Reg.No. :

I.Answer all the questions.
II.Use Blue pen only.

Time : 01:15:00 Hrs

Total Marks : 50

Section-A

4 x 1 = 4

1) If the rate of change of y with respect to x is 6 and x is changing at 4 units / sec , then the rate of change of y per sec is

(a) 24 units / sec (b) 10 units/sec (c) 2 units/sec (d) 22 units/sec

2) The weekly profit p , in rupees of a corporation is determined by the number x of shirts produced per week according to the formula p = 2000x - $0.03x^2$ - 1000. Find the rate at which the profit is changing when the production level x is 1000 shirts per week .

(a) Rs. 140 (b) Rs. 2000 (c) Rs. 1500 (d) Rs. 1940

3) The bottom of a rectangular swimming tank is 25 m by 40 m . Water is pumped into tank at the rate of 500m^3/min. Find the rate at which the level of the water in the tank is rising ?

(a) 0.5m/min (b) 0.2m/min (c) 0.05 m/min (d) 0.01 m / min

4) The slope of the tangent at (2 , 8) on the curve $y = x^3$ is

(a) 3 (b) 12 (c) 6 (d) 8

Section-B

5 x 6 = 30

5) Find the equilibrium price and equilibrium quantity for the following demand and supply functions. $q_d = 4 - 0.05p$ and $q_s = 0.8 + 0.11p$

6) Find the marginal revenue for the revenue function $R(x) = 100x + \frac{x^2}{2}, Where\ x = 10.$

7) The unit price, p of some product is related to the number of units sold, x, by the demand function $p = 200 - \frac{x}{1000}$. The cost of producing x units of this product is given by C = 40x + 12,000. The number of units produced and sold x is increasing at the rate of 300 units per week. When the number of units produced and sold is 20,000 determine the instantaneous rate of change with respect to time ,**t** (in weeks) of (i) Revenue (ii) Cost (iii) Profit.

Section-C

5 x 10 = 50

8) A point moves along the curve $y^2 = 12x$ in such a way that its x - coordinate is increasing at the rate of $5\sqrt{2}$ units per second when the point is at (3 , 6). Show that the y - coordinate increases at the same rate as that of x - coordinate.

9) Given are the following revenue, cost and profit equations $R = 800x - \frac{x^2}{10}, C = 40x + 5,000, P = R - C,$ Where x denotes the number of units produced and sold (per month). When the production is at 2000 units and incerasing at the rate of 100 units per month, determine the instantaneous rate of change With respect to time, **t** (in months) , of (i) revenue (ii) cost (iii) profit.

10) A metal cylinder When heated, expands in such a way that its radius r, increases at the rate of 0.2 cm. per minute and its height h increses at a rate of 0.15 cm per minute. retaining its shape. Determine the rate of change of the volume of the cylinder when its radius is 10 cms and its height is 25 cms.

11) For What values of x, is the rate of increase of $x^3 - 5x^2 + 5x + 8$ is twice the rate of increase of x ?

12) Determine the coefficients a and b so that the curve $y = ax^2 - 6x + b$ may pass through the point (0,2) and have its tangent parallel to the x - axis at x = 1.5.

13) a)   Using derivative as a rate measure prove the following statement : " If the area of a cricle increases at a uniform rate, then the rate of increase of the perimeter varies inversely as the radius of the cricle ".

b)   The radius of a circular plate is increasing at the rate of 0.2 cm per second. At what rate is the area increasing when the radius of the plate is 25 cm . ?

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