UNIVERSITY OF THE PUNJAB

Subject: Business Statistics & Mathematics   Paper: BC-301   Time: 3 Hrs.   Marks: 100

NOTE: *Attempt any FIVE questions using proper method. All questions carry equal marks. Attempt at least TWO questions from each section.*

SECTION – I

Q # 1:- (a) Define the following: (10)

   (i) Geometric Mean   (ii) Harmonic Mean   (iii) Quartiles

   (iv) Dispersion   (v) Measure of Skewness

(b) The mid values of a frequency distribution are given as:

Mid Values	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	2

Calculate: (i) Geometric mean   (ii) Median   (iii) Co-efficient of skewness   (10)

Q # 2:- (a) The manufacturer has 20 sales points of them 12 are in the urban area. The manufacturer selects a sale point at random to know the stock position. What is the probability that the selected point is of rural area?   (10)

(b) A pair of unbiased die is tossed. Calculate variance of the random variable X from the probability distribution, where X represents the sum of dots on the upper face of dice.   (10)

Q # 3:- (a) Define the following: (10)

   (i) Statistical hypothesis   (ii) Type-I and Type-II errors   (iii) Test statistic

   (iv) Rejection region   (v) Null hypothesis

(b) A random sample of 40 hens from a normal population showed the average laying is 272 eggs per year with standard deviation of 25 eggs. The company claims that the average laying is at least 285 eggs per year. Test this claim of the company using $\alpha = 0.05$ (Table value is -1.645)   (10)

P.T.O.

Q # 4:- A population consists of five numbers 2, 4, 6, 8, 10. Consider all possible samples of size 2 which can be drawn with replacement from this population. Form the sampling distribution of sample means and sample variances and verify that:

(i) $E(\overline{X}) = \mu$

(ii) $E(S^2) = \frac{n-1}{n}\sigma^2$

(20)

SECTION – II

Q # 5:- **(a)** The first term of an A.P. is 5, the last term 45 and the sum 400. Find number of terms and common difference in the series. (10)

(b) The common ratio, last term and the sum of a G.P. are 3, 486 and 728 respectively. Find the first term and the number of terms. (10)

Q # 6:- **(a)** Sum of money doubles itself in 12.5 years at a certain rate p.a. of simple interest. Show that it will take about 9 years to double itself at the same rate of compound interest. (10)

(b) In what time Rs. 3000 invested at 10% simple interest will amount to Rs. 12000. (10)

Q # 7:- **(a)** The sum of two consecutive even numbers is 66. Find the integers. (10)

(b) Solve the following equation by any appropriate method: $\sqrt{5x+4} - \sqrt{3x+1} = 1$. (10)

Q # 8:- Solve the following system of linear equations by matrices:

$$x + y - z = 1; \ 2x - y + z = 5; \ 3x - y - 2z = 10$$

(20)

UNIVERSITY OF THE PUNJAB

PART – I   A/14
Examination:- B. Com.

Roll No. ....

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

Note: Attempt any five questions. All questions carry equal marks. Attempt at least TWO Questions from each section.

SECTION-I

1.

Weekly Wages Rs.	No. of Workers	Weekly Wages Rs.	No. of Workers
0—40	6	160 —200	45
40—80	15	200—240	27
80—120	22	240—280	13
120—160	30	280—320	6

Required: Calculate Arithmetic Mean, Median and Co-efficient of Variation.

2. X: 5, 6, 7, 8, 9, .10, 11, 12, 13, 14, 15
   Y: 9, 7, 10, 3, 13, 11, 14, 10, 14, 12, 18

Required: Calculate Co-efficient of correlation and also the line of regression y on x.

3. Calculate Price Index Numbers using Laspeyre`s, Paasche`s, Fisher`s and Marshall`s formulae for 2001 taking 2000 as base year from the following data:

Commodity	2000		2001	
	Price	Quantity	Price	Quantity
Wheat	30	110	32	112
Rice	40	100	38	110
Jawar	25	50	22	80
Maize	10	40	15	50

4. The table of hair colours and eye colours of 200 persons is given below:

Eye Colour	Hair Colour			Total
	Light Black	Dark Black	Brown	
Blue	26	21	13	60
Black	25	42	21	88
Brown	19	18	15	52
Total	70	81	49	200

Test the Hypothesis that hair and eye colours are independent. The table value of **Chi-square** at 4 degree of freedom at 5% level of significance is 9.49.

SECTION: II

5. If

$$A = \begin{pmatrix} 2 & -3 & 4 \\ 1 & 5 & -2 \\ 4 & 2 & 6 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 1 & -2 & 3 \\ 4 & -5 & -6 \\ 7 & 8 & 9 \end{pmatrix}$$

Find: (i) $A + B$ **(ii)** $2A - 3B$ **(iii)** AB

6. (a) Solve the following Quadratic Equation:
$$2x^2 + 15x + 18 = 0$$
   (b) The difference of two numbers is 33. The larger number is one more than three times the smaller number. **Find the numbers.**

7. (a) The sum of 10 terms of an A.P., whose last term is 28, is 145. Find the first term and the common difference.
   (b) **Find the sum of the series:**
   1, 1/2, 1/4, 1/8, 1/16, ...to infinity cannot exceed 2.

8. Find out the effective rate of interest equivalent to the nominal rate of 8% p.a. Compounded quarterly.

UNIVERSITY OF THE PUNJAB

PART – I   S/2014
Examination:- B. Com.

Roll No. ....

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

NOTE: Attempt any FIVE questions. All questions carry equal marks. Attempt at least TWO Questions from each section.

SECTION-I

1.

Wages Rs.	No. of workers'	Wages Rs.	No. of workers'	Wages Rs.	No. of workers
117—124	13	145—152	56	173—180	55
124—131	17	152—159	73	180—187	40
131—138	33	159—166	81	187—194	20
138—145	47	166—173	65		

   Required: Calculate Arithmetic Mean, Harmonic Mean, Standard Deviation and Co-efficient of variation.

2.   x: 16, 72, 73, 63, 83, 80, 66, 66, 74, 62.
   y: 40, 52, 43, 49, 61, 58, 44, 58, 50, 45.
   Required: Calculate coefficient of correlation and comment on the answer.

3. **Test for Association:**

	A_1	A_2	A_3
B_1	20	15	30
B_2	30	18	35
B_3	35	20	40

(Tabulated value of chi-square for 4 degrees of freedom at 5% level of significance = 9.488)

4. Construct index number for 2002 from the following data taking 2000 as base using:
   (i) Laspere's Index Number   (ii) Paasche's Index Number   (iii) Fisher's Index Number

Commodity	2000		2002	
	Price	Quantity	Price	Quantity
A	5	100	6	120
B	7	120	10	80
C	10	80	12	80
D	4	50	5	60
E	8	70	8	80

SECTION - II

5. If

$$A = \begin{pmatrix} 1 & 3 & 2 \\ 3 & 2 & 0 \\ 4 & 5 & 6 \end{pmatrix} \quad \text{and } B = \begin{pmatrix} -2 & 5 & 4 \\ 0 & 3 & -5 \\ -1 & 4 & 2 \end{pmatrix}$$

   Calculate: (i) A + B   (ii) 2A – 3B   (iii) AB

6. a) Solve the following simultaneous equations.
      2x + y = -7
      3x + 2y = -12
   b) Solve the quadratic equation

      $6x^2 - 5x = 6$

7. Find out the compound amount and compound interest at the end of 3 years on a sum of Rs.20,000 borrowed at 6% compounded annually.

8. A 90 days Rs. 4,000, 7% interest bearing note dated April 4, was discounted on May 4, at a discount rate of 8%. What was the discounted value of the note? (Take 360 days in the year)

UNIVERSITY OF THE PUNJAB

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

NOTE: Attempt any FIVE questions using proper method. All questions carry equal marks. Attempt at least TWO questions from each section.

SECTION-I

Q.1 Compute Arithmetic Mean, Median, Variance and Pearson's Coefficient of Skewness.

Monthly income Rs.	No of families	Monthly income Rs.	No of families
110 – 119	2	160 – 169	18
120 – 129	4	170 – 179	13
130 – 139	17	180 – 189	6
140 – 149	28	190 – 199	5
150 – 159	25	200 – 209	2

Q.2

(a) Two coins are tossed. Show that the probability of getting at least one head is ¾.

(b) The results of the use of two drugs in the treatment of a certain disease are as follows:

	Recovered	No Change	Died
Drug – A	40	18	12
Drug – B	50	8	7

Test association using chi-square statistic. Tabulated value of chi-square for 2 degree of freedom at 5% level of significance is 5.99.

Q.3 From the following data, compute index number for 2003, taking the price of 2002 as the base.

Use Laspeyre's, Paasche's, Marshall's and Fisher's formulae.

Years	A		B		C		D		E	
	Price	Qty.	Price	Qty.	Price	Qty.	Price	Qty.	Price	Qty.
2002	9	10	6	80	3	17	9	20	6	30
2003	11	5	9	100	2	20	7	15	8	40

Q.4 A population consists of six numbers 3, 6, 9, 12, 15 and 18. Consider all possible samples of size $n = 2$, which can be drawn without replacement from this population. Calculate:

i.   The Mean of population.
ii. The Standard Deviation of population.
iii. The Mean of the sampling distribution of means.
iv. The standard error

SECTION – II

Q.5 The matrices A and B are given as follows:

$$A = \begin{pmatrix} 13 & 2 & -6 \\ -3 & 9 & 0 \\ 8 & 4 & -1 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 11 & -2 & 6 \\ 9 & -14 & 3 \\ -4 & 8 & 5 \end{pmatrix}$$

Obtain: (i) $A + 2B$ (ii) $3A - 4B$ (iii) AB

Q.6 (a) Solve the following simultaneous equations:

$$\frac{2}{x} + \frac{3}{y} = 2$$

$$\frac{8}{x} + \frac{9}{y} = 7$$

(b) If a car traveled 5 kilometers an hour faster it would take one hour less to travel 210 kilometers. What is the speed of the car and what time does it take.

Q.7 A drilling company contracted to drill a well at a cost of Rs. 30 for the first foot, Rs.35 for the second foot, Rs. 40 for the third foot and so on. How deep a well can be drilled for Rs. 3,075.

Q.8 Mr. Ahmed deposits Rs. 500 at the end of each quarter. So, as to accumulate a sum of Rs.10,000 to purchase a refrigerator. If the interest rate is 5% per annum, compounded quarterly. How many such quarterly deposits he will have to make.

UNIVERSITY OF THE PUNJAB

PART – I   S/2015
Examination:- B. Com.

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

NOTE: Attempt any FIVE questions using proper method. All questions carry equal marks. Attempt at least TWO questions from each section.

SECTION- I

1. The following are the scores made by two batsmen A and B in a series of innings

A	28	22	46	85	9	59	175	42	11	92
B	52	18	4	95	125	12	90	58	7	79

Who is better as run getter? Who is more consistent player?

2. Find the regression line x on y and y on x.

X	125	137	156	112	107	136	123	106
Y	78	89	97	69	59	79	68	53

And show that $\Sigma (Y - \hat{Y}) = 0$

3. construct index no for 2002 from the following data taken 2000 as base using Laspeyre's, Paasche's, Fisher's and Marshall's index number.

Commodity	2000		2002	
	Price	Quantity	Price	Quantity
A	5	100	6	120
B	7	120	10	80
C	10	80	12	80
D	4	50	5	60

4. Test for Association:

	A₁	A₂	A₃
B₁	20	15	30
B₂	30	18	35
B₃	35	20	40

Tabulated value of chi-square for 4 degrees of freedom at 5% level of significance = 9.488.

SECTION – II

5. Find the inverse of matrix.

$$A = \begin{pmatrix} 4 & 10 & 0 \\ -7 & 1 & -2 \\ 6 & -5 & 6 \end{pmatrix}$$

6. (a) Half of two numbers addition is equal to 7/5 and half of two numbers subtraction is 7/12 find the numbers.

(b) Solve the following $x^2 + 5x = 50$

7. (a) For an A.P: $a_{10} = 275$ and $a_3 = 450$. Find first term, general term and common difference of the progression.

(b) The 54th and 4th term of an A.P are – 61 and 64 respectively. Show that the common difference is – 5/2 and 23rd term is 16.5.

8. (a) How long will it take for 1500 invested at 8% simple interest to triple in amount?

(b) How long does it take for a money to double at 16% P.a compounded semi annually?

UNIVERSITY OF THE PUNJAB

PART – I   A/2016
Examination:- B. Com.

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

NOTE: *Attempt any FIVE questions. All questions carry equal marks. Attempt at least TWO questions from each section.*

SECTION- I

Q. 1. From the following frequency distribution find Median, Mode and Coefficient of Skewness.

Weekly Earnings (in Rs)	No. of Workers	Weekly Earnings (in Rs)	No. of Workers
0 – 50	3	200 – 250	21
50 – 100	7	250 – 300	12
100 – 150	12		
150 – 200	18		

Q.2. The price and quantities of four commodities in years 2005 and 2012.

Years	A		B		C		D	
	Price	Qty	Price	Qty	Price	Qty	Price	Qty
2005	17.00	135	19.36	214	15.18	191	99.32	161
2012	27.52	369	29.59	247	14.46	227	96.17	186

Compute Laspeyre's, Paasche's, Fisher's index number of prices for 2012.

Q.3. From the following data Calculate Co-efficient of co-relation, regression line Y on X and also comment on answer.

x	16	72	73	63	83	80	66	66	74	62
y	40	52	43	49	61	58	44	58	50	45

Q. 4. A population consists of five numbers 8, 12, 16, 18 and 20. Take all the possible samples of size 2, without replacement from this population. Find the mean of all samples. From sampling distribution of these sample means.

Calculate:
  (i)   The mean and standard deviation of the population
  (ii)   The mean and standard error of the sampling distribution of X.
  (iii)   Verify the results. $\mu_{\bar{x}} = \mu$ and $\sigma_{\bar{x}}^2 = \dfrac{\sigma^2}{n} \cdot \dfrac{N-n}{N-1}$

SECTION – II

Q. 5. (a) Find the sum of infinite Geometric series $5 + 5/6 + 5/36 + \ldots\ldots\infty$
  (b) Which term of the sequence 16, 8, 4, 2, ... is 1/16.

Q. 6. (a) Solve $\sqrt{5x + 4} - \sqrt{3x + 1} = 1$
  (b) Solve for x and y.
      $5x + 4y = 7$
      $3x - 4y = 17$

Q.7. If $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & 2 \\ 2 & 3 & -1 \end{pmatrix}$ then obtain A^{-1}.

Q. 8. What semi-annual payment is required to pay off a loan of Rs 8,00000 in ten years if interest is 16% compounded semi-annually.

UNIVERSITY OF THE PUNJAB

NOTE: Attempt any FIVE questions. All questions carry equal marks. Attempt at least TWO questions from each section.

SECTION-I

1. Find the line of regression of Y on X and X on Y and draw regression line of Y on X from the given data.

x	5	7	6	12	17	19	20	29
y	22	14	11	9	9	8	6	2

2. Calculate co-efficient of mean deviation about mean and co-efficient of mean Deviation about median.

Classes	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 – 49
f	13	31	49	78	102	110

3. Draw all possible samples of size 3 from the population 0,3,6,9,12,15 without replacement. Make sampling distribution and show that (i) $\mu_{\bar{x}} = \mu$ (ii) $6\frac{2}{\bar{x}} = \frac{6^2}{n} \frac{N-n}{N-1}$

4. Calculate Price Index Numbers using Laspeyre's, Paasche's, Fisher's and Marshall's formulae for 2003 taking 2002 as base.

Years	A		B		C		D	
	Price	Quantity	price	Quantity	Price	Quantity	Price	Quantity
2002	9	10	6	80	3	17	9	20
2003	11	5	9	100	2	20	7	15

SECTION II

Q.5   If $A=\begin{bmatrix} 1 & -1 & 2 \\ 0 & 3 & 1 \end{bmatrix}$ and $B=\begin{bmatrix} 2 & 3 & 0 \\ 1 & 2 & -1 \end{bmatrix}$, Show that

   a) A+B   **b)** B-A   **c)** whether AB=BA

Q.6   a) Mr. Ahmad want to open an account paying 16.2% compounded monthly for his son's college education. How much Mr. Ahmad has to deposit (principle amount) if ordinary annuity payments of Rs.3000 are to be drawn out of account for 6 years.

   b) How long will it take for money to double at 16% p.a. compounded semi-annually?

Q.7   a) Find first term and sum up to 10th term of the geometric progression whose 6th and 7th terms are 64 and 128.

   b) A laptop company produces 7000 laptops in its 4th year of existence and 10,000 laptops in 6th year. What is the production of the company in the first year?

Q.8   a) Solve the following simultaneous equations.
$$6x - 5y + 70 = 0$$
$$4x = 3y - 44$$

   b) Solve the following equation by factorization.
$$3x^2 - x = 8$$

UNIVERSITY OF THE PUNJAB

PART – I   A/2017
Examination:- B. Com.

Roll No. ....

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

NOTE: Attempt any FIVE questions using proper method. All questions carry equal marks. Attempt at least TWO questions from each section.

SECTION-I

1.

Groups Rs.	Frequency	Groups Rs.	Frequency
0—7	5	28 —35	18
7—14	13	35—42	13
14—21	18	42—49	5
21—28	28		

Required: Calculate Arithmetic Mean, Median, Mode and Co-efficient of Variation.

2. X: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
    Y: 17, 17, 18, 18, 18, 19, 19, 20, 21, 22
Required: Calculate Co-efficient of correlation and also the line of regression y on x.

3. Calculate Price Index Numbers using Laspeyre's, Paasche's, Fisher's and Marshall's formulae for 2001 taking 2000 as base year from the following data:

Commodity	2000		2001	
	Price	Quantity	Price	Quantity
Wheat	12	10	15	12
Rice	15	7	20	5
Jawar	24	5	20	9
Maize	5	16	5	14

4. The table of hair colours and eye colours of 200 persons is given below:

Eye Colour	Hair Colour			Total
	Light Black	Dark Black	Brown	
Blue	26	21	13	60
Black	25	42	21	88
Brown	19	18	15	52
Total	70	81	49	200

Test the Hypothesis that hair and eye colours are independent. The table value of Chi-**square** for four degrees of freedom at 5% level of significance is 9.49.

SECTION: II

5. If
$$A = \begin{pmatrix} 2 & -3 & 4 \\ 1 & 5 & -2 \\ 4 & 2 & 6 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 1 & -2 & 3 \\ 4 & -5 & -6 \\ 7 & 8 & 9 \end{pmatrix}$$

Find: (i) $A + B$ (ii) $2A - 3B$ (iii) AB

6. (a) Solve the following Quadratic Equation:
   $$2x^2 + 15x + 18 = 0$$
   (b) The difference of two numbers is 33. The larger number is one more than three times the smaller number. **Find the numbers.**

7. (a) The sum of 10 terms of an A.P., whose last term is 28, is 145. Find the first term and the common difference.
   (b) **Find the sum of the series:**
   $$1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16} \dots \dots \text{to infinity cannot exceed 2.}$$

8. Find out the effective rate of interest equivalent to the nominal rate of 8% p.a. Compounded quarterly.

UNIVERSITY OF THE PUNJAB

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

Note: attempt any five questions. All questions carry equal marks. Attempt at least TWO Questions from each section.

SECTION- I

1. From the following frequency distribution find Mean, Median, Mode and Coefficient of variation.

Weekly Earnings (in Rs)	No. of Workers	Weekly Earnings (in Rs)	No. of Workers
3 0 – 39	6	70 – 79	18
40 – 49	10	80 – 89	8
50 – 59	11		
60 – 69	12		

2. From the following data Calculate Co-efficient of co-relation, regression line Y on X and $show$ $that$ $(y-y^\wedge)=0$

x	60	72	73	63	83	80	66	66	74	62
y	40	52	43	49	61	58	44	58	50	45

3. The price and quantities of four commodities in years 20012 and 2015.

Years	A		B		C		D	
	Price	Qty	Price	Qty	Price	Qty	Price	Qty
20012	10	25	13	21	4	10	9	20
2015	9	27	12	22	3	14	7	15

Compute Laspeyre's, Paasche's, MarshalEdgeworth Fisher's index number of prices for 2015.

4. A population consists of five numbers 7, 9, 11, 13 and 15. Take all the possible samples of size 2, without replacement from this population. Find the mean of all samples. From sampling distribution of these sample means.

Calculate:
   (i)   The mean and standard deviation of the population
   (ii)   The mean and standard error of the sampling distribution of X.
   (iii)   Verify the results. a) $\mu_{\bar{x}} = \mu$ b) $\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n} \cdot \frac{N-n}{N-1}$

SECTION - II

5. Solve by cramer's rule:

$$x+y+z=6$$
$$x+y-z=0$$
$$2x+3y-2z=2$$

6. (a) Solve by any method $4x^2 +3x-7=0$
   (b) Solve for x and y.
$$6x - 5y +70=0$$
$$4x= 3y-44$$

7. (a) Find the sum of infinite Geometric series $5 + 5/6 + 5/36 + \dots\dots\infty$
   (b) Which term of the sequence 31,29,27, …….. is 3.

8. (a) What principal will amount to 12760 at 10.85% in 5 months ?
   (b) At what rate Rs.71800 amount to Rs.30500@ in 22 months

UNIVERSITY OF THE PUNJAB

PART – I   A/2018
Examination:- B. Com.

Subject: Business Statistics & Mathematics
PAPER: BC-301

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

NOTE: Attempt any FIVE questions using proper method. All questions carry equal marks. Attempt at least TWO questions from each section.

SECTION-I

Q.1 Calculate Bowley's Coefficient of Skewness from the following frequency (20) distribution and describe shape of the distribution.

Ages (years)	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54
No. of Men	29	176	208	173	82	40	15	3

Q.2 Calculate the co-efficient of correlation and obtain the lines of regression of the (20) following data:

Price (X)	3	4	5	6	7	8	9	10	11	12
Demand (Y)	25	24	20	20	19	17	16	13	10	6

Q.3 A population consists of 8 values: 2, 4, 6, 8, 10, 12, 14, 16. Select all possible (20) random samples of size 2 from this population using without replacement and find the mean of each sample. Make sampling distribution of means and find its mean and variance. Also compute the mean and variance of the population. Verify the mean and the variance of the sampling distribution with the mean and variance of the population respectively.

Q.4 (a) Two fair coins are tossed. Find the probability distribution of X, the number of (10) heads. Also obtain the expected value of X.

(b) The prices and quantities of three commodities are shown below: (10)

Commodity	Price (Rs.)		Quantity	
	1998	2005	1998	2005
Rice	35	32	71	80
Barley	20	18	107	138
Maize	26	20	62	57

Compute Fisher's Ideal price index number for 2005 using 1998 as base.

SECTION-II

Q.5 (a) Solve the equation: $x^2 + 5x = 50$ (10)

(b) The sum of two consecutive even integers is 66. Find the numbers. (10)

Q.6 Find inverse of the matrix (20)

$$\begin{bmatrix} 1 & 2 & \frac{1}{2} \\ 4 & 5 & 6 \\ 1 & 3 & -2 \end{bmatrix}$$

Q.7 (a) The 5th and the 13th term of an A.P. are 5 and -3 respectively. Find the A.P. (10) and 16th term.

(b) A company offers two alternatives for the payment of salary to the post of an (10) employee. Either he may receive Rs.240000 per year or Rs.100 in the first month, Rs.200 in the second month, Rs.400 in the third month and so on. Which of the two alternatives should he prefer?

Q.8 An investor is considering two ways of investing Rs.200000 for a period of 10 (20) years: Option A offers 1.5 percent compounded every 3 months, Option B offers 3.2 percent compounded every 6 months. Which is the better option?

UNIVERSITY OF THE PUNJAB

PART-I: 2nd Annual – 2018

Examination: B. Com.

Subject: Business Statistics & Mathematics

PAPER: BC-301

TIME ALLOWED: 3 Hrs.

MAX. MARKS: 100

NOTE: Attempt any **FIVE** questions using proper method. All questions carry equal marks. Attempt at least **TWO** questions from each section.

SECTION- I

1. Find the line of regression of Y on X and X on Y from the given data also calculate correlation coefficient

x	88	92	95	72	65	88	60
y	65	70	80	60	53	72	55

2. Calculate co-efficient of skewness by karl pearson

Classes	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 – 89
f	13	31	49	78	110	102

3. Draw all possible samples of size 3 from the population 1,3,5,7,9,11 without replacement. Make sampling distribution and show that   (i) $\mu_x = \mu$ (ii) $6_{\bar{x}}^2 = \dfrac{6^2}{n} \dfrac{N-n}{N-1}$

4. Calculate Price Index Numbers using Laspeyre's, Paasche's, Fisher's and Marshall's formulae for 2003 taking 2002 as base.

Years	A		B		C			
	Price	Quantity	price	Quantity	Price	Quantity		
2002	2	20	4	4	1	10		
2003	5	15	8	5	2	12		

SECTION - II

5. (a) The sum of three consecutive even integer is 132. What are integers?

   (b) Solve by quadric formula. $x = 4 - 2x^2$.

6. (a) Find inverse $A = \begin{pmatrix} 70 & 30 \\ 12 & 40 \end{pmatrix}$

   (b) Determine the values of a and b if $|A| = 2$ and $|B| = 8$

   Where $A = \begin{pmatrix} a & 3 \\ 2b & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -b \\ 2 & a \end{pmatrix}$

7. (a) Find the total compound interest that has to be paid after 3 years on the original principal of 16,000 at yearly rate of 11%.

   (b) Find the amount of which Rs. 20,000 will grow if interest at 12% P.A compounded quarterly for 5 years.

8. The common ratio and sum of a G.P are 2 and 765 respectively. Find first term, if number of terms are eight.

UNIVERSITY OF THE PUNJAB

B.Com. Part – I   Annual Exam – 2019

Subject: Business Statistics & Mathematics   Paper: BC-301   Time: 3 Hrs.   Marks: 100

NOTE: *Attempt any FIVE questions. All questions carry equal marks.*
Attempt at least TWO questions from each section.

SECTION- I

Q.1 following is the frequency distribution .Calculate Bowley's coefficient of skewnes

Scores	0 -10	10 -20	20 -30	30 -40	40 -50	50 - 70	70 - 100
No. of matches (f)	3	7	12	18	31	24	21

Q2. The following data given the ages and blood pressure of 10 women.

Age	56	42	36	47	49	42	60	72	63	55
Blood pressure	147	125	118	128	145	140	155	160	149	150

(a) Find correlation coefficient between age and blood pressure.

(b)Calculate two regression coefficients

Q3. Calculate price index numbers using Laspeyse's, Paasche's, Fisher's and Marshall's formula for 2011 taking 2009 as base year.

Year	Wheat		Rice		Maize	
	Price	Qty	Price	Qty	Price	Qty
2009	3.8	29	2.9	3	6.5	12
2011	5.8	24	4.5	2.5	7.8	14

Q4. Draw all possible samples of size 2 with replacement from the population 2,4,6,8,10 make sampling distribution and show that (i) $\mu_{\bar{x}} = \mu$ (ii) $\sigma_{\bar{x}}^2 = \sigma^2/n$

P.T.O.

Q.5 If $A = \begin{pmatrix} 2 & -3 & 5 \\ K & 4 & 6 \\ 2 & 0 & 8 \end{pmatrix}$ is singular matrix then find K.

Q6. (a) If the sum of two consecutive numbers is 27 find the numbers?

(b) Solve the equation $2X = 3-8x$

Q7.(a) Which term of the sequence ,16,8,4,2,.......is 1/16?

(b) Find the first term of Geometric progression whose 6th term and 7th term are 32/9 and 64/27 respectively

Q8. A tract of land is leased in perpetuity at Rs12500 due at the beginning of each month .If worth 13.5% compounded monthly. What is the value of lease?

NOTE: Attempt any FIVE questions. All questions carry equal marks.
Attempt at least TWO questions from each section.

Section-I

Q.1. The following data show last week daily sales in thousands of dollars of two departmental stores:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Store-A	63	79	84	99	54	71
Store-B	88	73	45	55	65	64

(i)   Calculate Mean and Standard Deviation of each store sales.
(ii) Which store performance is better in sales?
(iii) Which store performance is more consistent with respect to sales?

Q.2. The following figures show the expenditure on advertisement (X) and net income (Y) for a random sample of 10 business firms. All figures are measured in thousands of dollars.

X	13	17	29	28	40	37	41	26	24	35
Y	15	21	18	14	22	23	24	16	17	20

Compute

(i)   Mean values of X and Y.
(ii) Standard Deviations of X and Y.
(iii) Coefficient of correlation between X and Y.
(iv) The line of regression Y on X.
(v)   The mean value of Y given that X = 30.

Q.3.(a) Two fair dice are rolled. Let X denotes the sum of dots appearing on the upper faces of the two dice, find the probability distribution of X.

(b) The prices and quantities of three commodities during 1997 and 2007 are given below:

Commodity	Price		Quantity	
	1997	2007	1997	2007
A	12	10	501	600
B	38	50	100	194
C	40	40	56	76

Compute Fisher's Ideal price index number for 2007 on the basis of 1997.

Q.4. The following table is based on the GPA's (grade point averages) of a sample of 300 students selected from all classes taught by all instructor during the past four years and how these students evaluated this instructor.

		GPA of the Student		
		Below 2.5	2.5 to 3.5	Above 3.5
Evaluation of the Instructor	Excellent	18	33	37
	Good	17	27	43
	Average	21	31	23
	Poor	25	14	11

Test at the 1% significance level if GPAs of students and instructor evaluations are dependent.

Q.5.(a) Solve the following equation:

$$4x^2+20 = 18+35x$$

(b) The product of one less than a certain positive number and 2 less than 3 times the number is 16. Find the number.

Q.6. If $A = \begin{bmatrix} 1 & 3 & 5 \\ 4 & -2 & 7 \\ 3 & 2 & -4 \end{bmatrix}$ then obtain A^{-1}.

Q.7.(a) A company earned a profit of $ 37,000 in its first years of operation. It is estimated that the profit will increase by $ 7000 each year, find the total profit of first ten years of operation.

(b) Express 0.7272727272 .... as a quotient of two integers using the idea of infinite geometric series.

Q.8. (a) Find out the compound amount and compound interest at the end of 5 years on a sum of Rs. 50,000 borrowed at 8% compounded annually.

(b) A machine depreciates 20 per cent in the first year, then by 10 per cent per annum for the next 5 years and by 2 per cent per annum thereafter. Find its value after 7 years if its initial price is Rs. 720,000.

UNIVERSITY OF THE PUNJAB

Time: 3 Hrs.   Marks: 100

NOTE: *Attempt any FIVE questions. All questions carry equal marks.*
Attempt at least TWO questions from each section.

SECTION- I

1. From the following frequency distribution find Mean, Mode, Standard Deviation and Coefficient of variation.

Weekly Earnings (in Rs)	No. of Workers	Weekly Earnings (in Rs)	No. of Workers
20 – 24	1	40 – 44	15
25 – 29	4	45 – 49	9
30 – 34	8	50---54	2
35– 39	11		

2. From the following data Calculate Co-efficient of co-relation, regression line Y on X and trend values show $(y-\hat{y})=0$

x	60	72	73	63	83	80	66	66	74	62
y	40	52	43	49	61	58	44	58	50	45

3. The price and quantities of four commodities in years 2012 and 2015.

Years	A		B		C		D	
	Price	Qty	Price	Qty	Price	Qty	Price	Qty
2012	10	25	13	21	4	10	9	20
2015	9	27	12	22	3	14	7	15

Compute Laspeyre's, Paasche's, Marshal Edgeworth Fisher's index number of prices for 2015.

4. A population consists of five numbers 0,2, 4, 6, 8 and 10. Take all the possible samples of size 2, without replacement from this population. Find the mean of all samples. From sampling distribution of these sample means.

   Calculate:

   (i)   The mean and standard deviation of the population

   (ii) The mean and standard error of the sampling distribution of X.

   (iii) Verify the results.

<center>SECTION - II</center>

5. Solve by matrices: $2x+y=-1/2$
   $$2x+4y=7$$

6. (a) The sum of two numbers is 64 their difference is 10. Find the two numbers

   (b) Solve for x and y.
   $$6x - 5y +70=0$$
   $$4x= 3y-44$$

7. (a) Find the sum of infinite Geometric series $5 + 5/6 + 5/36 + \ldots\ldots\infty$

   (b) Which term of the sequence 8, 1.6, 0.32, …….. is 0.00256.

8. The difference between simple and compound interest on a certain sum is Rs. 250 for two years at 5%p.a find the sum

<center>**Page 2 of 2**</center>

UNIVERSITY OF THE PUNJAB

Associate Degree in Commerce / B.Com. Part – I

2nd Annual – 2020 & Annual – 2021

Subject: Business Statistics & Mathematics   Paper: BC-301

Roll No. ....

Time: 3 Hrs. Marks: 100

NOTE: *Attempt any FIVE questions using proper method. All questions carry equal marks. Attempt at least TWO questions from each section.*

Section - I

Q # 1:- **(a)** Define the following:

(i) Geometric mean   (ii) Quartiles (iii) Mean deviation   (iv) Variance

(v) Coefficient of variation

(b) Calculate Median and Mean deviation from median from the following data:

Class	f	Class	f
20 – 24	14	40 – 44	102
25 – 29	32	45 – 49	76
30 – 34	49	50 – 54	34
35 - 39	78	55 – 59	12

Q # 2:- **(a)** Define the following:

(i) Coefficient of correlation (ii) Dependent variable   (iii) Method of least square

(iv) Perfect positive correlation

(b) Calculate coefficient of correlation between U and V where $U = \dfrac{X - 400}{100}$ and $V = \dfrac{Y - 40}{10}$.

Also find the regression line X on Y. Find the value of X when $Y = 80$

X	400	200	700	100	500	300	600
Y	60	30	70	10	40	20	50

Q # 3:- **(a)** For the following probability distribution:

X	0	1	2	3	4	5
P(x)	0.1	0.3	0.2	A	0.2	0.05

Calculate: (i) A   (ii) E(X)   (iii) $E(X^2)$ (iv) Var(X)

(b) A study is made to determine the possible relationship between religions affiliation and attitude toward a certain proposed piece of legislation. The data is as below:

Attributes	For	Against	Indifferent
Catholic	60	30	20
Jewish	30	60	10

Apply the chi – square test at 5% level of significance.

(The table value of chi – square for 2 d.f. at 5% level of significance = 5.991)

Q # 4:- Draw all possible samples of size 3 without replacement from the population 3, 6, 9, 9, 12 and 15. Form a sampling distribution of mean. Find mean, variance and standard deviation of the sampling distribution of means. Also find the mean, variance and standard deviation of the population. Show that mean of the sampling distribution of means Is equal to the population mean.

Section - II

Q # 5:- **(a)** A company paid Rs. 2400 for heat and power during march. If cost of heat was Rs. 800 less than three times the cost of power. How much was the cost of heat?

(b) Solve $2x^2 + 13x + 15 = 0$ by method of completing squares.

Q # 6:- **(a)** Solve the following system of equations:

$$1.5x + 0.8y = 1.2$$

$$0.7x + 1.2y = -4.4 .$$

(b) If $A = \begin{bmatrix} 2 & -3 & 5 \\ k & 4 & 6 \\ 2 & 0 & 8 \end{bmatrix}$ is Singular matrix, then find k.

Q # 7:- The first term of an A.P. is 5, the last term 45 and sum 400. Find number of terms and common difference in the series.

Q # 8:- You want to receive Rs. 6000 at the end of every three months for five years. Interest is 17.6% compounded quarterly.

(a) How much would you have to deposit at the beginning of the five years period?

(b) How much of what you receive is interest?