MODEL QUESTION PAPER

Business Statistics and Analytics **(18MBA14)**

Part - A

Note: 1) Answer any 4 full questions from Q.No. 1 to Q.No. 7
      2) Part - B, Q.No. 8 is compulsory

1 a. Discuss the importance of business analytics?   (3 marks)
   b. The following distribution gives the pattern of overtime work done by 100 employees of a company. Find the mean and median?   (7 marks)

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

   c. The mean of the number of sales of cars over a 3 month period is 87, and the standard deviation is 5. The mean of the commissions is Rs. 5225 and the standard deviation is Rs.733. Compare the variations of the two. State the conclusions drawn?   (10 marks)

2   a. Give the formulas for Karl Pearson's correlation and Spearman's Rank correlation ?
                                                                                           (3marks)
   b. Explain the difference between PERT and CPM ?   (7 marks)
   c. Consider the following data, obtain the two regression equations.

X	6	2	10	4	8
Y	9	11	5	8	7

Also, estimate Y when X is equal to 20.   (10 marks)

3 a. What is Binomial distribution and mention its formula?   (3marks)
   b. The prices of tea company shares in Mumbai and Kolkata for last 10 months are recorded below. Determine in which market the share price show less variability .

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct
Mumbai	105	120	115	118	130	127	109	110	104	112
Kolkata	108	117	120	130	100	125	125	120	110	135

   c. The mean and standard deviation of wages of 1000 workers engaged in a factory are Rs.1200 and 400 respectively. Assuming the distribution to be normal, estimate
(i) Percentage of workers getting wages above Rs.1600.
(ii) Number of workers getting wages between RS.600 and Rs.900.
The area under normal curve for different Z are given below

Z	0.5	0.75	1	1.5
Area	0.1915	0.2734	0.3413	0.4332

4 a. Define time series analysis ? Mention the methods used for the study and measurement of trend in a time series?   (3marks)

   b. From the following series of annual data, find the trend line by the method of semi-averages. Also estimate the value for 1999

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Actual Value	170	231	261	267	278	302	299	298	340

   c. The sales of a company in million of rupees for the year 1994 - 2001 are given below

Year	1994	1995	1996	1997	1998	1999	2000	2001
Sales	550	560	555	585	540	525	545	585

(i) Find the linear trend equation?
(ii) Estimate the sales for the year 1993?
(iii)Find the slope of the straight line trend?
(iv)Do the figures show a rising trend or a falling trend?

5 a. Illustrate merge and burst events in network analysis ?

   b.   Use graphical method, find the maximum value of, $Z=5X_1+7X_2$
subject to the constraints

$$X_1+X_2 \leq 4$$
$$3X_1+8X_2 \leq 24$$
$$10X_1+7X_2 \leq 35$$
$$X_1,X_2 \geq 0 \qquad\qquad\qquad\qquad (\text{7marks})$$

   c.

Find the initial feasible solution of the following transportation problem by least cost method and   North west corner rule

	W_1	W_2	W_3	Suppliers
F_1	48	60	56	140
F_2	45	55	53	260
F_3	50	65	60	360
F_4	52	64	55	220
Demand	200	320	250	

                                                                                              (10 Marks)

6 a. What do you mean by correlation? Mention any four uses of it?   (3 Marks)

b.

Find the initial feasible solution of the following transportation problem by VAM method

	W_1	W_2	W_3	Suppliers
F_1	48	60	56	140
F_2	45	55	53	260
F_3	50	65	60	360
F_4	52	64	55	220
Demand	200	320	250	

(7 Marks)

C.

In a factory turning out fan blades there is a small change of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate the approx number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10,000 packets. **(10 Marks)**

7. a. What is Poisson's distribution? Write a formula for probability function of Poisson's distributions. **(3 Marks)**

b. A manufacturer employs three inputs: man hours, machine hours and cloth material to manufacture two types of dresses. Type A dress fetches him a profit of Rs. 160 per piece, while type B, that of Rs. 180 per piece. The manufacturer has enough man hours to manufacture 50 pieces of type A or 20 pieces of type B dresses per day while the machine hours ha possesses suffice only for 36 pieces of type A or for 24 pieces for type B dresses. Cloth material available per day is limited but sufficient enough for 30 pieces of either type of dress. Formulate the linear programming problem. **(7 Marks)**

c.

From the following information draw a network, diagram and calculate E_{ST}, E_{FT}, L_{ST}, L_{FT} and total float for all activities. Find critical path. **(10 Marks)**

Name of the activity	Pre-requisite activity	Duration
A	None	2
B	None	3
C	None	4
D	A	6
E	B	7
F	C	5
G	D & E	8
H	B	9
I	H & F	5

8. Case Study (Compulsory) :

a. The daily wages of 1000 workmen are normally distributed around a mean of Rs. 70 and with a standard deviation of Rs.5. Estimate the number of workers whose daily wages will be i) between Rs.70 and 72;   ii) between Rs.69 and 72;   iii) more than Rs.75;   iv) less than Rs.63.

<div align="right">(10 Marks)</div>

b.

A project consists of nine activities whose time estimates (in weeks) and other characteristics are given below :   **(10 Marks)**

Activity	Preceding Activity/lies	Time estimate (Weeks)		
		Most optimistic	Most likely	Most pessimistic
A	-	2	4	6
B	-	6	6	6
C	-	6	12	24
D	A	2	5	8
E	A	11	14	23
F	B, D	8	10	12
G	B, D	3	6	9
H	C, F	9	15	27
I	E	4	10	16

i)   Show the PERT network for the project.

ii) Indentify the critical activities and find the expected project completion time and its variance.

iii) If the project is required to be completed by December 31 of a given year and the manager wants to be 95% sure of meeting the deadline, when he should start the project work. Given P $(0 < Z < 1.645) = 0.45$.