UNIVERSITY OF THE PUNJAB



B.A. / B.Sc. Part - I **Annual Examination - 2017**

Roll No.	*********	•
		•

Subject: Statistics-I PAPER: A (Statistics-I)

TIME ALLOWED: 3 hrs. MAX. MARKS: 75

b) Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight of apples: Weight (grams) 65-84 85-104 105-124 125-144 145-164 165-184 185-204 f		ALI	M. A (St	ausucs-1	<u>) </u>				-				MAX	. M	ARKS: 75	5
 Q.1 a) Define sample, what are its properties? b) Compare ratio and interval scales of measurements. c) A survey of retail establishments had assistants as follows: 2, 3, 9, 0, 4, 4, 1, 5, 4, 8, 5, 3, 6, 6, 0, 2, 2, 7, 6, 4, 8, 4, 3, 3, 1, 0, 8, 7, 5, 1, 3, 4, 2, 4, 7, 5, 2, 6, 3, 1, 7, 5, 4, 6, 4, 2, 5, 3, 4. Arrange the values as a frequency distribution with proper class interval and number of classes. Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean b) Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65–84 85–104 105–124 125–144 145–164 165–184 185–204 (grams) f 9 10 17 10 5 4 5 c) Prove that the sum of squared deviations from arithmetic mean is smallest. Qt.3 a) Differentiate between simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σ pηqη / Σ pqqq) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) Year Commodity (Prices in Rs.) Year Commodity (Prices in Rs.) 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.	^د.		TE:	Attempt section.	any l Use of	TVE Scie	ques ntific	tions Calc	select ulator	ing :	at lea d Stat	st TW	O que l tables	stion is a	ns from ea llowed.	ıch
 Q.1 a) Define sample, what are its properties? Compare ratio and interval scales of measurements. c) A survey of retail establishments had assistants as follows: 2, 3, 9, 0, 4, 4, 1, 5, 4, 8, 5, 3, 6, 6, 0, 2, 2, 7, 6, 4, 8, 4, 3, 3, 1, 0, 8, 7, 5, 1, 3, 4, 2, 4, 7, 5, 2, 6, 3, 1, 7, 5, 4, 6, 4, 2, 5, 3, 4 Arrange the values as a frequency distribution with proper class interval and number of classes. Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean b. Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight (grams) b) Forve that the sum of squared deviations from arithmetic mean is smallest. C) Prove that the sum of squared deviations from arithmetic mean is smallest. C) Prove that the simple aggregate value index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σρηqη reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) Year Commodity (Prices in Rs.) 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series. 							- ,					• ***				
c) Compare ratio and interval scales of measurements. c) A survey of retail establishments had assistants as follows: 2, 3, 9, 0, 4, 4, 1, 5, 4, 8, 5, 3, 6, 6, 0, 2, 2, 7, 6, 4, 8, 4, 3, 3, 1, 0, 8, 7, 5, 1, 3, 4, 2, 4, 7, 5, 2, 6, 3, 1, 7, 5, 4, 6, 4, 2, 5, 3, 4 Arrange the values as a frequency distribution with proper class interval and number of classes. Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean b) Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65-84 85-104 105-124 125-144 145-164 165-184 185-204 (grams) f 9 10 17 10 5 4 5 c) Prove that the sum of squared deviations from arithmetic mean is smallest. a) Differentiate between simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. \(\frac{\cappa_{\eta}}{\cappa_{\eta}}\)) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year \(\frac{\cappa_{\eta}}{A}\) B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.	Q.1	a)	Define sample, what are its properties?													
 2, 3, 9, 0, 4, 4, 1, 5, 4, 8, 5, 3, 6, 6, 0, 2, 2, 7, 6, 4, 8, 4, 3, 3, 1, 0, 8, 7, 5, 1, 3, 4, 2, 4, 7, 5, 2, 6, 3, 1, 7, 5, 4, 6, 4, 2, 5, 3, 4		b)) Compare ratio and interval scales of measurements												(2+3)	
 Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65-84 85-104 105-124 125-144 145-164 165-184 185-204 (grams) Prove that the sum of squared deviations from arithmetic mean is smallest. Differentiate between simple and composite Index numbers. Prove that the simple aggregate value index numbers (i.e. Σ p_nq_n) satisfy the time reversal and circular tests. From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series. 		c)	A surve	y of retail	estab	ishm	ents h	ad as	sistan	s as	fallow	e.				(03)
 2. 7, 6, 4, 8, 4, 3, 3, 1, 0, 8, 7, 5, 1, 3, 4, 2, 4, 7, 5, 2, 6, 3, 1, 7, 5, 4, 6, 4, 2, 5, 3, 4 Arrange the values as a frequency distribution with proper class interval and number of classes. Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65–84 85–104 105–124 125–144 145–164 165–184 185–204 (grams) f 9 10 17 10 5 4 5 c) Prove that the sum of squared deviations from arithmetic mean is smallest. Differentiate between simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σρηqη Σρηqη) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) Year Commodity (Prices in Rs.) 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series. 	•		•	z, 3, 9	', U ,	4,	4, 1	. 5.	4.	8.	5 3	6	6 Ó	2		(07)
Arrange the values as a frequency distribution with proper class interval and number of classes. Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean by Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65-84 85-104 105-124 125-144 145-164 165-184 185-204 (grams)				2, 7, 6,	4, 8,	4, 3	3, 3,	1,	0, 8,	7, 5	5, 1,	['] 3, ['] 4				
 Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65–84 85–104 105–124 125–144 145–164 165–184 185–204 (grams)			•	ν, Ζ, ξ), J,	7.	7.	5.	4.	6	4	2 !	5 3	1		
 Q.2 a) What are the principal criteria for a satisfactory average? State giving reasons the circumstances in which it would be preferable to use the Arithmetic mean b) Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65-84 85-104 105-124 125-144 145-164 165-184 185-204 (grams) f 9 10 17 10 5 4 5 C) Prove that the sum of squared deviations from arithmetic mean is smallest. c) Prove that the simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σρηθη / Σρηθη) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the 			of class	e the valu	es as	a freq	luency	/ dist	ributior	with	prop	er clas	ss interv	al ar	nd number	
circumstances in which it would be preferable to use the Arithmetic mean b) Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight 65-84 85-104 105-124 125-144 145-164 165-184 185-204 (grams) f			UI CIASSI	55 .												
 b) Calculate the standard deviation of the following frequency distribution showing the weights of apples: Weight (grams) f g 10 17 10 4 5 c) Prove that the sum of squared deviations from arithmetic mean is smallest. b) Prove that the simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σ p_nq_n) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.	Q.2	a)	a) What are the principal criteria for a satisfactory average? State giving account													
weights of apples: Weight 65-84 85-104 105-124 125-144 145-164 165-184 185-204 f 9 10 17 10 5 4 5 C) Prove that the sum of squared deviations from arithmetic mean is smallest. C		The state and the state of the												asons the	(4+3)	
Weights of apples. Weights 65-84 85-104 105-124 125-144 145-164 165-184 185-204 c) Prove that the sum of squared deviations from arithmetic mean is smallest. c) Prove that the simple aggregate value index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σρηqη) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.		by Calculate the standard deviation of the following frequency distribution show											owing the	(0.4)		
Commodity (Prices in Rs.) Prove that the sum of squared deviations from arithmetic mean is smallest.			weigins	or apples.							oquei	ncy un	Stributio	11 311	lowing the	(04)
Commodity (Prices in Rs.) Prove that the sum of squared deviations from arithmetic mean is smallest.					85-	-104	105-	-124	125-	144	145-	-164	165-1	84	185-204	
 c) Prove that the sum of squared deviations from arithmetic mean is smallest. d) Differentiate between simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σ p_nq_n) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.)			(grams													
 a) Differentiate between simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σρηθη Σρηθη) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.)			T	9	10		17		10		5		4		5	
 a) Differentiate between simple and composite Index numbers. b) Prove that the simple aggregate value index numbers (i.e. Σρηθη Σρηθη) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.)		c)	Prove th	at the sun	n of sq	uared	devia	ations	from a	arithn	netic n	nean i	s emalle	et		(0.4)
b) Prove that the simple aggregate value index numbers $\left(\frac{\sum p_n q_n}{\sum p_0 q_0}\right)$ satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.			•												(04)	
 b) Prove that the simple aggregate value index numbers (i.e. Σρηqη Σρηqη) satisfy the time reversal and circular tests. c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.) A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series. 	Q;3	a)) Differentiate between simple and composite Index numbers											(04)		
c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.)		ы												(04)		
c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.)		IJ,	satisfy the time $\frac{\sum p_0 q_0}{\sum p_0 q_0}$												e time	(- '/
c) From the data given below, compute the index numbers of prices, taking 1980 as base. Use simple average of price relatives. Year Commodity (Prices in Rs.)			reversal	and aire.d	44	_						$\sum p_0 q_0$)			
Year Commodity (Prices in Rs.) A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 20.00 2.40 2.60 2.60	_	c)	From the	data dive	ar test	5.		. 4ln.a.	:						_	
Year Commodity (Prices in Rs.) A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 20.00 2	far,	-,	base. Use simple average of price relatives												(07)	
A B C D 1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.			Commodity (Prices in Pa)													
1980 16.25 20.00 2.40 10.50 1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.					Year	A			1003 11			<u> </u>				
1981 17.22 22.40 2.64 12.50 1982 19.55 16.00 3.00 12.60 1983 18.70 20.00 3.80 14.65 Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.					1980	16.2	25		00	~~~~						
Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.					1981	17.2	22									
Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.				ļ		19.5	55									
Q.4 a) When do you compute the deviations from trend and when ratios to trend? Explain how you eliminate the average seasonal variations from the observed values of the time series.				Ĺ	1983	18.7	70	20.0	00	3.80						
time series.	Q.4	a)	When do	you com	oute th	e dev	iations	s fron	n trend	and	when	ratios	to trend	12 E	volain	(00)
diffe series.			Tow you climinate the average seasonal variations from the observed volume of the												(80)	
UI TIPE estimated number of vicitors (100s) =t = t = t = t = t = t = t = t = t = t		61	CHIC SCHE	· • · · · · · · · · · · · · · · · · · ·											0, 11,0	
visitors (ous) at a noliday resort were as follows:		D)	ine estin	lated num	ber of	visito	rs ('00	Os) at	a holid	day r	esort v	vere a	s follow	s:		(07)
19 19 19 19 20 20 20 20 20 20 20 20 20 20 20 20 20				Year	19	19	19	19	19	20	20				7	(4,7)
95 96 97 98 99 00 01 02 03 04 Visitors 31 49 74 62 65 73 70 84 86 70			}-,	Vicitore									03	04		
	•				Imeric	49	/4	62	65	<u>73</u>	70	84	86	79		
Show by direct numerical calculation that the 2-year centred moving average is			equivalen	t to a 3 ve	ar wei	ai Ca obted	movi	on th	nat the	2-y	ear c	entred	movin	g av	erage is	
equivalent to a 3 year weighted moving average with weights 1, 2, 1 respectively.			.,	u o ye	ai wei	Aurea	HIOVE	ny av	erage	with	weigh	ts 1, 2	, 1 resp	ectiv	ely.	
2.5 a) Write the assumptions of simple linear regrees in year to	2.5	a)	Write the	assumptio	ons of	simple	e lines	ır rea	ression	n mo	del					1025
, and accompliants of simple linear regression model		b)	Given the	following	set of	value	s:									(05) (10)
· · · · · · · · · · · · · · · · · · ·		b)	Given the	following	set of	value	S:	ıı ıeg	1622101	ı mo	uei.					(05)
b) Given the following set of values:				1.3/												1147

(10)

i) ii)

SECTION-II

Q.6	a) b)	Differentiate between; i) trial and event ii) experiment and random experiment A club consists of four members. How many sample points are in the sample space when three officers: president, secretary and treasurer, are to be chosen? Justify your	(06) (2+2)
·	c)	procedure to be used. Two dice are rolled. Let A be the event that the sum of dots on the faces shown is odd, and B the event that there is at least one 3 shown. Describe $A \cup B$; $A \cap B$; and $(A \cap \overline{B}) \cup \overline{A}$.	(05)
		$(A(1B) \cup A$.	مر
Q.7	a)	Two drawings each of three balls are made from a bag containing 5 white and 8 black balls; the balls are not being replaced before the next trial. What are the probabilities that the first drawing will give 3 white balls and the second 3 black balls?	(04)
	b)	There are three families, each having four children; 2 boys and 2 girls; 3 boys and 1 girl; and 1 boy and 3 girls. A child from each family is invited to a party. Find the probability (i) that only girls turn up for the party, (ii) that two girls and one boy turn up for the party.	(05)
	c)	There are three coins, identical in appearance, one of which is ideal and the other two biased with probabilities 1/3 and 2/3 respectively for a head. One coin is taken at random and tossed twice. If a head appears both the times, what is the probability that the ideal coin was chosen?	(06)
Q.8	a)	Differentiate between probability function and Distribution function (a discrete case). Also write example(s) in support of your answer.	(04)
	b)	An urn contains 3 black, 2 red and 3 green balls and 2 balls are selected at random from it. If X is the number of black balls and Y is the number of red balls selected, then find	(06)
		 i) the joint probability function f(x, y); ii) P(X + Y ≤ 1); iii) the marginal p.d. g(x) and h(y); iv) the conditional p.d. f(x 1), v) Are X and Y independent? 	
	c)	If $f(x) = \frac{6 - 7 - x }{36}$, for $x = 2, 3, 4, 12$. Then find the mean and variance of the	(05)
		random variable x.	
Q.9	a) b)	Write the properties of a Binomial experiment. A and B play a game in which A's probability of winning is 2/3. In a series of 8 games, what is the probability that A will win (i) at least 4 games, (ii) 6 or more games, and (iii) from 3 to 6 games?	(04) (06)
	c) .	During a promotional campaign of a new drink, a soft drink company places prize- winning caps on one of every ten bottles. Hoping to win a prize, a child decides to buy a bottle of a new cola each day for one full week. What is the probability that the child win prize(s)? i) at least one day? ii) first two days? iii) all days?	(05)
Q.10	a)	Derive the mean and variance of uniform distribution U(a,b).	(05)
	b)	A normal distribution has mean = 12 and σ =2, find the area under the curve	(05)
	•	a) from X=10 to X=13.5, b) from X=11.4 to X=14.2,	(34)
	c)	In a normal distribution with μ =47.6 and σ =16.2, find (i) the probability that a single	(05)
		observation will be larger than 50, (ii) two points such that a single observation has a 97% probability of falling between them	