INDIAN SCHOOL MUSCAT

SECOND PERIODIC TEST

APPLIED MATHEMATICS – 241

CLASS: XII F MAX. MARKS: 20

DATE: 09-05-2021 TIME ALLOWED: 40 MINUTES

INSTRUCTIONS:

1. All questions are compulsory.
2. Calculators are not allowed.
3. Question No 1 to 2 are Very short answer Type questions of 1 mark each.
4. Question No 3 to 6 are Short answer type – I questions of 2 marks each.
5. Question No 7 to 8 are Short answer type- II questions of 3 marks each.
6. Question No. 9 is on case study. The case study question has 5 case – based sub-parts. An examinee is to attempt any 4 out of 5 sub – parts(1 Mark each).

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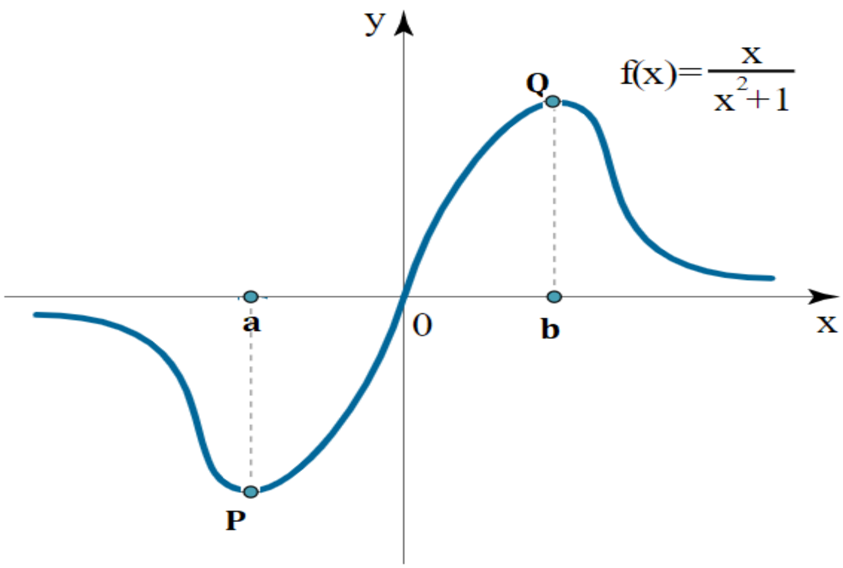
Q.No		Marks
1.	Find $\frac{dy}{dx}$ if y = $\sqrt{3^{logx}}$	**1**
2.	If y = x + $\sqrt{1+x^2}$, find $\frac{dy}{dx}$	**1**
3.	If xy + y^2 + x^2 = 1 then find $\frac{dy}{dx}$	**2**
4.	If $2^{(x+y)} = (x+y)^2$ then show that $\frac{dy}{dx} = -1$	**2**
5.	Find $\frac{dy}{dx}$ if x = 2at^2 and y = 2at + at^3	**2**
6.	If y = $log\sqrt{3-x^2}$ and u = $\sqrt{3-x^2}$ find $\frac{dy}{du}$	**2**
7.	Find the intervals in which the functions given below are strictly decreasing or strictly increasing f(x) = $\mathbf{x^4} - \frac{\mathbf{x^3}}{\mathbf{3}}$. Also find the points of local maxima and minima using first derivative test.	**3**
8.	Find all the points on the curve y = x^3- 11x + 5 at which the tangent has the equation y = x – 1 .	**3**

9. The study of the behavior of various functions to solve various optimization problems require a sound knowledge of derivatives. The slope of the tangent lines provide vital criteria about the points in the domain of the function where it attains its maximum or minimum value and to find those maximum or minimum values. It helps to estimate the profit and the loss point of certain ventures. Statisticians employed in companies make use of this concept to calculate the exact quantity of a certain item to be manufactured by the company to maximize the profit or to minimise the cost.

Answer the questions below with reference to the following graph of f(x).



i) The derivative of f(x) is represented by function A(x). Then A(x) =

a) $\frac{1-x}{x^2+1}$ b) $\frac{1-x^2}{x^2+1}$ c) $\frac{1-x^2}{(x^2+1)^2}$ d) $\frac{2x}{(x^2+1)^2}$ 1

ii) The value of a and b (see the graph) is

a) 1 and -1 b) 2 and -2 c) -1 and 2 d) -1 and $\frac{1}{2}$

iii) The function strictly increases in 1

a) (0, 2) b) (-1, 1) c) (- ∞, -1) U (2, ∞) d) (0, ∞)

If an industry producing cars, models its total cost function 1
C(x) = $\frac{x}{x^2+1}$ where x is the number of cars produced
per day, where x ≥ 0 .

iv) The maximum number of car/cars produced in a day is/are

a) 2 b) 1 c) $\frac{1}{2}$ d) 5 1

v) If one unit on y axis is equivalent to 1 million rupees what is the total cost to produce one car in a day. 1

a) 50 million rupees b) 5 lakh rupees c) 1 lakh rupees d) 2 lakh rupees