INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

INFORMATION TECHNOLOGY

TUTORIAL QUESTION BANK

Course Title	**PROBABILITY AND STATISTICS**				
Course Code	AHSB12				
Programme	B.Tech				
Semester	II	CSE | IT			
	III	AE | ME			
	IV	CE			
Course Type	Foundation				
Regulation	**IARE - R18**				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	-	-
Chief Coordinator	Dr. M Anita, Professor				
Course Faculty	Dr. J Suresh Goud, Associate Professor Ms. V Subbalaxmi, Assistant Professor Mr. Ch. Chaitanya, Assistant Professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Enrich the knowledge of probability on single random variables and probability distributions.
II	Apply the concept of correlation and regression to find covariance.
III	Determine mean and variance of given data by sampling distribution.
IV	Analyze the given data for appropriate test of hypothesis.

COURSE OUTCOMES (COs):

CO 1	Discuss the concepts of probability, conditional probability, Baye's theorem and random variables
CO 2	Classify the probability distributions and study their properties
CO 3	Understand the concepts of correlation and regression to the given data.
CO 4	Apply testing of Hypothesis for sample means and sample proportions.
CO 5	Estimate the truth value of the statistical hypotheses by using small sample tests.

COURSE LEARNING OUTCOMES (CLOs):

AHSB12.01	Describe the basic concepts of probability.
AHSB12.02	Summarize the concept of conditional probability and estimate the probability of event using Baye's theorem.
AHSB12.03	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.
AHSB12.04	Use the concept of random variables in real-world problem like graph theory; machine learning, Natural language processing.
AHSB12.05	Determine the binomial distribution to find mean and variance.
AHSB12.06	Understand binomial distribution to the phenomena of real-world problem like sick versus healthy.
AHSB12.07	Determine the poisson distribution to find mean and variance.
AHSB12.08	Use poisson distribution in real-world problem to predict soccer scores.
AHSB12.09	Illustrate the inferential methods relating to the means of normal distributions.
AHSB12.10	Describe the mapping of normal distribution in real-world problem to analyze the stock market.
AHSB12.11	Explain multiple random variables and the covariance of two random variables.
AHSB12.12	Understand the concept of multiple random variables in real-world problems aspects of wireless communication system.
AHSB12.13	Calculate the correlation coefficient to the given data.
AHSB12.14	Contrast the correlation and regression to the real-world such as stock price and interest rates.
AHSB12.15	Calculate the regression to the given data.
AHSB12.16	Discuss the concept of sampling distribution of statistics and in particular describe the behavior of the sample mean.
AHSB12.17	Understand the foundation for hypothesis testing.
AHSB12.18	Summarize the concept of hypothesis testing in real-world problem to selecting the best means to stop smoking.
AHSB12.19	Apply testing of hypothesis to predict the significance difference in the sample means.
AHSB12.20	Apply testing of hypothesis to predict the significance difference in the sample proportions.
AHSB12.21	Use Student t-test to predict the difference in sample means.
AHSB12.22	Apply F-test to predict the difference in sample variances.
AHSB12.23	Understand the characteristics between the samples using Chi-square test.

TUTORIAL QUESTION BANK

MODULE- I				
PROBABILITY AND RANDOM VARIABLES				
Part - A (Short Answer Questions)				
S No	**QUESTIONS**	**Blooms Taxonomy Level**	**Course Outcomes**	**Course Learning Outcomes (CLOs)**
1	What is the definition of probability?	Remember	CO 1	AHSB12.01
2	What is the probability for a leap year to have 52 Mondays and 53 Sundays?	Understand	CO 1	AHSB12.01
3	What is conditional probability?	Remember	CO 1	AHSB12.02
4	State Baye's theorem.	Remember	CO 1	AHSB12.02
5	Define the discrete and continuous random variables with a suitable example.	Remember	CO 1	AHSB12.03
6	List the important Properties of probability density function.	Remember	CO 1	AHSB12.03
7	Obtain the probability distribution of getting number tails if we toss three coins.	Remember	CO 1	AHSB12.03
8	Define the term mathematical expectation of a probability distribution function	Remember	CO 1	AHSB12.03
9	Define the term Mean and Variance of a probability mass function.	Remember	CO 1	AHSB12.03
10	Define the term Mean and Variance of a probability density function.	Remember	CO 1	AHSB12.03
11	Find the probability distribution for sum of scores on dice if we throw two dice.	Remember	CO 1	AHSB12.03
12	Out of 24 mangoes, 6 mangoes are rotten. If we draw two mangoes. Obtain probability distribution of number of rotten mangoes that can be drawn.	Remember	CO 1	AHSB12.03
13	If X is a random variable then Prove E[X+K] = E[X] + K ,where 'K' constant.	Understand	CO 1	AHSB12.03
14	Prove that $\sigma^2 = E(X^2) - \mu^2$.	Understand	CO 1	AHSB12.03
15	Explain probability mass function and probability density of random variables.	Remember	CO 1	AHSB12.03
16	If X is Discrete Random variable then Prove that Variance (aX +b) = a^2 Variance(X).	Understand	CO 1	AHSB12.03
17	A fair coin is tossed six times. Find the probability of getting four heads.	Understand	CO 1	AHSB12.03
18	Define different types of random variables with example.	Remember	CO 1	AHSB12.03
19	A coin is tossed 9 times. Find the probability of getting 5 heads.	Understand	CO 1	AHSB12.03
20	Define random variable with an example.	Remember	CO 1	AHSB12.03
Part - B (Long Answer Questions)				
1	A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that the red ball drawn is from bag B.	Understand	CO 1	AHSB12.02
2	Suppose 5 men out of 100 and 25 women out of 10000 are colour blind. A colour blind person is chosen at random. What is the probability of the person being a male (Assume male and female to be in equal numbers)?	Understand	CO 1	AHSB12.02
3	In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A (ii) Machine B (iii) Machine C.	Understand	CO 1	AHSB12.02
4	Bag I contains 2 white, 3 red balls and bag II contains 4 white, 5 red balls, one ball is drawn at random from one of the bag it found to be red. Find the probability that red ball is drawn from bag I.	Understand	CO 1	AHSB12.02
5	In a certain college 25% are boys 10% are girls are studying statistics, the girls constitute 60% of class room. a) What is the probability that statistics is being studied? b) If a student is selected at random and is found to be studying statistics, find the probability that the student is a girl?	Understand	CO 1	AHSB12.02
6	The length of time(in minutes) that a certain lady speaks on the telephone is found to be random phenomenon, with a probability function specified by the function $f(x) = \begin{cases} Ae^{-\frac{x}{5}}, x \geq 0 \\ 0, otherwise \end{cases}$. (i) Find the value of A that makes f(x) a probability density function. (ii) What is the probability that she will take over the phone is more than 20 minutes?	Understand	CO 1	AHSB12.03

7	If X denote the sum of the two numbers that appear when a pair of fair dice is tossed. Determine (i) Distribution function (ii) Mean and (iii) Variance.	Understand	CO 1	AHSB12.03
8	Is the function defined as follows a density function $f(x)=\begin{cases} e^{-x}, & x\geq 0 \\ 0, & x<0 \end{cases}$. If so determine the probability that the variate having this density will fall in the interval (1, 2)? Find the cumulative probability F (2)?	Understand	CO 1	AHSB12.03
9	If probability density function $f(x)=\begin{cases} Kx^3, & 0\leq x\leq 3 \\ 0, & elsewhere \end{cases}$. Find the value of K and find the probability between x=1/2 and x=3/2.	Understand	CO 1	AHSB12.03
10	A random variable x has the following probability function: X: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 P(x): 0 | k | 2k | 2k | 3k | k^2 | $2k^2$ | $7k^2+k$ | k^3+2k^2 Find (i) k (ii) P(x<6) (iii) P($x\geq 6$)	Understand	CO 1	AHSB12.03
11	Let X denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine (i) Discrete probability distribution (ii) Expectation (iii) Variance.	Understand	CO 1	AHSB12.03
12	A random variable X has the following probability function: X: -3 | -2 | -1 | 0 | 1 | 2 | 3 P(X): k | 0.1 | k | 0.2 | 2k | 0.4 | 2k Then find (i) k (ii) mean (iii) variance.	Understand	CO 1	AHSB12.03
13	A continuous random variable has the probability density function $f(x)=\begin{cases} kxe^{-\lambda x}, & for\ x\geq 0, \lambda>0 \\ 0, & otherwise \end{cases}$ Determine (i) k (ii) Mean (iii) Variance.	Understand	CO 1	AHSB12.03
14	If the Probability density function of random variable is $f(x)=k(1-x^2), 0<x<1$ then Calculate (i) k (ii) p(0.1 < x< 0.2) (iii) P(x > 0.5)	Understand	CO 1	AHSB12.03
15	A random variable X has the following probability function. X: 4 | 5 | 6 | 8 P(X): 0.1 | 0.3 | 0.4 | 0.2 Determine (i) Expectation (ii) variance (iii) Standard deviation.	Understand	CO 1	AHSB12.03
16	If X is a Continuous random variable whose density function is $f(x)=\begin{cases} x & if\ 0<x<1 \\ 2-x & if\ 1\leq x<2 \\ 0 & elsewhere \end{cases}$ Find $E(25X^2+30X-5)$.	Understand	CO 1	AHSB12.03
17	The cumulative distribution function for a continuous random variable X is $F(x)=\begin{cases} 1-e^{-2x}, & x\geq 0 \\ 0, & x<0 \end{cases}$ Find (i) density function f(x) (ii) Mean and (iii) Variance of the density function.	Understand	CO 1	AHSB12.03
18	Two coins are tossed simultaneously. Let X denotes the number of heads then find i) E(X) ii) $E(X^2)$ iii)$E(X^3)$ iv) V(X).	Understand	CO 1	AHSB12.03
19	Is the function defined by $f(x)=\begin{cases} 0, & x<2 \\ \frac{1}{18}(2x+3), & 2\leq x\leq 4 \\ 0, & x>4 \end{cases}$ a probability density function? Find the probability that a variate having f(x) as density function will fall in the interval $2\leq x\leq 3$.	Understand	CO 1	AHSB12.03
20	The probability density function of a random variable X is $f(x)=\frac{K}{x^2+1}, -\infty<x<\infty$. Find K and the distribution function F(x).	Understand	CO 1	AHSB12.03

Part - C (Problem Solving and Critical Thinking Questions)				
1	A box contains 2 red, 3 blue and 4 black, three balls are drawn from the box at random. Find probability that (i) Three balls are different colours. (ii) Three balls are same colour. (iii) Two are same and third is different.	Understand	CO 1	AHSB12.02
2	A businessman goes to hotels X, Y, Z, 20%, 50% and 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing. What is the probability that business man's room having faulty pluming is assigned to hotel Z?	Understand	CO 1	AHSB12.02
3	In a factory, machine A produces 40% of the output and machine B produces 60%. On the average, 9 items in 1000 produced by A are defective and 1 item in 250 produced by B is defective. An item drawn at random from a day's output is defective. What is the probability that it was produced by A or B?	Understand	CO 1	AHSB12.02
4	A fair die is tossed. Let the random variable X denote the twice the number appearing on the die: (i) Write the probability distribution of X (ii) Mean and (iii) Variance.	Understand	CO 1	AHSB12.03
5	If f(x) =k $e^{-\|x\|}$ is probability density function in the interval, $-\infty < x < \infty$, then find i) k ii) Mean iii) Variance iv) P(0<x<4).	Understand	CO 1	AHSB12.03
6	The function f(x)=Ax^2, in 0< x <1 is valid probability density function then find the value of A.	Understand	CO 1	AHSB12.03
7	The density function of a random variable X is $f(x)=\begin{cases} e^{-x} & ,x\geq 0 \\ 0 & ,otherwise \end{cases}$ Find E(X), E(X^2), V(X).	Understand	CO 1	AHSB12.03
8	If E(X) = 10, v(x) =1 then find E [2x (x+20)].	Understand	CO 1	AHSB12.03
9	A discrete random variable X has the following probability distribution X: 1 2 3 4 5 6 7 8 P(X=x): 2k 4k 6k 8k 10k 12k 14k 4k Find (i) k (ii) p(X<3) (iii) $p(X\geq 5)$	Understand	CO 1	AHSB12.03
10	For the continuous random variable X whose probability density function is given by $f(x)=\begin{cases} cx(2-x), 0\leq x\leq 2 \\ 0, otherwise \end{cases}$ Find c, mean and variance of X.	Understand	CO 1	AHSB12.03
MODULE-II				
PROBABILITY DISTRIBUTION				
Part – A (Short Answer Questions)				
1	20% of items produced from a goods factory are defective. If we choose 5 items randomly then find the probability of non defective item.	Understand	CO 2	AHSB12.05
2	The probability if no misprint in a book is e^{-4}. Find probability that a page of book contains exactly two misprints.	Understand	CO 2	AHSB12.07
3	Assume that 50% of all engineering students are good in Mathematics. Determine the probability that among 18 engineering students exactly 10 are good in Mathematics.	Understand	CO 2	AHSB12.05
4	If the probability of a defective bolt is 0.2, find (i) mean (ii) standard deviation for the bolts in a total of 400.	Understand	CO 2	AHSB12.07
5	Explain about Binomial distribution.	Remember	CO 2	AHSB12.05
6	If n=4, p=0.5 then find standard deviation of the binomial distribution.	Understand	CO 2	AHSB12.05
7	Explain about Poisson distribution.	Remember	CO 2	AHSB12.07
8	Determine the binomial distribution for which the mean is 4 and variance 3	Understand	CO 2	AHSB12.05
9	If X is normally distributed with mean 2 and variance 0.1, then find P ($\|x-2\|\geq 0.01$)?	Understand	CO 2	AHSB12.09
10	If X is Poisson variate such that P(X=1) = 24P(X=3) then find the mean.	Understand	CO 2	AHSB12.07

11	Explain about Normal distribution.	Remember	CO 2	AHSB12.09
12	What is the recurrence relation for binomial distribution?	Remember	CO 2	AHSB12.05
13	The mean and variance of a binomial distribution are 4 and 4/3 respectively. Then find P(x=1).	Understand	CO 2	AHSB12.05
14	In eight throws of a die 5 or 6 is considered a success. Find the mean number of success	Understand	CO 2	AHSB12.05
15	If a bank received on the average 6 bad cheques per day, find the probability that it will receive 4 bad cheques on any given day.	Understand	CO 2	AHSB12.05
16	Define Normal curve.	Remember	CO 2	AHSB12.09
17	Define the terms Mean, Variance of Poisson distribution	Remember	CO 2	AHSB12.07
18	Define the term mode of a Binomial distribution.	Remember	CO 2	AHSB12.05
19	Define the terms mean, variance of Binomial distribution.	Remember	CO 2	AHSB12.05
20	Draft the recurrence relation for the Binomial distribution.	Remember	CO 2	AHSB12.05
	Part - B (Long Answer Questions)			
1	Out of 20 tape recorders 5 are defective. Find the standard deviation of defective in the sample of 10 randomly chosen tape recorders. Find (i) P(X=0) (ii) P(X=1) (iii) P(X=2) (iv) P (1<X<4).	Understand	CO 2	AHSB12.05
2	A car-hire firm has two cars which it hires out day by day. The number of demands for a car o n each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days (i) on which there is no demand (ii) on which demand is refused.	Understand	CO 2	AHSB12.07
3	The average number of phone calls per minute coming into a switch board between 2 P.M. and 4 P.M. is 2.5. Determine the probability that during one particular minute (i) 4 or fewer calls (ii) more than 6 calls.	Understand	CO 2	AHSB12.07
4	In 1000 sets of trials per an event of small probability the frequencies f of the number of x of successes are x: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Tota f: 305 | 365 | 210 | 80 | 28 | 9 | 2 | 1 | 100 Fit the expected frequencies Using Poisson.	Understand	CO 2	AHSB12.07
5	For a normally distributed variate with mean 1 and standard deviation 3. Find i) $P(3.43 \le X \le 6.19)$ ii) $P(-1.43 \le X \le 6.19)$.	Understand	CO 2	AHSB12.09
6	If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that i) P ($26 \le X \le 40$) ii) P($X \ge 45$).	Understand	CO 2	AHSB12.09
7	4 coins are tossed 160 times. Fit the Binomial distribution of getting number of heads.	Understand	CO 2	AHSB12.05
8	The mean weight of 500 male students at a certain college is 75kg and the standard deviation is 7kg. Assuming that the weights are normally distributed find how many students weight (i) Between 60 and 78 kg (ii) more than 92kg.	Understand	CO 2	AHSB12.09
9	The mean and standard deviation of the box obtained by 1000 students in an examination are respectively 34.5 and 16.5. Assuming the normality of the distribution. Find the approximate number of students expected to obtain marks between 30 and 60.	Understand	CO 2	AHSB12.09
10	If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs. How many students have masses (i) greater than 72 kg (ii) less than or equal to 64 kg (iii) between 65 and 71 kg inclusive.	Understand	CO 2	AHSB12.09
11	Out of 800 families with 5 children each, how many would you expect to have (i)3 boys (ii)5girls (iii)either 2 or 3 boys ? Assume equal probabilities for boys and girls.	Understand	CO 2	AHSB12.05
12	If a Poisson distribution is such that $P(X=1)=\frac{3}{2}P(X=3)$ then find (i) $P(X \ge 1)$ (ii) $P(X \le 3)$ (iii) $P(2 \le X \le 5)$.	Understand	CO 2	AHSB12.07
13	Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents is (i) at least one (ii) at most one.	Understand	CO 2	AHSB12.07
14	In a Normal distribution, 7% of the item are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution.	Understand	CO 2	AHSB12.09
15	A shipment of 20 tape recorders contains 5 defectives find the standard deviation of the probability distribution of the number of defectives in a sample of 10	Understand	CO 2	AHSB12.07

	randomly chosen for inspection.			
16	1000 students have written an examination with the mean of test is 35 and standard deviation is 5. Assuming the distribution to be normal find i) How many students marks like between 25 and 40? ii) How many students get more than 40? iii) How many students get below 20? iv) How many students get more than 50.	Understand	CO 2	AHSB12.09
17	Fit a Binomial Distribution to the following data x: 0 1 2 3 4 5 f: 2 14 20 34 22 8	Understand	CO 2	AHSB12.05
18	Show that the recurrence relation for the Poisson distribution is $P(x) = \frac{\lambda}{x} . P(x-1)$	Understand	CO 2	AHSB12.07
19	The life of electronic tubes of a certain types may be assumed to be normal distributed with mean 155 hours and standard deviation 19 hours. Determine the probability that the life of a randomly chosen tube is (i) between 136 hours and 174 hours. (ii) less than 117 hours (iii) will be more than 195 hours	Understand	CO 2	AHSB12.09
20	The probability that a man hitting a target is 1/3. If he fires 5 times , determine the probability that he fires (i) At most 3 times (ii) At least 2 times	Understand	CO 2	AHSB12.05
	Part - C (Problem Solving and Critical Thinking Questions)			
1	Prove that the Poisson distribution is a limiting case of Binomial distribution.	Understand	CO 2	AHSB12.07
2	Derive variance of the Poisson distribution.	Understand	CO 2	AHSB12.07
3	Prove that Mode in Normal distribution.	Understand	CO 2	AHSB12.09
4	Derive median of the Normal distribution.	Understand	CO 2	AHSB12.09
5	The marks obtained in Statistics in a certain examination found to be normally distributed. If 15% of the students greater than or equal to 60 marks, 40% less than 30 marks. Find the mean and standard deviation.	Understand	CO 2	AHSB12.09
6	The variance and mean of a binomial variable X with parameters n and p are 4 and 3. Find i) P(X=1) ii) P(X≥1) iii) P(0<X<3).	Understand	CO 2	AHSB12.05
7	Fit a Binomial distribution to the following data x: 0 1 2 3 4 5 6 Total f: 13 25 52 58 32 16 4 200	Understand	CO 2	AHSB12.05
8	Derive the Mean of Normal distribution.	Understand	CO 2	AHSB12.09
9	The marks obtained in mathematics by 1000 students are normally distributed with mean 78% and standard deviation 11%. Determine (i)How many students got marks above 90% marks (ii)What was the highest mark obtained by the lowest 10% of the students (iii)Within what limits did the middle of 90% of the student lie.	Understand	CO 2	AHSB12.09
10	Derive the mean of Binomial Distribution.	Understand	CO 2	AHSB12.05
	MODULE -III			
	CORRELATION AND REGRESSION			
	Part - A (Short Answer Questions)			
1	Define correlation coefficient.	Remember	CO 3	AHSB12.11
2	Explain types of correlation.	Remember	CO 3	AHSB12.11
3	Given n=12, $\sigma_x = 2.5, \sigma_y = 3.6$ and sum of the product of deviation from the mean of X and Y is 64 find the correlation co-efficient.	Understand	CO 3	AHSB12.12
4	Explain about rank correlation coefficient.	Remember	CO 3	AHSB12.13
5	Write the properties of correlation coefficient.	Remember	CO 3	AHSB12.11
6	If $\sum XY = 216, \sum X^2 = 102, \sum Y^2 = 471$ then find correlation coefficient.	Understand	CO 3	AHSB12.12
7	Given n=10, $\sigma_x = 5.4, \sigma_y = 6.2$ and sum of product of deviations from the mean of X and Y is 66 find the correlation co-efficient.	Understand	CO 3	AHSB12.12
8	Write the properties of rank correlation coefficient.	Remember	CO 3	AHSB12.13

9	From the following data calculate (i) correlation c coefficient (ii) standard deviation of y. bxy=0.85, byx=0.89, $\sigma_x = 3$.	Understand	CO 3	AHSB12.14
10	If N=8, $\sum X = 544, \sum Y = 552, \sum XY = 37560$ then find COV(X,Y).	Understand	CO 3	AHSB12.12
11	The equations of two regression lines are 7x-16y+9=0, 5y-4x-3=0. Find the coefficient of correlation.	Understand	CO 3	AHSB12.14
12	What are normal equations for regression lines?	Remember	CO 3	AHSB12.14
13	Explain about multiple correlation.	Remember	CO 3	AHSB12.14
14	If r_{12}=0.5, r_{13}=0.3, r_{23}=0.45 then find multiple correlation coefficient $R_{1.23}$.	Understand	CO 3	AHSB12.14
15	What is the regression equation of X_1 on X_2 and X_3?	Remember	CO 3	AHSB12.14
16	Define multiple regressions.	Remember	CO 3	AHSB12.14
17	If $r_{12} = 0.77, r_{13} = 0.72, r_{23} = 0.52$ Find the multiple correlation coefficient $R_{1.23.}$	Understand	CO 3	AHSB12.14
18	Write the properties of regression lines.	Remember	CO 3	AHSB12.14
19	Write the difference between correlation and regression.	Remember	CO 3	AHSB12.14
20	If r_{12}=0.8, r_{13}=0.5 and r_{23}=0.3 then find multiple correlation coefficient $R_{1.23}$.	Understand	CO 3	AHSB12.14
	Part – B (Long Answer Questions)			
1	A random sample of 5 college students is selected and their grades in mathematics and statistics are found to be Calculate Spearman's rank correlation coefficient.	Understand	CO 3	AHSB12.13
2	Calculate the coefficient of correlation from the following data	Understand	CO 3	AHSB12.12
3	The following data gives the marks in obtained by 10 students in accountancy and statistics. Find the coefficient of correlation.	Understand	CO 3	AHSB12.13
4	Calculate the Karl Pearson's coefficient of correlation from the following data.	Understand	CO 3	AHSB12.12
5	Find a suitable coefficient of correlation for the following data:	Understand	CO 3	AHSB12.12
6	The following table give the distribution of the total population and those who are totally partially blind among them. Find out if there is any relation between age and blindness.	Understand	CO 3	AHSB12.12
7	Following are the ranks obtained by 10 students in two subjects, Statistics and Mathematics. To what extent the knowledge of the students in two subjects is related?	Understand	CO 3	AHSB12.13

	1	2	3	4	5					
Mathematics	85	60	73	40	90					
Statistics	93	75	65	50	80					

x	12	9	8	10	11	13	7
y	14	8	6	9	11	12	13

R. No.	1	2	3	4	5	6	7	8	9	10
Accountancy	45	70	65	30	90	40	50	75	85	60
Statistics	35	90	70	40	95	40	80	80	80	50

Wages	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

Fertilizer used(tones)	15	18	20	24	30	35	40	50
Productivity (tones)	85	93	95	105	120	130	150	160

Age	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-
No. of Persons (000)	100	60	40	36	24	11	6	3
Blind	55	40	40	40	36	22	18	15

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	2	4	1	5	3	9	7	10	6	8

8	The ranks of 16 students in Mathematics and Statistics are as follows (1,1),(2,10),(3,3),(4,4),(5,5),(6,7),(7,2),(8,6),(9,8),(10,11),(11,15),(12,9),(13,14),(14,12),(15,16),(16,13). Calculate the rank correlation coefficient for proficiencies of this group in mathematics and statistics.	Understand	CO 3	AHSB12.13
9	A sample of 12 fathers and their elder sons gave the following data about their elder sons. Calculate the coefficient of rank correlation. Fathers: 65, 63, 67, 64, 68, 62, 70, 66, 68, 67, 69, 71 Sons: 68, 66, 68, 65, 69, 66, 68, 65, 71, 67, 68, 70	Understand	CO 3	AHSB12.12
10	Following are the rank obtained by 10 students in two subjects, Statistics and Mathematics. To what extent the knowledge of the students in two subjects are related? Mathematics: 48, 33, 40, 9, 16, 16, 65, 24, 16, 57 Statistics: 13, 13, 24, 6, 15, 4, 20, 9, 6, 19	Understand	CO 3	AHSB12.13
11	Determine the regression equation which best fit to the following data: x: 10, 12, 13, 16, 17, 20, 25 y: 10, 22, 24, 27, 29, 33, 37	Understand	CO 3	AHSB12.14
12	In the following table S is weight of Potassium bromide which will dissolve in 100 grams. Of water at V^{o}C. Fit an equation of the form S=mT+b by the method of least squares. Use this relation to estimate S when T=50^o. T: 0, 20, 40, 60, 80 S: 54, 65, 75, 85, 96	Understand	CO 3	AHSB12.14
13	From a sample of 200 pairs of observation the following quantities were calculated. $\sum X=11.34, \sum Y=20.78, \sum X^2=12.16, \sum Y^2=84.96, \sum XY=22.13$ From the above data show how to compute the coefficients of the equation Y=a+bX.	Understand	CO 3	AHSB12.14
14	If $\sigma_x=\sigma_y=\sigma$ and the angle between the regression lines is $\text{Tan}^{-1}\left(\frac{4}{3}\right)$. Find r.	Understand	CO 3	AHSB12.14
15	Give the following data compute multiple coefficient of correlation of X_3 on X_1 and X_2. X_1: 3, 5, 6, 8, 12, 14 X_2: 16, 10, 7, 4, 3, 2 X_3: 90, 72, 54, 42, 30, 12	Understand	CO 3	AHSB12.14
16	For 20 army personal the regression of weight of kidneys (Y) on weight of heart (X) is Y=0.399X+6.394 and the regression of weight of heart on weight of kidneys is X=1.212Y+2.461. Find the correlation coefficient.	Understand	CO 3	AHSB12.14
17	Find the most likely production corresponding to a rainfall 40 from the following data: Average: Rain fall(X) 30, Production(Y) 500Kgs Standard deviation: 5, 100Kgs Coefficient of correlation: 0.8, -	Understand	CO 3	AHSB12.14
18	The heights of mothers and daughters are given in the following table. From the two tables of regression estimate the expected average height of daughter when the height of the mother is 64.5 inches. Height of the mother(inches): 62, 63, 64, 64, 65, 66, 68, 70 Height of the daughter(inches): 64, 65, 61, 69, 67, 68, 71, 65	Understand	CO 3	AHSB12.14
19	A panel of two judges P and Q graded seven dramatic performances by independently awarding marks as follows: Performance: 1, 2, 3, 4, 5, 6, 7 Marks by P: 46, 42, 44, 40, 43, 41, 45 Marks by Q: 40, 38, 36, 35, 39, 37, 41 The eight performance, which judge Q would not attend, was awarded 37 marks by judge P. If judge Q had also been present, how many marks would be expected to have been awarded by him to the eight performance.	Understand	CO 3	AHSB12.13

20	Find the multiple linear regression of X_1 on X_2 and X_3 from the data given below: X_1: 11, 17, 26, 28, 31, 35, 41, 49, 63, 69 X_2: 2, 4, 6, 5, 8, 7, 10, 11, 13, 14 X_3: 2, 3, 4, 5, 6, 7, 9, 10, 11, 13	Understand	CO 3	AHSB12.14
	Part – C (Problem Solving and Critical Thinking)			
1	Find coefficient of correlation between X and Y for the following data. X: 10, 12, 18, 24, 23, 27 Y: 13, 18, 12, 25, 30, 10	Understand	CO 3	AHSB12.12
2	Ten competitors in a musical test were ranked by the three judges A, B and C in the following order. Rank A: 1, 6, 5, 10, 3, 2, 4, 9, 7, 8 Rank B: 3, 5, 8, 4, 7, 10, 2, 1, 6, 9 Rank C: 6, 4, 9, 8, 1, 2, 3, 10, 5, 7 Using rank correlation method, discuss which pair of judges has the nearest approach to common likings in music.	Understand	CO 3	AHSB12.13
3	Obtain the rank correlation coefficient for the following data. X: 68, 64, 75, 50, 64, 80, 75, 40, 55, 64 Y: 62, 58, 68, 45, 81, 60, 68, 48, 50, 70	Understand	CO 3	AHSB12.13
4	Prove that the coefficient of correlation lies between -1 and 1.	Understand	CO 3	AHSB12.13
5	The ranks of the 15 students in two subjects A and B are given below, the two numbers within the brackets denoting the ranks of the same student in A and B respectively. (1,10), (2,7), (3,2), (4,6), (5,4), (6,8), (7,3), (8,1), (9,11), (10,15), (11,9), (12,5), (13,14), (14,12), (15,13) Use Spearman's formula to find the rank correlation coefficient.	Understand	CO 3	AHSB12.13
06	Derive the formula to find the angle between the two regression lines.	Understand	CO 3	AHSB12.14
07	If $\sigma_x = \sigma_y = \sigma$ and the angle between the regression lines are $\theta = Tan^{-1}(3)$. Obtain r.	Understand	CO 3	AHSB12.14
08	If θ is the angle between two regression lines and S.D. of Y is twice the S.D. of X and r=0.25, find tan θ.	Understand	CO 3	AHSB12.14
09	Find the multiple linear regression equation of X_1 on X_2 and X_3 from the data given below: X_1: 2, 4, 6, 8 X_2: 3, 5, 7, 9 X_3: 4, 6, 8, 10	Understand	CO 3	AHSB12.14
10	Calculate the regression equation of Y on X from the data given below, taking deviations from actual means of X and Y. Price(Rs.): 10, 12, 13, 12, 16, 15 Amount Demanded: 40, 38, 43, 45, 37, 43 Estimate the likely demand when the price is Rs. 20.	Understand	CO 3	AHSB12.14
	MODULE -IV			
	TEST OF HYPOTHESIS - I			
	Part – A (Short Answer Questions)			
1	Explain different types and classification of sampling.	Remember	CO 4	AHSB12.16
2	Define population? Give an example.	Remember	CO 4	AHSB12.16
3	Define sample? Give an example.	Remember	CO 4	AHSB12.16
4	Define parameter and statistic.	Remember	CO 4	AHSB12.16
5	What is the value of correction factor if n=5 and N=200.	Understand	CO 4	AHSB12.16
6	Define standard error of a statistic.	Remember	CO 4	AHSB12.16
7	How many different samples of size n=2 can be chosen from a finite population of size 25.	Understand	CO 4	AHSB12.16
8	Find standard error and probable error of sample size 14 and correlation coefficient 0.74.	Understand	CO 4	AHSB12.16

9	If the population consists of four members 1, 5, 6, 8. How many samples of size three can be drawn with replacement?	Understand	CO 4	AHSB12.16
10	The mean weekly wages of workers are with standard deviation of rupees 4. A sample of 625 is selected. Find the standard error of the mean.	Understand	CO 4	AHSB12.16
11	Distinguish between large and small samples with example.	Remember	CO 4	AHSB12.16
12	In a manufacturing company out of 100 goods 25 are top quality. Find sample proportion.	Understand	CO 4	AHSB12.20
13	Construct the confidence interval for single mean if mean of sample size of 400 is 40, standard deviation is 10.	Understand	CO 4	AHSB12.19
14	Construct the confidence interval for single proportion if 18 goods are defective from a sample of 200 goods.	Understand	CO 4	AHSB12.20
15	Define sample proportion.	Remember	CO 4	AHSB12.20
16	In a manufacturing company out of 200 goods 80 were faulty. Find sample proportion.	Understand	CO 4	AHSB12.20
17	Find the sample proportion in one day production of 400 articles only 50 are top quality.	Understand	CO 4	AHSB12.20
18	Write the test statistic for difference of means in large samples.	Remember	CO 4	AHSB12.19
19	Write the test statistic for difference of proportions in large samples.	Remember	CO 4	AHSB12.20
20	Find the confidence interval for mean if mean of sample size of 144 is 150, standard deviation is 2.	Understand	CO 4	AHSB12.19
	Part – B (Long Answer Questions)			
1	A population consists of five numbers 2,3,6,8 and 11. Consider all possible samples of size two which can be drawn with replacement from this population. Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CO 4	AHSB12.16
2	A population consists of 5, 10, 14, 18, 13, 24. Consider all possible samples of size two which can be drawn without replacement from this population. Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CO 4	AHSB12.16
3	A population consists of five numbers4, 8, 12, 16, 20, 24. Consider all possible samples of size two which can be drawn without replacement from this population. Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) he standard deviation of the sampling distribution of means.	Understand	CO 4	AHSB12.16
4	Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6. Which can be drawn with replacement? Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) T he standard deviation of the sampling distribution of means.	Understand	CO 4	AHSB12.16
5	Samples of size 2 are taken from the population 3, 6, 9, 15 27. Which can be drawn with replacement? Find i) The mean of the population ii) The standard deviation of the population iii) The mean of the sampling distribution of means iv) The standard deviation of the sampling distribution of means.	Understand	CO 4	AHSB12.16
6	If the population is 3, 6, 9, 15, 27 i) List all possible samples of size 3 that can be taken without replacement from the finite population. ii) Calculate the mean of each of the sampling distribution of means. iii) Find the standard deviation of sampling distribution of means.	Understand	CO 4	AHSB12.16
7	The mean height of students in a college is 155 cms and standard deviation is 15. What is the probability that the mean height of 36 students is less than 157 cms.	Understand	CO 4	AHSB12.16

<table>
<tr><td>8</td><td>A random sample of size 100 is taken from an infinite population having the mean 76 and the variance 256. What is the probability that $\bar{x}$ will be between 75 and 78.</td><td>Understand</td><td>CO 4</td><td>AHSB12.16</td></tr>
<tr><td>9</td><td>The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Find the probability that the mean of the sample size 36 will be negative.</td><td>Understand</td><td>CO 4</td><td>AHSB12.16</td></tr>
<tr><td>10</td><td>A random sample of size 64 is taken from a normal population with μ =51.4 and σ =68. What is the probability that the mean of the sample will
i) exceed 52.9 ii) fall between 50.5 and 52.3 iii) be less than 50.6.</td><td>Understand</td><td>CO 4</td><td>AHSB12.16</td></tr>
<tr><td>11</td><td>A sample of 400 items is taken from a population whose standard deviation is 10.The mean of sample is 40.Test whether the sample has come from a population with mean 38 also calculate 95% confidence interval for the population.</td><td>Understand</td><td>CO 4</td><td>AHSB12.19</td></tr>
<tr><td>12</td><td>The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches.</td><td>Understand</td><td>CO 4</td><td>AHSB12.19</td></tr>
<tr><td>13</td><td>An ambulance service claims that it takes on the average 8.9 minutes to reach its destination In emergency calls. To check on this claim the agency which issues license to Ambulance service has then timed on fifty emergency calls getting a mean of 9.2 minutes with 1.6 minutes. What can they conclude at 5% level of significance?</td><td>Understand</td><td>CO 4</td><td>AHSB12.19</td></tr>
<tr><td>14</td><td>According to norms established for a mechanical aptitude test persons who are 18 years have an average weight of 73.2 with S.D 8.6 if 40 randomly selected persons have average 76.7 test the hypothesis H_0 : μ =73.2 against alternative hypothesis : μ >73.2.</td><td>Understand</td><td>CO 4</td><td>AHSB12.19</td></tr>
<tr><td>15</td><td>A sample of 100 electric bulbs produced by manufacturer ‘A’ showed a mean life time of 1190 hrs and s .d. of 90 hrs A sample of 75 bulbs produced by manufacturer ‘B’ Showed a mean life time of 1230 hrs with s.d. of 120 hrs. Is there difference between the mean life times of the two brands at a significance level of 0.05.</td><td>Understand</td><td>CO 4</td><td>AHSB12.19</td></tr>
<tr><td>16</td><td>On the basis of their total scores, 200 candidates of a civil service examination are divided into two groups; the first group is 30% and the remaining 70%. Consider the first question of the examination among the first group, 40 had the correct answer. Whereas among the second group, 80 had the correct answer. On the basis of these results, can one conclude that the first question is not good at discriminating ability of the type being examined here.</td><td>Understand</td><td>CO 4</td><td>AHSB12.20</td></tr>
<tr><td>17</td><td>A cigarette manufacturing firm claims that brand A line of cigarettes outsells its brand B by 8% .if it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B. Test whether 8% difference is a valid claim.</td><td>Understand</td><td>CO 4</td><td>AHSB12.20</td></tr>
<tr><td>18</td><td>If 48 out of 400 persons in rural area possessed ‘cell’ phones while 120 out of 500 in urban area. Can it be accepted that the proportion of ‘cell’ phones in the rural area and Urban area is same or not. Use 5% of level of significance.</td><td>Understand</td><td>CO 4</td><td>AHSB12.20</td></tr>
<tr><td>19</td><td>Samples of students were drawn from two universities and from their weights in kilograms mean and S.D are calculated and shown below make a large sample test to the significance of difference between means.
<table>
<tr><th></th><th>Mean</th><th>Standard Deviation</th><th>Sample Size</th></tr>
<tr><td>University - A</td><td>55</td><td>10</td><td>400</td></tr>
<tr><td>University - B</td><td>57</td><td>15</td><td>100</td></tr>
</table></td><td>Understand</td><td>CO 4</td><td>AHSB12.19</td></tr>
<tr><td>20</td><td>In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?</td><td>Understand</td><td>CO 4</td><td>AHSB12.20</td></tr>
<tr><td colspan="5">Part – C (Problem Solving and Critical Thinking)</td></tr>
<tr><td>1</td><td>Let S={1, 5, 6, 8}, find the probability distribution of the sample mean for random sample of size 2 drawn without replacement. Find
i) The mean of the population.
ii) The standard deviation of the population.
iii) The mean of the sampling distribution of means.</td><td>Understand</td><td>CO 4</td><td>AHSB12.16</td></tr>
</table>

	iv) The standard deviation of the sampling distribution of means.			
2	Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6. Which can be drawn without replacement? Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CO 4	AHSB12.16
3	A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.	Understand	CO 4	AHSB12.16
4	A random sample of size 64 is taken from an infinite population having the mean 45 and the standard deviation 8. What is the probability that x will be between 46 and 47.5.	Understand	CO 4	AHSB12.16
5	If a 1-gallon can of paint covers on an average 513 square feet with a standard deviation of 31.5 square feet, what is the probability that the mean area covered by a sample of 40 of these 1-gallon cans will be anywhere from 510to 520 square feet?	Understand	CO 4	AHSB12.16
6	A sample of 900 members has mean of 3.4 and S.D of 2.61 is this sample has been taken from a large population mean 3.25 and S.D 2.61. Also calculate 95% confidence interval.	Understand	CO 4	AHSB12.19
7	It is claimed that a random sample of 49 tyres has a mean life of 15200 kms this sample was taken from population whose mean is 15150 kms and S.D is 1200 km test 0.05 level of significant.	Understand	CO 4	AHSB12.19
8	A manufacturer claims that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of sample of 200 pieces of equipments received 18 were faulty test the claim at 0.05 level.	Understand	CO 4	AHSB12.20
9	Among the items produced by a factory out of 500, 15 were defective. In another sample of 400, 20 were defective test the significant difference between two proportions at 5% level.	Understand	CO 4	AHSB12.20
10	A manufacturer produced 20 defective articles in a batch of 400. After overhauled it produced 10 defective in a batch of 300 has a machine being improved after over hauling.	Understand	CO 4	AHSB12.20
	MODULE -V			
	TEST OF HYPOTHESIS - II			
	Part - A (Short Answer Questions)			
1	If $\bar{x}$ =47.5, $\mu = 42.1, s = 8.4, n = 24$ then find t.	Understand	CO 5	AHSB12.21
2	Write a short note on Distinguish between t test for difference of means and F test.	Remember	CO 5	AHSB12.22
3	If $\bar{x}$ =40, $\mu = 25, s = 8.4, n = 24$ then find t.	Understand	CO 5	AHSB12.21
4	What is the test statistic for t test for single mean?	Remember	CO 5	AHSB12.21
5	Define degree of freedom.	Remember	CO 5	AHSB12.21
6	What is the degree of freedom for F test?	Remember	CO 5	AHSB12.22
7	Find $F_{0.05}$ with (7, 8) degrees of freedom.	Understand	CO 5	AHSB12.22
8	Find $t_{0.05}$ when 16 degrees of freedom.	Understand	CO 5	AHSB12.21
9	A random sample of size 16 from a normal population. The mean of sample is 53 and sum of square of deviations from mean is 150.can this sample is regarded as taken from the population having mean 56 at 0.05 level of significance.	Understand	CO 5	AHSB12.21
10	Find $F_{0.95}$ with (19, 24) degrees of freedom.	Understand	CO 5	AHSB12.22
11	What is the test statistic for t test for difference of means?	Remember	CO 5	AHSB12.21
12	Find $t_{0.99}$ when 7 degrees of freedom.	Understand	CO 5	AHSB12.21
13	What is the degree of freedom for t test for difference of means?	Remember	CO 5	AHSB12.21
14	Find $t_{0.95}$ when 9 degrees of freedom.	Understand	CO 5	AHSB12.21
15	What is the test statistic for F test?	Remember	CO 5	AHSB12.22
16	Find $F_{0.99}$ with (28, 12) degrees of freedom.	Understand	CO 5	AHSB12.22
17	Write the formulae for sample variance and sample standard deviation.	Remember	CO 5	AHSB12.21
18	What is the degree of freedom for chi square test in case of contingency table of order 4x3?	Understand	CO 5	AHSB12.23
19	What is the test statistic for chi square test?	Remember	CO 5	AHSB12.23
20	Find $\chi^2_{0.05}$ at 9 degrees of freedom.	Understand	CO 5	AHSB12.23

Part - B (Long Answer Questions)

1	Producer of 'gutkha' claims that the nicotine content in his 'gutkha' on the average is 0.83 mg. can this claim be accepted if a random sample of 8 'gutkhas' of this type have the nicotine contents of 2.0,1.7,2.1, 1.9,2.2, 2.1, 2.0,1.6 mg.	Understand	CO 5	AHSB12.21
2	A sample of 26 bulbs gives a mean life of 990 hrs with S.D of 20hrs. The manufacturer claims that the mean life of bulbs 1000 hrs. Is the sample not upto the standard?	Understand	CO 5	AHSB12.21
3	A random sample of 10 boys had the following I.Q's 70,120,110,101,88,83,95,98,107,100. Do the data support the assumption of population means I.Q of 100. Test at 5% level of significance?	Understand	CO 5	AHSB12.21
4	The means of two random samples of sizes 9,7 are 196.42 and 198.82.the sum of squares of deviations from their respective means are 26.94,18.73.can the samples be considered to have been the same population?	Understand	CO 5	AHSB12.21
5	In one sample of 8 observations the sum of squares of deviations of the sample values from the sample mean was 84.4 and another sample of 10 observations it was 102.6 .test whether there is any significant difference between two sample variances at at 5% level of significance.	Understand	CO 5	AHSB12.22
6	Two random samples gave the following results. Sample | size | Sample mean | Sum of squares of deviations from mean I | 10 | 15 | 90 II | 12 | 14 | 108 Test whether the samples came from the same population or not?	Understand	CO 5	AHSB12.22
7	Two independent samples of items are given respectively had the following values. Sample I: 11, 11, 13, 11, 15, 9, 12, 14 Sample II: 9, 11, 10, 13, 9, 8, 10, - Test whether there is any significant difference between their means?	Understand	CO 5	AHSB12.21
8	Time taken by workers in performing a job by method 1 and method 2 is given below. Method 1: 20, 16, 27, 23, 22, 26, - Method 2: 27, 33, 42, 35, 32, 34, 38 Does the data show that variances of time distribution from population which these samples are drawn do not differ significantly?	Understand	CO 5	AHSB12.21
9	The no. of automobile accidents per week in a certain area as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accidents were same in the during last 10 weeks.	Understand	CO 5	AHSB12.23
10	A die is thrown 264 times with the following results .show that the die is unbiased. No appeared on die: 1, 2, 3, 4, 5, 6 Frequency: 40, 32, 28, 58, 54, 52	Understand	CO 5	AHSB12.23
11	200 digits were choosen at random from set of tables the frequency of the digits are digit: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 frequency: 18, 19, 23, 21, 16, 25, 22, 20, 21, 15 Use chi square test to asset the correctness of the hypothesis that the digits are distributed in equal number in the table	Understand	CO 5	AHSB12.23
12	Fit a poisson distribution to the following data and test the goodness of fit at 0.05 level. x: 0, 1, 2, 3, 4, 5, 6, 7 frequency: 305, 366, 210, 80, 28, 9, 2, 1	Understand	CO 5	AHSB12.23
13	Given below is the number of male births in 1000 families having 5 children Male children: 0, 1, 2, 3, 4, 5 Number of families: 40, 300, 250, 200, 30, 180 Test whether the given data is consistent with the hypothesis that the binomial distribution holds if the chance of a male birth is equal to female birth.	Understand	CO 5	AHSB12.23

<table>
<tr><td>14</td><td>5 dice were thrown 96 times the number of times showing 4,5 or 6 obtain is given below
<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>frequency</td><td>1</td><td>10</td><td>24</td><td>35</td><td>18</td><td>8</td></tr></table>Fit a binomial distribution and test for goodness of fit.</td><td>Understand</td><td>CO 5</td><td>AHSB12.23</td></tr>
<tr><td>15</td><td>The following is the distribution of the hourly number of trucks arriving at a
<table><tr><td>Trucks per hour</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>frequency</td><td>52</td><td>151</td><td>130</td><td>102</td><td>45</td><td>12</td><td>3</td><td>1</td><td>2</td></tr></table>company wear house.
Fit a poisson distribution to the following table and test the goodness of fit at 0.05 level.</td><td>Understand</td><td>CO 5</td><td>AHSB12.23</td></tr>
<tr><td>16</td><td>The average breaking strength of the steel rods is specified to be 18.5 thousand pounds. To test this sample of 14 rods were tested. The mean and S.D obtained were 17.85 and 1.955 respectively. Is the result of experiment significant?</td><td>Understand</td><td>CO 5</td><td>AHSB12.21</td></tr>
<tr><td>17</td><td>A group of 5 patients treated with medicine A weigh 42, 39, 48, 60 and 41 kgs . Second group of 7 patients from the same hospital treated with medicine B weigh 38, 42, 56, 64, 68, 69 and 62 kgs. Do you agree with the claim that medicine B increases the weigh significantly.</td><td>Understand</td><td>CO 5</td><td>AHSB12.22</td></tr>
<tr><td>18</td><td>In one sample of 10 observations, the sum of the deviations of the sample values from sample mean was 120 and in the other sample of 12 observations it was 314. Test whether the difference is significant at 5% level.</td><td>Understand</td><td>CO 5</td><td>AHSB12.21</td></tr>
<tr><td>19</td><td>The following table gives the classification of 100 workers according to gender and nature of work. Test whether the nature of work is independent of the gender of the worker.
<table><tr><th></th><th>Stable</th><th>Unstable</th><th>Total</th></tr><tr><td>Male</td><td>40</td><td>20</td><td>60</td></tr><tr><td>Female</td><td>10</td><td>30</td><td>40</td></tr><tr><td>Total</td><td>50</td><td>50</td><td>100</td></tr></table></td><td>Understand</td><td>CO 5</td><td>AHSB12.23</td></tr>
<tr><td>20</td><td>The following random samples are measurements of the heat-producing capacity (in millions of calories per ton) of speciments of coal from two mines:
<table><tr><td>Mine 1</td><td>8,260</td><td>8,130</td><td>8,350</td><td>8,070</td><td>8,340</td><td>…</td></tr><tr><td>Mine 2</td><td>7,950</td><td>1,890</td><td>7,900</td><td>8,140</td><td>7,920</td><td>7,840</td></tr></table>Use the 0.05 level of significance to test whether it is reasonable to assume that the variances of the two populations are equal.</td><td>Understand</td><td>CO 5</td><td>AHSB12.21</td></tr>
<tr><td colspan="5">Part – C (Problem Solving and Critical Thinking)</td></tr>
<tr><td>1</td><td>A mechanist making engine parts with axle diameters of 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D of 0.040 inch. Compute the statistic you would use to test whether the work is meeting the specifications.</td><td>Understand</td><td>CO 5</td><td>AHSB12.21</td></tr>
<tr><td>2</td><td>To examine the hypothesis that the husbands are more intelligent than the wives, an investigator took a sample of 10 couples and administered them a test which measures the I.Q. The results are as follows.
<table><tr><td>Husbands</td><td>117</td><td>105</td><td>97</td><td>105</td><td>123</td><td>109</td><td>86</td><td>78</td><td>103</td><td>107</td></tr><tr><td>Wives</td><td>106</td><td>98</td><td>87</td><td>104</td><td>116</td><td>95</td><td>90</td><td>69</td><td>108</td><td>85</td></tr></table>Test the hypothesis with a reasonable test at the level of significance of 0.05.</td><td>Understand</td><td>CO 5</td><td>AHSB12.22</td></tr>
<tr><td>3</td><td>Two independent samples of 8 & 7 items respectively had the following values.
<table><tr><td>Sample I</td><td>11</td><td>11</td><td>13</td><td>11</td><td>15</td><td>9</td><td>12</td><td>14</td></tr><tr><td>Sample II</td><td>9</td><td>11</td><td>10</td><td>13</td><td>9</td><td>8</td><td>10</td><td></td></tr></table>Is the difference between the means of samples significant?</td><td>Understand</td><td>CO 5</td><td>AHSB12.21</td></tr>
<tr><td>4</td><td>Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins. the sample standard deviation of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal.</td><td>Understand</td><td>CO 5</td><td>AHSB12.22</td></tr>
<tr><td>5</td><td>From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.
<table><tr><th>Soft drinks</th><th>Clerks</th><th>Teachers</th><th>officers</th></tr><tr><td>Pepsi</td><td>10</td><td>25</td><td>65</td></tr></table></td><td>Understand</td><td>CO 5</td><td>AHSB12.23</td></tr>
</table>

	Thumsup 15 30 65 Fanta 50 60 30			
6	In an investigation on the machine performance, the following results are obtained. **No.of units inspected**: Machine1 375, Machine2 450 **No.of defective**: Machine1 17, Machine2 22	Understand	CO 5	AHSB12.23
7	A survey of 240 families with 4 children each revealed the following distribution. Male Births: 4, 3, 2, 1, 0 No of families: 10, 55, 105, 58, 12 Test whether the male and female births are equally popular.	Understand	CO 5	AHSB12.23
8	Samples of students were drawn from two universities and from their weights in kilograms mean and S.D are calculated and shown below make a large sample test to the significance of difference between means. **Mean**: University A 55, University B 57 **Standard Deviation**: University A 10, University B 15 **Sample Size**: University A 10, University B 20	Understand	CO 5	AHSB12.21
9	The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, test whether the two populations have the same variance. Unit- A: 14.1, 10.1, 14.7, 13.7, 14.0 Unit - B: 14.0, 14.5, 13.7, 12.7, 14.1	Understand	CO 5	AHSB12.22
10	The nicotine in milligrams of two samples of tobacco were found to be as follows. Test the hypothesis for the difference between means at 0.05 level. Sample-A: 24, 27, 26, 23, 25, - Sample-B: 29, 30, 30, 31, 24, 36	Understand	CO 5	AHSB12.21

Prepared by:
Dr. M Anita, Professor

HOD, IT