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Question Paper Code : BS2002

M.B.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2017.

First Semester

DBA 1602 – STATISTICS FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are mutually exclusive and exhaustive events?
2. Three cards are drawn in succession from a deck without replacement. Find the probability distribution for the number of spades?
3. What are the qualities of a good estimate?
4. What is sampling? Why is sampling necessary?
5. Define null and alternate hypotheses.
6. Define independence of attributes.
7. How do the non-parametric methods differ from parametric methods?
8. When is Mann-Whitney 'U' test used?
9. Distinguish between correlation and regression.
10. What is time series? Give two examples.

PART B — (5 × 16 = 80 marks)

11. (a) Mr. X is in charge of the electronics section of a large department store. He has noticed that the probability that a customer who is just browsing will buy something is 0.3. Suppose that 15 customers browse in the electronics section each hour.
 - (i) What is the probability that at least one browsing customer will buy something during a specified hour? (5)
 - (ii) What is the probability that no browsing customer will buy something during a specified hour? (5)
 - (iii) What is the probability that no more than 4 browsing customer will buy something during a specified hour? (6)

Or

- (b) A soft drink machine is regulated so that it discharges an average of 200 millilitres per cup. If the amount of drink is normally distributed with a standard deviation equal to 15 millilitres,
- (i) What fraction of the cups will contain more than 224 millilitres? (5)
 - (ii) What is the probability that a cup contains between 191 and 209 millilitres? (5)
 - (iii) How many cups will probably over flow if 230 millilitres cups are used for the next 1000 drinks? (6)
12. (a) (i) For a particular brand of TV picture tube, it is known that the mean operating life of the tubes is 1000 hours with a standard deviation of 250 hours, what is the probability that the mean for a random sample of size 25 will be between 950 and 1050 hours? (8)
- (ii) A manufacturer of watches has determined from experience that 3% of the watches he produces are defective. If a random sample of 300 watches examined, what is the probability that the proportion defective is between 0.02 and 0.035? (8)

Or

- (b) (i) The average travel time taken based on a random sample of 10 people working in a company to reach the office is 40 minutes with a standard deviation of 10 minutes. Establish the 95% confidence interval for the mean travel time of everyone in the company to design the working hours. (8)
- (ii) The university is considering raising tuition fees to improve college facilities and they want to determine what percentage of students favour the increase. The university needs to be 90% confident that the percentage has been estimated to within 2% of the true value. How large a sample is needed to guarantee this accuracy regardless of the true percentage? (8)
13. (a) (i) A trucking firm suspects the claim that the average lifetime of certain tyres is at least 28000 miles. To check the claim, the firm puts 40 of these tyres on its trucks and gets a mean lifetime of 27,463 miles with a standard deviation of 1,348 miles. What it can conclude if the probability of a Type I error is to be at most 0.01? (8)
- (ii) A large automobile manufacturing company is trying to decide whether to purchase brand A and brand B tyres for its new models. To help arrive at a decision an experiment is conducted using 12 of each brand. The tyres are run until they wear out. The results are:
- Brand A: $\bar{x}_1 = 37,900$ kilometers, $s_1 = 5,100$ kilometers
- Brand B: $\bar{x}_2 = 39,800$ kilometers, $s_2 = 5,900$ kilometers
- Test the hypothesis at the 0.05 level of significance that they have equal variance of two brands. (8)

Or

- (b) Fit a Poisson distribution to the following data and test the goodness of fit. (16)

$\underline{x}:$	0	1	2	3	4	5	6
$\underline{f}:$	275	72	30	7	5	2	1

14. (a) Use Kruskal-Wallis test to test for difference in mean among the three samples. If $\alpha = 0.01$, what are your conclusions.

Sample 1 : 95 97 99 98 99 99 99 94 95 98

Sample 2 : 104 102 102 105 99 102 111 103 100 103

Sample 3 : 119 130 132 136 141 172 145 150 144 135

(16)

Or

- (b) Calculate the coefficient of rank correlation from the following data.

X: 48 34 40 12 16 16 66 25 16 57

Y: 15 15 24 8 13 6 20 9 9 15

(16)

15. (a) Calculate the coefficient of correlation and obtain the line of regression for the following data.

$\underline{X}:$ 1 2 3 4 5 6 7 8 9

$\underline{Y}:$ 9 8 10 12 11 13 14 16 15

Obtain an estimate of Y which should correspond to the value $X = 6.2$.

(16)

Or

- (b) Explain the various components of time series analysis with suitable examples. (16)

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Question Paper Code : K1002

M.B.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2016.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours

Maximum : 100 marks

Statistical Table may be provided.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the Properties of a probability Distribution.
2. Define Axiomatic Probability.
3. Write a note on Sampling distribution and Standard Error.
4. What are the Properties of a Point Estimator?
5. Write short note on One and two tail tests.
6. Explain the Test for Single mean in Small Samples.
7. Write a note on One sample run test.
8. What is Rank Sum Test?
9. List out the Properties of Regression Coefficients.
10. What are the components of Time Series?

PART B — (5 × 16 = 80 marks)

11. (a) A corporate hospital is interested in the survey of individuals regarding the occurrence of a health problem in a particular area of Hyderabad City. There are 250 respondents classified according to income, containing high Blood Pressure (BP), Containing Heart problem

Complaint	Respondents' Annual income			
	Rs.8,00,000 or less		Above Rs.8,00,000	
	High BP	No High BP	High BP	No High BP
Heart problem	54	40	36	20
No Heart problem	36	20	24	20

- (i) What is the probability of obtaining a respondents who has a Heart problem in drawing at random?
- (ii) If a respondent has income over Rs.8,00,000 and having High BP, what is the probability that he has a Heart problem?
- (iii) What is the conditional probability of drawing a respondent who has a Heart problem given that the he is having High BP?
- (iv) Are the events having 'Heart problem and having 'High BP' statistically independent?

Or

- (b) (i) Define a Binomial Distribution? What are its Characteristics? Under what conditions a Binomial Distribution tend to a Poisson Distribution?
 - (ii) In a corporate hospital, 2.5% of the days account for a daily collection of Rs.25,00,000 or more. On 34% of the days, the daily collection is Rs.13,00,000 or below. Estimate the average daily collection and Standard Deviation of this business. Assume the daily collection follows a Normal Distribution.
12. (a) (i) Compare and contrast random and non random sampling methods. Which sampling method do you prefer and why?
- (ii) How do you determine sample size?

Or

- (b) A finite population is {1, 2, 3, 4, 5}.
 - (i) Take a random sample of size "2" and show that the sample mean is an unbiased estimator for the population mean.
 - (ii) Take a random sample of size "3" and show that the sample mean is an unbiased estimator for the population mean.
 - (iii) Show that sample size of "3" is efficient when compared to a sample of "2".

13. (a) (i) The manufacturer of a 'Spot Remover' claims that his product removes at least 90% of all spots. What can be concluded about the claim if the spot remover removed only 274 spots out of 300 spots chosen at random from spots on cloth from a Dry Cleaning unit of a Five Star Hotel?

- (ii) Information on two brands of fluorescent bulbs is given below. Is there any significant difference in the quality of the two brands?

Brand	Mean life	Standard deviation	Sample size
A	2000 hours	250 hours	12
B	2230 hours	300 hours	15

Or

- (b) The following information is available with regard to Customer Satisfaction across different age groups. What can be said about the level of satisfaction and age? Use $\alpha = 5\%$ LOS.

Age (years)	Level of satisfaction		
	Low	Moderate	High
Below 25	125	330	300
25 to 45	150	240	340
45 to 60	150	200	150
Above 60	85	150	100

14. (a) The scores of a written examination using three different methods, are given below.

Video	64	78	72	83	45	60	56	65	68
Audio	68	70	55	47	79	63	68	76	70
E-Class	58	73	40	81	74	67	84	71	92

Test at $\alpha = 5\%$ LOS, whether the three methods of training yield the same result using Kruskal-Wallis test.

Or

- (b) (i) Discuss in detail about Mann-Whitney test with suitable examples.
(ii) What is the utility of rank correlation?

15. (a) Fit two linear regression lines and comment on correlation between the variables.

X	70.4	73.8	75.3	75.1	73.6	75.3	72.7	75.6	71.8	78.1
Y	4.2	1.2	2.6	4.0	2.8	1.8	2.8	3.4	3.6	6.2

Or

(b) Find 4 yearly Moving averages and comment.

Year	Income (Rs.)	Year	Income (Rs.)
1997	110	2005	108
1998	146	2006	114
1999	78	2007	122
2000	105	2008	135
2001	109	2009	156
2002	120	2010	143
2003	115	2011	150
2004	110	2012	142

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Question Paper Code : S1002

M.B.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2016.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours

Maximum : 100 marks

(Use of Statistical Tables are Permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the rules for probability?
2. How will you define Axiomatic probability?
3. What is Central limit theorem?
4. Define Sampling distribution.
5. State the Alternative hypothesis.
6. When do you use Z-test?
7. What is Goodness of fit?
8. Define Rank correlation.
9. What is Seasonal variations?
10. Define Ideal Index.

PART B — (5 × 16 = 80 marks)

11. (a) Three groups of children contain respectively 3 girls and 1 boy; 2 girls and 2 boys; 1 girl and 3 boys. One child is selected at random from each group. Show that the chance that the three selected consists of 1 girl and 2 boys is $13 / 32$.

Or

- (b) A sub-committee of 6 members is to be formed out of a group consisting of 7 men and 4 women. Calculate the probability that the sub-committee will consist of (i) exactly 2 women; and (ii) at least 2 women.

12. (a) A random sample of $n = 25$ was selected from a normally distributed population. The population mean is 106 and standard deviation is 12. (i) Find the standard error of the sampling distribution. (ii) What is the probability that the sample mean is greater than 100? (iii) What is the probability that the sample mean will be within \pm from the population mean?

Or

- (b) A random sample of 100 students belonging to a college was taken. It was found that the mean height of these students was 168.75 cm. What should be the confidence intervals for estimating the mean height of the entire population of students at (i) 90% (ii) 99% assuming the population standard deviation as 7.5 cm?
13. (a) A brand manager is concerned that her brand's share may be unevenly distributed throughout the country. In a survey in which the country was divided into four geographic regions, a random sample of 100 consumers in each region was surveyed with the following results.

	Regions			
	A	B	C	D
Purchase the brand	40	55	45	50
Do not purchase	60	45	55	50

Test whether the brand share is the same across the four regions using chi-square test.

Or

- (b) A company has devised three training methods to train its workers. It is keen to know which of these three training method would lead to greatest productivity after training. Given below are productivity measures for individual workers trained by each method.

<i>Method 1</i>	30	40	45	38	48	55	52
<i>Method 2</i>	55	46	37	43	52	42	40
<i>Method 3</i>	42	38	49	40	55	36	41

Find out whether the three training methods lead to different levels of productivity at the 0.05 level of significance.

14. (a) A company has introduced a new drug B to cure common cold. It is being compared against an existing drug A. The relevant data are shown below :

	Helped	Harmed	No effect	Total
Drug A	44	10	26	80
Drug B	52	10	15	80
Total	96	20	44	160

Is the new drug more effective in curing cold?

Or

- (b) The management of the Punjab National Bank wants to test the effectiveness of an advertising company that is intending to enhance the awareness of the bank's service features. It administered a questionnaire before the advertising campaign, the bank administered the same questionnaire to the same group of people. Both the before and after advertising campaign scores are given in the following table.

Consumer :	1	2	3	4	5	6	7	8	9	10
Before :	82	81	89	74	68	80	77	66	77	75
After :	87	84	84	74	78	81	79	81	81	89

Using Wilcoxon matched-pairs test, test the hypothesis that there is no difference in consumer awareness of bank services offered after the advertising campaign.

15. (a) From the following data, obtain the two regression equations :

<i>Sales :</i>	91	97	108	121	67	124	51	73	111	57
<i>Purchases :</i>	71	75	69	97	70	91	39	61	80	47

Or

- (b) Calculate the quarterly trend values by the method of least squares for the following quarterly data for the last five years given below :

<i>Year</i>	<i>I Qt.</i>	<i>II Qt.</i>	<i>III Qt.</i>	<i>IV Qt.</i>
1995	60	80	72	68
1996	68	104	100	88
1997	108	152	136	124
1998	160	184	172	167

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Question Paper Code : 80002

M.B.A. DEGREE EXAMINATION, AUGUST 2015.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours

Maximum : 100 marks

(Statistical table may be provided.)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give two examples for conditional probability?
2. Give two examples for a random variable.
3. Distinguish between a discrete and a continuous probability distribution.
4. Distinguish between a point and an interval estimates for population parameters.
5. Why are hypothesis framed?
6. Distinguish between a parametric and a non parametric test.
7. Give two uses for rank correlation.
8. Why is rank sum tests called so?
9. What is nonsense correlation?
10. How are irregular variations of time series removed in time series analysis?

PART B — (5 × 16 = 80 marks)

11. (a) Two firms A and B show quality problems in supplying a component to a single customer as 20% and 10% respectively. A randomly picked component happens to be defective. What are the chances that it was from supplier A? If another randomly picked component was good, what are the chances that it was from supplier B?

Or

- (b) A firm receives 100 lots of components from a supplier. Each lot has 3% defects on an average, following a poisson distribution. What are the chances of a lot having 4% defectives? How many lots will have less than 4% defectives? What are the chances of a firm having less than 2% defectives.

12. (a) What is a sampling distribution? How is central limit theorem useful in using sampling distributions. Give the mathematical expression for making point and interval estimates of means and proportions using appropriate symbols?

Or

- (b) Why are samples taken? Distinguish between small and large samples. Distinguish between probability and non probability sampling. How is sample size determined for any study measuring means and proportions?
13. (a) Two classes are studied for academic performance, It yields the following statistical data :

	Number	Mean	Standard deviation
Class A	45	73.5	2.5
Class B	55	67	3

Test whether both classes have a similar aggregate %.

Specify the hypothesis, perform the necessary test and discuss the result appropriately. Use relevant statistical tables.

Or

- (b) Distinguish chi square test used for goodness of fit and association of variables. A certain group of customers was researched to test the impact of gender on choice of a hobby. The results are tabulated below.

	Watching Serials	Reading books	Chatting on whatsapp
Male	15	45	30
Female	35	10	30

Do a chi square test of association and check whether gender has an impact on the choice of hobby. Also compute the contingency coefficient of association.

14. (a) The sales of two products is recorded for a one week period.

	1	2	3	4	5	6	7
Prod A	35	45	60	70	60	15	5
Prod B	25	27	40	50	50	30	5

Use sign test to determine which product has sold better over the week.

Or

- (b) The expenditure of three customers in a shopping mall is recorded (in Rs) during their visits to the mall using a pèople meter. The data is tabulated below

Customer A: 500 540 600 300 250 270 650

Customer B: 400 1000 200 150 170 125

Customer C: 900 950 970 650 600 850 900 770

Use Kruskal Wallis to test whether all three customers are spending a similar amount of money inside the Mall. Use relevant statistical tables.

15. (a) A certain department is trying to improve quality. Data is collected monthly on the time spent in quality improvement initiatives (in minutes) and the average defects in the department over 10 days (in %). This is tabulated below.

	1	2	3	4	5	6	7	8	9	10
Time	45	55	35	20	20	120	60	50	40	20
Defects	5	4	7	10	12	2	3	3	4	4

Estimate the regression equation of defect % as a function of the daily time spent on quality efforts. If 65 minutes is spent on quality efforts, what level of defects do you foresee?

Or

- (b) Explain the various components of a time series. What is the difference between a multiplicative and an additive model of time series. Distinguish between cyclic component and a seasonal component. What are the tools used to estimate each component? Give two examples for each component in real life.
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Question Paper Code : 22004

M.B.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2015.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

(Statistical Table may be provided)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is classical probability? How is it different from statistical probability?
2. What is posterior probability?
3. What is the use of central limit theorem?
4. Distinguish between point and interval estimates of a population parameter.
5. What is a hypothesis?
6. When is a sample considered to be a large sample?
7. When are non parametric tests used?
8. Give two uses for rank correlation in real life situations.
9. How is the accuracy of regression measured?
10. Give two examples for the use of time series analysis.

PART B — (5 × 16 = 80 marks)

- 11 (a) Box A has 5 red and 6 blue balls. Box B has 9 red and 4 blue balls. A ball is picked from each box. What is the probability that both are not red? A ball picked from one of the boxes happens to be blue. What are the chances that it is from box B?

Or

~~11.~~ The number of ice creams ordered by students follows a Poisson distribution with a mean of 3. What are the chances that a student does not order any ice creams? What are the chances of the student ordering at least three ice creams? What are the chances of the student ordering between 2 and 4 ice creams?

12. (a) Describe the various types of sampling techniques being used in studies. Distinguish between probability and non probability sampling methods.

Or

(b) 50 boxes of bananas are tested. They have an average weight of 101kg with standard deviation of 4kg. The number of bananas in each box is 303 with a standard deviation of 20 bananas. Estimate the average weight of a banana box and the average number of bananas in each box at 90% confidence level. If the confidence level is to be increased to 95%, what will the new sample size be?

13. (a) Two groups of sweets are sampled. Sweet A study has 50 cans. Each can has an average weight of 110g and a standard deviation of 10g. Sweet B study has 70 cans and shows an average weight of 110g with a standard deviation of 5g. Write down the hypothesis and test whether both sweets have similar weights.

Or

(b) A certain class of 75 is studied for preference towards two sweets, rasgulla and gulab jamun among boys and girls. The results are tabulated.

	Rasgulla	Gulab Jamun
Boys	20	10
Girls	15	30

Use chi square test of association to test whether gender has an association with preference towards a particular type of sweet.

14. (a) Two cities are compared for rainfalls during the past few years (in mm per year)

City A : 500,400,650,300,150,700

City B : 150,200,300,124,379,400,244,350

Use Mann whitney test to find out whether both cities have similar rainfalls.

Or

- (b) A certain country is studied to check the influence of rainfall on GDP growth.

Year :	1	2	3	4	5	6
Rainfall (mm/year) :	600	300	750	800	400	375
GDP Growth (%) :	6	2	9	13	4	5

Test using rank correlation whether rainfall has any impact on the GDP growth of the country:

15. (a) A certain industry is studied to test the impact of advertisement on sales over a few years. The results are tabulated below.

Year :	1	2	3	4	5	6	7
Advertisement (Rs. Cr) :	35	50	70	25	30	15	85
Sales (Rs. Cr) :	400	800	950	500	550	400	950

Find the Karl Pearson's coefficient of correlation and comment on the impact of advertisements on the sales.

Or

- (b) A certain vegetable is studied for sales over a six year period. The results are tabulated below.

Year :	1	2	3	4	5	6
Sales :	250	300	400	375	550	300

Find the equation for the trend line. Does the vegetable sale show any other time series component?

Reg. No.

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Question Paper Code : 46002

M.B.A. DEGREE EXAMINATION, AUGUST 2014.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours

Maximum : 100 marks

(Use of statistical table permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is conditional probability?
2. What is a random variable?
3. Why are samples taken?
4. What is sampling error?
5. What is type I error?
6. When is a one sample t-test done?
7. Distinguish between parametric and non parametric tests.
8. Write down the hypothesis for a Man Whitney test assuming relevent variables.
9. How is the accuracy of a regression equation measured?
10. What are the various components of time series analysis?

PART B — (5 × 16 = 80 marks)

11. (a) One hundred people are observed in three cities A,B and C each. For obesity. 40, 60 and 70 people are found to be obese in cities A,B and C respectively. A person from one of the cities happens to be obese. What are the chances that he is from city A of City B but not city C.

Or

- (b) A certain computer lab gets 3 virus attacks on an average every month. Assuming the virus attacks to follow a Poisson distribution, estimate the chances of having less than two virus attacks a month. What are the chances of having an attack free month? What are the chances that the number of attacks is between 1 and 4?
12. (a) A certain population is sampled for IQ levels. From a sample of 150 people, the average IQ was found to be 120, with a standard deviation of 12.5. Estimate the average range of IQ of the population assuming 90%, 95% and 99%. Estimate the confidence level of an IQ range of 110 to 130.

Or

- (b) A certain population is studied for age, height and weight. It is desired to estimate the three parameters with an accuracy of 1 year, 3cm and 1.5 kg respectively. If the standard deviations of the three parameters are 3.5 years, 4cm and 5kg, determine the sample size of the study if the confidence interval expected is 95%.
13. (a) A certain die is tossed 96 times and the results of the tosses are recorded in the following table.

Result of throw	1	2	3	4	5	6
Frequency	12	13	17	17	18	19

Use the chi square test 5% significance level to test whether the die is a fair die.

Or

- (b) A certain group of people are sampled for the number of complaints per month. The complaint levels are segregated by gender as follows
- Female : 25, 27, 35, 15, 20, 27, 37
- Male : 5, 10, 10, 12, 10, 7, 6
- Do female members have an average of 20 complaints a month? Do the male members have an average of 10 complaints a month? Do both male and female members have the same tendency to complain?
14. (a) The marks of 7 students in two subjects-English and Maths is given below:

Student	1	2	3	4	5	6	7
English	70	65	80	55	70	75	50
Maths	50	95	90	65	70	70	75

Use sign test to test whether students score similar marks in both subjects.

Or

- (b) The following are the ranks given to five contestants in a singing competition by two judges.

Contestant	A	B	C	D	E
Judge 1	1	2	5	4	3
Judge 2	2	3	1	4	5

Use rank correlation to determine whether the judges agree with each other in deciding the best singer.

15. (a) A certain company has observed the advertising expense and the sales figures and has generated the table given below.

Advertising expense (Rs. lakhs)	3.4	4.5	5.5	6.5	4.8
Sales (Rs. lakhs)	680	800	1000	1100	1200

Find the regression equation of sales as a function of the advertising expense. If the advertisement spend happens to be Rs.5 lakhs, estimate the sales.

Or

- (b) The sales of a product quarter wise (Rs crores) is as follows.

Year/Quarter	Q1	Q2	Q3	Q4
1	20	40	10	100
2	25	45	12	150
3	30	45	15	160
4	35	50	20	180

Estimate the seasonal components for each of the quarters. Also estimate the sales for Q1 in the fifth year.

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Question Paper Code : 96002

M.B.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2014.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is conditional probability?
2. State the Baye's theorem.
3. State the central limit theorem.
4. Name any two commonly used sampling techniques.
5. What is a strong hypothesis?
6. Distinguish between a t-test and a z-test.
7. Give two advantages of using a non parametric test.
8. Mention the formula used to calculate the U-statistic in the Mann-whitney test.
9. What is the implication of weak correlation between two variables?
10. What is an irregular variation in time series data?

PART B — (5 × 16 = 80 marks)

11. (a) Two boxes B1 and B2 contain red, blue and green coloured balloons. B1 has 6 red, 5 green and 10 blue balloons. B2 has 4 red, 3 blue and 7 green balloons. A balloon picked from one of the boxes happens to be green. What are the chances that it originated in box B1? If a blue balloon breaks in box B2, and we get the same result on picking a balloon in one of the boxes, measure the change in probability of it coming from B1.

Or

- (b) A class of students has an average weight of 77 kg with a standard deviation of 12. What are the chances of a student weighing less than 65 kg? What are the chances that a student is heavier than 93 kg? What are the chances of a student weighing in the range between 59 kg and 73 kg?
12. (a) Describe the different types of sampling methods used in statistics and research.

Or

- (b) A certain batch of sweets was weighed. The average weight of the 250 boxes was 970g and standard deviation was 75g. At 95% confidence level, estimate the interval within which any box of sweets is likely weigh. How will this interval change if the confidence level is reduced to 90%?
13. (a) Two towns are studied for their income levels.
 Town A : $\mu = \text{Rs. } 15,000$, $\sigma = \text{Rs. } 4,000$
 Town B : $\mu = \text{Rs. } 10,000$, $\sigma = \text{Rs. } 1,000$
 Test whether both towns have similar salary levels per month.

Or

- (b) Data is collected about a certain community and experiments are conducted to test the association between drinking habit and crimes committed. 195 members are studied. Test the association between the drinking habit and tendency to commit crimes. Use chi square test.

	Crimes committed	No crimes committed
Drinkers	80	10
Non Drinkers	15	90

14. (a) Two shops are studied for sales of Dizzy cola drink (no of bottles). Use sign test to determine which shop is selling more.

	Mon	Tue	Wed	Thu	Fri
Shop A	400	200	300	170	230
Shop B	150	450	600	550	450

Or

- (b) In a cooking competition Two judges have ranked five participants as follows. Use rank correlation to determine whether the two judges are agreeing with each other sufficiently.

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Judge 1	1	2	3	4	5
Judge 2	3	2	4	5	1

15. (a) A certain product sales (in '000) are measured against the money spend advertisement (in Rs. '000). Estimate the regression equation of sales as a function of the money spent on advertisement. What will the sales be if the money spent on advertisement is Rs. 28,000?

Advertisement 33 40 5 25 30
(Rs. in '000)

Sales 700 900 300 800 1100
(in '000)

Or

- (b) Explain the various components used in time series analysis along with the methods and formulae used to estimate each component.

Reg. No. :

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Question Paper Code : 86002

M.B.A. DEGREE EXAMINATION, AUGUST 2013.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

(Please provide statistical table)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Given below are the weekly wages (in Rs.) of six workers in a factory. 1620, 1900, 1780, 1850, 1790, 1680.
If two of these workers are selected at random to serve as representatives, what is the probability that at least one will have lower than average.
2. What is the chance of drawing, without bias four aces successively from a pack of 52 cards?
3. The diameter of shafts produced in a machine follows normal distribution with the variance of 81 mm. A random sample of 36 shafts taken from the production has its mean diameter of 30 mm. Find the confidence interval for the diameter of shafts at a significance level of 0.05.
4. Suppose we know that the weight of cement in filled bags is distributed normally with a standard deviation σ of 0.2 Kg. We want to know how large a sample should be taken so that the mean weight of cement in filled bag can be estimated within plus or minus 0.05 kg of the true value with a confidence level of 90%.
5. A machine puts out 10 imperfect articles in a sample of 200. After the machine is overhauled it puts out 4 imperfect articles in a batch of 100. Is there any significant difference between proportion of defective articles before and after overhauling? Use significance level equal to 0.05.
6. In a hospital, in a certain week 50 babies were born in which 30 were male babies and 20 female. Test the hypothesis that the ratio of male and female births are in the ratio 1:1 by chi-square test. Use significance level of 0.05.
7. Explain Whitney U Test?
8. Give brief account of One-Sample Test?
9. What is the distinction between positive and negative correlation?
10. What are the main methods of calculating co-efficient of correlation?

PART B — (5 × 16 = 80 marks)

11. (a) A manufacturing firm produces steel pipes in three plants with daily production volumes of 500, 1000, and 2000 units respectively. According to the past experience, it is known that the fraction of defective output produced by the three plants are respectively 0.005, 0.006 and 0.010. If a pipe is selected from a day's total production and found to be defective, find out:
- (i) From which plant the pipe comes?
 - (ii) What is the probability that it came from the first plant?
- Or
- (b) Two urns contain respectively 3 white and 4 black balls; and 2 white and 5 black balls. What is the probability that,
- (i) Ball drawn randomly from first urn is black?
 - (ii) One urn is selected at random and a ball is drawn from it is black?
 - (iii) One urn is selected at random, and a ball is drawn from it is black; if probability of first urn selection is twice that of second?
 - (iv) Ball is drawn from first urn and put in a second and then one ball is drawn from the second urn is black?

12. (a) The age of employees in a company follows normal distribution with its mean and variance of 40 years and 121 years, respectively. If a random sample of 36 employees is taken from a finite normal population of size 1000, what is the probability that the sample mean is:

- (i) Lesser than 45,
- (ii) Greater than 42 and
- (iii) In between 40 and 42.

Or

- (b) A manufacturer of a company believes that mean life of their component is normally distributed with mean of 1200 hr of usage with standard deviation of 100 hr. However, due to lot of recent complaints from customers and warranty claims, the service engineer carries out a random sample survey of the items sold by the company. He collects a sample data of 25 components and observes the mean life as 900 hrs with standard deviation of 150 hrs. He assumes the standard deviation of the production population which he does not know as sample standard deviation. Find the interval estimate based on posterior distribution (credibility set) at 95% confidence for the life of the component. What would be his advice to management? The production manager is not happy with the result and further takes a random sample of 15 items and checks its life through lab tests. He finds the mean life of 1000 hr with standard deviation of 75 hr. What is his estimate of the life using Bayesian statistics?

13. (a) The number of days on which the sales exceeded the targeted sales in retail shop-1 as well as in Retail shop-2 of a company follows binomial distribution. The sales manager feels that the performance of the Retail shop-1 will exceed that of the Retail shop-2. To test his intuition, a sample of 110 days' sales records of the Retail shop-1 is taken and it is found that on 90 days' the sales exceeded the targeted sales. Similarly, a sample of 130 days' sales records of the Retail shop-2 is taken and it is found that on 112 days, the sales exceeded the targeted sales. Check the intuition the sales manager at a significance level of 0.10.

Or

- (b) A district industries centre (DIC) has collected the data summarizing the number of industries in the district under each combination of the level of technology used and the level of rate of return, as shown in Table. Check whether the rate of return is independent of the level of technology while grouping the industries, at a significance level of 0.05.

Summary of Data of industries

Rate of return	Level of technology used		
	Low	Medium	High
$R < 8\%$	20	50	10
$8\% \leq R < 10\%$	50	70	20
$10\% \leq R < 15\%$	30	75	70
$15\% \leq R$	10	35	60

14. (a) The production volume of units assembled by three different operators (1, 2 and 3) during 9 shifts are summarized in table. Check whether there is significant difference between the production volumes of units assembled by the three operators using Kruskal-Wallis test at a significance level of 0.05.

Production Volume of Units Assembled

Shift no.	Operator-1	Operator-2	Operator-3
1	29	30	26
2	34	21	36
3	34	23	41
4	20	25	48
5	32	44	27
6	45	37	39
7	42	34	28
8	24	19	46
9	35	38	15

Or

- (b) In a computer company, the performance indices of a randomly selected sample of programmers of each of its two branches located in different cities are summarized the alternate hypothesis that the first population is stochastically larger than the second population at a significance level of 0.05. Test the hypothesis.

Performance Indices of Employees

Branch-1	Branch-2	Branch-1	Branch-2
87	78	91	83
76	55	68	97
57	92	73	53
50	71	79	89
43	25	59	74
73	62	50	30
40	45	35	54
90	77	82	32
75	34	73	-
85	50	66	-

15. (a) The demand values (in lakhs of tons) of a product during the past 6 years are summarized in table.

Demand Values	
Year (X)	Demand (Y)
1997	50
1998	60
1999	50
2000	80
2001	72
2002	90

- (i) Fit a linear regression to estimate the demand of the product in future.
- (ii) Compute the demand of the product for the year 2008.

Or

- (b) The demand (In thousands of units) of refrigerators manufactured by company are summarized table.

Year	Original Time series of refrigerators			
	Quarter			
	1	2	3	4
1	124	120	176	140
2	104	128	148	132
3	80	152	168	156
4	116	156	184	180

Perform the steps of time series to get following:

- (i) Deseasonalized forecast
- (ii) Trend forecast
- (iii) Cyclical component.

Reg. No. :

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Question Paper Code : 86002

M.B.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2013.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Use of statistical tables is permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are independent events?
2. What is a random variable?
3. Explain the central limit theorem.
4. How is sample size determined?
5. What is a hypothesis?
6. What are the uses of a chi square test?
7. What is a non parametric test?
8. What is the precondition to use the Mann /Whitney test?
9. What is nonsense correlation?
10. What are seasonal variations in a time series?

PART B — (5 × 16 = 80 marks)

11. (a) There are two more assignments in a class before its end, and if you get an A on at least one of them, you will get an A for the semester. Your subjective assessment of your performance is

Event	Probability
A on paper and A on exam	.25
A on paper only	.10
A on exam only	.30
A on neither	.35

- (i) What is the probability of getting an A on the paper?
- (ii) What is the probability of getting an A on the exam?
- (iii) What is the probability of getting an A in the course?
- (iv) Are the grades on the assignments independent?

Or

- (b) A video rental store has two video cameras available for customers to rent. Historically, demand for cameras has followed this distribution. The revenue per rental is \$40. If a customer wants a camera and none is available, the store gives a \$15 coupon for tape rental.

Demand	Relative Frequency	Revenue	Cost
0	.35	0	0
1	.30	40	0
2	.20	80	0
3	.10	80	15
4	.05	80	30

- (i) What is the expected demand?
 - (ii) What is the expected revenue?
 - (iii) What is the expected cost?
 - (iv) What is the expected profit?
12. (a) Twenty-five percent of the employees of a large company are minorities. A random sample of 7 employees is selected.
- (i) What is the probability that the sample contains exactly 4 minorities?
 - (ii) What is the probability that the sample contains fewer than 2 minorities?
 - (iii) What is the probability that the sample contains exactly 1 non - minority?
 - (iv) What is the expected number of minorities in the sample?
 - (v) What is the variance of the minorities?

Or

- (b) A random sample of nine telephone calls in an office provided the following information.

Call Number	Duration (In Minutes)	Type of call
1	3	Local
2	8	long distance
3	4	local
4	3	local
5	5	long distance
6	6	local
7	3	local
8	5	local
9	8	local

- (i) Determine the point estimate for the average duration of all calls.
- (ii) What is the point estimate for the standard deviation of the population?
- (iii) Determine the standard error of the mean.
- (iv) What is the point estimate for the proportion of all calls that were long distance?
- (v) Determine the standard error of proportion.
13. (a) Zip, Inc. manufactures Zip drives on two different manufacturing processes. Because the management of this company is interested in determining if process 1 takes less manufacturing time than process 2, they selected independent samples for each process. The results of the samples are shown below.

	Process 1	Process 2
Sample size	27	22
Sample mean (in minutes)	10	14
Sample variance	16	25

- (i) State the null and alternative hypotheses.
- (ii) Determine the degrees of freedom for the t test.
- (iii) Compute the test statistic
- (iv) At 95% confidence, test to determine if there is sufficient evidence to indicate that process 1 takes a significantly shorter time to manufacture the Zip drives.

Or

- (b) From a poll of 800 television viewers, the following data have been accumulated as to their levels of education and their preference of television stations.

	Level of Education			Total
	High School	Bachelor	Graduate	
Public broadcasting	110	190	100	400
Commercial stations	80	220	100	400
Total	190	410	200	800

Test at $\alpha = .05$ to determine if the selection of a TV station is dependent upon the level of education. Use the p-value approach.

- 14. (a) The sales records of two branches of a department store over the last 12 months are shown below. (Sales figures are in thousands of dollars.) We want to use the Mann-Whitney-Wilcoxon test to determine if there is a significant difference in the sales of the two branches.

Month	Branch A	Branch B
1	257	210
2	280	230
3	200	250
4	250	260
5	284	275
6	295	300
7	297	320
8	265	290
9	330	310
10	350	325
11	340	329
12	272	335

- (i) Compute the sum of the ranks (T) for branch A.
- (ii) Compute the mean μ_T .
- (iii) Compute σ_T .
- (iv) Use $\alpha = 0.05$ and test to determine if there is a significant difference in the populations of the sales of the two branches.

Or

(b) In a sample of 400 people, 250 indicated that they prefer domestic wines, while 140 said they prefer European wines, and 10 indicated no preference. We want to use the sign test to determine if there is evidence of a significant difference in the preferences for the two types of wine.

- (i) Provide the hypotheses to be tested.
- (ii) Compute the mean.
- (iii) Compute the standard deviation.
- (iv) At 95% confidence, test to determine if there is evidence of a significant difference in the preferences for the two types of wine.

15. (a) Assume you have noted the following prices for books and the number of pages that each book contains.

Book	Pages (x)	Price (y)
A	500	\$7.00
B	700	7.50
C	750	9.00
D	590	6.50
E	540	7.50
F	650	7.00
G	480	4.50

- (i) Develop a least-squares estimated regression line.
- (ii) Compute the coefficient of determination and explain its meaning.
- (iii) Compute the correlation coefficient between the price and the number of pages. Test to see if x and y are related. Use $\alpha = 0.10$.

Or

- (b) Write a detailed note on
- (i) Regression analysis
 - (ii) Correlation analysis and
 - (iii) Time series analysis.
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Reg. No. :

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Question Paper Code : 75502

M.B.A. DEGREE EXAMINATION, AUGUST 2012.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the definition of axiomatic probability.
2. Write four properties of normal distribution.
3. Mention the different non random sampling methods.
4. How do you determine sample size?
5. State central limit theorem.
6. Explain One and two tail tests.
7. Define Type-I and Type-II errors.
8. Define Rank correlation.
9. What is the principle of least squares?
10. What do you mean by Irregular variations?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the conditions under which a binomial distribution can be approximated to a Poisson distribution and normal distribution? (4)
- (ii) In a retail business, 2.5% of the days account for a daily collection of Rs.25,00,000 or more. On 34% of the days, the daily collection is Rs.13,00,000 or less. Estimate the average daily collection and standard deviation of this business. Assume the daily collection follows a normal distribution. (12)

Or

- (b) (i) Explain :
- (1) Conditional probability,
 - (2) Marginal probability and
 - (3) Joint probability with suitable examples. (6)
- (ii) A Bank uses three different methods to contact its customers for recovery of default personal loans, (x) telephone contact, (y) sending an E-mail and (z) direct approach by the executive. It is known from experience that 35%, 20% and 45% are the cases dealt using these three methods. Out of the default customers 55%, 45% and 60% of them respectively got regularization of their loans subsequent to the contact. If a randomly selected customer is found to have got his loan regularization recently, what was the probability that he was contacted directly by the executive? (10)
12. (a) (i) Write a detailed note on various random sampling methods with suitable examples. (8)
- (ii) Discuss about sampling distribution and standard error. (8)

Or

- (b) (i) Explain about the sampling distribution of sample mean. (8)
- (ii) What are the properties of a good estimator? (8)
13. (a) (i) Discuss in detail the process of testing hypothesis. What are null and alternative hypotheses? (6)
- (ii) The billing mistakes at a retail outlet are given in the following distribution. Fit a Poisson distribution and test for the goodness of fit at 5% LOS. (10)

Number of mistakes per bill	0	1	2	3	4	5
Number of bills	140	154	67	29	7	3

Or

- (b) (i) A drug manufacturer has installed a machine to fill automatically an amount of 15 grams of drug in each phial. A random sample of 15 fills is found to contain 14.95 grams on the average with a Standard Deviation of 0.09 grams in a phial. Test at 5% LOS, if the adjustments to the machine are required? (8)

- (ii) A firm believes that the tyres produced by process 'A' on an average last longer than the tyres produced by Process 'B'. Apply appropriate test and conclude at 5% level of significance, if the following is the data available. (8)

Process	Sample size	Mean life in Kms.	S.D. in Kms.
A	50	22,400	1100
B	50	21,800	1000

14. (a) (i) List different non parametric tests. (4)
- (ii) The following grades are obtained by students of a management programme in "SCM" paper when taught by the A = Senior Professor and B = Junior Professor. Can you conclude that the senior professor is more effective by applying Mann-Whitney U test? (12)

A	73	87	72	68	76	75	82	66	95	75	70	79	56	50
B	86	81	81	82	75	84	88	90	85	84	92	83	91	53

Or

- (b) (i) Discuss about one sample run test. (4)
- (ii) The scores of a written examination of 20 pilots, who were trained by using three different methods, are given below. (12)

Video cassette - A	74	88	82	93	55	70	-	-	-
Audio cassette - B	78	80	65	57	89	-	-	-	-
Class room - C	68	83	50	91	84	77	94	81	92

Test at $\alpha = 5\%$ LOS, whether the three methods of training yield the same result using Kruskal-Wallis test.

15. (a) (i) Discuss the Properties of regression coefficients in detail. (6)
- (ii) The following data pertains to X = Revenue (in '000 of rupees) generated at a Corporate Hospital and Y = Number of Patients (in '00) arrived for the last ten years. Find the Karl Pearson's coefficient of correlation and comment. (10)

X	86	95	75	85	90	98	112	74	100	110
Y	21	24	18	24	22	30	27	18	25	28

Or

(b) (i) Discuss about the methods of estimating trend. (4)

(ii) The revenue generated at a business unit is as given below. Fit a trend line using least squares method and estimate the revenue for the year 2013. (12)

Year	Revenue (Rs. '000)	Year	Revenue (Rs. '000)
1996	150	2004	300
1997	215	2005	268
1998	275	2006	209
1999	245	2007	390
2000	365	2008	290
2001	256	2009	280
2002	205	2010	450
2003	220	2011	350

Reg. No. :

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Question Paper Code : 85502

M.B.A. DEGREE EXAMINATION, FEBRUARY 2012.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Use of Statistical Tables is permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a random variable?
2. What are independent variables?
3. Why are samples taken?
4. What is central limit theorem?
5. What are tests of attributes?
6. What are some assumptions of chi squared tests?
7. When are non parametric tests used?
8. When is mann whitney test used?
9. When is regression used?
10. What is seasonal variation in time series data?

PART B — (5 × 16 = 80 marks)

11. (a) In a recent survey about appliance ownership, 58.3% of the respondents indicated that they own Maytag appliances, while 23.9% indicated they own both Maytag and GE appliances and 70.7% said they own at least one of the two appliances.

Define the events as

M = Owning a Maytag appliance

G = Owning a GE appliance.

- (i) What is the probability that a respondent owns a GE appliance?
- (ii) Given that a respondent owns a Maytag appliance, what is the probability that the respondent also owns a GE appliance?
- (iii) Are events M and "G" mutually exclusive? Why or why not? Explain, using probabilities.
- (iv) Are the two events "M" and "G" independent? Explain, using probabilities.

Or

(b) A local university reports that 10% of their students take their general education courses on a pass/fail basis. Assume that fifteen students are registered for a general education course.

- (i) What is the expected number of students who have registered on a pass/fail basis?
- (ii) What is the probability that exactly five are registered on a pass/fail basis?
- (iii) What is the probability that more than four are registered on a pass/fail basis?
- (iv) What is the probability that less than two are registered on a pass/fail basis?

12. (a) A simple random sample of 6 recent graduates revealed the following information about their weekly incomes.

Graduates	Weekly Income
A	\$250
B	270
C	285
D	240
E	255
F	290

- (i) What is the expected value of the average weekly income of all the recent graduates?
- (ii) What is the expected value of the standard deviation for the population?

Or

(b) There are 8,000 students at the University of Tennessee at Chattanooga. The average age of all the students is 24 years with a standard deviation of 9 years. A random sample of 36 students is selected.

- (i) Determine the standard error of the mean.
- (ii) What is the probability that the sample mean will be larger than 19.5?
- (iii) What is the probability that the sample mean will be between 25.5 and 27 years?

13. (a) Five hundred randomly selected automobile owners were questioned on the main reason they had purchased their current automobile. The results are given below.

	Styling	Engineering	Fuel Economy	Total
Male	70	130	150	350
Female	30	20	100	150
Total	100	150	250	500

- (i) State the null and alternative hypotheses for a contingency table test.
- (ii) State the decision rule for the critical value approach. Let $\alpha = .01$.
- (iii) Calculate the χ^2 test statistic.
- (iv) Give your conclusion for this test.

Or

(b) Independent random samples taken at two companies provided the following information regarding annual salaries of the employees.

	Company A	Company B
Sample size	72	50
Sample Mean (in \$ 1,000)	48	43
Population Standard Deviation (in \$ 1,000)	12	10

- (i) We want to determine whether or not there is a significant difference between the average salaries of the employees at the two companies. Compute the test statistic.
- (ii) Compute the p-value; and at 95% confidence, test the hypotheses.

14. (a) Three universities in your state have decided to administer the same comprehensive examination to the recipients of MBA degrees. From each institution, a random sample of MBA recipients has been selected and given the test. The following table shows the scores of the students from each university.

Northern University	Central University	Southern University
56	62	94
85	97	72
65	91	93
86	82	78
93	-	54
-	-	77

Use the Kruskal-Wallis test to determine if there is a significant difference in the average scores of the students from the three universities. Let $\alpha = 0.01$.

Or

- (b) Two faculty members ranked 12 candidates for scholarships. Calculate the Spearman rank-correlation coefficient and test it for significance. Use a .02 level of significance.

Candidate	Rank by Professor A	Rank by Professor B
1	6	5
2	10	11
3	2	6
4	1	3
5	5	4
6	11	12
7	4	2
8	3	1
9	7	7
10	12	10
11	9	8
12	8	9

15. (a) The following data represent the number of flash drives sold per day at a local computer shop and their prices.

Price (x)	Units Sold (y)
\$ 34	3
36	4
32	6
35	5
30	9
38	2

- (i) Develop a least-squares regression line and explain what the slope of the line indicates.
- (ii) Compute the coefficient of determination and comment on the strength of relationship between x and y .
- (iii) Compute the sample correlation coefficient between the price and the number of flash drives sold. Use $\alpha = 0.01$ to test the relationship between x and y .

Or

- (b) Below you are given information on crime statistics for Middletown :

Year	Quarter	Number of Crimes Committed Y_t
1	1	10
	2	20
	3	25
	4	5
2	1	10
	2	30
	3	35
	4	25

Year	Quarter	Number of Crimes Committed Y_t
3	1	20
	2	40
	3	35
	4	15
4	1	20
	2	50
	3	45
	4	35

The seasonal factors for these data are

Quarter	Seasonal Factor S_t
1	.589
2	1.351
3	1.335
4	.726

- (i) Deseasonalize the series.
- (ii) Obtain an estimate of the linear trend for this series.
- (iii) Use the seasonal and trend components to forecast the number of crimes for each quarter of Year 5.

Reg. No. :

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Question Paper Code : 95502

M.B.A. DEGREE EXAMINATION, AUGUST 2011.

First Semester

DBA 1602 – STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Statistical Table may be provided

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Sixty percent of the student body at UTC is from the state of Tennessee (T). 30% percent are from other states (O), and the remainder are international students (I). Twenty percent of students from Tennessee live in the dormitories, whereas, 50% of students from other states live in the dormitories. Finally, 80% of the international students live in the dormitories.

Given that a student lives in the dormitory, what is the probability that she/he is from Tennessee?

2. On the average, 6.7 cars arrive at the drive-up window of a bank every hour. Define the random variable X to be the number of cars arriving in any hour.

Compute the probability that no more than 5 cars will arrive in the next hour.

3. In a local university, 10% of the students live in the dormitories. A random sample of 100 students is selected for a particular study.

What is the probability that the sample proportion (the proportion living in the dormitories) is between 0.172 and 0.178?

4. A random sample of 87 airline pilots had an average yearly income of \$99400 with a standard deviation of \$12,000.

Develop a 95% confidence interval for the average yearly income of all pilots.

5. The Bureau of Labour Statistics reported that the average yearly income of dentists in the year 2005 was \$110,000. A sample of 81 dentists, which was taken in 2006, showed an average yearly income of \$120,000. Assume the standard deviation of the *population* of dentists in 2006 is \$36,000.

We want to test to determine if there has been a significant increase in the average yearly income of dentists. Provide the null and the alternative hypotheses.

6. Identify the null and alternative hypotheses for the following problems.

It has been stated that 75 out of every 100 people who go to the movies on Saturday night buy popcorn.

7. A PTA group wishes to determine whether a baggage of letters sent to the local station has reduced the amount of violence broadcast between the hours of 4 P.M. and 9 P.M. The results of a survey of viewers are given here.

Response	Number of Respondents
More Violence	4
Less Violence	11
No change	6

Carry out a sign test to determine whether or not the letters were effective in reducing the amount of violence during the 4 to 9 p.m. period. Use a .05 level of significance. Be sure to state the null and alternative hypotheses.

8. The following data show the preference of 20 people for a candidate to a public office. A "+" indicates a preference for the Democratic candidate, and a "-" indicates a preference for the Republican candidate.

Individual	Republicans vs. Democrats
1	+
2	-
3	+
4	+
5	+
6	+
7	-
8	+
9	+
10	+
11	+

12	-
13	-
14	+
15	+
16	-
17	-
18	+
19	+
20	+

With $\alpha = 0.05$, test for a significant difference in the preference for the candidates.

9. Explain the procedure to check the accuracy of a regression equation.
10. What are the four components used in time series analysis? Explain each component.

PART B — (5 × 16 = 80 marks)

11. (a) A bank has the following data on the gender and marital status of 200 customers.

	Male	Female
Single	20	30
Married	100	50

- (i) What is the probability of finding a single female customer?
- (ii) If a customer is female, what is the probability that she is single?
- (iii) if a customer is male, what is the probability that he is married?
- (iv) Are gender and marital status mutually exclusive?
- (v) Is marital status independent of gender? Explain using probabilities. (16)

Or

- (b) The daily dinner bills in a local restaurant are normally distributed with a mean of \$28 and a standard deviation of \$6.
 - (i) What is the probability that a randomly selected bill will be at least \$39.10?
 - (ii) What percentage of the bills will be less than \$16.90?
 - (iii) What are the minimum and maximum of the middle 95% of the bills?
 - (iv) If twelve of one day's bills had a value of at least \$43.06, how many bills did the restaurant collect on that day? (16)

12. (a) In a large university, 20% of the students are business majors. A random sample of 100 students is selected, and their majors are recorded.
- Compute the standard error of the proportion.
 - What is the probability that the sample contains at least 12 business majors?
 - What is the probability that the sample contains less than 15 business majors?
 - What is the probability that the sample contains between 12 and 14 business majors? (16)

Or

- (b) A sample of 144 cans of coffee showed an average weight of 16 ounces. The standard deviation of the population is known to be 1.4 ounces.
- Construct a 68.26% confidence interval for the mean of the population.
 - Construct a 97% confidence interval for the mean of the population.
 - Discuss why the answers in Parts a and b are different. (16)

13. (a) An automobile manufacturer stated that it will be willing to mass produce electric-powered cars if more than 30% of potential buyers indicate they will purchase the newly designed electric cars. In a sample of 500 potential buyers, 160 indicated that they would buy such a product.
- State the hypotheses for this problem
 - Compute the standard error of \bar{p} .
 - Compute the test statistic.
 - At 95% confidence, what is your conclusion? Should the manufacturer produce the new electric powered car? (16)

Or

- (b) A group of 2000 individuals from different cities were asked whether they owned a foreign or a domestic car. The following contingency table shows the results of the survey.

CITY

Type of car	Detroit	Atlanta	Denver	Total
Domestic	80	200	520	800
Foreign	120	600	480	1200
Total	200	800	1000	2000

At $\alpha = 0.05$, test to determine if the type of car purchased is independent of the city in which the purchasers live. (16)

14. (a) The monthly sales records of two branches of a department store (Branch A and Branch B) over the last year (12 months) were gathered. It was decided to use the Mann-Whitey-Wilcoxon test to determine if there has been a significant difference between the sales of the two branches.
- (i) Provide the hypotheses for this test.
 - (ii) Compute the mean μ_T .
 - (iii) Compute the standard deviation σ_T .
 - (iv) The sum of the ranks for branch A was determined to be 184.5. Compute the test statistic Z.
 - (v) Use $\alpha = 0.05$ and test to determine if there is a significant difference in the populations of the sales of the two branches. (16)

Or

- (b) Two faculty members ranked 12 candidates for scholarships. Calculate the Spearman rank-correlation coefficient and test it for significance. Use a .02 level of significance.

Candidate	Rank by Professor A	Rank by Professor B
1	6	5
2	10	11
3	2	6
4	1	3
5	5	4
6	11	12
7	4	2
8	3	1
9	7	7
10	12	10
11	9	8
12	8	9

(16)

15. (a) Given below are five observations collected in a regression study on two variables x (independent variable) and y (dependent variable).

X	Y
10	7
20	5
30	4
40	2
50	1

- (i) Develop the least squares estimated regression equation
(ii) Compute the coefficient of correlation. (16)

Or

- (b) Annual sales for the last seven years for an organization are given in the following table. Determine the linear least square regression line.

Year	Annual sales
1	Rs. 1,760,000
2	Rs. 21,20,000
3	Rs. 23,50,000
4	Rs. 28,00,000
5	Rs. 32,00,000
6	Rs. 37,50,000
7	Rs.38,00,000

(16)

Reg. No. :

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Question Paper Code : 85502

M.B.A. DEGREE EXAMINATION, FEBRUARY 2011.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Statistical Table may be provided.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the axiomatic definition of Probability.
2. What is the Probability Distribution function of a Normal distribution?
3. Differentiate between point and interval estimates.
4. What are different sampling errors?
5. Differentiate between One and two tail tests.
6. Briefly explain F test.
7. Briefly explain Spearman's Rank Correlation.
8. What is sign test?
9. State the principle of Least Squares.
10. What are the reasons for Irregular Variations?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain Conditional and Joint probability with suitable examples. (6)
- (ii) A Bank uses three different methods to contact its customers for recovery of default Personal Loans,
- (1) Telephone contact
 - (2) Sending an E-Mail and
 - (3) Direct approach by the Executive. It is known from experience that 30%, 20% and 50% are the cases dealt using these three methods. Out of the default customers, 50%, 40% and 60% respectively got regularization of their loans subsequent to the contact. If a randomly selected customer is found to have got his loan regularization recently, what was the probability that he was contacted directly by the Executive? (10)

Or

- (b) (i) Write the Binomial distribution function. State the conditions under which a Binomial distribution can be approximated to a Normal distribution. (6)
- (ii) The average daily sales of 500 Branch offices was Rs. 150,000 and the standard deviation Rs.15,000. Assuming the Distribution to be Normal, indicate how many branches have sales between:
- (1) Rs. 1,20,000 and Rs. 1,60,000,
 - (2) Below Rs.1,40,000 and
 - (3) More than Rs.1,65,000. (10)
12. (a) (i) Explain Sampling distribution for "proportion". (8)
- (ii) Discuss in detail about the properties of a good estimator. (8)

Or

- (b) (i) Differentiate between probability and non-probability sampling. Discuss any two probability sampling methods with suitable examples. (10)
- (ii) What is meant by sample size? How to determine the sample size? Explain. (6)
13. (a) (i) The manufacturer of a 'Spot Remover' claims that his product removes atleast 90% of all spots. What can be concluded about the claim if the spot remover removed only 274 spots out of 300 spots chosen at random from spots on cloth from a Dry Cleaning unit of a Five Star Hotel? (8)

- (ii) Samples of two different Company's bulbs are tested for length of life and the following data are obtained :

	Company A	Company B
Sample size	40	60
Sample mean	1234	1136
Sample S.D.	36	40

Do you conclude that the length of life of Company A bulbs are greater than Company B bulbs? (8)

Or

- (b) The following information is available with regard to customer Satisfaction on cleanliness of a hotel. What can be said about the level of Satisfaction and Cleanliness? Use $\alpha = 5\%$ LOS. (16)

Cleanliness	Level of satisfaction		
	Low	Moderate	High
Highly clean	125	230	300
Moderately clean	250	340	240
Unclean	190	400	150
Highly unclean	85	300	100

14. (a) (i) Discuss about the Run test for paired data. (6)
 (ii) Write the procedure to apply Mann-Whitney U-test. (10)

Or

- (b) (i) Explain one sample run test. (6)
 (ii) Write the procedure to apply the Kruskal-Wallis test. (10)
15. (a) (i) What is meant by correlation? What are its limits? (6)
 (ii) Find both the regression lines. Estimate the Coefficient of Correlation and comment. (10)

X :	115	120	130	90	120	100	125	140
Y :	85	140	95	125	150	60	120	100

Or

(b) (i) What is trend analysis? What are the methods of estimating trend? (6)

(ii) The number of arrivals of a particular type at a retail outlet are as follows. Fit a linear trend line to the following data using 'least squares principle' and estimate the expected number of arrivals for the year 2011. (10)

Year :	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
No. of arrivals :	435	320	375	490	560	440	520	650	530	650

Reg. No. :

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Question Paper Code : GG 1502

M.B.A. DEGREE EXAMINATION, AUGUST 2010.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Statistical Table may be provided.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is classical Probability?
2. Name two discrete probability distributions.
3. What is central limit theorem?
4. What is goodness of fit?
5. What is a hypothesis?
6. State the hypothesis for a one sample t-test.
7. What is a non parametric test?
8. Name two non parametric tests.
9. How will you test the accuracy of a regression equation?
10. What are the preconditions for regression analysis?

PART B — (5 × 16 = 80 marks)

11. (a) A very short quiz has one multiple choice question with five possible choices (*a, b, c, d, e*) and one true or false question. Assume you are taking the quiz but do not have any idea what the correct answer is to either question, but you mark an answer anyway.
- (i) What is the probability that you have given the correct answer to both questions?
 - (ii) What is the probability that only one of the two answers is correct?
 - (iii) What is the probability that neither answer is correct?
 - (iv) What is the probability that only your answer to the multiple choice question is correct?
 - (v) What is the probability that you have only answered the true or false question correctly?

Or

- (b) In a large corporation, 65% of the employees are male. A random sample of five employees is selected. Use the Binomial probability tables to answer the following questions.
- (i) What is the probability that the sample contains exactly three male employees?
 - (ii) What is the probability that the sample contains no male employees?
 - (iii) What is the probability that the sample contains more than three female employees?
 - (iv) What is the expected number of female employees in the sample?
12. (a) MNM Corporation gives each of its employees an aptitude test. The scores on the test are normally distributed with a mean of 75 and a standard deviation of 15. A simple random sample of 25 is taken from a population of 500.
- (i) What are the expected value, the standard deviation, and the shape of the sampling distribution of \bar{x} ?

- (ii) What is the probability that the average aptitude test in the sample will be between 70.14 and 82.14?
- (iii) What is the probability that the average aptitude test in the sample will be greater than 82.68?
- (iv) What is the probability that the average aptitude test in the sample will be less than 78.69?

Or

- (b) An experimental diet to induce weight loss was followed for one week by a randomly selected group of 12 students with the following results.

Student	Loss in Pounds
1	2.2
2	2.6
3	0.4
4	2.0
5	0.0
6	1.8
7	5.2
8	3.8
9	4.2
10	3.8
11	1.4
12	2.6

- (i) Find a point estimate for the average amount lost after one week on this diet. Is this an unbiased estimate of the population mean? Explain.
- (ii) Find a point estimate for the variance of the amount lost on this diet. Is this an unbiased estimate of the population variance? Explain.
- (iii) Find a point estimate for the standard deviation of the amount lost on this diet.

13. (a) A group of young business women wish to open a high fashion boutique in a vacant store but only if the average income of households in the area is at least Rs. 25,000. A random sample of 9 households showed the following results.

Rs. 28,000 Rs. 24,000 Rs. 26,000 Rs. 25,000
Rs. 23,000 Rs. 27,000 Rs. 26,000 Rs. 22,000
Rs. 24,000

Assume the population of incomes is normally distributed.

- (i) Compute the sample mean and the standard deviation.
- (ii) State the hypotheses for this problem.
- (iii) Compute the test statistic.
- (iv) At 95% confidence using the p -value approach, what is your conclusion?

Or

- (b) During the first few weeks of the new television season, the evening news audience proportions were recorded as ABC- 31%, CBS- 34%, and NBC- 35%. A sample of 600 homes yielded the following viewing audience data.

Number of Homes	
ABC	150
CBS	200
NBC	250

We want to determine whether there has been a significant change in the number of viewing audience of the three networks or not.

- (i) State the null and alternative hypotheses to be tested.
- (ii) Compute the expected frequencies.
- (iii) Compute the test statistic.
- (iv) The null hypothesis is to be tested at 95% confidence. Determine the critical value for this test. What do you conclude?

14. (a) Universities in your state have decided to administer the same comprehensive examination to the recipients of MBA degrees. From each institution, a random sample of MBA recipients has been selected and given the test. The following table shows the scores of the students from each university.

Northern University	Central University	Southern University
56	62	94
85	97	72
65	91	93
86	82	78
93		54
		77

Use the Kruskal-Wallis test to determine if there is a significant difference in the average scores of the students from the three universities at 1% level of significance.

Or

- (b) A clothing manufacturer purchased some newly designed sewing machines in the hopes that production would be increased. The production records of a random sample of workers are shown below.

Worker	Old Machine	New Machine
1	28	36
2	36	40
3	27	25
4	25	32
5	38	30
6	36	32
7	40	40
8	29	28
9	32	35
10	28	33
11	20	26
12	32	31
13	32	23
14	32	34
15	36	36

Use the Wilcoxon signed-rank test to determine whether the new machines have significantly increased production. Use .05 level of significance.

15. (a) Given below are five observations collected in a regression study on two variables x (independent variable) and y (dependent variable).

x	y
10	7
20	5
30	4
40	2
50	1

- (i) Develop the least squares estimated regression equation
- (ii) At 95% confidence, perform a t test and determine whether or not the slope is significantly different from zero.
- (iii) Perform an F test to determine whether or not the model is significant. Let $\alpha = 0.05$.
- (iv) Compute the coefficient of determination.
- (v) Compute the coefficient of correlation.

Or

- (b) The following sample data contains the number of years of college and the current annual salary for a random sample of heavy equipment salespeople.

Years of College	Annual Income (In Thousands)
2	20
2	23
3	25
4	26
3	28
1	29
4	27
3	30
4	33
4	35

- (i) Which variable is the dependent variable? Which is the independent variable?
- (ii) Determine the least squares estimated regression line.

- (iii) Predict the annual income of a salesperson with one year of college.
 - (iv) Test if the relationship between years of college and income is statistically significant at the .05 level of significance.
 - (v) Calculate the coefficient of determination.
 - (vi) Calculate the sample correlation coefficient between income and years of college. Interpret the value you obtain.
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DBA1602-1

Back

Z 7344

M.B.A. DEGREE EXAMINATION, AUGUST 2007.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007)

Time : Three hours

Maximum : 100 marks

(Statistical tables are not required)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is conditional probability?
2. When are two events independent?
3. What is a small sample?
4. What is central limit theorem?
5. What is a hypothesis?
6. Distinguish between z-test and t-test.
7. What is a non-parametric test?
8. When is a Mann Whitney U-test used?
9. What is correlation coefficient?
10. What is cyclical variation?

PART B — (5 × 16 = 80 marks)

11. (a) The income of a group of 10,000 employees was found to be normally distributed with a mean of Rs. 1,750 and a standard deviation of Rs. 50.

- (i) Show that 95% of the group had an income exceeding Rs. 1,668 and only 5% had an income exceeding Rs. 1,832 (Z at 95% is 1.64) (8)
- (ii) What was the lowest income of the richest 100 employees and the highest income of the poorest 100 employees (Z at 99% is 2.57) (8)

Or

- (b) (i) Explain Baye's theorem with an example. (8)
- (ii) Distinguish between Binomial and Poisson distribution. (8)
12. (a) A simple random sample of 50 ball bearings taken from a large population has a mean weight of 1.5 kg/bearing and a standard deviation of 0.1 kg/bearing.
- (i) Estimate the standard error of mean. (4)
- (ii) If the sample is taken from a production run of 150, estimate the standard error of mean. (4)
- (iii) If 10% of the bearings are known to be defective, calculate the standard error of proportions in a sample of 50. (4)
- (iv) If 10% of the bearings are known to be defective, and the production run of 150 is considered, calculate the standard error of proportions in a sample of 50. (4)

Or

- (b) The diameter of a steel pipe manufactured at a large factory is expected to be normally distributed with a mean of 1.3 cm and a standard deviation of 0.04 cm.
- (i) If a random sample of 16 pipes is selected, what is the probability that a randomly selected pipe will have a diameter between 1.28 cm and 1.3 cm. (8)
- (ii) Between which two values will 60% of the pipes fall in terms of diameter measured? (8)
13. (a) You are given the following data about two brands of bulbs

	Mean Life	Standard deviation	Sample size
Brand A	2000 hrs	250 hrs	12
Brand B	2230 hrs	300 hrs	15

Is there a significant difference between the quality of the two brands of bulbs. (t at $\alpha=0.025$ is -1.708)

Or

- (b) An IQ test was administered to 5 students before and after a training program. The results are as follows

Candidate	I	II	III	IV	V
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether the program has resulted in a change of IQ at $t = 4.6$.

14. (a) Eleven cities are ranked according to their pollution levels and occurrence of pulmonary diseases.

City :	A	B	C	D	E	F	G	H	I	J	K
Pollution :	4	7	9	1	2	10	3	5	6	8	11
Pulmonary disease :	5	4	7	3	1	11	2	10	8	6	9

Is there any relation between pollution and pulmonary disease?
Comment on the findings.

Or

- (b) A group of 20 pilots were trained in three different methods video cassette, audio cassette and class room training. Their scores in written exams were as follows :

Video cassette : 74 88 82 93 55 70

Audio cassette : 78 80 65 57 89

Class room : 68 83 50 91 84 77 94 81 92

Test whether there is any difference in the effectiveness of the three methods. Use Kruskal Wallis test. ($K_{Table} = 4.605$ and $\alpha = 10\%$)

15. (a) The following table gives frequency according to marks obtained by 67 students in an intelligence test. Measure the degree of relationship between age and marks.

Test marks	Age in years				Total
	18	19	20	21	
200 - 250	4	4	2	1	11
250 - 300	3	5	4	2	14
300 - 350	2	6	8	5	21
350 - 400	1	4	6	10	21
Total	10	19	20	18	67

Or

- (ii) Assuming that half the population is vegetarian so that the chance of an individual being a vegetarian is $\frac{1}{2}$ and assuming that 100 investigators can take sample of 10 individuals to see whether they are vegetarian, how many investigators would you expect to report that 3 people or less were vegetarian? (8)

Or

- (b) (i) A problem in statistics is given to five students A, B, C, D and E. Whose chances of solving it are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ and $\frac{1}{6}$ respectively. What is the probability that the problem will be solved? (8)
- (ii) A study of past participants of a training program shows a mean time of 500 hours being spent with a standard deviation of 100 hours. What is the probability that
- (1) A candidate will take more than 600 hours
 - (2) A candidate will take less than 400 hours
 - (3) A candidate will take less than 600 hours
 - (4) A candidate will take between 400 and 600 hours.
- (Assume area between $z = +1$ to $z = -1$ as 0.683) (2 marks each) (8)

12. (a) Explain the different types of sampling based on probabilistic methods.

Or

- (b) (i) Mary Bartel, an auditor for a large credit card company, knows that, on average, the monthly balance of any given customer is \$112, and the standard deviation is \$56. If Mary audits 50 randomly selected accounts, what is the standard error of the measurement? What should be the sample size if she wants to have a measurement of error $\pm \$5$? (Assume $z = 1.96$ for 5% significance level). If the population is a finite 1000 customers, what will the sample size be? (8)
- (ii) Discuss the applications of central limit theorem. (8)
13. (a) (i) Two independent samples were collected. The first sample contained 42 elements, and had a mean of 32.3 with a variance of 9. The second sample of 57 elements had a mean of 34 and variance of 16

- (1) Compare the standard error of difference between the two sample means. (4)
- (2) Using $\alpha = 0.05$, test whether there is sufficient evidence to show that the second population has a higher mean. (4)

Assume $z = 2.57$ for 1% significance level.

- (ii) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a standard deviation of 5 months. A random sample of 6 such bulbs give the following values :

Life in month : 24, 26, 30, 20, 20 18.

Can you regard the producer's claim to be valid at 1% level of significance? (Given that the table values of the appropriate test statistic at the said level are 4.032, 3.707 and 3.499 for 5, 6 and 7 degrees of freedom respectively). (8)

Or

- (b) National health care company samples its employee attitudes in 4 regions N, S, C, and W for preference of job review method. The contingency table is as follows.

	N	S	C	W	
Number preferring present method	68	75	57	79	279
Number preferring new method	$\frac{32}{100}$	$\frac{45}{120}$	$\frac{33}{90}$	$\frac{31}{110}$	$\frac{141}{420}$

Test whether region influences the preference towards job review method at 10% significance (Assume cutoff $\chi^2 = 6.251$ for $\gamma = 3$).

14. (a) (i) The following data show employees' rates of defective work before and after a change in wage incentive plan. Compare the following two sets of data to see whether the change lowered the defective units produced. Use 0.10 level of significance.

Before 8 7 6 9 7 10 8 5 5 8 10 8

After 6 5 8 6 9 8 10 7 5 6 9 8

Use sign test (8)

- (ii) Two judges at a college homecoming parade rank 8 floats in the following order :

Float 1 2 3 4 5 6 7 8

Judge A 5 8 4 3 6 2 7 1

Judge B 7 5 4 2 8 1 6 3

Calculate the rank correlation coefficient. (8)

Or

- (b) A large hospital hires most of its nurses from two major universities in the area. Over the last year they have stated giving a test to the newly graduated nurses entering the hospital, to determine which school seems to educate nurses better. Based on the following scores (Max 100) determine using Mann-Whitney test whether the two schools have differing quality of students.

School A 97 69 73 84 76 92 90 88 84 87 93

School B 88 99 65 69 97 84 85 89 91 90 87 91 72

(Assume at 10% significance level, $z = 1.645$)

15. (a) For the following data set
- Plot the scatter diagram
 - Develop the estimating equation that best describes the data
 - Predict Y for X = 10, 15, 20

X	13	16	14	11	17	9	13	17	18	12
Y	6.2	8.6	7.2	4.5	9.0	8.5	6.5	9.3	9.5	5.7

Or

- (b) The western natural gas company has supplied 18, 20, 21, 25 and 26 billion cubic feet of gas respectively for the years 1991-95 :
- Find the linear trend representing the data
 - Calculate the percent trend for the data
 - Calculate cyclical residual for the data
 - In which years does the largest fluctuation of sales from trend occur.

Reg. No. :

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Y 1602

M.B.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2008.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are Mutually exclusive events and equally likely events?
2. Define Baye's theorem.
3. Name various sampling techniques.
4. Explain Central limit theorem.
5. State where Poisson Distribution can be applied.
6. What are the differences between Two-Tailed and One-Tailed tests?
7. Draw the format of ANOVA table.
8. When do you use Non-parametric methods?
9. What are different components of Time series analysis?
10. Distinguish between correlation and regression.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the characteristics of Binomial distribution? (4)
- (ii) In quality check it is found that one in 500 products is defective. If 100 such products as one container. Find the probability that, in container :
- (1) No defects (4)
- (2) Less than 2 defects (4)
- (3) One or more defect. (4)

Or

- (b) Data Monitor Inc., has conducted a study on the starting salaries offered to management students across various B-schools for the posts of management trainees. A group of 10,000 students was normally distributed with mean of Rs. 17,600 and a standard distribution of Rs. 7806. Find :
- (i) Number of students whose offered salary is more than Rs. 25,000 (4)
- (ii) Percentage of students fall between Rs. 10,000 and Rs. 20,000 (6)
- (iii) What is the lowest salary offered among the highest 500 students. (6)
12. (a) (i) What is Stratified Sampling technique? How can it be applied in taking samples? (4)
- (ii) A market research firm wants to study salaries of 3000 management trainees. How large a sample size it should take in order to estimate the mean annual earnings within plus or minus Rs. 1,000 and at 95 percent confidence level? The standard deviation of population is known to be Rs. 3,000. (12)

Or

- (b) A random sample of 100 articles taken from a batch of 2696 articles contains 5 defective articles. Find 95 percent confidence interval for the proportion of defective articles in the whole batch. (16)

13. (a) A random sample of 10 items on machine-I, the number of defect are found as 10 6 16 17 13 12 8 14 15 9.

For another random sample of 12 items on machine-II, the number of defects are 7 13 22 15 12 14 18 8 21 23 10 17.

Test whether sample-I and sample-II differ significantly as regarding the number of defects.

(You can use t for 20 DoF at 5% level of significance is 2.09). (16)

Or

- (b) In a locality 100 persons were randomly selected and asked about their educational achievements. The results are given as follows :

		Education			
		Middle	HighSchool	College	Total
Sex	Male	10	15	25	50
	Female	25	10	15	50
	Total	35	25	40	100

Can you say education depends on Gender?

(You can use χ^2 for 20 DoF at 5% level of significance is 5.99) (16)

14. (a) Ten students got the following percentage of marks in Mathematics and Statistics :

Student Number	1	2	3	4	5	6	7	8	9	10
Marks in Mathematics	78	36	98	25	75	82	90	62	65	39
Marks in Statistics	84	51	91	60	68	62	86	58	53	47

Calculate the rank correlation coefficient. (16)

Or

- (b) Test the hypothesis of no difference between the ages of male and female employees of a certain company using Mann-Whitney U test for the sample data. Use 0.1 level of significance. (16)

Male employee 31 25 38 33 42 40 44 26 43 35

Female employee 44 30 34 47 35 32 35 47 48 34

15. (a) Calculate the coefficient of correlation from the data reported on 66 villages between total arable land to the rice cultivated land in hectares. (16)

Arable land	0-500	500-1000	1000-1500	1500-2000	2000-2500	Total
Rice cultivated land						
0-200	12	6	-	-	-	18
200-400	2	18	4	2	1	27
400-600	-	4	7	3	-	14
600-800	-	1	-	2	1	4
800-1000	-	-	-	1	2	3
Total	14	29	11	8	4	66

Or

- (b) You are given the data relating to purchases and sales. Obtain the regression equation of sales. Estimate sales when the purchases equal 100. (16)

Purchases 62 72 98 76 81 56 76 92 88 49

Sales 112 124 131 117 132 96 120 136 97 85

Reg. No. :

LL 1602

M.B.A. DEGREE EXAMINATION, AUGUST 2009.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the various kinds of changes in time series analysis?
2. Explain central limit theorem.
3. What are the different methods of random sampling?
4. Explain type 1 and type 2 errors.
5. What is non-parametric test?
6. Distinguish between a two tailed and one tailed test.
7. Explain scatter diagram.
8. Explain coefficient of determination.
9. Briefly explain sign test for paired data.
10. What are the conditions under which binomial distribution is used?

PART B — (5 × 16 = 80 marks)

11. (a) A coin is tossed 4 times. What is the probability of getting
- (i) At least 2 heads
 - (ii) More than 2 heads
 - (iii) Exactly 3 heads
 - (iv) At the most 2 heads
 - (v) Between 1 and 3 heads (both inclusive).

Or

- (b) The no. of customers appear at the ticket counter of PVR theatre at a rate of 120 per hour. Find the probability that during a given minute
- (i) No customer appears
 - (ii) Only one customer appears
 - (iii) Only three customers appear
 - (iv) At least two customers appear
 - (v) Between one and three customers (both inclusive) appear.
12. (a) A company claims that the life of its bulb is 2000 hrs with std. deviation of 30 hrs. A random sample of 25 showed that an average life of 1940 hrs with a std. deviation of 25 hrs. At 5% level of significance can we conclude that the sample has come from the population with mean of 2000 hrs?

Or

- (b) (i) Explain the process of hypothesis testing.
(ii) Explain characteristics of t-distribution.
13. (a) A panel of judges A and B graded seven debaters and independently awarded the following marks :

Debater :	1	2	3	4	5	6	7
Marks by A :	40	34	28	30	44	38	31
Marks by B :	32	39	26	30	38	34	28

An 8th debater was awarded 36 marks by Judge A while Judge B was not present. If Judge B were also present, how many marks would you expect him to award to the 8th debater assuming that the same degree of relationship exists in their judgement?

Or

(b) Following data relates to sales of a company :

Year :	2000	2001	2002	2003	2004
Sales :	10	20	30	50	40

- (i) Fit a straight line trend by the method of least squares and tabulate the trend value.
(ii) Estimate the likely sales for the year 2006.

14. (a) X can solve 3 problems out of 5, Y can solve 2 out of 5, Z can solve 3 out of 4. What is the probability that

- (i) the problem will be solved
(ii) only 2 of them will solve the problem
(iii) atleast 2 of them will solve the problem.

Or

(b) (i) Explain Poisson distribution.

(ii) When can the Poisson distribution be used to approximate the binomial distribution?

15. (a) What are the advantages and disadvantages of non-parametric tests?

Or

(b)	Student	College Rank	Company Rank 10 years later
	John	4	4
	Margaret	3	3
	Debbie	1	1
	Steve	2	2
	Lisa	5	5

Above table lists 5 people and compares the academic rank they achieved in college with the level they have attained in a certain company 10 years after graduation. Value 5 represents highest rank and the rank of 1, the lowest.

Calculate the coefficient of rank correlation between success in college and company level achieved 10 years later.

Reg. No. :

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Z 1502

M.B.A. DEGREE EXAMINATION, FEBRUARY 2009.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007)

Time : Three hours

Maximum : 100 marks

(Use of Statistical Table may be permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Probability.
2. Explain independent event.
3. What do you mean by point estimate?
4. Explain the types of errors in hypothesis testing.
5. When do you use 't' test?
6. Write a note about chi-square test.
7. What is non-parametric tests?
8. Briefly explain run test.
9. Explain correlation.
10. Explain the components of time series.

PART B — (5 × 16 = 80 marks)

11. (a) (i) A committee of four has to be formed from among 3 economists, 4 engineers, 2 statisticians and a doctor. What is the probability that each of the four professions is represented on the committee? What is the probability that the committee consists of the doctor and atleast one economist? (8)
- (ii) State and prove Baye's theorem. (8)

Or

- (b) (i) A company has two plants to manufacture scooters. Plant I manufactures 80 percent of the scooters and plant II manufacture 20 percent. At plant I, 85 out of 100 scooters are rated standard quality or better. At plant II only 65 out of 100 scooters are rated standard quality or better. What is the probability that scooter selected at random came from plant I, if it is known that the scooter is of standard quality? What is the probability that the scooter came from plant II, if it is known that the scooter is of standard quality? (8)
- (ii) Define Poisson distribution and find its mean and variance. (8)
12. (a) (i) Before an increase in excise duty on tea, 400 people out of a sample of 500 persons were found to be tea drinkers. After an increase in duty, 400 people were tea drinkers in a sample of 600 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea. (8)
- (ii) A certain drug was administered to 456 makes out of a total 720 in a certain locality to test its efficacy against typhoid. The incidence of typhoid is shown below. Find the effectives of the drug against the disease. (T.V is 3.84 at 5% level)

	Infection	No Infection
Administering the drug	144	312
Without Administering drug	192	72

(8)

Or

- (b) Experience has shown that 20% of a manufactured product is of top quality. In one day's production of 400 articles, only 50 are of top quality. Show that either the production of the day chosen was not a representative sample on the hypothesis of 20% was wrong. Based on the particular day's production, find also the 95% confidence limits for the percentage of top quality product. (16)

13. (a) (i) Explain the process of testing hypothesis. (8)
- (ii) A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Show that the S.E of the proportion of bad ones in a sample of size is 0.015 and deduce that the percentage of bad pineapples in the consignment almost certainly lies between 8.5 and 17.5. (8)

Or

- (b) (i) Explain point estimates and various methods of point estimates. (8)
- (ii) Random samples of 250 bolts manufactured by machine A and 200 bolts manufactured by machine B showed 24 and 10 defective bolts respectively. Test the hypothesis that the machines are showing difference qualities of performance. Use 5 per cent level of significance. (8)
14. (a) (i) During contest the following results were obtained, showing the preference of judges in terms of marks allocated to various contestants.

Contestants:	1	2	3	4	5	6	7	8	9	10
Judge 1:	9	6	2	6	5	9	6	8	2	6
Judge 2:	7	5	4	7	3	5	7	7	5	8
Contestants:	11	12	13	14	15	16	17	18	19	20
Judge 1:	8	9	5	4	3	5	9	8	6	7
Judge 2:	8	9	6	6	5	6	7	8	5	6

From the above data, work out the effectiveness of the grading procedure. (8)

- (ii) Ten cartons are taken at random from an automatic filling machine. The mean net weight of the 10 cartons is 11.8 oz and the standard deviation is 0.15 oz. Does the sample mean differ significantly from the intended weight of 12 oz? You are given for $\gamma = 9$, $t_{0.05} = 2.26$. (8)

Or

- (b) (i) Given two samples having the following observation values, establish the sample belonging to the sample population or from population using Mann-Whitney u -test. (8)

X 450 750 925 820 770 650 575 975 1050 1450
Y 775 475 580 900 625 525 1050 450 820 1160

- (ii) In a class, there are 30 boys and 20 girls. These students are selected for getting into the bus for the picnic according to their pattern of arrival as given below.

G, B, G, G, G, B, B, B, G, B, G, B, B, G, G, G, B, G, G, B, B, G, B, B,
B, G, B, B, G, G, B, B, G, G, B, B, B, G, G, B, B, B, B, G, B, B, B, B,
B, B.

From the sequence of arrival, can we conclude, the arrival pattern is random? (8)

15. (a) Find the two regression lines for the following data. (16)

X: 45 48 50 55 65 70 75 72 80 85
Y: 25 30 35 30 40 50 45 55 60 65

Or

- (b) Compute the trend values for the following data using method of least squares : (16)

Year : 1982 1983 1984 1985 1986 1987 1988
Y: 83 60 54 21 22 13 23

Reg. No. :

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Question Paper Code : YY 1502

M.B.A. DEGREE EXAMINATION, FEBRUARY 2010.

First Semester

DBA 1602 — STATISTICS FOR MANAGEMENT

(Regulation 2007/2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A distribution function of a random variable X is given by $F(x) = 1 - (1+x)e^{-x}$ for $x \geq 0$, find the density function.
2. Write down the Probability Distribution function of Binomial distribution.
3. What is 95% confidential interval for proportions?
4. What are the properties of a good estimator?
5. Describe the process of testing the Hypothesis.
6. Define Type-I and Type-II errors.
7. If (X,Y) is a two - dimensional random variable with $E(X)=2$, $E(X^2)=\frac{9}{2}$, $E(Y)=\frac{4}{3}$, $E(Y^2)=\frac{8}{3}$, and $E(XY)=3$ find the rank correlation coefficient.
8. Give the mean of r-statistics in one sample run test.

9. What are the components of time series?
10. The equations of lines of regression are $3x + 2y = 26$ and $6x + y = 31$. Find the mean value of X and Y.

PART B — (5 × 16 = 80 marks)

11. (a) (i) The number of monthly breakdowns of a computer is a random variable having a Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month:
- (1) Without a breakdown.
- (2) With atleast one breakdown. (8)
- (ii) A random variable x has the following Probability Distribution.

$X=x_i$	-2	-1	0	1	2	3
$P(X=x_i)$	0.2	2k	0.2	2k	0.1	k

Find the value of k, and calculate the mean and variance. (8)

Or

- (b) (i) Define a Poisson distribution. State the conditions under which a Binomial Distribution can be approximated to a Poisson distribution. (6)
- (ii) The service time of a critical components used in a system is known to follow a Normal distribution with a mean of 15,500 hours and a Standard Deviation of 2100 hours. Estimate the Probability that the components has a service time of
- (1) Below 17,180 hours,
- (2) Between 13,500 hours and 16,000 hours,
- (3) More than 14,500 hours and below 18,020 hours. (10)
12. (a) (i) Suppose in a normally distributed population, average income per household is Rs. 10,000 p.m. with the standard deviation of Rs. 800. A survey based on a random sample of 100 households is undertaken. What is the probability that the sample mean will be between Rs. 9,800 and Rs. 10,100? (8)
- (ii) Discuss various sampling and non sampling errors. (8)

Or

(b) (i) Differentiate between random and non random sampling. What are different random sampling techniques? Explain with suitable examples. (10)

(ii) The life time of a certain brand of an electric bulb may be considered a random variable with mean 1200 hours and standard deviation 250 hours. Using central limit Theorem, find the probability that the average life time of 60 bulbs exceed 1250 hours. (6)

13. (a) (i) A drug manufacturing has installed a machine to fill automatically an amount of 15 grams of drug in each phial. A random sample of 15 fills is found to contain 14.95 grams on the average with a Standard Deviation of 0.09 grams in a phial. Test at 5% level of significance, if the adjustments to the machine are required? (8)

(ii) A firm believes that the tyres produced by Process 'A' on an average last longer than the tyres produced by Process 'B'. Apply appropriate test to check the correctness of the firm's belief at 5% level of significance, given the following data. (8)

Process	Sample Size	Mean life in Kms	S.D. in Kms
A	50	22,400	1100
B	50	21,800	1000

Or

(b) The following table gives the number of good and bad parts produced by each of three shifts in a factory :

Shift	Quality of Product	
	Good	Bad
Day	900	130
Evening	700	170
Night	400	200

Is there any association between the shifts and the quality of parts produced? Use 5% level of significance. (16)

14. (a) Discuss in detail the procedure to be followed in the context of Mann-Whitney U-test. (16)

Or

(b) Write down the procedure to apply the Kruskal-Wallis test. (16)

15. (a) (i) What is meant by correlation? What are its limits? (6)

(ii) Given X = Number of Calls to a Call center, Y = Revenue in Crores of Rupees. Fit a regression line of Y on X and predict the value of Y for $X = 70$.

X : 42 64 45 36 33 65 47 40 52 25

Y : 260 130 270 250 210 210 190 200 230 180

(10)

Or

(b) Find four yearly Moving average and comment for the following data.

Year	Income (Rs.)	Year	Income (Rs.)
1995	15,000	2002	34,790
1996	21,560	2003	56,870
1997	34,520	2004	59,900
1998	45,560	2005	67,940
1999	35,690	2006	56,820
2000	40,520	2007	65,780
2001	27,950	2008	58,930

(16)