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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



I SEMESTER M.TECH (EM/CME/PME ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: STATISTICS, PROBABILITY & RELIABILITY [MAT 505]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

* Answer **ANY FIVE fULL** the questions.

✤ All questions carry equal marks (4+3+3)

1A.	The first four moments of a distribution about 4 are -1.5 , 17 , -30 and 108. Find the moments about the mean, β_1 and β_2 .											d 108.	Find the
1B.	A continuous random variable X has pdf $f(x) = 3x^2$, $0 \le x \le 1$. Find two numbers 'a ' and 'b' such that'(i) $P(X \le a) = P(X \ge a)$ (ii) $P(X \ge b) = 0.05$.											ı ' and 'b'	
1C.	Find the m.g.f of X with pdf $f(x) = e^{- x }$, $-\infty < x < \infty$. Also find Var(x).												
2A.	The lengths and weights of a sample of 6 articles manufactured by a factory are given below. Find the correlation coefficient and the two regression lines.Length(x)35671011Weight (y)81211141617									re given			
2B.	Let $X_1, X_2 \dots X_n$ denote a random sample of size n from a distribution with N(θ_1, θ_2) - $\infty < \theta_1 < \infty, 0 < \theta_2 < \infty$. Find the MLE for θ_1 and θ_2 .										2)-∞ <		
2C.	A set of examination marks is normally distributed with a mean 75 and standard deviation 5. If the top 5% of students get grade A and the bottom 25% get grade B, what mark is the lowest A and what mark is the highest B?									eviation rk is the			
	The fol	lowing	are the s	scores of	two bat	smen	A and	d B in a	series				
	А	12	115	6	73	7	19	119	36		84	29	
3A.	В	47	12	16	42	4	51	37	48		13	0	
	a) Who is a better scorer on an average b) who is more consistent												
3B.	If the r the root	andom ts of the	variable e equatio	$x' k' is unon 4x^2 +$	niformly 4xk + k	distri $+2 =$	ibuted 0 are	over ((real?.), 5), v	vhat	t is the	probab	ility that
3C.	A random sample of size 15 from a normal distribution N(μ , σ^2) yields $\bar{x} = 3.2$ and $s^2 = 4.24$. Find a 95% confidence interval for μ .									and $s^2 =$			
4A.	4.24. Find a 95% confidence interval for μ .A survey of 320 families with 5 children each revealed the following distribution.Is the result consistent with the hypothesis that the male and female births are equally probable at 5% significance level.No.ofboys543210No. of girls012345												

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INSPIRED BY LIFE

The daily expenditure of 230 families is given below .

1													
	Expenditure	0-100	100 -	200	- 30	0 - 4	- 00	500 -	600 -				
	Rs		200	300) 40	00 5	500	600	700				
4B.	No. of	4,	16	60) –		,		4				
	families												
	The median an frequencies.	nd mode	e are Rs.	335 and	Rs.340	respectiv	ely. Calo	culate th	e missing				
	In a certain factory producing blades there is a small chance $\frac{1}{500}$ for any blade to be												
4C.	defective. The lapackets contain packets.	olades are ing a) n	e supplied o defectiv	in packe ve blades	ets of 10. s b) 2 de	Calculate efective in	the appr a const	oximate Ignment	number of of 10,000				
	Calculate the quartile coefficient of skewness from the following data												
5 1	Weight	70 -	80 - 9	0-	100-	110-	120-	130-	140-				
ЭA.		80	90 1	00	110	120	130	140	150				
	No. of	12	18 3	5	42	50	45	20	8				
	persons												
5B.	Suppose that the that the reliabit operation may be	e life leng lity of the consider	gth of an e ne device ered to ach	lectronic (for an 1 lieve a re	device is 100 hour eliability	s exponent period) is of 0.95?	ially dist s 0.90. H	ributed. I ow many	t is known y hours of				
	The diameter of	f an elec	tric cable,	say X is	s assume	d to be a	continuo	us randor	n variable				
50	with pdf $f(x) = \int kx(1-x) \ 0 \le x \le 1$												
50.	0, elsewhere												
	, a) Find ' k' b)	Find a nu	imber c ' s	uch that]	P(X < c)	= 2 P (X)	> c) c) Fi	nd the cd	f				
6A.	Find the mean a	nd varia	nce of Gan	ıma distr	ribution.								
6B.	Suppose a die variance of num	is tossed ber of su	3times. S access	uccess is	s getting	1 or 6 or	n a toss.	Find the	mean and				
	Let X have a p simple hypothe	df of the sis H_0 :	form $f(x; \theta = 1 \text{ again})$	θ) = θx^{θ} ist the all	^{e-1} , 0 <x< lternative</x< 	< 1, where hypothes	$\theta \in \theta \in \{\theta: \theta \}$ sis H ₀ : θ	$= 1,2 \}.$ = 2, use	Γo test the a random				
6C.	sample X_1, X_2	of size n	= 2 and d	lefine the	e critical	region to	be C =	$(x_1, x_2);$	$\frac{3}{4} \le x_1 x_2 \bigg\}$				
	Find the power function of the test												