Goa Vidyaprasarak Mandal´ s
Gopal Govind Poy Raiturcar College of Commerce and Economics
Farmagudi Ponda Goa
B.Com. (Semester II) Examination, April 2017

MATHEMATICAL TECHNIQUES

Duration:- 2 Hours **Marks:-80**

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Q1 Attempt the following. **(4 x 5 = 20)**

a) In how much time will Rs.5,000 at 3 % p.a. produce the same income as Rs.10,000 in 2 years at 3% p.a. simple interest?

b) Show that the points (5,4), (2,3), and (1,0) are the vertices of an isosceles triangle.

c) A function f is given as:

$$f(x) = \begin{cases} 3x+5, & \text{for } -3 \le x < -1 \\ 2x+1, & \text{for } -1 \le x < 2 \\ 2-x, & \text{for } 2 \le x \le 4 \end{cases}$$

Find $f(-2), f(2), f(3), f(1)$.

d) Find $\frac{dy}{dx}$
i) $y = x^2 log x$ ii) $y = (a^x - 5x + 4)^5$

e) Find the equation of line having slope 3/4 and Y-intercept -6.

OR

QI Attempt the following. **(4 x 5 = 20)**

p) In how many years will sum of money be doubled at 25% p.a. simple interest?

q) A(2,1) and B(4,3) are two points. If B is the mid-point of segment AC, find the co-ordinates of the point C.

r) If $f(x) = 2x^2 - 3x + 1$, for what value of x is $f(2x) = 2f(x)$?

s) Differentiate with respect to x
i) $y = \dfrac{3x+5}{5x-7}$ ii)$y = \sqrt{3x^2 + 2 + e^x}$

t) Find the equation of the line passing through the point of intersection of the lines $2x + y = 3$, $x - 3y = 12$ and through the point (2,3).

Q2 Attempt the following. **(4 x 5 = 20)**

a) Find the value of x if the triangle whose vertices are A(x,-4), B(2,3) and C(4,-1) is right angled at C.

b) What sum of money will amount to Rs.73,502.58 in 3 years at 7 % p. a. compound interest?

c) Find i)$\lim_{x\to 2} \dfrac{x^2-7x+10}{x^2-4}$ $\quad$ *ii*) $\lim_{x\to 0} \dfrac{\sqrt{4+x}-\sqrt{4-x}}{x}$

d) Evaluate the following integrals:
i) $\int (x-3)(x+5)dx$ $\quad$ ii) $\int (3x+\dfrac{2}{x}-e^x)dx$

e) The demand function for a commodity is given by p=16 - $\dfrac{x^2}{4}$. Find i) the total revenue function and ii) marginal revenue at x=1.

OR

QII Attempt the following. **(4 x 5 = 20)**

p) A(m,5) and B(-4,n) are the end point of a segment and C(2,-1) is the midpoint. Find m and n.

q) Find the future value of Rs.20,00,000 after 3 years if the compound interest rate is 8 % p.a.

r) Examine for continuity at x=0, the function

$$f(x) = \begin{cases} \dfrac{\sqrt{2+x}-\sqrt{2-x}}{x} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$$

s) Evaluate the following integrals:
i) $\int \dfrac{x^4-6}{x^2}dx$ $\quad$ ii) $\int (3x+4)(2x-3)dx$

t) At what rate of compound interest would an amount double itself in 3 years? Given that $2^{\frac{1}{3}} = 1.2611$ approximately.

Q3 Attempt the following. **(4 x 5 = 20)**

a) Solve the following L.P.P. by graphical method.
Maximize $Z = 800x + 100y$ subject to
. $\quad 4x + 6y \leq 120$
. $\quad 10x + 3y \leq 180$
. $\quad x \geq 0, \;\; y \geq 0.$

b) Find the maximum and minimum value of the function

$$f(x) = x^3 - 2x^2 + x + 10$$

c) If $D = 25 - 3p - p^2$ is a demand function, find elasticity of demand when $p = 3$.

d) If $u = x^3 + x^2y + y^3$, prove that

$$x\frac{\delta u}{\delta x} + y\frac{\delta u}{\delta y} = 3u.$$

e) Differentiate with respect to x

i) $y = (x^3 + 4)(1 + logx)$ ii)$y = \dfrac{x^2 - 1}{2x + 1}$

OR

QIII Attempt the following. (4 x 5 = 20)

p) Solve the following L.P.P. by graphical method.
Minimize $Z = 25x + 40y$ subject to
. $x + y \geq 10$
. $6x + 4y \geq 48$
. $x \geq 0, \ \ y \geq 0.$

q) The supply function for a commodity is given by $y = 20 - 3x - 3x^2$ where y is demand and x is price. Find the price elasticity of supply when x=2.

r) If $z = 3x^2 + 2xy + 5xy^2$ find $\dfrac{\delta^2 z}{\delta x \delta y}$ and $\dfrac{\delta^2 z}{\delta y \delta x}$

s) A sum of money amounts to Rs.45,980 in 3 years and to Rs.48,640 in 4 years at a certain rate of simple interest. Find the sum and rate.

t) The demand function for a commodity is given by $p = 45 - 3x - 4x^2$. Find the consumers surplus when x=2.

Q 4 Attempt the following. (4 x 5 = 20)

a) Find the equation of the line passing through the points (1,-2) and (-3,4).

b) A sum of money is invested for 2 years at a certain rate. If it had been invested at a rate 2 % higher than the present rate, it would have given Rs.1,300 more as simple interest. Find the sum.

c) Evaluate the integral $\int_1^3 (1 - 2x)dx$.

d) Find the total revenue function and demand function, if the marginal revenue function is given as $MR = 7 - 4x$.

e) The demand function for a commodity is $p = 20 - 2D - D^2$. Find the consumers surplus when $D_1 = 3$.

OR

Q IV Attempt the following. (4 x 5 = 20)

p) Find the equation of the line passing through (5,-1) and the sum of whose intercepts on the co-ordinate axes as 8.

q) A sum of Rs.6,55,000 is invested in a fixed deposit giving 10% p.a. compound interest. Find the interest in the 4^{th} year.

r) Find the value of $\int_2^3 x(x+1)dx$.

s) The supply function for a commodity is $p = q^2 + 10$. Find the producers surplus when the price per unit of the commodity is Rs.35.

t) The marginal cost function for producing x items is given by $MC = 3x^2 + 5x - 4$. Find the total cost function and the average cost function if the fixed cost is Rs.1000.

End