

BCA 1st SEMESTER EXAM., 2014
BASIC MATHEMATICS CODE - 303102

Time: 3 hours

Full Marks: 60

Instructions:

- i. The Marks are indicated in the right -hand margin.
- ii. There are **SEVEN** questions in this paper.
- iii. Attempts **FIVE** question in all.
- iv. Question Nos. **1** and **2** are compulsory.

1. Answer any six of the following as directed:

2*6=12

- (a) Assume A and B as two sets having two element in common. If $n(A) = 5$ and $n(B) = 3$, find $n(A \times B)$ and number of common elements in $A \times B$.
- (b) Let A and B be two sets such that $(A \cap B) \subseteq B$ and $B \not\subseteq A$. Draw the Venn diagram.
- (c) If the cardinality of set A is n , then find the cardinality of its power set $P(A)$.
- (d) How many subsets of $\{1, 2, 3, \dots, 10\}$ contain at least 7 elements?
- (e) Find the number of distinct relation from a set A to a set B , each with n elements..
- (f) Define anti-symmetric relation.
- (g) A relation R on a set A is said to be equivalence, if
 - (I) R is reflexive, anti-symmetric and transitive.
 - (II) R is reflexive, symmetric and transitive. (Choose the correct one)
- (h) If P is sufficient for Q , then which of the following is true?
 - (I) $P \rightarrow Q$
 - (II) $Q \rightarrow P$ (Choose the correct one)
- (i) Find the adjacency matrix of the relation $r = \{(2, 2), (2, 5), (5, 6), (6, 6)\}$ on the set $A = \{2, 5, 6\}$.
- (j) Find the derivative of $e^{-x^2/2}$.

2. Answer any three of the following:

4*3=12

- (a) How many proper subsets of $\{1, 2, 3, 4, 5\}$ contains the numbers 1 and 5?
- (b) List all the members of the power set of the set $C = \{\phi\}$.
- (c) How many positive integers not exceeding 100 are divisible either by 4 or by 6?
- (d) Let $A = \{a, b, d\}$ and $R = \{(a, b), (a, d), (b, d), (d, a), (d, d)\}$ be a relation on A .

Construct the diagraph.

(e) If m and n are odd integers, then prove that mn is an odd integer.

Answer any three of the following:

$$12 \times 3 = 36$$

3. (a) Let $A = \{1, 4, 5\}$ and $R = \{(1, 4), (1, 5), (4, 1), (4, 4), (5, 5)\}$ Determine M_R .

(b) Given that f_1 and f_2 are functions from R to R in which $f_1(x) = x$ and $f_2(x) = -x$.

Determine $f_1 \cdot f_2$.

4. Find the truth set of each of the following propositional function $P(x)$ defined on the set N

Of positive integers:

(a) $P(x) : x+3 < 7$

(b) $P(x) : x+5 > 8$

(c) $P(x) : x+4 < 1$

5. Compute the following integral: $\int \frac{\sqrt{x}}{\sqrt{x}} dx$

6. (a) Find the derivative of e^x

(b) Find the envelop of the family of straight lines $y = mx - 2am - am^3$, where m is a parameter.

7. Compute the area of the surface obtained by rotating the parabola

$y = x^2$ around the y -axis.
