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CES COLLEGE OF ARTS AND COMMERCE CUNCOLIM SALCETE GOA
FYBCOM IInd (Old Course) SEMESTER END EXAMINATION, APRIL 2018
MATHEMATICAL TECHNIQUES

Marks: 80 | Duration: 2hrs
Date:21/04/2017 | Time: 10.00.a.m. to 12.00 noon

Instructions: 1) Attempt all questions.
2) Figure to the right indicates full marks.
3) Use of non – programmable calculator is allowed.
4) Log tables and graph papers will be supplied on request.

Q.I. Attempt the following: (4x5=20)

a) The ages of two persons are now in the ratio 5:4. After 9 years, they will be in the ratio 6:5. Find their present ages.

b) If A= (2, 1) and B= (3, 4). Find f(AB).

c) If $f(x) = \frac{5x-1}{5x+1}$, find f(f(x)).

d) Find $\lim_{x\to 3} \frac{x^3-27}{x-3}$

e) Differentiate the following w.r.t. x (i) $x^7 + 8x^5 - 2x + 10$ and (ii) $x(x^2 + 2)$

OR

Q.I. Attempt the following: (4x5=20)

v) Monthly incomes of A and B are in the ratio of 4:3 and their monthly expenses are in the ratio 3:2. If each of them saves Rs.600/- per month, find their monthly incomes.

w) p divides Seg AB in the ratio 2:3 internally. If A= (1, 4) and B= (2, 3) find the co-ordinates of point P.

x) If $f(x) = 2x - 1$ and $g(x) = x^2 - 1$, find (i) f(g(x)) and g(f(x)).

y) A function is defined as

$f(x) = x^2 - 4 ; 0 \le x \le 2$
$= 3x + 2 ; 2 < x \le 4$
$= x^2 - 1 ; 4 < x \le 6$

Discuss the continuity of f at $x = 2$ and $x = 4$.

z) Differentiate the following w.r.t. x (i) $x^4 + 2x + 3$ (ii) $x(x - 1)$.

Q.2. Attempt the following: (4x5=20)

a) Show that the points (0, 0); (5, 5) and (-5, 5) are the vertices of right angled triangle.

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

c) In 10 years, the population of a town increased by 4%. Today the population is 87,800. What was its population 20 years ago?

d) $y = (x^2+2x+1)^6$; find $\frac{dy}{dx}$

e) Find $\int \frac{(x^2+x)(x+1)}{x} dx$

OR

Q.II. Attempt the following: (4x5=20)

v) The population of a town was 75,000. Due to an increase in 6% in males and 5% in females, the population became 79,150. Find the number of males and females separately in the new population.

w) Find equation of line passing through (3, 4) and parallel to $2x - 3y = 4$.

x) If A= (2, 2), B= (-2, 4), C= (2, 6) are the vertices of a ΔABC. Prove that it is an isosceles Δ

y) $y = x^2\log(x+1)$ find $\frac{dy}{dx}$

z) $\int (2x + 7)^8 dx$

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Q.3. Attempt the following: (4x5=20)

a) If a 32 men can do a piece of work in 60 days, how days will be required for 48 men to do the work?

b) Find the equation of a line perpendicular to $3x = 6 - 2y$ and passing through the mid-point of the line joining points (5, -2) and (2, 2).

c) The demand function of a commodity is $p = 60 + 15x - 5x^2$. Find Marginal revenue when demand is 5 units.

d) The marginal revenue for a commodity is $20 - 2x$, find total revenue when $x = 4$.

e) The marginal cost function is $f(x) = 15x^2 + 6x + 4$ and fixed cost is Rs.200/-, find the total cost and average cost function.

OR

Q.III. Attempt the following: (4x5=20)

v) Cost of 15 balls is Rs. 240/- what will be the cost of 80 balls?

w) The x-intercept of a line is 4 times its y-intercept. If it passes through the point (1, 5), find its equation.

x) The price p of an item is given by $p = 3 + 4x - x^2$. Find the rate at which price is changing when demand is 5. At what rate is the total revenue changing then?

y) The marginal revenue function is $MR = 7 - 4x - x^2$. Find the total revenue.

z) Find the producers surplus at $x = 3$, if the supply function is $p = 6x - 7$.

Q.4. Attempt the following: (4x5=20)

a) The line is parallel to the line $3x+4y = 5$. If (1, 6) is a point on this line, find its equation.

b) If $x = 25 - 3p - p^2$ is the demand function, find price elasticity of demand when $p = 3$.

c) The total cost function is given by $c = 2x^3 - 15x^2 + 24x + 50$. Find the value of x for which the total cost is decreasing.

d) The supply function of a commodity is $p = q^2 + 10$. Find the producer surplus when price per unit of the commodity is Rs.35/-

e) If $f(x, y) = x^5 + y^4 + 3x^2y^3 - 12$ find (i) f_{xy} and f_{yx}

OR

Q.IV. Attempt the following: (4x5=20)

v) Find the equation of line passing through the point (1, 5) and parallel to the line passing through the points (4, 4) and (6, 8).

w) The cost function is given by $c = 3x^3 + 5x^2 + 4$. Find the average cost and marginal cost when $x = 4$.

x) Show that $f(x) = \frac{1}{x} + 1$ is always decreasing for all values of x except $x = 0$.

y) The demand function is given by $y = 15 - x - x^2$. Find the consumers surplus when the demand is 2.

z) $f(x, y) = x^3 + 3x^2y + y^2$. Verify if $f_{xy} = f_{yx}$.

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