JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS, OCTOBER-2019
B. TECH. THIRD SEMESTER (CSE AND IT BRANCH)

COURSE CODE: **18B11MA313** MAX. MARKS: **25**
COURSE NAME: **PROBABILITY AND STATISTICS**
COURSE CREDITS: **3**
MAX. TIME: $1\frac{1}{2}$ **Hrs**

***NOTE:** All questions are compulsory. Sketch diagram and define random variables along with range where applicable. Scientific calculators are allowed. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q.1 Three horses A, B and C are running a race. A and B have the same probability of winning and each is twice as likely to win as C. If there is no tie in winning position, find the probability that B or C wins? **(2 Marks) [CO-1]**

Q.2 A class has 10 boys and 5 girls. Three students are selected at random one after another. Find the probability that;

a) The first two are boys and the third is a girl.

b) The first and third are of the same gender and the second is of an opposite gender.

(3 Marks) [CO-1]

Q.3 If X is the number scored in a throw of a fair die, find the upper bound for Chebychev's inequality $P[|X-\mu|>2.5]$ where μ is the mean of X. Also find the actual probability. **(3 Marks) [CO-2]**

Q.4 Let $F_X(x)$ be the distribution function of a random variable X given by:

$$F_X(x)=\begin{cases}\frac{x^3}{27}; 0\le x\le 3\\ 1 \quad ; x>3\\ 0 \quad elsewhere\end{cases}.$$

Find the **(i)** Probability Density function and **(ii)** $P(X>1)$. **(2 Marks) [CO-2]**

Q.5 Consider the density of random variables X and Y:

$$f_X(x)=\begin{cases}1; 0\le x\le 1\\ 0; elsewhere\end{cases} \text{ and } f_Y(y)=\begin{cases}1; 0\le y\le 1\\ 0; elsewhere\end{cases}$$

Find the density of $X+Y$, if X and Y are independent. **(3 Marks) [CO-2]**

Q.6 A box contains 10 chips from supplier A, 16 chips from supplier B, and 14 chips from supplier C. Assume that we perform the following experiment 20 times: draw one chip from the box, note the supplier from where it came, and put it back.

a) Define all the random variables of interest along with range.

b) What is the probability that a chip from vendor B is drawn 9 times?

(3 Marks) [CO-3]

P.T.O.

Q.7 The compressive strength of samples of cement can be modelled by a normal distribution with a mean of 5000 kilograms per square centimetre and a standard deviation of 100 kilograms per square centimetre. What are the probability that a sample's strength is between 5100 and 5200 Kg/cm^2?

(3 Marks) [CO-3]

Q.8 A panel of two judges, *A* and *B*, graded seven T. V. Serial performance by awarding marks independently as shown in the following:

Performance:	1	2	3	4	5	6	7
Marks by *A*:	46	42	44	40	43	41	45
Marks by *B*:	40	38	36	35	39	37	41

Calculate:

(i) The Karl Pearson's correlation coefficient between the marks of two judges, *A* and *B*.

(ii) The eight T. V. Performance which judge *B* could not attend, was awarded 37 marks by judge *A*. If the judge *B* had also been present, how many marks would be expected to have been awarded by him to the eight T. V. performance? Use regression analysis to answer this question.

(4+2=6 Marks) [CO-4]

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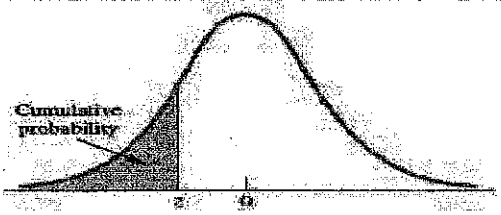
(Standard) Normal probability table to compute $\mathbb{P}(Z \leq z)$:



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.0	.5000	.4960	.4920	.4880	.4840	.4601	.4761	.4721	.4681	.4641