2021

(July)

COMPUTER APPLICATION

(Honours)

(Mathematics—II)

(BCA–201)

Marks : 45

Time : 2 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Let A and B be any two non-empty sets. Then prove the following results : 4

(i) $A \quad B \quad A \quad B \quad A$

(ii) $A \quad B \quad A \quad B \quad B$

(b) Let $\mathbb{N}$ be the set of natural numbers and for each $\mathbb{N}$. Also let

$A \quad 1, \frac{1}{2}, \frac{1}{3}, \ldots\ldots, \frac{1}{}$

Then find the following : 4

(i) $\{A : \mathbb{N}\}$

(ii) $\{A : \mathbb{N}\}$

(c) Let $n(A) \quad a$ and $n(B) \quad b$, where $n(A)$ number of elements of A. Then find the number of elements of $P(A \quad B)$. 2

2. *(a)* Let

$(y \quad 2, 2x \quad 1) \quad (x \quad 1, y \quad 2)$

Then determine the values of x and y. 2

(b) Let A and B be any two non-empty sets. Then prove that

$A \quad (B \quad C) \quad (A \quad B) \quad (A \quad C)$ 4

(c) Give an example of a relation that is reflexive but neither symmetric nor transitive. 2

(d) Let R be an equivalence relation in a set A. Then show that R^{1} is also an equivalence relation. 2

UNIT—II

3. *(a)* Write the following sentences into a statement formula : 3

(i) A necessary condition for x to be prime is that either x is odd or x 2.

(ii) If taxes are increased or government spending decreases, then inflation will not occur.

(iii) He is poor but honest.

(b) By using truth table, prove the following tautological equivalences : 4

$p \quad (q \quad r) \quad (p \quad q) \quad (p \quad r)$

(c) Construct a truth table for the following statement formula : 3

$(p \quad q) \quad (\sim q \quad \sim p)$

4. *(a)* Find the negation of each of the following quantified predicates : 3

(i) $(\ x \ D)(x \ 2 \ 7)$

(ii) $(\ x \ D) \ (x \ 3 \ 10)$

Where D $\{1, 2, 3, 4\}$

(b) Symbolize the following sentences using predicate logic : 3

(i) Every natural number is either even or odd.

(ii) For any integer, there exists an integer such that their product is equal to zero.

(c) Test the logical validity of the following arguments : 4

All even integers are divisible by 2.

6 is an even integer.

Therefore, 6 is divisible by 2.

UNIT—III

5. *(a)* For x 0·4845 and y 0·4800, calculate the value of $\frac{x^2 \quad y^2}{x \quad y}$ using normalized floating point arithmetic. Compare with the value of $(x \quad y)$. 3

(b) Round-off the number 75462 to four significant digits and then calculate the absolute error, relative error and percentage error results. 3

(c) Write an algorithm to implement the solution of $f(x)$ 0 by Newton-Raphson method. 3

6. *(a)* Find a root of the equation

$$f(x) \quad x^3 \quad 4x \quad 9 \quad 0$$

using the bisection method in four iterations. 4

(b) Solve the following set of equations by Gauss elimination method : 5

$$6x \quad 3y \quad 2z \quad 6$$
$$6x \quad 4y \quad 3z \quad 0$$
$$20x \quad 15y \quad 12z \quad 0$$

UNIT—IV

7. *(a)* Compute the value of $f(x)$ for $x \quad 2{\cdot}5$ from the following table : 4

x	1	2	3	4
$f(x)$	1	8	27	64

(b) Find the third divided difference with arguments 2, 4, 9, 10 of the function $f(x) \quad x^3 \quad 2x$. 4

8. *(a)* By using Newton's forward interpolation formula, find the cubic polynomial which takes the following values : 5

$y(0) \quad 1, y(1) \quad 0, y(2) \quad 1, y(3) \quad 10$

Hence or otherwise obtain $y(4)$.

(b) Write one fundamental assumption for the validity of the various methods used for interpolation. 3

UNIT—V

9. *(a)* Find $f(x)$ and $f(x)$ from the following table : 6

x	1·5	2·0	2·5	3·0	3·5	4·0
$f(x)$	3·375	7·000	13·625	24·000	38·875	59·000

(b) Write down the algorithm for integrating a tabulated function using trapezoidal rule. 2

10. *(a)* Use Simpson's $\frac{1}{3}$ rule to prove that $\log_e 7$ is approximately 1·9587 using

$$\int_1^7 \frac{dx}{x}$$

4

(b) Use trapezoidal rule to evaluate

$$\int_0^6 \frac{dx}{1 \quad x^2}$$

taking $h \quad 1$. 4

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