SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :B.Tech - IT/P-IT
Title of the Paper :Probability and Statistics Max. Marks :80
Sub. Code :412501/512501/612501/612PT401 Time : 3 Hours
Date :21/04/2010 Session :AN

PART - A (10 x 2 = 20)

Answer ALL the Questions

1. If the events A and B are independent, prove that A and B are also independent.

2. State Baye's theorem.

3. If a boy is throwing stones at a target, what is the probability that his 10^{th} throw is his 5^{th} hit, if the probability of hitting the target at any trial is ½.

4. Define uniform distribution.

5. Define linear Regression.

6. What is the principle of least squares?

7. Suppose that customers arrive at a Poisson rate of one per every 12 minutes, and that the service time is exponential at a rate of one service per 8 minutes.
   (a) What is the average number of customers in the systems.
   (b) What is the average time a customer spends in the systems?

8. Write down Pollaczek – Khin chine formula.

9. Define Time series.

10. Define control chart.

PART – B (5 x 12 = 60)

Answer All the Questions

11. Three urns contain 3 white, 1 red and 1 black balls; 2 white, 3 red and 4 black balls; 1 white, 3 red and 2 black balls respectively. One urn is chosen at random and from it 2 balls are drawn at random. If they are found to be 1 red and 1 black ball, what is the probability that the first urn was chosen?

(or)

12. A random variable x has the following probability distribution.

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

Find (i) the value of K (ii) P(1.5<x<4.5/x>2) and (iii) the smallest value of λ for which $P(x \leq \lambda) > 1/2$.

13. Out of 800 families with 4 children each, how many families would be expected to have
(a) 2 boys and 2 girls, (b) at least 1 boy
(c) at most 2 girls and (d) children of both sexes. Assume equal probabilities for boys and girls.

(or)

14. Define mean and variable of Normal Distribution.

15. Obtain the equations of the regression lines form the following data, using the method of least squares. Hence find the coefficient of correlation between x and y. Also estimate the value of
(a) y, when x = 38 and (b) x, when y = 18.

X	22	26	29	30	31	31	34	35
Y	20	20	21	29	27	24	27	31

(or)

16. Fit the curve xy = b + ax to the following data

X	1	2	3	4
Y	3	2.5	2	1.5

17. A duplicating machine maintained for office use is operated by an office assistant who earns Rs.5 per hour. The time to complete each job varies according to an exponential distribution with mean 6 min. Assume a Poisson input with an average arrival rate of 5 jobs per hour. If an 8-h day is used as a base, determine.
    (a) the percentage idle time of the machine.
    (b) the average time a job is in the system and
    (c) the average earning per day of the assistant.

(or)

18. A one-man barber shop takes exactly 25 minutes to complete one hair-cut. If customers arrive at the barber shop in a Poisson fashion at an average rate of one every 40 minutes, how long on an average a customer spends in the shop? Also find the average time a customer must wait for service.

19. Find seasonal variations by the ratio – to – trend method from the data given below.

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1983	30	40	36	34
1984	34	52	50	44
1985	40	58	54	48
1986	54	76	68	62
1987	80	92	86	82

(or)

20. The following data refer to visual defects found in the inspection of the first 10 samples of size 100. Use the data to obtain upper and lower control limits for percentage defective in samples of 100. Represent the first ten sample results in the chart (using p - chart)

Sample No:	1	2	3	4	5	6	7	8	9	10	Total
No. of Defective	2	1	1	3	2	3	4	2	2	0	20