|||||| ||| ||||| ||| ||| ||| |||| ||| |||| ||| ||||

Reg. No. : ....

Name : ....

K19U 3186

I Semester B.Sc. Degree (CBCSS- Supplementary/Improvement)

Examination, November-2019

(2014 -2018 Admissions)

COMPLEMENTARY COURSE IN MATHEMATICS

1C01 MAT-CH: MATHEMATICS FOR CHEMISTRY - I

Time : 3 Hours

Max. Marks :40

SECTION-A

I. All the first **4** questions are compulsory. They carry **1** mark each.**(4×1=4)**
1. State Demoivre's Theorem.   **(1)**

2. If the derivative of a function vanishes for all values of x in an interval, then the function must be a _____   **(1)**

3. Write a homogeneous function f(x,y) of order n in general form. **(1)**

4. In cylindrical co-ordinates (r, θ, z)____ is a rectangular vertical co-ordinate.   **(1)**

SECTION-B

II. Answer any **Seven** questions from among the questions 5 to 13. These questions carry 2 marks each.   **(7×2=14)**

5. Give the Leibnitz theorem.   **(2)**

6. From the Taylor's development how will you get Maclaurin's development?   **(2)**

7. Expand sinx as Maclaurin's series.   **(2)**

P.T.O.

8. Show that $x^3 - 3x^2 + 2x + 2$ is monotonically increasing in every interval. **(2)**

9. Verify that $\dfrac{\partial^3 u}{\partial y \partial x^2} = \dfrac{\partial^3 u}{\partial x^2 \partial y}$, $u = x^3 y^2 + x^2 y^3$. **(2)**

10. If $u = x - y^2$, $x = 2r - 3s + 4$, $y = -r + 8s - 5$ find $\dfrac{\partial u}{\partial r}$. **(2)**

11. In a cycloid $x = a(t + \sin t)$, $y = a(1 - \cos t)$ find $\dfrac{dy}{dx}$. **(2)**

12. $Lt_{x \to 0} \dfrac{1 - \cos x}{x^2} =$ **(2)**

13. Define evolute. **(2)**

SECTION-C

III. Answer any **four** questions from among the questions **14** to **19**. These questions carry **3** marks each. **(4×3=12)**

14. Verify Lagrange's mean value theorem for $f(x) = 2x - x^2$ in the interval $[0,1]$. **(3)**

15. Change the independent variable to θ. in the equation **(3)**

$\dfrac{d^2 y}{dx^2} + \dfrac{2x}{1 + x^2} \dfrac{dy}{dx} + \dfrac{y}{(1 + x^2)^2} = 0$ by means of the transformation $x = \tan\theta$.

16. Find the nth derivative of $\cos^4 x$. **(3)**

17. Find the values of a and b in order that $Lt_{x \to 0} \dfrac{x(1 + a\cos x) - b\sin x}{x^3}$ be equal to 1. **(3)**

18. Determine $Lt(\cos x)^{1/x^2}$ as $x \to 0$. **(3)**

19. Graph the set of points whose polar co-ordinates satisfy the condition $r \le 0$ and $\theta = \dfrac{\pi}{4}$. **(3)**

SECTION-D

IV. Answer any **Two** questions from among the questions **20** to **23**. These questions carry **5** marks each. **(2×5=10)**

20. If $y = (\sin^{-1} x)^2$ prove that $(1 - x^2)\dfrac{d^2 y}{dx^2} - x\dfrac{dy}{dx} - 2 = 0$. **(5)**

21. Determine $Lim \dfrac{Log(x - a)}{Log(e^x - e^a)}$ as $x \to a$. **(5)**

22. Prove that if $y^3 - 3ax^2 + x^3 = 0$ then $\dfrac{d^2 y}{dx^2} + \dfrac{2a^2 x^2}{y^5} = 0$. **(5)**

23. Translate the equation $\rho = 6\cos\phi$ into Cartesian and cylindrical equations. **(5)**

———————