

EASTERN UNIVERSITY, SRI LANKA

FACULTY OF COMMERCE AND MANAGEMENT

FIRST YEAR SECOND SEMESTER EXAMINATION IN

BACHELOR OF BUSINESS ADMINISTRATION (HONS)/ BACHELOR OF COMMERCE (HONS)

[2018/2019] (MARCH 2022) – (REPEAT)

COM 1032 BASIC CALCULUS

Answer All Questions.

Time: 02 Hours

01. (i) If  $f(x) = 4(x + 1)$  and  $h(x) = \sqrt{x + 1}$  then find  $\frac{f(2)}{h(8)}$ .
- (ii) If  $f(x) = \sqrt{x}$  and  $g(x) = 1 - 3x$ , then find  
a)  $f(g(x))$ ; b)  $g(f(x))$ ; c) values of  $x$  when  $f(g(x)) = g(f(x))$ .
- (iii) Evaluate the following limits:
- a)  $\lim_{x \rightarrow 3} (4 - 3x + x^3)^2$ ;                      b)  $\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x^2 - 9}$ ;
- c)  $\lim_{x \rightarrow \infty} \frac{2x^3 + x^2 - 1}{3x^3 - x + 1}$ ;                      d)  $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$ .

[ Total 25 Marks]

02. (i) Differentiate the following functions with respect to  $x$  :
- a)  $y = 3 \left( \frac{x^2 + 2x}{x} \right)$ ;                      b)  $y = 9x^{1/3}(x^3 + 1)$ ;
- c)  $y = [\ln(1 + e^x)]^3$ ;                      d)  $y = \frac{(x - 5)^4}{e^x}$ .
- (ii) Find  $\frac{dy}{dx}$  for the function  $y - xy^2 + x^2 + 1 = 0$ .
- (iii) Find the third derivative of the function  $y = x^3 \ln(x)$  and evaluate it at  $x = 2$ .

[ Total 25 Marks]

03. (i) Find and classify all the critical points for the function  $y = -x^3 + 2x^2 + 4x - 16$ .
- (ii) A firm has the following demand and the total cost functions:  
 $p = 20x + 4000$ , and  $TC = 3200 + 0.1x^3$ ,  
where  $x$  is the number of units of output produced and sold and  $p$  is the price per unit.

- a) Write down the expressions for
- Average cost;
  - Marginal cost;
  - Total revenue;
  - Marginal revenue;
  - Profit.
- b) Determine the value of  $x$  for which total revenue is maximum.
- c) Determine the value of  $x$  for which profit is maximum. What is the maximum profit?

[Total 25 Marks]

04. (i) Find the following indefinite integrals:

a)  $\int x(x-3)^2 dx;$

b)  $\int x^3 e^{(x^4+2)} dx;$

- (ii) Evaluate the following definite integrals:

a)  $\int_1^3 \frac{x^2 + 2x + 12}{x} dx;$

b)  $\int_0^1 \left( e^x - \frac{1}{e^x} \right) dx.$

- (iii) The marginal cost for a product is given by  $MC = x^2 - 6x + 20$  where  $x$ , the quantity produced. Determine the total cost, given fixed cost is 805.

[Total 25 Marks]