

(6 pages)

MAY 2013

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

Time : Three hours

Maximum : 100 marks

PART A — (5 × 6 = 30 marks)

Answer any FIVE questions.

All questions carry equal marks.

1. Define the following with examples.
 - (a) Experiment
 - (b) Outcomes
 - (c) Sample space
 - (d) Event
2. What is Bernoulli process? Explain its use in Binomial distribution.
3. Illustrate the concept of decision tree with a small example.
4. Explain the steps of random sampling.
5. List and explain the terminologies of ANOVA.
6. Write short notes on discriminant analysis.

7. The sales revenue function is as given below.

$$R(X) = 10x^3 + 20x^2 - 3x + 100$$

Find the marginal revenue function. Also, find the marginal revenue when X is equal to 100.

8. Give a sample cover page of a research report.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

All questions carry equal marks.

9. Based on 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 forth coming year. Find the following:

- (a) The probability of commissioning no project in time?
- (b) The probability of commissioning three projects in time?
- (c) The probability of commissioning at most two projects in time?
- (d) The probability of commissioning 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_j)				
		50	100	150	200	250
Order size Q_i	75	950	1200	575	-675	-1425
	150	50	1700	2000	2250	1600
	225	-850	850	2550	3550	4525
	300	-1800	600	1800	2000	5000

11. A survey is conducted to analyze the status of employment of the recently graduated batch of students of a premier technological university. It is planned to conduct stratified sampling for this study. So, the population which consists of different colleges is divided into three strata, viz., Government colleges, Aided Colleges and Self Financing Colleges. Since, the regulations of AICTE and the respective university ensure uniform standard of infrastructure and educational standards, proportional stratified sampling is used for this study. The total number of engineering colleges in the university is 200. The number of engineering colleges in the three categories, viz. government, aided and self financing are 20, 50 and 130, respectively. If the sample size is 20, determine the number of colleges to be sampled from each category.

12. The daily demand of a product appears to follow uniform distribution. The observed frequency of demand values are summarized in the following table.

Observed frequencies of daily demand

Demand	25	26	27	28	29	30	31	32	33	34
--------	----	----	----	----	----	----	----	----	----	----

(Units)

Observed frequency	18	15	12	15	11	14	17	15	19	14
--------------------	----	----	----	----	----	----	----	----	----	----

Check whether the given data follow uniform distribution at a significance level of 0.01.

13. Explain the steps of factor analysis.

14. Differentiate the following:

(a) $y = (10x^3 + 20x^2 + 20)(\log x)$

(b) $y = \frac{x^3(3x+2)^{\frac{1}{2}}}{(x+2)(1-x)}$

4

**P/ID 77502/
PMBB/PMB1B**
[P.T.O.]

15. Give the table of content of a research report of your choice and explain them in brief.
16. Construct the probability mass function of tossing 3 coins.

PART C — (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.

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