Roll. No. .....

O.M.R. Serial No. | | | | | | | | |

Question Booklet Number

B.Sc. (SEM.-V) (NEP) (SUPPLE.) EXAMINATION, 2024-25

BIOTECHNOLOGY

(Molecular Biology)

(BBT-5001)

Paper Code							
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Question Booklet Series

A

Time : 1 : 30 Hours **Max. 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.
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 :

(Remaining instructions on last page)

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, उसे तुरन्त बदल लें।
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 उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

1. DNA was first identified as genetic material by:

(A) Watson

(B) Miescher

(C) Mendel

(D) Griffith

2. The double helix model for DNA was proposed by:

(A) Meselson and Stahl

(B) Avery et al.

(C) Hershey and Chase

(D) Watson and Crick

3. In prokaryotes, DNA replication starts at:

(A) Many origins

(B) One single origin

(C) Telomeres

(D) Nucleolus

4. The main enzyme that adds nucleotides during DNA replication is:

(A) RNA polymerase

(B) Ligase

(C) DNA polymerase

(D) Helicase

5. Rolling circle replication occurs in:

(A) Plasmids and phage DNA

(B) Mitochondrial DNA

(C) Chloroplast DNA

(D) Eukaryotic chromosomes

6. The direction of new DNA strand synthesis is:

(A) 3' to 5'

(B) 5' to 3'

(C) Random

(D) N/A

7. Which protein unwinds DNA during replication?

(A) Topoisomerase

(B) Ligase

(C) Polymerase

(D) Helicase

8. Okazaki fragments are found during:

(A) Leading strand synthesis

(B) Lagging strand synthesis

(C) DNA repair

(D) RNA processing

9. The enzyme responsible for joining Okazaki fragments is:

(A) DNA ligase

(B) DNA polymerase I

(C) Helicase

(D) Primase

10. Semiconservative nature of DNA replication was proven by:

(A) Avery-Macleod-McCarty

(B) Hershey and Chase

(C) Meselson and Stahl

(D) Watson and Crick

11. DNA primase synthesizes:

(A) DNA primers

(B) RNA polymerase

(C) DNA ligase

(D) RNA primers

12. The fidelity of DNA replication is enhanced by:

(A) Polymerase proofreading

(B) Exonuclease activity

(C) Both (A) and (B)

(D) Ribosomes

13. DNA polymerase III is mainly found in:

(A) Eukaryotes

(B) Viruses

(C) Prokaryotes

(D) Plants

14. The leading strand is synthesized:

(A) Discontinuously

(B) In fragments

(C) Continuously

(D) Randomly

15. Pre-priming proteins are essential for:

(A) RNA synthesis

(B) Glycolysis

(C) Mitosis

(D) DNA unwinding before replication

16. Bidirectional replication means:

(A) DNA is replicated in one direction

(B) DNA is replicated at both fork ends

(C) Only in eukaryotes

(D) Only in prokaryotes

17. The replication fork is:

(A) Where DNA is translated

(B) Where proteins are degraded

(C) Where DNA is being unwound and replicated

(D) None of these

18. DNA polymerases require a template and a:

(A) Free 5' end

(B) Free 3' end

(C) Promoter

(D) Stop codon

19. Eukaryotic chromosomes have:

(A) Single origin of replication

(B) Multiple origins of replication

(C) No origins of replication

(D) Rolling circle

20. Unique aspect of eukaryotic replication:

(A) Multiple origins

(B) Primosome involvement

(C) Both (A) and (B)

(D) None of these

21. Primosome is required for:

(A) Initiation of DNA replication

(B) Transcription

(C) Translation

(D) Protein folding

22. DNA polymerase in bacteria responsible for major elongation:

(A) DNA polymerase I

(B) DNA polymerase III

(C) DNA polymerase II

(D) RNA polymerase

23. Which protein relieves supercoiling?

(A) Helicase

(B) Primase

(C) Ligase

(D) Topoisomerase

24. High fidelity replication is important for:

(A) Genetic stability

(B) Protein synthesis

(C) Membrane integrity

(D) None of these

25. Semiconservative replication produces:

(A) One old and one new strand per duplex

(B) Two old strands

(C) Two new strands

(D) Random strands

26. DNA damage by UV light causes:

(A) Double-strand breaks

(B) Ribose breaks

(C) Thymine dimers

(D) Guanine cross-links

27. Removal of abnormal bases like uracil from DNA is done by:

(A) Base excision repair

(B) Photoreactivation

(C) Mismatch repair

(D) Nucleotide excision repair

28. Nucleotide excision repair typically corrects:

(A) Thymine dimers

(B) Mismatched bases

(C) Alkylated guanine

(D) Both (A) and (C)

29. Mismatch repair is mainly for:

(A) Removing thymine dimers

(B) Correcting replication errors

(C) Repairing double-strand breaks

(D) Deamination damage

30. Photoreactivation repairs damage caused by:

(A) X-rays

(B) Chemical mutagens

(C) UV light

(D) Ionizing radiation

31. DNA glycosylase is associated with:

(A) Nucleotide excision

(B) Base excision repair

(C) Mismatch repair

(D) Homologous recombination

32. Nonhomologous end joining is a mechanism for repairing:

(A) Single-strand breaks

(B) Base mismatches

(C) Double-strand breaks

(D) Alkylation

33. The enzyme photolyase requires what for activity?

(A) Visible light

(B) Darkness

(C) ATP

(D) DNA polymerase

34. Homologous recombination maintains:

(A) Cell wall structure

(B) RNA splicing

(C) Protein folding

(D) Genome integrity

35. During mismatch repair, which strand is preferentially repaired?

(A) Methylated strand

(B) Non-methylated strand

(C) Leading strand

(D) Lagging strand

36. Recombinational repair needs:

(A) Homologous sequences

(B) Ligases only

(C) Topoisomerase

(D) Nuclease only

37. The main enzyme for nucleotide excision repair is:

(A) DNA glycosylase

(B) DNA ligase

(C) UvrABC endonuclease

(D) Telomerase

38. In E. coli, MutS recognizes:

(A) Thymine dimers

(B) Double-stranded breaks

(C) Holliday junction

(D) Mismatched base pairs

39. Homologous recombination is important during:

(A) Replication

(B) Transcription

(C) Meiosis

(D) Translation

40. The classic model for homologous recombination is:

(A) Meselson-Stahl

(B) Holliday model

(C) Watson-Crick

(D) Avery model

41. AP (apurinic/apyrimidinic) sites result from:

(A) Deamination

(B) Photoreactivation

(C) Recombination

(D) Depurination

42. DNA ligase in repair processes is important for:

(A) Adding nucleotides

(B) Removing primers

(C) Sealing breaks

(D) Proofreading

43. ATM and ATR are proteins involved in:

(A) DNA repair signaling

(B) Transcription

(C) Protein synthesis

(D) Golgi function

44. Nonhomologous end joining is often:

(A) Error-free

(B) Error-prone

(C) Highly accurate

(D) Not used in eukaryotes

45. Translesion synthesis allows:

(A) Repair in the dark

(B) No role in DNA repair

(C) Only in prokaryotes

(D) Replication across DNA lesions

46. Homologous recombination requires:

(A) RecA protein (in bacteria)

(B) Photolyase

(C) Primase

(D) Ligase only

47. In recombinational repair, DNA sequence _____ is required.

(A) difference

(B) methylation

(C) phosphorylation

(D) similarity

48. MutH protein acts as:

(A) DNA ligase

(B) Endonuclease in mismatch repair

(C) DNA helicase

(D) RNA polymerase

49. Nucleotide excision repair removes:

(A) Only a single base

(B) Only mismatches

(C) Oligonucleotide segment (several bases)

(D) RNA

50. DNA repair protects cells from:

(A) Mutations

(B) Protein folding errors

(C) Membrane rupture

(D) None of these

51. The enzyme responsible for transcription is:

(A) DNA polymerase

(B) RNA polymerase

(C) DNA ligase

(D) Primase

52. Sigma factor is needed for:

(A) Replication

(B) Splicing

(C) Translation

(D) Initiation of transcription in prokaryotes

53. Promoters are located:

(A) At the start of genes

(B) At the end of genes

(C) In exons

(D) In introns

54. The RNA synthesized during transcription is complementary to:

(A) Coding strand

(B) Template strand

(C) Both

(D) None of these

55. The process of removing introns from pre-mRNA is:

(A) Splicing

(B) Polyadenylation

(C) Capping

(D) Translation

56. RNA polymerase II transcribes:

(A) tRNA

(B) rRNA

(C) snRNA

(D) mRNA

57. Which RNA is most abundant in cells?

(A) mRNA

(B) tRNA

(C) rRNA

(D) snRNA

58. What is the role of the 5' cap?

(A) Stabilizes mRNA

(B) Marks mRNA for degradation

(C) Assists splicing only

(D) Exports DNA

59. Polyadenylation adds:

(A) A G-cap at the 5' end

(B) A string of G

(C) A string of A at the 3' end

(D) Methylations

60. The core promoter element in eukaryotes is:

(A) Pribnow box

(B) TATA box

(C) GC box

(D) CAAT box

61. Enhancers are:

(A) Introns

(B) Part of exons

(C) RNA molecules

(D) Distant regulatory DNA elements

62. Termination of transcription in prokaryotes can be:

(A) Rho-dependent or rho-independent

(B) Only rho-dependent

(C) Only rho-independent

(D) Random

63. In prokaryotes, the sigma factor falls off after:

(A) Initiation stage

(B) Elongation begins

(C) At the end of mRNA synthesis

(D) Capping

64. Transcription factors assist:

(A) DNA replication

(B) Translation

(C) Splicing

(D) Initiation and regulation of transcription

65. rRNA transcripts are processed in the:

(A) Cytoplasm

(B) Golgi

(C) Nucleolus

(D) Mitochondria

66. Which is not a step in mRNA maturation?

(A) 5' capping

(B) Polyadenylation

(C) Peptide bond formation

(D) Splicing

67. Alternative splicing produces:

(A) Same mRNAs always

(B) Only tRNAs

(C) Only rRNAs

(D) Different mRNAs from the same gene

68. What is required for transcription elongation?

(A) Rho protein

(B) Template DNA and RNA polymerase

(C) Ligase

(D) Helicase

69. Which RNA polymerase makes tRNA in eukaryotes?

(A) RNA pol I

(B) RNA pol II

(C) RNA pol III

(D) RNA pol IV

70. Promoter clearance is associated with:

(A) Transition from initiation to elongation in transcription

(B) Translation

(C) DNA repair

(D) Protein folding

71. Spliceosome is composed of:

(A) DNA and protein

(B) Lipids and carbohydrate

(C) snRNPs and protein

(D) rRNA only

72. Prokaryotic mRNA is usually:

(A) Monocistronic

(B) Polycistronic

(C) Non-coding

(D) Always spliced

73. Which RNA is involved in translation?

(A) tRNA

(B) mRNA

(C) rRNA

(D) All of the above

74. The primary transcript in eukaryotes is called:

(A) Pre-mRNA

(B) mRNA

(C) snRNA

(D) rRNA

75. The process of gene expression regulation occurs at:

(A) Transcriptional level

(B) Post-transcriptional level

(C) Translational level

(D) All of the above

76. The operon concept was proposed by:

(A) Watson and Crick

(B) Hershey and Chase

(C) Jacob and Monod

(D) Avery et al.

77. The lac operon is an example of:

(A) Inducible operon

(B) Repressible operon

(C) Constitutive operon

(D) None of these

78. Tryptophan (trp) operon is:

(A) Inducible

(B) Repressible

(C) Both

(D) Neither

79. Ribosome is composed of:

(A) Only RNA

(B) Only proteins

(C) Both RNA and proteins

(D) Only DNA

80. Shine-Dalgarno sequence is present in:

(A) Prokaryotic mRNA

(B) Eukaryotic mRNA

(C) rRNA

(D) tRNA

81. The small ribosomal subunit in prokaryotes is:

(A) 30S

(B) 40S

(C) 60S

(D) 70S

82. tRNA functions to:

(A) Carry mRNA

(B) Act as enzyme

(C) Carry DNA

(D) Carry amino acids

83. The start codon for translation is:

(A) UAA

(B) UAG

(C) AUG

(D) UGA

84. Wobble hypothesis explains:

(A) DNA damage

(B) RNA splicing

(C) Transposons

(D) Base pairing flexibility at the third codon position

85. Polyribosome (polysome) is:

(A) Single ribosome on mRNA

(B) Several ribosomes translating one mRNA

(C) Only in mitochondria

(D) Only in prokaryotes

86. In eukaryotes, translation occurs in:

(A) Nucleus

(B) Mitochondria only

(C) Cytoplasm

(D) Golgi

87. The A site in ribosome is for:

(A) Growing peptide exit

(B) Peptide bond formation

(C) mRNA attachment

(D) Aminoacyl-tRNA entry

88. Release factors are required for:

(A) Initiation of transcription

(B) Peptide bond formation

(C) Termination of translation

(D) DNA repair

89. Posttranslational modification includes:

(A) Phosphorylation

(B) Methylation

(C) Glycosylation

(D) All of the above

90. Antibiotic chloramphenicol inhibits:

(A) DNA replication

(B) RNA capping

(C) Peptide bond formation in prokaryotes

(D) mRNA degradation

91. The process where single mRNA is translated by several ribosomes is called:

(A) Polysome formation

(B) Splicing

(C) Transcription

(D) DNA replication

92. The repressor in lac operon binds to:

(A) Promoter

(B) Operator

(C) Regulator gene

(D) Coding gene

93. Leader sequence is present in:

(A) tRNA

(B) Protein

(C) DNA

(D) mRNA

94. Prokaryotic translation and transcription:

(A) Can occur simultaneously

(B) Are separated in space

(C) Only in the nucleus

(D) Not related

95. Eukaryotic ribosome is:

(A) 70S

(B) 80S

(C) 60S

(D) 30S

96. Which is a mechanism of gene regulation in eukaryotes?

(A) DNA methylation

(B) Enhancer elements

(C) RNA interference

(D) All of the above

97. Aminoacyl-tRNA synthetase:

(A) Attaches amino acid to tRNA

(B) Synthesizes rRNA

(C) Splices introns

(D) Degrades proteins

98. Initiator tRNA in prokaryotes carries:

(A) Methionine

(B) Formylmethionine

(C) Tryptophan

(D) Lysine

99. Mutation in operator region of operon may cause:

(A) Loss of regulation

(B) More protein production

(C) Repressed transcription

(D) Any of the above

100. Inhibitors of translation can be used as:

(A) Antibiotics

(B) Sugars

(C) Polysaccharides

(D) None of these

Rough Work / रफ कार्य

Example :

Question :

Q.1 Ⓐ ● Ⓒ Ⓓ

Q.2 Ⓐ Ⓑ ● Ⓓ

Q.3 Ⓐ ● Ⓒ Ⓓ

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 & 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.

उदाहरण :

प्रश्न :

प्रश्न 1 Ⓐ ● Ⓒ Ⓓ

प्रश्न 2 Ⓐ Ⓑ ● Ⓓ

प्रश्न 3 Ⓐ ● Ⓒ Ⓓ

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ०एम०आर० 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. ओ०एम०आर० 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 में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, 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।

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