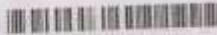


C102403



Reg. No. :

Name :



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. (4x1=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 $A^{-1}=A^T$.
3. Write the n^{th} 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. (7x2=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 n^{th} derivative of $\frac{x^2+3x+3}{x+1}$.
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 $[1, 2]$.

P.T.O.

K19U 3325

(2)



11. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin x}$.
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 $\frac{d^2 y}{dx^2}$.
14. Evaluate $\lim_{x \rightarrow 0} \left(\frac{e^{mx} - 1}{x} \right)$.
15. State Leibnitz's theorem, for n^{th} derivative.

PART-C
(Questions 16-22)

Answer any Four Questions. Each question carries 3 marks. (4x3=12)

16. Show that the vectors $(2, 1, 1)$, $(2, 0, -1)$ and $(4, 2, 1)$ are linearly independent.
17. Find the n^{th} 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 $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x^3}$
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 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) .



(3)



K19U 3325

PART-D
(Questions 23-26)

Answer any **Two** questions. Each question carries **5** marks. (2x5=10)

23. If $y = e^{ax+bx^2}$, 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 $\tan x$ upto term containing x^6 .

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