JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, May/June-2015
PROBABILITY AND STATISTICS
(Common to ME, CSE, IT, MCT, AME, MIE, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) If X is a Poisson variate such that $p(x=1)=24p(x=3)$, find the mean.   [2M]

  b) If X is a continuous random variable whose probability density function is given

by $f(x) = \begin{cases} \dfrac{1}{3}, -1 < x < 2 \\ 0, else \text{ where} \end{cases}$

Find the moment generating function.   [3M]

  c) The joint probability density function of two random variables x, y is given by

$f(x, y) = \begin{cases} \dfrac{x}{5}+Ky, 0<x<1, 1<y<5 \\ 0, elsewhere \end{cases}$

Find the value of K.   [2M]

  d) The equations of two regression lines obtained in a correlation analysis are
$3x + 12 y = 19$, $3y + 9x = 46$. Find the means of x and y.   [3M]

  e) A random sample of 500 Apples was taken from a large consignment and 60 were
found to be bad, find the standard error.   [2M]

  f) What is the maximum error one can expect to make with probability 0.9 when
using mean of a random sample of size $n=64$ to estimate the mean of a
population with $\sigma^2 = 2.56$?   [3M]

  g) Define Balking.   [2M]

  h) Given that $P_n(\Delta t) = \dfrac{(\lambda \Delta t)^n e^{-\lambda \Delta t}}{n!}$, find $P_0(\Delta t)$.   [3M]

  i) Define a regular Marcov Chain.   [2M]

  j) Find whether the matrix $\begin{bmatrix} 0.75 & 0.25 & 0 \\ 0 & 0.5 & 0.5 \\ 0.6 & 0.4 & 0 \end{bmatrix}$ is a regular transition matrix or not.

[3M]

PART-B   (50 Marks)

2.a) Two dice are thrown 4 times. If getting a sum of 7is a success. Find the
probability that getting the success i) Twice   ii) only once.

  b) Students of a class were given an examination. Their marks were found to be
normally distributed with mean 55 marks and standard deviation 5. Find the
number of students who got the marks more than 60 if 500 students wrote the
examination.   [5+5]

OR

3.a) Poisson variable has a double mode at $x = 2$ and $x = 3$, find the maximum probability and also find $P(x \geq 2)$.

b) If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs how many students have masses greater than 72 kgs.

[5+5]

4. Calculate the coefficient of correlation between the two variables x and y. Also find the regression coefficients. [10]

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

OR

5. The joint probability density function is given by $f(x,y) = \begin{cases} 10xy^2, 0 < x < y < 1 \\ 0, elsewhere \end{cases}$

find:
a) Marginal probability density function for X
b) Marginal probability density function for Y
c) Conditional P.D.F of X given Y
d) Conditional P.D.F of Y given X
e) $P(Y > 0.5/X = 0.25)$.

[2×5=10]

6. Two independent samples of 8 and 7 items respectively have the following values.

Sample I	11	11	13	11	15	9	12	14
Sample II	9	11	10	13	9	8	10	-

Is the difference between the means of sample significant? [10]

OR

7. Given below is the number of male births in 1000 families having five children in each family.

Male Children	0	1	2	3	4	5
No. of Families	40	300	250	200	30	180

Test whether the given data is consistent with the hypothesis that the binomial law holds if the chance of a male birth is equal to that of female birth. [10]

8. Patients arrive at a hospital at random with a mean arrival rate of 3 per hour. The department is served by one doctor, who spends on average 15 minutes with each patient. Actual consulting times being exponentially distributed. Find
a) The portion of time that the doctor is idle.
b) The mean number of patients waiting to see the doctor.
c) The probability of there being more than 3 patients waiting.
d) The mean waiting time for patients. [2+3+3+2]

OR