# Uva Wellassa University

## Faculty of Management

Uva Wellassa University

**Degree of Bachelor of Business Management in Entrepreneurship and Management**

***SECOND YEAR FIRST SEMESTER EXAMINATION- AUGUST/ SEPTEMBER-2014***

**HTE 231-2 Business Mathematics**

**Instructions to candidates:**

No. of pages : Three (03)
No. of questions : Four (04)
Time allocation : Two (02) Hours
Marks allocation : 100 Marks
Answer **all** questions.

**Index No:**

01)

i) A real estate firm handles an apartment complex with 50 units. When the rent is Rs.280 per month all 50 units are occupied. However, when the rent is Rs.325 per month the average number of occupied units drops to 47. Assume that the relationship between monthly rent p and demand x is linear.

a. Write the equation of the line giving the demand x in terms of rent p. (4 Marks)

b. Use the equation to predict the number of units occupied if the rent is raised to Rs.355. (4 Marks)

c. Predict the number of units occupied if the rent is lowered to Rs.295. (4 Marks)

ii) The total cost y, for x units of a certain product consists of fixed cost and the variable cost. The total cost is Rs.6000 for 50 units and Rs.9000 for 100 units.

a. Find the linear relationship between x and y. (4 Marks)

b. What does the slope of the line indicates? (5 Marks)

c. Find the cost to produce 200 units. (4 Marks)

(Total 25 Marks)

02) Differentiate **any 5** of the following functions.

i) $y = \frac{1}{3x^2}$

ii) $s = t^{-1/2} + \frac{4}{t^{\frac{3}{2}}} - 5t^{-4}$

iii) $y = \sqrt{3x^2 - 5x + 3}$

iv) $f(x) = x^4 \left[1 - \frac{2}{x+1}\right]$

v) $g(x) = (3x - 2x^2)(5 + 4x)$

vi) $y = 3t^2 + 5t - \sqrt{2t}$ (5 Marks each)

(Total 25 Marks)

03) The revenue from the sales of x fire extinguishers is estimated to be $R(x) = 54x + 0.4x^2$ Dollars. The total cost of producing x fire extinguishers $C(x) = 400 + 30x - 0.2x^2$ dollars.

i. Find the marginal cost function and marginal cost when 60 items are produced. (6 Marks)

ii. Find the marginal revenue function and revenue for the $20^{th}$ item. (6 Marks)

iii. Find the marginal profit function and profit for the $40^{th}$ item. (6 Marks)

iv. Find the marginal average cost function and average cost for the $65^{th}$ item. (7 Marks)

(Total 25 Marks)

04)

i. Evaluate the determinant of the matrix by expanding the second raw.

$$\begin{matrix} 2 & 3 & -1 \\ 0 & 2 & 4 \\ -2 & 5 & 6 \end{matrix}$$

(5 Marks)

ii. Find the inverse matrix.

$$\begin{matrix} 4 & 1 & 5 \\ -2 & 3 & 1 \\ 3 & -1 & 4 \end{matrix}$$

(10 Marks)

iii. If the total revenue and Total cost for a given organization is $R = 4000q + 33q^2$ and $C = 2q^3 - 3q^2 + 400q + 5000$ respectively.

Find the maximum profit of the organization. (10 Marks)

(Total 25 Marks)