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Reg. No. : .....

Name : .....

First Semester M.Tech. Degree Examination, June 2009
Branch : Civil (2008 Scheme)
Environmental Engineering and Transportation Engg.
(Common)
CMA 1002 : APPLIED STATISTICS

Time: 3 Hours Max. Marks: 100

Instructions *: Answer* ***any five*** *questions.* ***All*** *questions carry* ***equal*** *marks.*

I. a) Derive the mean and variance of a Poisson distribution.

b) If the probability of a new born child is male in a typical family is 0.6. Find the probability that in a family of 5 children there are i) exactly 3 boys. ii) majority of girls.

c) Fit a Poisson distribution for the following data.

x :	0	1	2	3	4
f :	122	60	15	2	1

II. a) In a certain examination, the percentage of candidates passing and getting distinctions were 45 and 9 respectively. Evaluate the average marks obtained by the candidate, the minimum marks being 40 and 75 respectively (Assume the distribution to be normal)

b) Is the function $f(x) = \begin{cases} \frac{1}{18}(3+2x), & 2 \le x \le 4 \\ 0, & \text{other wise} \end{cases}$. Find $P(2 \le X \le 3)$.

c) Define simple random sampling, stratified sampling, systematic sampling.

III. a) The mean operating life of a random sample of 15 bulbs taken from a population with SD 500 hrs is 8900 hours. Find i) 95% confidence limits ii) 90% confidence limits for the population mean.

b) Ten students are selected at random from a school and their heights are found to be in inches 50, 52, 52, 53, 55, 56, 57, 58, 58 and 59. In the light of these data discuss the suggestion that the mean height of students of the school is 54 inches. Use 5% level of significance.

c) A coin is tossed 10,000 times and head turns up 5195 times. Is the coin unibiased ?

P.T.O.

IV. a) The theory predicts the proportion of beans, in the four groups A, B, C and D should be 9 : 3 : 3 : 1. In an experiment with 1600 beans the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory ? (Given $\chi^2_{0.5}$ for 3 d.f = 7.81).

b) Calculate the coefficient of correlation from the following data :

x :	1	2	3	4	5	6	7	8	9
y :	9	8	10	12	11	13	14	16	15

c) If θ is the angle between two regression lines, show that $\tan\theta = \frac{1-r^2}{r} \cdot \frac{\sigma_x \sigma_y}{\sigma_x^2 \sigma_y^2}$.

V. Three different machines are used for a production on the basis of the outputs, set up one-way ANOVA table and test whether the machines are equally effective.

Machine I	Machine II	Machine III
10	9	20
15	7	16
11	5	10
10	6	14

Given that the value of F at 5% level of significance for (2, 9) d.f is 4.26.

VI. a) Given $f(x, y) = x\, e^{-x(y+1)}, x \geq 0, y \geq 0$ find the regression curve of Y on X.

b) Perform a two way ANOVA on the data given below.

Plots of land	Treatments			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42