Institute of Human Resource Advancement (IHRA)

University of Colombo, Sri Lanka

Masters Degree in Business Management

Course No 01

1st Semester Examination

(Held on November/December 2012)

Business Mathematics (MBM – 02)

Instructions to the Candidates

1. Total number of questions is Six (06)
2. Answer five (05) questions only. Use of calculators is permitted.
3. Time allocated for the examination is three (03) hours.
4. Total number of pages four (04)
5. At the end of the examination attach all answer sheets together.
6. Enter your index number on all pages of the answer sheets.
7. If a page or a part of this question paper is not printed properly, please inform the Supervisor immediately.

(1) i. Solve the following equations

a. $2X^2 - 7X + 6 = 0$ (03 Marks)

b. $5^{2x} - 30(5^x) + 125 = 0$ (04 Marks)

ii. It is expected that there will be equal contribution from several companies to invest in a project which needs Rs.480Mn for the initial investment. But two of the expected companies are not contributed for the investment. Therefore, other companies have to pay additional Rs.12Mn each. Find the expected number of companies and their contribution for the initial investment.

(06 Marks)

iii. *If* $F(X) = 5X^6 + 4X^5 - 3X^4 + 8X^3 - 2X^2 + X - 10$ *and* $g(X) = X + 3$,

Find $F(X) \div g(X)$

(04 Marks)

iv. Show that $(X - 3)$ *is a factor of* $2X^2 - 5X - 3$

(03 Marks)

(Total 20 marks)

(2) i. $\frac{6n-3}{5!} + \frac{3n}{4!} + \frac{4-n}{3!}$ Simplify

(03 Marks)

ii The HR manager of Kumara company needs to create a Quality Circle including Auditors, Accountants, and Top level managers. There are four Auditors, three Accountants and two top level managers in the company. It is expected that each level should represent in the Quality Circle and there should be at least two Auditors in the Circle. Find the number of ways that the Quality Circle with five members can be arranged.

(05 Marks)

iii. $(a + b)^4$ Expand

(04 Marks)

iv. Find the 9^{th} term of $\left(\frac{1}{x}+x\right)^{12}$

(04 Marks)

v. What is the independent term of $\left(3x^4+\frac{5}{x^3}\right)^7$

(04 Marks)

(Total 20 marks)

(3) i. $\frac{1}{x^2-1}$ Express as partial fraction

(05 Marks)

ii. $If\ B=\begin{pmatrix}-2 & 6 & 2\\ 3 & -1 & -5\\ 1 & -9 & 2\end{pmatrix}$ *Find the determinant*

(05 Marks)

iii. The "X" company produces two products "A" and "B". The price of the product "A" is Rs.10 and the unit cost is Rs.5. Price of the product "B" is Rs.12 and the unit cost is Rs.8. The company can earn a profit of Rs.820 from both products per day. As the government imposed a tax of Rs.2 for both products, the company increased the selling prices by Rs.1 each. The demand of the both products declined by 20 units and 10 units respectively and the total profit decreased by Rs.290. How many units were sold from both products before the prices were changed? (Solve using Inverse Matrix Method)

(10 Marks)

(Total 20 marks)

(4) i. Fifty thousand rupees is borrowed for two years on 8% annual compound interest. After two years the total amount was not paid and six months later, Rs61236 was paid to settle the amount. Find the interest rate for the additional period.

(06 Marks)

ii. You are willing to invest in a project worth of 10mn after 6yrs from today. If the annual interest rate is 16% and compounded quarterly, how much should you deposit at the end of every year to have sufficient funds to invest in the project.

(06 Marks)

iii. A manufacturer expects to buy a new machine worth of Rs.250000 to the factory after 8 yrs from today. He plans to deposit Rs.20000 at the end of every year to make a fund to buy the machine. The annual interest rate is 12% compounded quarterly. Will the manufacturer's expectation be successful

(08 Marks)

(Total 20 marks)

(5) i. $f(x) = \frac{1}{2x-6}$ *Find the domain*

(04 Marks)

ii. *If* $f(x) = \frac{2x+5}{3x+4}$ *find* $f^{-1}(x)$

(04 Marks)

iii. Demand function of a product is $p = 100 - 5q$. where q is the quantity demanded and p is price. Total average cost is given by$AC = 20 + \frac{10000}{q}$. Calculate the followings.

a. Profit function
b. Quantity at profit maximization
c. Maximum profit
d. Price at profit maximization.

(12 Marks)

(Total 20 marks)

(6). i. Marginal cost function of a product is $2q^2 - 112q + 2000$ and marginal revenue function is $800 - 4q$. Find the increment of profit when the number of units produced is increased from 15 to 30.

(07 Marks)

ii. Marginal cost function of a product is given by $mc = 25 + 30q + 9q^2$. Total fixed cost is 55. Find the Total cost function, and Total variable cost function.

(07 Marks)

iii. Demand and Supply functions are $, p(x) = 36 - x^2$ *and* $p(x) - 18 = x^2$ respectively. Find the consumer surplus and producer surplus.

(06 Marks)

(Total 20 marks)