Register No.: ………………………………   Name: ………………………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER INTEGRATED M.C.A DEGREE EXAMINATION (R), DECEMBER 2022
(2020 SCHEME)

Course Code: 20IMCAT203

Course Name: Probability and Statistics

Max. Marks: 60   **Duration: 3 Hours**

Statistical tables and non- programmable scientific calculators up to Casio Fx991ESPlus may be permitted in the examination hall.

PART A
(Answer all questions. Each question carries 3 marks)

1. Write the empirical relation between mean, median and mode.

2. Eight coins were tossed together and the number of heads resulting was noted. The operation was repeated 256 times and the frequency distribution of the number of heads is given below. Calculate median?

X	0	1	2	3	4	5	6	7	8
f	1	9	26	59	72	52	29	7	1

3. Define product rule and sum rule.

4. How many permutation of the letters ABCDEFGH contain the string ABC?

5. The letters of the word 'article' are arranged at random. Find the probability that the vowels may occupy the even places.

6. If $P(A) = 0.4, P(B) = 0.7$ and $P(at\ least\ one\ A\ and\ B) = 0.8$.

   Find $P(only\ one\ of\ A\ and\ B)$.

7. What is the probability of guessing correctly at least six of the ten answers in TRUE-FALSE objective test?

8. State addition theorem of expectation and multiplication theorem of expectation.

9. Describe the relation between Binomial and Normal distribution.

10. For a normal distribution with mean 2 and variance 9. Find the value of x such that the probability of the interval [2,x] is 0.4115.

PART B
(Answer one full question from each module, each question carries 6 marks)

MODULE I

11. The frequency distribution of weight in grams of mangoes of a given variety is given below. Calculate the arithmetic mean and median. (6)

Weight (in gms)	410-419	420-429	430-439	440-449	450-459	460-469	470-479
No. of mangoes	14	20	42	54	45	18	7

OR

12. The arithmetic mean and standard deviation of series of 20 items were calculated by a student as 20 cm and 5 cm respectively. But while calculating them an item 13 was misread as 30. Find the correct arithmetic mean and standard deviation. (6)

MODULE II

13. a) How many one-to-one functions are there from a set with m elements to one with n elements? (3)

    b) Using tree diagram, how many bit strings of length four do not have two consecutive 1's? (3)

OR

14. a) How many bit strings of length eight either start with a 1 bit or end with the two bits 00? (3)

    b) How many ways are there to pack six copies of the same book into four identical boxes where a box can contain as many as six books? (3)

MODULE III

15. A restaurant serves two special dishes A and B to its customers consisting of 60% men and 40% women. 80% of men order dish A and the rest B. 70% of women order B and the rest A. In what ratio of A to B should the restaurant prepare the two dishes? (6)

OR

16. Two sets of candidates are competing for the positions on the board of directors of a company. The probability that the first and second sets will win are 0.6 and 0.4 respectively. If the first set wins the probability of introducing a new product is 0.8 and the corresponding probability if the second set wins is 0.3. what is the probability that the product will be introduced? (6)

MODULE IV

17. Ten unbiased coins are tossed simultaneously. Find the probability of obtaining,

      i)   Exactly 6 heads
      ii)   At least 8 heads   (6)
      iii)   No head
      iv)   At least one head
      v)   Not more than three heads.

OR

18. If 5% of the electric bulbs manufactured by a company are defective. Use Poisson distribution to find the probability that in a sample of 100 bulbs.

                                                                      (6)

      i)   None is defective
      ii)   5 bulbs will be defective. (Given: $e^{-5} = 0.007$)

MODULE V

19. Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches². How many soldiers in a regiment of 1000 would you expect to be

                                                                      (6)

      i)   Over six feet tall and
      ii)   Below 5.5 feet? Assume heights to be normally distributed.

OR

20. A random variable follows exponential distribution with PDF

$$f(x) = \begin{cases} 2e^{-2x}, x \geq 0 \\ \quad 0, x < 0 \end{cases}$$

Find the probability that it will take on a value
      i)   Between 1 and 3.   (6)
      ii)   Greater than 0.5.
                Also find
      iii)   Mean and variance.