Roll No. Total No. of Pages : 03

Total No. of Questions : 07

BCA (2007 to 2010 Batch) (Sem.–2nd)

MATHEMATICS-I (DISCRETE)

Subject Code : BC-203

Paper ID : [B0207]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students has to attempt any FOUR questions.**

SECTION-A

1. Answer the following :

empty sets such that A $\subseteq$ B, B $\subseteq$ C and C $\subseteq$ A.
d about these sets ?

(b) Show that the following argument is valid :

S_1 : No student is lazy.

S_2 : John is an artist.

S_3 : All artists are lazy.

S : John is not a student.

(c) Let R and S be the relation from A = {1, 2, 3} to B = {*a, b*} defined by

$$R = \{(1, a), (3, a), (2, b), (3, b)\}$$
$$S = \{(1, b), (2, b)\}$$

Find R $\cap$ S and R $\cup$ S

(d) Construct the truth tables of

$(p \to q) \to (\sim q \to \sim p)$

(e) Define universal quantifier.

(f) Find the first five terms of a sequence $a_0, a_1, a_2, ..., a_n, ...$ satisfying the given recurrence relation and initial conditions :

$a_n = a_{n-1} + n$ if $n \geq 1$, $a_0 = 5$.

(g) Define Hamiltonian graph.

(h) Draw the multigraph G whose adjacency matrix A = (a_{ij}) is

$$A = \begin{bmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

(i) Explain what is meant by a source and a sink in a digraph G.

(j) What do you mean by rooted trees ?

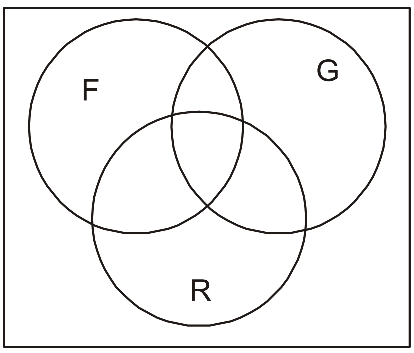
SECTION-B

2. Suppose 100 of the 120 mathematics students at a college take at least one of the languages French (F), German (G) and Russian (R). Also suppose 65 study French, 20 study French and German, 45 study German, 25 study French and Russian, 42 study Russian, 15 study German and Russian.

(a) Find the number of students who study all three languages.

(b) Fill in the correct of number of students in each of the eight regions of the following Venn diagrams.

(c) Determine the number k of students who study
(*i*) exactly one language
(*ii*) exactly two languages.



Venn diagram for part (b)