Final Exam Guidelines

Chapter-4

Theory: Correlation, Correlation Coefficient, Comment on Correlation Coefficient, Properties of Correlation Coefficient, Regression, Regression Coefficient, Regression Equation, Properties of Regression Coefficient, Difference Between Correlation Coefficient and Regression Coefficient, Uses of Regression.

Problem: The following table gives the ages and blood pressure of 10 women:

Age in years: x	56	42	36	47	49	42	72	63	55	60
Blood pressure: y	147	125	118	128	125	140	155	160	149	150

i. Find correlation coefficient between age and blood pressure of a women and comment.
ii. Draw Scatter Diagram
iii. Obtain the regression line of y on x.
iv. Estimate the blood pressure of a women whose age is 50 years.
v. Obtain the regression line of x on y.

Chapter-5

Theory: Random Experiment, Sample Space, Event, Mutually Exclusive Event, Independent Event, Conditional Probability, Classical Probability, Axiomatic Probability, Additive Law.

Problems:

1. If P[A] = 0.6, P[B]= 0.8 and P[AB]= 0.50 Find (i) P[$\bar{A}$]; (ii) P[A U B] ;(iii) P[A |B]; iv) P[B |A] (v) P[$A \quad \bar{B}$]; (vi) P[$\bar{A} \quad B$]; (vii) P[$\bar{A} \quad \bar{B}$] ; (viii) P[$\overline{A \cup B}$] (xi) Are the events A and B independent? (x) Are A and B mutually exclusive?
2. Suppose A and B are two mutually exclusive events with P[A]=.35 and P[B]=.15. Find (i) P[A$\cup$B] (ii) P[$\bar{A}$] (iii) P[A$\cap$B] (iv) P[$\bar{A} \cup \bar{B}$]
3. Consider two events A and B such that P (A) $= \frac{1}{8}$, P $(A \mid B) = \frac{1}{4}$ and P $(B) = \frac{1}{6}$ .Examine the following statements and comment on the validity of each of these: (i) A and B are independent (ii) A and B are mutually exclusive (iii) Find the value of P (A U B).

Chapter-6

Theory: Random variable, types of random variable, probability function, probability density function, mathematical expectation, properties of mathematical expectation, properties of variance of a random variable.

Problems:

1.	The following is the probability density function of a random variable X: $$f(x) = \frac{x}{2} \quad ; 0< x <2$$ Find (i) $P[x \le 1.25]$, (ii) E[X] , (iii) V[X] (iv) $P[0.75 \le x \le 1.5]$ (v) E[5x +7] and (vi) V[5x +7]
2.	A continuous random variable X has the following probability density function: $$f(x) = kx^2 ; 0 \le x \le 1$$ Question From Class Lecture
3	The following is the probability density function of a random variable x: $$f(x) = K(2x-x^2) ; 0< x <2$$ Find (i) the value of 'K' ; (ii) P(x>1) (iii) P(1.5 < x < 2.25) (iv) E[3x +6] and (v) V[4x +9]
4.	A continuous random variable X has the following probability density function: $f(x) = K(x-1); \quad 2 \le x \le 6$ Compute (i) the value of 'K' ; (ii) P(X >3) (iii) P(3 < X < 4) (iv) E[2x +7] and (v) V[9x +7]
5	A continuous random variable X has the following probability density function: $f(x) = K(x+1);$ Compute (i) the value of 'K' ; (ii) P(X >3); (iii) P(X = 4) (iv) P(3 < X < 4) (v) E[x +7] and (vi) V[x +7]
6.	Suppose that in a certain region of a country the daily rainfall (in inches) is a continuous random variable X with probability density function f(x) given by $$f(x) = \frac{3}{12}\left(6x - 3x^2\right) \quad ,0 < x < 2$$ Find the probability that at a given day in this region the rainfall is (i) not more than 1.5 inches. (ii) Between 0.5 and 1.5 inches. Also calculate mean and variance of the daily rainfall (in inches).

Chapter-7

Theory: Binomial Distribution, Poisson Distribution, Normal Distribution, Properties of Binomial and Poisson Distribution, practical example of Poisson Distribution, Importance of Normal Distribution.

Problems:

(1) A family has five children. The probability of a child being a boy or a girl is equal. Find the probability that the family has (i) no boy; (ii) at most 2 boys and (iii) at least 3 boys.

(2) A fair coin is tossed 5 times. Find the probability of (i) exactly two heads, (ii) at least 3 heads, (iii0 no heads and (iv) at most 2 heads.

(3) Ten coins are tossed simultaneously. Find the probability of getting (i) at least Seven heads (ii) exactly seven heads (iii) at most seven heads

(4) 20 wrist watches in a box of 100 are defective. If 10 watches are selected at random, find the probability that (i) 10 are defective (ii) 10 are good (iii) at least one watch is defective (iv) at most 3 are defective.

Chapter-8

Theory: Hypothesis, Test of Hypothesis, Null Hypothesis, Alternative hypothesis, Type-I error, Type-II error, Level of significance, Procedure of test of hypothesis, Commonly Used Test Statistic, Write some applications of χ^2 -test?

Problems:

(1) Two hundred Engineers were interviewed and classified according to their results and job satisfaction. The distribution of graduates by results and job satisfaction are given in the following contingency table:

Results	Job satisfaction	
	Yes	No
Excellent	20	70
Good	45	65

Compute the value of Chi-square for the above data.

(2) Suppose that we randomly assign 600 Corona patients in two groups. One group is treated with a modern antibiotic. The other group gets a *homeopathic preparation.* The data are presented in the table below:

	Remission of Symptoms	
Treatment	No	Yes
Antibiotic	110	190
Homeopathic	160	140

Compute the value of Chi-square for the above data.