



K15U 0590

Reg. No. :

Name :

I Semester B.C.A. Degree (CCSS – Reg./Supple./Improv.)

Examination, November 2015

Complementary Course in Mathematics

1C01 MAT-BCA : MATHEMATICS FOR BCA – I

(2014 Admn. Onwards)

Time : 3 Hours

Max. Marks : 40

SECTION – A

All questions are **compulsory**.

1. Find the derivative of $e^{\sinh x}$.

2. $\lim_{x \rightarrow 0} \left[\frac{a}{x} - \cot \frac{x}{a} \right]$.

3. $\lim_{(x,y) \rightarrow (0,1)} \frac{x^{3/2}}{\sqrt{x^2 + y^2 + 9}}$.

4. Represent the polar co-ordinate in the polar graph, where point is $(2, 5\pi/4)$.

(4×1=4)

SECTION – B

Answer **any 7** questions.

5. Find $\frac{dy}{dx}$ when $x = a(\cos t + \sin t)$ and $y = a(\sin t - t \cos t)$.

6. If $y = \frac{\log x}{x}$ show that $\frac{d^2y}{dx^2} = 2 \frac{\log x - 3}{x^3}$.

P.T.O.



7. Verify Rolles theorem for $f(x) = \frac{\sin x}{e^x}$ in $[0, \pi]$.
8. Verify the Langranges mean value theorem for $f(x) = \log x$ is $[1, e]$.
9. Discuss the graph of cosechx.
10. Find $\lim_{x \rightarrow 0} \frac{\cosh x - \cos x}{x \sin x}$.
11. If $U = \frac{1}{\sqrt{x^2 + y^2 + z^2}}$; $x^2 + y^2 + z^2 \neq 0$ show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$.
12. Find the 1st order partial derivatives of $\log(x^2 + y^2)$.
13. Find the polar equation of the circle $x^2 + (y - 3)^2 = 9$. (7×2=14)

SECTION – C

Answer **any 4** questions.

14. Find $\frac{dy}{dx}$ of $y = (\cos x)^{\log x}$.
15. Expand $\log(1 + x)$ using Maclaurins theorem.
16. Determine $\lim_{x \rightarrow 0} \frac{\sinh x - x}{\sin x - x \cos x}$.
17. Evaluate $\lim_{x \rightarrow a} (x - a)^{(x-a)}$.
18. If H is a homogeneous function of x, y and z of degree n, then prove that
- $$x \frac{\partial H}{\partial x} + y \frac{\partial H}{\partial y} + z \frac{\partial H}{\partial z} = nH.$$
19. Prove that the curvature of a circle is a constant. (4×3=12)



SECTION - D

Answer **any 2** questions.

20. If $y = \cos(m \sin^{-1}x)$, then show that $(1 - x^2) y_{n+2} - (2n + 1) x y_{n+1} + m^2 - n^2 y_n = 0$.

21. Find the evolute of the parabola $y^2 = 4ax$.

22. Prove that $f_{xy}(0, 0) \neq f_{yx}(0, 0)$ for the function f given by

$$f(x, y) = \begin{cases} \frac{xy(x^2 - y^2)}{x^2 + y^2} & ; (x, y) \neq (0, 0) \\ 0 & \text{otherwise} \end{cases}$$

23. Translate equation $r = \operatorname{cosec} \theta$ into Cartesian and spherical co-ordinate system.

(2x5=10)
