Model Question Paper

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
FIRST SEMESTER B.TECH DEGREE EXAMINATION, MARCH 2022

STATISTICS, PROBABILITY AND CALCULUS

101009/ MA100B

Max. Marks: 100   **Duration: 3 hours**

PART A

(Answer **all** questions, **each** question carries 3 marks)

1. Discuss about population and sample.

2. Illustrate data collection and information with an example.

3. Draw frequency curve for following:

Class	10-20	20-30	30-40	40-50
Frequency	10	30	40	20

4. Find the median from the data.

Age(in years) x	3	4	5	6	7	8	8	9
No.of children (f)	14	20	40	54	40	18	7	7

5. State Bayes' theorem.

6. In basketball, Nicole makes 4 baskets for every 10 shots. If she takes 3 shots, what is the probability that *exactly* 2 of them will be baskets?

7. Find the mean and variance of Binomial Distribution.

8. State any three properties of Normal distribution.

9. State Lagrange's mean value theorem.

10. Evaluate the area of a circle using the double integral.

PART B

(Answer **one full** question from each module, each question carries **14** marks)

Module –I

11. Explain the applications of data collection in various branches of science with examples.

12. Explain collection of Data: Internal and external data, Primary and secondary Data.

Module –II

13. Define central tendencies. Find the mean from the set of grouped data

Class mark	10	30	50	70	90	110
Frequency	16	9	3	12	11	2

14. Obtain the marginal and joint frequencies from the table. Also calculate the conditional relative frequencies.

	Clown	Acrobat	Elephant Tamer	Total
Boys	3	2	8	13
Girls	2	4	1	7
Total	5	6	9	20

Module –III

15. a) In a recent survey in a class, it was determined that only 50% of the students attend class on

Tuesday. From past data it was noted that 90% of those who went to class on Tuesday pass the course, while only 10% of those who did not go to class on Tuesday passed the course.

   i)   What percentage of students is expected to pass the course?

   ii) Given that a student passes the course, what is the probability that he/she attended classes on Thursday.

  b) A coin is thrown 3 times. What is the probability that atleast one head is obtained?

  c) A problem is given to three persons P,Q,R whose respective chances of solving it are 2/7,4/7,4/9 . What is the probability that the problem is solved?

16.a) Define sample space. Give an example.

  b) Three bags contain 3 red, 7 black, 8 red, 2 black and 4 red & 6 black balls respectively. One

of the bags is selected at random and a ball is drawn from it. If the ball drawn is red, find the

probability that it is drawn from the third bag.

c) In a class, there are 15 boys and 10 girls. Three students are selected at random. Find the probability that 1 girl and 2 boys are selected.

Module –IV

17. a) During one stage in the manufacture of integrated circuit chips, a coating must be applied. If 60% of the chips receive a thick enough coating, find the probabilities that among 20 chips: at least 15 will have a thick enough coating.

b) The number of customers arriving at Taiwan Bank is Poisson distributed with a mean, 4 customers/per minute.

i)   Within 2 minutes, what is the probability that there are 3 customers?

ii) What is the probability density function for the time between the arrival of the next customer?

18. a) The amount of milk that is put into a 10 oz jar has a normal distribution with a standard deviation of 0.04. oz. What proportion of the jar contain:

i) Less than 7.06 oz?

ii) More than 7.09 oz?

iii) Less than 7 oz?

   b)   The probability density function for a continuous random variable X is

$$f(x) = a + bx^2, \ 0 \le x \le 1$$
$$0, \ \text{otherwise.}$$

   where a, b are some constants. Find

i)   a, b if $E(X) = \frac{3}{5}$

ii) $Var(X)$.

Module –V

19. a) Find the area enclosed by one loop of the curve $r = \sin 2\theta$.

b) Evaluate the integral, $I = \iint\limits_{R}\left(6x + 2y^2\right)dA$ where R is the region enclosed by the parabola $x = y^2$ and the line $2x + y = 3$.

20.a) Evaluate $\iint\limits_{D} 2xy\,dA$ where , D is the portion of the region between the circles of radius 2 and radius 5 centered at the origin that lies in the first quadrant.

b) Evaluate $\iiint\limits_{E} 2x\,dV$ where E is the region under the plane $2x + 3y + z = 6$ that lies in the first octant.