



K20U 3325

Reg. No. :

Name :

I Semester B.Sc. Degree CBCSS (OBE) Reg./Sup./Imp.
Examination, November 2020
(2019 Admn. Onwards)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
IC01MAT-CS : Mathematics for Computer Science – I

Time : 3 Hours

Max. Marks : 40

PART – A

Questions 1 – 5. Answer **any 4** questions. **Each** question carries **1** mark.

1. Define equivalent matrices.
2. Find the value of k for which the system of equations.
 $(3k - 8)x + 3y + 3z = 0$
 $3x + (3k - 8)y + 3z = 0$
 $3x + 3y + (3k - 8)z = 0$ has a non trivial solution.
3. Define Orthogonal transformation.
4. Write the n^{th} derivative of $\log(ax + b)$.
5. State Taylor's theorem.

PART – B

Questions 6 – 15. Answer **any 7** questions. **Each** question carries **2** marks.

6. Solve : $2x + y = 1$
 $5x + 3y = 2$ using matrix inversion method.
7. Show that the vectors $(1, 3, 4, 2)$, $(3, -5, 2, 2)$ and $(2, -1, 3, 2)$ are linearly dependent.

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8. Find the n^{th} derivative of $\frac{x+2}{x+1} + \log\left(\frac{x+2}{x+1}\right)$.
9. Determine the value of c in the mean value theorem for $f(x) = x(x-1)(x-2)$ in $[0, 12]$.
10. Evaluate $\lim_{x \rightarrow 0} \frac{\log x}{\cot x}$.
11. Write the working procedure to fit the line $y = a + bx$ to a given data.
12. Find the rank of matrix $\begin{bmatrix} 1 & 2 \\ 2 & 4 \\ 3 & 5 \end{bmatrix}$ by reducing it to normal form.
13. If $ax^2 + 2hxy + by^2 = 1$, find $\frac{dy}{dx}$.
14. Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{\sin x} - \frac{1}{x} \right)$.
15. State Leibnitz's theorem.

PART - C

Questions 16 – 22. Answer **any 4** questions. **Each** question carries **3** marks **each**.

16. Find the rank of $\begin{bmatrix} 2 & -1 & 3 & 1 \\ 1 & 4 & -2 & 1 \\ 5 & 2 & 4 & 3 \end{bmatrix}$.
17. Find the n^{th} derivative of $\frac{x}{(x-1)(2x+3)}$.
18. If $(1-x^2)y_2 - xy_1 - a^2y = 0$, prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n = 0$.
19. Evaluate $\lim_{x \rightarrow 0} \frac{(e^x \sin x - x - x^3)}{(x^2 + x + \log(1-x))}$.
20. Evaluate $\lim_{x \rightarrow \pi/2} \sin x^{\tan x}$.



21. If R is the resistance to maintain a train at speed V , find a law of type $R = a + bV^2$ connecting R and V , using the following data :

V(miles/hour)	10	20	30	40	50
R(lb/ton)	8	10	15	21	30

22. Verify Rolle's theorem for the function $f(x) = (x - a)^m (x - b)^n$, where m and n are positive integers, in the interval $[a, b]$.

PART – D

Questions 23 – 26. Answer **any 2** questions. **Each** question carries **5** marks.

23. Using partition method, find the inverse of $\begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$.

24. Find the n^{th} derivative of $e^{2x}\text{Cos}^2x\text{Sin}x$.

25. Using Maclaurin's series, expand $\tan x$ upto term containing x^5 .

26. Fit a second degree parabola to the following data :

x	1	1.5	2	3	3.5	4
y	1.1	1.3	1.6	2.7	3.4	4.1