Code No: R22011   **R10**   SET - 1

II B. Tech II Semester Supplementary Examinations, November - 2018
PROBABILITY AND STATISTICS
(Com. to CE, CHEM, PE)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1 a) Box A contains 5 red and 3 white marbles and Box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of same colour. [8M]

   b) A businessman goes to hotels X, Y, Z, 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing's. What is the probability that businessman's room having faulty plumbing is assigned to hotel Z? [7M]

2 a) For a discrete probability distribution [8M]

X	0	1	2	3	4	5	6
$P(X)$	0	$2K$	$2K$	$3K$	K^2	$2K^2$	$7K^2 + K$

Find (i) k (ii) mean (iii) variance

   b) If the probability density function of a random variable X is given by [7M]

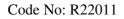$$f(x) = \begin{cases} 2kx\, e^{-x^2} & for\ x > 0 \\ 0, & for\ x \le 0 \end{cases}$$

Determine (i) k (ii) the distribution function of X.

3 a) If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen at random (i) none will be defective (ii) one will be defective (iii) at most two rivets will be defective [8M]

   b) A random variable has Poisson distribution such that $P(1) = P(2)$, find (i) mean of the distribution (ii) P(4) (iii) $P(x \ge 1)$ (iv) $P(1 < x < 4)$ [7M]

4 a) A random sample of size 64 is taken from a normal population with $\mu = 51.4$ and $\sigma = 68$. What is the probability that the mean of the sample will (i) exceed 52.9 (ii) fall between 50.5 and 52.3 (iii) be less than 50.6. [8M]

   b) Find 95% confidence limits for the mean of normal distributed with variance is 0.25, using a sample of n=100 values with mean 212.3 [7M]

5 a) Mean life time of a sample of 100 tube lights produced by a company is found to be 1560hrs with a population Standard deviation of 90 hrs. Test the hypothesis for $\alpha = 0.05$ that mean life time of the tubes produced by the company is 1580hrs [8M]

   b) Ransom samples of 400 men and 200 women in a locality were asked whether they would like to have a bus stop near their residence. 200 men and 40 women in favour of the proposal. Test the significance between the differences of two proportions at 5% level. [7M]

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6 a) A random sample of 6 steel beams has a mean compressive strength of 58392 psi [8M]
with standard deviation of 648psi. Use this information and level of significance
$\alpha = 0.05$ to test whether the true average compressive strength of the steel from
which this sample came is 58000psi. Assume normality.

   b) Fit a Poisson distribution to the following data and for its goodness of fit at 0.05 [7M]
level of significance

x	0	1	2	3	4
f	419	352	154	56	19

7 a) The following data gives readings 10 samples of size 6 each in the production of a [8M]
certain component.

Sample	1	2	3	4	5	6	7	8	9	10
Mean $\bar{X}$	383	508	505	582	557	337	514	614	707	753
Range R	95	128	100	91	68	65	148	28	37	80

Draw Control Charts for $\bar{X}$ (for $n = 6$, $A_2 = 0.483$). What is your conclusion.

   b) [7M]
   Calculate the coefficient of correlation between age of cars and annual maintenance
   cost and comment

Age of Cars(years)	2	4	6	7	8	10	12
Annual maintenance cost (Rupees)	1600	1500	1800	1900	1700	2100	2000

8 a) A Bank plans to open a single server drive –in banking facility at a certain centre. [8M]
It is estimated that 20 customers will arrive each hour on average. If on average, it
requires 2 minutes to process a customer's transaction, determine
      (i)   The proportion of time that the system will be idle
      (ii)   On the average how long a customer will have to wait before reaching
             the server
      (iii) The fraction of customers who will have to wait

   b) A one person barber shop has six chairs to accommodate people waiting for hair [7M]
cut. Assume that customers who arrive when all the six chairs are full leave
without entering the shop. Customers arrive at the average rate of 3 per hour and
spend an average of 15 minutes for service. Find (i) The probability that a customer
can get directly into the barber chair upon arrival (ii) Expected number of customers
waiting for a haircut