

MAY 2015

P/ID 77801/PMBSB

Time : Three hours

Maximum : 100 marks

PART A — (5 × 6 = 30 marks)

Answer any FIVE questions.

1. List and explain the rules of probability.
2. State Baye's theorem and explain its applications.
3. Distinguish between primary data and secondary data. Also, discuss their sources.
4. What is snow ball sampling?
5. What are the methods of factor rotation in factor analysis? Explain any one of them.
6. Explain the principles of minima and maxima.
7. What is business research report? Explain its features.
8. What is conjoint analysis? Explain its types.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Based on the past experience, the quality control engineer of a heavy Electrical Limited has estimated that the probability of commissioning each project in time at a client site is 0.8. The company is planning to commission 10 such projects in the forthcoming year. Find the probability of completing (a) no project in time, (b) three projects in time, (c) at most two projects in time, (d) at least three projects in time?
10. Consider the following data on daily net profit. Obtain the best order size based on Hurwicz criterion.

	Demand (D_i)				
	50	100	150	200	250
75	950	1200	575	-675	-1425
Order size Q_i 150	50	1700	2000	2250	1600
225	-850	850	2550	3550	4525
300	-1800	600	1800	2000	5000

11. What is stratified sampling? Explain it with an example.

12. The weight of a drug produced in Alpha pharmaceutical company follows normal distribution whose population is infinite. The specified mean of the weight of the drug of this population is 100 mg and its variance is unknown. The quality engineer of the firm claims that the mean weight of the drugs does not differ significantly from the specified mean weight of the population. So, the purchase manager of Beta hospital who places order for that drug with the Alpha pharmaceutical company has selected a random sample of 36 drugs. The mean and variance of the sample are found to be 96 mg and 25 mg, respectively. Verify the intuition of the quality manager of Alpha pharmaceutical company at a significance level of 0.01.
13. The results of a survey on the sales of a product (Y) as a function of time period (X) are summarized below.

	X	Y
Mean	40	125
Standard deviation	2.5	16
Correlation coefficient (r)	0.85	

Fit the regression line of Y on X and estimate the value of Y when X is 45.

14. The total cost of producing x units of an item and marketing them is as given below.
 $C(x) = 0.004x^3 - 0.03x^2 - 25x + 2500$
- (a) Find the total cost of the item when the output is 5 units.
 - (b) Find the marginal cost of the item, when the output is 4 units.
 - (c) Find the average cost of the item, when the output is 10 units.

15. Explain the features of any statistical software with which you are familiar.
16. Give a detailed research report format for a topic of your interest and explain its content.

PART C — (1 × 20 = 20 marks)

Compulsory

17. There are four different technological alternatives to manufacture a product. The R & D manager feels that the type of technology may have some impact on the hourly output (in units) of the product. Because there might be variability from one plant to another plant, he decides to use the Randomized Complete Block Design. The corresponding data are presented below.
 - (a) Write the model of this situation.
 - (b) Check whether each component of the model has effect on the output of the product at a significance level of 5%.

		Technology			
		T1	T2	T3	T4
Plant	P1	73	68	74	71
	P2	73	57	75	52
	P3	45	38	68	40
	P4	73	41	75	75
