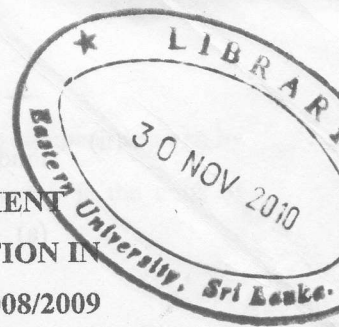


EASTERN UNIVERSITY SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
FIRST YEAR, SECOND SEMESTER EXAMINATION IN
BUSINESS ADMINISTRATION/ COMMERCE 2008/2009
(SEPT 2010) – PROPER AND REPEAT
COM 1032 BASIC CALCULUS



Answer All Questions

Time: 03 Hours

01. (i) (a) If $f(x) = x + |x - 2|$ compute $f(-1)$ and $f(3)$.
- (b) Specify the domain of the function $g(t) = \sqrt{3t - 2}$
- (c) Find the composite function $f[g(1)]$ if $f(u) = \sqrt{u + 1}$ and $g(x) = x^2 - 1$.
- (d) A certain industrial machine depreciates so that its value after t years is given by a function $Q(t) = ke^{-0.04t}$. After 20 years the machine is worth 8986.58.
- Find the following:
- (a) the value of k ;
- (b) original value of the machine.
- (ii) A private college in the south west has launched a fund – raising campaign. Suppose that the college officials estimate that it will take $f(x) = \frac{10x}{150-x}$ weeks to reach x percent of their goal.
- (a) What is the domain of the function?
- (b) For what values of x does $f(x)$ have a practical interpretation in this context?
- (c) Sketch the relevant portion of the graph of this function.
- (d) How long will it take to reach 50 percent of the campaign's goal?

(20 Marks)

02. (i) Evaluate the limits of the functions given below:

(a) $\lim_{x \rightarrow -2} \frac{x^2 + 8}{x + 2}$; (b) $\lim_{x \rightarrow 1} \frac{1 - x}{\sqrt{5 - x^2} - 2}$

(ii) Find $\frac{dy}{dx}$ for the functions given below.

(a) $y = \ln \left[\frac{\sqrt{4x+3}(x^2-2x+9)}{(3x-2)^{3/2}} \right]$; b) $y = \frac{e^{2x^2} + e^{3x+2}}{e^{3x}}$

(iii) (a) If $x^2 + xy = 5$, find $\frac{d^2y}{dx^2}$ in terms of x and y .

(b) Suppose that $y = \frac{1}{t}$ and $t = 3 - \frac{1}{x^2}$. Find the following:

(I) $\frac{dy}{dt}$; (II) $\frac{dt}{dx}$; (III) $\frac{dy}{dx}$ in terms of x and y ;

(IV) $\frac{d^2y}{dx^2}$ at $x = 2$.

(iv) Suppose that the demand function is given by $q = 3p^2 e^{5p^2+2p+6}$, where q is number of units and p is the price per unit. Find the elasticity of demand in terms of

(20 Mar

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

$$y = x^4(x-1) - \frac{1}{3}x^3$$

(ii) Suppose that the demand function is $x = \frac{1}{3}(25-2p)$, where x is the numbers of units and p is the price per unit. Let the average cost per unit be Rs 40. Find:

- (a) the revenue function in terms of p ;
- (b) the cost function in terms of p ;
- (c) the profit function;
- (d) the price per unit that maximizes the profit function;
- (e) the maximum profit.

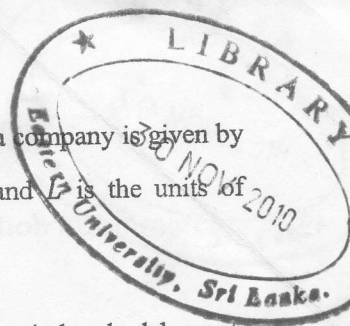
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04. (i) (a) Find all the first and second order partial derivation for the function

$$f(x, y) = (x^3 + y^2)^2.$$

(b) Use the method of Lagrange multipliers to find the maximum values of f below subject to the given constraint:

$$f(x, y) = 4x^2 - 2xy + 6y^2; \quad x + y = 72$$



- (ii) (a) The number of units of a product that are manufactured by a company is given by $f(k, L) = 10k^{0.4}L^{0.6}$, where k is the units of capital and L is the units of Labour.
- (I) Find the marginal productivity of labour and capital,
 - (II) Determine the effect on output of an additional unit of capital and labour at $k = 8, L = 20$.

- (b) The profit function for a firm producing two goods x and y is given by $\pi(x, y) = 160x - 3x^2 - 2xy - 2y^2 - 120y - 18$. Find the profit maximizing level of output for each product and the maximum profit.

(20 Marks)

05. (i) Integrate the following

(a) $\int \left(\frac{1}{x^3} - \frac{x}{2} \right)^2 dx$; (b) $\int 2xe^x dx$.

(ii) Evaluate the following definite integrals

(a) $\int_0^3 \frac{6x}{x^2+1} dx$; (b) $\int_{-2}^3 e^{-x/2} dx$.

(iii) Marginal cost is given by $MC = 32 + 18q - 12q^2$. Fixed cost is 43. Find the total cost function.

(iv) The demand and supply function under perfect competition are $P_d = 16 - x^2$ and $P_s = 2x^2 + 4$ respectively. Find the consumer's surplus and producer's surplus.

(20 Marks)