Reg. No.:.... Name:.....



K19U 3187

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

Examination, November-2019

(2014-2018 Admission)

COMPLEMENTARY COURSE IN MATHEMATICS 1C01 MAT-ST: MATHEMATICS FOR STATISTICS-I

Time: 3 Hours Max. Marks: 40

SECTION -A

All the first Four questions are compulsory. They carry 1 marks each.

(4x1=4)

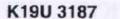
- 1. If $x = at^2$, y = 2at find $\frac{dy}{dx}$. (1)
- 2. If the derivative of a function vanishes for all values of x in an interval, then the function must be a _____ (1)
- 3. Define limit of a function. (1)
- 4. To define polar co- ordinates we start with an origin called _____ (1)

SECTION -B

Answer any **Seven** questions from among the questions 5 to13. These questions carry **2** marks each. (7×2=14)

- 5. Find the derivative of cosec h x. (2)
- 6. Give two important properties of evolute. (2)
- 7. Replace the polar equation by equivalent Cartesian equations $r\cos\theta = -4$. (2)

P.T.O.





8. Find the spherical co-ordinates equation for the sphere $x^2 + y^2 + (z-1)^2 = 1$. (2)

(2)

- 9. Verify Rolle's theorem for x^2 in [-1,1]. (2)
- 10. show that $x^3 3x^2 + 2x + 2$ is monotonically increasing in every interval.(2)

11. Verify
$$\frac{\partial^3 u}{\partial y \partial x^2} = \frac{\partial^3 u}{\partial x^2 \partial y}$$
, where $u = x^3 y^2 + x^2 y^3$. (2)

- **12.** Differentiate $(\sin x)^{\log x}$. (2)
- **13.** If $x = a(\theta \sin \theta)$, $y = a(1 \cos \theta)$ find $\frac{d^2y}{dx^2}$. (2)

SECTION -C

Answer any Four questions from among the questions 14 to 19. These questions carry 3 marks each. (4x3=12)

- 14. Find the nth derivative of $\frac{x^2}{(x+2)(2x+3)}$. (3)
- 15. Separate the intervals in which the polynomial $2x^3-15x^2+36x+1$ is increasing or decreasing. (3)
- 16. If z is a function of x and y prove that if $x = e^{u} + e^{-v}$ $y = e^{-u} e^{-v}$, then

$$\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \times \frac{\partial z}{\partial x} - y \times \frac{\partial z}{\partial y}.$$
 (3)

- 17. Find the polar equation for the circle $x^2(y-3)^2 = 9$. (3)
- 18. Determine $Lt(\cos x)^{1/2}$ as $x \to 0$. (3)
- 19. graph the set of points whose polar co-ordinates satisfy the condition $r \le 0$ and $\theta = \frac{\pi}{4}$. (3)



(3)

K19U 3187

SECTION -D

Answer any **Two** questions from among the questions 20 to 23. These questions carry **5** marks each. (2x5=10)

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

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

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

23. Find
$$Lt_{x\to 0} \frac{1+\sin x -\cos x + \log(1-x)}{x \tan^2 x}$$
. (5)