[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 2569 **Roll No.....**

Unique Paper Code : 101133

Name of the Course : Bachelor of Business Studies 2013

Name of the Paper : Business Statistics and its Applications

Semester : I

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Q. No. **1** is compulsory.
3. Attempt any **four** questions from **Q2** to **Q6.**
4. Use of non-programmable calculators is allowed.

1. (a) The mean and standard deviation of 100 observations was worked as 40 and 5 respectively by a computer which by mistake took the value 50 in place of 40 for one observation. Recalculate mean and variance. (4)

   (b) The incidence of occupational disease in an industry is such that the workmen have a 25% chance of suffering from it. What is the probability that out of six workmen four or more will contract the disease. (4)

   (c) The coefficient of correlation between two variables X and Y is 0.4 and their covariance is 10. If variance of X series is 9, find variance of Y. (3)

   (d) Construct index numbers of price from the follwong data by applying :

      (i) Laspeyre's method

      (ii) Paasche method

P.T.O.

Commodities	2011		2012	
	Price	Quantity	Price	Quantity
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

(4)

2. Attempt any **3** parts :

(a) Calculate Mean Absolute Deviation (Mean Deviation) for the following series :

X	10	11	12	13	14
f	3	12	18	12	3

(b) 100 executives working in multinational companies were contacted to know their annual emoluments. When summarised, the raw data resulted in the distribution given below. Find the (a) average total annual emoluments (b) median emoluments

Total emoluments (Rs, Lakhs)	02-06	06-10	10-14	14-18	18-22	22-26	26-30
Number of executives	10	15	30	18	12	09	06

(c) For a group containing 100 observations the Arithmetic Mean and Standard Deviation are 8 and $\sqrt{(10.5)}$ respectively. For 50 observations selected from these 100 observations the mean and standard deviation are 10 and 2 respectively. Find the mean and standard deviation for the other half.

(d) If the Arithmetic Mean of the following data is 28, find the missing frequency and the find the median

Profit per shop	0-10	10-20	20-30	30-40	40-50	50-60
Number of shops	12	18	27	?	17	6

(5×3=15)

3. (a) A company has four production sections S1, S2, S3 and S4 which contribute 30%, 20%, 22% and 28% respectively to the total output. It was observed that these sections respectively produced 1%, 2%,3% and 4% defective units, If a unit is selected at random and found to be defective, what is the probability that the unit so selected has come from section one ?

(b) In a distribution exactly normal 7% of items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution ?

(Given $Z_{0.43} = 1.48$; $Z_{0.39} = 1.23$)

(c) The probability that there is at least one error in an accounts statement prepared by A is 0.2 and for B and C they are 0.25 and 0.4 respectively. A, B and C prepared 10, 16 and 20 statements respectively. Find the expected number of correct statements in all. (5×3=15)

4. (a) From the following data calculate the rank correlation coefficient after making adjustment for tied ranks :

X	48	33	40	9	16	16	65	24	16	57
Y	13	13	24	6	15	4	20	9	6	19

(7)

(b) You are given the following data relating to purchases and sales. Obtain the two regression equations by the method of least squares and estimate the likely sales when purchases are equal to 100 :

Purchases	82	72	98	76	81	65	76	92	88	49
Sales	112	124	117	110	132	100	120	136	97	85

(8)

5. (a) Calculate the Fisher's index number for the data given below :

Commodity	Base Year Price (Rs.)	Base Year Quantity (kg.)	Current year price (Rs.)	Current year quantity (kg.)
A	6	50	10	56
B	2	70	2	120
C	4	60	6	60
D	10	30	12	25

See whether this satisfies the time reversal test and factor reversal test. (8)

(b) Below are given figures of production (in '000 quintals) of a sugar factory :

Year	2000	2001	2002	2003	2004	2005	2006
Production ('000 qtl.)	80	90	92	83	94	99	92

Fit a straight line trend to these figures and predict the production of sugar for the year 2008. (7)

6. (a) Calculate Karl Pearson's coefficient of correlation for the following data. Also draw the scatter diagram :

X	14	19	24	21	26	22	15	20	19
Y	31	36	48	37	50	45	33	41	39

(9)

(b) Given the following values :

Year	A	Year	B
1995	$\Sigma p_0 q_0$ = Rs. 20	1998	$\Sigma p_3 q_1$ = Rs. 35
1996	$\Sigma p_1 q_0$ = Rs. 24	1999	$\Sigma p_4 q_1$ = Rs. 43
1997	$\Sigma p_2 q_0$ = Rs. 30	2000	$\Sigma p_5 q_1$ = Rs. 52.5
1998	$\Sigma p_3 q_0$ = Rs. 40	2001	$\Sigma p_6 q_1$ = Rs. 55

(i) Calculate the price indices in A series with q_0 as weights and in B series with q_3 as weights.

(ii) Splice the two series so as to make A a continuous series. (6)

Paper No. 102 2012

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 1136 **Roll No.....**

Unique Paper Code : 101133

Name of the Paper : Business Statistics

Name of the Course : Bachelor of Business Studies

Semester : I

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Q. **1** is compulsory.
3. Attempt any **6** questions out of Q2–Q8.

1. (a) The mean daily sales of a store were Rs. 14,000 for the month of June. During the month, the highest sales were 29,300 and the lowest were 7,580. Find the average daily sales if the highest and lowest sales are not taken into account.

   (b) An urn contains 6 white and 4 red balls, and a second urn contains 5 white and 6 red balls. From one of the chosen urns at random two balls are drawn. Find the probability that they are of different colours.

   (c) The standard deviation of variable X is 2 and for Y it is 5. The coefficient of correlation is 0.8. Find the regression coefficient of X on Y.

   (d) The annual trend equation for a time series data is given as $Y = 24 + 12X$. What will be the equation for a quarterly change in the value of Y.

   (e) The incidence of occupational disease in an industry is such that the workmen have a 20% chance of suffering from it. What is the probability that out of 6 workmen 4 or more will contract the disease. (5X3=15)

2. (a) For the given frequency distribution the mean is 248. Find the missing frequency and the median of the distribution.

P.T.O.

Class Interval	Frequency
100-150	10
150-200	5
200-250	x
250-300	8
300-350	20

(5)

(b) The Indian economy grew at the following rates in the past 5 years

Year	Rate of growth
2006-07	8
2007-08	8.5
2008-09	8
2009-10	7.8
2010-11	6.5

(Given antilog 2.02372 = 105.6; antilog 2.0324 = 107.7; antilog 2.0268 = 106.4). (5)

3. (a) Find the value of quartile deviation and its coefficient from the following data :

X	10	20	30	40	50	80
F	4	7	15	8	7	2

(5)

(b) Calculate Karl Pearson's coefficient of skewness for the data above. (5)

4. (a) Calculate Pearson's coefficient of correlation between the indices of wages and cost of living from the following data. Interpret the value obtained.

Wages	100	101	102	102	100	99
Cost of living	98	99	99	97	95	92

(6)

(b) Calculate Spearman's coefficient of rank correlation for the following data :

X	53	98	95	81	75	61	59
Y	47	25	32	37	30	40	39

(4)

5. From the following data of the age of husbands and the age of wives, obtain the two regression equations. Determine the husband's age if the wife's age is 16.

Husband's age	36	22	25	28	28	31	30	38
Wife's age	28	18	22	20	27	29	27	35

(10)

6. (a) Estimate the production for 2008 using the time series data below (assuming a straight line trend)

Year	1999	2000	2001	2002	2003	2004	2005
Production of TV sets ('000)	17	20	19	26	24	35	40

(6)

(b) What is a centered moving average ? What are the merits and limitations of the moving average method ? (4)

7. (a) Compute the chain index number with 2000 price as base from the following table giving the average wholesale price of the commodities A, B and C for the years 2000 to 2004.

			Average wholesale price (in Rs.)		
Commodities	2000	2001	2002	2003	2004
A	20	16	28	35	21
B	25	30	24	36	45
C	20	25	30	24	30

(6)

(b) What are the different uses of index numbers ? Give examples of some commonly used index numbers. (4)

8. (a) Among 1000 applicants for admission to M.A. economics course, 600 applicants were economics graduates and 400 were non-economic graduates. 30% of economic graduate applicants and 5% of non-economic graduate applicants obtained admission. If an applicant selected at random is found to have been given admission what is the probability that he or she is an economics graduate. (5)

(b) The marks of students are normally distributed. 10% get more than 75 marks and 20% get less than 40 marks. Find the mean and standard deviation of the distribution.

Given below are Z values and respective areas for the question.

Z	0.84	1.28	2.0
Area	0.2995	0.3997	0.4772

(5)

[This question paper contains 6 printed pages.]

9388 *Your Roll No.* .....

BBS / I Sem. – 2011

BUSINESS STUDIES – Paper – 103

(Business Statistics and Applications)

Time : 3 hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any **15** *questions in all.*

1. An incomplete distribution is given below :

Class Interval :	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total
Frequency :	12	30	?	65	?	25	18	229

Find out the missing frequencies if median value is 46.

2. The means and Standard deviation of two brands of light bulbs are given below :

	Brand I	Brand II
Mean	800 hrs	770 hrs
Standard deviation	100 hrs	60 hrs

Calculate a measure of relative dispersion for the two brands and interpret the results.

P.T.O.

3. From the following information, calculate the Combined Standard deviation.

$n_1 = 90$ $\quad \overline{X}_1 = 20$ $\quad \sigma_1 = 8$

$n_2 = 60$ $\quad \overline{X}_2 = 15$ $\quad \sigma_2 = 6$

4. The marks obtained by a students in a class are 25, 20, 15, 45, 18, 7, 10, 38 and 12.

Find the quartiles and Bowley's coefficients of Skewness for the given data and interpret the results.

5. An insurance company insured 2,000 Scooter drivers, 4,000 car drivers and 6,000 truck drivers. The probability of accident is 0.01, 0.03 and 0.15 respectively. One of the insured person meets an accident. What is the probability that he is a scooter driver ?

6. Let the Probability density of X be given by

$$f(x) = \begin{cases} c(4x - 2x^2), & 0 < x < 2 \\ 0 \quad , & \text{otherwise} \end{cases}$$

(a) What is the value of c ?

(b) $P\left\{\frac{1}{2} < X < \frac{3}{2}\right\} = ??$

7. A book of 525 pages contain 42 typographical errors. If there errors are randomly distributed throughout the book, what is the probability that 10 pages, selected at random will have

(i) no error

(ii) 3 error

(iii) atmost 2 error

[Use $e^{-0.8} = 0.45$]

8. The lifetime of a special type of battery is a random variable with mean 40 hrs and standard deviation 20 hrs. A battery is used until it fails, at which point it is replaced by a new one. Assuming a stockpile of 25 such batteries, the lifetimes of which are independent, approximate the probability that over 1100 hrs of use can be obtained.

9. Ten competitors in a beauty contest are ranked by two judges in the following order :

I judge :	1	6	5	10	3	2	4	9	7	8
II judge :	6	4	9	8	1	2	3	10	5	7

Calculate the Spearman's rank correlation coefficients. Is there an association between the ranking.

10. Given $X = 4Y + 5$ and $Y = KX + 4$ are the lines of regression of X on Y and Y on X respectively. If K is positive, prove that it cannot exceed $\frac{1}{4}$.

If $K = \frac{1}{16}$, find the means of two variables and the coefficients of correlation between them.

11. Show by an example that two uncorrelated variables may not be independent.

12. Given below are two price index series. Splice them on the base 1974 = 100. By what percentage did the price of steel rise between 1970 and 1975.

Year	Old price index for steel (Base 1965 = 100)	New price Index for steel (Base 1974 = 100)
1970	141.5	
1971	163.7	
1972	158.2	
1973	156.8	99.8
1974	157.1	100
1975		102.3

13. A textile worker in the city of Mumbai earns Rs. 3500 per month. The cost of living index for a particular month is given as 136. Using the following information,

find out the amount of money he spent on house rent and clothing.

Groups	Expenditure	Group Index
Food	1400	180
Clothing	?	150
House Rent	?	100
Fuel & Lighting	560	110
Miscellaneous	630	80

14. Apply the method of least squares to obtain the trend values by fiting a simple linear trend to the following data and predict the sales for the year 2010 :

Year :	2003	2004	2005	2006	2007
Sales :	100	120	110	140	80

15. Calculate the 3-yearly moving averages of the production figures given below and determine the trend values. Find the short-term fluctuations using multiplicative model.

Year	Production (in '000 tonnes)
1999	15
2000	21
2001	30
2002	36

2003	42
2004	46
2005	50
2006	56
2007	63
2008	70
2009	74
2010	82

16. (a) Briefly explain the utility of Geometric mean.

    (b) State the properties of coefficient of correlation.

17. Write short notes on :

    (a) Purpose of Sampling

    (b) Components of time series

18. (a) Why is standard deviation considered best measure of dispersion ?

    (b) "Graphs and diagrams assist the cause of data analysis." Comment.

[This question paper contains 8+1 printed pages.]

6225 *Your Roll No.* .....

BBS / I Sem. – 2010

BUSINESS STUDIES – Paper 103 (N.S.)

(Business Statistics and Applications)

Time : 3 hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt **Six** *questions in all.*
Question No. **1** *is compulsory.*

1. (a) Examine the validity of the following statements and give reasons for your answer :

(i) The mean and S.D. of a series are 50 and 8 respectively. By adding 2 to each value in the series, the new mean is 52 and new S.D. is 10.

(ii) If one of the regression co-efficients is greater than unity, the other must also be greater than unity. (4)

(b) What characteristic component of time series should each of the following events be associated with :

P.T.O.

(i) Fire in a factory delaying production for 3 weeks.

(ii) Rise in sales of a textile firm during Diwali.

(iii) Need for increase in production of wheat due to consistent rise in population.

(iv) A period of boom in the IT Sector. (2)

(c) The possible returns from a security are as follows :

Return (in %)	10	15	20
Probability	0.3	0.6	0.1

Find the expected return from the security. (2)

(d) If $\beta_1 = +1$, $\beta_2 = 4$ and variance = 9, find the third and fourth moments about the mean. Also, comment on the nature of the distribution. (2)

2. (a) A survey was conducted to study the relationship between expenditure on accommodation (X) and expenditure on entertainment (Y), the following results were obtained :

	Mean	S.D.
Expenditure on accommodation (X)	173	66
Expenditure on entertainment (Y)	47.58	22

Co-efficient of Correlation : 0.57

Find the estimated expenditure on entertainment if the expenditure on accomodation is 200. (6)

(b) Calculate price indices for the year 2010 with year 2005 as the base year using :

(i) Laspeyre's index method

(ii) Paasche's index method

(iii) Fisher's index method

Commodity	Unit	2005		2010	
		Price (in ₹)	Value (in ₹)	Quantity	Value (in ₹)
A	Kg	10	1500	160	1760
B	Kg	12	1080	100	1300
C	Metre	15	900	60	960
D	Packets	9	450	40	480

(7)

3. (a) A financial analyst feels that the chances of rise in the price of shares of company A in the next week are 30% and for a rise in price of shares of company B in the next week are 15%. The prices of shares are independent of each other.

Find the probability that in the next week

(i) Only one company's share price rises.

(ii) Neither company's share price would rise.

(6)

P.T.O.

(b) The equations of the regression lines between two variables X and Y are as follows :

$2X - 3Y = 0$ and $4X - 5Y - 8 = 0$

(i) Identify the regression equation of X on Y and Y on X.

(ii) Find the mean values of the variables X and Y.

(iii) Determine r_{XY}. (7)

4. (a) In a statistical investigation in two villages A and B, the following data was obtained :

Details	Village A	Village B
Number of respondents	600	500
Average income (in ₹)	175	186
S.D. of income (in ₹)	10	9

(i) What is the average income of respondents in Village A and B put together ?

(ii) In which village is the variation in income greater ? (6)

(b) Fit a straight line trend using the method of least squares to the following data :

Year	2002	2003	2004	2005	2006	2007	2008	2009
Earnings (in ₹ crores)	60	70	72	63	74	79	72	80

What would be the predicted earnings for the year 2012 ? (7)

5. (a) In a factory there are 100 skilled, 250 semi-skilled and 150 unskilled workers. It has been observed that on an average a unit length of a particular fabric is woven by a skilled worker in 3 hours, by a semi-skilled worker in 4 hours and by an unskilled worker in 5 hours. After a training of two years, the semi-skilled workers are expected to become skilled and the unskilled workers are expected to become semi-skilled. What will be the change in time required for weaving a unit length of fabric by an average worker, after two years of training ? (6)

(b) The metropolitan airport commission is considering the establishment of limitation on noise pollution around a local airport. At present the noise level per Jet take off in a locality near the airport is normally distributed with a mean of 100 decibels and S.D. of 6 decibels.

(i) What is the probability that a randomly selected jet will generate a noise level greater than 108 decibels in this locality ?

(ii) What is the probability that a randomly selected jet will generate a noise level of 100 decibels ?

(iii) Suppose a regulation is passed that requires jet noise in this locality must be less than 105 decibels 95% of the times. Assuming that S.D. of the noise distribution remains same, what will be the new mean level of noise to comply with the regulation ? (7)

6. (a) Incomplete information from partially destroyed records on cost of living is as follows :

Group	Group Index	Percent of total expenditure
Food	268	60
Clothing	280	Not available
Housing	210	20
Fuel and Electricity	240	5
Miscellaneous	260	Not available

Using the percent of total expenditure as weights, the cost of living index was found to be 255.8. Estimate the missing weights. (6)

(b) A drug manufacturer believes that there is 0.95 chance that Food and Drugs Administration (FDA)

will approve a new drug the company plans to distribute, if the results of current testing show that the drug causes no side effects. The manufacturer further believes that there is a 0.5 chance that the FDA will approve the drug if the test shows that the drug does cause side effects. A physician working for the drug manufacturer believes that there is a 0.2 chance that the tests will show that the drug causes side effects.

(i) What is the probability that the drug will be approved by the FDA ?

(ii) If the drug is approved by the FDA, what is the probability that it causes side effects.

(iii) What is the probability that the drug was approved by FDA and it causes no side effects ? (7)

7. (a) The data in the following table relates the weekly maintenance cost (in ₹) to the age (in months) of ten machines of similar type in a manufacturing company. Determine the regression line of maintenance cost on age of the machine and use this to predict the maintenance cost for a machine which is 40 months old

Machine	1	2	3	4	5	6	7	8	9	10
Age of machine (in months)	5	10	15	20	30	30	30	50	50	60
Weekly Maintenance Cost (in ₹)	190	240	250	300	310	335	300	300	350	395

(6)

(b) Calculate the median, Q_1, Q_3, D_7 and P_{60} from the following data :

Marks (less than)	10	20	30	40	50	60	70	80
Number of Students	4	16	40	76	96	112	120	125

(7)

D. AREA UNDER THE NORMAL CURVE

The entries in the table are the probabilities that a random variable having the standard normal distribution assumes a value between 0 and z; they are given by the area under the curve shaded in the figure shown on the right-hand side.

The Standard Normal distribution.

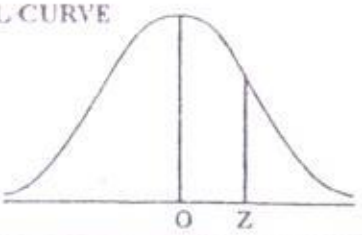

Table of Area

↓Z→	0	1	2	3	4	5	6	7	8	9
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2223
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
.7	.2580	.2612	.2642	.2673	.2703	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4849	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.49.64
2.7	.4965	.4965	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4390	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4947	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4898	.4898
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000