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PUNJAB PUBLIC SERVICE COMMISSION
COMBINED COMPETITIVE EXAMINATION
FOR RECRUITMENT TO THE POSTS OF
PROVINCIAL MANAGEMENT SERVICE, ETC -2022
CASE NO. 2C2023
SUBJECT: STATISTICS (PAPER-I)

TIME ALLOWED: THREE HOURS

MAXIMUM MARKS: 100

NOTE:
   i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
   ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
   iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
   iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: **Attempt FIVE questions in all. Non-Programmable calculator is allowed.**

Q.No.1   a) Name the different measurement scales.

b) Find mean, median and mode of the following data:

Weight	Frequency
65 – 84	9
85 – 104	10
105 – 124	17
125 – 144	10
145 – 164	5
165 – 184	4
185 – 204	5

(5+15=20 Marks)

Q.No.2   In a factor, machines A, B and C manufacture 25, 30 and 45 percent of the total output respectively. Of their outputs 5, 4, 3 percent, respectively are defective items. An item is selected at random and found to be defective. What is the probability that the item is manufactured from machine B?

(20 Marks)

Q.No.3   a) Find the probability distribution and distribution function for the number of heads when 3 balanced coins are tossed.

b) A r.v x is has a p.d.f:

$$f(x) = 2x \qquad 0 \le x \le 1$$
$$= 0 \qquad \text{elsewhere}$$

Find $P[x \le 1/2 \mid 1/3 \le x \le 2/3]$

(10+10=20 Marks)

Q.No.4   An architect is designing the interior door in a men's gymnasium. He wants to make them high enough so that 90 percent of the men using the doors will have at least a one-foot clearance. Assuming that the heights will be normally distributed with a mean of 6 feet and a standard deviation of 0.4 feet, how high must the architect make the door? (20 Marks)

Q.No.5   (a) If x is binomially distributed with mean 3.2 and variance 1.152. Find the probability $P[X < \mu - 2\sigma^2]$

b) Suppose that customers enter a shop at the rate of 30 persons per hour and follow Poisson distribution. Calculate the probability that in a 3 minute interval no customers enter the shop.

(10+10=20 Marks)

Q.No.6   Find the moment generating function of bivariate normal distribution.   (20 Marks)

Q.No.7   a) Fit an equation of the form $Y=aX^b$ to the following data:

X	1	2	3	4	5	6
Y	2.98	4.26	5.21	6.10	6.80	7.50

b) The profits, £Y, of a certain company in the Xth year of its life are given by

X	1	2	3	4	5
Y	2500	2800	3300	3900	4600

Taking u = X-3 and v = (Y - 3300)/ 100, find the parabolic curve of v on u in the form $v=a+bu+cu^2$ deduce the curve of Y on X.

(10+10=20 Marks)

Q.No.8   Define regression and discuss the properties of the least square simple linear regression.

(20 Marks)

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