



Total No. of Questions: 3/13

Total No. of Pages: 03

First Year (Computer Science)
CMAT12201:Discrete Mathematics
(Semester II)

Program: BSc Comp05
Program (Specific):B.Sc. Computer Science
Class: F.Y.B.Sc(Comp. Sci.)
Course Type: Minor

Credits: 2
Time: 2 Hours
Max. Marks: 30
Set A

Instructions to the candidate:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw a well labelled diagram wherever necessary.

Q.1) Answer the following. (Any 5 out of 7)

[10 Marks]

i) Construct the truth table for the following statement.

$$(p \vee \neg q) \rightarrow q.$$

ii) Test validity of argument by direct method.

$$a \rightarrow \sim b, b, \sim c \rightarrow a \vdash c.$$

iii) Write the negation of the following statement

$$\exists x(x^2 + 1 = 5).$$

iv) Write the matrix $M(R)$ of the relation R defined as

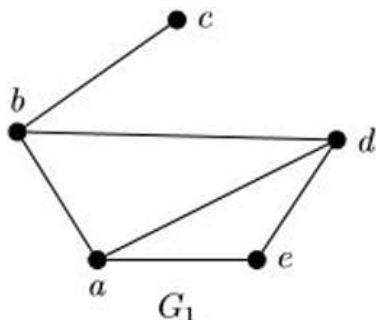
$$R = \{(x, y) / x R y \text{ if and only if } x + y = 3\} \text{ on the set } A = \{0, 1, 2, 3, 4\}.$$

Also draw the digraph.

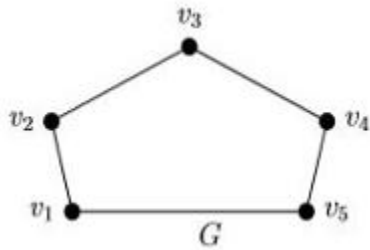
v) Discuss whether the following relation R defined on the set $A = \{a, b, c, d\}$ is reflexive and symmetric, where

$$R = \{(a, a), (b, b), (b, c), (c, d), (c, b), (c, c), (d, d), (a, c)\}.$$

vi) Verify handshaking lemma for the following graph G_1 .



vii) Find the complement of the following graph G.



Q.2) Answer the following. (Any 2 out of 3)

[10 Marks]

i) Using Warshall's algorithm to obtain the transitive closure of the relation

$$R = \{(1, 2), (2, 2), (2, 4), (3, 2), (3, 4), (4, 1)\} \text{ on the set } A = \{1, 2, 3, 4\}.$$

ii) Find the greatest common divisor d of 389 and 167 and hence find integers m and n such that

$$d = 389m + 167n.$$

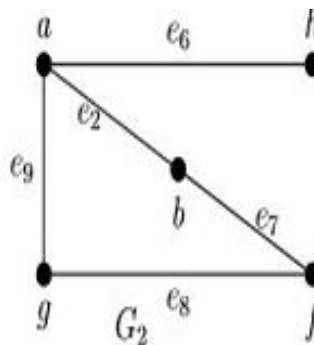
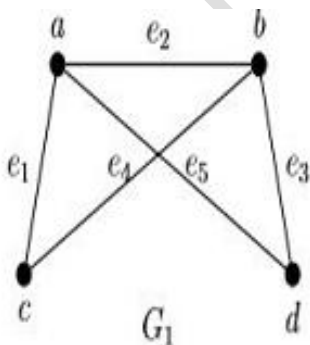
iii) Test the validity of the following argument by using direct method.

"If you send me an e-mail message, then I will finish writing the program. If you do not send me an e-mail message, then I will go to sleep early. If I go to sleep early, then I will wake up feeling refreshed lead to the conclusion, if I do not finish writing the program, then I will wake up feeling refreshed."

Q.3) Answer the following. (Any 2 out of 3)

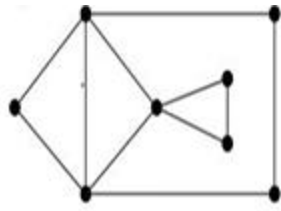
[10 Marks]

i) Find $G_1 \cup G_2$ and $G_1 \cap G_2$ for the following graphs.



ii) Check whether the following graph is

- a) An Eulerian
- b) A Hamiltonian graph



iii) Show that the following graphs are isomorphic

