UNIVERSITY OF THE PUNJAB

Sample paper

Roll No._____

Examination:- B.A./B.Sc.part-I

Subject: **STATISTICS** Time Allowed: **3 hours**
Paper: **theory** Max. Marks: **75**

Note: Attempt Five questions selecting at least two questions from each section. Use of Scientific Calculators and Statistical tables is allowed.

SECTION-I

Q.1 a) Why a frequency distribution is constructed? Write at least three reasons. **(03)**

b) Write disadvantages of arithmetic mean. **(04)**

c) Construct a frequency distribution for the data below (weight of 9^{th} class students), indicate the class limits and class boundaries clearly with a class interval of 13. **(08)**

41.78,61.65,81.71,26.84,60.20,29.32,28.31,33.47,18.95,44.43,31.47,44.63,50.35,48.19,41.17, 35.35,22.78,29.19,43.72,37.50,32.82,44.44,51.26,43.89,22.35,39.42,48.12,50.32,47.15,29.17

Q.2 a) Prove that the variance of the sum or difference of two independent variables is equal to sum of their respective variances. **(05)**

b) Goals scored by two teams A and B in a football season were as follows **(10)**

No. of goals scored in a match (x_i)		0	1	2	3	4
Number of matches	A	27	9	8	5	4
	B	17	9	6	5	3

By calculating the variance, decide which team may be considered more efficient?

Q.3 a) Write the shortcomings of consumer Price index number. **(06)**

b) From the data given below compute the index number of prices taking 2009 as base using simple average of price relatives. **(09)**

Year	Commodity (Prices in Rs.)			
	A	B	C	D
2009	16.25	20.00	2.40	10.50
2010	17.22	22.40	2.64	12.50
2011	19.55	16.00	3.00	12.60
2012	18.70	20.00	3.80	14.65

Q.4 a) Write the names of the methods to find the TREND from a time series. **(04)**

b) The following data shows the number of bags (hundreds) of fertilizer sold by a certain dealer. Compute 4-quarter centered moving average and comment on the results. **(11)**

Year	Quarters			
	I	II	III	IV
2001	72	98	79	106
2002	79	122	101	143
2003	94	141	128	160
2004	125	143	135	187

Q.5 a) Write the properties of least square regression line. **(04)**

b) Compute the least square regression line of Y(criminals arrested) on X (police barriers in a city) for the following (assumed) data. Explain the parameters, and estimate the number of criminals arrested if police barriers in a city be 18. **(11)**

X	5	6	8	10	12	13	15	16	17
Y	16	19	23	28	36	41	44	45	50

Note:- Don't round the figures except for the explanation of the model parameters.

SECTION-II

Q.6 **a)** Define event, trial, sample space, independent event and random experiment. **(05)**

b) If a card is drawn from an ordinary deck of 52 playing cards, find the probability that **(04)**

i) The card is a red card. ii) The card is a diamond

ii) Card is a 10 iv) Card is a Black Queen (Queen of Spade)

c) If one card is selected at random from a deck of 52 playing cards, what is the probability that the card is a club or a face card or both? (Where Ace is not a face card) **(06)**

Q.7 **a)** Given $P(A) = 0.60, P(B) = 0.40, P(A \cap B) = 0.24$, find **(08)**

$P(A/B), P(A \cup B), P(A/\overline{B}), P(B/A)$

and $P(\overline{B})$. What is the relation between A and B?

b) One urn contains 3 white and 2 black balls, another contain 5 white and 3 black balls if an urn is chosen at random and a ball is taken from it , what is the probability that it is white? **(07)**

Q.8 **a)** Differentiate between Probability function and Distribution function. **(03)**

b) Suppose random variable x has a probability distribution(p.d.) given by **(07)**

x	-1	0	1
f(x)	3c	3c	6c

(i) Determine "c" (ii) What is the p.d. of Y=2X+1? (iii) Determine the p.d. of random variable X , where X denotes the number of Aces in a hand of Bridge.

c) A large store places its last 15 clock radios in a clearance sale. Unknown to anyone, 5 of the radios are defective. If a customer tests 3 different clock radios selected at random, what is the probability distribution of number of defective radios in the sample? **(05)**

Note:- Don't use Binomial distribution.

Q.9 **a)** Write the properties of a Binomial experiment. **(04**

b) A certain event is believed to follow the Binomial distribution. In 1024 samples of 5, the result was observed one 405 times and twice 270 times. Find p and q. **(06**

c) A biased coin is tossed 4 times and the number of heads noted. The results of experiment are shown in the following table. Find the probability of obtaining a head when the coin is tossed. **(05**

No. of heads	0	1	2	3	4
frequency	12	50	151	200	87

Q10 **a)** Given the density function $f(x) = kx,\ 0 \le x \le 2$ *and* $f(x) = 0$ *elsewhere* .Find the value of k so that the function $f(x)$ may be a density function, find also the probability that both of two sample values will exceed 1. Compute the distribution function F(x). **(06**

b) Prove that the mean and variance of the Normal distribution with p.d.f **(06**

$$f(x) = \frac{1}{\sqrt{(2\pi\sigma^2)}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}, \quad -\infty \le x \le \infty$$, are μ *and* σ^2 respectively.

c) A random variable X is Normally distributed with μ=50 and σ^2=25, find the probability that it will fall between (i) 0 and 40, (ii) 55 and 100 **(0**