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16MBA14

First Semester MBA Degree Examination, Dec.2016/Jan.2017 Quantitative Methods

Time: 3 hrs.

Max. Marks:80

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

- 1 a. What is binomial distribution? Write the formula to calculate probability. (02 Marks)
 b. How do you explain the choice of arithmetic mean as the best measure of central tendency? Under what circumstances would it be appropriate to use median or mode? (06 Marks)
 c. A survey was conducted to determine the age (in years) of 120 automobiles. The result of survey is as follows:

Age of auto :	0-4	4-8	8-12	12-16	16-20
Number of autos :	13	29	48	22	8

Find the median age and modal age of autos. Also find the mean age. (08 Marks)

- 2 a. Distinguish between positive, negative and zero correlation with suitable diagram. (02 Marks)
 b. In a bolt factory machines A, B, C manufacture respectively 25%, 35% and 40% of the total productions. Of their output, 5%, 4% and 2% respectively are defective bolts. A bolt is drawn at random and is found to be defective. What is the probability that it is manufactured by i) Machine A; ii) Machine B? (06 Marks)
 c. The following data represent the percentage of goal met by each of three sales persons over last five years:

Raman :	88	68	89	92	103
Sindhu :	76	88	90	86	79
Prasad :	104	88	118	88	123

Which salesman is more consistent and why? (08 Marks)

- 3 a. What do you mean by regression analysis? Distinguish between simple and multiple regression. (02 Marks)
 b. The management of a photograph record company has discovered that the number of defects on records appears to follow a Poisson distribution with mean equal to 0.4.
 i) What is the probability that a record selected at random will have 3 defects?
 ii) If management sets a policy that records sold to customers must not have any defects, what percentage of its record production will not be made available for sales because of defects? (06 Marks)
 c. The following data relate to the scores obtained by salesman of a company in an intelligence test and their weekly sales in thousands of rupees:

Salesman:	A	B	C	D	E	F	G	H	I
Test score:	50	60	50	60	80	50	80	40	70
Weekly sales:	30	60	40	50	60	30	70	50	60

Obtain the regression line of sales on intelligence test score of the salesmen. If the intelligence test score of a salesman is 65, what would be his expected sales? (08 Marks)

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

- 4 a. Illustrate merge and burst events in network analysis. (02 Marks)
 b. Briefly explain the different types of decision making environments. (06 Marks)
 c. Calculate Spearman's rank correlation coefficient between advertisement cost ('000 Rs) and sales (lakhs Rs) from the following data and interpret your result. (08 Marks)

Advertisement cost:	57	16	24	65	16	16	9	40	48	33
Sales:	19	6	9	20	4	15	6	24	13	13

- 5 a. What is a decision tree? What are nodes and branches? (02 Marks)
 b. List out the differences between CPM and PERT. (06 Marks)
 c. Anita electric company produces two products P_1 and P_2 . Products are produced and sold on a weekly basis. The weekly production can not exceed 25 for product P_1 and 35 for product P_2 because of limited available facilities. The company employs total of 60 workers. Product P_1 requires 2 man week of labour, while P_2 requires one man week of labour. Profit margin on P_1 is Rs.60 and on P_2 is Rs.40. Formulate this problem as a linear programming problem and solve graphically for maximum profit. (08 Marks)
- 6 a. What is a redundant constraint? Explain with a neat sketch. (02 Marks)
 b. In a manufacturing organization with 5000 employees, the mean wage of workers is Rs.8000 per month with standard deviation of Rs.2000. Assuming normal distribution, estimate:
 i) Number of workers getting salary below Rs.6000.
 ii) Number of workers getting salary above Rs.10000.
 iii) Number of workers getting salary between Rs.7000 and Rs.9000.
 Given $P(0 < z < 1) = 0.34134$ and $P(0 < z < 0.5) = 0.19146$. (06 Marks)
 c. Construct a network diagram for the following project whose activities, precedence relationship and duration of each activity is given below. Also find the critical path and minimum time to complete the project. (08 Marks)

Activities	A	B	C	D	E	F	G	H	I
Predecessor	-	-	-	A	A	B, D	C	C	F, G
Time (days)	8	10	8	10	16	17	18	14	9

- 7 a. Explain the assumptions of linear programming model. (02 Marks)
 b. Particulars regarding the monthly wages paid to employees of two service organizations X and Y are as follows:

	Organization X	Organization Y
Number of employees	550	650
Average monthly wage	Rs.5000	Rs.4500
Variance of distribution of wage	900	1600

- i) Which organization pays a larger amount as wage?
 ii) Find the combined mean and variance of wages of two organizations. (06 Marks)
- c. Consider the following project:

Activity	1-2	1-3	1-4	2-3	2-5	3-4	3-6	4-6	5-6
t_o	2	6	6	2	11	15	3	9	4
t_m	4	6	12	5	14	24	6	15	10
t_p	6	6	24	8	23	45	9	27	16

Determine the critical path and the expected duration of completing the project with its standard deviation. Also find the probability that project will not be completed before 60 days. [$P[0 < z < 1.5] = 0.4332$]. (08 Marks)

- 8 a. Find initial solution for the following transportation problem using i) Least cost method; ii) Vogel's approximation method.

Plant	Distribution centre			Production
	D ₁	D ₂	D ₃	
P ₁	6	4	12	10
P ₂	10	6	5	80
P ₃	15	16	8	70
Demand	20	50	90	

(08 Marks)

- b. A solution for the following transportation problem is: $x_{13} = 10$, $x_{21} = 20$, $x_{24} = 5$, $x_{31} = 5$, $x_{32} = 10$, $x_{33} = 5$.

Factory	Destination				Supply
	D ₁	D ₂	D ₃	D ₄	
F ₁	5	10	4	5	10
F ₂	6	8	7	2	25
F ₃	4	2	5	7	20
Demand	25	10	15	5	

- i) Is this solution feasible?
 ii) Is this solution optimal?
 iii) Does this problem have more than one solution?
 If so find all the solutions. Justify and show all.

(08 Marks)

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