INSTITUTE OF COST AND MANAGEMENT ACCOUNTANTS OF PAKISTAN

New Fall (E) 2011, April 2012 Examinations

Monday, the 16th April 2012

BUSINESS MATHEMATICS & STATISTICS - (S-203)

STAGE – 2

Time Allowed: 02 Hours 45 Minutes   **Maximum Marks: 80**   **Roll No.:**

(i) Attempt ALL questions.

(ii) Answers must be neat, relevant and brief.

(iii) In marking the question paper, the examiners take into account clarity of exposition, logic of arguments, effective presentation, language and use of clear diagram / chart, where appropriate.

(iv) Read the instructions printed inside the top cover of answer script CAREFULLY before attempting the paper.

(v) Use of non-programmable scientific calculators of any model is allowed.

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

(vii) Question No.1 – "Multiple Choice Question" printed separately, is an integral part of this question paper.

(viii) **Question Paper must be returned to invigilator before leaving the examination hall.**

Marks

SECTION "A"

Q. 2 **(a)** Solve the quadratic equation: $\dfrac{x+6}{5} - \dfrac{2x-1}{2} = 3$ **04**

(b) The demand relationships for the two products produced by a company are given by:

$$p_1 = 130 - 2x$$
$$p_2 = 320 - 4y$$

Where 'x' units of the first product and 'y' units of the second product are sold per week at the price of Rs. p_1 / unit and Rs. p_2 / unit, respectively. The joint weekly cost Rs. 'C' of producing these 'x' units and 'y' units is given by:

$$C = 40x + 2xy + 2y^2 + 2,000$$

Required:

Determine the number of units of the two products, which should be produced weekly to maximize profit and calculate the maximum profit.   **10**

(c) An employee, who received fixed annual increments, had a final salary of Rs. 900,000 per annum after 10 years. If his total salary was Rs. 6,500,000 over the 10 years, what was his initial salary?   **06**

Q. 3 **(a)** A company estimates that the demand for its product fluctuates with the price it charges. The demand function is given as:

$$q = 100,000 - 200p$$

Where 'q' equals the number of units demanded and 'p' equals the price in rupees. The total cost of producing 'q' units of the product is estimated by the function:

$$C = 150,000 + 100q + 0.003q^2$$

Required:

(i) Determine how many units of 'q' should be produced in order to maximize annual profit?   **06**

(ii) What price should be charged?   **02**

(iii) What is the annual profit expected to equal?   **02**

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(b) A sum of Rs.50,000 is to grow to Rs.140,000 over an 8-year period. At what annual **06** interest rate must it be invested, given that the interest is compounded quarterly?

(c) Find the inverse of the following matrix: **04**

$$A = \begin{bmatrix} 0 & 3 & 1 \\ 1 & 1 & 0 \\ 2 & 3 & 3 \end{bmatrix}$$

SECTION "B"

Q. 4 (a) From a pack of 52 cards, two cards are drawn at random. Find out the probability that **04** the first card is a 'King' and the other one is an 'Ace', if first card is (i) replaced and (ii) not replaced.

(b) The probability that a patient recovers from a rare blood disease is 0.5. If 10 people are **06** known to have contracted this disease, what is the probability that exactly 5 persons having this disease will survive?

Q. 5 (a) A random sample of 10 students produced mean marks of 65 with a variance of 20 on a **05** placement test in Accounting. Assuming the scores to be normally distributed, construct a 98% confidence interval for the average performance of all such students.
(Given that $t_{\alpha/2} = t_{0.01,9} = 2.821$)

(b) Compute and interpret 'coefficient of correlation' between the percentages of marks **05** secured by 7 students in the subjects of Statistics and Economics.

Marks in Statistics	50	54	56	60	62	61	65
Marks in Economics	22	25	34	28	26	30	33

SECTION "C"

Q. 6 The normal and crash points for various activities are given below:

Activity (i,j)	Normal Duration	Normal Cost	Crash Duration	Crash Cost
	In days	Rs. '000'	In days	Rs. '000'
(1, 2)	8	100	6	200
(1, 3)	4	150	2	350
(2, 4)	2	50	1	90
(2, 5)	10	100	5	400
(3, 4)	5	100	1	200
(4, 5)	3	80	1	100

Required:

(a) Draw the network diagram. **04**

(b) Determine all possible paths and identify the critical path of the project. **03**

(c) Calculate the slopes for each activity. **03**

Q. 7 Solve the following linear programming model by using 'Simplex Method': **10**

Maximise $Z = 6x + 8y + 7z$

Subject to : $3x + y + z \le 50$
$2x + y + 4z \le 100$
$x + 2y + 2z \le 80$
$x, \quad y, \quad z \ge 0$

THE END