

15U114

Name: .....

Reg. No.....

**FIRST SEMESTER DEGREE EXTERNAL EXAMINATION DEC. /JAN. 2015 -16**  
**(2015 Admission)**  
**CC15UBCA1C01- MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS**  
**(complementary)**

Time:3 Hours

Max Marks :80

Answer all questions

(10x1 = 10 marks)

1. The rank of an identity matrix of order 3 is.....
2. Find the characteristic equation of  $\begin{pmatrix} 3 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 6 & 1 \end{pmatrix}$ .
3. Find  $\frac{dy}{dx}$  if  $y = \frac{3}{\sqrt{(x+1)}}$
4. Verify that  $y = cx^3$  is a solution of  $xy' = 3y$ .
5. Evaluate  $\int x \cos x \, dx$
6.  $\int_0^{2\pi} (1 + \sin x) \, dx = \dots\dots\dots$
7. Find the order of  $y'' + 2y' + 2y = 0$ .
8. Solve  $y' = \cos 3x$ .
9. Differential equation associated with  $x^2 = 4ay$  is.....
10. Find  $\vec{a} \times \vec{b}$  if  $\vec{a} = 3\hat{i} + 5\hat{j} + 7\hat{k}$  and  $\vec{b} = 3\hat{i} + 4\hat{j} - \hat{k}$ .

[ Answer all questions

(10x1 = 10 marks)

11. Find  $A^{-1}$  if  $A = \begin{pmatrix} -2 & -1 \\ 5 & -4 \end{pmatrix}$ .
12. Find  $\frac{dy}{dx}$  if  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ .
13. Solve  $y'' - 2y' + y = 0$ .
14. Evaluate  $\int \frac{\cos x}{2 - \sin x} \, dx$
15. Differentiate  $y = \left(\frac{1+3x}{3x}\right)(3-x)$  with respect to  $x$ .

**III Answer any five questions**

**(5x4 = 20marks)**

16. Find AB if  $A = \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}$  and  $B = (3 \ 6 \ 1)$ .

17. Find the rank of  $\begin{pmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{pmatrix}$ .

18. Solve the initial value problem  $y' = \frac{-y}{x}$ ,  $y(1) = 1$ .

19. Evaluate  $\int \sin^3 x \cos x \, dx$

20. Evaluate  $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1+\cos^2 x} \, dx$

21. Find the derivative of  $y = x^3$  using the first principle.

22. Solve  $y'' + 4y = 0$ ,  $y(0) = 3$ ,  $y\left(\frac{\pi}{2}\right) = -3$ .

23. Solve  $y'' - a^2y = 0$ .

**IV Answer any five questions**

**(5x8 = 40marks)**

24. If  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 2 \\ 3 & 1 & 1 \end{bmatrix}$  find the characteristic equation and show that A satisfies the characteristic equation.

25. Solve by Gauss Elimination method

$$\begin{aligned} x + y - z &= 9 \\ 8y + 6z &= -6 \\ -2x + 4y - 6z &= 40 \end{aligned}$$

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

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

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

29. Solve  $y'' - y = \cos x$ .

30. Find the general solution of  $(D^2 + 3D - 4)y = 8 \sin 2x + 6 \cos 2x$ .

31. Solve  $3y'' + 2y' - y = e^{x/2} + 2e^{3x}$

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