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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 $\begin{bmatrix} \cos 0 & -\sin \theta \\ \sin 0 & \cos 0 \end{bmatrix}$

2. What is the value of a x 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 $(3 x^2 + 2)^2$?

5. Find the integral of $2x^2 - 3x + \dfrac{2}{x}$

6. Evaluate $\displaystyle\int_{0}^{\frac{\pi}{2}} \sin x\, dx.$

7. What is the order of the differential equation $\dfrac{d^2 y}{dx^2} + \text{o} y = \text{o}$?

8. Write the general form of a first order linear differential equation.

9. What are the roots of the auxiliary equation of $\dfrac{d^2y}{dx^2} - 5\dfrac{dy}{dx} - 6y = 0$?

10. Write a particular integral of $\dfrac{d^2y}{dx^2} + 8\dfrac{dy}{dx} + 25y = e$

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 $f(x) = 7x^{?} \; \circ \; -3$ find $f'(1)$ and $f'(-1)$.

13. Show that $\int^{n/2} \sin^{} x\,dx = \int^{\pi.2} \cos^{} x\,dx.$

14. Solve the initial value problem Y $\dfrac{Y(1)}{y}$

15. Solve $(D^2 - 5D + 6)\, y = e^{r}$ Where $\dfrac{}{dx}$

Part C (Short Essay Type)

$(5 \times 2 = 10$ marks$)$

Answer any **five** *questions.*

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

17. If $A = \begin{matrix} 3 & 3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{matrix}$ 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 $\dfrac{dy}{dx}$

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

20.   Prove that $\displaystyle\int_{1}^{3}(x^2 + X + 3)\, dx = \int_{1}^{2}(x^2 + x + 3)\, dx + \int_{2}^{3}(x^2 + x + 3)\, dx.$

21.   Integrate $\dfrac{5}{(3x - 1)(2x + 1)}$ using the method of partial fractions.

22. $\dfrac{dy}{dx} + y \tan x = \cos^2 X.$

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

(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 $\begin{aligned} 2x - y + z &= 7 \\ 3x + y - 5z &= 13 \\ x + y + z &= 5 \end{aligned}$

Turn over

26. (i) Differentiate $\overline{(x^- + 1)} \sin x$.

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

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

28. Solve $\dfrac{d\ldots}{dx} + 2y = 4x$.

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

30. $(D^2 - 3D + 2)\, y = xe^{\hat{}} + \sin 2x$ Where $D \equiv \dfrac{'}{dx}$.

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

$(5 \times 8 = 40 \text{ marks})$