

2125

B.Sc. (Hons.) Bio-Informatics (FYUP)
First Semester

BINF-1003: Maths and Computer Fundamentals for Biologist

Time allowed: 3 Hours

Max. Marks: 60

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

1. Answer the following:-

- (i) In a group of 80 people, 42 like coffee, 57 like tea and each person likes at least one of the two drinks. How many like both coffee and tea?
- (ii) Draw the graphs of the following functions:
f: $\mathbb{R} \rightarrow \mathbb{R}$ such that $f(x) = |x - 2|$.
- (iii) Find X and Y if
- $$2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix} \text{ and } 3X + 2Y = \begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}.$$
- (iv) What are the primary characteristics of a computer?
- (v) List five input devices used with computers
- (vi) Differentiate between system software and application software with examples.

(2, 2, 2, 2, 2, 2)

UNIT-I

2a) If $A = \{2, 4, 6, 8, 10\}$, $B = \{1, 2, 3, 4, 5, 6, 7\}$, $C = \{2, 6, 7, 10\}$ and $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, then verify that

- (i) $A \cup (B \cap C) = (A \cup B) \cap C$ (iii) $A \cap (B \cap C) = (A \cap B) \cap C$
(ii) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ (iv) $(B \cup C)' = B' \cap C'$

b) Let A be the set of first ten natural numbers and let R be a relation on A defined by $R = \{(x, y) : x \in A, y \in A \text{ and } x + 2y = 10\}$.

- i) Express R and R^{-1} as sets of ordered pairs.
ii) Determine the domain and ranges of R and R^{-1} .

(6, 6)

3. a) There are 6 boys and 3 girls in a class. A committee of 5 is to be formed such that it contains 3 boys and 2 girls. In how many ways can this be done? Also, find the number of ways if atleast one girl is always in the committee.

b) Find the value of n if

$$\frac{(2n)!}{3!(2n-3)!} : \frac{n!}{2!(n-2)!} = 44 : 3.$$

c) Find the middle term(s) in the expansion of $\left(\frac{x}{3} + 9y\right)^9$.

(4, 4, 4)

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(2)

4. a) Find the inverse of the matrix $\begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$

b) Verify that $A(B+C)=AB+AC$, where

$$A = \begin{bmatrix} 1 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \end{bmatrix} \text{ and } C = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 3 & 0 \end{bmatrix}. \quad (6, 6)$$

UNIT-II

- 5 Discuss about the Supercomputers, Mainframe Computers, Mini Computers, and Personal Computers. Also, compare their features and functions. (12)
- 6 Discuss the different types of primary and secondary storage devices in detail. (12)
- 7.a) Explain the three main types of computer programming languages with example.
- b) Define the term software and discuss its types with examples. (6, 6)

x-x-x