TIME ALLOWED: THREE HOURS   **MAXIMUM MARKS: 100**

NOTE: **Attempt FIVE Questions in All. Calculator is Allowed.**

Q No. 1:   a)   For a Statistics class, mean for the midterm score is 75 and the standard deviation is 8. Using Chebyshev's theorem, find the percentage of students who scored between 59 and 91.

(b)   A class of 25 students took a test whereas 10 students had an average score of 80 while remaining students had an average score of 60. Calculate the weighted average score of the whole class?

(c)   The second moments about the mean of two distributions are 9 and 16, while third moments about the mean are -8.1 and -12.8 respectively. Which distribution is more skewed to the left?

(6+6+8 Marks)

Q No. 2:   a)   An employer wishes to hire three people from a group of 15 applicants, 8 men and 7 women, all of whom are equally qualified to fill the position. If he selects three at random what is the probability that (i) all three will be men, (ii) at least one will be a woman?

(5+5 Marks)

b)   The probability distribution of a r.v X is given in the following table below. Find:

i)   The value of k
ii)   The distribution function

X	1	2	3	4	5
P(x)	1/10	3/10	k	2/10	1/10

(5+5 Marks)

Q No. 3:   a)   Ten percent of the tools produced in a certain manufacturing process turn out to be defective. Find the probability that in a sample of 10 tools chosen at random exactly 2 will be defective by using (a) binomial distribution and (b) Poisson approximation to the binomial distribution.

(5+5 Marks)

(b)   Let X represents the number of weekly credit card purchases a person makes and Y the number of credit cards a person owns. Joint table for X and Y is given.

		X			
		0	1	2	3
Y	1	0.08	0.10	0.10	0.02
	2	0.08	0.05	0.22	0.05
	3	0.04	0.04	0.04	0.18

Find (a) Marginal distribution of X and Y respectively
(b) P(X=2)   (c) $P(Y = 2 | X = 3)$.

(5+2+3 Marks)

Q No. 4:

a) If a variable is binomially distributed, determine its mean and variance

(4+6 Marks)

b) An attendant at a car wash is paid according to the number of cars that pass through. Suppose the probabilities are 1/12, 1/12, 1/4, 1/4, 1/6, and 1/6,respectively, that the attendant receives $7, $9, $11,$13, $15, or $17 between 4:00 P.M. and 5:00 P.M. on any sunny Friday. Find the attendant's expected earnings for this particular period.

(10 Marks)

Q No. 5:

a) Find mean and variance of geometric distribution
$P(X=x) = q^{x-1}p$ $x=1,2,3,... \infty$

(b) The probability that a man aged 50 years will die within a year is 0.01125. What is the probability that of 12 such men at least 11 will reach their fifty-first birthday?

(10+10 Marks)

Variance

Q No. 6:

a) Show that mean and $\widehat{S.D.}$ of exponential distribution are equal, having p.d.f. $f(x) = \lambda e^{-\lambda x}$ for $x >0$.

(b) A fair coin is tossed 20 times. Find the probability that the number of heads occurring is between 10 and 14 inclusive by using the normal approximation to binomial distribution.

✓ **(10+10 Marks)**

Q No. 7:

a) A college entrance examination consisted of three tests in Mathematics, English and General knowledge. To test the ability of the examination to predict performance in a statistics course, data concerning a sample of 200 students were gathered and analyzed. Where X_1=score on statistics test, X_2=score on English test, X_3=score on mathematics test and X_4=score on general knowledge test. Following calculations were obtained.

(5+5 Marks)

$$r_{12}=0.9, r_{13}=0.75, r_{14}=0.8, r_{23}=0.7, r_{24}=0.7, r_{34}=0.85$$

$$r_{124}=0.7935, r_{134}=0.2215, r_{143}=0.4664, r_{123}=0.7939, r_{243}=0.2791$$

and $r_{234}=0.2791$. Calculate r_{1234} and r_{1423}.

(b) Two members of a selection committee assigned scores to eight persons on the basis of their performance. Rank these persons according to their suitability for promotion. Calculate the coefficient of rank correlation.

Persons	Scores assigned by Member 1	Scores assigned by Member 2
A	93 ·1	92 2
B	90 2	87 4
C	90 2	99 1
D	88 3	90 3
E	86 4	85 5
F	84 5·	85 5
G	77 6	85 5
H	69 7	79 6