



# INDIAN SCHOOL MUSCAT SECOND PERIODIC TEST

## MATHEMATICS

CLASS: XII  
30.05.2022

Sub. Code: 041

Time Allotted: 50 mins.  
Max. Marks: 20

### GENERAL INSTRUCTIONS:

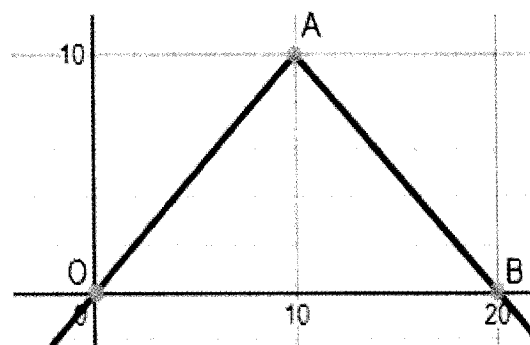
- (2) This question paper consists of 7 questions. All questions are compulsory.  
(ii) Questions 1 - 3 carry 2 marks each.  
(iii) Questions 4 and 5 carry 3 marks each.  
(iv) Questions 6 and 7 carry 4 marks each.

1. Differentiate  $y = \log \sqrt{\frac{1+\sin x}{1-\sin x}}$ , with respect to  $x$ . (2)
2. Find  $\frac{dy}{dx}$  if  $\sin^2 y + \cos(xy) = k$  (2)
3. If  $x = 4t$  and  $y = \frac{4}{t^2}$ , find  $\frac{d^2y}{dx^2}$ . (2)
4. If  $y = \log(x + \sqrt{1+x^2})$ , prove that  $(1+x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} = 0$  (3)
5. Find  $a$  and  $b$  if the function  $f(x) = \begin{cases} ax^2 + b, & \text{if } x < 1 \\ 2x + 1, & \text{if } x \geq 1 \end{cases}$  is differentiable at  $x = 1$ . (3)
6. Find  $\frac{dy}{dx}$  if  $y = x^{\log x} + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$  (4)
7. CASE STUDY:

The graph shows the journey of a bicycle for 20 seconds, represented by the function  $f(x) = 10 - |x - 10|$ . Based on the given information, answer the following:

- (2) Show that the function  $g(x) = |x - 10|$  is not differentiable at  $x = 10$ .

- (ii) Check the continuity of the function  $g(x) = |x - 10|$  at  $x = 10$ .



End of the Question Paper



# INDIAN SCHOOL MUSCAT SECOND PERIODIC TEST

## MATHEMATICS

CLASS: XII  
30.05.2022

Sub. Code: 041

Time Allotted: 50 mins.  
Max. Marks: 20

### GENERAL INSTRUCTIONS:

- (2) This question paper consists of 7 questions. All questions are compulsory.  
(ii) Questions 1 – 3 carry 2 marks each.  
(iii) Questions 4 and 5 carry 3 marks each.  
(iv) Questions 6 and 7 carry 4 marks each.

1. Find  $\frac{dy}{dx}$  if  $\tan^2 y + \cot(xy) = a$  (2)

2. If  $x = t^2$  and  $y = \frac{4}{t}$ , find  $\frac{d^2y}{dx^2}$ . (2)

3. If  $f(x) = \frac{\log x}{x}$ , find  $f'(1)$ . (2)

4. Find  $a$  and  $b$  if the function  $f(x) = \begin{cases} x^2, & \text{if } x \leq 2 \\ ax + b, & \text{if } x > 2 \end{cases}$  is differentiable at  $x = 2$ . (3)

5. If  $y = \log(x + \sqrt{4 + x^2})$ , prove that  $(4 + x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} = 0$  (3)

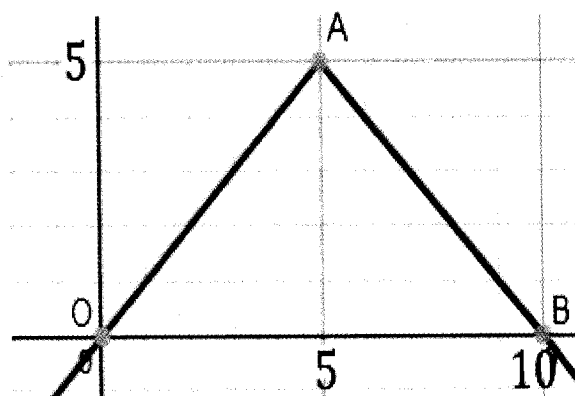
6. Find  $\frac{dy}{dx}$  if  $y = x^{\cos x} + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$  (4)

### 7. CASE STUDY:

The graph shows the journey of a bicycle for 20 seconds, represented by the function  $f(x) = 5 - |x - 5|$ . Based on the given information, answer the following:

(2) Show that the function  $g(x) = |x - 5|$  is not differentiable at  $x = 5$ . (2)

(ii) Check the continuity of the function  $g(x) = |x - 5|$  at  $x = 5$ .



End of the Question Paper



# INDIAN SCHOOL MUSCAT SECOND PERIODIC TEST

## MATHEMATICS

CLASS: XII  
30.05.2022

Sub. Code: 041

Time Allotted: 50 mins.  
Max. Marks: 20

### GENERAL INSTRUCTIONS:

- (4) This question paper consists of 7 questions. All questions are compulsory.  
(ii) Questions 1 - 3 carry 2 marks each.  
(iii) Questions 4 and 5 carry 3 marks each.  
(iv) Questions 6 and 7 carry 4 marks each.

1. If  $x = 2t^3$  and  $y = \frac{3}{t^2}$ , find  $\frac{d^2y}{dx^2}$ . (2)

2. Differentiate  $y = 2^{\log(x)^x}$  with respect to  $x$ . (2)

3. Find  $\frac{dy}{dx}$  if  $\cos^2 y + \sin(xy) = c$  (2)

4. If  $y = \log(x + \sqrt{x^2 + 9})$ , prove that  $(x^2 + 9) \frac{d^2y}{dx^2} + x \frac{dy}{dx} = 0$  (3)

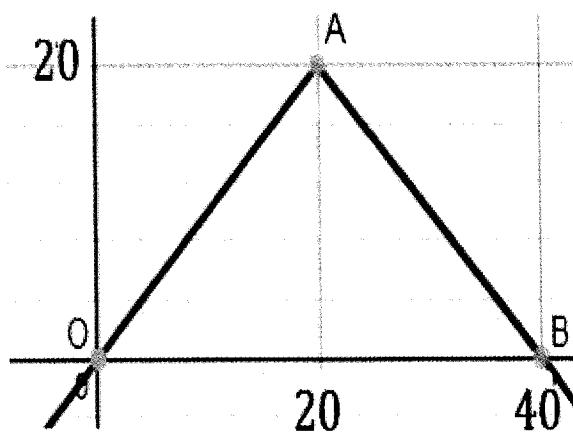
5. Find  $p$  and  $q$  if the function  $f(x) = \begin{cases} q - px^2, & \text{if } x < 1 \\ 2x + 1, & \text{if } x \geq 1 \end{cases}$  is differentiable at  $x = 1$ . (3)

### 6. CASE STUDY:

The graph shows the journey of a bicycle for 20 seconds, represented by the function  $f(x) = 20 - |x - 20|$ . Based on the given information, answer the following:

(4) Show that the function  $g(x) = |x - 20|$  is not differentiable at  $x = 20$ . (2)

(ii) Check the continuity of the function  $g(x) = |x - 20|$  at  $x = 20$ . (2)



7. Find  $\frac{dy}{dx}$  if  $y = (\tan x)^x + \sec^{-1}\left(\frac{1}{2x^2-1}\right)$  (4)

End of the Question Paper