

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, - 500 043, Hyderabad, Telangana

QUESTION BANK

Department	COMP	COMPUTER SCIENCE AND ENGINEERING									
Course Title	PROBA	PROBABILITY AND STATISTICS									
Course Code	AHSC08	AHSC08									
Program	B.Tech	B.Tech									
Semester	II	II CSE									
Course Type	Foundati	Foundation									
Regulation	UG-20										
		Theory		Prac	etical						
Course Structure	Lecture	Tutorials	Credits	Laboratory	Credits						
	3	1	4	-	-						
Course Coordinator	Ms. P N	aga Lakshmi D	Oevi, Assistant Pr	ofessor							

COURSE OBJECTIVES:

The students will try to learn:

I	The theory of random variables, basic random variate distributions and their applications.
II	The Methods and techniques for quantifying the degree of closeness among two or more variables and linear regression analysis.
III	The Estimation statistics and Hypothesis testing which play a vital role in the assessment of the quality of the materials, products and ensuring the standards of the engineering process.
IV	The statistical tools which are essential for translating an engineering problem into probability model.

COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	Explain the role of random variables and types of random variables, expected values of the discrete and continuous random variables under randomized probabilistic conditions.	Understand
CO 2	Interpret the parameters of random variate Probability distributions such as Binomial, Poisson and Normal distribution by using their probability functions, expectation and variance.	Understand
CO 3	Apply Bivariate Regression as well as Correlation Analysis for statistical forecasting.	Apply
CO 4	Make Use of estimation statistics in computing confidence intervals, Regression analysis and hypothesis testing.	Apply
CO 5	Identify the role of statistical hypotheses, types of errors, confidence intervals, the tests of hypotheses for large samplein making decisions over statistical claims in hypothesis testing	Apply
CO 6	Identify the tests of hypothesis for small sample in making decisions over statistical claims in hypothesis testing	Apply

QUESTION BANK:

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		MODULE	I	
	PROBABILITY	AND RAN	DOM VARIABLES	
PAI	RT A-PROBLEM SOLVING	G AND CRI	TICAL THINKING QUES	ΓΙΟΝS
1	The probability density function of a random variable X is Calculate the value of $f(x) = \begin{cases} 3x^2, 0 < x < 1 \\ 0, otherwise \end{cases}$ calculate the value a, if $P(a \le x \le 1) = \frac{19}{81}$	Understand	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.	CO 1
2	The daily consumption of electric power (in millions of kW-hours) is a random variable having the probability density function $f(x) = \begin{cases} \frac{1}{9}xe^{\frac{-x}{3}}, x > 0 \\ 0, otherwise \end{cases}$ If the total production is 12 million kW-hours, determine the probability that there is a power cut on a given day.	Understand	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.	CO 1
3	A fair coin is tossed until a head or five tails occurs. Find the expected number E of tosses of the coin.	Understand	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.	CO 1
4	A fair die is tossed. Let the random variable X denote the twice the number appearing on the die:(i) construct the probability distribution of X hence find Mean and Variance.	Understand	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.	CO 1

5	If $f(x) = k e^{- x }$ probability do in the interval then evaluate Variance iv) If By finding k.	ensity fu l, x is a ii) Mea	real, m iii)		Undo	ersta	nd	the der	ncept ndom e prop nsity ntinud d use	perties functi ous ra	continuous	nuous ad explain robability a a variable late the	CO 1
6	The function $f(x) = Ax^2$, in $0 < x < 1$ is valid probability density function then Calculate the value of A.				Unde	erstar	nd	the der	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.				CO 1
7	The density function of a random variable X is $f(x) = \begin{cases} e^{-x}, x \ge 0 \\ 0, otherwise \end{cases}$ evaluate E[X], $E(X^2)$, $V(X)$.				Unde	ersta	nd	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.				CO 1	
8	If $E[X] = 10$, $V(X)=1$, then Calculate $E(2X(X+10))$.			en	Unde	ersta	nd	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the expected values.			te ad explain robability discrete ad use it	CO 1	
9	A discrete random variable X has the following probability distribution. Calculate (i) k (ii) P(X<3) (iii)P (X > 5).				Undo	ersta	nd	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.			CO 1		
		x P(X)	1 2k	2 4k	3 6k	4 8k	5 10		6 12k	7 14k	8 4k		

10	For the continuous random variable X whose probability density function is given by $f(x) = \begin{cases} cx(2-x), 0 \le x \le 2\\ 0, otherwise \end{cases}$ Calculate c, mean and variance of X.	Understand	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.	CO 1
		I	R QUESTIONS	
1	Let X denotes the maximum of the two numbers that appear when a pair of fair dice is thrown once. calculate the (i) Discrete probability distribution (ii) Expectation (iii) Variance.	Understand	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.	CO 1
2	Let X denotes the number of heads in a single toss of 4 fair coins. Determine P(X<2) ii) P(1 <x≤3)< td=""><td>Understand</td><td>Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.</td><td>CO 1</td></x≤3)<>	Understand	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.	CO 1
3	A random variable X has the following probability function. Calculate (i) Expectation (ii) variance (iii) Standard deviation.	Understand	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.	CO 1
	x	-1 0 1	2 3	
	P(X)	0.3 0.1 0.1	0.3 0.2	
4	Find the mean and variance of the uniform probability distribution given by $P(x)=1/n$ for $x=1,2,3,\ldots,n$.	Understand	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.	CO 1

5	A random variable the following proba function. Calculate Expectation (ii) var (iii) Standard devia	bility (i) riance	U	nderst	and	Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values.			CO 1	
		X	8	12	16	20	24			
		P(X)	1/8	1/6	3/8	1/4	1/12			
6	The length of time minutes) that a cer speaks on the teleph found to be random phenomenon, with a probability function specified by the function $f(x) = \begin{cases} Ae^{\frac{-x}{5}}, x \ge 0 \\ 0, otherwise \end{cases}$ Calculate the value that makes $f(x)$ a probability density (ii) calculate the probability density (iii) calculate the probability density (iii) calculate the probability density (iv) calculate (iv) ca	tain lad hone is a a (i) of A function obabilit ver the	y n.	nderst	and	the production densition and up continuous continuous continuous continuous continuous continuous contenuous c	pt of a om variate function of the control of the c	ecall the continuous able and es of proletion of a andom vocalculation ange, expected	explain cability ariable e the	CO 1
7	If X denote the sum two numbers that a when a pair of fair tossed. Estimate th Distribution function Mean and (iii) Vari	eppear dice is se (i) on (ii) ance.	U	Understand		concerando the promass rando to cal range	pt of a om vari- ropertic function om vari- culate	ecall the discrete able and es of prolon of a diable and the discrebilities, ues.	pability screte use it	CO 1
8	Is the function define follows a density function $f(x) = \begin{cases} e^{-x}, x \ge 0 \\ 0, x < 0 \end{cases}$ If so, estimate the probability that the having This density in the interval $(1, 2)$ Calculate the cumular probability $F(2)$?	nction . e variate will fa	2	nderst	and	concerando the prodensition continuand uncontinuand uncon	pt of a om variate function of the control of the c	ecall the continuous able and es of prolition of a andom vocalculation ange, expected.	explain cability ariable e the	CO 1

10	If probability density function . $f(x) = \begin{cases} kx^3, 0 \le x \le 3 \\ 0, otherwise \end{cases}$ Calculate the value of K and Calculate the probability between $x=1/2$ and $x=3/2$. A random variable x has the following probability function: Calculate (i) k (ii) $P(x<6)$ (iii) $P(X\ge6)$				Understand Understand			Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values. Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete				CO 1	
		х	0	1 2 3		3	random variable and use it to calculate the discrete range probabilities, expected values.						
		P(X)	0	k	$\frac{2}{2k}$	2k	3k	$\frac{3}{k^2}$	$\frac{6}{2k^2}$	-			
11	Let X denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. calculate the (i) Discrete probability distribution (ii) Expectation (iii) Variance.				iders		Learner to recall the concept of a discrete random variable and explain the properties of probability mass function of a discrete random variable and use it to calculate the discrete range probabilities, expected values. Learner to recall the			CO 1			
12	A random variable the following problem function: Then Calculate (i) mean (iii) variance	ability k (ii)	lity				ran the ma ran to e ran exp	dom prop ss fu dom calcu ge p	of a varia pertie nction varia late trobab	discrease ble as of profession of a ble a ble districted ble a ble districted ble a ble districted ble discrete ble discrete ble discrete ble discrete ble a ble discrete ble discrete ble a ble discrete ble discrete ble a ble discrete ble a ble discrete	ete nd exp orobab discre nd use screte	ility ete	CO 1
	-	$\frac{x}{P(X)}$	-3 k	-2 0.1	-1 k	0	$\frac{1}{2k}$	0.4		_			
13	A continuous rand variable has the production $f(x) = \begin{cases} kxe^{-\lambda x}, for \\ \lambda > 0 \\ 0, otherwis \end{cases}$ Evaluate (i) Mean Variance by finding	com cobability $rx \ge 0$, $cose$ c	ty	_		tand	Lea con ran the der con and con pro	arner acept adom prop asity atinuo tinuo	to re of a varia pertie funct ous ra	call to continuous de la continuous de l	nuous nd exp robab f a n varia late tl	ility able	CO 1

14	If the Probability density function of random variations is $f(x) = k(1 - x^2)$, $0 < x < 1$, then Calculation (i) k (ii) P(0.1 < $x < 0.2$) (iii) P($x > 0.5$).	able tee 22)	Understand			arner ncept ndom e proposity ntinuc d use ntinuc obabil	CO 1	
10	the following probability function. Calculate (i) Expectatio (ii) variance (iii) Standa deviation.	on urd			the material to rail extensions.	ncept ndom e prop ass fundom calcu nge pr	to recall the of a discrete variable and explain perties of probability action of a discrete variable and use it late the discrete robabilities, d values.	
		P(X)	$\frac{4}{0.1}$	5 0.3	6	8		
16	If X is a Continuous ran variable whose density function is $f(x) = \begin{cases} x, if & 0 < x < 1 \\ (2-x), 1 \le x < 0 \end{cases}$ Evaluate $E(25X^2 + 30X - 1)$	2,	om Understand			arner ncept ndom e proposity ntinuced use ntinucobabil	CO 1	
17	The cumulative distribution for a continuous random variable $f(x) = \begin{cases} 1 - e^{-2x}, & \text{if } x \geq 0 \\ 0, & \text{x} < 0 \end{cases}$ Evaluate (i) density function $f(x)$ (ii) Mean a (iii) Variance of the denfunction.	X is ≥ 0	Under	corrant the discorrant correction pro	arner ncept ndom e prop stribu ntinuo d use ntinuo obabil	CO 1		
18	Two coins are tossed simultaneously. Let X denotes the number of heads then Calculate $E[E[x^2], E[x^3], V(X).$	X],	Under	rstand	the material to ran	ncept ndom e prop ass fun dom calcu	to recall the of a discrete variable and explain perties of probability action of a discrete variable and use it late the discrete cobabilities, d values.	CO 1

19	Is the function defined by $f(x) = \begin{cases} 0, if & x < 2 \\ \frac{(2x+3)}{18}, 2 \le x \le 4, \\ 0, & x > 4 \end{cases}$ a probability density function? Estimate the probability that a variate having $f(x)$ as density function will fall in the interval $2 \le x \le 3$.	Understand	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.	CO 1
20	The probability density function of a random variable X is $f(x) = \frac{k}{x^2+1}, -\infty < x < \infty$ Calculate K and the distribution function F(x).	Understand	Learner to recall the concept of a continuous random variable and explain the properties of probability density function of a continuous random variable and use it to calculate the continuous range probabilities, expected values.	CO 1
	PART-C SHO	ORT ANSWI	ER QUESTIONS	
1	State the classical definition of probability?	Understand	_	CO 1
2	If $E(X) = 6$ and $E(X^2) = 100$ find the variance.	Understand	_	CO 1
3	If three coins are thrown at a time and X denotes the random variable which is defined as $X(x) = no$ of heads, write its probability distribution table.	Understand		CO 1
4	If $E(X) = 7$, $E(X^2) = 40$, find the value of $E(5X^2 - 11x + 8)$	Understand	_	CO 1
5	State the definitions of discrete and continuous random variables with a suitable example.	Understand		CO 1
6	List out the important Properties of probability density function.	Understand	_	CO 1
7	Find the probability distribution of getting number tails if we toss three coins calculate mean.	Understand		CO 1
8	State the definition of mathematical expectation of a probability distribution function	Understand	_	CO 1
9	State the definition of the Mean and Variance of a probability mass function.	Understand	_	CO 1

10	State the definition of the Mean and Variance of a probability density function.	Understand		CO 1
11	Find the probability distribution for sum of scores on dice if we throw two dice.	Understand		CO 1
12	Out of 24 mangoes, 6 mangoes are rotten. If two mangoes drawn at random, obtain probability distribution of number of rotten mangoes that can be drawn. also find the expectation	Understand		CO 1
13	If X is a random variable then show that $E[X+K]=E(X)+K$ where 'K' constant.	Understand	Learner to Explain the concept of random variable and Prove E $[X+K]=E(X)+K$, where 'K' constant.	CO 1
14	Show that $\sigma^2 = E(X^2) - \mu^2$.	Understand	Learner to Explain the concept of variance of a random variable and Prove	CO 1
15	State the definitions of the probability mass function and probability density of random variables.	Understand		CO 1
16	If X is Discrete Random variable then show that $V[aX+b]=a^2 V(X)$.	Understand	Learner to Explain the concept of variance of a random variable and Prove that $V[aX+b]=a^2 V(X)$.	CO 1
17	State the classical definition of probability. If a fair coin is tossed six times. Calculate the probability of getting four heads.	Understand	Learner to recall the concept of classical probability and explain its practical importance and use it to calculate the probability of getting four heads when a fair coin is tossed for 6 times.	CO 1
18	State the definition of different types of random variables with example.	Understand		CO 1
19	Outline the classical definition of probability. A coin is tossed 9 times. Calculate the probability of getting 5 heads.	Understand	Learner to recall the concept of classical probability and explain its practical importance and use it to calculate the probability of getting four heads when a fair coin is tossed for 9 times.	CO 1
20	State the definition of random variable with an example.	Understand	_	CO 1

	MODULE II									
			RIBUTIONS							
	RT A-PROBLEM SOLVING									
1	Show that the Poisson distribution is a limiting case of Binomial distribution.	Understand	Learner to recall the definitions of Binomial as well as Poisson distributions and outline the proof of the theorem that Poisson distribution is a limiting case of Binomial distribution.	CO 2						
2	Explain the properties of normal distribution. Calculate the variance of the Poisson distribution.	Understand	Learner to recall the definition of Poisson distribution and outline the proof of variance of Poisson distribution	CO 2						
3	Explain the properties of normal distribution. Determine the Mode in Normal distribution.	Understand	Learner to recall the definition of Normal distribution and Illustrate the properties of Normal curve and derive the mode of normal distribution.	CO 2						
4	Explain the properties of normal distribution. Calculate the median of the Normal distribution.	Understand	Learner to recall the definition of Normal distribution and Illustrate the properties of Normal curve and derive the median of normal distribution.	CO 2						
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. Calculate the mean and standard deviation.	Understand	Learner to recall the definition of Normal distribution and explain the properties of Normal distribution and use Normal distribution formula to calculate the mean and standard deviation.	CO 2						
6	The variance and mean of a binomial variable X with parameters n and p are 3 and 4. Calculate i) $P(X=1)$ ii) $P(X \ge 1)$ iii) $P(0 < X < 3)$.	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2						
7	Calculate the expected frequencies of the Binomial distribution to the following data	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required frequencies.	CO 2						

		X	0	1	2	3	4	5	6		
		f	13	25	52	58	32	16	4		
8	Explain the properti normal distribution. the Mean of Normal distribution.		Un	iderst	and	def dist	arner initic tribu prop ve an	CO 2			
9	If 7% of the students marks less than 35 a of the students score 63 marks calculate the and variance assuming normality.	nd 1 d ab he m	11% pove	Un	iderst	and	def dis- pro dis- dis- cale	initic tribu perti tribu tribu culat	on on tion des contion tion tion the the	recall the f Normal and explain the of Normal and use Normal formula to be mean and eviation.	CO 2
10	Explain the properti Binomial distribution Obtain the formula f mean of Binomial Distribution.	n. for			iderst		def dis	initic tribu oof of tribu	on on tion me		CO 2
	PAR	T-B	LO	NG	ANS	SWE	\mathbf{R} \mathbf{Q}	UE	STI	ONS	
2	Out of 20 tape recording are defective. Calculate standard deviation of defective in the sample randomly chosen tape recorders. Calculate P(X=0) (ii) P(X=1) P(X=2) (iv) P(0 <x=1) a="" car-hire="" firm="" has="" td="" to<=""><td></td><td>nderst</td><td></td><td>def diss pro- diss Bir cale pro-</td><td>initio tribu perti tribu nomia culat bbabi arner</td><td>tion of the tion of the the the tion of the the the the the the the the the the</td><td>recall the</td><td>CO 2</td></x=1)>		nderst		def diss pro- diss Bir cale pro-	initio tribu perti tribu nomia culat bbabi arner	tion of the tion of the the the tion of the	recall the	CO 2		
	which it hires out day by day. The number of demands for a car on 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.						dis prodis form	tribu perti tribu mula	tion les d tion to	f Poisson and explain the of Poisson and use Poisson calculate the obabilities.	
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. Estimate the probability that during one particular minute (i) 4 or fewer calls (ii) more than 6 calls.				iderst	and	def dist pro dist form	initic tribu perti tribu mula	on on tion des contion to continuous description of the contion of the continuous description of	recall the f Poisson and explain the of Poisson and use Poisson calculate the obabilities.	CO 2

4	In 1000 sets of trials per an event of small probability the frequencies the successes are given below. Calculate the expected frequencies Using Poisson.	Underst	and	defi dist pro dist form	pert ribu nula uire	n plain the on e Poisson e the	CO 2		
	x 0 1 f 305 365	2 3 210 80	$\frac{4}{28}$	5 9	6		$\frac{\text{Total}}{1000}$		
5	For a normally distributed variate with mean 1 and standard deviation 3. Calculate $i)P(3.43 \le X \le 6.19)$ $ii)P(-1.43 \le X \le 6.19)$.	Underst	and	defi dist pro dist dist calo	nitionition perteribu pribu pribu	on of ation ties of ation ation	f Norm and us formul e requin	al plain the al e Normal a to	CO 2
6	If X is a normal variate with mean 30 and standard deviation 5. Calculate the probabilities that $i)P(26 \le x \le 40)$ $ii)P(X \ge 45)$.	Underst	and	defi dist pro dist dist calo	nitio cribu pert cribu cribu	on of ation ties of ation ation	f Norm and us formul e requin	al plain the al e Normal a to	CO 2
7	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Underst	and	defi dist pro dist Bin calo	nitionition perteributioni omiculat	on of ation ties of ation at for	ecall the Binom and extended from and use the requirements of the control of the	tial splain the nial e	CO 2
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 Calculate how many students weight (i) Between 60 and 78 kg (ii) more than 92kg.	Underst	and	Lea defi dist pro dist dist calc	rnen inition pert pert cribu cribu	r to ron of ation ties of ation ation	f Norm and us formul e requin	al plain the al e Normal a to	CO 2
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. Calculate the approximate number of students expected to obtain marks between 30 and 60.	Underst	and	defi dist pro dist dist calo	nitio cribu pert cribu cribu	on of ation ties of ation ation	f Norm and us formul e requin	al plain the al e Normal a to	CO 2

10	If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs. Calculate 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	Learner to recall the definition of Normal distribution and explain the properties of Normal distribution and use Normal distribution formula to calculate the required probabilities.	CO 2
11	Out of 800 families with 5 children each, calculate how many would you expect to have (i)3 boys (ii)5 girls (iii)either 2 or 3 boys? Assume equal probabilities for boys and girls.	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2
12	If a Poisson distribution is such that then Calculate $P(x=1) = \frac{3}{2}P(x=3) \text{ then }$ calculate (i) $P(X \ge 1)$ (ii) $P(X \le 3)$ (ii) $P(2 \le X \le 5)$.	Understand	Learner to recall the definition of Poisson distribution and explain the properties of Poisson distribution and use Poisson formula to calculate the required probabilities.	CO 2
13	Average number of accidents on any day on a national highway is 1.8. Calculate the probability that the number of accidents is (i) at least one (ii) at most one.	Understand	Learner to recall the definition of Poisson distribution and explain the properties of Poisson distribution and use Poisson formula to calculate the required probabilities.	CO 2
14	In a Normal distribution, 7% of the item are under 35 and 89% are under 63. Calculate the mean and standard deviation of the distribution.	Understand	Learner to recall the definition of Normal distribution and explain the properties of Normal distribution and use Normal distribution formula to calculate the mean and variance.	CO 2
15	A shipment of 20 tape recorders contains 5 defectives Calculate the standard deviation of the probability distribution of the number of defectives in a sample of 10 randomly chosen for inspection.	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2

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 Calculate 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 below 20? iv) How many students get more than 50.	Understand	Learner to recall the definition of Normal distribution and explain the properties of Normal distribution and use Normal distribution formula to calculate the required probabilities.	CO 2
17	Calculate the expected frequencies Using Binomial Distribution to the following data	Ц	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required frequencies.	CO 2
18	Show that the recurrence relation for the Poisson distribution is $P(x) = \frac{\lambda}{X}$. $P(x-1)$	Understand	Learner to Define the Poisson distribution and explain its properties and use it to derive the recurrence relation.	CO 2
19	The life of electronic tubes of a certain type may be assumed to be normal distributed with mean 155 hours and standard deviation 19 hours. Calculate 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	Learner to recall the definition of Normal distribution and explain the properties of Normal distribution and use Normal distribution formula to calculate the required probabilities.	CO 2
20	The probability that a man hitting a target is 1/3. If he fires 5 times, the probability that he fires (i) At most 3 times (ii) At least 2 times	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2

	PART-C SHO	ORT ANSWI	ER QUESTIONS	
1	20% of items produced from a goods factory are defective. If we choose 5 items randomly then Calculate the probability of non-defective item.	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2
2	The probability if no misprint in a book is e^{-4} . Calculate probability that a page of book contains exactly two misprints.	Understand	Learner to recall the definition of Poisson distribution and explain the properties of Poisson distribution and use Poisson formula to calculate the required probabilities.	CO 2
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	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2
4	If the probability of a defective bolt is 0.2, Calculate (i) mean (ii) standard deviation for the bolts in a total of 400.	Understand	Learner to recall the definition of Poisson distribution and explain the properties of Poisson distribution and use Poisson formula to calculate the required probabilities.	CO 2
5	Interpret the properties of Binomial distribution.	Understand	Learner to Define the binomial distribution and explain its properties and parameters.	CO 2
6	If n=4, p=0.5 then Calculate standard deviation of the binomial distribution.	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2
7	Explain the properties of Poisson distribution.	Understand	Learner to Define the Poisson distribution and explain its properties and parameters.	CO 2

8	Build the binomial distribution for which the mean is 4 and variance 3	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required parameters.	CO 2
9	If X is normally distributed with mean 2 and variance 0.1, then Calculate $P(x-2 \ge 0.01)$?	Understand	Learner to recall the definition of Normal distribution and explain the properties of Normal distribution and use Normal distribution formula to calculate the required probabilities.	CO 2
10	If X is Poisson variate such that $P(X=1) = 24P(X=3)$ then Calculate the mean.	Understand	Learner to recall the definition of Poisson distribution and explain the properties of Poisson distribution and use Poisson formula to calculate the mean.	CO 2
11	Explain the properties of normal distribution Normal distribution.	Understand	Learner to Define the Normal distribution and explain its properties and parameters.	CO 2
12	Interpret the properties of Binomial distribution. Derive the recurrence relation for binomial distribution.	Understand	Learner to Define the binomial distribution and explain its properties and use it to derive the recurrence relation.	CO 2
13	The mean and variance of a binomial distribution are 4 and 4/3 respectively. Then Calculate P(x=1).	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2
14	In eight throws of a die 5 or 6 is considered a success. Calculate the mean number of success	Understand	Learner to recall the definition of Binomial distribution and explain the properties of Binomial distribution and use Binomial formula to calculate the required probabilities.	CO 2

15	If a bank rece average 6 bad day, Calculate probability th receive 4 bad any given day	cheques per the cheques of the cheques of	per		Und	ersta	nd	des dis pro dis for	finit strib oper strib mul	ties oution la to	of Pontant of Pontant and	oisso d ex oisso d us ulat	plain the on se Poisson e the	CO 2
16	Illustrate the the Normal co		s of		Und	ersta	nd	Le det dis	arne finit strib		reca of No	all thorma d Ill	ne	CO 2
17	State the form Variance of P distribution		Iean	ι,	Und	ersta	nd							CO 2
18	State the form of a Binomial			;	Und	ersta	nd							CO 2
19	State the form variance of Bidistribution.		nean	,	Und	ersta	nd							CO 2
20	Explain the p Poisson distri the recurrence the Poisson d	bution. Do	eriv	e	Und	ersta	nd	Po exp	isso plain e it		trib prop erive	utio pert the	n and les and	CO 2
					MO	DUI	Œ							
		CORR	REL						GR.	ESS	ION	1		
PA	RT A-PROBI	LEM SOI	LVI	NG	AN	D C	RI	TIC	AL	TH	INI	KIN	G QUES	TIONS
1	Interpret the correlation co Calculate coe correlation be Y for the follows:	properties efficient. fficient of etween X a	of and			pply		Le con the be van	arne ncep rrela e de twee riab	er to ot of ation gree en th les by	reca coef and of ca e gives	all the ficient Interpretation Inter	ne of erpret	CO 3
			X	10	12	18	24	1 2	3	27				
2	Interpret the rank correlation Ten competition musical test with three judges in the following rank competition of judges has approach to competition in music.	properties on coefficitors in a vere ranked ges A, B and ges and ges and ges are the correlation that which the nearest	ent. d by nd (y C	A A	pply	25	Le con de the usi	arne ncep rrela gree e giv	ation of cl ven to spear	coef and losei wo v mai	ficie Int ness varia n's r	nt of rank erpret the between bles by	CO 3
		Rank A	1	6	5	10	3	2	4	9	7	8		
		Rank B Rank C	3 6	5	8 9	8	7	10	3	1 10	6 5	9 7		

3	Interpret the rank correlati Obtain the raccoefficient for data.		A	pply		conce corre degree the g	ner to ept of clation to given to give to	CO 3					
		X 68Y 62		75 68	50 45	64 81	80 60	75 68	40 48	55 50	64 70		
4	Show that the correlation lie and 1.	e coeffic	eient of			pply		Lear conce corre proof	ner to ept of elation	reca coeff and e the of co	ll the ficien outli orem	t of ine the	CO 3
5	Interpret the rank correlation The ranks of students in two and B are give two numbers brackets denoted the same so and B respect (2,7), (3,2), (6,8), (7,3), (6,8), (7,3), (10,15), (11,9), (13,14), (14,1). Spearman's feedback Calculate the correlation correlation control of the same so and B respect (2,7), (3,2), (4,6,8), (7,3), (5,6,8), (7,3), (6,8), (7,8)	the 15 wo subject the 15 wo subject the 15 wo subject the below within the structure of the tudent in the structure of the subject to the sub	ficient. ects A w, the the e ranks in A 1,10), 4), 11), 13) Use		A	pply		Learn concern degree the gusing	ner to ept of elation	reca coeff and losen wo v	ll the icien Inter less brariab	t of rank rpret the between bles by nk	CO 3
					(CIE-I	II						
6	Outline the p formula for a two regression	ngle bet n lines.	ween			pply		and l betw lines corre	Interp een th by us	regreeret the give ing contact and	ession he an ven re oeffic	n lines	CO 4
7	Outline the formula between two solutions. If $\sigma_x = 0$ angle between lines are $\theta = 0$. Obtain r.	regression $\sigma_y = \sigma$ are the regression	on nd the gression		A	pply		and l betw lines corre	Interp een th by us	regreeret the given ing contact and	ession he an ven re oeffic	n lines	CO 4
8	Outline the forbetween two states and S.D. of Y. S.D. of X and Calculate tan	regression the angle regression is twiced in the contract of t	on e on lines e the		A	pply		and l betw lines corre	Interp een th by us	regreeret the given ing contact and	ession he an ven re oeffic	n lines	CO 4

9	Outline the foregression line the value of y from the follow	es. Ca when	lculate x =12		App	ly	formand relative ma	mulad I Tra ation vari them	e of renslate between the betw	e the een the in to	sion lines inherent ne given a tion by	CO 4
								X	Y			
				Avera	ige		7	.6	14.8			
			Stan	dard d	eviat	ion	3	.6	2.5			
			Coeffic	ient of	corre	latio	n 0.	99	-			
10	Outline the fo	ormula	e of		App	ly	Lea	arner	to re	call t	he	CO 4
	regression line									_	sion lines	
	the regression	_		Y							inherent	
	on X from the		_								ne given	
	below, taking			,						in to		
	from actual n			d							tion by	
	Y. Estimate t		· ·				usi	ng lir	near 1	Regres	ssion.	
	demand when Rs. 20.	i the p	orice is									
	1ts. 20.	т	Price (R) a)	10	12	13	12	16	15		
			unt den									
								45		43		
1	T		RT-B I	JUNG							L _	CO 3
1	Interpret the rank correlati				App	ly				call t	ne nt of rank	CO 3
	A random sai			•				_			erpret the	
	college studer	_									between	
	and their grad		ciccica								ables by	
	mathematics		atistics							an's		
	are found to							-			lation.	
	Spearman's raccoefficient.	ank co	rrelatio	n								
					1	2	3	4	5			
			Mathe	matics	85	60	73	40	90			
		_	Stati	stics	93	75	65	50	80			
2	Interpret the	prope	rties of		App	lv	Lea	rner	to re	call t	he	CO 3
	correlation co				11	J	con	cept	of co	efficie	ent of	
	Calculate the	coeffic	cient of				cor	relati	ion ai	nd Int	erpret	
	correlation from	om the	е				the	degr	ree of	close	ness	
	following data	a					bet	ween	the a	given	two	
									_	_	Pearson's	
									nt of	corre	lation.	
				2 9				13	7			
			·	4 8	6	9			13			
3	Explain the p	_			App	ly				call t		CO 3
	rank correlati							_			nt of rank	
	The following		_	ie							erpret the	
	marks in obta		-	,			_				between	
	students in a			ıa				_			ables by	
	statistics. When A: a			.						an's i	ank lation.	
	number, A: a statistics. Ca			.			COE	шсте	III OI	corre.	iatiOII.	
	coefficient of											
		0011616	. UI () II.									

			D.	1	0	1 9		4			Τ,	7	0	0	10			
		_	R	1	2	3	_	4	5	6		7	8	9	10	-		
		_	A	45	70	65	_	80	90	40			75	85	60	_		
	T		S	35	90	70	4	10	95	40			80	80	50			
4	Interpre					f		Ap	ply					reca				CO 3
	correlati											_				nt of		
	Calculat															erpret		
	Pearson?				of								_	of cl				
	correlati													e giv				
	following	_													_	Pearson	ı's	
	wages ar	nd C:	cost											of co	rrel	ation.		
		1	V	100	10)1	102	1	.02	100	C	99	97	98	96			
		(C	98	9	9	99	(97	95	. !	92	95	94	90			
5	Explain	the p	rope	ertie	s of			Ap	ply		Le	arne	r to	reca	ll th	ie		CO 3
	rank cor					t.		1	1 0							nt of		
	Calculat											_				erpret		
	coefficie	nt of o	corre	elati	on f	or								of cl		-		
	the follo													e giv				
	F: Fertil	_														Pearson	's	
	P: Produ			,	,									-	_	ation.		
			F	15	$\frac{1}{5}$	8	20	24	1	30	3	5	40	50)			
			P	85	_		95	10	5	120	_	30	150	16	_			
6	Explain	the n				9			ply					reca		ΙΑ		CO 3
U	correlati	_	_			A		лρ	pry							nt of		00 5
	following											_				erpret		
	distribut	_	_											of cl		_		
	populati					,							_	e giv				
	are total													_		Pearson	,,	
	among t			-		ııt.								-	_	ation.		
	if there																	
	between					s.												
	Where A	_																
	No of pe	_																
	and B: r																	
	A			10-2		20-3	80	30-	40	40-	50	50-	-60	60-	70	70-80		
	N	_	_	60		40	_	36		2			1	6	_	3	1	
	В			40		40		40		3		_	22	18	_	15	1	
7	Interpre								ply					reca				CO 3
1	rank cor							лρ	pry							nt of ra	ոե	003
	Followin					υ•						_				erpret t		
	obtained	_				n										betwee:		
	two subj											_				bles by		
	Mathem											_		mo v rman		_		
	what ext											_	_			ation.		
	of the st					,~					200	011101	.0110	01 00	(1			
	subjects				,													
	242,0000	10 101	Г	$\frac{1}{S}$	1	2	3	4	5	6	7	8	9	10				
			-	M	2	$\frac{2}{4}$	1	5	3	9	$\frac{7}{7}$	10	6	8				
				TAT	4	4	1	J	ა	9	1	ΤÜ	U	0				

8	Explain the rank correla The ranks of Mathematic	ation co	oeffici uden	ent. ts in		App	oly		conc	ept elati	of co	nd Ir	ient nterj	of ran	e	CO 3
	are as follow (3,3), (4,4), (7,2),(8,6), (11,15), (12,13,14),(14,15)	vs (1,1) (5,5), (9,8), (,9),), (2, (6,7) 10,11	10),					the g	give g sp	n tw earn		iabl ran			
	(16,13). Cal correlation of proficiencies in mathema statistics.	coeffici s of Th	ent fo	or												
9	Interpret the correlation of sample of 1: their elder set following date elder sons. Coefficient of Where F: Finches and State of	coefficion father sons gas atta about a correstather's	ent. rs an ve th out th ate th lation heig	A d e neir ne n. ht in		App	oly		conc corre the o betw varia	ept elati degr een ible	of coion a ree or the s by	and In f clos given	ient nterj senes n tw g Pe	ss o arson's		CO 3
		F 65	63	67	64		62	_		66	68	69	71			
		S 68	66	68	65	69	66	6	8 6	35	71	68	70			
10	Explain the rank correla Following as	tion core the	effici rank	ient.		Арр	oly		conc	ept elati	of co	nd Ir	ient nterj	of ran	e	CO 3
	obtained by								_					etween		
	two subjects Mathematic								-	-		o var nan's		es by		
	what extent								,			corr				
	of the stude									,_0	. 01					
	subjects are															
		M	48	33	40			16	65	24		_	7			
		S	13	13	24			4	20	9	6	1	9			
						CI	E-II									
11	Outline the					App	oly					ecall		3.0		CO 4
	regression li											_		n lines		
	the regression which best													nerent given		
	following da		пе									veen s in t		given		
	lonowing do													n by		
												Regr				
	•		X	10	12	13	16	1	7 2	20	25					
			у	10	22	24	27	2	9 3	33	37					

				_							
12	Outline the formulae	of			Αp	ply		Lear	ner to	recall the	CO 4
	regression lines. In th	e						form	ulae o	of regression lines	
	following table S is we	eigh	t.					and '	Trans	late the inherent	
	of Potassium bromide							relati	ion b	etween the given	
	will dissolve in 100 gr	ams	S.							oles in to a	
	Of water at V^o C. Fit									ical function by	
	equation of the form.	Carr								ar Regression.	
	_	لمما	۰t					using	, iiiiea	ar regression.	
	S=mT+b by the metal		OI								
	least squares. Use Th										
	relation to estimate S	wh	en								
	$T=50^{\circ}$.										
	T 0 20 40 60		80								
	S 54 65 75 88	$5 \mid $	96								
13	Interpret the properti	es o	of		Αp	ply		Lear	ner to	recall the	CO 4
	regression coefficients				-			form	ulae c	of regression lines	
	a sample of 200 pairs									late the inherent	
	observation the follow									etween the given	
	quantities were calcul		1							oles in to a	
	$\sum X = 11.34, \sum Y = 1$									ical function by	
	$\sum X = 11.54, \sum T = 1$ $\sum X^2 = 12.16,$	20.1	ο,							ar Regression.	
	$\sum X = 12.10,$ $\sum Y^2 = 84.96,$							using	, iiiiea	ii Regression.	
	1 -	,	1								
	$\sum XY = 22.13, \text{Fro}$		ne								
	above data show how		c								
	Calculate the coefficie										
	the equation $Y(x)=a$ -										
14	Outline the formula o	f an	ıgle		Αp	ply				recall the	CO 4
	between two regressio	n						conce	ept of	regression lines	
	lines. If $\sigma_x = \sigma_y = \sigma$ and	d th	e					and l	Interp	oret the angle	
	angle between the reg		sion					betw	een tl	he given regression	
	lines is $\theta = Tan^{-1} \left(\frac{4}{3}\right)$),						lines	by us	sing coefficient of	
	calculate r.							corre	lation	and regression	
								coeff	cient	S.	
15	Outline the formulae	of			Ap	ply		Lear	ner to	recall the	CO 4
	regression lines. Calcu	ılat	e		-			form	ulae o	of regression lines	
	both regression lines									late the inherent	
	best fit to the following									etween the given	
	data: Also, i) find y v		า							oles in to a	
	x = 13.ii) find x when									ical function by	
	11.5	J								ar Regression.	
	1	x	2	$\frac{1}{4}$	6	8	10		14		
			4	2	5	10	4		12	_	
1.0	Intermed the	у		<u> </u>			4				CO 4
16	Interpret the properti				ΑŢ	ply				recall the	004
	regression coefficients	11						-	regression lines oret the degree of		
	20 army personal the										
	regression of weight o									between the given	
	kidneys (Y) on weight	t of								oles by using	
	heart (X) is $Y =$									of correlation and	
	0.399X+6.394 and the							regre	ssion	coefficients.	
	regression of weight o		art								
	on weight of kidneys										
	X=1.212Y+2.461. Ca	lcul	ate								
	the correlation coeffic	ient									

17	Outline th	e for	mulae	of			Ap	ply		Lea	arne	r to	rec	all t	he			CO 4
	regression	lines	. Calcı	ulate)		form				mul	nulae of regression lines						
	the most l	ikely	produ	ctior	1					and	l Tr	ansl	late	the	inhe	rent		
	correspond	_								relation between the given								
	40 from th	e foll	lowing	data	a:					two variables in to a								
										ma	mathematical function by							
											ng l	linear Regression.						
								Ra		all ()	()	Production(Y)						
				erage					30					Kgs				
			andard						5				100 Kgs					
			ficient		orrel	latio			0.					-				
18	Outline th						Ap	ply				r to						CO 4
	regression lines. The heights									1						f ranl	k	
	of mothers		_												terpr	et		
	are given i			_								_			eness			
	table. From				S								_		two			
	of regression				0									_		rson's	3	
	_	expected average height of								coe	етист	.ent	of c	orre	elatio	n.		
	"	hter when the height of																
		ne mother is 64.5 inches.																
		Where F: Mother's height in inches and D: Daughter's																
		height in inches.																
	neight in i	ncnes			- 0			0.4		1 0	<u>a</u>	00		_				
			M	62	65		64	64		_	_	68	70	4				
	1		D	64	6	5 6	51	69				71	65					
19	Explain th	_	_				Ap	ply				r to						CO 4
		rank correlation coefficient.									_					f ranl		
		el of two judges P and													_	et th		
		aded seven dramatic								_					s bet			
	performan		-												ables	by		
	independe	-		ng						using spearman's rank coefficient of correlation.								
	marks as f									coefficient of correlation.								
	The eight	-		,														
	which judg																	
	attend, wa				0													
	Q had also	_	_	_	e													
	calculate h		_		C C													
	would be e		-															
	been awar	_																
	eighth per		-	00 0	110													
			Perfor	man	ce	1	2	2	3	4	5		3	7				
		 	Marks			46	4	_	44	40	43		_	45				
		F	Marks			40	3		36	35	39	_	7	$\frac{10}{41}$				
20	Given the	bi-va			-			ply				r to			he		T	CO 4
					nd		1	r-J							sion i	lines		231
	Using regression lines i) find y when $x=10.ii$) find x											_	inhe					
	when y =		,															
										relation between the given two variables in to a								
										mathematical function by								
							using linear Regression.											
				X	1	5	3	2	1	1	7	3		<u> </u>				
				Y	6	1	0	0	1	2	1	5						
						L *	J			"	-	9						

	PART-C SHO	ORT ANSW	ER QUESTIONS	
1	State the definition of correlation coefficient.	Apply	-	CO 3
2	List out the types of correlation.	Apply	_	CO 3
3	Outline the properties of coefficient correlation. Given $n = 12, \sigma_x = 2.5$ and $\sigma_y = 3.6$ sum of the product of deviation from the mean of X and Y is 64 Calculate the correlation co-efficient.	Apply	Learner to recall the concept of coefficient of correlation and explain its practical importance and use the formula to calculate the coefficient of correlation for the given data.	CO 3
4	State the formula of rank correlation coefficient.	Apply	_	CO 3
5	State the properties of correlation coefficient.	Apply	_	CO 3
6	Outline the properties of coefficient correlation. If $\sum XY = 216$, $\sum X^2 = 102$, $\sum Y^2 = 471$ then Calculate correlation coefficient.	Apply	Learner to recall the concept of coefficient of correlation and explain its practical importance and use the formula to calculate the coefficient of correlation for the given data.	CO 3
7	Outline the properties of coefficient correlation. Given n=10, $\sigma_x = 5.4$ and $\sigma_y = 6.2$ sum of product of deviations from the mean of X and Y is 66 Calculate the correlation co-efficient.	Apply	Learner to recall the concept of coefficient of correlation and explain its practical importance and use the formula to calculate the coefficient of correlation for the given data.	CO 3
8	State the properties of rank correlation coefficient.	Apply	-	CO 3
9	Outline the properties of coefficient correlation. From the following data calculate (i) correlation coefficient (ii) standard deviation of y. $b_{xy} = 0.85, b_{yx} = 0.89$ and $\sigma_x = 3$	Apply	Learner to recall the concept of coefficient of correlation and explain its practical importance and use the formula to calculate the coefficient of correlation for the given data.	CO 3
10	Outline the properties of coefficient correlation. If N=8, $\sum X = 544$, $\sum Y = 552$, $\sum XY = 37560$ then Calculate COV (X, Y).	Apply	Learner to recall the concept of coefficient of correlation and explain its practical importance and use the formula to calculate the covariance for the given data.	CO 3

		CIE-II		
11	Outline the properties of coefficient correlation. The equations of two regression lines are 7x-16y+9=0, 5y-4x-3=0. Calculate the coefficient of correlation.	Apply	Learner to recall the concept of coefficient of correlation and explain its practical importance and use the formula to calculate the coefficient of correlation for the given data.	CO 4
12	State the formulae of normal equations for regression lines?	Apply		CO 4
13	State the formula of angle between two regression lines	Apply	_	CO 4
14	Find the means of X and Y variables from the following two regression equations: $2Y-X-50=0$, $3Y-2X-10=0$	Apply		CO 4
15	Find the coefficient of correlation between X and Y variables from the following two regression equations: $2Y-X-50=0$ $3Y-2X-10=0$	Apply		CO 4
16	Find the means of X and Y variables from the following two regression equations: $4X-5Y+33=0$ $20X-9Y-107=0$	Apply		CO 4
17	Find the coefficient of correlation between X and Y variables from the following two regression equations: $4X-5Y+33=0$ $20X-9Y-107=0$	Apply		CO 3
18	State the properties of regression lines.	Remember	_	CO 4
19	List the differences between correlation and regression.	Apply		CO 3
20	$\sum X = 15, \sum Y = 25,$ $\sum X^2 = 55, \sum Y^2 = 135,$ $\sum XY = 83 \text{ and } N = 5 \text{ find}$ the regression coefficient of y on x.	Apply		CO 4

MODULE IV TESTING OF HYPOTHESIS-I PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS Let $S=\{1, 5, 6, 8\}$ Calculate CO 5 Apply Learner to recall the the probability distribution concept of sampling of the sample mean for distribution of means and random sample of size 2 explain the parameters drawn without replacement. related to sampling Calculate i) The mean of distribution of means under the population. ii) The without replacement and standard deviation of the hence use them to calculate population. iii) The mean of the required values. the sampling distribution of means. iv) The standard deviation of the sampling distribution of means. CO₅ Samples of size 2 are taken Apply Learner to recall the from the population 1, 2, 3, concept of sampling 4, 5, 6. Which can be drawn distribution of means and without replacement? explain the parameters Calculate i) The mean of related to sampling distribution of means under the population. ii) The standard deviation of the without replacement and population. iii) The mean of hence use them to calculate the sampling distribution of the required values. means. iv) The standard deviation of the sampling distribution of means. 3 CO₅ A normal population has a Apply Learner to recall the mean of 0.1 and standard statement of central limit deviation of 2.1. Calculate theorem and Relate it to the probability that mean of the normality and calculate a sample of size 900 will be the required probabilities by negative. using the concept of central limit theorem 4 A random sample of size 64 Apply Learner to recall the CO_5 is taken from an infinite statement of central limit population having the mean theorem and Relate it to 45 and the standard the normality and calculate deviation 8. Calculate the required probabilities by probability that x will be using the concept of central between 46 and 47.5. limit theorem 5 CO 5 If a 1-gallon can of paint Apply Learner to recall the covers on an average 513 statement of central limit theorem and Relate it to square feet with a standard deviation of 31.5 square the normality and calculate feet, Calculate the the required probabilities by probability that the mean using the concept of central area covered by a sample of limit theorem 40 of these 1-gallon cans will be anywhere from 510 to 520 square feet?

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.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
7	It is claimed that a random sample of 49 tires has a mean life of 15200 kms This sample was taken from population whose mean is 15150 kms and S.D is 1200 km Examine the truth value of the claim at 0.05 level of significant.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
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 equipment received 18 were faulty Examine the truth value of the claim at 0.05 level.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
9	Among the items produced by a factory out of 500, 15 were defective. In another sample of 400, 20 were defective Examine whether there is any significant difference between two proportions at 5% level.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
10	A manufacturer produced 20 defective articles in a batch of 400. After overhauled it produced 10 defectives in a batch of 300 Examine whether the machine being improved after over hauling or not.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5

	PART-B LO	NG ANSWE	ER QUESTIONS	
1	A population consists of ranks of five students based on their performance in a physical test namely 2,3,6,8 and 11. Consider all possible samples of size two which can be drawn with replacement from This population. Calculate The mean of the population. The standard deviation of the population. The mean of the sampling distribution of means. The standard deviation of the sampling distribution of means.	Apply	Learner to recall the concept of sampling distribution of means and explain the parameters related to sampling distribution of means under with replacement and hence use them to calculate the required values.	CO 5
2	A population consists of ranks of six students based on their performance in a physical test namely 5, 10, 14, 18, 13, 24. Consider all possible samples of size two which can be drawn without replacement from This population. Calculate The mean of the population. The standard deviation of the population. The mean of the sampling distribution of means. The standard deviation of the sampling distribution of means.	Apply	Learner to recall the concept of sampling distribution of means and explain the parameters related to sampling distribution of means under without replacement and hence use them to calculate the required values.	CO 5
3	A population consists of ranks of six students based on their performance in a physical test namely 4, 8, 12, 16, 20, 24. Consider all possible samples of size two which can be drawn without replacement from This population. Calculate The mean of the population. The standard deviation of the population. The mean of the sampling distribution of means. he standard deviation of the sampling distribution of means.	Apply	Learner to recall the concept of sampling distribution of means and explain the parameters related to sampling distribution of means under without replacement and hence use them to calculate the required values.	CO 5

4	A population consists of ranks of six students based on their performance in a physical test. Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6. Which can be drawn with replacement? Calculate The mean of the population. The standard deviation of the population. The mean of the sampling distribution of means. The standard deviation of the sampling distribution of means.	Apply	Learner to recall the concept of sampling distribution of means and explain the parameters related to sampling distribution of means under with replacement and hence use them to calculate the required values.	CO 5
5	A population consists of ranks of five students based on their performance in a physical test. Samples of size 2 are taken from the population 3, 6, 9, 15 27. Which can be drawn with replacement? Calculate 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.	Apply	Learner to recall the concept of sampling distribution of means and explain the parameters related to sampling distribution of means under with replacement and hence use them to calculate the required values.	CO 5
6	A population consists of ranks of five students based on their performance in a physical test. If the population is 3, 6, 9, 15, 27. List all possible samples of size 3 that can be taken without replacement from the finite population. Calculate the mean of each of the sampling distribution of means. Calculate the standard deviation of sampling distribution of means.	Apply	Learner to recall the concept of sampling distribution of means and explain the parameters related to sampling distribution of means under without replacement and hence use them to calculate the required values.	CO 5
7	The mean height of students in a college is 155 cm and standard deviation is 15. Estimate the probability that the mean height of 36 students is less than 157 cm.	Apply	Learner to recall the statement of central limit theorem and Relate it to the normality and calculate the required probabilities by using the concept of central limit theorem.	CO 5

8	A random sample of size 100 is taken from an infinite population having the mean 76 and the variance 256. Estimate the probability that \bar{x} will be between 75 and 78.	Apply	Learner to recall the statement of central limit theorem and Relate it to the normality and calculate the required probabilities by using the concept of central limit theorem	CO 5
9	The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Calculate the probability that the mean of the sample size 36 will be negative.	Apply	Learner to recall the statement of central limit theorem and Relate it to the normality and calculate the required probabilities by using the concept of central limit theorem	CO 5
10	A random sample of size 64 is taken from a normal population with = 51.4 and = 68. Estimate 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.	Apply	Learner to recall the statement of central limit theorem and Relate it to the normality and calculate the required probabilities by using the concept of central limit theorem	CO 5
11	A sample of 400 items is taken from a population whose standard deviation is 10. The mean of sample is 40. Examine whether the sample has come from a population with mean 38 also calculate 95% confidence interval for the population.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
12	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?	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
13	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. Examine the claim at 5% LOS	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5

14	According to norms established for a mechanical aptitude test, the 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 Examine the truth value of the hypothesis $H_0: \mu = 73.2$ against alternative hypothesis: $\mu > 73.2$.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
15	A sample of 100 electric bulbs produced by manufacturer 'A' showed a mean life time of 1190 hours and s.d. of 90 hours A sample of 75 bulbs produced by manufacturer 'B' Showed a mean life time of 1230 hours with s.d. of 120 hrs. Examine whether there is any difference between the mean life times of the two brands at a significance level of 0.05.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
16	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.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5
17	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. Examine whether 8% difference is a valid claim.	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.	CO 5

18	rural are phones we in urban accepted proportion in the ruarea is sa	of 400 persons a possessed 'cell' while 120 out of area. Can it be that the on of 'cell' phonoral area and Urame or not. Use of significance.	1' 500 es ban	Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.			CO 5
19	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 Examine the significance of difference between means.			Apply	Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.			CO 5
			Mean	Standard I	Deviation	Sample Size	'	
		University A	55	10		400		
	ı	University B	57	15		100		
20	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?			Apply	procedur hypothes suitable formula a calculate value wit	to recall the re of testing of sis and select the test statistic and compare the d test statistic the the tabulate draw the inference	ne d	CO 5
	•	PART-C	SHOF	RT ANSWE	ER QUES	STIONS	<u>"</u>	
1		the different typing methods.	pes	Apply	_			CO 5
2		e definition of on? Give an		Apply				CO 5
3		e definition of Give an examp	le.	Apply				CO 5
4	paramete	e definition of er and statistic.		Apply				CO 5
5		value of correct n=5 and N=200		Apply				CO 5
6		e definition of error of a stati	stic.	Apply				CO 5
7	different can be cl population	How many samples of size hosen from a fin on of size 25.	ite	Apply	_			CO 5
8	probable	standard error error of sample nd correlation at 0.74.		Apply				CO 5

9	If the population consists of four members 1, 5, 6, 8, Find How many samples of size three can be drawn with replacement?	Apply		CO 5
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.	Apply		CO 5
11	List out the differences between large and small samples with example.	Apply	_	CO 5
12	In a manufacturing company out of 100 goods 25 are top quality. Find sample proportion.	Apply		CO 5
13	Find the confidence interval for single mean if mean of sample size of 400 is 40, standard deviation is 10.	Apply		CO 5
14	Find the confidence interval for single proportion if 18 goods are defective from a sample of 200 goods.	Apply		CO 5
15	State the Formula of standard error of sample proportion.	Apply	_	CO 5
16	In a manufacturing company out of 200 goods 80 were faulty. Find the sample proportion.	Apply	_	CO 5
17	Find the sample proportion in one day production of 400 articles only 50 are top quality.	Apply	_	CO 5
18	State the formula for difference of means in large samples.	Apply	_	CO 5
19	State the formula of test statistic for difference of proportions in large samples.	Apply	_	CO 5
20	Find the confidence interval for mean if mean of sample size of 144 is 150, standard deviation is 2.	Apply		CO 5

				MO	DUI	E '	$\overline{\mathbf{V}}$					
		TEST	ΓIN	G OI	HY	PC	THE	ESIS	S-II			
PA	RT A-PROBI	EM SOLV	ING	AN	D C	RI	ГІСА	LJ	CHIN	IKII	NG QUES	STIONS
1	A mechanist in parts with axis	naking engir	ne		pply		Lear	ner	to recre of	call t	he	CO 6
	0.700 inch. A sample of 10		\mathbf{a}						sis an test s		ect the tic	
	mean diamete	er of 0.742 in	ch				form	ula	and o	comp	are the	
	with a S.D of	0.040 inch.					calcı	uate	ed tes	t sta	tistic	
	Compute the						value	e wi	th th	e tab	ulated	
	would use to l						value	e to	draw	the	inference.	
	whether the w		ng									
	the specificati											
2	To examine the	· ·		A	pply				to re			CO 6
	that the husb						_		re of		_	
	intelligent than the wives, an investigator took a sample of 9 couples and administered them a test										ect the	
									test s			
										_	are the	
											tistic	
	measures the I.Q. The results are as follows.										ulated inference.	
	Where H: hus						varue	e to	uraw	ше	imerence.	
	W: wife's I.Q.		10									
	truth value of											
	hypothesis at											
	significance of											
	E		$\frac{1}{5 \mid 9}$	7 10	05 1	23	109	86	5 78	3 10)3	
	V					16	95	90	_	_		
3	Two independ				pply				to re			CO 6
	8 and 7 items	-		11	ppiy				re of			
	had the follow						_				_	
	the difference	_					hypothesis and select the suitable test statistic					
	means of sam					formula and compare the						
	significant?	-								_	tistic	
							value	e wi	th th	e tab	ulated	
							value to draw the inference.				inference.	
		Sample I	11	11	13	11	15	9	12	14		
		Sample II	9	11	10	13	9	8	10	_		
4	Pumpkins wer	re grown und	der	A	pply		Lear	ner	to re	call t	he	CO 6
	two experiment	ntal					proc	eduı	re of	F-tes	t for	
	conditions. T						_	-			es and	
	samples of 11 and 9										stic value	
	pumpkins. Th	_							it wi			
	standard devi		r							ue to	draw the	
	weights as 0.8		_				infer	ence	Э.			
	respectively.	_										
	the weight dis											
	value of hypot											
	true variances		IIC									
	THE VALIBILITY	are equal.										

5		following dat	· ·	Apply			to recal			CO 6
		whether ther			_			ni squar	e-test	
	any signit	ficant liking in	n the		fo	r indep	endenc	ey of		
	habit of t	aking soft dr	inks		at	${ m tribut}\epsilon$	e test			
	among th	e categories o	of		sta	atistic	value c	ompare	it	
	employees	S.			wi	th the	tabula	ted valu	ie to	
					dr	aw the	inferei	nce.		
		Soft	drinks	Clerks	Teache	ers of	ficers			
		F	epsi	10	25		65			
		Thu	mbs up	15	30		65			
		F	anta	50	60		30			
6	In an inve	estigation on	the	Apply	Le	earner	to reca	ll the		CO 6
	machine	performance,	the		pr	ocedur	e of Ch	ni squar	e-test	
	following	results are			fo	r indep	endenc	ey of		
	obtained.	Examine wh	ether		at	$ ext{tribut}\epsilon$	es and o	calculate	e test	
	the perfor	rmance of the			sta	atistic	value c	ompare	it	
	machines	is independe	nt or		wi	th the	tabula	ted valu	ie to	
		ing chi squar			dr	aw the	infere	nce.		
	at 5% LC	_								
	1		No of	units ins	pected	No o	f defect	ive	<u> </u>	
		Machine	-	375			17			
		Machine2	2	450			22			
7	The follo	wing is the		Apply	Le	arner	to recal	ll the		CO 6
	distributi	on of the num	nber		pr	ocedur	e of Ch	ni squar	e-test	
	of trucks	arriving at a			for	r good:	ness of	fit and	fit	
	company	ware house fe	or		bi	nomial	as wel	l as Poi	sson	
	every two	hours. Fit P	oisson		di	stribut	ions, ca	alculate	test	
	-	on as well as					value t			
	binomial	distribution t	o the		ch	chi-square test compare it with the tabulated value to draw the inference, test for				
	above tak	ole and Test f	or the		wi					
	assessmer	nt of goodness	s of fit		dr					
		istributions a				the assessment of goodness				
	level and	conclude whi	ch					istribut		
	distributi	on frequencie	s are		an	d selec	ct the b	est fit		
	nearer to	the original	lata.		di	stribut	ion bas	sing on t	the	
					re	sults.				
	1		Γime Inte	ervals	0	2	4 6	;	'	
		Freque	ency of n	o of truck	ks 52	130	45 3	;		
8	Samples	of students w	ere	Apply	Le	arner	to recal	ll the		CO 6
	_	om two univer	I .	•		ocedur	e of tes	sting of		
	and from	their weights	in		-			select t	he	
		mean and S			_	_	test sta			
	_	d and shown			for	rmula	and cor	mpare t	he	
	make a la	rge sample						statistic		
		the significan	ce of					abulate		
		between mea	I .					he infere		
			Mean	Standa	rd Devi	Deviation Sample Size				
		University A		10			10			
			1	1			1		4	

9	The measurements of to output of two units hat given the following rest Assuming that both sat have been obtained fro normal populations at significant level, examit whether the two populations are the same variance.	s e	Apply		equa calcom tabu	rner teedurality of ulate pare ulateorence	CO 6			
	Unit		14.1	10.1	14	.7 1	3.7	14.0		
	Unit	- B	14.0	14.5	13	3.7 1	2.7	14.1		
10	The nicotine in milligrate of two samples of tobate were found to be as foldown to be as foldown the hypothesis for the difference between measurements of the control of the control of the control of the control of two controls are two controls of two co		Apply Learner to recall the procedure of testing of hypothesis and select the suitable test statistic formula and compare the calculated test statistic value with the tabulated value to draw the inference.						CO 6	
	San	nple	A 24	27	26	23	25	-		
	Sar	nple-l	B 29	30	30	31	24	36		
	PART-	BL	ONG .	ANS	WE	R QI	U ES '	TIOI	NS	
1	Producer of 'gutkha' contents of 2.0,1.7,2.1, 1.9,2.2, 2.1, 2.0,1.6 mg		Apply		procesuita form calcuvalu	rner tedure othes able to ula a ulate e wit e to	CO 6			
2	A sample of 26 bulbs g mean life of 990 hours S.D of 20hrs. The manufacturer claims the the mean life of bulbs hrs. Examine whether sample is up to the standard or not?		Apply			rner teedure othes able to ulate e wit	CO 6			
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. Examine the truth value of the claim at 5% level of significance?			Apply			rner tedure othes able to ulate e wit e to	CO 6		

4	The means samples of		A	pply		pro	cedı	ire c		ing of	CO 6		
	196.42 and of squares of								and s t stat	elect the			
	their respec			.I								pare the	
	26.94, 18.73											tatistic	
	be consider		_									abulated	
	the same p											e inference.	
5	In one sam				A	pply		Lea	rnei	r to	recall	the	CO 6
	observation	s the	sum of					pro	cedı	ire c	of F-te	est for	
	squares of	leviat	ions of the					equ	ality	y of	varia	nces and	
	sample valu	ies fro	om the					calc	ulat	te te	st sta	tistic value	
	sample mea										with		
	another sar	_									alue 1	to draw the	
	observation							infe	reno	ce.			
	Examine w												
	any signific												
	between tw variances a												
	significance												
6	Two rando		nples gave		Apply Learner to recall the						the	CO 6	
	the following								cedı				
	Examine w	_						_				elect the	
	samples car	ne fro	om the same	е					able				
	population						nula						
						calculated test statistic							
							ie w						
			1 -			valı							
	Sample	size	Sample r	nean		um o	f sq	quares of deviations from mean 90					
	I	10	15 14										
	Two indepe			f	Λ.	nnler		Los	2020	108	maga 11	the	CO 6
7	items are g	1	\mathbf{A}_{\cdot}	pply					recall of test	ing of	000		
	had the fol					_				elect the			
	Examine w								t stat				
	any signific					forn	nula	and	d com	pare the			
	between th						ulat						
							ie w						
												e inference.	
			•	11	11	13	11	15	_		_	1	
			1	9	11	10	13		8				
8	Time taker	-		,	$\mathbf{A}_{\mathbf{b}}$	pply					recall		CO 6
		performing a job by method 1 and method 2 is given						pro					
	below. Doe					equ							
	T POTOW: DOE										tistic value		
	that varian	that variances of time						compare it with the tabulated value to draw th					
								tan	шат	ed v	ameı	O Oraw The	
	distribution	from	ı					infe			arue 1	to draw the	
	distribution population	n from which	n n these								arue 1	to draw the	
	distribution	n from which draw	n n these vn do not								arue 1	to draw the	
	distribution population samples are	which draw	n n these vn do not	20	16	6 27	, 2	infe			arue	to draw the	

			1						т			11 . 1		CO 6	
9	The no. of automobile						Apply			Learner to recall the					
	accidents per week in a								-	procedure of Chi square-test					
	certain area as follows:									for equal frequencies and					
	12,8,20,2,14	re					ulate	test s	statisti	ic value					
	these freque	encies	s in						com	pare	it wit	h the			
	agreement	with 1	the b	elief					tabı	ılated	l valu	e to di	raw the		
	that accides	nts w	ere s	ame i	in				infe	rence					
	the during	last 1	.0 we	eks.											
10	A die is thr					A	pply	V	Lear	ner t	o reca	all the		CO 6	
	with the fol						11.	,					are-test		
	Prove that		_						_			ss and			
	unbiased.	0110 0											ic value		
	difficused.										it wit		ic varac		
										_			raw the		
							tabulated value to draw the inference.								
		N	o ani	oeare	d-on	die	1	2	3	4	5	6			
		1		eque			40	32		58	54	52			
11	200 digits v	zere c				A	pply							CO 6	
	random from						r 1'1.	,		Learner to recall the procedure of Chi square-test					
	the frequency of the digits is								_	for equal frequencies and					
	Where d: digits and f:									calculate test statistic value					
	frequencies. Use chi square									compare it with the					
	test to examine the									_			raw the		
	correctness of the					inference.					e to a	law the			
	hypothesis that the digits								ime	interence.					
	are distribu			_											
	number in		_	ıaı											
	number in	d	0	1	2	3	4	5	6	7	8	9			
		f	18	19	23	21	16			20	21	15			
12	Estimate th				25		pply					all the		CO 6	
14	frequencies	on	Л	rppr	y					iare-test	000				
	distribution					-			f fit ar						
		_					_								
	data and E	ess					calculate test statistic value								
	of fit at 0.0	of fit at 0.05 level.								compare it with the					
										tabulated value to draw the inference.					
								_			_				
			X	0	1		2	3	4	5 6					
			f	305			210	80	28	9 2		<u> </u>	Т	~~:	
13	Given belov				r	A	pply	У				all the		CO 6	
	of male birt							-			_	iare-test			
	families hav	_							,	for goodness of fit and					
	Examine w												ic value		
	data is consistent with the										it wit				
	hypothesis that the											e to di	raw the		
	binomial di								infe	rence	•				
	if the chance				th										
	is equal to														
				childı		0	_	1	2	3	4	5]		
Number of famili					milies	40	$0 \mid 3$	300	250	200	30	180			

14	5 dice were thrown the number of time showing 4,5 or 6 ob given below Fit a binomial distr and Examine the g of fit.	s otain is ribution	Apply			Learner to recall the procedure of Chi square-test for goodness of fit and calculate test statistic value compare it with the tabulated value to draw the inference.				
		X	0 1	2	3	4	5			
		frequency	1 1 10	24	35	18	8			
15	A survey of 240 far with 4 children each revealed the following distribution. Example whether the male as female births are expopular by selecting suitable probability distribution for conference of the confere	h ng ine nd qually g	App	ly	Lear process for a calculation tabu	CO 6				
	expected frequencie	Male Births	s 4	3	2	1	0			
		No of familie		55	$\frac{2}{105}$	58	12			
16	The average breaki strength of the stee specified to be 18.5 thousand pounds. It is a superior of the steed mean and S.D obtains were 17.85 and 1.95 respectively. Is the experiment significant of the steed of the superior of the steed of the superior of the superior of the steed of the superior of the steed of the superior of the su	ng el rods is sample of . The ined 55 result of ent?	App	Lear proceed hypocontrol suits form calculated value.	CO 6					
	treated with medicive weigh 42, 39, 48, 60 kgs. Second group patients from the schospital treated with medicine B weigh 3 64, 68, 69 and 62 k you agree with the that medicine B in the weigh significant	of 7 ame th 88, 42, 56, gs. Do claim creases		hypo suita form calci valu	cedurothes able to nula a ulated e wit e to o					
18	In one sample of 10 observations, the su deviations of the sa values from sample was 120 and in the sample of 12 observations was 314. Examine the difference is signat 5% level.	im of the ample mean other vations it whether	App	Lear proceed calculations tabut infer	CO 6					

19	The following the classific workers account nature Examine work is in the gender		pply	for i attri	ener to recedure of ndepend ibutes are istic value the tab	CO 6				
	-			Stab	le Uns	stable	Total		l	
		-	Male	40		20	60			
		-	Female	10		30	40			
		-	Total	50		50	100			
20	The follow	ing rando			pply			ecall the		CO 6
	The following random samples are measurements of the heat-producing capacity (in millions of calories per ton) of specimens of coal from two mines: Use the 0.05 level of significance to Examine whether it is reasonable to assume that the variances of the two populations are				rr-J	proceed calcomments comments the comments comments comments above.	redure of vality of valuate tes pare it valuated valuated.			
	equal.	1								
		Mine 1	8,260	8,130	8,350	8,070	8,340			
		Mine 2	7,950	1,890	7,900	8,140	7,920	7,840		
		PAR	Γ-C SH	ORT .	ANSW	ER Q	UESTI	ONS	-	
1	If $\bar{x} = 47.5$,	μ = 42.1,		A	pply					CO 6
	s=8.4, n=24	4 then Fir	nd t.							
2	List the dif		oetween	A	pply				CO_6	
	t-test and									
3	If $\bar{x} = 40$, μ	,	_	A	pply					CO 6
	s=8.4,n=24									
4	State the distatistic for mean?			A	.pply			CO 6		
5	State the degree of fr		of	A	pply	_		CO 6		
6	State the F degree of fr	Formula of			.pply	_		CO 6		
7	Find $F_{0.05}$ degrees of f	with (7, 8			pply			CO 6		
8	Find $t_{0.05}$ v	A	pply			CO 6				
9	of freedom. 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.			A	pply					CO 6

10	Find $F_{0.95}$ with (19, 24) degrees of freedom.	Apply	_	CO 6
11	State the definition of the statistic for t test for difference of means?	Apply	_	CO 6
12	Find $t_{0.99}$ when 7 degrees of freedom.	Apply	_	CO 6
13	State the formula of the degree of freedom for t test for difference of means?	Apply	_	CO 6
14	Find $t_{0.95}$ when 9 degrees of freedom.	Apply	_	CO 6
15	State the definition of the statistic for F test?	Apply	_	CO 6
16	Find $F_{0.99}$ with (28, 12) degrees of freedom.	Apply	_	CO 6
17	State the formulae for sample variance and sample standard deviation.	Apply	_	CO 6
18	State the formula of the degree of freedom for chi square test for contingency table of order 4x3?	Apply	_	CO 6
19	State the Formula of statistic for chi square test?	Apply	_	CO 6
20	Find $\chi^2_{0.05}$ at 9 degrees of freedom.	Apply	_	CO 6

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