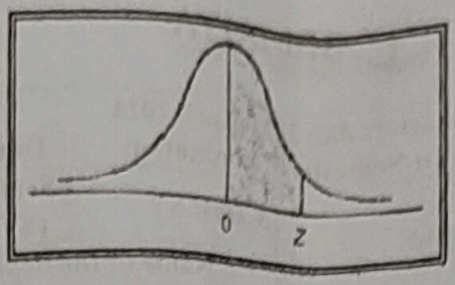
SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: Jan 2024-April 2024		
Maximum Marks: 30 **Examination: In-Semester Examination**		**Duration: 1hr. 15 min.**
Programme code: 01 **Programme:** B. Tech Computer Engineering	**Class:** SY	**Semester:** IV **(SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department:** COMP	
Course Code: 116U01C401	**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

Table The Standardized Normal Distribution



Entry represents area under the standardized normal distribution from the mean to Z

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	0910	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	2518	2549
0.7	2580	2612	2642	2673	2704	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	4515	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	4881	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	4960	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	49865	49869	49874	49878	49882	49886	49889	49893	49897	49900
3.1	49903	49906	49910	49913	49916	49918	49921	49924	49926	49929
3.2	49931	49934	49936	49938	49940	49942	49944	49946	49948	49950
3.3	49952	49953	49955	49957	49958	49960	49961	49962	49964	49965
3.4	49966	49968	49969	49970	49971	49972	49973	49974	49975	49976
3.5	49977	49978	49978	49979	49980	49981	49981	49982	49983	49983
3.6	49984	49985	49985	49986	49986	49987	49987	49988	49988	49989
3.7	49989	49990	49990	49990	49991	49991	49992	49992	49992	49992
3.8	49993	49993	49993	49994	49994	49994	49994	49995	49995	49995
3.9	49995	49995	49996	49996	49996	49996	49996	49996	49997	49997