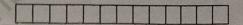
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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech. (CSBS)

(SEM: 3rd SESSIONAL EXAMINATION -I)(2021-2022)

Subject Name: Computational Statistics (CSBS)

Time: 1.15Hours

[SET-B]

Max. Marks:30

General Instructions:

- > All questions are compulsory. Answers should be brief and to the point.
- > This Question paper consists of ...2......pages & ...5.......questions.
- > It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- ➤ <u>Section A</u> Question No 1 is objective type questions carrying 1 mark each, Question No 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- ➤ <u>Section B</u> Question No-3 is Short answer type questions carrying 5 marks each. You need to attempt any two out of three questions given.
- ➤ <u>Section C</u> Question No. 4 & 5 are Long answer type (within unit choice) questions carrying 6 marks each. You need to attempt any one part <u>a or b</u>.
- > Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- > No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

>		SECTION - 3	[8]	
		Note: For Normal distribution $P(0 < z < 0.5)$ 0.1915, $P(0 < z < 0.8) = 0.2881$, $P(0 < z < 1) = 0.3413$, $P(0 < z < 1.5) = 0.4332$, $P(0 < z < 2) = 0.4772$		
1.	Atte	empt all parts	(4×1=4)	CO
	a.	What is efficiency of estimator?	(i)	CO1
	b.	Define Normal distribution.	(1)	C01
	c.	If X follows $N_P(\mu, \Sigma)$, then Squared Mahalanobis distance follows to which distribution?	(1)	CO1
	d.	What is the characteristic function for Multivariate normal distribution?	(1)	CO1
2.	Atte	empt all parts	(2×2=4)	CO
	a.	Let X follows N ₃ (0, Σ) with	(2)	CO1
		$\Sigma = \begin{bmatrix} 1 & c & 0 \\ c & 1 & c \\ 0 & c & 1 \end{bmatrix}$		
		find the value of c, such that $(X_1 + X_2 + X_3)$ and $(X_1 - X_2 - X_3)$ are		1
		independent.	0	
14 3	b.	What is quadratic form in Multivariate normal discribution?	(2)	CO1
			C	
		0.)•	

P		SECTION P		
		SECTION - B		
3.	An	swer any two of the following-	[2×5=10]	CO
	a.	If X is a normal variate with mean 30 and Standard deviation 5. Find the		CO
		probabilities that i) $26 \le X \le 40$ ii) $ x - 30 > 5$	(5)	CO1
	b.	Question- If X distributed as $N_3(\mu, \Sigma)$, where	(5)	CO1
			(5)	COI
		[3] [6 1 -2]		
1		$\mu^{=}\begin{bmatrix} 3\\1\\4 \end{bmatrix} \text{ and } \Sigma = \begin{bmatrix} 6 & 1 & -2\\1 & 13 & 4\\-2 & 4 & 4 \end{bmatrix}$		
		i) Find the distribution of $Z = 2Y_1 - Y_2 + 3Y_3$.		
		ii) Find the distribution of $Z_1 = Y_1 + Y_2 + Y_3$		
		$Z_2 = Y_1 - Y_2 + 2Y_3$		
		Define Multipolish and district of the distric		
	c.	Define Multivariate normal distribution and also the different properties of Multivariate normal distribution?	(5)	CO1
-		Withtivariate normal distribution?		
				14.4
1		CECTION C		
-		SECTION – C	707	2.6
4	And	www.one.of.the following (Ann. on the 12 to 15 to 15	U	
7		wer any one of the following-(Any one can be applicative if applicable)	[2×6=12]	CO
	a.	If X distributed as $N_3(\mu, \Sigma)$, where	(6)	CO1
10	1-1	[1] [4 0 -11]		
		$\mu = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix} \text{ and } \Sigma = \begin{bmatrix} 4 & 0 & -11 \\ 0 & 5 & 0 \\ -11 & 0 & 2 \end{bmatrix}$		
P	18			
	1	Check whether i) (X ₁ , X ₃) and X ₂ are independent or not.		
		ii) $-X_1$ and $(-X_1 + X_2 - X_3)$ are independent or not.		
		iii) (X_1) and $(X_1 + 3X_2 + 2X_3)$ are independent or not.		
_	b.	What is Multivariate analysis? what are the objectives of multivariate analysis?	(6)	C01
5.		ver any one of the following-		
	a.	If X distributed as $N_3(\mu, \Sigma)$, where	(6)	CO1
		$\mu = \begin{bmatrix} 5 \\ 3 \\ 7 \end{bmatrix} \text{ and } \Sigma = \begin{bmatrix} 4 & -1 & 0 \\ -1 & 4 & 2 \\ 0 & 2 & 9 \end{bmatrix}$		1
		$\begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 $		
		i) Find the probability P(X ₁ >6)		
		ii) Find the $P(4X_1 - 3X_2 + 5X_3) < 80$		
		iii) Find the $P(5X_2 + 4X_3 > 70)$		
		That is the second of the seco		
	b.	What is likelihood function for Multivariate normal distribution and find out	(6)	CO1
		estimate for mean vector and covariance matrix.		