D 110217   (Pages : 3)   Name...

Reg. No.....................................

FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2024

Mathematics

MTS 5D 04—MATHEMATICS FOR DECISION MAKING

(2020 Admission onwards)

Time : Two Hours   Maximum : 60 Marks

Section A

Answer any number of questions.
Each question carries 2 marks.
Ceiling is 20.

1. Define frequency distribution.

2. Consider this dataset showing the retirement age of 11 people, in whole years :

   54, 54, 54, 55, 56, 57, 57, 58, 58, 60, 60

   Find the mode.

3. Write any *three* measures of variation.

4. Suppose a sample consisting of following numbers has mean 8.5.

   7, x, 11, 8, 12, 7, 6, 6

   Find the value of x.

5. A coin is thrown 3 times. What is the probability that at least one head is obtained ?

6. How many different ways can you select one manufacturer, one car size, and one color ?

7. Classify each statement as an example of classical probability, empirical probability, or subjective probability :

   (i)   The probability that you will get the flu in this year is 0.1.

   (ii) The probability that a voter chosen at random will be younger than 35 years old is 0.3.

8. Two cards are selected in sequence from a standard deck. Find the probability that the second card is a queen, given that the first card is a king. (Assume that the king is not replaced).

Turn over

9. Define probability distribution of a random variable. Decide whether the distribution is a probability distribution. Explain your reasoning :

x	:	1	2	3	4
$p(x)$	:	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{5}{4}$	-1

10. Find the mean of the following probability distribution :

x	:	1	2	3	4	5
$p(x)$	:	0.16	0.22	0.28	0.20	0.14

11. Define normal distribution of a random variable. Write its mean and variance.

12. Find the z-score that corresponds to a cumulative area of 0.3632.

Section B

Answer any number of questions.
Each questions carries 5 marks.
Ceiling is 30.

13. A random sample of the number of children per household in a region is given below. Find the standard deviation :

x	:	0	1	2	3	4	5	6
f	:	10	19	7	7	2	1	4

14. The probability that A hits a target is $\frac{1}{4}$, and the probability that B hits the target is $\frac{2}{5}$. Both shoot at the target. Find the probability that at least one of them hits the target, that is, that A or B (or both) hit the target.

15. In a rolling of a six sided die, find the probability of :

    (i)   A rolling of 3 ;

    (ii) A rolling of 7 ; and

    (iii) A rolling of a number less than 5.

16. Define independent events and multiplication rules in probability for any two events A and B.

17. Assume the random variable x is normally distributed with mean $\mu = 174$ and standard deviation $\sigma = 20$. Find the indicated probability :

    (i) $P(X < 170)$.

    (ii) $P(X > 182)$.

18. A fair of coin tossed 6 times. Find the probability that :

    (i)   Exactly two heads.

    (ii)   At least four heads.

19. A building contractor is planning to develop a subdivision. The subdivision is to consist of 6 one-story houses, 4 two-story houses, and 2 split-level houses. In how many distinguishable ways can the houses be arranged ?

Section C

Answer any **one** *question.*
The question carries 10 *marks.*

20. A pair of fair dice is tossed. Let X is the random variable which assigns the sum of toss of a pair of die. Find the distribution function.

21. An education finance corporation claims that the average credit card debts carried by undergraduates are normally distributed, with a mean of $3173 and a standard deviation of $1120. (Adapted from Sallie Mae). What is the probability that a randomly selected undergraduate, who is a credit card holder, has a credit card balance less than $2700 ?

$(1 \times 10 = 10 \text{ marks})$