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H – 2072

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, November 2019**

**First Degree Programme under CBCSS**

**Complementary Course For Mathematics**

**ST 1131.1 – DESCRIPTIVE STATISTICS AND INTRODUCTION TO  
PROBABILITY**

**(2014 Admn – 2017 Admn)**

Time : 3 Hours

Max. Marks : 100

SECTION – A

Answer **all** the questions. Each carries **1** mark.

1. Give one limitation of secondary data.
2. Give an example of a qualitative variable.
3. A set of 20 observations has standard deviation 4. If a value 10 is added to every observation in the set, then find the standard deviation of the new set of observations.
4. Define sampling error.
5. Which average is suitable for nominal data?
6. Give an example of mutually exclusive events.
7. State any one limitation of classical definition of probability.
8. Who introduced axiomatic definition of probability?

P.T.O.

9. State multiplication theorem of probability.

10. If  $P(A|B) = \frac{1}{4}$  and  $P(B|A) = \frac{2}{5}$  then find  $\frac{P(B)}{P(A)}$

(10 × 1 = 10 Marks)

SECTION – B

Answer any eight questions. Each carries 2 marks.

11. Distinguish between nominal and ordinal scales of measurement.
12. Give two examples of non-sampling error.
13. Mention two uses of ogives.
14. Mention the significance of stem and leaf chart.
15. Give two merits of median.
16. A student who travels in a bicycle from his house to college at 10km/hr and back to home at 15km/hr. Find the average speed of his onward and backward journey.
17. Give an example of a random experiment having continuous sample space.
18. For a random experiment, the sample space  $S = \{1, 2, 3, 4, 5, 6\}$ ,  $A = \{1, 2, 3\}$  and  $B = \{3, 4, 5, 6\}$ . Write the events.
- (i)  $A \cap B)^c$
- (ii)  $A^c \cap B$ .
19. Let  $S = \{1, 2, 3, 4, 5, 6\}$  be a sample space and let  $A = \{1, 2, 3, 4\}$ ,  $P(A) = \frac{1}{3}$ . Write down the probability space.
20. Are mutually exclusive events independent events? Establish your claim.

21. Anitha has a 40% chance of receiving an A grade in Statistics, a 60% chance of receiving an A grade in Physics, and an 86% chance of receiving an A grade in either Statistics or Physics. Find the probability that she receives A grade in both Statistics and Physics.
22. Justify the term posterior probability in Baye's formula.

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions. Each carries **4** marks.

23. What are the advantages of sample survey over census survey?
24. Discuss the merits and demerits of forming a frequency table.
25. Establish the relation between r-th raw and central moments.
26. How will you draw a box plot? What is its significance in data analysis?
27. If  $A_1, A_2, A_3$  are mutually exclusive and exhaustive events show that  $B_1 = A_1, B_2 = A_1^c A_2, B_3 = A_1^c A_2^c A_3$  are mutually exclusive and exhaustive.
28. Suppose you are given an unbiased die and you are asked to find the probability of the event "an even number turns up when the die is rolled". Explain how do you obtain this probability using the empirical and classical definitions of probability.
29. State and prove addition theorem of probability.
30. In a factory, machines A and B are producing items of the same type. Of this production, machines A and B produce 5% and 10% defective items respectively. Machines A and B produce 40% and 60% of the total output of the factory. One item is selected at random and it is found to be defective. What is the probability that the defective item is produced by machine A?
31. Suppose that a cancer diagnostic test is 95% accurate both on those that do and those that do not have the disease. If 0.4% of the population have cancer, compute the probability that a tested person chosen randomly from the population, has cancer, given that his/her test result indicates so.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. Each carries **15** marks.

32. Explain different steps in the execution of a statistical survey.
33. Compute mean deviation about median for the following data showing the journey time in minutes of 100 students of a school.

Journey time	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of Students	5	9	22	35	15	10	4

34. A certain product was found to have two types of defects. Suppose that the probability that a randomly chosen item has only a type-1 defect is 0.2 and the probability that it has only type-2 defect is 0.3. Also, the probability that it has both defects is 0.1. Find the probabilities of the following events:
- (i) It has either a type-1 defect or type-2 defect or both
  - (ii) It does not have either of the defects
  - (iii) It has type-1 defect but not type-2 defect
  - (iv) It has exactly one of the defects.
35. Suppose that in a college 35% of the faculty are seniors, 40% are juniors, 15% are freshmen and the remaining are guest teachers. Assume that there is no overlap in these categories. If we are told that 10% of the seniors, 50% of the juniors, 70% of the freshmen and 5% of the guest teachers are doctoral degree holders determine the probability that a faculty member chosen at random has doctoral degree.

(2 × 15 = 30 Marks)