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**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**THIRD SEMESTER INTEGRATED M.C.A DEGREE EXAMINATION (S), MAY 2022****(2020 SCHEME)****Course Code: 20IMCAT203****Course Name: Probability and Statistics****Max. Marks: 60****Duration: 3 Hours***Students can use Statistical table***PART A***(Answer all questions. Each question carries 3 marks)*

- Define Median. State its any two merits and demerits.
- The following table gives the age distribution of a group of 50 individuals.

Age (in years)	16-20	21-25	26-30	31-36
Number of persons	10	15	17	8

Calculate Range and the Coefficient of Range.

- State the Inclusion-Exclusion Principle.
- How many Permutations of the letters ABCDEFGH contain the string ABC?
- $n$  persons are seated on  $n$  chairs at a round table. Find the probability that two specified persons are sitting next to each other.
- State Multiplication Theorem of Probability for two events.
- State Addition Theorem of Expectation for two random variables.
- A die is tossed twice. Getting 'an odd number' is termed as a success. Find the probability distribution of the numbers of successes.
- 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.
- Describe the relation between Poisson and Normal distribution.

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

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

Weight in grams	Number of Mangoes
410-419	14
420-429	20

(6)

430-439	42
440-449	54
450-459	45
460-469	18
470-479	7

**OR**

12. The arithmetic mean and the standard deviation of a set of 9 items are 43 and 5 respectively. If an item of value 63 is added to the set, find the Mean and Standard deviation of 10 items. (6)

**MODULE II**

13. a) How many functions are there from a set with  $m$  elements to a set with  $n$  elements? (3)
- b) How many different strings can be made by reordering the letters of the word SUCCESS? (3)

**OR**

14. a) 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)
- b) Suppose that a cookie shop has four different kinds of cookies. How many different ways can six cookies be chosen? Assume that only the type of cookie, and not the individual cookies or the order in which they are chosen, matters. (3)

**MODULE III**

15. In a village of 21 inhabitants, a person tells a rumor to a second person who in turn repeats it to a third person, etc. At each step the recipient of the rumor is chosen at random from the 20 people available. Find the probability that the rumor will be told 10 times without: (6)
- i) Returning to the originator.
- ii) Being repeated to any person.

**OR**

16. Probability that a man will be alive 25 years is 0.3 and the probability that his wife will be alive 25 years is 0.4. Find the probability that (6)
- i) both will be alive for 25 years.
- ii) only the man will be alive for 25 years.
- iii) only the woman will be alive for 25 years.
- iv) none will be alive for 25 years.
- v) at least one of them will be alive for 25 years.

**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.

**OR**

18. If a random variable  $X$  follows Poisson distribution such that  $P(X = 1) = P(X = 2)$   
Find
- i) the mean and variance of the distribution. (6)
  - ii)  $P(X = 0)$ .

**MODULE V**

19. Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches. How many soldiers in a regiment of 1000 would you expect to be
- i) over six feet tall. (6)
  - ii) below 5.5 feet.
- Assume heights to be normally distributed.

**OR**

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

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