

Roll No. ....

Question Booklet Number

O. M. R. Serial No.

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Question Booklet Number
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**M. Sc. (Fourth Semester)**  
**(NEP) EXAMINATION, 2025-26**

**BOTANY**

**[Bioinformatics And Intellectual Property Rights (IPR)]**

Paper Code							
B	0	4	1	0	0	8	T

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 of the following best defines the term 'Bioinformatics' ?
  - (A) Study of plant morphology
  - (B) Application of computer technology to manage and analyse biological data
  - (C) Study of chemical reactions
  - (D) Study of microscope structure
2. Bioinformatics mainly involves the integration of :
  - (A) Physics and Chemistry
  - (B) Zoology and Botany
  - (C) Biology and Computer Science
  - (D) Biology and Mathematics
3. Which of the following is a major application of bioinformatics ?
  - (A) Weather forecasting
  - (B) Road construction
  - (C) Drug discovery and development
  - (D) Textile design
4. Which biological data type is commonly analyzed using bioinformatic tools ?
  - (A) Soil composition
  - (B) DNA and protein sequences
  - (C) Metal structure
  - (D) Rock samples
5. Which branch of bioinformatics deals with the study of complete DNA sequence organism ?
  - (A) Proteomics
  - (B) Metabolomics
  - (C) Genomics
  - (D) Transcriptomics
6. Which area of bioinformatics focuses on the study of RNA transcripts ?
  - (A) Proteomics
  - (B) Transcriptomics
  - (C) Metabolomics
  - (D) Structural biology
7. Which bioinformatics field studies the complete set of proteins produced by a cell ?
  - (A) Genomics
  - (B) Proteomics
  - (C) Cytology
  - (D) Ecology
8. Which of the following best describes genome annotation ?
  - (A) DNA extraction
  - (B) Identification of genes and functional elements in genome
  - (C) Protein purification
  - (D) Gel electrophoresis

9. Which of the following is an advantage of bioinformatics ?
- (A) Increases experimental cost
  - (B) Destroys DNA
  - (C) Reduces time and labor
  - (D) Stops mutations
10. Which bioinformatics tool is commonly used to compare a query sequence with sequences in databases ?
- (A) Primer3
  - (B) ORF Finder
  - (C) ClustalW
  - (D) BLAST
11. Which software is mainly used for multiple sequence alignment ?
- (A) BLAST
  - (B) FASTA
  - (C) ClustalW
  - (D) Primer3
12. Which bioinformatics software is used to identify Open Reading Frames (ORFs) ?
- (A) ORF Finder
  - (B) FASTA
  - (C) BLAST
  - (D) ClustalW
13. Which database stores experimentally determined three-dimensional structures of proteins ?
- (A) GenBank
  - (B) UniProt
  - (C) Protein Data Bank (PDB)
  - (D) EMBL
14. Which tool is used for primer designing ?
- (A) ClustalW
  - (B) BLAST
  - (C) FASTA
  - (D) Primer3
15. Which file format is commonly used to store biological sequence data ?
- (A) PDF
  - (B) DOC
  - (C) FASTA
  - (D) JPG
16. Which BLAST program compares protein query sequence with protein database ?
- (A) BLASTn
  - (B) BLASTp
  - (C) BLASTx
  - (D) tBLASTn

17. Which software is used for phylogenetic tree construction ?
- (A) Primer3
  - (B) MEGA
  - (C) ORF Finder
  - (D) PubChem
18. Which database contains curated protein sequence information ?
- (A) Swiss-Prot
  - (B) GenBank
  - (C) EMBL
  - (D) DDBJ
19. Which bioinformatics approach is used to study evolutionary relationships ?
- (A) Primer designing
  - (B) PCR
  - (C) Restriction digestion
  - (D) Phylogenetic analysis
20. Which database mainly stores nucleotide sequences such as DNA and RNA ?
- (A) GenBank
  - (B) UniProt
  - (C) PDB
  - (D) Pfam
21. Which of the following best defines a biological database ?
- (A) A place to store chemicals
  - (B) Organized collection of biological data
  - (C) A laboratory instrument
  - (D) A microscope
22. Which software is commonly used for molecular visualization ?
- (A) BLAST
  - (B) MEGA
  - (C) PyMOL
  - (D) FASTA
23. The size of E-coli bacteria is :
- (A) 75000 nm
  - (B) 75 nm
  - (C)  $7.5 \times 10^{-5}$  nm
  - (D)  $7.5 \times 10^{-9}$  nm
24. Which of the following is a stop codon ?
- (A) AUG
  - (B) UGG
  - (C) UGA
  - (D) GGU
25. Which tool is used to search protein domains and families ?
- (A) Pfam
  - (B) GenBank
  - (C) EMBL
  - (D) DDBJ

26. Which of the following best explains gene prediction ?
- (A) Finding restriction sites
  - (B) Identifying possible genes in DNA sequence
  - (C) Designing primers
  - (D) Protein purification
27. Which database is maintained by NCBI ?
- (A) Swiss-Prot
  - (B) GenBank
  - (C) Pfam
  - (D) InterPro
28. Which type of alignment aligns sequences across entire length ?
- (A) Local alignment
  - (B) Partial alignment
  - (C) Random alignment
  - (D) Global alignment
29. Which of the following best describes proteomics ?
- (A) Study of genes
  - (B) Study of RNA
  - (C) Study of proteins
  - (D) Study of chromosomes
30. Which of the following best explains motif ?
- (A) Random sequence
  - (B) Conserved sequence pattern
  - (C) Stop codon
  - (D) Intronic region
31. Which of the following best explains contig ?
- (A) Single nucleotide
  - (B) Overlapping DNA fragments forming continuous sequence
  - (C) Protein domain
  - (D) Enzyme
32. Which of the following best explains functional bioinformatics ?
- (A) Study of ecological systems
  - (B) Study of minerals
  - (C) Study of fossils
  - (D) Study of gene and protein functions using computational methods
33. Which BLAST program compares nucleotide sequence with nucleotide database ?
- (A) BLASTp
  - (B) BLASTn
  - (C) BLASTx
  - (D) tBLASTn

34. Which of the following best explains E-value in BLAST ?
- (A) Expected number of random hits
  - (B) Energy value
  - (C) Enzyme value
  - (D) Expression value
35. Which of the following best explains genome assembly ?
- (A) Cutting DNA
  - (B) Designing primers
  - (C) Joining sequence reads to form longer sequences
  - (D) Amplifying DNA
36. Which of the following best explains comparative genomics ?
- (A) Study of protein purification
  - (B) Study of soil microbes
  - (C) Study of fossils
  - (D) Comparison of genomes from different organisms
37. Which of the following best describes data mining in bioinformatics ?
- (A) Digging soil samples
  - (B) Amplifying RNA
  - (C) Cutting DNA
  - (D) Extracting useful patterns from biological data
38. Which database provides integrated access to multiple NCBI databases ?
- (A) Entrez
  - (B) Swiss-Prot
  - (C) Pfam
  - (D) KEGG
39. Which of the following best explains next-generation sequencing (NGS) data analysis ?
- (A) Manual counting of bases
  - (B) Computational processing of large-scale sequencing data
  - (C) Cutting DNA by enzymes
  - (D) Protein purification
40. "There is a plenty of room at the bottom." This was stated by :
- (A) Issac Newton
  - (B) Albert Einstein
  - (C) Richard Feynman
  - (D) Eric Drexler
41. Which organization maintains the EMBL nucleotide database ?
- (A) NCBI
  - (B) European Bioinformatics Institute (EBI)
  - (C) DDBJ
  - (D) KEGG

42. What is the primary function of FASTA tool ?
- (A) Primer designing
  - (B) Sequence similarity search
  - (C) Protein purification
  - (D) Genome assembly
43. Which component is essential for primer designing ?
- (A) GC content
  - (B) Amino acid sequence
  - (C) Protein folding
  - (D) Lipid composition
44. What does ORF stand for in bioinformatics ?
- (A) Open Reading Frame
  - (B) Original Replication Factor
  - (C) Ordered Restriction Fragment
  - (D) Open Replication Format
45. Which of the following is required for phylogenetic tree construction ?
- (A) Sequence alignment
  - (B) Gel electrophoresis
  - (C) Staining solution
  - (D) PCR machine
46. Which type of database stores raw nucleotide sequence submissions ?
- (A) Literature database
  - (B) Secondary database
  - (C) Structural database
  - (D) Primary database
47. Which of the following is an example of a primary nucleotide database ?
- (A) Pfam
  - (B) GenBank
  - (C) Swiss-Prot
  - (D) PDB
48. What is the purpose of multiple sequence alignment ?
- (A) To purify proteins
  - (B) To detect conserved regions among sequences
  - (C) To amplify DNA
  - (D) To break chromosomes
49. Which of the following best describes a phylogenetic tree ?
- (A) Diagram showing evolutionary relationships
  - (B) DNA extraction chart
  - (C) Protein structure diagram
  - (D) Chemical reaction map
50. What is the main purpose of genome annotation ?
- (A) Cutting DNA fragments
  - (B) Identifying genes and assigning functions
  - (C) Protein staining
  - (D) DNA amplification

51. Intellectual Property is primarily divided into which two broad categories ?
- (A) Industrial Property and Copyright  
 (B) Public Property and Private Property  
 (C) Tangible Property and Intangible Property  
 (D) National Property and International Property
52. Which organization is responsible for administering most international IPR treaties ?
- (A) WTO  
 (B) UNESCO  
 (C) WIPO  
 (D) IMF
53. The headquarters of WIPO is located at :
- (A) Paris  
 (B) London  
 (C) Geneva  
 (D) New York
54. Which agreement prescribes minimum standards of IPR protection globally ?
- (A) Berne Convention  
 (B) Paris Convention  
 (C) TRIPS Agreement  
 (D) Madrid Protocol
55. Which of the following is NOT an Intellectual Property Right ?
- (A) Patent  
 (B) Trademark  
 (C) Copyright  
 (D) Trade License
56. An essential requirement for patentability is :
- (A) Popularity  
 (B) Novelty  
 (C) Low price  
 (D) Advertising
57. Which condition ensures invention is not obvious ?
- (A) Novelty  
 (B) Utility  
 (C) Inventive Step  
 (D) Publication
58. Patent protection in India is granted for a period of :
- (A) 10 years  
 (B) 15 years  
 (C) 20 years  
 (D) 25 years

59. Which of the following is NOT patentable in India ?
- (A) New machine
  - (B) Chemical compound
  - (C) Method of agriculture
  - (D) Pharmaceutical product
60. Who can file a patent application ?
- (A) True and first inventor
  - (B) Assignee
  - (C) Legal representative
  - (D) All of the above
61. The authority responsible for granting patents in India is :
- (A) WIPO
  - (B) CSIR
  - (C) Indian Patent Office
  - (D) WTO
62. Headquarters of Indian Patent Office is located at :
- (A) Delhi
  - (B) Mumbai
  - (C) Kolkata
  - (D) Chennai
63. Which document describes scope of legal protection in a patent ?
- (A) Abstract
  - (B) Description
  - (C) Claims
  - (D) Drawings
64. Patent application in India is published in :
- (A) Gazette of India
  - (B) Patent Journal
  - (C) Newspaper
  - (D) Official Website only
65. Who examines patent applications ?
- (A) Controller
  - (B) Registrar
  - (C) Examiner
  - (D) Judge
66. What is the standard duration of protection for a patent ?
- (A) 10 years
  - (B) 20 years
  - (C) 50 years
  - (D) Life of the creator
67. Protection period for Industrial Design in India is :
- (A) 5 years
  - (B) 10 years (extendable by 5)
  - (C) 20 years
  - (D) Lifetime
68. Which IPR protects brand name and logo ?
- (A) Patent
  - (B) Trademark
  - (C) Copyright
  - (D) GI

69. Trademark registration in India is valid for :
- (A) 5 years
  - (B) 7 years
  - (C) 10 years
  - (D) 20 years
70. Which symbol denotes an unregistered trademark ?
- (A) ®
  - (B) ©
  - (C) ™
  - (D) #
71. Which IPR protects computer software in India ?
- (A) Patent
  - (B) Trademark
  - (C) Copyright
  - (D) Design
72. Which Act governs patents in India ?
- (A) Copyright Act, 1957
  - (B) Patents Act, 1970
  - (C) IT Act, 2000
  - (D) GI Act, 1999
73. Which Act governs trademarks in India ?
- (A) Patents Act, 1970
  - (B) Trademark Act, 1999
  - (C) Copyright Act, 1957
  - (D) Designs Act, 2000
74. Which IPR protects Geographical Indications ?
- (A) Patent
  - (B) GI
  - (C) Design
  - (D) Trademark
75. GI protection in India is valid for :
- (A) 5 years
  - (B) 10 years (renewable)
  - (C) 15 years
  - (D) 20 years
76. Which city hosts GI Registry of India ?
- (A) Delhi
  - (B) Mumbai
  - (C) Chennai
  - (D) Kolkata

77. Which IPR encourages disclosure of invention ?
- (A) Trade Secret
  - (B) Patent
  - (C) Trademark
  - (D) GI
78. Before 2005, India followed which patent system for pharmaceuticals ?
- (A) Product Patent
  - (B) Process Patent
  - (C) Utility Patent
  - (D) Design Patent
79. Which IPR protects layout design of integrated circuits ?
- (A) Patent
  - (B) Copyright
  - (C) Layout Design
  - (D) Trademark
80. Which of the following is a ground for revocation of patent ?
- (A) High cost
  - (B) Low sales
  - (C) Lack of novelty
  - (D) Advertisement
81. Who is called “Person Skilled in the Art” ?
- (A) Inventor
  - (B) Average skilled technical person
  - (C) Artist
  - (D) Patent Agent
82. Which IPR is mandatory to register for protection ?
- (A) Copyright
  - (B) Patent
  - (C) Trade Secret
  - (D) Know-how
83. Copyright in literary works lasts for :
- (A) 20 years
  - (B) 50 years
  - (C) Life of author + 60 years
  - (D) Perpetual
84. Which of the following cannot be protected by copyright ?
- (A) Book
  - (B) Song
  - (C) Idea
  - (D) Film

85. Which patent document contains drawings ?
- (A) Claims
  - (B) Abstract
  - (C) Drawings Section
  - (D) Title
86. Which step comes first in patent procedure ?
- (A) Grant
  - (B) Examination
  - (C) Filing
  - (D) Publication
87. Which agreement relates to international trademark registration ?
- (A) Berne Convention
  - (B) Madrid Protocol
  - (C) TRIPS
  - (D) Paris Convention
88. Which right protects performers and producers ?
- (A) Patent
  - (B) Copyright
  - (C) Related Rights
  - (D) Design
89. Which IPR has potentially unlimited validity if renewed ?
- (A) Patent
  - (B) Trademark
  - (C) Design
  - (D) GI
90. Which organization administers TRIPS Agreement ?
- (A) WIPO
  - (B) WTO
  - (C) WHO
  - (D) UNESCO
91. Which requirement ensures usefulness of invention ?
- (A) Novelty
  - (B) Inventive step
  - (C) Industrial applicability
  - (D) Publication
92. Discovery of natural living organism is :
- (A) Patentable
  - (B) Non-patentable
  - (C) Copyrightable
  - (D) Trademarkable

93. Which type of patent relates to machines and devices ?
- (A) Product Patent
  - (B) Process Patent
  - (C) Design Patent
  - (D) Utility Model
94. Patent specification must be :
- (A) Vague
  - (B) Secret
  - (C) Clear and complete
  - (D) Short
95. Who controls Indian Patent Office ?
- (A) Registrar
  - (B) Controller General of Patents
  - (C) Chief Justice
  - (D) Director WIPO
96. The Geographical and Identification (GI) tag is valid for how many years initially ?
- (A) 10 years
  - (B) 15 years
  - (C) 20 years
  - (D) 25 years
97. Which right protects artistic paintings ?
- (A) Patent
  - (B) Trademark
  - (C) Copyright
  - (D) Design
98. Which filing establishes priority date ?
- (A) Grant
  - (B) Publication
  - (C) First Filing
  - (D) Examination
99. Which IPR covers inventions ?
- (A) Trademark
  - (B) Patent
  - (C) Copyright
  - (D) GI
100. World Intellectual Property Day is celebrated on :
- (A) April, 26
  - (B) June, 5
  - (C) December, 10
  - (D) January, 1

***(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 छँटना 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।