CBCS Scheme

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16/17SCS/SIT/SCN/SCE/SSE/LNI/SFC14

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Probability Statistics and Queuing Theory

Time: 3 hrs.

Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing one full question from each module.*
2. *Use of Statistical table permitted.*

Module-1

1   a. State and prove Baye's Theorem. (08 Marks)

b. If $p(x) = \dfrac{k}{2^x}$, x = 0, 1, 2 - - - - is probability distribution function find k hence find mean and variance. (08 Marks)

OR

2   a. In a binary communication channel the data are transmitted as 0, 1, 2 probability of transmitted (T) 0, 1, 2 are received (R) is 0, 1, 2 respectively is given in the table

T\R	0	1	2
0	0.98	0.05	0.15
1	0.1	0.8	0.1
2	0.1	0.15	0.75

Find the probability of error message given $P(T_0) = 0.4$, $P(T_1) = 0.25$, $P(T_2) = 0.35$ (08 Marks)

b. Joint distribution of X and Y is given by $f(x, y) = 4xy \, \bar{e}^{(x^2+y^2)}$, x, y, ≥ 0 and X and Y are independent. Find conditional density of X and Y. (08 Marks)

Module-2

3   a. Find mean, and variance for Binomial Distribution. (08 Marks)

b. Fit Normal distribution of the following data :

x	4	6	8	10	12	14	16	18	20	22	24
f	1	7	15	22	35	43	38	20	13	5	1

(08 Marks)

OR

4   a. Find mean and variance for exponential distribution. (08 Marks)

b. A car hire firm has 3 cars. The demand of cars is Poisson's variate with mean 1.5. Find the number of day in leap year i) No demand   ii) demand refused. (08 Marks)

Module-3

5   a. Define Random process and explain its classification. Explain Erlong stationary and Ergodic process. (08 Marks)

b. Consider the process x(t) = A coswt + B sinwt where A, B are un correlated random variable each with mean 0, and variance 1 and w positive constant. Show that process x(t) is covariance stationary. (08 Marks)

6   a. Find mean, auto correlation, atuo convariance, correlation coefficient of Poisson's process. (08 Marks)

OR

b. Consider communication systems that transmit the digit 0 and 1 through several stages. At each stage the probability that same digit will be received by next stage as transmitted is 0.75. What is the probability that 0 is transmitted in initial stage is received as 0 at the fifth stage. Also find steady state value. **(08 Marks)**

Module-4

7 a. Experience has shown that 20% of manufactured product is top quality. In one day production of 400 articles, only 50 are top quality. Show that ether the production of the day chosen was not representative sample or the hypothesis of 20% was wrong. Based on the particular day's production. Find also the 95% confidence limit for 20% top quality $[z_{0.05} = 1.96]$ **(08 Marks)**

b. Two independent samples of sizes 7 and 6 have the following values:

Sample A	28	30	32	33	31	29	24
Sample B	29	30	30	24	27	28	-

Examine whether samples are drawn from a normal population having same variance $[F_{0.05} = 4.39]$ **(08 Marks)**

OR

8 a. The mean value of a random sample of 60 items was found to be 145 with standard deviation 40. Find 95% confidence limit for population mean. What size of the sample is required to estimate the population mean within 5 of its actual value with atleast 95%, using sample mean. **(08 Marks)**

b. A Gaurage has recorded the following faults in cars of four make over period :

	Fault		
Make	Mech	Elect	Chasis
A	32	26	12
B	60	54	22
C	52	38	16
D	28	25	12

Can we say faults are independent? **(08 Marks)**

Module-5

9 a. Define M/M/1 model. Find average (expected) number of customer in the system. **(08 Marks)**

b. Suppose people arrive to purchase tickets for basketball game at the average rate of 4min. It takes on average of 10 sec to purchase a ticket. If a fan arrives 2 min before the start of game and if its takes 1½ min to reach the correct seat after the fan purchase the ticket, then
   i) Can fan expect to seated for the start of game
   ii) How early must fan arrive in order to be 99% sure of being seating for the start of game. **(08 Marks)**

OR

10 a. State little law. derive death process with consist rate. **(08 Marks)**

b. In a railway yard Goods train arrive at a rate of 30 train/ day. Assuming that internal arrival time follows exponential distribution and the service time distribution is also exponential distribution with average of 36 min, calculate :
   i) Mean line length
   ii) Probability that queue size exceeds 10. **(08 Marks)**

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