Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Second Semester)
(NEP) EXAMINATION, 2025-26

BOTANY

(Cytogenetics & Basic Molecular Biology)

Paper Code							
B	0	4	0	8	0	3	T

Questions Booklet Series
C

Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

(Only for Rough Work)

1. Molecular chaperones assist proteins by :

(A) Helping correct folding of newly synthesized proteins

(B) Destroying them

(C) Replicating DNA

(D) Transcribing RNA

2. Protein folding into its functional conformation is essential because :

(A) It replicates DNA

(B) Structure determines protein function

(C) RNA forms ribosomes

(D) DNA mutates

3. Post-translational modification may include :

(A) DNA replication

(B) Phosphorylation, glycosylation, or cleavage

(C) RNA splicing

(D) Gene mutation

4. Termination of translation occurs when :

(A) Ribosome reaches promoter

(B) RNA degrades

(C) DNA mutates

(D) Stop codon is recognized by release factors

5. The P site of the ribosome holds :

(A) Incoming tRNA

(B) Empty tRNA

(C) tRNA carrying the growing polypeptide chain

(D) DNA

6. The A site of the ribosome binds :

(A) Growing peptide chain

(B) Incoming aminoacyl-tRNA

(C) Released tRNA

(D) mRNA

7. Peptide bond formation during translation is catalyzed by :

(A) DNA polymerase

(B) Peptidyl transferase activity of rRNA

(C) tRNA enzyme

(D) Helicase

8. The ribosome contains how many functional sites for tRNA binding?

(A) One

(B) Two

(C) Three (A, P, E sites)

(D) Four

9. During translation initiation in eukaryotes, the ribosome recognizes :

(A) Stop codon

(B) Start codon (AUG)

(C) Anticodon

(D) DNA sequence

10. The genetic code is described as degenerate because :

(A) Codons overlap

(B) Proteins repeat

(C) Codons mutate

(D) More than one codon codes for the same amino acid

11. Telomerase maintains chromosome stability by :

(A) Destroying telomeres

(B) Extending telomeric DNA sequences

(C) Replicating RNA

(D) Producing histones

12. Proofreading activity during replication is performed by :

(A) RNA polymerase

(B) DNA polymerase

(C) DNA ligase

(D) Helicase

13. DNA repair mechanisms are important because they :

(A) Destroy damaged DNA

(B) Increase mutation rate

(C) Maintain genetic stability

(D) Stop transcription

14. Ribosomal RNA primarily functions in :

(A) DNA replication

(B) Formation and catalytic activity of ribosomes

(C) Gene mutation

(D) Chromosome segregation

15. The anticodon of tRNA pairs with :

(A) mRNA codon

(B) DNA codon

(C) rRNA

(D) Protein

16. Transcription involves synthesis of :

(A) DNA from RNA

(B) RNA from DNA template

(C) Protein from RNA

(D) DNA from protein

17. DNA ligase functions to :

(A) Break DNA

(B) Join DNA fragments together

(C) Replicate DNA

(D) Synthesize RNA

18. Okazaki fragments are produced during replication of :

(A) Leading strand

(B) RNA strand

(C) Lagging strand

(D) Template strand

19. DNA polymerase requires which molecule to initiate synthesis?

(A) DNA ligase

(B) Helicase

(C) RNA primer

(D) Histone

20. DNA replication is called semi-conservative because :

(A) DNA is partially destroyed

(B) Each daughter molecule contains one parental strand

(C) Both strands are new

(D) Replication occurs once

21. Enhancers are :

(A) Protein molecules

(B) Lipid molecules

(C) RNA sequences

(D) DNA sequences increasing transcription

22. Gene regulation in prokaryotes is mainly at :

(A) Transcription

(B) Translation

(C) Replication

(D) Mutation

23. Repressor protein binds to :

(A) Promoter

(B) Terminator

(C) Enhancer

(D) Operator

24. Structural genes code for :

(A) RNA only

(B) Proteins

(C) Lipids

(D) Carbohydrates

25. Operator site is part of :

(A) Ribosome

(B) Chromosome

(C) Operon

(D) Histone

26. Regulatory genes control :

(A) Protein structure

(B) Gene expression

(C) DNA replication

(D) Mutation

27. The lac operon is found in :

(A) Yeast

(B) Plants

(C) Bacteria

(D) Humans

28. Prokaryotic genes are often organized into :

(A) Introns

(B) Operons

(C) Exons

(D) Chromatids

29. The fine structure of gene was explained by :

(A) Watson

(B) Mendel

(C) Darwin

(D) Benzer

30. A gene is defined as :

(A) Protein unit

(B) DNA segment coding for functional product

(C) RNA unit

(D) Chromosome

31. Mutation can result in :

(A) Genetic variation

(B) Cell death only

(C) No effect

(D) Protein loss only

32. Site directed mutagenesis is used to :

(A) Destroy DNA

(B) Introduce specific mutations

(C) Repair DNA

(D) Stop replication

33. EMS is a :

(A) Chemical mutagen

(B) Physical mutagen

(C) Biological mutagen

(D) Radiation

34. Mutations useful in crop improvement are called :

(A) Induced mutations

(B) Natural mutations

(C) Harmful mutations

(D) Silent mutations

35. Addition or deletion of bases causing reading shift is :

(A) Substitution

(B) Neutral mutation

(C) Silent mutation

(D) Frameshift mutation

36. A mutation that changes one base pair is :

(A) Frameshift

(B) Deletion

(C) Chromosomal mutation

(D) Point mutation

37. Mutagens are agents that :

(A) Repair DNA

(B) Induce mutations

(C) Destroy RNA

(D) Form proteins

38. UV radiation causes :

(A) Thymine dimers

(B) Adenine dimers

(C) Guanine dimers

(D) Cytosine dimers

39. Mutation caused by chemicals is :

(A) Physical mutation

(B) Chemical mutation

(C) Genetic mutation

(D) Natural mutation

40. A sudden heritable change in DNA is called :

(A) Replication

(B) Translation

(C) Mutation

(D) Transcription

41. Polyploidy has been widely used in plant breeding because it :

(A) Reduces variation

(B) Stops mutation

(C) Increases genetic diversity and vigor

(D) Prevents meiosis

42. Structural chromosomal mutations primarily affect :

(A) RNA structure

(B) Arrangement of genes on chromosomes

(C) Ribosome activity

(D) Protein folding

43. Translocation heterozygotes may produce reduced fertility due to :

(A) DNA mutation

(B) RNA processing errors

(C) Protein synthesis errors

(D) Abnormal segregation of chromosomes during meiosis

44. A condition in which one chromosome of a pair is missing is called :

(A) Trisomy

(B) Polyploidy

(C) Monosomy

(D) Tetrasomy

45. Polyploid plants often show increased size due to :

(A) Increased RNA synthesis

(B) Increased cell size (gigantism)

(C) Faster DNA repair

(D) Higher mutation rate

46. Allopolyploidy is commonly formed through :

(A) Mutation within a species

(B) Hybridization between two different species followed by chromosome doubling

(C) DNA replication failure

(D) Deletion of chromosomes

47. Autopolyploidy arises from :

(A) Hybridization of different species

(B) Multiplication of chromosome sets from the same species

(C) Loss of chromosomes

(D) Gene duplication only

48. Aneuploid organisms arise mainly due to :

(A) DNA replication errors

(B) RNA transcription errors

(C) Non-disjunction of chromosomes during meiosis

(D) Mutation in genes

49. A paracentric inversion differs from a pericentric inversion because it :

(A) Includes the centromere.

(B) Occurs only in plants

(C) Does not include the centromere

(D) Occurs only during mitosis

50. A chromosomal aberration that results from unequal crossing over during meiosis is most likely to produce :

(A) Duplication

(B) Inversion

(C) Translocation

(D) Aneuploidy

51. Gene interaction often modifies the classical Mendelian ratio due to :

(A) Mutation

(B) Interaction between different genes affecting phenotype

(C) DNA repair

(D) Protein synthesis

52. Mitochondrial DNA inheritance is important because it :

(A) Controls ribosomes

(B) Encodes proteins for respiration

(C) Produces histones

(D) Forms chromosomes

53. A cross between two heterozygous individuals produces a phenotypic ratio of :

(A) 1 : 1

(B) 3 : 1

(C) 9 : 3 : 3 : 1

(D) 1 : 2 : 1

54. Multiple alleles occur because :

(A) A gene has more than two alternative forms in a population

(B) Many chromosomes exist

(C) DNA is duplicated

(D) Genes mutate simultaneously

55. Recombination frequency is used to :

(A) Identify proteins

(B) Map gene distances on chromosomes

(C) Measure RNA synthesis

(D) Determine mutation rate

56. Linkage reduces genetic recombination because :

(A) Genes mutate

(B) RNA interferes

(C) DNA replicates faster

(D) Genes are located close together on the same chromosome

57. Cytoplasmic inheritance differs from nuclear inheritance because it is :

(A) Biparental

(B) Usually maternally inherited

(C) Random

(D) Dominant

58. A test cross is useful in determining :

(A) Mutation rate

(B) Gene sequence

(C) Chromosome number

(D) Genotype of a dominant phenotype organism

59. Epistasis occurs when :

(A) Alleles segregate independently

(B) One gene masks the expression of another gene

(C) Chromosomes mutate

(D) DNA replicates

60. Mendel's law of independent assortment applies to genes that are :

(A) On the same chromosome

(B) On different chromosomes or far apart on the same chromosome

(C) Dominant only

(D) Recessive only

61. Exons are :

(A) Coding regions of genes

(B) Non-coding DNA

(C) Satellite DNA

(D) Regulatory DNA

62. Introns are :

(A) Coding sequences

(B) Protein sequences

(C) Non-coding sequences

(D) Ribosomal genes

63. Repetitive DNA may function in :

(A) Chromosome structure

(B) Protein synthesis

(C) Lipid formation

(D) Respiration

64. Satellite DNA is usually found in :

(A) Telomeres

(B) Ribosomes

(C) Centromeric regions

(D) Cytoplasm

65. Genome size is usually measured in :

(A) Nanometers

(B) Base pairs

(C) Kilograms

(D) Microns

66. Overlapping genes share :

(A) Different chromosomes

(B) Common DNA sequences

(C) Same proteins

(D) Same RNA

67. Genes containing introns and exons are called :

(A) Structural genes

(B) Overlapping genes

(C) Split genes

(D) Silent genes

68. Non-functional copies of genes are known as :

(A) Introns

(B) Pseudogenes

(C) Operons

(D) Exons

69. Highly repetitive DNA sequences are called :

(A) Coding DNA

(B) Introns

(C) Gene clusters

(D) Satellite DNA

70. The paradox that genome size does not correlate with organism complexity is called :

(A) Genome paradox

(B) DNA paradox

(C) C-value paradox

(D) Gene paradox

71. Fluorescent banding techniques are used in :

(A) PCR

(B) Karyotyping

(C) Translation

(D) Replication

72. Chromosome banding techniques were developed mainly for :

(A) Cytogenetic analysis

(B) Gene cloning

(C) Protein synthesis

(D) DNA sequencing

73. Dark G-bands represent :

(A) GC rich regions

(B) AT rich regions

(C) RNA rich regions

(D) Protein rich regions

74. Banding patterns help in detecting :

(A) Enzymes

(B) Lipids

(C) Proteins

(D) Chromosomal abnormalities

75. R-banding produces bands that are :

(A) Same as G bands

(B) Reverse of G bands

(C) Random

(D) Non-specific

76. Chromosome banding is mainly used for :

(A) Protein synthesis

(B) Chromosome identification

(C) DNA replication

(D) Mutation repair

77. Q-banding uses :

(A) Quinacrine dye

(B) Giemsa dye

(C) Ethidium bromide

(D) Acridine orange

78. C-banding specifically stains :

(A) Constitutive heterochromatin

(B) Euchromatin

(C) Centromeres only

(D) Telomeres

79. G banding uses :

(A) Acridine orange

(B) Giemsa stain

(C) Crystal violet

(D) Safranin

80. The most common chromosome banding technique is :

(A) C banding

(B) Q banding

(C) G banding

(D) R banding

81. The "beads-on-a-string" model describes :

(A) Ribosome structure

(B) Gene mutation

(C) Nucleosome arrangement on-DNA

(D) RNA folding

82. The interaction between histone tails and DNA contributes to :

(A) DNA replication

(B) Chromatin compaction

(C) Protein synthesis

(D) Mutation

83. Constitutive heterochromatin is typically found at :

(A) Promoters

(B) Ribosomes

(C) Introns

(D) Centromeres and telomeres

84. Chromatin remodeling complexes primarily function to :

(A) Destroy histones

(B) Reposition nucleosomes to regulate transcription

(C) Replicate DNA

(D) Repair RNA

85. Histone acetylation generally leads to :

(A) Increased gene expression

(B) DNA condensation

(C) DNA degradation

(D) Chromosome breakage

86. The 30 nm chromatin fiber results from :

(A) DNA replication

(B) Coiling of nucleosome chains

(C) RNA synthesis

(D) Chromosome mutation

87. Heterochromatin is usually associated with :

(A) Active genes

(B) Ribosome synthesis

(C) Gene silencing

(D) RNA processing

88. Euchromatin is transcriptionally active mainly because it is :

(A) Highly methylated

(B) Less condensed and accessible to RNA polymerase

(C) Lacking histones

(D) Located outside nucleus

89. Histones bind DNA primarily through :

(A) Hydrogen bonding with bases

(B) Hydrophobic interactions

(C) Covalent bonding

(D) Electrostatic interaction with negatively charged DNA

90. The nucleosome core particle contains :

(A) Six histones

(B) Eight histone proteins (octamer)

(C) Ten histones

(D) Four histones

91. The spindle apparatus is made of :

(A) Actin

(B) Myosin

(C) Microtubules

(D) Chromatin

92. Programmed cell death is called :

(A) Necrosis

(B) Apoptosis

(C) Senescence

(D) Autolysis

93. The longest phase of the cell cycle is :

(A) Interphase

(B) Prophase

(C) Metaphase

(D) Anaphase

94. Separation of sister chromatids occurs during :

(A) Metaphase

(B) Prophase

(C) Anaphase

(D) Telophase

95. Chromosomes align at the equatorial plate during :

(A) Metaphase

(B) Prophase

(C) Anaphase

(D) Telophase

96. Cytokinesis in plant cells occurs by formation of :

(A) Cleavage furrow

(B) Cell plate

(C) Chromosome plate

(D) Spindle fibers

97. The protein responsible for regulating the cell cycle is :

(A) Histone

(B) Cyclin

(C) Actin

(D) Tubulin

98. The checkpoint that ensures DNA replication is complete before mitosis begins is :

(A) G_1 checkpoint

(B) S checkpoint

(C) M checkpoint

(D) G_2 checkpoint

99. The process by which a cell divides into two identical daughter cells is called :

(A) Meiosis

(B) Cytokinesis

(C) Mitosis

(D) Replication

100. The phase of the cell cycle in which DNA replication occurs is :

(A) G_1 phase

(B) S phase

(C) G_2 phase

(D) M phase

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।