EASTERN UNIVERSITY SRI LANKA

FACULTY OF COMMERCE AND MANAGEMENT

FIRST YEAR, SECOND SEMESTER EXAMINATION IN

BUSINESS ADMINISTRATION/ COMMERCE 2011/2012

(AUGUST 2014) – PROPER / REPEAT / RE-REPEAT

COM 1032 BASIC CALCULUS

Answer All Questions **Time: 02 Hours**

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

$a)\quad f(x)=\dfrac{x^2+5}{x+2}$ $b)\quad f(x)=\sqrt{x^2+9}$

(04 marks)

(ii) a) If $f(x)=\begin{cases}-2x+4 & if\ x\le 1\\ x^2+1 & if\ x>1\end{cases}$ then find

$i)\quad f(3)+f(-5)$ $ii)\quad f\left(\dfrac{f(0)}{f(2)}\right)$

(04 marks)

b) If $f(x)=x+1,$ and $g(x)=(x-1)^3+2x^2$, then find $g(f(x))$.

(02 marks)

(iv) Evaluate the following limits:

$a)\quad \lim\limits_{x\to 1}\left(\dfrac{1}{x^2}-\dfrac{1}{x}\right)$ $b)\quad \lim\limits_{x\to 0}\dfrac{\sqrt{2+x}-\sqrt{2}}{x}$

$c)\quad \lim\limits_{x\to \alpha}\left(\dfrac{x^2-6x+13}{2x^3+7x^2-11}\right)$ $d)\quad \lim\limits_{x\to 8}\left(x^{2/3}+4x^{-1/3}-5\right)$

$e)\quad \lim\limits_{x\to 2}\left(\dfrac{x^3-8}{2-x}\right)$

(15 marks)

[Total 25 Marks]

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

a) $y=\sqrt{x}\left(\sqrt{x}+3\right)$

b) $y=\dfrac{3x+2}{(x+2)\left(x^2-3\right)+3}$

c) $y=\left(x^2+2\right)e^{2x}\ln\left(x^2+2\right)$

d) $y=\left(\dfrac{2x^3+1}{3x^2+1}\right)^2$

(15 marks)

(ii) a) If $y=\dfrac{x}{1+x}$ then show that $x\dfrac{dy}{dx}=y(1-y)$.

(03marks)

b) If $x=t\ln t$ and $y=\dfrac{\ln t}{t}$, then find $\dfrac{dy}{dx}$ and evaluate it at $t=1$.

(04 marks)

c) If $e^{xy}-4xy=4$ then find $\dfrac{dy}{dx}$ in terms of x and y.

(03 marks)

d) If $y=e^{(-2x)}\ln 2x$, then find $\dfrac{d^3y}{dx^3}$.

(03 marks)

[Total 28 Marks]

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

$$y=x^4-8x^3+80x^2+15.$$

(07 Marks)

(ii) If the average cost function of a particular product is given by $AC=\dfrac{160}{x}+5-3x+2x^2$; where x is the number of units produced and sold. Find the total cost function of the product.

(03 Marks)

(ii) A manufacturer has found that if he wants to increase his output, he must lower his price. His total revenue $R(x)$ from an output level x is given by the expression $R(x)=x(148-x)$. His production costs are: Rs. 1000 as fixed cost and Rs. 36 per unit as variable cost. You are required to find the following:

a) the output level that would maximize revenue;

b) the maximum total revenue;

c) the profit function $P(x)$;

d) the output level that maximizes profit;

e) the maximum total profit.

(15 Marks)

[Total 25 Marks]

04. (i) Integrate the following:

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

c) $\int\left(2x^3+3x-7\right)x^2dx$ d) $\int x\left(2+x^2\right)^{3/2}dx$

e) $\int \frac{2xe^{2x}}{e^{(2x+3)}}dx$

(14 marks)

(ii) Evaluate the following:

a) $\int_0^3 \frac{6x}{x^2+1}\,dx$ b) $\int_{-1}^{2}\left(4x^3+6x\right)^2dx$

(05 marks)

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

(03 marks)

[Total 22 Marks]