# 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 $(A \wedge B) \subseteq B$ and $B \not\subset A$. 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, …, 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 $e^{-x2/2}$.

**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*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: $\int_{\sqrt{}}^{\sqrt{}}$

**6.** (a) Find the derivative of $e$

(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*.

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