INSTITUTE OF COST AND MANAGEMENT ACCOUNTANTS OF PAKISTAN

PROFESSIONAL-I EXAMINATION-SPRING (SUMMER), 2006

Sunday, the 28th May, 2006 **38**

QUANTITATIVE METHODS

Time Allowed – 2 Hours 45 Minutes *Maximum Marks – 70*

(i) *Attempt FIVE questions out of seven questions of this part of the paper. All questions carry equal marks.*

(ii) *Show computations where necessary.*

(iii) *Answer must be neat, relevant and brief.*

(iv) *In marking paper, the examiners take into account clarity of exposition, logic of arguments, presentation and language.*

(v) *Read the instructions printed on the top cover of answer script CAREFULLY before attempting the paper.*

(vi) *Use of non-programmeable scientific calculators of any model is allowed.*

(vii) *DO NOT write your Name, Reg. No. or Roll No. anywhere inside the answer script.*

(viii) *Question No. 1 "Multiple Choice Question" printed separately, is an integral part of this paper.*

Marks

Q. 2 (a) An investor has Rs. 500,000 to invest. Three investment options are being considered, each having an expected annual rate and expected risk factor. The interest rates are 16%, 8% and 12%, respectively, and expected risk factors are 12%, 9% and 8%, respectively. The investor's goal is an average return of 12 percent and average risk factor of 10 percent. Determine whether there is a meaningful investment strategy, which will satisfy these requirements. 8

(b) Solve the following system of equation by Gaussian Elimination Method : 6

$$\begin{aligned} x_1 + 2x_2 &= 5 \\ x_1 - x_3 &= -15 \\ -x_1 + 3x_2 + 2x_3 &= 40 \end{aligned}$$

Marks

Q. 3 (a) Consider the following demand and supply functions for two competing products :

$$q_{d_1} = 82 - 3P_1 + P_2$$
$$q_{s_1} = 15P_1 - 5$$
$$q_{d_2} = 92 + 2P_1 - 4P_2$$
$$q_{s_2} = 32P_2 - 6$$

Required :

(i) Determine the prices which bring the supply and demand levels into equilibrium for the two products. 7

(ii) What are equilibrium quantities ? 2

(b) Evaluate : $\int (x^3 + 5)^3 (x^2)\, dx$ 5

Q. 4 Mr. 'X' has borrowed a sum of Rs. 50,000/- at 10% per annum compounded semi-annually. The debts are due in 3 years. Mr. 'X' has decided to establish a sinking fund so as to facilitate the paying off debts.

Required :

If interest is earned at 6% per annum compounded semi-annually ;

(a) What semi-annual deposits will be required to settle down the amount due in 3 years ? 12

(b) What amount of interest is paid by Mr. 'X' on his borrowing ? 2

Q. 5 (a) An automobile inspection station inspects vehicle for level of air pollution emissions. Vehicles either pass (P) or fail (F) the inspections.

Required :

(i) Draw a decision-tree which enumerates the possible outcomes associated with four consecutive automobile inspections-+. 5

(ii) What is the probability that at least three automobiles pass the inspection ? 4

(b) The probability that a machine will produce a defective part equals 0.05. The probability of any item being defective is 0.05 regardless of the quality of previous units. What is the probability that the two consecutive parts will be non-defective ? 5

Marks

Q. 6 (a) The mean of 5 observations is 7 and their sample variance is 10. If three of the five observations are 2, 6 and 10, find the other two numbers. 7

(b) The income distribution of 100 families is given below :

Income	0–25	25–50	50–75	75–100	100–125	125–150
No. of families	18	?	25	?	14	18

Required :

Median of the given distribution is 60. Find the missing frequencies ? 7

Q. 7 (a) The total revenue function for a product is :

$$R = f(x) = -4x^2 + 300x$$

where 'R' is measured in hundred of rupees and 'x' equals the number of units sold (in 000s).

The total cost for producing x (hundred) units is described by the function ;

$$C = g(x) = x^2 - 150\ x + 5000$$

where 'C' is measured in hundred of rupees.

Required :

(i) Formulate the profit function 2

$$P = h(x)$$

(ii) How many units should be produced and sold in order to maximize total profit ? 3

(iii) What is the maximum profits ? 2

(b) Find the general and particular solution of the following : 7

$$\frac{d^2y}{dx^2} = 6x - 9 ;$$

$$f'(2) = 10$$

$$f'(-2) = -10$$

Marks

Q. 8 (a) Define the term Network Analysis. 4

(b) (i) Find the critical path of the following network using the EST/LSTs. 4

Activity	Preceding activity	Duration (days)
1	–	4
2	1	7
3	1	5
4	1	6
5	2	2
6	3	3
7	5	5
8	2,6	11
9	7,8	7
10	3	4
11	4	3
12	9,10,11	4

(ii) Calculate the floats of the network. 3

(iii) The standard deviations of the activities on the critical path are 1, 2, 1.5, 3, 2.5, and 3 respectively. Based on these values calculate the probability of achieving a scheduled time of 40 days for the project duration. 3

THE END