Goa Vidyaprasarak Mandal´ s
Gopal Govind Poy Raiturcar College of Commerce and Economics
Farmagudi Ponda Goa
B.Com. (Semester II Old Course) Examination, April 2018
MATHEMATICAL TECHNIQUES

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

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

a) In what time, the interest on Rs.5,000 at 9 % will be equal to the interest on Rs. 3000 for 6 years at 15% , both the interests being simple interest?

b) Find y, if the distance between (1,-3) and (-2,y) is 5 units.

c) If $f(x) = x^2 - 5x + 6$, find x if $f(x+2) = f(x+1)$.

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

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) How many years will it take to double the sum of money invested at 12% p.a. simple interest?

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

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) $y = \frac{x-1}{5x+2}$ ii)$y = (2x^2 + x + a^x)$

t) Find the equation of the line passing through the point of intersection of the lines $x + 2y = 3$, $x + 3y = 4$ and through the point (2,1).

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

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

b) Find the interest on Rs.10000 at 5 % p. a. compounded for 6 years.

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

d) Evaluate the following integrals:

i) $\int (x-3)(x+1)dx$ ii) $\int \frac{x^2+2x+1}{x}dx$

e) The demand D when the price p is given by $D = \frac{p+6}{p-2}$. Find the rate of change of demand when price is 4.

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 externally in the ratio 3:2.

q) Find the future value of Rs. 100000 after 4 years if the compound interest rate is 8 % p.a.

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

$$f(x) = \begin{cases} \frac{\sqrt{2+x}-\sqrt{2-x}}{x} & \text{for } x \neq 0 \\ 1 & \text{for } x = 0 \end{cases}$$

s) Evaluate the following integrals:

i) $\int \frac{x^2-5x}{x}dx$ ii) $\int x(2x+7)dx$

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 $Z = 6x + 7y$ subject to

. $x + y \leq 6$

. $3x + y \leq 8$

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

b) Find the range of the function given by

$$f(x) = 2x + 1 \quad \text{for} \quad 2 \leq x \leq 5.$$

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

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

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

OR

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

p) Solve the following L.P.P. by graphical method.
Minimize $Z = 2x - y$ subject to

$$x + y \leq 5$$
$$x + 2y \leq 8$$
$$x \geq 0, \quad y \geq 0.$$

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=5.

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

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) $y = \dfrac{x^2 - 1}{x + 1}$

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.1,200 more as simple interest. Find the sum.

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

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 $D = 5$.

OR

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

p) Find the equation of the line passing through (4,3) and having slope $\frac{1}{3}$.

q) In how many years would Rs. 4,00,000 become Rs. 4,97,778.75 at 6% p.a. compound interest?

r) Find the value of $\int_0^2 x(x-1)dx$.

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 cost function is given by $C = 3x^3 + 5x^2 + 4$. Find the average cost and marginal cost. Also find the average and marginal cost when x=6.

End