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

Question Paper Code: 41201

M.E. DEGREE EXAMINATION, DECEMBER 2014.

First Semester

Computer Science and Engineering

14PMA121 - ADVANCED MATHEMATICS FOR COMPUTING

[Common to Computer Science and Engineering (With Specialization in Networks)]

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

(Statistical Tables may be permitted)

Answer ALL Questions.

PART A - (5 x 1 = 5 Marks)

1. The number of vertices of odd degree in a graph is always
   (a) odd (b) even (c) one (d) zero

2. Let G be a connected planar graph having n vertices ,m edges and r regions. Then $\sum \deg(x)$ is
   (a) 2m (b) 3m (c) 5m (d) mn

3. The maximum likely hood estimate are
   (a) Unbiased (b) Inconsistent (c) Consistent (d)None of the above

4. If θ_0 is a population parameter and θ is the corresponding sample statistic, then the alternative hypothesis for two tailed is
   (a) $H_1: \theta = \theta_0$ (b) $H_1: \theta \neq \theta_0$ (c) $H_1: \theta > \theta_0$ (d) $H_1: \theta < \theta_0$

5. The simulation that can be used in investment analysis is

(a) deterministic (b) static (c) dynamic (d) none

PART - B (5 x 3 = 15 Marks)

6. Write the adjacency and incidence matrices of a graph.

7. Distinguish between a general tree and a binary tree.

8. State the principle of method of least squares.

9. Write any two properties of t-distribution.

10. Write briefly about simulation of a Queuing system.

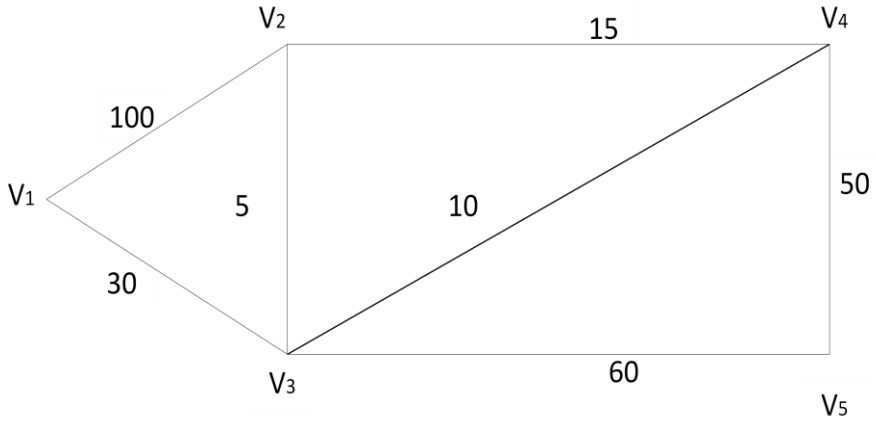
PART - C (5 x 16 = 80 Marks)

11. (a) (i) Show that a simple graph G with n vertices and k components cannot have more than $\frac{1}{2}(n-k)(n-k+1)$ edges. (8)

(ii) If the intersection of two paths in a graph G is disconnected then prove that their union has at least one circuit. (8)

Or

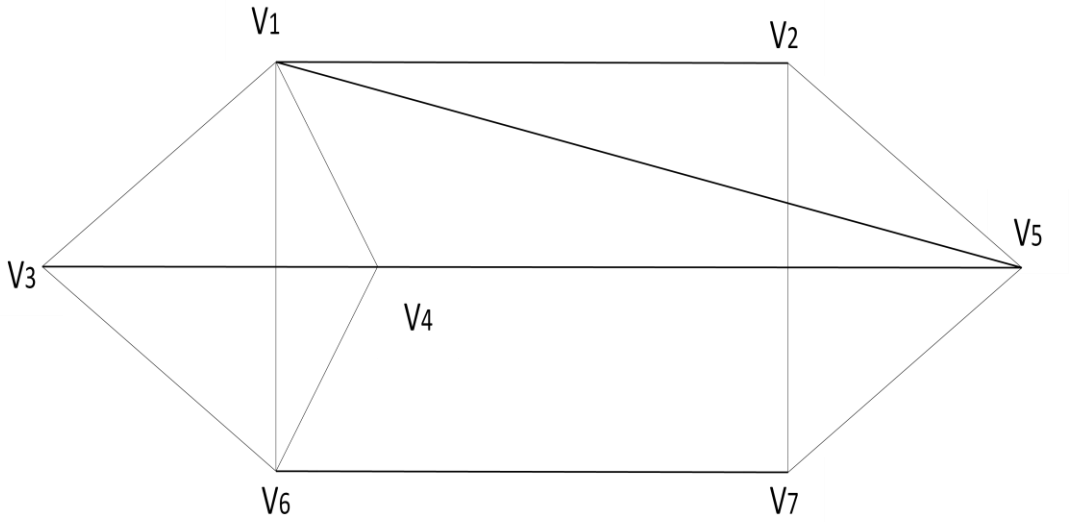
(b) (i) Find the shortest path from vertex V_1 to V_5 in the graph G_1.



(8)

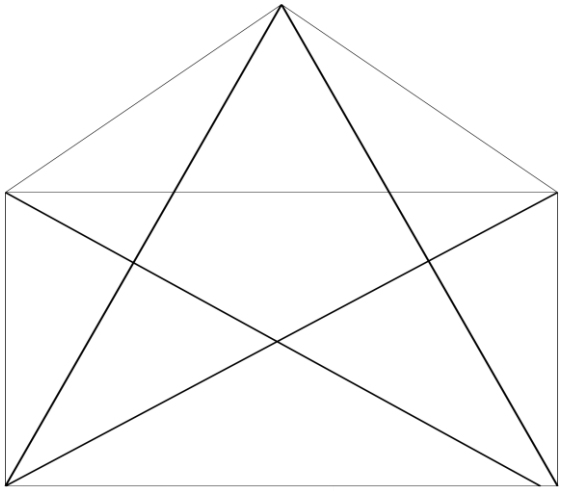
(ii) Let G be a connected graph with n vertices and e edges then prove that G has a Hamiltonian circuit provided $e \geq \frac{1}{2}(n^2 - 3n + 6)$,n$\geq$ 3. (8)

12. (a) (i) Paint the graph G_2 with minimum number of colours.



(8)

(ii) Show that the graph K_5 is non-planar

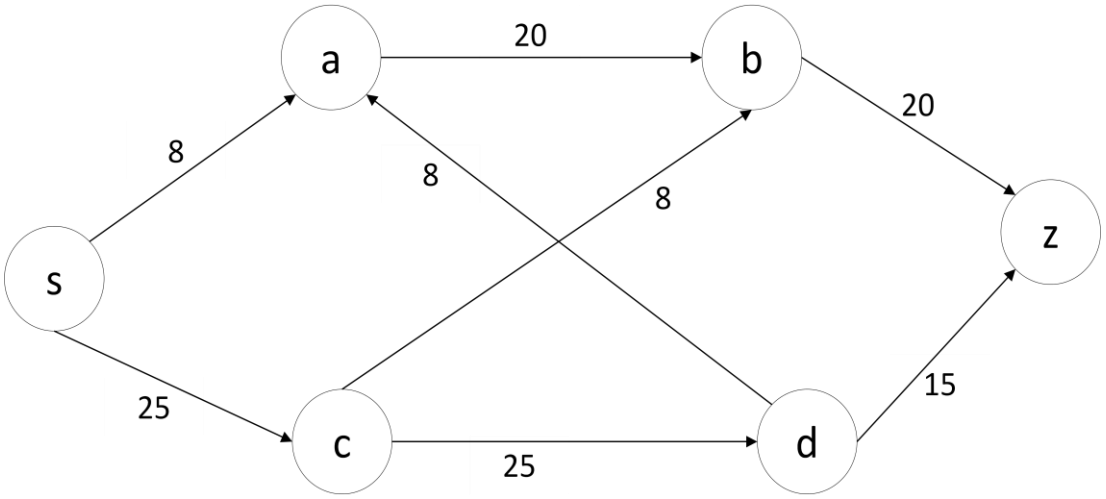


K5

(8)

Or

(b) Find the maximum flow of the graph G_4 where s is source and z sink. (16)



G4

13. (a) (i) Estimate α and β by the method of moments for

$$f(x;\alpha,\beta)=\frac{\beta^{\alpha}}{\Gamma\alpha}x^{\alpha-1}e^{-\beta x},0\le x\le\infty \quad (8)$$

(ii) Calculate trend values by the method of least squares from the given data and estimate the data for 2000

Year	1990	1992	1993	1994	1995
Data	60	80	102	121	137

(8)

Or

(b) Obtain the regression lines for the heights of fathers X and their sons Y. (16)

X(inches)	65	66	67	67	68	69	70	72
Y(inches)	67	68	65	68	72	72	69	71

14. (a) (i) Tests made on the breaking strength of 10 pieces of a metal wire gave the results: 578, 572, 570, 568, 572, 570, 570, 572, 596 and 584Kg .Test if the mean breaking strength of the wire can be assumed as 577 Kg at 5% level of significance. (8)

(ii) Test the significance of the difference between the means of the samples drawn from two normal population with the same S.D from the data (8)

	Size	Mean	SD
Sample1	100	61	4
Sample2	200	63	6

Or

(b) (i) 15.5 percent of a random sample of 1600 undergraduate were smokers, where as 20% of a random sample of 900 postgraduates were smokers in a state. Can we conclude that less numbers of undergraduates are smokers than the postgraduate? (8)

(ii) Test the normality of the following distribution by using χ^2 test of goodness of fit.

x	125	135	145	155	165	175	185	195	205
y	1	1	14	22	25	19	13	3	2

(8)

15. (a) (i) At a telephone booth suppose that the customers arrive with an average time of 1.2 time units arrive with an average time of 1.2 time units between one arrival and the next. Service times are assumed to be 2.8 time units, simulate the system for 12 time units by assuming that the system starts at t=0 .What is the average waiting time per customer? (8)

(ii) Summarize the procedure of Monte-Carlo simulation. (8)

Or

(b) A company has a single service station which has the following characteristics: The mean arrival rate of customers and the mean service time are 6.2 minutes and 5.5 minutes respectively .The time between an arrival and its services varies from one minute to seven minutes. The arrival and service time distributions are given below;

Time (min)	Arrival (Probability)	Service (probability)
1-2	0.05	0.10
2-3	0.20	0.20
3-4	0.35	0.40
4-5	0.25	0.20
5-6	0.10	0.10
6-7	0.05	---

The queuing process starts at 11 A.M and closes at 12. P.M. An arrival moves immediately into the service facility if it is empty. On the other hand, if the service station is busy the arrival will wait in the queue. .Customers are served on the first come first served basis. If the clerk's wages are Rs.6 per hour and the customer's waiting line costs Rs.5 per hour, would it be economical for the manager to engage the second clerk? Use Monte Carlo simulation technique. (16)