Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 07

BCA (Sem.–1st)

MATHEMATICS-I

Subject Code : BSBC-103 (2011 & 12 Batch)

Paper ID : [B1110]

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. Write briefly :

(a) Given X = {{1, 2}, 3} and Y = {1, 2, 3}. Are they equal sets ?

(b) If $A \cup B = A \cup C$, then is it necessary that B = C ? Justify your answer.

(c) Prove that if R and S are transitive then $R \cap S$ is also transitive.

(d) Define Converse, Contrapositive and Inverse of a statement in propositional calculus.

(e) Find the truth value of $((\sim q \wedge p) \wedge q)$.

(f) Let $a_n = 2^n + 5(3^n)$, for $n = 0, 1, 2, \ldots$. Find a_0, a_1, a_2, a_3 and a_4. Also show that $a_2 = 5a_1 - 6a_0$.

(g) Define a regular graph.

(h) Give an example of a graph which is Hamiltonian but not Eulerian.

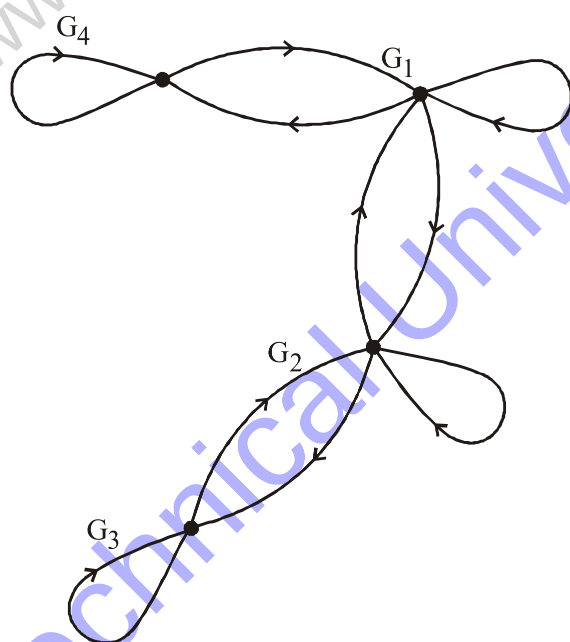
(i) Find the generating function for the sequence

1, 2, 3, 4, ...

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

SECTION-B

2. (a) Find the relation determined by graph given and the corresponding relation matrices. Also, determine the properties of the relation given by the graph.



(b) Show that $A \cup (B - C) = (A \cup B) - (C - A)$

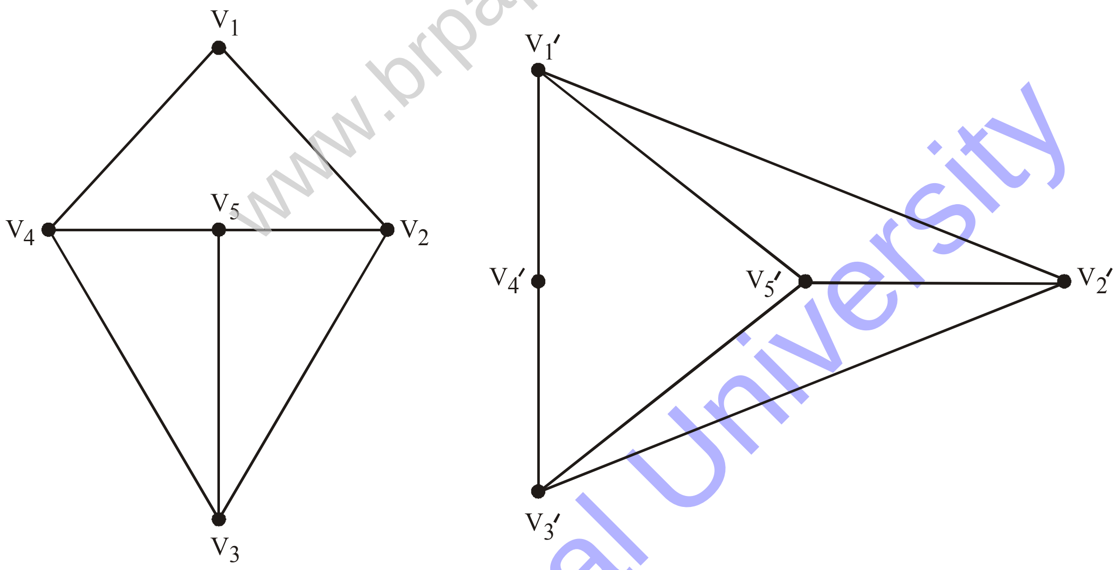
3. (a) Show that $\sim (p \vee (\sim p \wedge q)$ and $(\sim p \wedge \sim q)$ are logically equivalent.

(b) "*If there was a ball game, then travelling was difficult. If they arrived on time, then travelling was not difficult. They arrived on time. Therefore, there was no ball game*." Show that these statements constitute a valid argument.

4. Use Mathematical induction to prove that

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

5. (a) Show that the graphs G_1 and G_2 are isomorphic.



(b) Show that the maximum number of edges in a simple graph with n-vertices is $\frac{n(n-1)}{2}$.

6. (a) Solve the recurrence relation

$a_n = 5a_{n-1} - 6a_{n-2}$, for $n \geq 2$; $a_0 = 1$, $a_1 = 0$.

(b) What is the coefficient of $x^{101} y^{99}$ in the expansion of $(2x - 3y)^{200}$?

7. (a) Prove that in any graph, there are an even number of vertices of add degree.

(b) Define a tautology and give an example.