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

MATHEMATICAL TECHNIQUES

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

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

a) Find the time period for which Rs.6,000 at 4 % p.a. produce the same income as Rs.12,000 in 3 years at 5% p.a. simple interest?

b) Find the equation of line passing through the point (-1,3) with slope 3/2.

c) Find the range of the function f given as:

$$f(x) = 3x - 4, \text{ for } -1 \leq x \leq 3$$

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

e) Show that the points A(1,2), B(0,-5), and C(3,-4) are the vertices of a right angled triangle.

OR

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

p) At what % rate of interest, the simple interest of Rs.675 will be Rs. 168.75 in 4 years?

q) L(1,2) and N(3,4) are two points. If M is the mid-point of segment LN, find the co-ordinates of the point M.

r) If $f(x) = ax + 6$, and $f(1) = 11$

s) Differentiate with respect to x
i) $y = \dfrac{2x - 1}{5x + 2}$ ii)$y = (2x^2 + x + a^x)^{\frac{3}{2}}$

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) Find the interest on Rs.10000 at 4 % p. a. compounded for 5.5 years.

c) Find i) $\lim_{x\to 1}(\frac{1}{x-1}-\frac{1}{x^2-x})$ $\quad ii)\lim_{x\to 1}\frac{\sqrt{x+4}-\sqrt{5}}{x-1}$

d) Evaluate the following integrals:
i) $\int(2x-3)(x+1)dx$ $\quad$ ii) $\int\frac{x^2+2x+x^{-1}}{\sqrt{x}}dx$

e) The total revenue R of a firm when demand for its good is given by $R=15x-2x^2-x^3$. Find the average revenue and the marginal revenue when the demand x=2.

OR

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

p) If A is (4,-7) and B(-3,8), find the co-ordinate of the points which divides AB internally in the ratio 3:5.

q) Find the future value of Rs. 10,00,000 after 4 years if the compound interest rate is 7 % 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) $\int\frac{x^3-5x}{\sqrt{x}}dx$ $\quad$ ii) $\int x^3(2x+7)dx$

t) The amount of Rs.1,44,000 at 10% p.a. compound interest rate for 3 years equals the amount of a sum of money at 20 % p.a. compound interest rate for 2 years. Find the sum.

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

a) Solve the following L.P.P. by graphical method.
Maximize $Z=9x+13y$ subject to
. $\quad 2x+3y\leq 18$
. $\quad 2x+y\leq 10$
. $\quad x\geq 0,\ \ y\geq 0.$

b) Find the range of the function given by

$$f(x) = 3x - 4 \quad \text{for} \quad -1 \leq x \leq 3.$$

c) If $p = 100 - 3D - D^2$ is a demand function, find elasticity of demand when $D = 2$.

d) If $z = x^3 + x^2y + y^3$, find $x\frac{\delta z}{\delta x} + y\frac{\delta z}{\delta y}$.

e) Differentiate with respect to x

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

OR

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

p) Solve the following L.P.P. by graphical method.
Minimize $Z = x + 4y$ subject to

. $x + 3y \geq 3$

. $2x + y \geq 2$

. $x \geq 0, \quad y \geq 0.$

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

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

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) Differentiate with respect to x

i) $y = a^x x^3$ ii)$y = \frac{x^2-1}{x+1}$

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

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

b) A sum of money is invested for 2 years at a certain rate. If it had been invested at a rate 3 % higher than the present rate, it would have given Rs.1,300 more as simple interest. Find the sum.

c) Evaluate the integral $\int_0^2 (2x + 3)dx$.

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 having slope $-\frac{1}{2}$.

q) In how many years would Rs. 4,30,000 become Rs. 4,97,778.75 at 5% p.a. compound interest?

r) Find the value of $\int_0^3 x(x-1)dx$.

s) The supply function for a commodity is $p = q^2 + 20$. find the producers surplus when the price per unit of the commodity is Rs.25.

t) The cost function is given by $C = 3x^3 + 5x^2 + 4$. Find the average cost and marginal cost. Also find the average marginal cost when x=5.

End