

INSTITUTE OF COST AND MANAGEMENT ACCOUNTANTS OF PAKISTAN



Winter (November) 2011 Examinations

Saturday, the 19th November 2011

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.**

SECTION “A”

Marks

Q. 2 (a) A firm sells a single product for Rs.100 per unit. Variable costs per unit are Rs.30 for the materials and Rs.40 for the labor. Annual fixed costs are Rs.250,000. Construct the profit function stated in terms of x , the number of units produced and sold. What profit is earned if annual sales are 50,000 units? **08**

(b) Solve the quadratic equation by factorization $2x^2 - x - 1 = 0$ **04**

(c) Solve the following system of equations by Gaussian Elimination Method: **08**

$$\begin{aligned} 3x_2 + x_3 &= 30 \\ x_1 + x_2 &= 15 \\ 2x_1 + 3x_2 + 3x_3 &= 56 \end{aligned}$$

Q. 3 (a) The function describing the marginal cost (in rupees) of producing a product is: **06**
 $MC = 6x + 2,000$

Where 'x' equals the number of units produced. It is known that total cost equals Rs.200,000 when 100 units are produced. Determine the total cost function.

(b) Determine the following definite Integral: **06**

$$\int_2^4 \frac{2x-1}{2x^2-2x+5} dx$$

(c) The annual profit for a firm depends upon the number of units produced. Specially, the function which describes the relationship between profit P (stated in rupees) and the number of units produced 'x' is:

$$P = -0.02x^2 + 2,500x - 40,000$$

Required:

(i) Determine the number of units 'x' which will result in maximum profit. **06**

(ii) What is the expected maximum profit? **02**

PTO

SECTION "B"

Marks

- Q. 4 (a)** Use the method of the least squares to find the regression equation of y on x for the data in the following table: **05**

X	2	3	4	5	6	7	8
Y	2	3	3	4	5	7	8

- (b)** In a factory, item 'A' is being produced by 3 workers. Following are the details of the number of items produced in a day:

Quality	Units Produced by Workers			Total
	1	2	3	
Good	70	82	76	228
Defective	5	3	4	12
Total	75	85	80	240

Required:

If one item is selected at random what is the probability that:

- (i)** it is defective? **01**
- (ii)** it is defective or produced by Worker-1? **02**
- (iii)** it is of good quality or was produced by Worker-2? **02**

- Q. 5 (a)** The performance of the two players is given below:

Player X (No. of runs) (x)	24	39	54	15	27	19	25	37	8	11
Player Y (No. of wickets) (y)	3	4	2	5	1	6	8	0	4	9

The performance of which player is more consistent? **05**

- (b)** A poultry packing machine is supposed to put 500 grams of poultry in a container. The packing machine operates with a standard deviation of 25 grams. A random sample of 64 containers was taken to determine whether the machine was working properly. It resulted in the sample mean of 495 grams. Do you think that the machine is required to be repaired? (Use 0.05 level of significance, $Z_{\alpha/2}$ at 0.05 level of significance is 1.96) **05**

SECTION "C"

- Q. 6** Following is the data relating to the Project 'X':

Activity	Preceded by	Elapsed Time (Weeks)
A	–	2
B	A	5
C	–	2
D	B, C	4
E	–	3
F	D, E	4
G	F	5

Required:

- (a)** Draw the network diagram of the above project incorporating therein the Earliest Starting Time (EST) and Latest Starting Time (LST) for each activity. **07**
- (b)** Compute the total float for each activity. **03**

- Q. 7** Solve the following linear programming model by using simplex method: **10**

$$\begin{aligned}
 \text{Maximize } Z &= 3x_1 + 2x_2 + 5x_3 \\
 \text{Subject to } &x_1 + 2x_2 + x_3 \leq 500 \\
 &3x_1 + \quad + 2x_3 \leq 460 \\
 &x_1 + 4x_2 \leq 420 \\
 &x_1, x_2, x_3 \geq 0
 \end{aligned}$$

THE END