

INSTITUTE OF COST AND MANAGEMENT ACCOUNTANTS OF PAKISTAN



Spring (August) 2012 Examinations

Tuesday, the 4th September 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)** The marginal cost (in rupees) of producing a product is given by the following function: **04**

$$MC = 12x + 1,500$$

Where ‘x’ equals the number of units produced. The total cost equals Rs.9,600,000 when 600 units are produced. Find the total cost function.

**(b)** The Home Appliances Limited, a newly formed company, has invented a kitchen product. Its variable costs per unit including material, labor, and marketing costs, are expected to be Rs.900. The fixed costs in relation to the formation, operation, and management of the company and the purchase of equipment and machinery are Rs. 1,000,000. The selling price per unit has been estimated to be Rs.1,000.

**Required:**

**(i)** Determine the number of units that must be produced and sold in order to break even. **06**

**(ii)** The company expects to sell approximately 15,000 units over the life of the project for Rs.1,000 per unit. Determine the expected profits at this level of production. **04**

**(c)** The price of a particular commodity has been increasing at an annual rate of 12 percent compounded annually. The current price of the commodity is Rs.500. What was the price of the same item 5 years ago? **06**

**Q. 3 (a)** A person estimates that he can afford a mortgage payment of Rs.15,000 at the end of each month. He can obtain a 5-year car loan at an interest rate of 18 percent. What is the largest loan can he afford to pay back? **05**

PTO

(b) Solve the following system of equations by Cramer's Rule:

08

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

(c) Find the derivative of  $f(x) = e^{2x+3} (5x^2 - 2x + 10)^3$

07

**SECTION "B"**

Q. 4 (a) The income distribution of 100 families is given below:

Income (Rs.'000)	0 – 25	25 – 50	50 – 75	75 - 100	100 – 125	125 – 150
No. of families	18	?	25	?	10	18

The median of the given distribution is 60.

Required:

Find the missing frequencies (?).

05

(b) If 5 cards are drawn, without replacement, from a standard deck of 52 playing cards, what is the probability that 3 cards will be face cards?

05

Q. 5 (a) Pakistan cricket team is playing a 5-match one-day series against Australia. The probability that Pakistan wins a match is 0.3. What is the probability that Pakistan wins (i) at most 2 matches (ii) at least 2 matches?

05

(b) Find the Paache Index number for the following data by using 2005 as base year:

05

Commodity	Price/ Unit (Rs.) 2005	Price/ Unit (Rs.) 2011	Quantity (Units) 2005	Quantity (Units) 2011
A	15	20	125	150
B	30	40	160	185
C	75	90	140	165
D	100	125	78	85

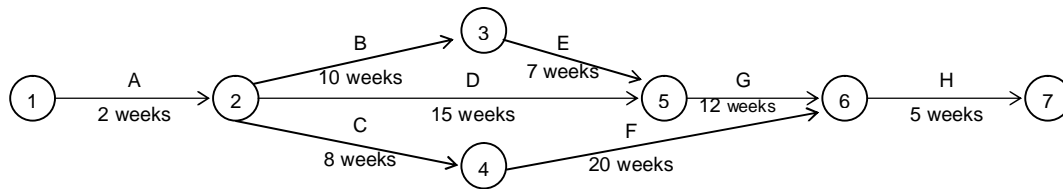
**SECTION "C"**

**Q. 6** A firm manufactures two products. Each product is processed through two departments. Product A requires 4 hours per unit in department-1 and 3 hours per unit in department-2. Product B requires 2 hours per unit in department-1 and 5 hours per unit in department-2. Department-1 and department-2 have 60 and 75 hours available each week, respectively. Profit margins for the two products are Rs.12 and Rs.10 per unit, respectively.  $x_1$  and  $x_2$  are the number of units produced for products A and B.

**Required:**

- (i) Formulate the linear programming model, which maximizes the total profit. **04**
- (ii) Solve the above problem using the Corner-Point method. **06**

**Q. 7** Calculate the EST, LST, EFT, LFT and the slack for each activity for the network given below and identify the critical path and the duration for the project. **10**



**THE END**

**(Relevant Tables on Next Page)**

**Series Present Worth Factor - Cumulative**

$$\frac{= (1+i)^n - 1}{i(1+i)^n}$$

Period	1.00%	1.50%	2.00%	2.50%	3.00%	3.50%	4.00%	4.50%	5.00%
1	1.01000	0.98522	0.98039	0.97561	0.97087	0.96618	0.96154	0.95694	0.95238
2	2.03010	1.95588	1.94156	1.92742	1.91347	1.89969	1.88609	1.87267	1.85941
3	3.06040	2.91220	2.88388	2.85602	2.82861	2.80164	2.77509	2.74896	2.72325
4	4.10101	3.85438	3.80773	3.76197	3.71710	3.67308	3.62990	3.58753	3.54595
5	5.15202	4.78264	4.71346	4.64583	4.57971	4.51505	4.45182	4.38998	4.32948
56	75.32679	37.70588	33.50469	29.96486	26.96546	24.40971	22.21982	20.33303	18.69854
57	77.09006	38.13387	33.82813	30.20962	27.15094	24.55045	22.32675	20.41439	18.76052
58	78.87096	38.55554	34.14523	30.44841	27.33101	24.68642	22.42957	20.49224	18.81954
59	80.66967	38.97097	34.45610	30.68137	27.50583	24.81780	22.52843	20.56673	18.87575
60	82.48637	39.38027	34.76089	30.90866	27.67556	24.94473	22.62349	20.63802	18.92929

**Table of Binomial Probabilities**

The following table lists the probability of attaining **s** successes out of **n** trials, where the probability of success in any one trial is **p**

		<b>p</b>														
<b>n</b>	<b>s</b>	<b>.10</b>	<b>.12</b>	<b>.14</b>	<b>.15</b>	<b>.16</b>	<b>.18</b>	<b>.20</b>	<b>.22</b>	<b>.24</b>	<b>.25</b>	<b>.30</b>	<b>.35</b>	<b>.40</b>	<b>.45</b>	<b>.50</b>
5	0	.590	.528	.470	.444	.418	.371	.328	.289	.254	.237	.168	.116	.078	.050	.031
5	1	.328	.360	.383	.392	.398	.407	.410	.407	.400	.396	.360	.312	.259	.206	.156
5	2	.073	.098	.125	.138	.152	.179	.205	.230	.253	.264	.309	.336	.346	.337	.313
5	3	.008	.013	.020	.024	.029	.039	.051	.065	.080	.088	.132	.181	.230	.276	.313
5	4		.001	.002	.002	.003	.004	.006	.009	.013	.015	.028	.049	.077	.113	.156
5	5								.001	.001	.001	.002	.005	.010	.018	.031