

(6 pages)

MAY 2016

**P/ID 77502/
PMBB/PMB1B**

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. Construct the probability mass function of rolling two six faced dies.
3. Based on the past experience, the chief of a consultancy organization has estimated that the probability of completing each in time is 0.7. The company is planning to execute 12 such projects in the forthcoming quarter. Find the probability of completing (a) no project in time, (b) four projects in time.
4. Distinguish between correlation and regression.
5. Briefly explain discriminant analysis.
6. What is factor rotation? Explain its types.

7. What is consumer surplus? Distinguish it from producer surplus.
8. Explain the guidelines for classification of literature under literature review.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. In a survey with a sample of 300 respondents, the monthly income of the respondents follows normal distribution with its mean and standard deviation as Rs.15,000 and Rs.3,000, respectively. Answer the following.
 - (a) What is the probability that the monthly income is less than Rs. 12,000? Also, find the number of respondents having income less than Rs. 12,000.
 - (b) What is the probability that the monthly income is more than Rs.16,000? Also, find the number of respondents having income more than Rs. 16,000.
 - (c) What is the probability that the monthly income is in between Rs.10,000 and Rs.17,000? Also, find the number of respondents having income in between Rs.10,000 and Rs. 17,000.

10. 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?
11. Consider the following cost matrix and determine the best order size using minimax criterion.

		Demand (D_j)				
		50	100	150	200	250
Order size Q_i	75	50	125	375	375	125
	150	40	500	100	250	500
	225	750	550	250	750	125
	300	500	40	500	400	540

12. A company owns a lease on a certain property. It may sell the lease for Rs. 75,000 or may drill the said property for oil. Various possible drilling results are as under along with the probabilities of happening and rupee consequences.

Possible rent	Probability	Rupee consequences
Dry well	0.10	-1,00,000
Gas well only	0.40	45,000
Oil and gas combination	0.30	98,000
Oil well	0.20	1,99,000

Draw a decision tree for the above problem and determine whether the company should drill or sell.

13. A researcher has grouped the number of employees in an organization w.r.t. their age and income level as shown in the following table. Check whether the age is independent of the income level while grouping the employees at a significance level of 0.05.

Age (X)	Income level		
	Low	Medium	High
$X < 40$	45	40	35
$40 < X < 50$	35	25	40
$50 < X$	35	35	45

14. List and explain different sampling techniques.

15. The total cost of producing x units of an item and marketing them is as given below.

$$C(x) = 0.003x^3 - 0.02x^2 - 0.15x + 3500$$

- (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.
16. Give the format of typical survey based research and explain its contents.

PART C — (1 × 20 = 20 marks)

Compulsory.

17. The sales manager of a leading textile show room at Chennai wishes to study the opinion of its customers on its service quality in a 0-10 scale. In this experiment, the nature of profession as well as the monthly income level of the customers are taken as fixed factors. Two different customers have been sampled under each experimental combination and the corresponding ratings are as shown below.

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		Nature of Profession			
		Engineer	Doctor	Lawyer	Others
Income level	Less than Rs. 10,000	3	3	8	10
		1	8	2	9
	More than Rs. 10,000	3	10	9	2
		7	4	7	8

- (a) Write the model of this factorial experiment.
- (b) Check the significance of each of the components of the model at the significance level of 0.05.
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