Roll. No. .....

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

Question Booklet Number

M.Sc. (SEM.-IV) (NEP) (SUPPLE.)EXAMINATION, 2024-25

ZOOLOGY

(Biotechnology)

Paper Code							
B	0	5	1	0	0	5	T

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. C-value represents :

(A) Concentration of DNA in a cell

(B) Content of DNA in the nucleus.

(C) Content of DNA in a prokaryotic nucleoid or in a eukaryotic haploid nucleus

(D) Concentration of DNA in chloroplast and mitochondria

2. The term blue biotechnology refers to :

(A) Terrestrial agriculture

(B) Marine based biotechnology

(C) Industrial enzyme production

(D) Biotechnology using fresh water organism

3. Type of DNA exhibiting left handed helix is/ are :

(A) B type

(B) B & Z type

(C) A+B type

(D) Z only.

4. Phosphates forms the backbone of all the three types of DNA but the Zig-Zag pattern of phosphate is met in with :

(A) B type

(B) A type

(C) Z type

(D) None

5. What is the significance of marine biotechnology in aquaculture?

(A) Developing sustainable fish farming practice

(B) Recreational fishing

(C) Enhancing marine biodiversity

(D) Improving water quality

6. Which type of gene therapy approach uses RNAi or antisense oligonucleotides to inhibit the expression of disease-causing genes?

(A) Gene silencing therapy

(B) Gene editing therapy

(C) Gene addition therapy

(D) Gene manipulating

7. Which of the following characteristics is not typically found in cloning vectors?

(A) Origin of replication

(B) Reporter genes

(C) Multiple Cloning Site (MCS)

(D) Transcription factors

8. What is the primary advantage of DNA vaccines compared to traditional vaccines?

(A) Long-lasting immunity

(B) Higher efficacy

(C) Safer administration

(D) Lower cost

9. Which marine biotechnology tool is used to identify species via genetic barcode?
   (A) RAPD
   (B) SDS-PAGE
   (C) DNA barcoding
   (D) CRISPER-Cas
10. PCR is exclusively used for
   (A) DNA identification
   (B) DNA recombination
   (C) DNA amplification.
   (D) DNA repair
11. _____ is the right granted by a government to an inventor to prevent others from commercial use of his invention.
   (A) Piracy
   (B) Ethics
   (C) Biosafety
   (D) Patents
12. Which of the following blotting techniques is used to identify RNA :
   (A) Southern blotting
   (B) Northern blotting
   (C) Western blotting
   (D) South-western blotting
13. GEAC stands for :
   (A) Genetic Ethical Approval Committee
   (B) Genetic Engineering Active Commission
   (C) Genetic Ethical Approval Commission
   (D) Genetic Engineering Appraisal Committee
14. Humulin is the term used for :
   (A) A sex hormone
   (B) Human insulin
   (C) Antibiotic
   (D) Biological substances that can check pollution
15. Nucleic acids strongly absorb UV light at :
   (A) 250 nm
   (B) 260 nm
   (C) 270 nm
   (D) 300 nm
16. During "gene cloning" which is called a gene taxi?
   (A) Vaccine
   (B) Plasmid
   (C) Bacteria
   (D) Protozoa
17. Which of the following enzymes are known as molecular scissors or molecular scalpels?
   (A) Hydrolases
   (B) DNA polymerases
   (C) Restriction endonucleases
   (D) Ligases
18. Ligases catalyse the formation of bonds between
   (A) C = C
   (B) C = O
   (C) C-H
   (D) H-H

19. Which of the following is not a means of genetic transfer?
(A) Conjugation
(B) Transduction
(C) Induction
(D) Transformation

20. Human genome project was discovered by:
(A) Francis Collins and Roderick
(B) Watson and Crick
(C) Beadle and Tatum
(D) Paul Berg and Wollman

21. Transgenic plants are not developed by :
(A) clone and genetically modified genes
(B) introduction of foreign genes
(C) genetic engineering
(D) purified genes

22. Restriction endonucleases are most widely used in recombinant DNA technology. They are obtained from :
(A) Bacteriophages
(B) Bacterial cells
(C) Plasmids
(D) All prokaryotic cells

23. Which is used in molecular genetic engineering?
(A) Tomato
(B) Tobacco
(C) Carrot
(D) Arabidopsis

24. Viral genome incorporated into host DNA is called :
(A) Prophase
(B) Prophage
(C) Bacteriophage
(D) None of these

25. Two microbes found to be very useful in genetic engineering are :
(A) Crown gall bacterium and Caenorhabditiselegans
(B) Escherichia coli and Agrobacterium tumefaciens
(C) Vibrio cholerae and a tailed bacteriophage
(D) Diplococcus sp. and Pseudomonas sp.

26. Restriction endonuclease :
(A) Synthesizes DNA
(B) Cuts the DNA molecule randomly
(C) Cuts the DNA molecule at specific sites
(D) Restricts the synthesis of DNA inside the nucleus

27. The process of reverse transcription was brought to light by the work of :
(A) George Beadle and Edward Tatum
(B) Garrod
(C) H.W. Temin and D. Baltimore
(D) R.W. Holley and Grover

28. Genetic engineering is possible because :

(A) the phenomenon of transduction in bacteria is well understood

(B) we can see DNA by electron microscope

(C) we can cut DNA at specific sites by endonucleases like DNAase 1

(D) restriction endonucleases purified from bacteria can be used in vitro

29. Who discovered recombinant DNA (rDN(A) technology?

(A) HarGobind Khorana

(B) James D. Watson

(C) Stanley Cohen and Herbert Boyer

(D) Walter Sutton and Avery

30. Find out the wrong statement :

(A) Mobile genetic elements, transposons were visualized by Barbara McClintock.

(B) Udder cell, a somatic cell is used to produce the cloned sheep by nuclear transplantation method.

(C) In pedigree analysis, a person immediately affected by an action is called proposiuts.

(D) Dr Ian Wilmut produced a cloned sheep called Dolly

31. The concerned Bacillus has anti toxins :

(A) Insecticide

(B) Agent for production of dairy products

(C) Source of industrial enzyme

(D) Indicator of water pollution

32. Who discovered monoclonal antibodies :

(A) Cesar Milstein and Georges Kohler

(B) Beadle and tautam

(C) Sutton and Avery

(D) Har Gobind Khorana

33. What are the key characteristics of stem cells?

(A) They are fully differentiated into specialized cell types

(B) They have ability to self renew

(C) They can not divide

(D) They are always taken from embryo

34. The first clinical gene therapy was done for the treatment of :

(A) AIDS

(B) Cancer

(C) Cystic fibrosis

(D) SCID (Severe Combined Immuno Deficiency resulting from deficiency of AD(A)

35. ADA is an enzyme which is deficient in a genetic disorder SCID. What is the full form of ADA?

(A) Adenosine deoxoyaminase

(B) Adenosine deaminase

(C) Aspartate deaminase

(D) Arginine deaminase

36. Silencing of a gene could be achieved through the use of :

(A) Short interfering RNA (RNAi)

(B) Antisense RNA

(C) By both

(D) None of the above

37. The concerned Bacillus has anti toxins :

(A) Insecticide

(B) Agent for production of dairy products

(C) Source of industrial enzyme

(D) Indicator of water pollution

38. What is the primary characteristic of stem cells?

(A) They can only perform one specific function

(B) They are highly specialized cells with a defined tissue structure

(C) They have the ability to develop into different types of specialized cells

(D) They are primarily found in muscle tissue

39. InRNAi, genes are silenced using :

(A) ss DNA

(B) ds DNA

(C) ds RNA

(D) ss RNA

40. Which type of stem cells are known for their ability to form all tissues of the body?

(A) Adult stem cells

(B) Mesenchymal stem cells

(C) Embryonic stem cells

(D) Hematopoietic stem cells

41. The Golden Rice variety is rich in :

(A) Vitamin C

(B) B-carotene and ferritin

(C) Biotin

(D) Lysine

42. Which of the following statements represent the criteria of DNA being the genetic material. Because :

(A) It is found in small amounts in cell.

(B) It is a complex structural entity.

(C) It is essentially stable & is transmitted through generation to generation

(D) It is a bio molecule with specific function.

43. The output of Griffiths experiment was that :
(A) RNA is the genetic material.
(B) RNA and protein is the genetic material.
(C) DNA and protein is the genetic material.
(D) DNA is the genetic material.

44. ELISA is :
(A) Using radiolabelled second antibody
(B) Usage of RBCs
(C) Using complement-mediated cell lysis
(D) Addition of substrate that is converted into a coloured end product

45. The ability of stem cells to divide and create more stem cells is called :
(A) Differentiation
(B) Self-renewal
(C) Reprogramming
(D) Homing

46. Avery, Macleod and M. McCarthy :
(A) Carried a new set of experiments to show that DNA Is the genetic material.
(B) Repeated Griffiths experiments and showed that DNA is the genetic material.
(C) Experimented to show that DNA undergoes mutation.
(D) Worked out the Biosynthesis of DNA.

47. Platelet-rich plasma is obtained by:
(A) Centrifuging blood samples
(B) Culturing fibroblasts
(C) Utilizing 3D bioprinting
(D) Growing cells on scaffolds

48. Induced Pluripotent Stem Cells (iPSCs) can be generated from:
(A) Only embryonic cells
(B) Adult cells
(C) Cancer cells
(D) None of the above

49. What term refers to harvesting, culturing then injecting one's own bone marrow-derived stem cells?
(A) Autologous conditioning
(B) Tissue engineering
(C) Stem cell therapy
(D) Self-donation

50. 7-methyl guanosine is a modification found in all :
(A) Pretranscriptional, Prokaryotes
(B) Pretranscriptional, eukaryotes
(C) Post-transcriptional, Prokaryotes
(D) Post-transcriptional, eukaryotes.

51 Where can adult stem cells be found in the body?

(A) Only in the liver

(B) In special sites called niches within various tissues

(C) In blood and bone marrow

(D) Both (B) and (C)

52. Mammalian ribosomes contain 4 types of rRNAs, they are :

(A) 23, 16 and 5S

(B) 5S, 28, 18 and 5.8 S

(C) 55, 23, 16 and 5S

(D) 23, 28, 16 and 5S.

53. The most unique feature of rRNA is :

(A) Base methylation

(B) Base replacement

(C) Decarboxylatio

(D) De-hydrogenation

54. The start point for transtcription in prokaryotes is :

(A) Always 100 bases downstream

(B) 100 bases upstream (mostly)

(C) 10 bases upstream

(D) 10 bases downstream.

55. Pribnow box (TATAAT) is found in all :

(A) Promotors

(B) Eukaryotes

(C) Repressors

(D) Prokaryotic promotors

56. Which of the following group represents the termination codons :

(A) UGA, UAA, UAT

(B) UGA, UAG, UAA

(C) UAG, UAT, UUU

(D) AUG, UGA, UAG

57. 7-methyl guanosine cap is found in :

(A) mRNA at 3' end

(B) mRNA at both 5' and 3' ends

(C) mRNA at 5' end

(D) tRNA at 5' end

58. The presence of 7-methyl guanosine cap and poly-A tail in mRNA is meant for :

(A) Protection from enzymatic degradation

(B) Transportation from nucleus to cytoplasm

(C) Both (A) and (B)

(D) Some unknown physio-genetic functions.

59. In eukaryotic system there are three types of RNA polymerases, which of the following is responsible for rRNA and tRNA synthesis :

(A) RNA Pol. I

(B) RNA POI. III

(C) RNA Pol. II

(D) RNA Pol. I and RNA Pol. III.

60. The only RNA polymerase found in nucleolus is :

(A) RNA Pol I

(B) RNA Pol. III

(C) RNA Pol. II

(D) RNA Pol. I and III

61. CAAT box is located at :

(A) 80 to -60 basepairs

(B) 60 to-40

(C) +80 to +60

(D) +60 to-40

62. The thermostable enzymes, 'Taq' and 'Pfu', isolatedfrom thermophilic bacteria are :

(A) RNA polymerases

(B) DNA polymerases

(C) Restriction endonucleases

(D) DNA ligases

63. The term "molecular scissors" generally refers to :

(A) DNA polymerases

(B) RNA polymerases

(C) Restriction endonucleases

(D) DNA ligases

64. Which of the following ion is important for tRNA stabilization :

(A) Mn"

(B) Cl

(C) Mg+

(D) Na

65. The restriction enzyme(s) used in recombinant DNA technology making staggered cuts in DNA leaving sticky ends is/are :

(A) Eco RI

(B) HindIII

(C) BamHI

(D) All of the above

66. The vaccines prepared through recombinant DNA technology are :

(A) Third generation vaccine

(B) First generation vaccine

(C) Second generation vaccine

(D) None

67. Gene therapy first used in the treatment of :

(A) Albinism

(B) Haemophilia

(C) SCID

(D) LIQID

68. The sigma factor of RNA polymerase plays a role of :

(A) Recognition of promotor sequences

(B) Elongation of growing mRNA

(C) Stabilization of unwound DNA

(D) Unwinding of double helix of DNA

69. Which of the following combination of risk are associated with genetically modified food :

(A) Toxicity

(B) Allergic reaction

(C) Antibiotic resistance in microorganism present in alimentary canal

(D) All the above

70. DNA probe is used for :

(A) DNA finger printing

(B) Detection of pathogenic bacteria

(C) Medical genetics to find whether a person carries a particular gene or not

(D) All the above

71. In case of site specific recombination the enzyme recombinase gets linked to the DNA through :

(A) Phosphodiester bonds.

(B) Ionic linkage

(C) Van der Waal bonds.

(D) Phosphotyrosine bonds.

72. Cry-gene which synthesize crystal protein isolated from :

(A) Bacillus thuriengensis

(B) Rhizobium

(C) Bacillus polymyxa

(D) Clostridium

73. Which viral vector is commonly used in gene therapy and can infect both dividing and non dividing cell :

(A) Retrovirus

(B) Lentivirus

(C) Adeno virus

(D) Adeno-associated virus

74. Gene editing therapy using CRISPR-Cas-9 allows for :

(A) Targeted gene replacement

(B) Gene silencing

(C) Specific gene mutations

(D) All of the above

75. Plasmids can be introduced into bacterial cells by a process called :

(A) Transformation

(B) Conjugation

(C) Transfusion

(D) Recombination.

76. Transgenes are :

(A) Proteins.

(B) Foreign gene.

(C) Transferable genes.

(D) Bacteriophage

77. Antisense RNA molecules have a sequence ------ to normal RNA transcripts.

(A) Complementary

(B) Opposite

(C) Non complementary

(D) Similar

78. Bt-cotton is resistant for :

(A) Round-worm

(B) Fluke-worm

(C) Boll-worm

(D) Pin-worm

79. By the transposition of an Insertion sequence into their midst most genes are :

(A) Activated

(B) Inactivated

(C) Depleted

(D) All of the above depending upon the situation

80. Best model for general recombination was given by :

(A) William Holliday.

(B) Holliday John.

(C) Robert Holliday

(D) Robin Holliday

81. cDNA clones are :

(A) Same

(B) Different

(C) Some with few exceptions

(D) Dependent on the cell type used to prepare the library

82. The most important advantage of cDNA clones is that :

(A) They contain interrupted coding sequences of DNA.

(B) They contain uninterrupted coding sequences of DNA.

(C) They contain some sequences from mRNA.

(D) They replicate very fast.

83. A type of DNA cloning that is carried out outside cell is :

(A) cDNA.

(B) PCR

(C) Genomic.

(D) Positional

84. Reverse genetics follows the sequence :

(A) Proteins -DNA.

(B) Genes proteins.

(C) mRNA DNA.

(D) Proteins denes

85 The plasmid resistant to ampicillin is :

(A) pBR 327

(B) pBR 322

(C) PUC

(D) All

86. The plasmid derived from E.coli is :

(A) pBR 327

(B) pBR 322

(C) All

(D) None

87. DNA vaccines stimulate an immune response by introducing:

(A) Inactivated pathogens

(B) Weak pathogens

(C) Antigenic proteins

(D) Antibodies

88. The plasmid with largest base pairs are :

(A) Phage

(B) Bacteriophage

(C) P elements

(D) YAC

89. The enzyme responsible for transposition is :

(A) Transposase

(B) Recombinase

(C) Transpase

(D) Recombase

90. Which of the viruses contain DNA with two segments :

(A) Cauliflower mosaic virus

(B) Geminiviruses

(C) Tobacco mosaic virus

(D) Yeast artificial chromosomes.

91. In the PCR technology the DNA segment is replicated over a billion times. This repeated replications catalyzed by the enzyme :

(A) DNA polymerase

(B) Taq polymerase

(C) DNA dependent RNA polymerase

(D) Primase

92. The plasmids associated with resistance to antibiotics are :

(A) R plasmids

(B) D plasmids

(C) Hfr plasmids

(D) All plasmids

93. What is the primary purpose of selectable markers in cloning vectors?

(A) Facilitating gene expression studies

(B) Identifying and selecting cells containing the vector

(C) Inhibiting the replication of cloning vectors

(D) Introducing specific mutations in DNA sequences

94. A typical genomic library consists of DNA fragments about :

(A) 10 kb.

(B) 15 kb.

(C) 20 Kb.

(D) 40 Kb.

95. Transposon tagging is used to :

(A) Isolate a gene

(B) Isolate a transposon

(C) Study the sequence of genes.

(D) Study the characters coded by genes

96. Which type of gene therapy approach involves introducing a functional copy of the faulty gene into the patient's cells?

(A) Gene silencing therapy

(B) Gene editing therapy

(C) Gene addition therapy

(D) Gene transformation therapy

97. Ideal host for the Amplification of DNA molecules is :

(A) Viruses

(B) Bacteria

(C) Plants

(D) Animals

98. Ti-Plasmid naturally occurs in :

(A) Agrobacterium

(B) Staphylococcus

(C) Corynebacterium

(D) Vibrio

99. Plasmids are naturally occurring :

(A) Linear single stranded DNA

(B) Linear duplex DNA

(C) Linear single stranded DNA

(D) circular duplex DNA

100. The most useful plasmid for cloning :

(A) PBR 323

(B) PBR 223

(C) BR 222

(D) PBR 322

Rough Work

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।