Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5459]-201

S.E. (Information Technology) (I Sem.) EXAMINATION, 2018

DISCRETE STRUCTURES

(2015 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Solve Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Draw the neat sketch wherever necessary.

1. (*a*) Suppose license plate contains 2 English letters followed by 4 digits :

(*i*) How many different license plates can be manufactured if repetition of letters and digits are allowed ?

(*ii*) How many plates are possible if only the letters are repeated ? [6]

(*b*) 100 of them 120 engineering students in a college take part in at least one of the activity group discussion, debate and quiz. 65 participate in group discussion, 45 participate in debate, 42 participate in quiz, 20 participate in debate and quiz. Find the number of students, who participate in :

(*i*) All the three activities.

(*ii*) Exactly one of the activities. [6]

P.T.O.

Or

2. (*a*) Out of 5 males and 6 females, a committee of 5 is to form. Find the number of ways in which it can be formed so that among the person chosen in the committee there are :

(*i*) Exactly 3 male and 2 female.

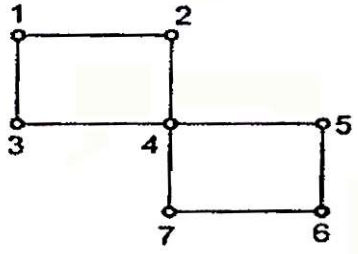
(*ii*) At least 2 male and one female. [6]

(*b*) It is known that the university 60% of the professor plays tennis, 50% of them plays football. 70% cricket, 20% plays tennis and football, 30% plays tennis & cricket and 40% plays football & cricket. If someone claimed that 20% of the professor plays tennis, football & cricket would you believe that claim ? Why ? [6]

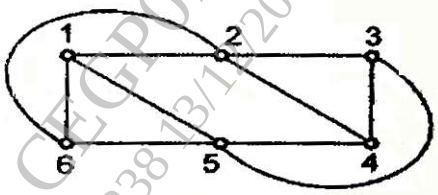
3. (*a*) Find the transitive closure of the relation R on A = {1, 2, 3, 4} defined by : [6]

R = {(1, 2), (1, 3), (1, 4), (2, 1), (2, 3), (3, 2), (3, 4), (4, 2), (4, 3)}.

(*b*) Determine, if the following graphs (G1, G2) are having the Hamiltonian circuit or path ? Justify your answer. [6]



G_1



G_2

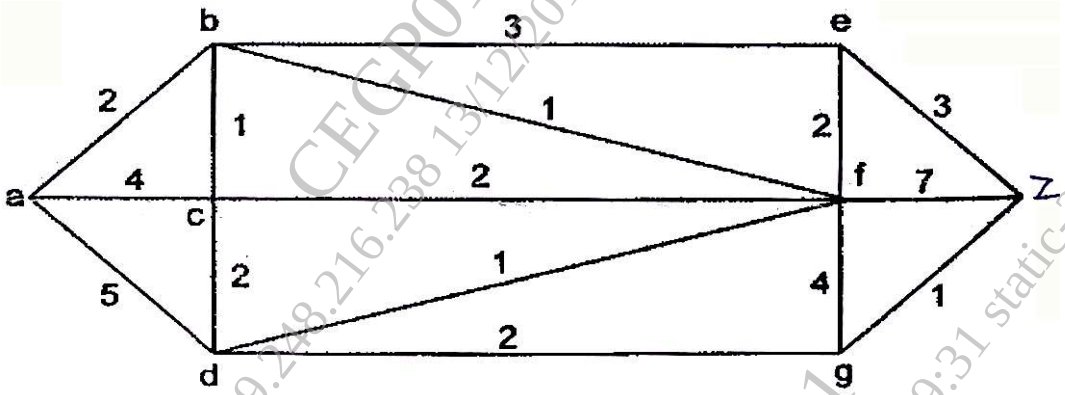
Or

4. (*a*) Let

$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 18, 24\}$$

be ordered by the relation X divides Y (Y divided by X). Show that the relation is a partial ordering and draw Hasse diagram. [6]

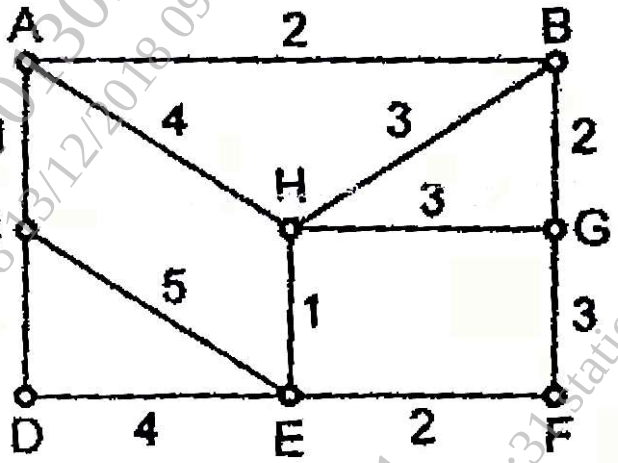
(*b*) Find the shortest path between $a - z$ for the given graph using Dijkstra's algorithm. [6]



5. (*a*) For the following set of weight construct optimal binary prefix code.

A = 5, B = 6, C = 6, D = 11, E = 20 [7]

(*b*) Using Prim's algorithm to find minimum spanning tree. Take *a* as staring vertex. [6]

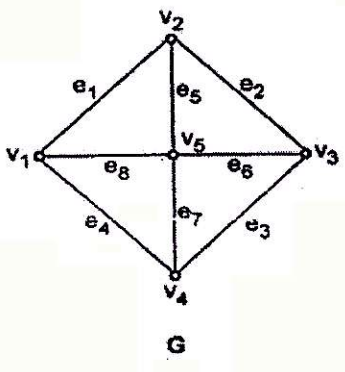


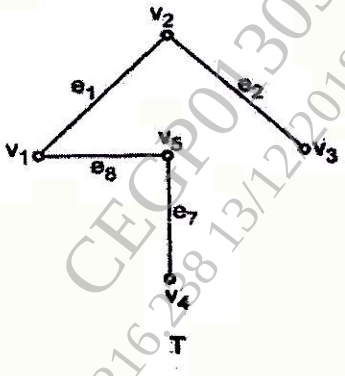
Or

6. (*a*) Construct the labelled tree of the following algebraic expression :

$$(((X + Y) * Z) / 3) + (19 + (X * X)) \quad [7]$$

(*b*) Find the fundamental cutsets of the following graph with respect to given spanning graph : [6]





7. (*a*) Define the following :

(*i*) Groupoid

(*ii*) Monoid

(*iii*) Abelian Group. [6]

(*b*) Let

$$R = \{0^o, 60^o, 120^o, 180^o, 240^o, 300^o\}$$

and * = binary operation, so that for a and b in R, $a * b$ is overall angular rotation corresponding to successive rotations by a and then by b. Show that (R, *) is a Group. [7]

Or

8. (*a*) Show that (G, +8) is an abelian group where :

$$G = \{0, 1, 2, 3, 4, 5, 6, 7\}.$$ [6]

(*b*) Show that (F, +, *) is a field where F is set of all rational numbers and + and * are ordinary addition and multiplication operators ? [7]