Vivekanand Education Society's Institute of Technology, Chembur, Mumbai

Department of Artificial Intelligence and Data Science

Year: 2021-22 (EVEN SEM)

Internal Assessment Test 2

Class : SE/ AI and DS	Division:
Semester : IV	Subject: Engineering Mathematics-IV
Date: 11/4/2022	Time: 1 hr

Course Outcome	CO3	CO4	
Percentage %	44%	56%	

Q.1)		(Attempt any five of the following)	Marks (20)	Course Outcomes
	a)	The number of monthly breakdowns of a computer is a random variable having a Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month with at least one breakdown.	2M	CO4
	b)	A machinist is making engine parts with axle diameters of 0.7 inch. A random sample of 10 parts shows a mean diameter 0.742 inch with a standard deviation of 0.04 inch. Test whether the work is meeting the specification. Apply 5% level of significance.	2M	CO4
	c)	In a sample of 1000 students, the mean marks of a certain test is 14 and standard deviation is 2.5. Assuming the distribution of marks in the test to be normal, find the number of students who have scored between 12 and 15?	2M	CO4
	d)	A r.v. X is normally distributed and the mean of X is 12 and standard deviation is 4. Find x_0 when $P(X > x_0) = 0.24$.	2M	CO4
	e)	Find the Z-transform of the sequence $\left(\frac{1}{2}\right)^k$, $k \geq 0$	2M	CO3

	f)	Find the inverse Z-transform of $\frac{z}{(z+2)}$, in the ROC $\lvert z\rvert > 2$	2M	CO3
Q.2)	a)	Samples of two types of electric light bulbs were tested for length of life and following data were obtained. Type I: $n_1 = 8$, $\bar{x}_1 = 1234$ hrs, $s_2 = 36$ hrs and Type II: $n_2 = 7$, $\bar{x}_2 = 1036$ hrs, $s_2 = 40$ hrs Is the difference in the means sufficient to conclude that type I is superior to type II. Apply 1% level of significance.	5M	CO4
		OR		
	b)	Investigate the association between the darkness of eye colour in father and son from the following data. Apply 5% level of significance.	5M	CO4

		Colour of father's eyes		
Colour of son's eyes		**Dark**	**Not Dark**	**Total**
	Dark	48	90	138
	Not Dark	80	782	862
	Total	128	872	1000

Q.3)	a)	Let $f(k) = \frac{(K+1)\,a^k}{K!}$ find $Z(f(k))$	5M	CO3
		OR		
	b)	Find the inverse Z-transform of $F(z) = \frac{1}{(z-3)(z-2)}$ if ROC (i) $\lvert z\rvert < 2$ (ii) $2 < \lvert z\rvert < 3$	5M	CO3

~ All the best!!! ~