

## M.SC.(IT) SEM-I (NC) EXAMINATION

2015

SATURDAY, 18<sup>TH</sup> APRIL

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]

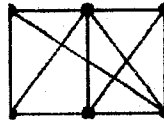
- (1) Chromatic number is the \_\_\_\_\_ number of color required to paint graph G.  
 (a) total (b) average (c) minimum (d) maximum
- (2) An alternating sequence of vertices and edges in graph is called:  
 (a) trail (b) cycle (c) path (d) degree
- (3)  $2(1, -2, 1) + 2(1, 3, -3) = \dots\dots\dots$   
 (a) (1, 2, -4) (b) (4, -2, -4) (c) (4, 2, -4) (d) (4, 2, 4)
- (4) Norm of the vector  $u = (-1, 2, -2)$  is  
 (a) 9 (b) 3 (c) 1 (d) -9
- (5) The degree of an isolated vertex is:  
 (a) 0 (b) 1 (c) 2 (d) -1
- (6) In a connected map with  $R = 10, V = 25$  then  $E = \underline{\hspace{2cm}}$   
 (a) 24 (b) 30 (c) 33 (d) 38
- (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  $K_8$  is:  
 (a) 49 (b) -7 (c) 7 (d) 1
- (10) 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

Q:2 Answer the following in short. (Any Ten)

[12]

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

- (2) Define the terms: Map and Regions.  
 (3) Define: Planar graph. Is below graph is planar?



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

- (5) Define graph and multigraph.  
 (6) Explain quantitative data.  
 (7) Define arithmetic mean.  
 (8) Find  $x, y, z$  if  $(2x, 3, y) = (4, x + z, 2z)$ .  
 (9) Define bridge and cut points.  
 (10) Define tree and spanning trees of the graph.  
 Define: Incidence matrix.  
 (11)  
 (12) Obtain median of the data 2, 5, 6, 2, 4, 5, 8 and 6.

**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]  
 (a) Show that  $U$  and  $V$  are orthogonal.

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

OR

**Q:3** (c) 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]

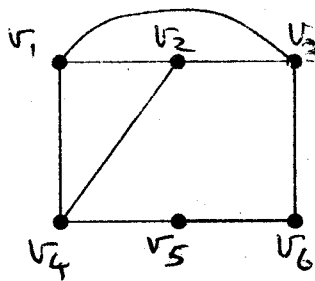
(d) Using Cremer's rule solve the simultaneous equations  $3x - 2y = 5$ ,  $5x + 4y = 1$ .

**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]



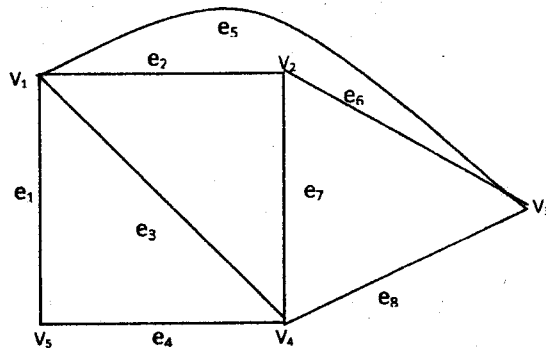
- (i) Find all simple paths from  $v_1$  to  $v_6$ .
- (ii) Find all trails from  $v_1$  to  $v_6$ .
- (iii) Find  $d(v_1, v_5)$ .
- (iv) Find all cycles in G.

OR

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

[5]

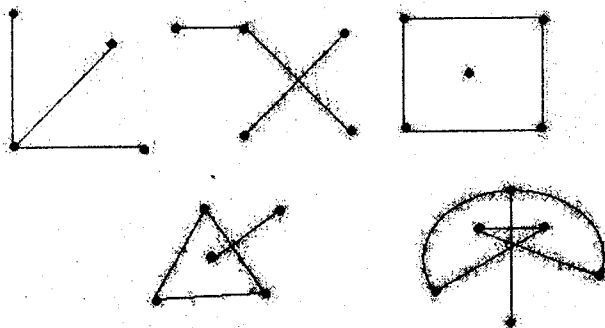
(c)



(d)

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

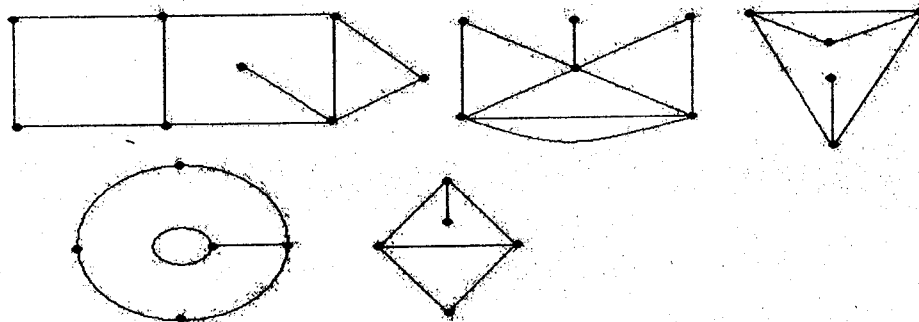
[5]



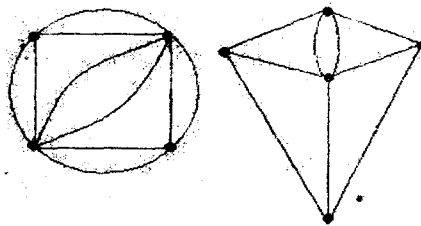
Q:5

(a) 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]



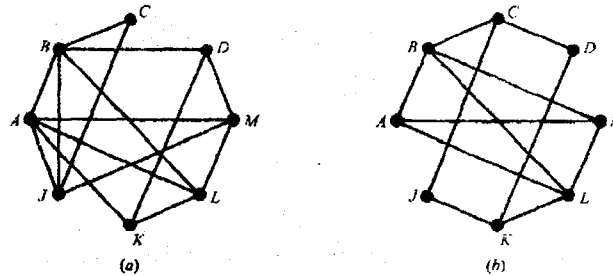
(b) Define the coloring of a map. Paint the following maps with minimum number of colors:



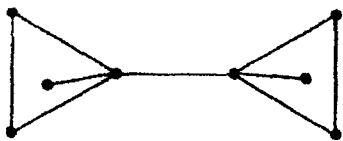
OR

Q:5

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



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



Q:6 Calculate Mean, Median and Mode for the following data.

weight(lbs) X	130	135	140	145	146	148	149	150	157
no. of persons(f)	3	4	6	6	3	5	2	1	1

OR

Q:6 The marks of 40 students who attended a workshop competitive exam are as follows:

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.

— x —