# 41321/C 210

Reg. No. | | | | | | | | |

## III Semester B.C.A.4 Degree Examination, November/December 2018
## DISCRETE MATHEMATICAL STRUCTURES (Theory) (Regular)

Time : 3 Hours Max. Marks : 80

***Instructions :*** ***1) Draw neat diagrams wherever required.***
***2) Simple calculators are allowed.***
***3) Answer the questions as per the instructions.***

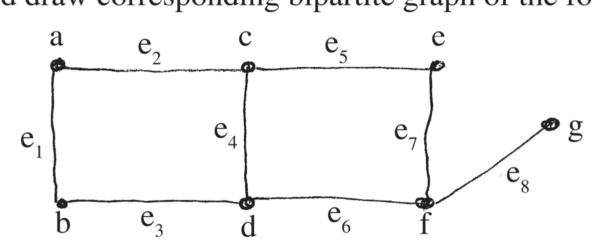
SECTION – A

1. Answer **all** the following questions. **(2×10=20)**
   a) If p is false and q is true, find the truth value of $(p \rightarrow \sim q)$.
   b) Define existential quantifier.
   c) If A = {a, b, c, d, e} and B = {d, e, f, g}, compute the cardinality of (B – A).
   d) Define pigeon hole principle.
   e) What do you mean by an algebraic system ?
   f) Define a Monoid.
   g) Obtain the recurrence relation for the fibonacci sequence.
   h) State the counting rule of Sum.
   i) What is a multigraph ?
   j) Define tree.

SECTION – B

Answer **any 4** questions of the following. **(5×4=20)**

2. Construct the truth table of $(p \wedge q) \rightarrow (\sim r)$.
3. Mention any 4 operations on sets with Mathematical notation and Venn diagram for each operation.
4. Prove that $1 + 2 + 3 + \ldots n = \frac{1}{2} \cdot n \cdot (n + 1)$, by Mathematical induction.
5. If $a * b = a + b + 3$ for all $a, b \in z$, the set of integers, prove that $(z, *)$ is an abelian group.
6. Define bipartite graph and draw corresponding bipartite graph of the following graph.

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SECTION – C

Answer **any 4** questions of the following. **(10×4=40)**

7. a) Write a note on well-formed formulas (wff).

b) Test whether the following argument is valid

$$\begin{array}{rcr} p & \rightarrow & \sim q \\ \sim r & \rightarrow & p \\ & & q \\ \hline \therefore & & r \end{array}$$

**(5+5)**

8. a) In a sample of 100 chips, 23 have a defect $D_1$, 26 have a defect of $D_2$, 30 have a defect of $D_3$, 7 have defects of $D_1$ and $D_2$, 8 have defects of $D_1$ and $D_3$, 10 have defects $D_2$ and $D_3$ and 3 have all the three defects. Find the number of chips having :

i) At least one defect

ii) No defect

b) Let A = {1, 2, 3, 4, 6} and R be a relation on A, defined by R = {(1, 1), (2, 1), (2, 2), (3, 1), (3, 3), (4, 1), (4, 2), (4, 4), (6, 1), (6, 2), (6, 3), (6, 6)}. Represent the relation R as matrix and draw its digraph. **(5+5)**

9. a) Show that G = {0, 1, 2, 3, 4, 5} is an abelian group under addition modulo 6.

b) Define Rings and Fields. **(5+5)**

10. a) Find the number of permutations of the word "PEPPER" and permutations if all P's together.

b) Out of 6 boys and 4 girls a committee of 6 is to be formed. In how many ways can this be done if the committee contains

i) 2 girls

ii) at least 2 girls **(5+5)**

11. Define **any 4** of the following terms related to graph theory.

i) Graph

ii) In-degree

iii) Out-degree

iv) Adjacency matrix

v) Isomorphic graph.