Roll No. .....

Question Booklet Number

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

M. Sc. (Biotechnology) (Fourth Semester)

EXAMINATION, July, 2022

GENOMICS, PROTEOMICS, INTELLECTUAL PROPERTY RIGHTS, 100 PRODUCT REGULATION & BIOSAFETY

Paper Code				
MBT	4	0	0	2

Questions Booklet Series
A

Time : 1:30 Hours] [*Maximum Marks : 100*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. 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 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। 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. Collection of the total genomic DNA from a single organism is called as :

(A) cDNA Library

(B) Reporter Genes

(C) Lambda Library

(D) Genomic Library

2. Which of the following is true about Proteomics ?

(A) Proteomics has enabled the identification of ever increasing numbers of protein.

(B) Proteomics generally refers to the large-scale experimental analysis of proteins and proteomes.

(C) Proteome is the entire set of proteins that is produced or modified by an organism or system.

(D) All of the above

3. Which of the following phenomena is used to assign a specific gene to particular region of a chromosome and determining the location of and relative distances between genes on the chromosome ?

(A) Genome Mapping

(B) Genome Sequencing

(C) Genome Assembly

(D) Genome Annotation

4. The distance between two genes is measured in units :

(A) Nanomorgan

(B) Micromorgan

(C) Millimorgan

(D) Centimorgan

5. Paired end sequencing of genome refers to :

(A) Random sequencing from one end

(B) Random sequencing from both ends

(C) Specific sequencing from one end

(D) Specific sequencing from both ends

6. Which of the following statements is not correct ?

(A) DNA sequencing generates initially short sequence reads from DNA clones.

(B) The short reads are joined to form larger fragments to assemble the whole genome.

(C) A number of overlapping cotings can be further merged to form a scaffold.

(D) The average length of the reads shall be less than 50 bases.

7. A phylogenetic diagram can be rooted or unrooted.

(A) True

(B) False

(C) Can be true or false

(D) Cannot say

8. Identify the correct combination :

(A) H2A, H2B, H3, H4 tetramer and H1 linker histone

(B) H2A, H2B, H3, H4 octamer and H1 linker histone

(C) H2A, H2B, H1, H4 tetramer and H3 linker histone

(D) H2A, H2B, H3, H1 tetramer and H4 linker histone

9. Mass spectrometry is used in :

(A) Transcriptome analysis

(B) Protein concentration measurement

(C) Protein separation

(D) Protein identification

10. Protein-protein interactions can be identified by :

(A) Phage display

(B) The yeast two-hybrid system

(C) Immunoprecipitation

(D) All of the above

11. Which of the following is true for Microarrays ?

(A) Used for analysis of gene expression

(B) Used to find mutations in genes

(C) Works on the principle of complementary hybridization

(D) All of the above

12. Which of the following properties are true for Intellectual Property (IP) ?

(A) IP is intangible without any physical parameters.

(B) IP encompasses the things which are creation of human mind.

(C) Photographs and architectural designs are covered under IP acts.

(D) All of the above

13. India is signatory under the following IPR treaties :

(A) TRIPS agreement

(B) Convention on Biological Diversity (CBD)

(C) Both (A) and (B)

(D) None of the above

14. Which of the following statements is not correct ?

(A) Indian patent law does not specify the rigid protection of computer software.

(B) Genetically altered micro-organisms were patentable.

(C) Medical and surgical procedures are patentable.

(D) Microbiological processes and emanating products are patentable.

15. Which of the following protects artistic and literary works ?

(A) Patents

(B) Trademarks

(C) Copyrights

(D) Geographical indicators

16. In India, the Copyright Act gives protection to the creator of work :

(A) Till 40 years after death

(B) Till 50 years after death

(C) Till 60 years after death

(D) No protection after the death of the creator

17. Which of the following is not element of patentability according to Aatents Act ?

(A) Novelty

(B) Inventive step

(C) Industrial applicability

(D) Cost of production

18. Identify the geographical indicator :

(i)	Mysore silk	(p)	Odisha
(ii)	Pattachitra	(q)	Kashmir
(iii)	Pashmina	(r)	Rajasthan
(iv)	Blue pottery	(s)	Karnataka

Codes :

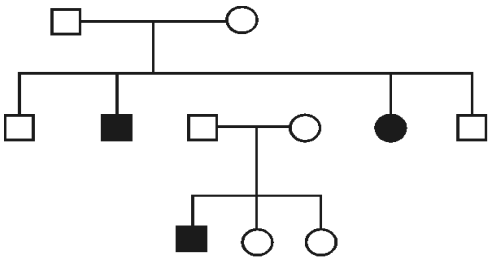
(A) (i)-(p), (ii)-(q), (iii)-(r), (iv)-(s)

(B) (i)-(s), (ii)-(p), (iii)-(q), (iv)-(r)

(C) (i)-(q), (ii)-(r), (iii)-(p), (iv)-(s)

(D) (i)-(q), (ii)-(p), (iii)-(s), (iv)-(r)

19. Identify the kind of inheritance from the following pedigree :



(A) Autosomal dominant

(B) Autosomal recessive

(C) Sex-linked dominant

(D) Sex-linked recessive

20. Which of the following is not true for 16S rRNA typing ?

(A) It is used in identification of bacteria and corresponding phylogenetic studies.

(B) It is a PCR based method.

(C) The template is DNA.

(D) The template is RNA.

21. NCBI stands for :

(A) National Center for Bioinformatics

(B) National Center for Biotechnology Information

(C) National Center for Biology Information

(D) National Center for Biomedical Information

22. Which of the following platform is used to perform whole genome sequencing ?

(A) Illumina

(B) Solexa

(C) Roche-454

(D) All of the above

23. Next generation sequencing will not be useful in which of the following applications ?

(A) Finding the differential expression levels of leaf specific genes under abiotic stress

(B) Quantifying the protein profiles of plant tissues under stress

(C) Decoding the complete genome of a newly isolated microbe

(D) Unraveling the whole transcriptome of an organism

24. What is the application of Bicinchonic Acid (BCA) assay ?

(A) Quantification of DNA

(B) Determination of protein concentration

(C) Protein purification

(D) Separation of proteins

25. Which acid is normally used in Bradford method for protein concentration ?

(A) Phosphoric acid

(B) Citric acid

(C) Sulfuric acid

(D) Acetic acid

26. The amino acid sequences of multiple proteins from many species have been determined using principles first developed by :

(A) Edman

(B) Sanger

(C) Mendel

(D) Watson and Crick

27. Which of the following is a Sanger's reagent ?

(A) 1-fluoro-2, 4-dinitrobenzene

(B) 1-fluoro-2, 3-dinitrobenzene

(C) 1-fluoro-2, 4-trinitrobenzene

(D) 1-fluoro-2, 3-trinitrobenzene

28. The isoelectric point of an amino acid is defined as the pH :

(A) where the molecule carries no electric charge.

(B) where the carboxyl group is uncharged.

(C) where the amino group is uncharged.

(D) of maximum electrolytic mobility.

29. Single Nucleotide Polymorphism is an example of :

(A) Frameshift mutation

(B) Transposition

(C) Gene regulator

(D) A genetic marker

30. Which of the following is false regarding "Haplotype" ?

(A) It is set of DNA variation.

(B) It may include SNP and Indels.

(C) Haplotypes are inherited together.

(D) None of the above

31. Statin is prescribed for lowering cholesterol, why in some patient taking statin shows muscle problem weakness and pain ?

(A) Because of variation of SLCO1BI gene.

(B) Patient showing muscle problem weakness and pain are not able to uptake the drug at molecular level.

(C) Because of variation of drug transporter.

(D) All of the above

32. Why doctors recommend genetic testing of CYP2D6 and CYP2C19 genes before prescribing amitriptyline (an antidepressant) ?

(A) It helps to decide dose of drug that doctors will recommend.

(B) It helps doctor to decide level of depression in patient.

(C) It will determine the extent of brain damage as a result of depression in these patient.

(D) None of the above

33. Gene ontology includes :

(A) Cellular component

(B) Molecular function

(C) Biological function

(D) All of the above

34. What is the right order of protein microarray analysis ?

(A) Sample incubation-immobilizing an Antibody-blocking the non-reactive sites- Detection

(B) Immobilizing an Antibody-Sample incubation-blocking the non-reactive sites- Detection

(C) Immobilizing an Antibody-blocking the non-reactive sites-Sample incubation- Detection

(D) mRNA-Fluorescent labelling of mRNA-Hybridization-Scanning

35. Regarding structural proteomics which of the following is true ?

(A) Structure domain is an element of proteins overall structure and often folds independent of rest of protein chain.

(B) Ribbon and Cartoon diagram of protein structure gives information about various secondary structures that occurs in protein.

(C) Structure proteomics include the analysis of protein structure at large scale.

(D) All of the above

36. Imagine you are designing an experiment to measure gene expression in the blood of patients who have been treated with a new drug. You want to measure expression of all genes in the genome and may want to use the data to identify novel transcripts in the future. Which method would you choose ?

(A) Real-time PCR

(B) Microarray Analysis

(C) RNA-seq

(D) Chip-seq

37. Precision medicine is associated with :

(A) Pharmacogenetics

(B) Homeopathic medicine

(C) Individual specific drug prescription

(D) Both (A) and (C)

38. Which of the following databases is relevant to structure proteomics ?

(A) UniProt

(B) PDB

(C) SwissProt

(D) All of the above

39. Epigenetics is associated with study of which of the following ?

(A) Histone modification

(B) Micro-RNA

(C) Gene splicing

(D) None of the above

40. KEGG pathways :

(A) Kyoto encyclopedia of gene and genome

(B) Knowledge engineering of gene and genome

(C) Known encyclopedia of genetics and genome

(D) None of the above

41. Pharmacodynamics is associated with :

(A) Drug Absorption

(B) Drug Distribution

(C) Drug Metabolism and Drug Excretion

(D) All of the above

42. PPE is :

(A) Personal Protective Equipment

(B) Public Protective Equipment

(C) Possible Protective Equipment

(D) All of the above

43. SARS-CoV-2 comes under which risk group category ?

(A) Risk group I

(B) Risk group II

(C) Risk group III

(D) Risk group IV

44. Probable sources of Laboratory Associated Infections (LAI) are :

(A) Culture and stocks

(B) Research animals

(C) Specimens

(D) All of the above

45. The International Biohazard warning symbol is :

(A) 

(B) 

(C) 

(D) 

46. A pathogen which causes serious diseases in humans and animals but does not spread from one individual to another; for which preventive measures and treatments are available fall into the category of :

(A) Risk Group I

(B) Risk Group II

(C) Risk Group III

(D) Risk Group IV

47. Primary containment means :

(A) Protection of personnel

(B) Protection of the laboratory environment from exposure to infectious agents.

(C) Protection of the environment external to the laboratory from exposure to infectious materials.

(D) Both (A) and (B)

48. Handling human pathogenic specimens of *Staphylococcus* and Hepatitis virus in laboratory requires :

(A) BSL-1

(B) BSL-2

(C) BSL-3

(D) BSL-4

49. HEPA filtered air exhaust ventilation is a pre-requisite for :

(A) BSL-1, BSL-2, BSL-3, BSL-4 cabinets

(B) BSL-2 and BSL-3 cabinets

(C) BSL-4 cabinets

(D) BSL-3 and SL-4 cabinets

50. In Class III Biosafety cabinets, air flow is :

(A) 0% re-circulated and 100% exhausted

(B) 100% re-circulated and 0% exhausted

(C) 30% re-circulated and 70% exhausted

(D) 70% re-circulated and 30% exhausted

51. Chemical fume hood :

(A) Offer protection to the product

(B) Offer protection to the environment

(C) Offer personnel protection

(D) All of the above

52. In immobilized pH gradient strips, proteins moves towards :

(A) Positive charge

(B) Acidic pH

(C) Isoelectric point

(D) Basic pH

53. The international treaty governing the movements of living modified organisms (LMOs) resulting from modern biotechnology from one country to another is :

(A) Convention on Biological Diversity (CBD)

(B) Cartegena Protocol on Biodiversity (CPB)

(C) Montreal Protocol

(D) Kyoto Protocol

54. The Competent Authority in India to issue the import permits for import of seeds for research purposes and quarantine inspection is done by :

(A) Department of Biotechnology (DBT)

(B) Indian Agriculture Research Institute (IARI)

(C) National Bureau of Plant Genetic Resources (NBPGR)

(D) ICAR–National Institute for Plant Biotechnology

55. India has approved commercial cultivation of the following GM crop :

(A) Soybeans

(B) Maize

(C) Canola

(D) Cotton

56. A recombinant DNA molecule is produced by joining together :

(A) one mRNA with a DNA segment

(B) one mRNA with a tRNA segment

(C) two mRNA molecules

(D) two DNA segments

57. RFLP is :

(A) Restriction Fragment Length Polymorphism

(B) Repeated Fragment Length Polymorphism

(C) Renewed Fragment Length Polymorphism

(D) Required Fragment Length Polymorphism

58. Bioreactors are used for :

(A) large scale production of desired substances by using cells /microbes

(B) kill bacteria

(C) store viruses

(D) get chemicals

59. Match the following :

(i)	Electrophoresis	(p)	Gene transfer in plants
(ii)	Probe	(q)	Cleaving polypeptide chains
(iii)	Cyanogen bromide	(r)	Small DNA segment used for hybridization
(iv)	Ti plasmid	(s)	Separation of DNA segments

Codes :

(A) (i)-(r), (ii)-(s), (iii)-(q), (iv)-(p)

(B) (i)-(s), (ii)-(r), (iii)-(q), (iv)-(p)

(C) (i)-(p), (ii)-(r), (iii)-(q), (iv)-(s)

(D) (i)-(q), (ii)-(p), (iii)-(s), (iv)-(r)

60. A segment of DNA that reads same from the forward and backward ends is called :

(A) Palindromic DNA

(B) Complementary DNA

(C) Plasmid DNA

(D) Copy DNA

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate 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 ny 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 एक सबसे सही अथवा सबसे उपयुक्त 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।