Code No: 56066 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, December - 2017
PROBABILITY AND STATISTICS
(Common to MMT, AE)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) A, B, C are aiming to shoot a balloon. A will succeed 4 times out of 5 attempts. The chance of B to shoot the balloon is 3 out of 4 and that of C is 2 out of 3. If the three aim the balloon simultaneously, then find the probability that at least two of them hit the balloon.

b) A random variable X has the following probability function

x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

i) Determine k
ii) Evaluate $P(X<6), P(X\geq 6), P(0<X<5)$ and $P(0\leq X\leq 4)$
iii) If $P(X\leq a)>\frac{1}{2}$ find the minimum value of 'a'
iv) Mean. [7+8]

2.a) If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs, how many students have masses
i) Greater than 72 kg
ii) Less than or equal to 64 kg
iii) Between 65 kg and 71 kg inclusive.

b) A population consists of 2, 3, 6, 8 and 11. Consider all possible samples of size two which can be drawn with replacement from the population. Find
i) The mean of the population.
ii) The standard deviation of the population.
iii) The mean of the sampling distribution of the means.
iv) The standard deviation of sampling distribution of means. [7+8]

3.a) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken and taken
15, 17, 10, 18, 16, 9, 7, 11, 13, 14.

b) An oceanographer wants to check whether the depth of the ocean in a certain region is 57.4 fathoms, as had previously been recorded. What can he conclude at 0.05 level of significance, if reading taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms? [7+8]

4. In an investigation on the machine performance the following results are obtained.

	No.of units inspected	No.of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at 0.05 level of significance. [15]

5.a) A random sample of 6 steel beams has a mean compressive strength of 58,392 psi (pounds per square inch) with a standard deviation of 648 psi. Use this information with 0.05 level of significance to test whether the true average compressive strength of the steel form which the sample came is 58,000 psi. Assume normality.

b) The following table gives the classification of 100 workers according to sex and nature of work. Test whether the nature of the work is independent of the sex of the worker. [8+7]

	Stable	Unstable	Total
Males	40	20	60
Females	10	30	40
Total	50	50	100

6. Find the coefficient of correlation and Price indices of cotton and wool are given below for the 12 months of a year. Obtain the equations of lines of regression between the indices. [15]

Price index of cotton X	78	77	85	88	87	82	81	77	76	83	97	93
Price index of wool Y	84	82	82	85	89	90	88	92	83	89	98	99

7.a) Derive the average number of customers in the system for $(M/M/1):(\infty/FIFPO)$

b) In a telephone exchange the arrival of calls follow Poisson distribution with an average of 8 minutes between two consecutive calls. The length of a call in 4 minutes. Determine

i) The probability that the arriving at the booth will have to wait

ii) The average queue length that forms from time to time. [7+8]

8.a) The transition probability matrix of a Markov chain is given by $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$. Is this Matrix irreducible?

b) A train process is considered as two state Markov Chain .If it rains, it is considered to be in stet 0 and it does not rain, the chain is in the state of 1. The transition probability of the Markov chain is defined by $P = \begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$. Find the probability that it will rain for 3 days from today assuming that it is raining today. Assume that the mutual probabilities of state 0 or state 1 as 0.4 and 0.6. [7+8]

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