Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Biotechnology) (Second Semester)
(NEP) EXAMINATION, 2025-26
MOLECULAR BIOLOGY AND GENETICS

Paper Code						
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Questions Booklet Series
A

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. Which enzyme has both 5′-3′ polymerase and 5′-3′ exonuclease activity ?

(A) DNA Pol I

(B) DNA Pol III

(C) Ligase

(D) Primase

2. In prokaryotes, leading and lagging strand synthesis are coordinated by :

(A) Single polymerase

(B) Helicase

(C) Ligase

(D) Dimeric DNA Pol III holoenzyme

3. Okazaki fragment length in eukaryotes is shorter because of :

(A) Faster replication

(B) More ligase

(C) Higher temperature

(D) Chromatin structure

4. Sliding clamp increases :

(A) Fidelity

(B) Processivity

(C) Speed only

(D) Proofreading

5. Which repair mechanism removes thymine dimers in dark ?

(A) Photoreactivation

(B) BER

(C) NER

(D) SOS

6. SOS response is induced by :

(A) DNA damage

(B) RNA damage

(C) Protein folding

(D) Lipid damage

7. Leading strand synthesis is continuous due to :

(A) Same direction as fork

(B) Opposite direction

(C) No primer

(D) No enzyme

8. Primosome includes :

(A) Exonuclease

(B) Ligase + polymerase

(C) RNA + DNA

(D) Primase + helicase

9. Fidelity of DNA replication is highest due to :

(A) Speed

(B) Proofreading + mismatch repair

(C) Ligase

(D) Helicase

10. DNA ligase uses :

(A) ATP

(B) NAD (prokaryotes)

(C) Both (A) and (B)

(D) None of the above

11. Beta clamp is involved in :

(A) Initiation

(B) Elongation

(C) Termination

(D) Repair

12. Nucleotide excision repair recognizes :

(A) Base mismatch

(B) Protein error

(C) RNA damage

(D) Helix distortion

13. Replication origin in bacteria is rich in :

(A) GC

(B) CG

(C) AU

(D) AT

14. Telomerase is active in :

(A) Somatic cells

(B) Germ cells

(C) RBC

(D) Platelets

15. Okazaki fragments require :

(A) One primer

(B) No primer

(C) Multiple primers

(D) DNA primer only

16. DNA Pol III proofreading direction :

(A) 5′-3′

(B) 3′-5′

(C) Both (A) and (B)

(D) None of the above

17. BER removes :

(A) Bulky lesions

(B) RNA

(C) Large deletions

(D) Single damaged base

18. Which enzyme prevents supercoiling ahead of the replication fork during replication ?

(A) Helicase

(B) Ligase

(C) Topoisomerase

(D) Primase

19. Helicase moves along DNA in :

(A) $3' \rightarrow 5'$

(B) $5' \rightarrow 3'$

(C) Both (A) and (B)

(D) Random

20. DNA Pol II is mainly involved in :

(A) Replication

(B) Transcription

(C) Repair

(D) Translation

21. Sigma factor recognizes :

(A) Terminator

(B) Promoter

(C) Enhancer

(D) Operator

22. RNA polymerase lacks :

(A) Catalytic activity

(B) Movement along DNA

(C) Binding to DNA

(D) Proofreading

23. Rho protein functions as :

(A) Helicase

(B) Ligase

(C) Polymerase

(D) Repressor

24. Eukaryotic RNA Pol II transcribes :

(A) rRNA

(B) tRNA

(C) mRNA

(D) U6snRNA

25. 5′ cap protects mRNA from :

(A) Polymerase

(B) Exonuclease

(C) Ligase

(D) Helicase

26. Alternative splicing increases :

(A) DNA content

(B) Stability

(C) RNA length

(D) Protein diversity

27. Poly-A tail is added by :

(A) RNA polymerase

(B) Ligase

(C) Poly-A polymerase

(D) Helicase

28. snRNPs recognize :

(A) Exons

(B) Splice sites

(C) Promoters

(D) Terminators

29. RNA editing involves :

(A) Base substitution

(B) Base insertion/deletion

(C) Both (A) and (B)

(D) None of the above

30. The Rho-independent termination involves :

(A) Protein

(B) Ligase

(C) DNA break

(D) Hairpin loop

31. Transcription bubble size is about :

(A) 5 bp

(B) 17 bp

(C) 50 bp

(D) 100 bp

32. CTD tail of RNA Pol II is involved in :

(A) Replication

(B) Repair

(C) Translation

(D) RNA processing

33. mRNA export requires :

(A) Ribosome

(B) Ligase

(C) Transport proteins

(D) Helicase

34. Introns are removed in :

(A) Cytoplasm

(B) Ribosome

(C) Nucleus

(D) ER

35. Spliceosome contains :

(A) DNA

(B) Lipid

(C) Protein only

(D) RNA + protein

36. Transcription direction is :

(A) 3′-5′

(B) 5′-3′

(C) Both (A) and (B)

(D) None of the above

37. Enhancers act :

(A) Upstream/downstream

(B) Only upstream

(C) Only downstream

(D) None of the above

38. mRNA stability depends on :

(A) Poly-A tail

(B) Cap

(C) Both (A) and (B)

(D) None of the above

39. TATA box is recognized by :

(A) TBP

(B) RNA Pol

(C) Ligase

(D) Helicase

40. RNA Pol I synthesizes :

(A) mRNA

(B) snRNA

(C) tRNA

(D) rRNA

41. The fidelity of translation is primarily ensured by :

(A) Ribosomal RNA

(B) Initiation factors

(C) Aminoacyl-tRNA synthetase

(D) Peptidyl transferase

42. Mis-acylation of tRNA leads to :

(A) Wrong codon recognition

(B) Incorrect amino acid incorporation

(C) Ribosome stalling

(D) mRNA degradation

43. Wobble base pairing occurs between :

(A) First codon-first anticodon

(B) Second codon-second anticodon

(C) Third codon-first anticodon

(D) First codon-third anticodon

44. Shine-Dalgarno sequence is recognized by :

(A) 50S subunit

(B) Initiation factor IF2

(C) tRNA

(D) 16S rRNA

45. In eukaryotes, Kozak sequence functions in :

(A) Termination

(B) Initiation

(C) Elongation

(D) Splicing

46. Peptidyl transferase activity resides in :

(A) Protein enzyme

(B) DNA

(C) tRNA

(D) rRNA (ribozyme)

47. Translocation of ribosome on mRNA requires :

(A) ATP

(B) NADH

(C) GTP

(D) $FADH_2$

48. Which antibiotic blocks translocation ?

(A) Tetracycline

(B) Chloramphenicol

(C) Erythromycin

(D) Streptomycin

49. Stop codon recognition involves :

(A) tRNA

(B) Ligase

(C) rRNA

(D) Release factor

50. Frameshift mutation affects :

(A) Single amino acid

(B) Only stop codon

(C) Entire downstream sequence

(D) Only start codon

51. Charging of tRNA requires :

(A) ATP

(B) GTP

(C) NAD

(D) FAD

52. Polysome formation indicates :

(A) Low translation

(B) High translation

(C) No translation

(D) RNA degradation

53. Kinetic proofreading in translation occurs at :

(A) A site

(B) P site

(C) E site

(D) Exit tunnel

54. N-formyl methionine is found in :

(A) Eukaryotes

(B) Prokaryotes

(C) Both (A) and (B)

(D) None of the above

55. Glycosylation occurs in :

(A) Cytoplasm

(B) Ribosome

(C) Nucleus

(D) ER/Golgi

56. Protein folding is assisted by :

(A) Ligase

(B) Helicase

(C) Chaperones

(D) Polymerase

57. Degeneracy reduces :

(A) Mutation effect

(B) Translation speed

(C) Protein length

(D) RNA stability

58. Which site in the ribosome exits deacylated tRNA ?

(A) A site

(B) P site

(C) E site

(D) T site

59. Initiation complex requires :

(A) IFS + GTP

(B) Ligase

(C) Helicase

(D) Polymerase

60. UAA codon is recognized by :

(A) tRNA

(B) DNA polymerase

(C) rRNA

(D) RF1/RF2

61. Lac operon is negatively regulated by :

(A) CAP

(B) Activator

(C) Enhancer

(D) Repressor

62. cAMP levels increase when :

(A) Glucose is high

(B) Glucose is low

(C) Lactose is high

(D) Oxygen is low

63. CAP binds to :

(A) Operator

(B) Promoter

(C) CAP site

(D) Terminator

64. Trp operon attenuation depends on :

(A) Secondary structure in mRNA

(B) DNA structure

(C) RNA stability

(D) Protein folding

65. Operator region binds :

(A) RNA polymerase

(B) Ligase

(C) Activator

(D) Repressor

66. Enhancers function by :

(A) Binding repressors

(B) Degrading RNA

(C) Increasing transcription

(D) Blocking ribosomes

67. DNA methylation leads to :

(A) Activation

(B) Repression

(C) Translation

(D) Mutation

68. Histone acetylation causes :

(A) Tight chromatin

(B) Mutation

(C) DNA break

(D) Open chromatin

69. siRNA mediates :

(A) Translation

(B) DNA repair

(C) RNA degradation

(D) Splicing

70. miRNA mainly causes :

(A) DNA mutation

(B) Translational repression

(C) Replication

(D) Splicing

71. Antisense RNA binds to :

(A) DNA

(B) Protein

(C) mRNA

(D) Lipid

72. Silencers bind :

(A) Ligase

(B) Activators

(C) Repressors

(D) Polymerase

73. Eukaryotic transcription factors bind :

(A) DNA

(B) RNA

(C) Protein

(D) Lipid

74. Epigenetic changes are :

(A) DNA sequence change

(B) Random

(C) Temporary

(D) Heritable without sequence change

75. Operon concept applies to :

(A) Eukaryotes

(B) Prokaryotes

(C) Both (A) and (B)

(D) None of the above

76. Trp operon is :

(A) Inducible

(B) Repressible

(C) Constitutive

(D) Silent

77. Promoter strength affects :

(A) Translation

(B) Repair

(C) Replication

(D) Transcription rate

78. RNAi pathway involves :

(A) Dicer enzyme

(B) Ligase

(C) Polymerase

(D) Helicase

79. Cis-elements are :

(A) Proteins

(B) Lipids

(C) RNA

(D) DNA sequences

80. Trans-acting factors are :

(A) DNA

(B) Lipids

(C) Proteins

(D) RNA only

81. Linkage reduces :

(A) Recombination

(B) Mutation

(C) Replication

(D) Transcription

82. Recombination frequency is :

(A) Always less than or equal to 50%

(B) Always greater than 50%

(C) Always 100%

(D) Zero

83. Crossing over occurs during :

(A) Prophase I

(B) Metaphase

(C) Anaphase

(D) Telophase

84. Genetic Map distance unit is :

(A) Morgan

(B) Centimorgan

(C) Base pair

(D) Dalton

85. Complete linkage means :

(A) 0% recombination

(B) 50% recombination

(C) 100% recombination

(D) Random

86. Interference affects :

(A) Crossing over frequency

(B) Mutation

(C) Replication

(D) Transcription

87. Sex-linked traits are on :

(A) Autosomes

(B) Mitochondria

(C) Sex chromosomes

(D) RNA

88. X-inactivation is :

(A) Random

(B) Fixed

(C) Permanent

(D) Temporary

89. Barr body is :

(A) Active X

(B) Inactive X

(C) Y chromosome

(D) DNA fragment

90. Dosage compensation ensures :

(A) Equal gene expression

(B) Mutation

(C) Replication

(D) Transcription stop

91. Holandric inheritance is :

(A) X-linked

(B) Y-linked

(C) Autosomal

(D) Mitochondrial

92. Recombination mapping assumes :

(A) Independent assortment

(B) DNA repair

(C) Random mutation

(D) Linear gene arrangement

93. Crossing over produces :

(A) Parental types

(B) Recombinant types

(C) Mutants

(D) None of the above

94. Double crossover affects :

(A) Mapping accuracy

(B) Mutation

(C) Replication

(D) Transcription

95. Sex determination type in humans is :

(A) XO

(B) Haploid

(C) ZW

(D) XY

96. Genetic distance is proportional to :

(A) Mutation rate

(B) Recombination frequency

(C) Replication

(D) Transcription

97. Linked genes are :

(A) On same chromosome

(B) On different chromosomes

(C) Random

(D) Unrelated

98. Three-point test cross determines :

(A) Gene order

(B) Mutation

(C) Replication

(D) Transcription

99. Crossing over increases :

(A) Variation

(B) Mutation

(C) Stability

(D) Repair

100. Population genetics studies :

(A) Single gene

(B) Gene frequency

(C) DNA structure

(D) Protein

(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।