

D 92872

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Name.....

Reg. No.....

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2015

(CUCBCSS--UG)

Complementary Course

BCA 1C01--MATHEMATICAL FOUNDATION OF COMPUTER APPLICATIONS

Maximum : 80 Marks

Time : Three Hours

Part A (Objective type)

Answer **all** ten questions.

1. What is the rank of the matrix $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$
2. What is the value of $a \times b$ if a and b are parallel vectors ?
3. State whether the ~~following statement~~ is true or false : "An additive constant vanishes on differentiation".
4. What is the derivative of $(3x^2 + 2)^2$?
5. Find the integral of $2x^2 - 3x + \frac{2}{x}$
6. Evaluate $\int_0^{\frac{\pi}{2}} \sin x dx$.
7. What is the order of the differential equation $\frac{d^2 y}{dx^2} + y = 0$?
8. Write the general form of a first order linear differential equation.

Turn over

9. What are the roots of the auxiliary equation of $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} - 6y = 0$?
10. Write a particular integral of $\frac{d^2 y}{dx^2} + 8 \frac{dy}{dx} + 25y = e$

Part B (Short Answer Type)**(10 x 1 = 10 marks)**Answer **all** five questions.

11. Find the values of x, y, z and a which satisfy the matrix equation.

$$\begin{bmatrix} x+3 & 2y+x \\ z-1 & 4a-6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 13 & 2a \end{bmatrix}$$

12. If $f(x) = 7x^3 - 3$ find $f(1)$ and $f(-1)$.

13. Show that $\int \sin^{-1} x dx = \int \cos^{-1} x dx$.

14. Solve the initial value problem $Y' = Y$ $Y(1) = y$

15. Solve $(D^2 - 5D + 6)y = e^{2x}$ Where $\frac{d}{dx}$

Part C (Short Essay Type)**(5 x 2 = 10 marks)**Answer any **five** questions.

16. Find the eigen values of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

17. If $A = \begin{bmatrix} 3 & 3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ find A^{-1} .

18. Find the differential coefficient of $\tan x$, using the first principle.

19. State chain rule of differentiation of composite functions. Using chain rule find $\frac{dy}{dx}$

When $y = 9u^2$ and $u = 1 - \frac{1}{2}x^2$.

20. Prove that $\int_1^3 (x^2 + x + 3) dx = \int_1^2 (x^2 + x + 3) dx + \int_2^3 (x^2 + x + 3) dx$.

21. Integrate $(3x^5 - 1)(2x + 1)$ using the method of partial fractions.

22. $\frac{dy}{dx} + y \tan x = \cos x$.

23. Solve $\frac{d^2y}{dx^2} + 4y = \sin x$.

(5 x 4 = 20 marks)

Part D (Essay Type)

Answer any **five** questions.

24. Find the rank of the matrix $\begin{vmatrix} 1 & 2 & 3 & 4 \\ 2 & -1 & 1 & 2 \\ -3 & 0 & 1 & -2 \\ 0 & 1 & 5 & 4 \end{vmatrix}$ by reducing it to the row reduced echelon form.

25. Test for consistency and if consistent solve the system of equations $2x - y + z = 7$
 $3x + y - 5z = 13$
 $x + y + z = 5$

Turn over

26. (i) Differentiate $\sqrt{(x+1)} \sin x$.

(ii) Using the quotient rule differentiate $\frac{\cos x}{1 + \sec x}$.

27. Evaluate $\int_0^{n/2} (\sin \theta) \cos^y \theta d\theta$.

28. Solve $\frac{dy}{dx} + 2y = 4x$.

29. Solve $\frac{dy}{dx} + \frac{x-2y}{2x-y} = 0$.

30. $(D^2 - 3D + 2)y = xe^{2x} + \sin 2x$ Where $D = \frac{d}{dx}$.

31. Form the partial differential equation by eliminating the arbitrary constants a and b from the equation $ax^2 + by^2 - z^2 = 1$.

(5 x 8 = 40 marks)