Exam.Code:0001
Sub. Code: 0041

2031

B.A./B.Sc. (General) First Semester

Statistics

Paper – 101: Probability Theory and Descriptive Statistics - I

Time allowed: 3 Hours | Max. Marks: 65

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two question from each Section.*

x-x-x

Q1. Answer the following questions:

a) Define probability mass function.
b) Discuss properties of Probability Distribution Function.
c) If the mean and median of a moderately asymmetrical series are 26.8 and 27.9 respectively, what would be its most probable mode?
d) Shoe size of most of the people in India is No. 7. Which measure of central value does it represent?
e) In a distribution S.D = 6. If all observation are multiplied by 2 what would be the result to Variance?
f) For the prices of two cities A & B

$\bar{X}_A = 20$	$\bar{X}_B = 15$
$\sigma_A = 2.45$	$\sigma_B = 3.69$

Which city has more stable prices?
g) Define Subdivided Bar Diagram with suitable example.

(2, 2, 2, 1, 1, 3, 2)

Section- A

Q2. (a) Discuss the axiomatic approach to probability. In what way it is an improvement over classical and statistical approaches?
(b) Four cards are drawn at random from a pack of 52 cards, find the probability
(i) they are a king, a queen, a jack and an ace.
(ii) two are kings and two are queens.
(iii) Two are black and two are red
(iv) There are two cards of hearts and two cards of diamonds **(5, 8)**

Q3. (a) State and prove
(i) Addition theorem of probability for mutually exclusive and mutually exclusive events
(ii) Multiplication theorem of probability for independent and dependent events.
(b) A letter is taken out at random from "ASSISTANT" and another is taken out from "STATISTICS". What is the chance that they are same letters? **(8, 5)**

Q4. (a) Define the "distribution function" (cdf) of a random variable and state its important properties.
(b) A random variable X has the following probability function

X	0	1	2	3	4	5	6	7
P(X=x)	0	K	2k	2k	3k	K^2	$2k^2$	$7k^2+k$

P.T.O.

(i) Find k, (ii) Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$ (iii) Determine the distribution function of X and (iv) If $P(X \leq a) > 1/2$ find the minimum value of a. **(5, 8)**

Q5. (a) Explain the concepts: **(i)** random variable **(ii)** independence of random variables, and **(iii)** marginal and conditional probability distributions.

(b) Joint distribution of X and Y is given as:

$$f(x,y) = .4xy\, e^{-(x^2+y^2)};\ x \geq 0, y \geq 0$$

Test whether X and Y are independent. For the above joint distribution, find the conditional density of X given $Y = y$. **(7, 6)**

Section- B

Q6. Answer the following questions:

The amount of protein (in grams) for a variety of fast-food sandwiches is reported here.

23	30	20	27	44	26	35	20	29	29
25	15	18	27	19	22	12	26	34	15
27	35	26	43	35	14	24	12	23	31
40	35	38	57	22	42	24	21	27	33

Source: The Doctor's Pocket Calorie, Fat, and Carbohydrate Counter.

(a) Construct a frequency distribution using 6 classes include class limits, class frequencies, midpoints, and cumulative frequencies.

(b) Draw a histogram, using relative frequencies

(c) Draw a frequency polygon, using relative frequencies and

(d) Draw an ogive for the data and find the median from ogive.

(e) Describe the shape of the histogram. **(4, 3, 2, 3, 1)**

Q7. (a) Discuss the procedure for the constructions of histogram and Ogives. Compare the applications of pie diagram with that of Multiple bar diagram.

(b) Calculate weighted average from the following data

Designation	**Monthly salary (in Rs)**	**Strength of the cadre**
Class 1 Officers	1500	10
Class 2 Officers	800	20
Subordinate staff	500	70
Clerical staff	250	100
Lower staff	100	150

(8, 5)

Q8. (a) Write a short note on Quartiles and Percentiles for continuous series.

(b) Following are the daily wages of workers in a textile. Find the median.

Wages (in Rs.)	Number of workers
less than 100	5
less than 200	12
less than 300	20
less than 400	32
less than 500	40
less than 600	45
less than 700	52

Contd.... P/3

less than 800	60
less than 900	68
less than 1000	75

(6, 7)

Q9. (a) Write a short note on the following:

(i) Quartile Deviation and Coefficient of Quartile Deviation

(ii) Mean Deviation and Coefficient of Mean Deviation

(iii) Standard Deviation and Coefficient of Variation

(b) Weekly wages of labours are given below. Calculate Q.D and Coefficient of Q.D.

Weekly Wage (Rs.) :	100	200	400	500	600
No. of Weeks :	5	8	21	12	6

(9, 4)

x-x-x