

**D****DE-2913****First Year B. Sc. (Sem. I) Examination****March / April – 2016****Mathematics : MTH-102****(Differential Calculus)**

Time : 2 Hours]

[Total Marks : 50

સૂચના / Instructions :

(૧)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
FIRST YEAR B. Sc. (SEM. 1)	<input type="text"/>
Name of the Subject :	<input type="text"/>
MATHEMATICS - MTH-102	<input type="text"/>
Subject Code No. : <input type="text"/> 2 <input type="text"/> 9 <input type="text"/> 1 <input type="text"/> 3	Section No. (1, 2,.....) : <input type="text"/> Nil
Student's Signature	

- (૨) આ પ્રશ્નપત્રમાં કુલ ચાર વિભાગો A, B, C અને D થઈને 18 પ્રશ્નો છે.
- (2) There are four sections in the question paper A, B, C and D having total 18 questions.
- (૩) દરેક પ્રશ્નને ફક્ત એક જ સાચો ઉત્તર છે.
- (3) There is only one correct answer for each question.
- (૪) પ્રચલિત સંકેતોને અનુસરો.
- (4) Follow usual symbols.
- (૫) ખોટા ઉત્તર માટે પ્રતિ એક ગુણે 0.25 ગુણ બાદ થશે.
- (5) For wrong answer per 1 mark, 0.25 mark will be deducted.

SECTION - A : Q. 1 to 4 Multiple choice questions : (1 mark)**SECTION - B : Q. 5 to 8 Multiple Choice Questions : (2 marks)****SECTION - C : Q. 9 to 14 Multiple choice questions : (3 mark)****SECTION - D : Q. 15 to 18 Multiple Choice Questions : (5 marks)****O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ****O.M.R. Sheet-ની પાછળ છાપેલ છે.****Important instructions to fillup O.M.R. Sheet
are given back side of provided O.M.R. Sheet.**

1 $f(x) = \frac{1}{1+x^2}$ વિધેય $[0, \infty)$ માં _____ છે.

- (A) ઘટતું
(B) અચળ
(C) આ પૈકી એકપણ નહીં
(D) વધતું

$f(x) = \frac{1}{1+x^2}$ is _____ function in $[0, \infty)$.

- (A) decreasing
(B) constant
(C) none of these
(D) increasing

2 $y = \frac{2x+3}{3x+2}$, તો $y_n =$ _____ .

$y = \frac{2x+3}{3x+2}$, then $y_n =$ _____ .

- (A) $\frac{5(-1)^{n+1} n! 3^{n+1}}{3(3x+2)^{n+1}}$ (B) $\frac{5(-1)^{n+1} (n+1)! 3^{n+1}}{3(3x+2)^{n+1}}$
(C) $\frac{5(-1)^{n-1} (n-1)! 3^{n-1}}{3(3x+2)^{n-1}}$ (D) $\frac{5(-1)^n n! 3^n}{3(3x+2)^{n+1}}$

3 $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\tan x}{\tan 3x} =$ _____ .

- (A) 3 (B) -3
(C) $-\frac{1}{3}$ (D) $\frac{1}{3}$

4 $y = \frac{2x-3}{x^2-3x+2}$ ની લંબક અનંતસ્પર્શકો _____ .

Vertical asymptotes of $y = \frac{2x-3}{x^2-3x+2}$ are _____ .

- (A) $x = -1$ and $x = 2$ (B) $x = 1$ and $x = 2$
(C) $x = -1$ and $x = -2$ (D) $x = 1$ and $x = -2$

5 જો $f(x) = 1 + (x-1)^{\frac{2}{3}}$ $x \in [0, 2]$ હોય, તો રોલના પ્રમેયની કઈ શરતનું પાલન થતું નથી ?

- (A) $[0, 2]$ માં સતત છે.
 (B) $f(0) = f(2)$
 (C) આ પૈકી એકપણ નહીં
 (D) $(0, 2)$ માં વિકલનીય છે.

If $f(x) = 1 + (x-1)^{\frac{2}{3}}$ $x \in [0, 2]$, then which condition of Roll's theorem is not true ?

- (A) continuous in $[0, 2]$
 (B) $f(0) = f(2)$
 (C) none of these
 (D) differentiable in $(0, 2)$

6 $y = \sin kx + \cos kx$ તો $y_n = \underline{\hspace{2cm}}$

$y = \sin kx + \cos kx$ then $y_n = \underline{\hspace{2cm}}$

(A) $k^n \left[1 + (-1)^n \sin 2kx \right]^{\frac{1}{2}}$

(B) $k^n \left[1 + (-1)^n \sin kx \right]^{\frac{1}{2}}$

(C) $k^n \left[1 + (-1)^n \cos kx \right]^{\frac{1}{2}}$

(D) $k^n \left[1 + (-1)^n \cos 2kx \right]^{\frac{1}{2}}$

7 $\lim_{x \rightarrow 1} \left(\frac{x}{x-1} - \frac{1}{\log x} \right) = \text{_____} .$

(A) $-\frac{1}{2}$

(B) $\frac{1}{2}$

(C) 1

(D) 2

8 $y = (x^2 + 4x + 5)e^{-x}$ _____ છે.

(A) $(-\infty, -1) \cup (1, \infty)$ માં વધતું વિધેય

(B) $(-\infty, -1) \cup (1, \infty)$ માં ઘટતું વિધેય

(C) $(-\infty, -1) \cup (1, \infty)$ માં ઉર્ધ્વ અંતર્ભુજ

(D) $(-\infty, -1) \cup (1, \infty)$ માં અધઃ અંતર્ભુજ

$y = (x^2 + 4x + 5)e^{-x}$ is _____.

(A) increasing in $(-\infty, -1) \cup (1, \infty)$

(B) decreasing in $(-\infty, -1) \cup (1, \infty)$

(C) concave upward in $(-\infty, -1) \cup (1, \infty)$

(D) concave downward in $(-\infty, -1) \cup (1, \infty)$

9 $y = \frac{x^2 + 2x - 1}{x}$ ની અનંતસ્પર્શક _____.

Asymptotes of $y = \frac{x^2 + 2x - 1}{x}$ is _____.

(A) $y = 2x - 1$

(B) $y = x - 2$

(C) $y = x + 2$

(D) $y = 2x + 1$

10 નીચેનામાંથી કયું $x > 0$ માટે સત્ય છે ?

Which of the following is true where $x > 0$?

(A) $\frac{x}{1+x^2} > \tan^{-1} x > x$

(B) $\frac{x}{1-x^2} > \tan^{-1} x > x$

(C) $\frac{x}{1-x^2} < \tan^{-1} x < x$

(D) $\frac{x}{1+x^2} < \tan^{-1} x < x$

11 $y = \sin^2 x \sin 2x$ ની $y_n =$ _____ .

$y = \sin^2 x \sin 2x$ then $y_n =$ _____ .

(A) $\left\{ 2^{n-1} \sin\left(2x + \frac{n\pi}{2}\right) + 4^{n-1} \sin\left(4x + \frac{n\pi}{2}\right) \right\}$

(B) $\left\{ 2^{n-1} \sin\left(2x + \frac{n\pi}{2}\right) - 4^{n-1} \sin\left(4x + \frac{n\pi}{2}\right) \right\}$

(C) $\left\{ 2^{n-1} \cos\left(2x + \frac{n\pi}{2}\right) - 4^{n-1} \cos\left(4x + \frac{n\pi}{2}\right) \right\}$

(D) $\left\{ 2^{n-1} \cos\left(2x + \frac{n\pi}{2}\right) + 4^{n-1} \cos\left(4x + \frac{n\pi}{2}\right) \right\}$

12 $y = \left(\frac{1-x}{1+x}\right)^2$ dñ $y_n = \underline{\hspace{2cm}}$.

$y = \left(\frac{1-x}{1+x}\right)^2$ then $y_n = \underline{\hspace{2cm}}$.

(A) $\frac{(n-x)(-1)^n n!}{(1+x)^{n+2}}$

(B) $\frac{4(n-x)(-1)^n n!}{(1+x)^{n+1}}$

(C) $\frac{4(n-x)(-1)^n n!}{(1+x)^{n+2}}$

(D) $\frac{4(n+x)(-1)^n n!}{(1+x)^{n+2}}$

13 $y = \cos(m \log x)$ dñ

$y = \cos(m \log x)$, then

(A) $x^2 y_{n+2} - (2n+1)xy_{n+1} + (m^2 + n^2)y_n = 0$

(B) $x^2 y_{n+2} - (2n+1)xy_{n+1} - (n^2 + m^2)y_n = 0$

(C) $x^2 y_{n+2} - (2n-1)xy_{n+1} - (n^2 + m^2)y_n = 0$

(D) $x^2 y_{n+2} + (2n+1)xy_{n+1} + (m^2 + n^2)y_n = 0$

14 $\lim_{x \rightarrow 0} \frac{\log(1+x \sin x)}{\cos x - 1} = \underline{\hspace{2cm}}$

(A) -2

(B) 2

(C) 1

(D) $\frac{1}{2}$

15 જો $f(x) = \cos x$ અને $g(x) = \sin x$ જ્યાં $-\frac{\pi}{2} \leq a \leq x \leq b \leq \frac{\pi}{2}$ તો કોશીની પ્રમેયથી

$$\lambda = \underline{\hspace{2cm}}$$

If $f(x) = \cos x$ and $g(x) = \sin x$ where $-\frac{\pi}{2} \leq a \leq x \leq b \leq \frac{\pi}{2}$ then by using

Cauchy theorem $\lambda = \underline{\hspace{2cm}}$.

(A) $\frac{a+b}{2}$

(B) \sqrt{ab}

(C) $\frac{a+b}{2ab}$

(D) $\frac{a-b}{2}$

16 $y = x(x+1)\log(x+1)$ તો $y_n = \underline{\hspace{2cm}}$.

$y = x(x+1)\log(x+1)$ then $y_n = \underline{\hspace{2cm}}$.

(A) $\frac{(-1)^{n-1}(n-3)!(2x+n)}{(x+1)^{n-1}}$

(B) $\frac{(-1)^{n-1}(n-3)!(2x-n)}{(x+1)^{n-2}}$

(C) $\frac{(-1)^{n-1}(n-3)!(2x+n)}{(x+1)^{n-2}}$

(D) $\frac{(-1)^{n-1}(n-3)!(2x-n)}{(x+1)^{n-1}}$

17 $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x + c^x}{3} \right)^{\frac{1}{x}} = \underline{\hspace{2cm}}, a, b, c \in \mathbb{R}^+ .$

(A) $(abc)^{\frac{1}{3}}$

(B) $(abc)^3$

(C) $e^{\frac{1}{3}}$

(D) e^3

18 વક્ર $x^3 + y^3 = 3xy$ ની વક્રતા $\left(\frac{3}{2}, \frac{3}{2} \right)$ બિંદુએ _____.

The curvature of the curve $x^3 + y^3 = 3xy$ at the point $\left(\frac{3}{2}, \frac{3}{2} \right)$ is _____ .

(A) $-\frac{8\sqrt{2}}{3}$

(B) $\frac{8\sqrt{2}}{3}$

(C) $\frac{3}{8\sqrt{2}}$

(D) $-\frac{3}{8\sqrt{2}}$