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Roll No.

(Write the digits in words)

Serial No. of OMR Answer Sheet

Day and Date

(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES(Use only **blue/black ball-point pen** in the space above and on both sides of the Answer Sheet)

1. Within 10 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope*.
3. A separate Answer Sheet is given. *It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*
4. Write your *Roll Number and Serial Number of the Answer Sheet by pen* in the space provided above.
5. **On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.**
6. No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and also Roll No. and OMR Sheet No. on the Question Booklet.
7. Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.
8. Each question in this Booklet is followed by four alternative answers. *For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle* in the corresponding row of the Answer Sheet, by ball-point pen as mentioned in the guidelines given on the first page of the Answer Sheet.
9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed.* If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero mark).
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. Deposit *only the OMR Answer Sheet* at the end of the Test.
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, **he/she shall be liable to such punishment as the University may determine and impose on him/her.**

No. of Questions/प्रश्नों की संख्या : 120

Time/समय : 2 Hours/घण्टे

Full Marks/पूर्णांक : 360

Note : (1) Attempt as many questions as you can. Each question carries 3 marks. One mark will be deducted for each incorrect answer. Zero mark will be awarded for each unattempted question.

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक प्रश्न 3 अंक का है। प्रत्येक गलत उत्तर के लिए एक अंक काटा जाएगा। प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक शून्य होगा।

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

1. In diploids number of linkage groups is equal to

- (1) $2n$ (2) n (3) $3n$ (4) $4n$

2. To distinguish a double cross-over product, we need at least

- (1) two genes on a linkage group (2) three genes on a linkage group
(3) three genes on two linkage groups (4) four genes on a linkage group

3. In rice two dominant genes Rc and Rd are needed for red pericarp if one or both of these are in recessive state, the pericarp is white, this is known as
- (1) inhibitory . (2) supplementary
(3) duplicate. (4) complimentary
4. Relationship between chromosomes related by dissent in wheat are called
- (1) homologous chromosomes (2) homoeologus chromosomes
(3) heterologous chromosomes (4) orthologous chromosomes
5. A digenic test cross has a ratio of
- (1) 1:1:1:1 (2) 1:1 (3) 1:1:1 (4) 1
6. Absence of one whole chromosome from a diploid is called .
- (1) trisomic (2) tetrasomic
(3) monosomic (4) isochromosome
7. Which of the following organelles does not have RNA ?
- (1) Cytoplasm (2) Ribosome (3) Chromosome (4) Nucleolus
8. Opening of flowers after pollination has occurred
- (1) chasmogamy (2) cleistogamy
(3) Both (1) and (2) (4) homogamy

16. The operon hypothesis was proposed by

- (1) Watson and Crick
- (2) Beadle and Tatum
- (3) Jacob and Monod
- (4) Nirenberg and Khorana

17. Stroma and Grana are parts of

- (1) chloroplast
- (2) nucleus
- (3) mitochondria
- (4) lysosomes

18. In a cell, the main sites of respiration are

- (1) plastids
- (2) ribosomes
- (3) mitochondria
- (4) lysosomes

19. In a cell sites of protein synthesis are

- (1) plastids
- (2) mitochondria
- (3) ribosomes
- (4) lysosomes

20. Meiosis is also referred to as

- (1) equational division
- (2) homotypic division
- (3) reduction division
- (4) additional division

21. Segregation occurs during

- (1) mitosis
- (2) endomitosis
- (3) meiosis
- (4) prophase

22. The process of DNA synthesis from RNA is called

- (1) reverse translation
- (2) reverse transcription
- (3) transcription
- (4) reverse mutation

23. In mitosis, DNA synthesis takes place during
 (1) G_1 stage (2) S stage (3) G_2 stage (4) All of the above
24. Equal division of cytoplasm during mitosis is called
 (1) equational division (2) karyokinesis
 (3) cytokinesis (4) horizontal division
25. A chromosome with several centromeres is called
 (1) acentric (2) dicentric (3) polycentric (4) monocentric
26. The movement of chromosomes at anaphase is associated with
 (1) chromomere (2) centromere
 (3) telomere (4) synaptonemal complex
27. How many different genotypes can exist in a population with dominance hierarchy $g^a > g^b > g^c > g^d$?
 (1) 6 (2) 8 (3) 16 (4) 20
28. Inversion leads to alternation in
 (1) composition of genes (2) sequence of genes
 (3) number of genes (4) addition of bases
29. Translocation homozygotes lead to alternation in
 (1) gene number (2) sequence of genes
 (3) linkage map (4) linkage groups

30. Monoploids are represented by

- (1) x (2) $2x$ (3) n (4) $2n$

31. Allopolyploidy is referred to as

- (1) hybrid polyploidy (2) simple polyploidy
(3) segmental polyploidy (4) No ploidy

32. Laws of inheritance were discovered by Mendel in 1866 working with

- (1) *Drosophila* (2) Maize (3) Garden pea (4) *Neurospora*

33. A cross made between two inbreds by reversing the order of male and female parent is called

- (1) tests cross (2) back cross
(3) reciprocal cross (4) dominant cross

34. Recent controversy of a GM crop in India is

- (1) BT rice (2) BT brinjal (3) BT cotton (4) BT banana

35. Highly cross pollinated species among the following is

- (1) Maize (2) Rice (3) Wheat (4) Finger millet

36. A vegetatively propagated crop is

- (1) sugarcane (2) sweetcane (3) saltcane (4) bittercane

43. Transformation

- (1) converts DNA into RNA
- (2) converts RNA into proteins
- (3) joins two DNA fragments
- (4) digests DNA into fragments

44. DNA polymerases

- (1) join DNA fragments
- (2) replicate RNA
- (3) replicate DNA
- (4) synthesize DNA in 5' → 3' direction

45. Genome markers

- (1) must be repeat DNA sequences
- (2) can be any unique DNA sequence
- (3) are only used in genetic maps
- (4) must occur as multiple alleles

46. The basic principle of PCR is performed with

- (1) help of primers
- (2) help of RNA
- (3) restriction enzyme
- (4) double-stranded DNA

47. GM is

- (1) gene modified
- (2) genetically modified
- (3) gene multiplied
- (4) genesis modified

48. Success of Green Revolution is due to
- (1) development of dwarf varieties (2) funding from India
(3) use of only fertilizer (4) use of only pesticides
49. Plant DNA fingerprinting can be cost effectively carried out by
- (1) RFLP (2) AFLP (3) RAPD (4) SNP
50. Southern Blotting is performed for the transfer of
- (1) RNA (2) DNA (3) proteins (4) carbohydrates
51. Law of purity of gametes is also called as
- (1) law of segregation (2) dominance law
(3) law of independent assortment (4) law of assortment
52. Micro-propagation has direct relationship with
- (1) tissue culture (2) vermiculture (3) silviculture (4) sericulture
53. Two important components in tissue culture
- (1) chlorophyll and cytoplasm (2) auxins and gibberellins
(3) charcoal and alcohol (4) acetic acid and ascorbic acid
54. Gen gun is concerned with
- (1) transformation (2) electrophoration
(3) conjugation (4) callus formation.

55. Agrobacteria were isolated in

- (1) Bacillus (2) Tumefaciens (3) Crown galls (4) TI plasmids

56. Ring spot virus is predominantly seen in

- (1) papaya (2) pomegranate (3) potato (4) peanut

57. Which country recently permitted the cultivation of BT rice?

- (1) Sri Lanka (2) South Korea (3) India (4) China

58. First food product of Biotechnology is

- (1) cheese (2) orange (3) brinjal (4) apple

59. BT brinjal field trials in India were first carried out by

- (1) Indian company (2) American company
(3) German company (4) Australian company

60. Main architects behind Golden rice are

- (1) Ingo Potrykus and Peter Beyer
(2) M. S. Swaminathan and G. S. Kush
(3) G. S. Kush and Robert Ziegler
(4) Robert Ziegler and M. S. Swaminathan

61. Which one of the following enzyme was isolated from bacteria?

- (1) Taq polymerase (2) dNTP polymerase
(3) Exon polymerase (4) Taq isomerase

62. The nucleotide sequence present in DNA sequence is
(1) ATPG (2) ATGC (3) AGCU (4) AUTC
63. Which of the following pairs of sequences contain a Single Nucleotide Polymorphism (SNP)?
(1) AAGGCTAA and AAGGCTAA (2) AAGGCTAA and AAGGCTGG
(3) AAGGCTAA and ATGGCTAA (4) GGGGGGGG and TTTTTTTT
64. Standard gel electrophoresis of DNA separates DNA fragments based upon
(1) charge differences
(2) sequence differences at one nucleotide
(3) size differences
(4) type of DNA
65. Agarose is a
(1) polysaccharide (2) polydeccaharide
(3) polyacrylamide (4) polyamide
66. AIDS virus can be detected by
(1) FCR (2) PCCR (3) PCR (4) TCR
67. Callus is an undifferentiated mass of
(1) bacterial cell (2) fungal cell (3) algal cell (4) plant cell

- 68.** The segment of gene that codes for protein is
(1) intron (2) exon (3) exen (4) nion
- 69.** LCR refers to
(1) Locus Control Region (2) Locus Control Receptor
(3) Locus Control Regulator (4) Locus Control Reactor
- 70.** Plant protein that specifically bind carbohydrates is
(1) peptin (2) lectin (3) lactin (4) mysocine
- 71.** MAS in plant breeding refers to
(1) Marker Associated Selection (2) Marker Assisted Selection
(3) Marker Free Selection (4) Marker Added Selection
- 72.** Protein that oversees the correct binding of other proteins is
(1) molecular neutrons (2) molecular cutters
(3) molecular chaperone (4) molecular scissors
- 73.** Running several PCR reactions with different primers in the same tube is
(1) multiplex PCR (2) RT-PCR (3) long PCR (4) reverse PCR
- 74.** An enzyme that uses single-stranded RNA as a template for making double-stranded DNA is called
(1) reverse transcriptase (2) reverse transase
(3) reverse phosphatase (4) reverse criptase

75. A vector that can survive in and be moved between more than one types of host cell is
 (1) T-tailed vector (2) shuttle vector (3) moving vector (4) labelled vector
76. An area of Microbiology that is concerned with the occurrence of disease in human population is
 (1) Immunology (2) Parasitology
 (3) Epidemiology (4) Bioremediation
77. Which process involves the deliberate alteration of an organism's genetic material?
 (1) Bioremediation (2) Biotechnology
 (3) Decomposition (4) Recombinant DNA
78. Which is the correct order of the taxonomic categories, going from most specific to most general?
 (1) Domain, kingdom, phylum, class, order, family, genus, species
 (2) Division, domain, kingdom, class, family, genus, species
 (3) Species, genus, family, order, class, phylum, kingdom, domain
 (4) Species, family, class, order, phylum, kingdom
79. Family of proteins involved in second messenger cascades
 (1) G protein (2) P protein (3) M protein (4) T protein
80. DNA sequence found within genes that are involved in the regulation of patterns of development (morphogenesis) in animals, fungi and plants are called
 (1) Homeobox (2) Heterobox (3) Homebox (4) Heterobox

81. DNA methylation involves the
- (1) deletion of methyl group
 - (2) addition of methyl group
 - (3) neither deletion nor addition
 - (4) addition of ethyl group
82. RI technology refers to
- (1) RNA interfectance
 - (2) RNA interchange
 - (3) RNA interference
 - (4) RNA interleucence
83. Small infectious nucleic acid that does not have a protein coat is
- (1) celluloid
 - (2) viroid
 - (3) vivid
 - (4) mucoid
84. Enzyme that changes the topology of DNA by nicking and resealing one strand of DNA is
- (1) Topoisamerase I
 - (2) Topoisamerase II
 - (3) Topoisamerase III
 - (4) Topoisamerase IV
85. Movement of a transposon to a new site in the genome is called
- (1) transposition
 - (2) transduction
 - (3) transcription
 - (4) translation
86. Receptor that moves small molecules across the plasma membrane is called
- (1) transfactor
 - (2) transporter
 - (3) transvector
 - (4) translator
87. Complex responsible transporting proteins from the intermembrane space into the interior of the organelle is
- (1) TIM complex
 - (2) TIC complex
 - (3) TAM complex
 - (4) TRI complex

88. Which episome of the bacterium *Agrobacterium tumefaciens* that carries the genes responsible for the induction of crown gall disease in infected plants?
- (1) Golgi complex (2) Ti plasmid (3) Ri plasmid (4) Pi plasmid
89. Subunit of transcription factor TFIID that binds to DNA
- (1) Tata folding protein (2) Tata releasing protein
(3) Tata binding protein (4) Tata unwinding protein
90. Relationship between chromosomal regions of different species where homologous genes occur in the same order is called
- (1) Monocotmy (2) Synteny (3) Parasynteny (4) Synonym
91. Which DNA describes sequences that do not contribute to the genotype of the organism?
- (1) Replicating DNA (2) Genomic DNA
(3) Amplified DNA (4) Selfish DNA
92. RTK is an abbreviation for
- (1) Receptor Tyrosine Kinase (2) Receptor Trypsin Kinase
(3) Receptor Tyrosine Kinatase (4) Receptor Trypsin Kenetic
93. Enzyme that functions in tRNA splicing is
- (1) RNA ligase (2) RNA galactase
(3) RNA lactase (4) RNA lucase

94. RNA virus with the ability to convert its sequence into DNA by reverse transcription is in
- (1) tobacco mosaic virus (2) retrovirus
(3) ring spot virus (4) provirus
95. Short stretches of 1000–2000 bases produced during discontinuous replication of
- (1) exons (2) transposons
(3) introns (4) Okazaki fragments
96. Which enzyme is responsible for a site-specific recombination?
- (1) Integrase (2) Intergrase (3) Innase (4) Invertase
97. A genetic unit that codes for the amino acid sequence of a complete polypeptide chain is closely related to
- (1) an anticodon (2) a promoter (3) a gene (4) a codon
98. Given the antisense strand DNA codon 3' TAC 5' the anticodon that pairs with the corresponding mRNA codon could be
- (1) 3' C 5' (2) 5' TAC 3' (3) 3' UAC 5' (4) 5' TAC 3'
99. Which of the following is not a characteristic of cellular RNA ?
- (1) Contains uracil
(2) Is single stranded
(3) Is much shorter than DNA
(4) Serves as template for its own synthesis

- 100.** A mutation in the codon UCG to UAG is described as
- (1) missense mutation (2) neutral mutation
(3) nonsense mutation (4) frame shift mutation
- 101.** An amino acid that cannot participate in alpha helical formation is
- (1) proline (2) histidine (3) phenylalanine (4) threonine
- 102.** A coding system in which each word may be coded by a variety of symbols or groups of letters is said to be
- (1) archaic (2) redundant (3) degenerate (4) polysyllabic
- 103.** An amino-acyl synthetase is responsible for
- (1) formation of peptide bond
(2) attaching an amino group to an organic group
(3) movement of tRNA molecule from A to P site on a ribosome
(4) joining an amino acid to a tRNA
- 104.** The step in the flow of genetic information where in DNA is copied into mRNA is called
- (1) translation (2) transformation
(3) replication (4) transcription
- 105.** The growing polypeptide chain is first attached to a tRNA molecule in which site of the ribosome?
- (1) A site (2) B site (3) P site (4) Active site

106. First protein sequenced is

- (1) inuline (2) insulin (3) imminoglobin (4) albumin

107. First enzyme extracted in crystalline form

- (1) invertase (2) maltase (3) urease (4) amylase

108. Central dogma of molecular genetics was proposed by

- (1) Watson (2) Crick (3) Morgan (4) Pasteur

109. The K_m value of enzyme is

- (1) enzyme concentration (2) substrate concentration
(3) rate of reaction (4) activation time

110. Human chromosome number was first given by

- (1) Mcclung (2) Brener and Horne
(3) Tjio and Levan (4) Crick

111. DNA in bacteria is a

- (1) circular Ds DNA (2) circular Ss DNA
(3) linear Ds DNA (4) linear Ss DNA

112. The genetic material of Prions is

- (1) RNA (2) DNA (3) lipids (4) proteins

113. Two poly nucleotide chains of DNA are linked by
 (1) hydrogen bond (2) phosphodiester bond
 (3) peptide bond (4) glycoside bond
114. Genes for rRNA synthesis is present in
 (1) nucleolus (2) telomere (3) centromere (4) pellicle
115. Non-epistatic interaction was given by
 (1) Morgan (2) Sturtevent
 (3) Boteson and Punnet (4) Sutton and Boveri
116. Linkage can be detected by
 (1) only test cross (2) only F_2 data
 (3) Both test cross and F_2 data (4) reciprocal cross
117. Which of the following is not characteristic of most mRNA processing in eukaryotes?
 (1) Addition of a poly A tail at 3' end
 (2) Addition of an unusual guanine to the 5' end
 (3) Removal of leader and trailer sequences
 (4) Deletion intons
118. Transduction was given by
 (1) Beadle and Tatum (2) Zinder and Lederberg
 (3) Lederberg and Tatum (4) Avery-MacLeod and McCarty

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119. 1% recombination frequency is equal to

- (1) 1 map unit (2) 10 map units (3) 0.5 map unit (4) 100 map units

120. The size of mutan in Benzer fine structure of gene is

- (1) 1 bp (2) 10 bp (3) 100 bp (4) 1000 bp

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण-पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली या काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 10 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में लिफाफा रहित प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा, केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।
5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्न-पुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्न-पुस्तिका पर अनुक्रमांक सं० और ओ० एम० आर० पत्र सं० की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिये आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिये केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो सम्बन्धित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ़ कार्य के लिये प्रश्न-पुस्तिका के मुखपृष्ठ के अन्दर वाले पृष्ठ तथा अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त केवल ओ०एम०आर० उत्तर-पत्र परीक्षा भवन में जमा कर दें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।