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First Semester MBA Degree Examination, December 2010
Statistics for Management

Time: 3 hrs. Max. Marks:100

Note:1. *Answer any FIVE full questions.*
2. *The use of statistical tables is permitted.*

1 a. Distinguish between primary data and secondary data and discuss the various methods of collecting secondary data. **(08 Marks)**

b. The amounts of interest paid on each of the three different sums of money yielding 10%, 12% and 15%, simple interest per annum are equal. What is the average yield percent on the total sum invested? **(05 Marks)**

c. You are working as a transport manager of a software company. Kilometers recorded for a sample of hired cars during a week yielded the following data : **(07 Marks)**

Kilometers covered	No. of cars	Kilometers covered	No. of cars
100 – 110	4	150 – 160	8
110 – 120	0	160 – 170	5
120 – 130	3	170 – 180	0
130 – 140	7	180 - 190	2
140 - 150	11	Total	40

Form a cumulative frequency and draw a cumulative frequency Ogive. Calculate Q_1, Q_2, Q_3 and P_{75}. Estimate graphically the number of cars which covered less than 165km in the week.

2 a. What is an index number? Describe briefly its applications in business and industry. **(08 Marks)**

b. "After settlement the average weekly wage in a factory had increased from Rs 800 to Rs 1200 and the standard deviation has increased from Rs 100 to Rs 150". Comment on the uniformity of the wages before and after the settlement. **(05 Marks)**

c. A factory pays workers on a piece rate basis and also bonus to each worker on the basis of individual output in each quarter. Calculate the average bonus/worker for a quarter and average output / worker. **(07 Marks)**

Output (in units)	70 – 74	75 – 79	80 – 84	85 – 89	90 – 94	95 – 99	100 – 104
Frequency	3	5	15	12	7	6	2
Bonus (Rs)	40	45	50	60	70	80	100

3 a. Distinguish between correlation and regression analysis. Provide examples to indicate their uses. **(08 Marks)**

b. The rate of increase in population of a country during the last 3 decades is 5 percent, 8 percent and 12 percent. Find the average rate of growth during last three decades. **(05 Marks)**

c. Calculate the Karl Pearson's coefficient of correlation between trunk height and tree diameter from the data given below : **(07 Marks)**

Trunk height	35	49	27	33	60	21	45	51
Diameter	8	9	7	6	13	7	11	12

4 a. "Averages, Dispersion and Skewness are complementary to one another in understanding a frequency distribution" – Explain. **(08 Marks)**

b. A Branch Manager of a Bank notices that, over a long period of time, the number of people using an ATM on a Saturday morning is on an average, 30 people per hour. What is the probability that in a 10 minute period
   i) Nobody uses the machine?   ii) 3 people use the machine?   (05 Marks)
c. Find the regression equation showing the capacity utilization on production.

	Average	Standard deviation
Production (in lakh units)	35.6	10.5
Capacity utilization (in %)	84.8	8.5
Correlation coefficient	$\gamma = 0.62$	

Estimate the production when capacity utilization is 70%.   (07 Marks)

5 a. Distinguish between trend, seasonal and cyclical variations in a time series. What effect does seasonal variability produce?   (08 Marks)
   b. Represent the following data by a percentage sub – divided bar diagram.   (05 Marks)

Item of expenditure	Family A	Family B
	Income Rs 500	Income Rs 300
Food	150	150
Clothing	125	60
Education	25	50
Miscellaneous	190	70
Savings or Deficit	+ 10	- 30

   c. Compute Laspeyre's, PaaSche's and Fisher's price index from the following data :
                                                                                  (07 Marks)

Commodities	1990 Base year 2000			
	Price	Quantity	Price	Quantity
A	20	8	40	6
B	50	10	60	5
C	40	15	50	15
D	20	20	20	25

6 a. Explain the important features of normal and Poisson distribution.   (08 Marks)
   b. How is analysis of variance helpful in solving business problems? Illustrate your answer with suitable examples.   (05 Marks)
   c. The sales of a company in millions of rupees for the years 1998 – 2005 are given below :

Year	Sales	Year	Sales
1998	550	2003	525
1999	560	2004	545
2000	555	2005	585
2001	585		
2002	540		

   i) Find the linear trend equation   ii) Estimate the sales for the year 1997   iii) Find the slope of the straight line trend.   (07 Marks)

7 a. Enumerate the various methods of sampling. Describe two of them, mentioning the situations where each one is to be used.   (08 Marks)
   b. A firm has appointed a large number of dealers all over the country to sell its food products. A random sample of 25 dealers is chosen for this purpose. The sample mean is Rs 30,000 and the sample standard deviation is Rs 10,000. Construct an interval estimate with 95% confidence.   (05 Marks)

c. Two salesman A and B are employed by a company. Recently it conducted a sample survey which yielded the following data :

	Salesman A	Salesman B
No. of sales	20	22
Average sales (Rs)	800	780
Standard deviation (Rs)	70	60

Is there any significant difference between the average sales of the two salesmen? **(07 Marks)**

8 a. Describe the various steps involved in testing of a hypothesis. **(08 Marks)**

b. A manufacturer claims that atleast 95% of equipments supplied by him confirmed to specifications. An examination of the sample of 200 pieces of equipments revealed that 18 were faulty. Test the claim of the manufacturer. **(05 Marks)**

c. A personnel manager is interested in trying to determine if absenteeism is greater on any one day of the week. Past records for last 1 year, show the following sample distribution :

Day of the week	Monday	Tuesday	Wednesday	Thursday	Friday
No. of absentees	66	56	54	48	75

Test whether absence is uniformly distributed over the week. **(07 Marks)**
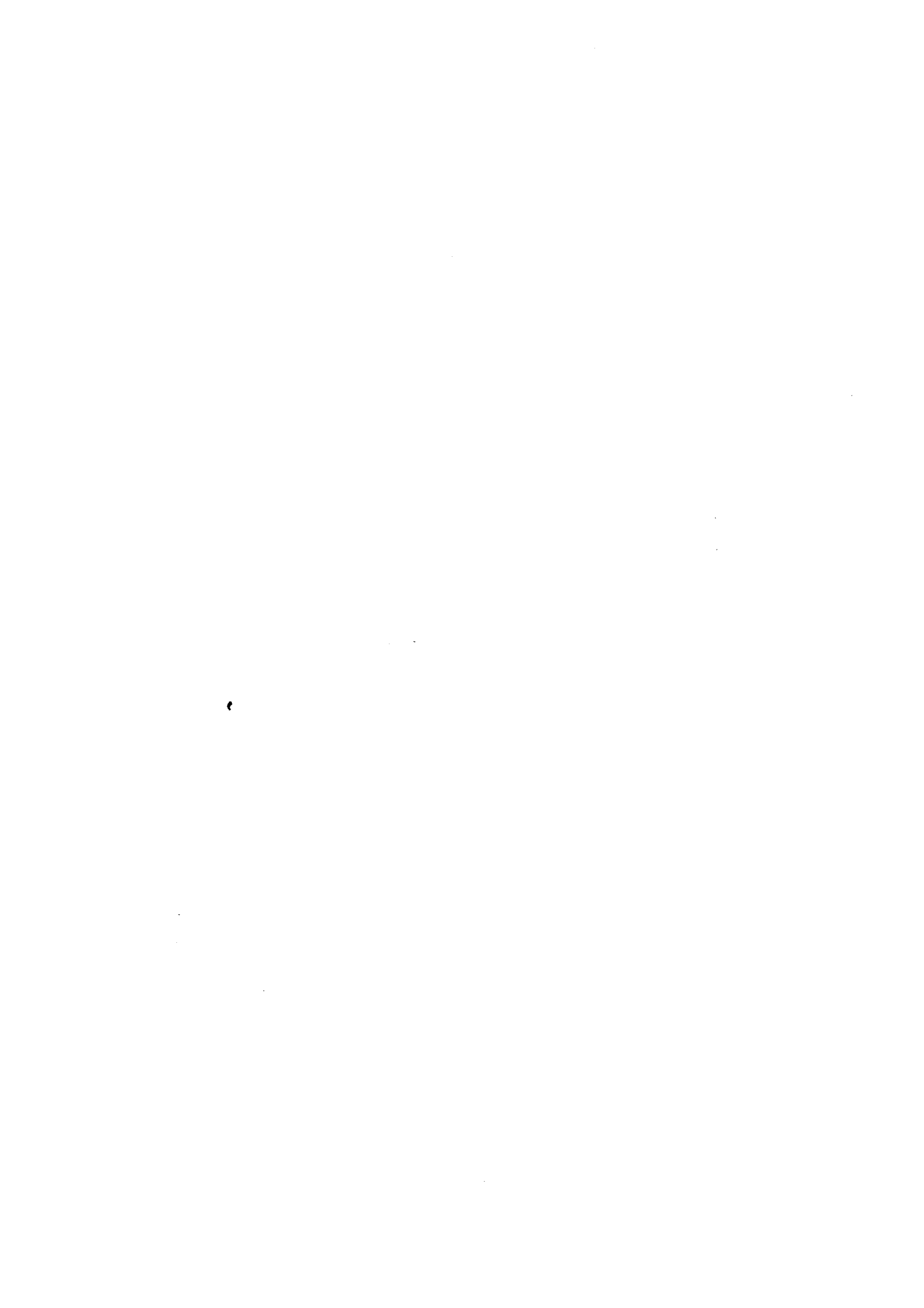
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First Semester MBA Degree Examination, December 2010
Statistics for Management

Time: 3 hrs.   Max. Marks:100

Note: *1.Answer any FIVE full questions.*
2.Use of statistical tables and non-programmable scientific calculators is allowed.

1   a. Distinguish between the primary and secondary data. Mention the methods of collecting primary data.   **(06 Marks)**

    b. Prepare a frequency distribution for the following observations taking class intervals as 15-25, 25-35, 35-45, ... and so on. Hence draw the histogram.

15	45	40	42	50	60	62	68	70	42
75	75	80	81	25	26	31	32	78	45
31	45	42	43	55	56	78	80	81	62
60	62	58	69	70	45	50	56	72	58
75	62	62	65	60	70	35	37	40	55

                                            (06 Marks)

    c. The following table gives the frequency distribution of the weekly wages (in '00 Rs.) of 100 workers in a factory.

Weekly wages ('00 Rs)	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Total
No. of workers	4	5	12	23	31	10	8	5	2	100

Draw the frequency polygon and less than Ogives for the above table.   **(08 Marks)**

2   a. What is meant by measure of central tendency? What are the merits and demerits of arithmetic mean?   **(06 Marks)**

    b. In the following grouped data, X are mid values of class interval and C is constant. If the arithmetic mean of the original distribution is 35.84, find its class intervals.   **(06 Marks)**

X – C	-21	-14	-7	0	7	14	21	Total
f	2	12	19	29	20	13	5	100

    c. The following data gives the distribution of 100 students. Calculate the most suitable average, giving the reason for your choice. Also obtain the values of quartiles, 6th decile and 70th percentile from the data.   **(08 Marks)**

Marks	No. of students	Marks	No. of students
Less than 10	5	Less than 50	60
Less than 20	13	Less than 60	80
Less than 30	20	Less than 70	90
Less than 40	32	Less than 80	100

3   a. Calculate the quartile deviation and its coefficient from the following data: **(06 Marks)**

C. I	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f	18	25	33	42	38	71	23

    b. Calculate the standard deviation from the following data: **(06 Marks)**

Income (Rs.)	10	20	30	40	50	60	70	80	90
No. of batsmen	3	7	9	10	11	12	15	18	15

    c. Calculate the Bowley's coefficient of skewness from the following data: **(08 Marks)**

Wages	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of workers	5	9	14	20	25	15	8	4

4   a. Define correlation. Explain the various types of correlation.   **(06 Marks)**

    b. Obtain the rank correlation coefficient for the following data: **(06 Marks)**

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

    c. In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: variance of X = 9. Regression equations 8X – 10Y = 0 , 40X – 18Y = 214. Find on the basis of above information
i) The mean values of X and Y.   ii) The coefficient of correlation between X and Y
iii) Standard deviation of Y.   **(08 Marks)**

5 a. Define the time series, with an example. List the various components of the time series.
(06 Marks)

b. Calculate the trend values, by the method of moving average, assuming a four-yearly cycle, from the following data, related to sugar production in India: (06 Marks)

Year	Sugar production (Lakh tonnes)	Year	Sugar production (Lakh tonnes)
1971	37.4	1977	48.4
1972	31.1	1978	64.6
1973	38.7	1979	58.4
1974	39.5	1980	38.6
1975	47.9	1981	51.4
1976	42.6	1982	84.4

c. Calculate i) Passche's index ii) Laspeyre's index and iii) Fisher's index numbers for the below given data: (08 Marks)

Commodity	Base Year		Current year	
	Price	Quantity	Price	Quantity
M	10	20	12	25
N	8	13.5	10	22
O	20	8	25	10
P	18	8	20	7
Q	35	8	30	10

6 a. Explain the following terms, with suitable examples:
i) Random experiment ii) Sample space iii) Mutually exclusive events. (06 Marks)

b. In a bolt factory, machines A, B and C manufacture 25%, 35% and 40% respectively of the total. Of their output 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the production and is found to be defective. What is the probability that it was manufactured by machine B? (06 Marks)

c. Data was collected over a period of 10 years, showing number of deaths from horse kicks in each of the 200 army corps. The distribution of deaths was as follows:

No. of deaths	0	1	2	3	4	Total
Frequency	109	65	22	3	1	200

Fit a Poisson distribution to the data and calculate the theoretical frequencies. (08 Marks)

7 a. Define sampling distribution. Write any four advantages of sampling. (06 Marks)

b. The mean and variance of a random sample of 64 observations were computed as 160 and 100 respectively. i) Compute the 95% confidence limits for population mean. ii) If the investigator wants to be 95% confident that the error in estimate of population mean should not exceed ± 1.4, how many additional observations are required? (06 Marks)

c. Given the following information relating to two places A and B, test whether, there is any significant difference between their mean wages. (08 Marks)

	A	B
Mean wages (Rs.)	47	49
Standard deviation (Rs.)	28	40
Number of workers	1000	1500

8 a. What is ANOVA? Explain the steps involved in carrying out ANOVA. (06 Marks)

b. The number of scooter accidents per month in a certain town were as follows:
12, 8, 20, 2, 14, 10, 15, 6, 9, 4
Are these frequencies in agreement with the belief that accident conditions were the same during this 10 month period? (Given $X^2_{0.05}$ for 9 d.f. = 16.919) (06 Marks)

c. A certain stimulus administered to each of 12 patients resulted in the following changes in blood pressure:
5, 2, 8, -1, 3, 0, -2, 1, 5, 0, 4, 6
Can it be concluded that the stimulus will, in general, be accompanied by an increase in blood pressure? (08 Marks)

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First Semester MBA Degree Examination, January 2011
Statistics for Management

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer any FIVE full questions.*
      2. *Use of scientific non-programmable* *Calculator permitted.*

1   a.   What is classification? Mention the objectives and basis of classification. **(07 Marks)**
      b.   The average daily wages of all the workers in a factory is Rs.444. If average daily wages paid to male and female workers are Rs.480 and Rs.360 respectively, find the percentage of male and female workers in that factory. **(05 Marks)**
      c.   Draw a histogram of the following distribution and hence locate the mode graphically:

C.I	0 - 4	4 - 8	8 - 12	12 - 20	20 - 24	24 - 32	32 - 40	Total
f	6	8	10	24	13	16	8	85

(08 Marks)

2   a.   Distinguish between : i)   Primary data and secondary data
                               ii) Census method and sampling method. **(06 Marks)**
      b.   Calculate Spearman's rank correlation co-efficient between advertising cost and sales given below: **(06 Marks)**

Advertising cost (Lakh Rs.)	39	65	62	90	82	75	25	98	36	78
Sales (Lakh Rs.)	47	53	58	86	62	68	60	91	51	84

      c.   The following data relates to the number of accidents in 30 cities. Find Karl Pearson's co-efficient of skewness: **(08 Marks)**

No. of accidents	10	11	12	13	14	15
No. of cities	2	4	10	8	5	1

3   a.   What do you mean by 'semi inter-quartile range'? Explain its merits and demerits. **(05 Marks)**
      b.   Calculate Laspeyre's, Paasche's and Fisher's index numbers using the following data: **(07 Marks)**

Item	Base year		Current year	
	Price (Rs.)	Total value (Rs.)	Price (Rs.)	Total value (Rs.)
A	6	300	10	560
B	2	200	2	240
C	4	240	6	360
D	10	300	12	288
E	8	320	12	432

      c.   The frequency distribution which has only been partly reproduced is given below:

Marks	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65
No. of students	3	5	-	18	14	-	2

          If the modal marks of the 60 students is given to be 47.5, then find the missing values.
(08 Marks)

4   a.   Explain with suitable examples :
        i) Event   ii) Random experiment   iii) Sample space
        iv) Equally likely events   v) Probability of an event   vi) Addition theorem of probability **(07 Marks)**

      b.   The probability that a contractor will get plumbing contract is $\frac{2}{3}$ and the probability that he will not get the electrical contract is $\frac{5}{9}$. If the probability of getting atleast one of these contracts is $\frac{4}{5}$, what is the probability that he will get both? **(05 Marks)**

4 c. You are given the exports of electronic goods from 1990 to 1995. Fit a linear trend to the exports data and estimate the expected exports for the year 2005. **(08 Marks)**

Year	1990	1991	1992	1993	1994	1995
Exports in crore Rs.	11	16	13	18	22	20

5 a. What is meant by 'correlation analysis'? Explain the types of correlation. **(06 Marks)**

b. Compute the median and 63rd percentile from the following details: **(06 Marks)**

Weight (kgs.)	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29
No. of bags	5	7	10	8	6	4

c. The height of father and sons are given below :

Height of father (inches)	65	66	67	67	68	69	71	73
Height of son (inches)	67	68	64	68	72	70	69	70

   i) Find the two lines of regression

   ii) Estimate the expected height of son when the height of father is 67.5 inches. **(08 Marks)**

6 a. What is time series? Explain the uses of time series. **(05 Marks)**

b. Calculate mean deviation and it's coefficient of the following distribution using median :

Age (yrs)	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of persons	8	15	24	34	47	50

(07 Marks)

c. Fit a Poisson distribution to the following data (Given $e^{-0.5} = 0.6065$) : **(08 Marks)**

x	0	1	2	3	4
f	123	59	14	3	1

7 a. Explain the different methods of sampling. **(06 Marks)**

b. The following are the B.P.'s of 8 persons before and after meditation. Can we conclude that meditation reduces B.P.? (Given for 7 d.f. $t_{0.05} = 1.90$) **(07 Marks)**

Person	1	2	3	4	5	6	7	8
Before meditation	92	90	86	92	88	94	90	90
After meditation	86	88	80	86	86	84	84	90

c. An automobile company gives you the following information about age groups and the liking for a particular model of car that it plans to launch:

Age (years)	Below 25	25 – 50	Above 50
Who liked the car	45	30	25
Who disliked the car	55	20	25

On the basis of the above data, can it be concluded that the model appeal is independent of the age group? (Value of X^2 for 2 d.f. is 5.991). **(07 Marks)**

8 a. Explain the procedure for testing a hypothesis. **(06 Marks)**

b. Among 80 electric bulbs manufactured by process 'A', three were defective. Among 130 electric bulbs manufactured by process 'B', two were defective. Test whether proportion of defectives in the two processes differ. **(06 Marks)**

c. Following are the weekly sale records (in thousand rupees) of three salesmen A, B and C of a company during 13 sale calls :

A	300	400	300	500	-
B	600	300	300	400	-
C	700	300	400	600	500

Test at 5% level of significance whether the sales of the three salesmen are different. (Given $F_{0.05} = 4.10$ for $V_1 = 2, V_2 = 10$) **(08 Marks)**

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