K19U 3325

I Semester B.Sc. Degree CBCSS (OBE) - Regular
Examination, November - 2019
(2019 Admission)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
1C01MAT-CS : MATHEMATICS FOR COMPUTER SCIENCE - I

Time : 3 Hours   Max. Marks : 40

PART-A
(QUESTIONS 1–5)

Answer any **Four** questions. Each question carries **1** mark.   **(4×1=4)**

1. If A is a square matrix of order 3 and rank 2, then find $|A|$
2. If A is an Orthogonal matrix, then show that $A^{-1}=A^1$.
3. Write the nth derivative of $\cos(ax+b)$
4. Define equivalent matrices
5. State Lagrange's mean value theorem.

PART-B
(QUESTIONS 6–15)

Answer any **Seven** questions . Each question carries **2** marks.**(7×2=14)**

6. Solve $3x-y=7$
   $5x+3y=7$ using determinants
7. Show that the transformation
   $Y_1=2x_1+x_2+x_3$
   $Y_2=x_1+x_2+2x_3$
   $Y_3=x_1-2x_3$ is regular.

8. Find the nth derivative of $\dfrac{x^2+3x+3}{x+1}$.
9. If $y=e^{ax}\sin bx$, prove that $y_2-2ay_1+(a^2+b^2)y=0$
10. Verify Rolle's theorem for the function $f(x)=x^2-3x+2$ in $[1, 2]$.

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11. Evaluate $\lim_{x \to 0} \dfrac{1-\cos x}{\sin x}$.

12. Write the working procedure to fit the line $y=a+bx+cx^2$ to a given data.

13. If $x^2+y^2=1$, find $\dfrac{d^2y}{dx^2}$.

14. Evaluate $\lim_{x \to 0} \left(\dfrac{e^{\sin x}-1}{x} \right)$.

15. State Leibnitz's theorem, for n^{th} derivative.

PART-C
(Questions 16–22)
Answer any **Four** Questions. Each question carries **3** marks. **(4×3=12)**

16. Show that the vectors $(2,1,1)$, $(2,0,-1)$ and $(4,2,1)$ are linearly independent.

17. Find the nth derivative of $e^x \sin x \cos x$.

18. Using partition method, find the inverse of $\begin{bmatrix} 3 & 2 & 4 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix}$

19. Evaluate $\lim_{x \to 0} \dfrac{\tan x - \sin x}{x^3}$

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 the 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 Cauchy's Mean value theorem for the functions e^x and e^{-x} in the interval (a, b).

PART-D
(Questions 23–26)
Answer any **Two** questions. Each question carries **5** marks.　(2×5=10)

23. If $y = e^{a\sin^{-1}x}$, show that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n=0$

24. Using Maclaurin's series, expand tanx upto term containing x^5.

25. Reduce the matrix $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ to normal form and hence find its rank.

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

x	1989	1990	1991	1992	1993	1994	1995	1996	1997
y	352	356	357	358	360	361	361	360	359

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