

18U124

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Name:.....

Reg.No:.....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(Supplementary/Improvement)

(CUCBCSS-UG)

CC15U BCA1 C01 - MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS

(Mathematics - Complementary Course)

(2015, 2016 Admissions)

Time: Three Hours

Maximum: 80 Marks

I. Answer **all** questions. Each question carries 1 mark.

1. If any two rows or columns are identical, then the value of determinant is
2. Eigen value of $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is
3. Differentiate the function $f(x) = \sin(x^2 + 2)$
4. $\int \cot x \, dx = \dots$
5. State product rule of differentiation.
6. If f is an odd function $\int_{-1}^1 f(x) dx = \dots$
7. Find the degree of the differential equation $\frac{dy}{dx} - \cos x = 0$
8. The general form of second order linear differential equation is
9. Apply the operator $D - 4$ on $y = 3x^2 + 4x$
10. Verify $y = e^x + 1$ is a solution of $y'' - y' = 0$

(10 × 1 = 10 Marks)

II. Answer **all** questions. Each question carries 2 marks.

11. Find the value of x for which $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$
12. Differentiate the function $f(x) = a^x$ with respect to x, where a is a positive constant.
13. Find the anti-derivative F of f defined by $f(x) = 4x^3 - 6$ where $F(0)=3$
14. Find the general solution of the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$
15. Find the general solution of the differential equation $4y'' + 4y' - 3y = 0$

(5 × 2 = 10 Marks)

III. Answer any **five** questions. Each question carries 4 marks.

16. Verify $u = x^2 - y^2$ is the solution of $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

17. Find the general solution of $(4D^2 + 4D + 17)y = 0$

18. Find X and Y if $X + Y = \begin{bmatrix} 2 & 5 \\ 0 & 1 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 6 & 4 \\ 3 & -1 \end{bmatrix}$

19. Obtain the inverse of the matrix $P = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

20. Find $|\vec{a} \times \vec{b}|$ if $\vec{a} = 2i + j + 3k$ and $\vec{b} = 3i + 4j - 5k$

21. Evaluate $\int \frac{dx}{x^2 - 6x + 13}$

22. Using first principle find the derivative of $f(x) = x + \frac{1}{x}$

23. Find the general solution of the differential equation $\frac{dy}{dx} - y = \cos x$

(5 × 4 = 20 Marks)

IV. Answer any *five* questions. Each question carries 8 marks.

24. Evaluate $\int \frac{3x-2}{(x+1)^2(x+3)} dx$

25. Solve the system of equation by Gauss elimination method

$$2x + 6y - z = -12$$

$$5x - y + z = 11$$

$$4x - y + 3z = 10$$

26. Evaluate $\int_0^{\pi/2} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$

27. Find the Eigen values of $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$

28. Form the differential equation representing the family of circles touching the x-axis at origin.

29. Solve the differential equation $(x - y) \frac{dy}{dx} = x + 2y$

30. Find the derivative of the function $f(x) = \frac{x^2 \cos(\frac{\pi}{4})}{\sin x}$

31. Differentiate $x^{\sin x}$, $x > 0$ with respect to x

(5 × 8 = 40 Marks)
