

Question Paper

Exam Date & Time: 11-Aug-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. BIOINFORMATICS DEGREE EXAMINATION - AUGUST 2023
SUBJECT: MBI 502 - DATABASE AND WEB DEVELOPMENT
(OBE - 2021 REGULATION - REPEATERS)

Marks: 70

Duration: 180 mins.

Answer all the questions.

Illustrate where necessary.

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| 1A) | Write a note on database users and user interfaces. | (3.5) |
| 1B) | Write a note on < marquee> tag. Explain any four attributes used with the < marquee> tag. | (3.5) |
| 1C) | Add a note on the ACID properties of relational model. | (3.5) |
| 1D) | Differentiate between constant and variable. | (3.5) |
| 2A) | Write the features of WAMP server. Explain the pros and cons of WAMP server. | (7) |
| 2B) | Add a note on server-side scripting language. List its applications. | (7) |
| 2C) | Explain the HTML tags and attributes for table creation and alteration. | (7) |
| 2D) | Write a short note on different keys and constraints in SQL. | (7) |
| 3A) | Explain with an example, the components of an Entity Relationship Diagram. | (14) |
| 3B) | Explain the tags and their attributes for frame architecture. List the disadvantages of frame design. | (14) |

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Question Paper

Exam Date & Time: 14-Aug-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M. Sc. (BIOINFORMATICS/SYSTEMS BIOLOGY) DEGREE EXAMINATION - AUGUST 2023
SUBJECT: MBI 504 - BIOINFORMATICS ALGORITHM AND APPLICATIONS
MSB 506 - SYSTEMS BIOLOGY ALGORITHMS
(OBE - 2021 REGULATION - REPEATERS)

Marks: 70

Duration: 180 mins.

Answer all the questions.

Illustrate where necessary.

- 1) Explain the Needleman-Wunsch algorithm for sequence alignment with an example. (14)
- 2) What is a phylogenetic tree? Explain with an example the character-based method for tree building. (14)

Explain the following briefly:

- 3A) What is multiple sequence alignment (MSA)? Write a short note on applications of MSA. (7)
- 3B) Describe in detail the parameters considered for the interpretation of BLAST results. (7)
- 4A) Write a note on gene prediction methods in eukaryotes. (7)
- 4B) Classify machine learning techniques. Explain in detail the working of Hidden Markov Model. (7)

5. Write short notes on the following:

- 5A) Write a note on types BLAST. (3.5)
- 5B) Write a note MEME suite. (3.5)
- 5C) Write a short note on PAM and BLOSUM matrices. (3.5)
- 5D) Write a note on gap penalties. (3.5)

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Question Paper

Exam Date & Time: 16-Aug-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M. Sc. BIOINFORMATICS DEGREE EXAMINATION - AUGUST 2023
SUBJECT: MBI 508 - MATHEMATICS AND R PROGRAMMING
(OBE - 2021 REGULATION - REPEATERS)

Marks: 70

Duration: 180 mins.

Answer all the questions.

Illustrate where necessary.

- 1) Add a note on R data structures. Explain each with an example. (14)
- 2) Obtain the eigen values of $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 2 \end{bmatrix}$ and Find the inverse of the matrix using Cayley Hamilton Theorem. (14)

Explain the following briefly:

- 3A) What are bioconductor packages? Explain the features of bioconductor packages. (7)
- 3B) Find r , if ${}^5P_r = 2 \cdot {}^6P_{r-1}$ (3)
- i) (4)
- ii) Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$,
 $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8\}$, $C = \{3, 4, 5, 6\}$
Find: (i) $(B - C)'$ (ii) B' (iii) $B \cap (A \cup C)$ (iv) $(A \cap B)'$ (v) $(A')'$ and draw appropriate Venn diagrams. (7)
- 4A) Solve using matrix method. (7)
 $x + y - 2z = 0$
 $2x - y + z = 2$
 $x + 2y - z = 2$
- 4B) Show that the following sequence is graphical. Also find a graph corresponding to the sequence 6, 5, 5, 4, 3, 2, 2, 2. (7)

Answer all the questions.

5. Write short notes on the following:

- 5A) Explain the following: (3.5)
- `cat()`
 - `ls()`
 - `:` operator
 - `%in%` operator
 - `%*%` operator

- rm(list=ls())
- c()
- seq()

5B) Add a note on ggplot2. (3.5)

5C) Simplify the Boolean expressions using laws of Boolean Algebra (3.5)

$$ABC + \bar{A}B + AB\bar{C}$$

Prove using Boolean Algebra

$$XY + YZ + \bar{Y}Z = XY + Z$$

5D) Define (a) Weighed Graph (b) Directed Graph (c) Bipartite Graph (d) Trees. Give Examples. Add a note on applications of graph theory in Biotechnology. (3.5)

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