K20U 3185

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (CBCSS – Supplementary) Examination, November 2020
(2014 – 2018 Admissions)
COMPLEMENTARY COURSE IN MATHEMATICS
1C01MAT-PH : Mathematics for Physics and Electronics – I

Time : 3 Hours Max. Marks : 40

SECTION – A

First **4** questions are compulsory. They carry **1** mark **each**.

1. Derivative of coshx is
2. What is the value of $\lim_{x\to 0}\frac{\tan x}{x}$?
3. Define limit of a function of two variables.
4. Find dy/dx if $x = 2t + 3$, $y = t^2 - 1$.

SECTION – B

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

5. Verify mean value theorem for the function $f(x) = x^2 + 2x + 9$ for interval (1, 5).
6. Find the n^{th} derivative of log (ax + b).
7. Using Maclaurin's theorem find the expansion of e^x.
8. Find limit $\frac{\log(x-a)}{\log(e^x - e^a)}$ as $x \to a$.
9. Find the percentage error in the area of an ellipse when an error of one percent is made in measuring major and minor axes.

P.T.O.

10. Find $\lim (x \log x)$ as x tends to zero.

11. If $y^2 - 3ax^2 + x^3 = 0$ then show that $\frac{d^2y}{dx^2} + 2\frac{a^2x^2}{y^5} = 0$.

12. Find the radius of curvature of the curve $y = 3x^2 + 4x$ at (1, 7).

13. Define evolute and involute of a curve.

SECTION – C

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

14. Find the n^{th} derivative of $\frac{x^2}{(x+2)(2x+3)}$.

15. Differentiate $e^{\sin^{-1}x}$ w. r. to $\sin^{-1}x$.

16. Find $\lim_{x\to 0} \frac{\tan x - x}{x - \sin x}$.

17. If $z = f(x, y)$ prove that if $x = e^u + e^{-v}$, $y = e^{-u} - e^v$ then $\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y}$.

18. Find the co-ordinates of centre of curvature of $xy = c^2$ at (c, c).

19. Find the spherical co-ordinates of the point that has rectangular co-ordinates $\left(4, -4, 4\sqrt{6}\right)$.

SECTION – D

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

20. State Leibnitz theorem on n^{th} derivative of product of two functions. Using it find n^{th} derivative of $x^2 e^{3x}$.

21. Find $\lim_{x\to 0} \frac{e^x - e^{-x} - 2x}{x^2 \sin x}$.

22. Find the radius of curvature of the curve $\sqrt{x} + \sqrt{y} = 1$ at $(\frac{1}{4}, \frac{1}{4})$.

23. Find the equations of the paraboloid $z = x^2 + y^2$ in cylindrical and spherical co-ordinates.