K15U 0586

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.) Examination, November 2015
Complementary Course in Mathematics
1C01 MAT – CH : MATHEMATICS FOR CHEMISTRY – I
(2014 Admn. Onwards)

Time : 3 Hours

Max. Marks : 40

SECTION – A

All the **4** questions are **compulsory**.

1. Find the derivative of $\cosh^{-1}x$.
2. State Maclaurin's theorem.
3. Find $\lim_{(x,y)\to(0,1)} \frac{x^{3/2}}{\sqrt{x^2+y^2+9}}$.
4. Represent the polar co-ordinate $\left(1, 5\frac{\pi}{6}\right)$ in polar graph. **(4×1=4)**

SECTION – B

Answer **any 7** questions :

5. Find the derivative of y with respect to x if $y = x^{\sin x}$
6. If $y = a\cos(\log x) + b\sin(\log x)$ show that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.
7. Expand cosx by Maclaurin's series.
8. Verify Lagrange's mean value theorem for the function $f(x) = x^3$ in [a, b].
9. Discuss the graph of cosech x.
10. Determine $\lim_{x\to\pi/2} \frac{\tan 3x}{\tan x}$.
11. If $u = \frac{1}{\sqrt{x^2+y^2+z^2}}$; $x^2 + y^2 + z^2 \neq 0$. Show that $\frac{\partial^2 y}{\partial x^2} + \frac{\partial^2 y}{\partial y^2} + \frac{\partial^2 y}{\partial z^2} = 0$.
12. Find the first order partial derivatives of e^{x-y}.
13. Find the Cartesian co-ordinates of the polar co-ordinate $\left(\sqrt{2}, \pi/2\right)$. **(7×2=14)**

P.T.O.

SECTION – C

Answer **any 4** questions :

14. Find $(e^x \log x)_n$.

15. Expand $l_n (1 + x)$ by Maclaurin's series.

16. Find c so that $f'(c) = \frac{f(b) - f(a)}{b - a}$ $f(x) = e^x$, $a = 0$, $b = 1$.

17. If $u = \tan^{-1} \frac{x^3 + y^3}{x - y}$; $x \neq y$ show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$.

18. Find the radius of curvature at any point on the curve $y = c \cosh\left(\frac{x}{c}\right)$.

19. Replace the polar equation to Cartesian equation and describe the curve

    a) $r = \cot\theta \operatorname{cosec}\theta$

    b) $r = 8 \sin\theta$. **(4×3=12)**

SECTION – D

Answer **any 2** questions :

20. Using Taylor's theorem, show that $\sin(x + h) = \sin x + h\cos x - \frac{h^2}{2!} \sin x - \frac{h^3}{3!} \cos x + \ldots$

21. Find $\lim_{x \to 0} \frac{e^x \sin x - x - x^2}{x^2 + x \log(1 - x)}$.

22. Find the evolute of the curve $x = a \cos^3\theta$; $y = a \sin^3\theta$.

23. Translate the equation $z = 0$ into spherical and rectangular system. **(2×5=10)**