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.

P.T.O.

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 $\lim_{x\to 0}\frac{\log x}{\cot x}$.

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 $\lim_{x\to 0}\left(\frac{1}{\sin x}-\frac{1}{x}\right)$.

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 $\lim_{x\to 0}\frac{(e^x\sin x - x - x^2)}{(x^2 + x + \log(1-x))}$.

20. Evaluate $\lim_{x\to \pi/2}\sin x^{\tan x}$.

21. If R is the resistance to maintain a train at speed V, find a law of type $R = a + b V^2$ 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 $e^{2x}Cos^2xSinx$.

25. Using Maclaurin's series, expand tanx 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

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