

(68)

**SARDAR PATEL UNIVERSITY****M.SC.(IT) SEM-I EXAMINATION****2012****THURSDAY, 29<sup>TH</sup> NOVEMBER****10:30 AM TO 12:30 PM****PS01FIIT02: MATHEMATICS-I****Total Marks: 70****Q:1** Choose the correct option in the following, mention the correct option with the answers in the answer book. **[10]**

- (1) Norm of the vector  $u = (3, 0, 4)$  is  
 (a) 25 (b) 7 (c) 0 (d) 5
- (2) The degree of a pendant vertex is:  
 (a) 0 (b) 1 (c) 2 (d) -1
- (3)  $4(1, 2, 1) + 2(1, 3, 3) = \dots\dots\dots$   
 (a) (6, 14, 10) (b) (6, 10, 14) (c) (6, 14, 10) (d) (10, 6, 14)
- (4) In a connected map with  $R = 11$ ,  $E = 27$  then  $V = \dots\dots\dots$   
 (a) 20 (b) 19 (c) 36 (d) 18
- (5) Chromatic number is the  $\dots\dots\dots$  number of color required to paint graph G.  
 (a) total (b) average (c) minimum (d) maximum
- (6) A Square matrix A is said to be symmetric if.....  
 (a)  $A \neq A^T$  (b)  $A = -A^T$  (c)  $A = A^T$  (d) None of these
- (7) Mode of 2, 3, 7, 6, 9, 6, 4, 8 is  
 (a) 7 (b) 6 (c) 4 (d) 9
- (8) Geometric mean of x, y, z is given by  
 (a)  $\sqrt{xyz}$  (b)  $\sqrt{x+y+z}$  (c)  $\sqrt[3]{xyz}$  (d) none of these
- (9) The degree of each vertex of the complete graph  $K_5$  is:  
 (a) 5 (b) -5 (c) 4 (d) 1
- (10) An alternating sequence of vertices and edges in graph is called:  
 (a) trail (b) cycle (c) path (d) degree

**Q:2** Answer the following in short. (Any Ten) **[12]**

- (1) Define graph and multigraph.
- (2) Define the terms: Map and Regions.

(3) Define: Planar graph. Is below graph is planar?



(4) Find  $x, y, z$  if  $(2x, 3, y) = (4, x + z, 2z)$ .

(5) Define: Incidence matrix.

(6) Find the degree of vertices  $V = \{P_1, P_2, P_3, P_4, P_5\}$  where  $E = \{(P_1, P_4), (P_1, P_2), (P_1, P_3), (P_3, P_4)\}$

(7) Define arithmetic mean.

(8) Obtain median of the data 2, 5, 6, 2, 4, 5, 8 and 6.

(9) Define bridge and cut points.

(10) Define tree and spanning trees of the graph.

(11) If  $A = \begin{bmatrix} 2 & 0 & -1 \\ 4 & 5 & 3 \\ 0 & 2 & 5 \end{bmatrix}$  then find  $A + A^T$  and  $A - A^T$ .

(12) Explain quantitative data.

**Q:3**  
(a) If  $A = \begin{bmatrix} 2 & 4 \\ 3 & 0 \\ 3 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 2 & 3 \\ 7 & 1 & 5 \end{bmatrix}$  then prove that  $(AB)^T = B^T A^T$  [5]

(b) Using Cremer's rule solve the simultaneous equations  $3x - 2y = 5$ ,  $5x + 4y = 1$ . [5]

OR

**Q:3** Define the dot product and norm of vector. Let  $U = (5, 4, 1)$ ,  $V = (3, -4, 1)$ , (i) Find norm of  $U$  and  $V$ . (ii) [5]

(c) Show that  $U$  and  $V$  are orthogonal.

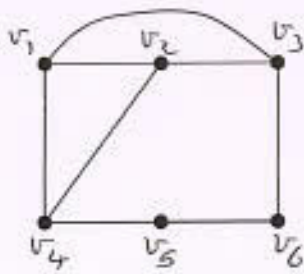
(d) Let  $A = \begin{bmatrix} 1 & 3 \\ 5 & 3 \end{bmatrix}$ . Find  $f(A)$ , where  $f(x) = x^2 - 4x - 12$ .

**Q:4** Draw the graph  $G$  corresponding to each adjacency matrix given below. [5]

(a)

$$\begin{bmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

(b) Consider the graph  $G$  as [5]



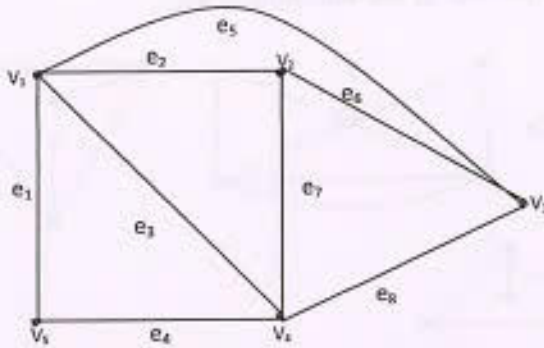
- (i) Find all simple paths from  $v_1$  to  $v_6$ .
- (ii) Find all trails from  $v_1$  to  $v_6$ .
- (iii) Find  $d(v_1, v_5)$ .
- (iv) Find all cycles in  $G$ .

OR

Q:4 Find the incidence matrix and adjacency matrix for the following Graphs:

[5]

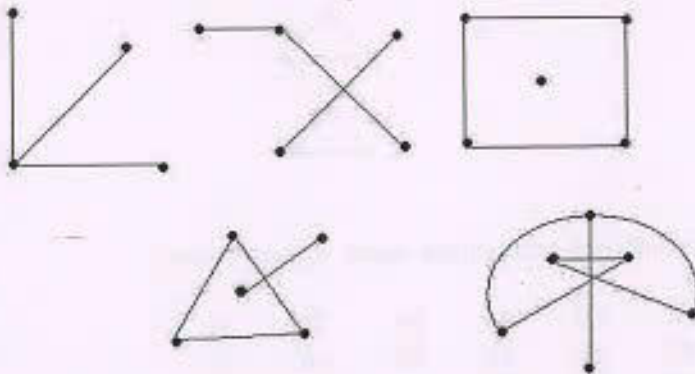
(c)



(d)

Define connected graph. Determine whether or not each of the graphs is connected or not:

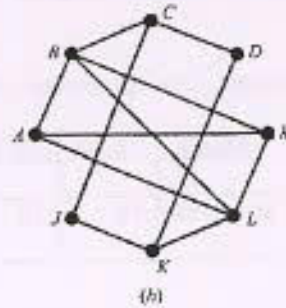
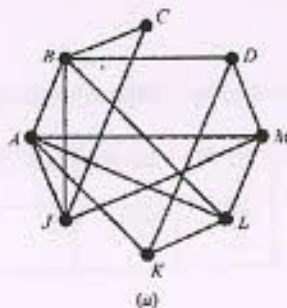
[5]



Q:5

(a) Find chromatic number for the following graphs using Welch-Powell algorithm:

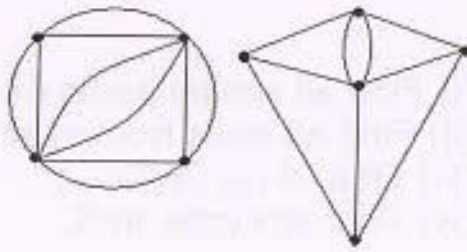
[5]



(b) Define the coloring of a map. Paint the following maps with minimum number of colors:

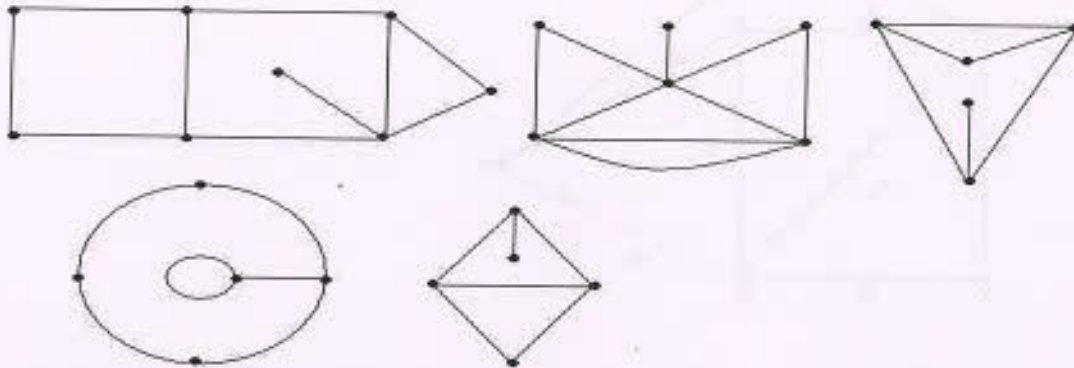
[5]





OR

- Q:5** (c) Identify cycle or closed path that borders each region of the following map. Also find the degree of each region and chromatic number of the following maps: [5]



- (d) State Euler's formula. Verify it for the following graphs: [5]



- Q:6** The marks of 40 students who attended a workshop competitive exam are as follows: [10]

27	32	57	34	36	48	49	31	51	34
49	45	51	29	47	36	50	46	30	46
35	35	48	41	53	36	37	47	47	30
43	45	42	30	46	50	28	44	48	49

- (i) Classify the above data in exclusive classes & one of them being 40 – 44.  
 (ii) Obtain mean and median of the distribution.

OR

- Q:6** For following data find mean, median and mode for the following marks distribution. [10]

Marks	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	10	18	27	20	15	6