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

Question Paper Code: 42101

M.E. DEGREE EXAMINATION, NOVEMBER 2015

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

(Use of statistical tables may be permitted)

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The degree of vertex for any Euler graph is
   (a) odd (b) multiple of three (c) even (d) none

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) $1m$

3. The maximum likely hood estimate is
   (a) Inconsistent (b) Consistent (c) Unbiased (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 chromatic number of the any tree having more than one vertex
   (a) 0 (b) 1 (c) 2 (d) 3

PART - B (5 x 3 = 15 Marks)

6. Define the operations intersection, cross product in graphs.

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

8. State the principle of method of least squares.

9. State any two conditions for the validity of x^2 test.

10. Write briefly about simulation of a queuing system.

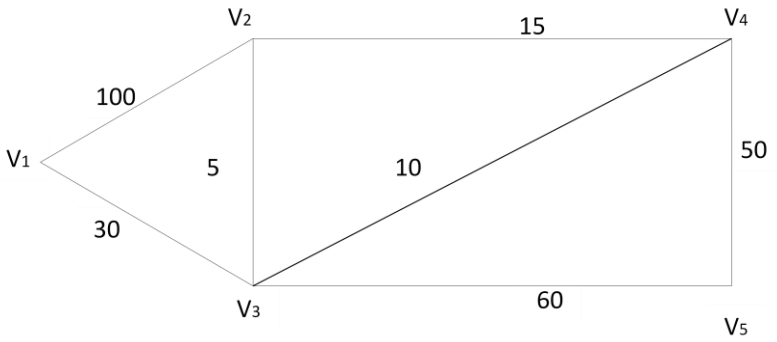
PART - C (5 x 16 = 80 Marks)

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)



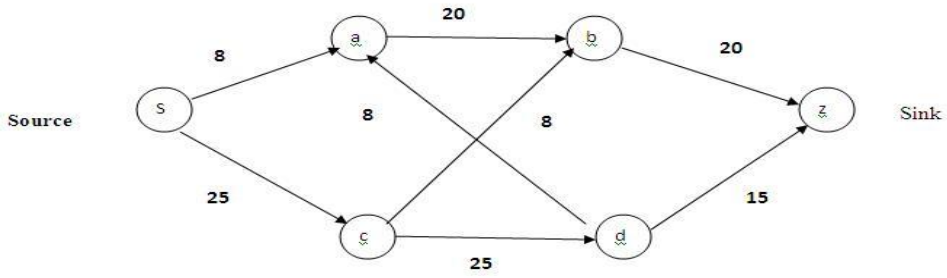
(ii) Let *G* be a connected graph with *n* vertices and *e* edges then prove that *G* has a Hamiltonian circuit provided $e \geq \frac{1}{2}(n^2-3n+6)$, n≥ 3. (8)

12. (a) (i) Prove Euler's formula in planar graph. (8)

(ii) Prove max-flow min-cut theorem. (8)

Or

(b) Find the maximum flow. (16)



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

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

(ii) Calculate trend values by the method of least squares from the given data and estimate the data for 2000. (8)

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

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) In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance? (8)

(ii) A random sample of 10 boys had the following I.Q's: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100
Do these data support the assumption of a population mean I.Q. of 100? (8)

Or

(b) (i) From the following information state whether the condition of the child is associated with the condition of the child. (8)

Condition of child	Condition of House		Total
	Clean	Dirty	
Clean	69	51	120
Fairly clean	81	20	101
Dirty	35	44	79
Total	185	115	300

(ii) Two independent samples of sizes 8 and 7 contained the following values. (8)

Samples 1	19	17	15	21	16	18	16	14
Samples 2	15	14	15	19	15	18	16	

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 is 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)