SOSc

KATHMANDU UNIVERSITY
End Semester Examination
March, 2025

Marks Scored:

Level : BDSc
Year : I

Course : DSMA 116
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 25 MAR 2025

SECTION "A"
[10 Q. × 1 = 10 marks]

Encircle the most appropriate answer from the given choices.

1. In a moderately symmetrical series, the arithmetic mean, median and mode are related as _____.
   a. Mean-Mode = 3 (Mean - Median)
   b. Mean-Median = 2(Median - Mode)
   c. Median- Mode = 2(Mean - Median)
   d. Mode – Median = 2(Mean - Median)

2. Marks obtained by all the students of class are presented in a frequency distribution with classes of equal width. Let the median of this grouped data be 14 with median class interval 12-18 and median class frequency is 12. If the number of students whose marks are less than 12 is 16, then total number of students in a class is_____?
   a. 12 b. 40 c. 18 d. 16

3. In a colony, there are 55 members. Every member posts a greeting card to all the members. How many greeting cards were posted by them? _____.
   a. 990 b. 890 c. 2970 d. 1980

4. Find the number of all possible samples from a population containing 8 items from which 2 items are selected at random without replacement_____.
   a. 56 b. 28 c. 66 d. 38

5. Bag 1 contains 4 white and 6 black balls while another Bag 2 contains 4 white and 3 black balls. One ball is drawn at random from one of the bags and it is found to be black. Find the probability that it was drawn from Bag 1.
   a. 12/13 b. 5/12 c. 7/11 d. 7/12

6. A bag contains 3 red, 2 white and 4 green balls. What is the probability of drawing the second ball to be green if the first ball drawn is red? The balls are not replaced in the bag.
   a. 0.82 b. 0.91 c. .23 d. 0.5

7. If A and B are two mutually exclusive events such that P(A) = 0.4 and P(AUB) = 0.6 then P(B) = _____.
   a. 0.20 b. 0.40 c. 0.6 d. 0.45

8. The first two moments of a distribution about the value 6 are 7 and 70. The mean and variance of the distribution are _____.
   a. 7 and 70 b. 13 and 70 c. 6 and 21 d. 13 and 21

9. For a distribution with mean, median, mode and standard deviation are 25, 24, 26 and 5 respectively, Karl Pearson's coefficient of skewness equals to_____.
   a. -0.20 b. 0.20 c. 1 d. -1

10. If A and B are two events such that P(A) = 0.2, P(B) = 0.6 and P(A|B) = 0.2 then the value of $P(A|\bar{B})$ is _____.
a. 0.2 b. 0.5 c. 0.8 d. 0.3

SECTION "B"
[10 Q.× 1 = 10 marks]

Fill in the blanks with the most appropriate word/symbol.

11. In a frequency distribution, the classes must be _____; meaning each data point can only fall into one class category.

12. The total of frequency up to an upper class limit or boundary is known as _____.

13. A long tail on the right is referred to as _____ distribution.

14. A curve that represents the cumulative frequency distribution of grouped data is called a/an _____.

15. If the distribution is negatively skewed, then the mean is _____ the value of mode.

16. Any measure indicating the center of a set of data, arranged in an increasing or decreasing order if magnitude, is called a _____.

17. Method in which the previously calculated probabilities are revised with values of new probability is called _____.

18. Previously assigned probabilities in Bayes Theorem that are changed with the new available information are called _____.

19. If μ_r be the r^{th} order central moment of a population then μ_0, μ_1, μ_2 are _____.

20. The variable that assigns a real number value to an event in a sample space is called _____.

KATHMANDU UNIVERSITY
End Semester Examination
March, 2025

SoSc.

Level : BDSc
Year : I
Time : 2 hrs. 30 mins.

25 MAR 2025

Course : DSMA 116
Semester : I
F. M. : 40

SECTION "C"
[2 Q. × 8 = 16 marks]

1. The following data in Table represent the blood cholesterol levels of 40 first-year sample students at a particular college.

213	174	193	196	220	183	194	200	192	200
200	199	178	183	188	193	187	181	193	194
205	196	211	202	213	216	206	195	191	170
184	191	221	212	221	204	204	191	183	229

a. Prepare stem-and- leaf plot of the data. [2]
b. Classify the data into six classes of suitable length and construct frequency, relative frequency and cumulative frequency distribution table. [3]
c. Prepare the box and whisker plot of this data set by using grouped frequency distribution constructed above and comment on the shape of distribution. [3]

2. The density for the random variable X, the lead content in a liter of gasoline, is:

$f(x) = 12.5x - 1.25, \quad 0.1 \leq x \leq 0.5,$
$= 0 \quad$ Otherwise

a. Find the cumulative distribution function for X. [2]
b. What is the probability that the lead concentration in a randomly selected liter of gasoline will lie between 0.2 and 0.3 gram per liter? [2]
c. Find the mean and variance of X. [2+2]

OR

a. A certain company sends 40% of its overnight mail parcels via express mail service E1. Of these parcels, 2% arrive after the guaranteed delivery time (denote the event "late delivery" by L). If a record of an overnight mailing is randomly selected from the company's file, what is the probability that the parcel went via E1 and was late? [2]
b. Suppose that 50% of the overnight parcels are sent via express mail service E2 and the remaining 10% are sent via E3. Of those sent via E2, only 1% arrive late, whereas 5% of the parcels handled by E3 arrive late. What is the probability that a randomly selected parcel arrived late? [2]
c. If a randomly selected parcel has arrived on time, what is the probability that it was not sent via E1? [2]
d. How many 3-digit numbers greater than 500 can be formed using 3, 4, 5, and 7? [2]

SECTION "D"
[6Q. × 4 = 24 marks]

3. By using grouped frequency distribution constructed in **question 1 part b), calculate** the first four moments about the mean. [4]

P.T.O.

4. Compute mean, and standard deviation of the blood cholesterol levels of 40 first-year sample students at a particular college by using grouped frequency distribution constructed in **question 1 part b)** **[2+2]**

5.

a. By using grouped frequency distribution constructed in **question 1 part b)** , compute Karl Pearson's coefficient of skewness and comment on the shape of the distribution. **[2]**

b. A student must choose four courses from among Calculus, Linear Algebra, Statistics, Nepali Literature, and English Literature. If the student chooses randomly, what is the probability that both Calculus and Linear Algebra are chosen? **[2]**

6.

a. A system consists of two components. The probability that the second component functions in a satisfactory manner during its design life is 0.9, the probability that at least one of the two components does so is 0.96, and the probability that both components do so is 0.75. Given that the first component functions in a satisfactory manner throughout its design life, what is the probability that the second one does also? **[2]**

b. The first three moments of a distribution about the value 67 of the variable are 0·45, 8·73 and 8·91. Calculate the second and third central moments, and compute coefficient of skewness based on these moments. **[2]**

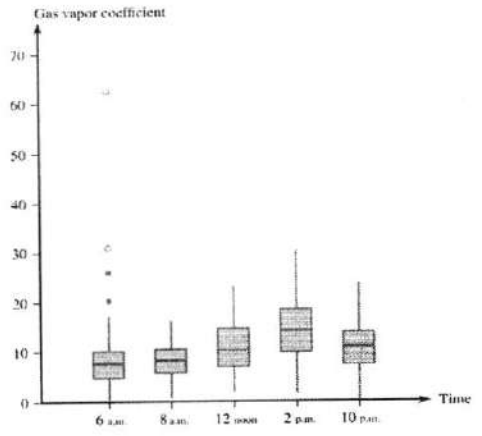
7. At a certain gas station, 40% of the customers use regular gas (A1), 35% use plus gas (A2), and 25% use premium (A3). Of those customers using regular gas, only 30% fill their tanks (event B). Of those customers using plus, 60% fill their tanks, whereas of those using premium, 50% fill their tanks.

a. What is the probability that the next customer will request plus gas and fill the tank? [2]

b. If the next customer fills the tank, what is the probability that regular gas is requested? [2]

8.

a. The accompanying comparative boxplot of gasoline vapor coefficients for vehicles in Detroit appeared in the article "Receptor Modeling Approach to VOC Emission Inventory Validation" (J. of Envir. Engr., 1995: 483–490). Discuss any interesting features [2]



b. The five years 2012 to 2016 saw volatility in the value of shares. The data in the following table give the annual percentage change in the share market index for Hong Kong, the Hang Sang, and for Australia, the S&P/ASX 200, for 2012 to 2016.

Year	2019	2020	2021	2022	2023
Hang Seng	22.9%	2.9%	1.3%	-7.2%	0.4%
ASX	14.6%	15.1%	1.1%	-2.1%	7.0%

For each index calculate the geometric rate of return for the five years and what conclusions can you reach concerning the geometric rates of return of the two indices?