Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02
Total No. of Questions: 07

B. Tech. (Sem.-1st)

MATHEMATICS-I

Subject Code: BSBC-103

Paper ID: B1110

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

Instruction to candidate:

1) Section - A is Compulsory.

2) Attempt any four questions from section - B

Section - A **(10x 2 = 20)**

Q1. a) Give $x = \{\{a, b\}, c\}$ amd $y = \{a, b, c\}$. Are they equal sets?

b) Prove that if R and S are symmetric then R∩S is also Symmetric

c) Using method of induction prove that

$$1 + 2 + 3 + - - - - + n = \frac{n(n+1)}{2}$$

d) Find the term independent of x in the expansion of

$$\left(2x + \frac{1}{x_2}\right)^9$$

e) List all elements of the set

A-$\{x \mid x \text{ is a square of an integer and } x < 80\}$

f) Find first five terms of the sequence defined by the recurrence relation

$$a_n = a_{n-1} + 3a_{n-2}, a_0 = 1, a_1 = 2$$

g) Construct the truth table of $\sim p \rightarrow (q \rightarrow p)$

h) Define chromatic number of a graph G.

i) Solve the recurrence relation $a_r + a_{r-1} + a_{r-2} = 0$

j) Find the coefficient of $x^5 y^8$ $in(x + y)^{13}$

Section - B **(4x10=40)**

Q2. a) Prove the distributive law:

A∪(B∩C) = (A∪B) ∩ (A∪C)

b) Using mathematical induction, prove that

$$\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + - - - - \frac{1}{\sqrt{n}} > \sqrt{n} \text{ for } n \geq 2$$

Q3. a) Using truth tables prove that

b) Determine the validity of the argument

If 7 is less than 4, then 7 is not a prime number

$$\frac{7 \text{ is not less then } 4}{7 \text{ is prime number}}$$

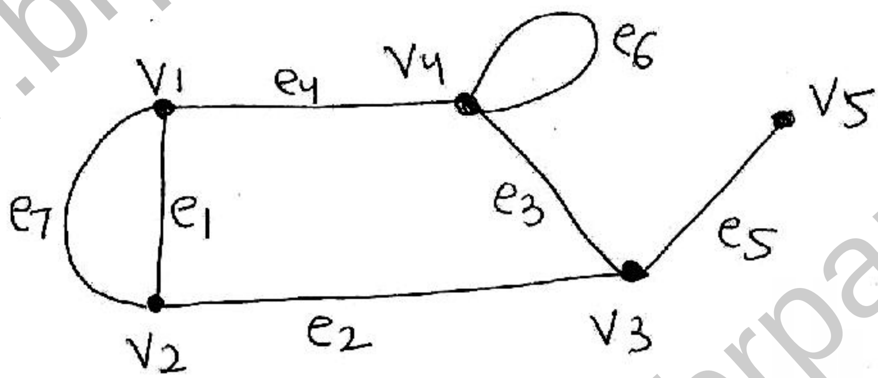
Q4. a) Solve $a_n + 5a_{n-1} = 9, a_0 = 6$

b) Obtain the terms independent of x in the expansion of $\left(2x - \frac{1}{x}\right)^{10}$

c) Find the fourth term from the end is the expansion of $\left(\frac{3}{x^2} - \frac{x^3}{6}\right)^7$

Q5. a) Prove that the number of edges is a complete graph with n vertices is $\frac{n(n-1)}{2}$

b) Find the degree of each vertex of the following graph



Q6. a) Prove that a graph G has a Hamiltonian circuit if e $\geq \frac{n^2-3n+6}{2}$, Where n is the number of vertices and e the number of edges in G

b) Prove that in any graph, there are an even number of vertices if odd degree

7 (a) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 0$

Where $a_0 = 4, \quad a_1 = 17$

b) Find particular solution of

$$a_r - 5a_{r-1} + 6a_{r-2} = 3r^2$$

-----END-----