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First Semester MBA Degree Examination, June/July 2011
Statistics for Management

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FOUR full questions from Q.No.1 to Q.No.7.
2. Q.No. 8 is compulsory.

- 1 a. Define statistics. Mention the objectives of statistics. (03 Marks)
 b. Construct a suitable bar diagram for the following data. The number of workers working in three different departments in different companies. (07 Marks)

Company	Departments			Total
	Marketing	HR	Accounts	
A	1200	800	600	2600
B	700	500	600	1800
C	400	700	400	1500

- c. Define and distinguish primary and secondary data. Also, explain briefly the methods of collecting primary data. (10 Marks)
- 2 a. Out of 100 numbers, 20 were 4's, 40 were 5's, 30 were 6's and the remainder 7's. Find the arithmetic mean of numbers. (03 Marks)

Numbers:

X	20	40	30	10
F	4	5	6	7

- b. What is pie-diagram? Draw a pie-diagram to represent the following data: (07 Marks)

Particulars	Amount spent (in 000's)
Food	40
Rent	20
Clothing	20
Education	10
Travel	05
Miscellaneous	05

- c. The information given below relates to the advertisement and sales of a company:

	Advertisement Expenditure (in lakhs)	Sales (in lakhs)
Arithmetic mean	20	100
Standard deviation	3	12

Correlation coefficient = +0.8.

- i) Find the two regression equations
 ii) What should be the advertisement expenditure, if the company wants to reach a sales target of Rs. 120 lakhs? (10 Marks)
- 3 a. Calculate the two regression coefficients when $\gamma = 0.8$, $\sigma_x = 5$ and $\sigma_y = 7$. (03 Marks)
 b. Define mean, median and mode. Also find the value of mode with the help of mean and median of the following frequency distribution. (07 Marks)

Marks	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
No. of students	4	16	48	52	57	18	9	4

- c. The following data relate to the prices and quantities of 4 commodities in the years 2008 and 2009. Construct the following index numbers of price for the year 2009 and taking 2008 as base, i) Laspeyre's index ii) Paasche's index and iii) Fisher's ideal index. (10 Marks)

Commodity	2008		2009	
	Price	Quantity	Price	Quantity
A	5.0	100	6	150
B	4.0	80	5	100
C	2.5	60	5	72
D	12.0	30	9	33

- 4 a. Distinguish between the correlation and regression. (03 Marks)
- b. What is skewness? Calculate the Karl Pearson's coefficient of skewness from the following data and comment on the result. (07 Marks)

Age group (years)	20-25	25-30	30-35	35-40	40-45	45-50	50-55
No. of employees	8	12	20	25	15	12	8

- c. From the prices of shares X and Y given below, state which share prices are more stable?

X(Rs)	55	54	53	53	56	68	52	50	51	49
Y(Rs)	107	106	105	105	107	108	104	103	104	101

(10 Marks)

- 5 a. Define time series. What are its components? (03 Marks)
- b. What is sampling? Explain the different methods of sampling. (07 Marks)
- c. Calculate the quartile deviation and its coefficient for the following data: (10 Marks)

X	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Y	2	10	18	25	20	10	8	7

- 6 a. From the following distribution find the range and the coefficient of range. (03 Marks)

X	6	12	18	24	32	38	46
Y	20	150	100	80	180	1500	700

- b. What do you mean by tabulation of data? Explain the various parts of a table. (07 Marks)
- c. If the average wages paid to 30 workers in Rs.85, find the missing frequencies. (10 Marks)

Wages (Rs.)	50	60	70	80	90	100	110	120
No. of workers	2	4	-	-	7	3	5	1

- 7 a. What is index number? State its uses. (03 Marks)
- b. Define probability. A survey conducted by a bath soap manufacturer of brand 'T' indicates that when men go for shopping, they are likely to buy T, 3 out of 4 times and women when they go for shopping, they are likely to buy brand T, 2 out of 3 times. Find the probability of brand T being bought when men and women shop together, (07 Marks)
- c. With the help of the following data, calculate the trend values by the method of least squares and estimate the sales for the year 2011. (10 Marks)

Years	2000	2001	2002	2003	2004	2005	2006
Sales (in lakhs)	25	27	32	36	44	55	69

- 8 a. Define t-test and F-test. (03 Marks)
- b. What is ANOVA? State the underlying assumptions. (07 Marks)
- c. A simple random sample of size is 49, is drawn from a finite population consisting of 110 units. If the population std. deviation is 14.7, find the standard error of sample mean when the sample is drawn i) with replacement and ii) without replacement. (10 Marks)

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First Semester MBA Degree Examination, June/July 2011
Statistics for Management

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Use of statistical table is permitted.

- 1 a. List the different stages involved in statistical investigation. (03 Marks)
 b. What do you mean by the term “Quartile deviation”? The mean of 5 observations is 15 and the variance is 9. If two more observations having values -3 and 10 are combined with these 5 observations, what will be the revised mean and variance of 7 observations? (07 Marks)
 c. For the following data given in table below, calculate the median, first quartile and seventh decile: (10 Marks)

Overtime hours	10-15	15-20	20-25	25-30	30-35	35-40
No. of employees	11	20	35	20	8	6

- 2 a. What do you mean by the term “measures of dispersion”? (03 Marks)
 b. For the following data given below, find the mean salary paid to the workers.

Income Group	800-1000	1000-1200	1200-1400	1400-1600	1600-1800
No. of firms	40	32	26	28	42
No. of workers	8	12	8	8	4

- c. What are the differences between primary and secondary data? List the sources of primary and secondary data and explain any one of primary sources. Also list any six business applications of statistics. (10 Marks)
- 3 a. What is meant by the terms “coefficient of correlation” and “coefficient of determination”? (03 Marks)
 b. Fit a straight line trend by the method of least squares and estimate the arrival in the year 2013, for the data indicated in the table below:

Year	2003	2004	2005	2006	2007	2008	2009
Tourists arrivals	18	20	23	25	24	28	30

- c. For the following data, calculate “Karl Pearsons’s coefficient” of skewness. (10 Marks)

Class	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Frequency	5	15	28	42	15	12	3

- 4 a. Express the relationship between arithmetic mean, geometric mean and harmonic mean. (03 Marks)
 b. For the following data, represent in percentage sub-divided diagram. (07 Marks)

Item	Family A	Family B
Food	5550	7280
Cloth	5100	6880
Rent	4800	6480
Fuel	4740	6320
Education	4950	6640
Others	4860	6400
Monthly Total Income	30000	40000

Important Note : 1. On completing your answers compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8=50, will be treated as malpractice.

- c. The life times of electronic devices have a mean life of 300 hours and standard deviation of 25 hours. Assuming the distribution to be normal, calculate the following:
- The probability of life time more than 350 hours.
 - What percentage will have life time less than 300 hours?
 - What percentage will have life time between 220 hours to 260 hours? (10 Marks)

- 5 a. What do you mean by time series analysis? List the components of it. (03 Marks)
- b. Calculate the Karl Pearson's coefficient of correlation and interpret it for following data:

No.	1	2	3	4	5	6	7	8	9	10
Age	30	32	35	40	48	50	52	55	57	61
Sick(Days)	1	0	2	5	2	4	6	5	7	8

(07 Marks)

- c. The responses of TV viewers are given in the following table. Do this data indicate the relationship between gender and opinion in the population interest?
Given critical value $\chi^2_{0.05} = 5.99$. (10 Marks)

Gender	Opinion		
	Entertainment	Educational	Waste of time
Female	52	28	30
Male	28	12	50

- 6 a. What is the difference between the continuous and discrete random variable? (03 Marks)
- b. Discuss briefly the different stages involved in Hypothesis testing. (07 Marks)
- c. For the following data find:
i) Laspeyre's index ii) Pasche's index iii) Fisher's ideal index.

Commodity	2008		2009	
	Price	Quantity	Price	Quantity
A	20	08	40	06
B	50	10	60	05
C	40	15	50	15
D	20	20	20	25

(10 Marks)

- 7 a. What do you mean by "Null hypothesis"? How it is different from "alternate hypothesis"? (03 Marks)
- b. What is sampling? Discuss briefly any two methods of probability and non-probability sampling methods. (07 Marks)
- c. A firm believes that Brand A tyres are better than Brand 'B' tyres. To test this belief, random samples were tested and results are tabulated below. Test the belief of a firm at 5% significance level. Clearly mention null and alternate hypothesis. (10 Marks)

Brand	Sample size	Average life (km)	Std. deviation (km)
A	50	22,400	1000
B	50	21,800	1000

- 8 a. List the differences between Type I and Type II errors. (03 Marks)
- b. For a group of 50 male workers, the mean and SD of their monthly wages are Rs. 6300 and Rs. 900 respectively. For a group of 40 female workers these are Rs. 5400 and Rs. 60 respectively. Find the S.D. of monthly-wages for combined group of workers. (07 Marks)
- c. The retail prices of commodity at three principal cities are indicated in the table. Do these data indicate that the price in the three cities are significantly different? Test hypothesis at 5% level of significance. Given that $F_{critical} = 4.26$ (10 Marks)

Mumbai	16	8	12	14
Kolkata	14	10	10	6
Delhi	4	10	8	8

- 3 a. Define correlation and regression. (03 Marks)
- b. A company has two plants to manufacture scooters. Plant I manufactures 80% of the scooters and plant II manufactures 20%. At plant I, 85 out of 100 scooters are rated standard quality. At plant II, 65 out of 100 scooters are rated standard quality.
- i) What is the probability that scooter selected at random came from plant I, if it is known that the scooter is of standard quality.
- ii) What is the probability that scooter selected at random came from plant II, if it is known that the scooter is of standard quality. (07 Marks)
- c. The following table gives the distribution of monthly income of 600 families in a city.

Monthly income (Rs)	No. of families
Below 75	60
75 – 150	170
150 – 225	200
225 – 300	60
300 – 375	50
375 – 450	40
450 and above	20

Draw a 'lessthan' and 'morethan' ogive curves for the above data on the same graph and from these read the median income. (10 Marks)

- 4 a. Differentiate between the primary and secondary data. (03 Marks)
- b. A firm believes that the tyres produced by process 'A', on an average last longer than tyres produced by process 'B'. To test this belief, random samples of tyres produced by the two processes were tested and results are :

Process	Sample size	Average life time (in km)	Standard deviations (in km)
A	50	22,400	1000
B	50	21,800	1000

Is there evidence at 5% of level of significance that the firm is correct in its belief?

($Z_{\alpha/2} = \pm 1.645$ at 5% level of significance).

(07 Marks)

- c. Explain the procedure in testing the null hypothesis. (10 Marks)
- 5 a. Write any three uses of index numbers. (03 Marks)
- b. The data on prices (Rs. Per kg) of a certain commodity during 2005 to 2009 are shown below. Compute the seasonal indexes by the average percentage method. (07 Marks)

Quarter	Year				
	2005	2006	2007	2008	2009
1	45	48	49	52	60
2	54	56	63	65	70
3	72	63	70	75	84
4	60	56	65	72	66

- c. Two hundred randomly selected adults were asked whether TV shows as a whole are primarily entertaining, educational or a waste of time. The respondents are categorized by gender. Their responses are given in the following table :

Gender	Opinion			Total
	Entertaining	Educational	Waste of time	
Male	52	28	30	110
Female	28	12	50	90
Total	80	40	80	200

Is this evidence convincing that there is a relationship between gender and opinion in the population interest? (10 Marks)

- 6 a. A bag contains 6 red and 9 green balls. If two balls are drawn at random, what is the probability of one ball being red and other green? (03 Marks)
- b. For the given set of 10 observations, find rank correlation coefficient. (07 Marks)

X	5	4	3	8	10	6	6	7	8	5
Y	6	2	1	5	6	3	9	8	10	7

- c. What is sampling : explain the different sampling methods. (10 Marks)
- 7 a. Define probability distribution. (03 Marks)
- b. Calculate Fisher's ideal index number from the given data : (07 Marks)

Commodity	Current year, 2010		Base year, 2009	
	Price	Value	Price	value
A	12	48	10	30
B	15	75	15	60
C	8	96	5	50
D	3	24	2	10

- c. In two factories A and B engaged in the same industry, the average weekly wages and standard deviations are as follows :

Factory	Average weekly wages in Rs.	S. D of wages in Rs.	No. of wages earners.
A	460	50	100
B	490	40	80

- i) Which factory pays higher amount as weekly wages?
- ii) Which factory shows greater variability in the distribution of wages?
- iii) What is the mean and standard deviation of all the workers in two factories taken together? (10 Marks)
- 8 a. List out the components of time series. (03 Marks)
- b. The mean weight of life of certain cutting tool is 41.5 hours, with standard deviation of 2.5 hours. What is the probability that simple random sample of size 50 drawn from this population will have a mean between 40.5 and 42 hours? (07 Marks)
- c. As head of the department of a consumer's research organization, you have the responsibility for testing and comparing lifetimes of four brands of electric bulbs. Suppose you test the lifetime of three electric bulbs of each of the four brands, the data are shown below, each entry representing the lifetime of an electric bulb, measured in hundreds of hours. (10 Marks)

Brand A	Brand B	Brand C	Brand D
20	25	24	23
19	23	20	20
21	21	22	20

Can we infer that the mean lifetimes of the four brands of electric bulbs are equal?
