



INSTITUTE OF HUMAN RESOURCE ADVANCEMENT
UNIVERSITY OF COLOMBO, SRI LANKA
Masters Degree in Business Management - Course No.03
1st Semester Examination
(Held in December, 2014)
MBM 02 – Business Mathematics

Instructions to the Candidates

- (1) Total number of pages – three (03)
- (2) Total number of questions - Five (05)
- (3) Answer all questions.
- (4) If a page or a part of this question paper is not printed, please inform the Supervisor immediately.
- (5) Time allocated for the examination is three (03) hours.
- (6) Write your index number in all pages of answer script.
- (7) Tie up all answer sheets at the end of the examination

- (1) i. Simplify the following sum.

$$\frac{2n-3}{5!} + \frac{6n}{4!} + \frac{4-3n}{3!}$$

(03 Marks)

- ii. Selecting seven members out of nine managers and six accountants, a committee should be appointed. Both managers & accountants should represent the committee but the minimum number of managers should be four. Find the number of ways to arrange the committee.

(05 Marks)

- iii. Expand $(3x + y)^7$

(05 Marks)

- iv. Find the 9th term of $\left(\frac{1}{2x} + x\right)^{12}$

(03 Marks)

- v. What is the independent term of $\left(2x^2 + \frac{1}{2x}\right)^6$

(04 Marks)

(Total 20 marks)

- (2) i. A manufacturer expects to buy a new machine worth of Rs.500, 000 to the factory after 08 yrs from today. He plans to deposit Rs.40, 000 at the end of every year to make a fund to buy the machine. The annual interest rate is 12% compounded quarterly for first 5 yrs. After 5 yrs the annual interest rate is 14% compounded quarterly. Will the manufacturer's expectation be success.

(10 Marks)

- ii. You need to follow a professional course after 5yrs from today. The course fee is expected Rs.400, 000. The duration of the course is 2yrs and you need Rs.20, 000 for your monthly payments at the end of every month during that period. You expect to start a saving account today to deposit a fixed amount at the beginning of every quarter to get your requirement fulfilled. If annual interest rate is 12% and compounded monthly, how much should you deposit at the beginning of every quarter.

(10 Marks)

(Total 20 marks)

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

(04 Marks)

ii. If $f(x) = \frac{x}{x-2}$ Show that $f^{-1}f(x) = f(f^{-1}(x)) = x$

(04 Marks)

ii. Express the following fractions as partial fractions.

a. $\frac{1}{4x^2-1}$

b. $\frac{1}{(x+2)(x^2-x+2)}$

(06 Marks)

iii. Find the domain.

i. $F(x) = \frac{x^2+7}{x+3}$

ii. $y = \frac{x-2}{\sqrt{x^2-4}}$

(6 Marks)

(Total 20 marks)

(4) i. Differentiate the following functions

a. $Y = xe^x$

(04 Marks)

b. $Y = \frac{x+1}{x}$

(04 Marks)

ii. The cost and revenue functions of a company are given by.

$$TR = 3000Q - 5Q^2 \text{ and}$$

$$TC = Q^3 - 50Q^2 + 20000$$

Where Q is the number of units produced. Assume that all the units produced are sold.

- Set up the profit function for the company.
- Find the derivative of the profit function with respect to the appropriate variable.
- Find the critical points and decide the number of units that should be produced to maximize the profits.
- Find the maximum profit.

(12 Marks)

(Total 20 marks)

- (5) i. Find the second order derivative of $Y = e^{3x} + e^x$ (03 Marks)
- ii. Find the slope of the business function $Y = 2x^2 + 5x + 7$ at (2, 25) (03 Marks)
- iii. Find the area of the function $y = x^2 + 4$ enclosed by X axis, $x=1$ and $x=4$. (03 Marks)
- iv. Integrate $\int x \ln x dx$ (03 Marks)
- v. Demand and supply functions for a product are given below.
- $P = 9 - 3Q$ demand function and
- $P = 2 + 4Q$ Supply function
- a. Find the price and quantity at the equilibrium point.
- b. Obtain the Consumer and producer surplus at the equilibrium.

(08 Marks)

(Total 20 marks)
