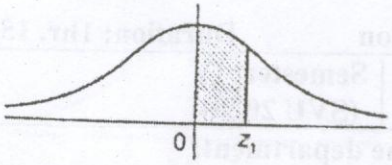
SOMAIYA VIDYAVIHAR UNIVERSITY

26/02/24

Semester: Jan 2024-April 2024		
Maximum Marks: 30 **Examination: In-Semester Examination**		**Duration: 1hr. 15 min.**
Programme code: 04 **Programme:** B. Tech Information Technology	**Class:** SY	**Semester:** IV **(SVU 2020)**
Name of the Constituent College: K. J. Somaiya College of Engineering	**Name of the department:** IT	
Course Code: 116U04C401	**Name of the Course:** Probability, Statistics and Optimization Techniques	

Question No.		Max. Marks
Q.1	Attempt any **THREE** of the following	
a)	The joint probability distribution of X and Y is given by $P(X = x, Y = y) = \frac{2x+3y}{72}$; $x = 0,1,2,\ y = 1,2,3$ (i) Find the joint p.m.f s of X and Y (ii) Find the Marginal Probability distributions of X and Y. (iii) Find $P(X + Y \leq 2)$	06
b)	A manufacturer has three machine operators A, B and C. The first operator A produces 1% defective items, whereas the other two operator's B and C produce 5% and 7% defective items respectively. A is on the job for 50% of the time, B is on the job for 30% of the time and C is on the job for 20% of the time. A defective item is produced, (i) What is the probability that it was produced by A? (ii) What is the probability that it was produced by B?	06
c)	If the heights of 500 students is normally distributed with mean 68 inches and standard deviation 4 inches, estimate the number of students having heights (i) greater than 72 inches (ii) between 65 and 71 inches	06
d)	A transmission channel has a per digit error probability $p = 0.01$. calculate the probability of 1 error in 10 received digits using (i) Binomial distribution (ii) Poisson Distribution	06
e)	A continuous random variable X has the probability density function given by $f(x) = \begin{cases} 2ax + b & 0 \leq x \leq 2 \\ 0 & otherwise \end{cases}$ If the mean of the distribution is 3, find the constants a and b.	06
Q.2	Attempt any **TWO** of the following	
(a)	Calculate the value of rank correlation coefficient from the following data regarding marks of 6 students in statistics and accountancy in a test: Marks in Statistics: 40, 42, 45, 35, 36, 39 Marks in Accountancy: 46, 43, 44, 39, 40, 43	06
(b)	Find equation of both the regression lines from the following data where x, y denote the actual values. Also Estimate x when $y = 15$ and estimate y when $x = 8$. $N = 12, \sum x = 120, \sum y = 432, \sum xy = 4992,\ \sum x^2 = 1392,\ \sum y^2 = 18252$	06
(c)	Calculate the Karl Pearson coefficient of correlation between price and demand Price: 2, 3, 4, 7, 4 Demand: 8, 7, 3, 1, 1	06

Area Under Standard Normal Curve



The table gives the area under the standard normal curve from $z = 0$ to $z = z_1$ which is the probability that z will lie between $z = 0$ and $z = z_1$.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.09 10	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2703	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4415	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4841	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4560	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990