



K20U 3187

Reg. No. :

Name :

I Semester B.Sc. Degree (CBCSS – Supplementary)
Examination, November 2020
(2014-2018 Admissions)
COMPLEMENTARY COURSE IN MATHEMATICS
1C01 MAT-ST : Mathematics for Statistics – I

Time : 3 Hours

Max. Marks : 40

SECTION – A

All the first 4 questions are **compulsory**. They carry **1 mark each**.

- | | |
|---|---|
| 1. The derivative of a^x is | 1 |
| 2. State Lagrange's mean value theorem. | 1 |
| 3. Write the homogeneous function $f(x, y)$ of order n in general form. | 1 |
| 4. Find $\lim_{(x,y) \rightarrow (0,0)} \frac{x}{x+y+1}$. | 1 |

SECTION – B

Answer **any 7** questions from among the questions **5 to 13**. These questions carry **2 marks each**.

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|--|---|
| 5. State Leibnitz theorem. | 2 |
| 6. Expand $\sin x$ as Maclaurins series. | 2 |
| 7. Verify Rolle's theorem for x^2 in $[-1, 1]$. | 2 |
| 8. Define circle of convergence at any point p . | 2 |
| 9. Show that $e^x = 1 + x + \frac{x^2}{2!} + \dots + \frac{x^{n-1}}{(n-1)!} + \frac{x^n}{n!} e^{\theta x}$. | 2 |
| 10. Give two important properties of evolute. | 2 |

P.T.O.



11. Replace the following polar co-ordinates by equivalent Cartesian equation
 $r \cos \theta = -4$.

2

12. Evaluate $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - x}$.

2

13. If $f(x, y) = x \cos y + ye^x$ find $\frac{\partial^2 f}{\partial y^2}$ and $\frac{\partial^2 f}{\partial x \partial y}$.

2

SECTION - C

Answer **any 4** questions from among the questions **14** to **19**. These questions carry **3** marks **each**.

14. Find the radius of curvature of the curve $2y^2 = x^3$ at the point $(2, 2)$.

3

15. Find the values of a and b in order that $\lim_{x \rightarrow 0} \frac{x(1 + a \cos x) - b \sin x}{x^3}$ be equal to 1.

3

16. If $H = f(y - z, z - x, x - y)$ prove that $\frac{\partial H}{\partial x} + \frac{\partial H}{\partial y} - \frac{\partial H}{\partial z} = 0$.

3

17. Find all polar co-ordinates of the point $p(2, \pi/6)$.

3

18. Differentiate $x^{\sin x} + (\sin x)^x$.

3

19. Find $\frac{\partial^2 \omega}{\partial x \partial y}$ if $\omega = xy + \frac{e^y}{y^2 + 1}$.

3

SECTION - D

Answer **any 2** questions from among the questions **20** to **23**. These questions carry **5** marks **each**.

20. If $u = \tan^{-1} \frac{x^3 + y^3}{x - y}$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$.

5

21. Translate $p = 6 \cos \phi$ into Cartesian and cylindrical equations.

5

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

5

23. Show that $\frac{x}{1+x} < \log(1+x) < x$ for $x > 0$.

5