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.

Name of the Examination :
☛ **FIRST YEAR B. Sc. (SEM. 1)**

Name of the Subject :
☛ **MATHEMATICS - MTH-102**

☛ Subject Code No. : **2 9 1 3** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

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 Choise Questions : (2 marks)
SECTION - C : Q. 9 to 14 Multiple choice questions : (3 mark)
SECTION - D : Q. 15 to 18 Multiple Choise Questions : (5 marks)

O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ O.M.R. Sheetની પાછળ છાપેલ છે.
Important instructions to fillup O.M.R. Sheet are given back side of provided O.M.R. Sheet.

1 $y=\frac{2x+3}{3x+2}$, તો $y_n=$ _____ .

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

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

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

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

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

2 $\lim_{x\to\frac{\pi}{2}} \frac{\tan x}{\tan 3x} =$ ______ .

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

(B) 3

(C) –3

(D) $-\frac{1}{3}$

3 $y=\frac{2x-3}{x^2-3x+2}$ના 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 $x=-2$

4 $f(x)=\frac{1}{1+x^2}$ વિધેય $[0,\infty)$માં ________ છે.

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

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

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

5 $y = \sin kx + \cos kx$ તો $y_n =$ ______

$y = \sin kx + \cos kx$ then $y_n =$ ______

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

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

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

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

6 $\lim_{x \to 1} \left(\frac{x}{x-1} - \frac{1}{\log x} \right) =$ ______ .

(A) 2

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

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

(D) 1

7 $y=\left(x^2+4x+5\right)e^{-x}$ ________ છે.

(A) $(-\infty,-1)\cup(1,\infty)$ માં અધઃ અંતર્મુખ

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

(C) $(-\infty,-1)\cup(1,\infty)$ માં ઘટતું વિધય

(D) $(-\infty,-1)\cup(1,\infty)$ માં ઉર્ધ્વ અંતર્મુખ

$y=\left(x^2+4x+5\right)e^{-x}$ is ________.

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

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

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

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

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

(A) $(0,2)$ મા વિકલનીય છે.

(B) $[0,2]$ માં સતત છે.

(C) $f(0)=f(2)$

(D) આ પૈકી એકપણ નહીં

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

(A) differentiable in $(0,2)$

(B) continuous in $[0,2]$

(C) $f(0)=f(2)$

(D) none of these

9 $y = \sin^2 x \sin 2x$ તો $y_n =$ _______ .

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

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

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

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

10 $y = \left(\frac{1-x}{1+x}\right)^2$ તો $y_n =$ _______ .

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

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

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

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

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

11 $y = \cos(m \log x)$ તો

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

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

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

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

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

12 $\lim_{x \to 0} \frac{\log(1 + x\sin x)}{\cos x - 1} =$ ________

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

(B) –2

(C) 2

(D) 1

13 $y = \frac{x^2 + 2x - 1}{x}$ ના અનંતસ્પર્શક ________.

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

(A) $y = 2x + 1$

(B) $y = 2x - 1$

(C) $y = x - 2$

(D) $y = x + 2$

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

15 $y = x(x+1)\log(x+1)$ તો $y_n =$ ______ .

$y = x(x+1)\log(x+1)$ then $y_n =$ ______ .

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

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

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

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

16 $\lim_{x \to 0}\left(\dfrac{a^x + b^x + c^x}{3}\right)^{\frac{1}{x}} =$ __________, $a, b, c \in R^+$.

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

(B) $(abc)^{-\frac{1}{3}}$

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

(D) $e^{-\frac{1}{3}}$

17 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) $-\frac{3}{8\sqrt{2}}$

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

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

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

18 જો $f(x)=\cos x$ અને $g(x)=\sin x$ જ્યાં $-\frac{\pi}{2}\le a\le x\le b\le\frac{\pi}{2}$ તો કોશીનાં પ્રમેયથી $\lambda=$ _____

If $f(x)=\cos x$ and $g(x)=\sin x$ where $-\frac{\pi}{2}\le a\le x\le b\le\frac{\pi}{2}$ then by using Cauchy theorem $\lambda=$ _____ .

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

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

(C) $\sqrt{ab}$

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