GOVT. BRENNEN COLLEGE
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M 7900

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (CCSS-Regular) Examination, November 2014
(2014 Admn.)
COMPLEMENTARY COURSE IN MATHEMATICS
1C01 MAT – CH : Mathematics for Chemistry – I

Time : 3 Hours Max. Marks : 40

SECTION – A

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

1. Find the derivative of $e^{\sinh x}$.
2. State Leibniz's theorem on n^{th} derivative of a product of two functions.
3. $\lim_{(x, y) \to (0, 1)} \frac{e^x}{y^3 + 3x}$.
4. Represent the polar coordinate $\left(z, 5\frac{\pi}{2}\right)$ in the polar graph. **(4×1=4)**

SECTION – B

Answer **any 7** questions.

5. Find $\frac{dy}{dx}$ of $y = e^{x^x}$.
6. If $y = \frac{\log x}{x}$, show that $\frac{d^2y}{dx^2} = \frac{2 \log x - 3}{x^3}$.
7. Find the Maclaurin's series of sinx.
8. Varify the Lagrange's mean value theorem for f(x) = log x in [1, e].
9. Discuss the graph of sechx.
10. $\lim_{x \to 0} \frac{\cosh x - \cos x}{x \sin x}$.

P.T.O.

11. Verify that $\frac{\partial^2 u}{\partial x\, \partial y} = \frac{\partial^2 u}{\partial y\, \partial x}$ $u = \sin^{-1}\left(\frac{x}{y}\right)$.

12. Find the first order partial derivative of $\log (x^2 + y^2)$.

13. Describe the graph of the polar equation $r = -1$. (7×2=14)

SECTION – C

Answer **any 4** questions.

14. Find $(x^n e^x)\, n$.

15. Expand tan x by Maclaurins series.

16. If $f(x) = (x - 1)\,(x - 2)\,(x - 3)$ $x \in [0, 4]$, find c in the mean value theorem.

17. If $U = \log \frac{x^2 + y^2}{x + y}$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 1$.

18. Find the curvature of the curve $r^m = a^m \cos m\theta$.

19. Replace the polar equation to Cartesian equation, then describe the graph
    a) $r \sin\theta = r \cos\theta$
    b) $r^2 \sin 2\theta = 2$. (4×3=12)

SECTION – D

Answer **any 2** questions.

20. Using Taylor's series prove that

$$f\left(\frac{x^2}{1+x}\right) = f(x) - \frac{x}{1+x} f'(x) + \frac{x^2}{(1+x)^2} \frac{f''(x)}{2!} \cdots$$

21. Find $\lim_{x \to 2} \left\{\frac{1}{x-2} - \frac{1}{\log}(x-1)\right\}$.

22. Find the evolute of the curve
    $x = a \cos\theta$, $y = b \sin\theta$.

23. Translate the equation $P = 5 \cos\phi$ into Cartesian and cylindrical coordinate system. (2×5=10)