

EASTERN UNIVERSITY SRI LANKA  
FACULTY OF COMMERCE AND MANAGEMENT

FIRST YEAR, SECOND SEMESTER EXAMINATION IN  
BUSINESS ADMINISTRATION/ COMMERCE 2010/2011  
(FEBRUARY 2013) – PROPER / REPEAT / RE-REPEAT

COM 1032 BASIC CALCULUS

Answer All Questions

Time: 02 Hours

01. (i) Find the domain of the following functions:

a)  $f(x) = \frac{4}{x^2 - 1}$       b)  $f(x) = \sqrt{x - 2}$

(02 marks)

(ii) a) If  $f(x) = 2^x + 3$ , then show that

i)  $f(2) = 2f(-1)$       ii)  $f(3) = f(0) + f(1) + 2$

(04 marks)

b) If  $f(x) = x + 1$ ,  $g(x) = 6x^2 + 2x$  and  $h(x) = x^2 - 5x + 8$ , then evaluate  $f[g(h(3))]$ .

(02 marks)

(c) If  $f(x) = \frac{x-1}{x}$ , then find  $f(x+1)$ .

(02marks)

(iii) Draw the graph of the following function:

$$f(x) = \begin{cases} x, & \text{if } 0 \leq x < 1 \\ 2, & \text{if } x = 1 \\ 2 - x, & \text{if } x > 1 \end{cases}$$

(05 marks)

(iv) Evaluate the following limits:

a)  $\lim_{x \rightarrow 2} \left( \frac{x^2 - 3x + 2}{x - 2} \right)$

b)  $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$

c)  $\lim_{x \rightarrow \infty} \left( \sqrt{x^2 + x + 1} - x \right)$

d)  $\lim_{x \rightarrow 8} \left( x^{2/3} + 4x^{-1/3} - 5 \right)$

(10 marks)

[Total 25 Marks]

02. (i) Differentiate the following functions with respect to  $x$ :

a)  $y = (x^2 + 2)(x^2 - 2)(4x^3 - 5x)$

b)  $y = \frac{e^{x^2}}{1+x^2}$

c)  $y = \ln(x + \sqrt{x^2 + 4})$

d)  $y = (x^3 - 2x)^4$

(12 marks)

(ii) a) If  $y = x^x$ , then show that  $\frac{dy}{dx} = y(1 + \ln x)$ .

(03marks)

b) If  $x = \frac{2a}{1+t^2}$  and  $y = \frac{2b}{1-t^2}$ , then find  $\frac{dy}{dx}$ ; where  $a, b$  are constants.

(04 marks)

c) If  $(x-4)^2 + (y+5)^2 = 10$ , then evaluate  $\frac{dy}{dx}$  at  $x = 3$  and  $y = 2$ .

(03 marks)

d) If  $y = x^3 \ln x$ , then find  $\frac{d^3 y}{dx^3}$ .

(03 marks)

[Total 25 Marks]

03. (i) Find the points of maxima and minima for the function,

$$y = x^5 - 5x^4 + 5x^3 - 1$$

(10 Marks)

- (ii) The daily production cost of a firm to manufacture  $x$  items is given by

$$C(x) = \frac{x^2}{2} + 14x + 500 \text{ and the demand function is given by } p = 150 - \frac{3}{2}x.$$

Find:

- the marginal cost function;
- the average cost function;
- the marginal average cost function;
- the revenue function;
- the profit function;
- the output level that maximizes profit;
- the total cost, total profit and price at the maximum output level.

(20 Marks)

[Total 30 Marks]

04. (i) Integrate the following:

a)  $\int \frac{3 + 5x - 6x^2 - 7x^3}{2x^2} dx$

b)  $\int \frac{e^{2 \ln x}}{x} dx$

c)  $\int (2x^3 + 3x - 7)x^2 dx$

d)  $\int x(2 + x^2)^{3/2} dx$

e)  $\int \frac{x^2 - 2}{x^3 - 6x + 1} dx$

(15 marks)

- (ii) The marginal cost function of a firm is given by  $5000e^{0.5x} + 30$ , where  $x$  is the quantity produced. If the fixed cost is Rs. 70000, find the total cost function of the firm.

(05 marks)

[Total 20 Marks]