

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), FEBRUARY 2022  
(2020 SCHEME)**

Course Code: 20IMCAT203

Course Name: Probability and Statistics

Max. Marks: 60

Duration: 3 Hours

*Students can use statistical tables.***PART A***(Answer all questions. Each question carries 3 marks)*

1. Describe the empirical relation between mean, median and mode.
2. State absolute and relative measures of dispersion.
3. Define sum rule and product rule.
4. Define  $r$ -permutation and  $r$ -combination.
5. Find the probability that in 5 tossing, a perfect coin turns up head at least 3 times in succession.
6. The letters of the word 'ARTICLE' are arranged at random. Find the probability that the vowels may occupy the even places.
7. State Multiplication Theorem of Expectation of two random variables  $A$  and  $B$ .
8. A die is thrown at random. What is the expectation of the number on it?
9. Define a continuous random variable.
10. Describe the relation between Binomial and Normal distributions.

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

11. Find the mean, median and mode of the data given below.

Weight (in kgs)	Number of students
93-97	3
98-102	5
103-107	12
108-112	17
113-117	14
118-122	6
123-127	3
128-132	1

(6)

**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

(6)

was misread as 30. Find the correct arithmetic mean and standard deviation.

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

### OR

14. a) How many poker hands of five cards can be dealt from a standard deck of 52 cards? Also how many ways are there to select 47 cards from a standard deck of 52 cards? (3)
- b) Prove that 'Let  $n$  and  $r$  be nonnegative integers with  $r \leq n$  then  $C(n, r) = C(n, n - r)$ ' (3)

### MODULE III

15. Twenty books are placed at random in a shelf. Find the probability that a particular pair of books shall be (6)
- i) Always together.
- ii) Never together.

### OR

16. 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)

### MODULE IV

17. In a binomial distribution with 6 independent trials, the probability of 3 and 4 successes is found to be 0.2457 and 0.0819 respectively. Find the parameters  $p$  and  $q$  of the binomial distribution. (6)

### OR

18. A manufacturer of blades knows that 5% of his product is defective. If he sells blades in boxes of 100, and guarantees that not more than 10 blades will be defective. What is the probability (approximately) that a box will fail to meet the guaranteed quality? (6)

### MODULE V

19. If  $X$  is an exponential random variable with parameter  $\lambda$ . (6)
- i) Find the distribution function of  $X$ .
- ii) Show that  $Mean(X) = \frac{1}{\lambda}$ .

**OR**

20. The income distribution of officers of a certain company was found to be follow normal distribution. The average income of an officer was Rs. 15,000. The standard deviation of the income of officers was Rs. 5,000. If there were 242 officers drawing salary above Rs. 18,500. How many officers were there in the company? (6)

\*\*\*\*\*