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

Question Paper Code: 12061

M.E. DEGREE EXAMINATION, MAY 2014.

First Semester

CAD / CAM

01PMA124 PROBABILITY AND STATISTICS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. A coin that shows heads with probability p is tossed until a head is obtained. Find the probability that the coin is tossed n times.
2. Compute the moment generating function of a Bernoulli random vari-able with parameter p.
3. Define a random sample.
4. What is the method of moments estimate for the parameter ¸ of an exponential distribution?
5. Define Type I and Type II errors of a hypothesis test.
6. Define x^2 and t distributions.
7. Explain the context of experimental designs.
8. What is factorial design?
9. What are the components of Time Series?
10. Define exponential smoothing.

PART - B (5 x 16 = 80 Marks)

11. (a) If X and X are independent and uniformly distributed in [0; 1], find the p.d.f. of Z = X + Y . Hence find P – – (16)

Or

(b) Find the moment generating function of the Binomial random variable X with parameters (n; p). Using this moment generating function, find its first, second, and third moments. (16)

12. (a) (i) Find the multiple correlation coefficient $R_{1:23}$ and the partial correlation $r_{12:3}$ for the data r_{12}= 0.8, r_{23} = -0.56, and r_{13} = - 0.4. (8)

(ii) A single observation X can be of type I, II, or III with prob-abilities – — and 1 - , respectively. Here is an unknown parameter with 0 ≤ ≤ 1. Ten independent observations resulted in 4 of type I and 3 each of types II and III. What is the maximum likelihood estimator of ? (8)

Or

(b) (i) Using principle of least squares, fit the straight line y = a + bx to the following data

X	1	2	3	4	5	6
X	3	5	8	13	14	18

(8)

(ii) Using the method of moments, estimate the parameters of the gamma distribution:

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(8)

13. (a) Let X Normal , where both and are unknown.

i. Find an interval estimation for . (8)

ii. Find an interval estimation for . (8)

Or

(b) (i) A random sample of 10 boys had the following IQs:70, 120,110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a polulation mean IQ of 100? Find a reasonable range in which most of the mean IQ values of samples of 10 boys lie. (8)

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

Sample I	19	17	15	21	16	18	16	14
Sample II	15	14	15	19	15	18	16	

Is the difference between sample means significant? (8)

14. (a) A completely randomized design experiment with 10 plots and 3 treatments gave the following results:.

Plot No	1	2	3	4	5	6	7	8	9	10
Treat ment	A	B	C	A	C	C	A	B	A	B
Yield	5	4	3	7	5	1	3	4	1	7

Analyze these results for treatment effects. (16)

Or

(b) Perform the ANOVA for the following Latin square design: (16)

29 D	19 B	29 C	6 A
16 C	10 A	21 D	19 B
6 A	39 D	24 B	37 C
25 B	42 C	10 A	30 D

15. (a) (i) Calculate 4-yearly and 5-yearly moving averages from the fol-lowing data: (8)

Year	Bank Clearance
1916	52.7
1917	79.4
1918	76.3
1919	66.0
1920	68.6
1921	93.8
1922	104.7
1923	87.2
1924	79.3
1925	103.6
1926	97.3
1927	92.4
1928	100.7

(ii) Describe Auto regressive process. (8)

Or

(b) Compute the mean squared error by Exponential smoothing method for the following data set consisting of 12 observations taken over time for = 0:1 and = 0:5. (16)

Time	1	2	3	4	5	6	7	8	9	10	11	12
Y	71	70	69	68	64	65	72	78	75	75	75	70