USN | | | | | | | | | | 18MBA14

First Semester MBA Degree Examination, Dec.2018/Jan.2019
Business Statistics and Analytics

Time: 3 hrs.

Max. Marks:100

Note: *1. Answer any FOUR full questions from Q1 to Q7.*
2. Question No.8 is compulsory.
3. Use of Z tables is permitted.

1 a. Define unboundedness and infeasibility in linear programming. **(03 Marks)**
   b. What are the objectives of time series analysis? Brief about components of time series. **(07 Marks)**
   c. A company wants to assess the impact of R and D expenditure (in Rs. 1000/-) on its annual profit (in Rs, 1000). The following table presents the information for last 8 years.

Year	R and D expenditure	Annual Profit
2010	9	45
2011	7	42
2012	7	40
2013	10	60
2014	4	30
2015	5	34
2016	3	25
2017	3	20

Estimate the regression equations and predict the annual profit for the year 2020 for an allocated sum of Rs. 100, 000/- as R and D expenditure. **(10 Marks)**

2 a. Differentiate between positive correlation and negative correlation. **(03 Marks)**
   b. Suppose a life insurance company insures the lives of 5000 persons aged 42. If studies show that any 42 years old person will die in a given year to be 0.001, find the probability that the company will have to pay atleast two claims during a given year. What is the probability that company will have to pay zero claims? **(07 Marks)**
   c. In two factories A and B engaged in the same industry, the average monthly wages and variances are as follows :

Factory	Average monthly wages in Rs.	Variance of the distribution	No. of wage earners
A	5000	900	550
B	4500	1600	650

   i) Which factory A and B pays higher amount as monthly wages
   ii) Which factory shows greater variability in the distribution of wages
   iii) What is the mean and standard deviation of all the workers in two factories taken together? **(10 Marks)**

3 a. What is Baye's theorem? **(03 Marks)**
   b. Discuss the types of correlation. **(07 Marks)**
   c. A firm buys castings of P and Q type of parts and sells them as finished product after machining, boring and polishing. The purchase cost for castings are Rs. 3 and Rs. 4 each for parts P and Q and selling costs are Rs. 8 and Rs. 10 respectively. The per hour capacity of machines used for machining, boring and polishing for two products is given below :

Capacity per hour	Parts	
	P	Q
Machining	30	50
Boring	30	45
Polishing	45	30

The running costs for machining, boring and polishing are Rs. 30, Rs. 22.50 and Rs. 22.50 per hour respectively. Formulate LPP to find out the product mix to maximize the profit.
  (10 Marks)

4 a. Explain looping and dangling errors in network. **(03 Marks)**
   b. What is meant by Central Tendency? What are the different measures of it? List the pre-requisites of good measures of central tendency. **(07 Marks)**
   c. Below are given the figures of production of a sugar factory. Values are in thousand quintals.

Year	2011	2012	2013	2014	2015	2016	2017
Production	80	90	92	83	94	99	92

Fit a straight line trend and show the trend line on graph. Estimate production in 2020.
  (10 Marks)

5 a. Enumerate the significance of measuring variation. **(03 Marks)**
   b. For the data on prices (in Rs. per kg) of a certain commodity during 2007 to 2011 are shown below. Compute the seasonal indexes by the average percentage method. **(07 Marks)**

Quarter	2007	2008	2009	2010	2011
1	45	48	49	52	60
2	54	56	63	65	70
3	72	63	70	75	84
4	60	56	65	72	66

   c. A company has 3 producing plants P_1, P_2, P_3 with production capacities of 2500, 2000 and 2600 units and 2 markets M_1, M_2 with demands of 3500 and 3600 units respectively. Production costs at P_1, P_2, P_3 are 1500/-, 1600/- and 1700/- per unit and selling prices at M_1, M_2 are 4400, 4700 rupees per unit. The transportation costs are as shown below. [profit matrix]

Market plant	M_1	M_2
P_1	1100	1500
P_2	800	100
P_3	1200	500

Tabulate the above data as transportation problem and find IBFS for maximization of profits using VAM.
  (10 Marks)

6   a.   What is Redundant Constraint?   **(03 Marks)**

     b.   Explain the role of correlation and regression in business.   **(07 Marks)**

     c.   A small project is composed of 7 activities whose time estimates are listed in the table below in weeks.

Activity	Optimistic time	Pessimistic time	Most likely time
1 – 2	1	7	1
1 – 3	1	7	4
1 – 4	2	8	2
2 – 5	1	1	1
3 – 5	2	14	5
4 – 6	2	8	5
5 – 6	3	15	6

       i)   Draw the network and find the expected project length

       ii)   What is the probability that the project will be completed atleast 4 weeks earlier than expected time.   **(10 Marks)**

7   a.   Mention any 3 areas where PERT/CPM techniques are applied.   **(03 Marks)**

     b.   In Punjab University there are 25 professors, 75 readers and 200 lecturers. Their monthly average salaries are Rs. 12000/- Rs. 6000/- and Rs. 3000/- respectively. After 5 years, it is expected that each lecturer will become a reader, and each reader a professor. Assuming no turnover of these employees. Find the excess salaries that will be drawn on an average by these employees after 5 years.   **(07 Marks)**

     c.   In a manufacturing organization with 5000 employees. The mean wage of workers is Rs. 8000/- per month with standard deviation of 2000/-. Assuming normal distribution, estimate :

       i)   Number of workers getting salary below Rs. 6,000/-

       ii)   Number of workers getting salary above Rs. 10,000/-

       iii)   Number of workers getting salary between Rs. 7,000/- and Rs. 9,000/-.   **(10 Marks)**

8   <u>Case Study (Compulsory)</u> :

     a.   Mr. X has Rs.100,000 that can be invested in a combination of only two stock portfolios with maximum investment allowed in either portfolio set at Rs. 75,000. The first portfolio has an average return of 10% where as second has 20%. In terms of risk factors associated with these portfolios, the first has a risk rating of 4, and second has 9. Since he wants to maximize his return, he will not accept an average rate of return below 12% or risk rating above 6. How much should he invest in each portfolio? Formulate this as linear programming problem and solve it graphically.   **(10 Marks)**

     b.   Tasks A, B, C, ... H, I constitute a project. The precedence relationships are :

       $A < D$; $A < E$; $B < E$; $D < F$; $C < G$; $C < H$; $F < I$; $G < I$.

       Draw a network to represent the project and find the critical path when time in days of each task is :

Task	A	B	C	D	E	F	G	H	I
Time	8	10	8	10	16	17	18	14	9

       Identify critical path with the help of EST, EFT, LST and LFT.   **(10 Marks)**

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