16U114 (Pages:2) Name……..

Reg. No……

FIRST SEMESTER B C A DEGREE EXAMINATION, NOVEMBER 2016

(Regular/ Supplementary/ Improvement)

(CUCBCSS - UG)

CC15UBCA1C01- MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS

(Mathematics - Complementary course)

(2015 Admission onwards)

Time: 3 Hours **Max Marks: 80**

I Answer *all* questions **$(10x1 = 10\ marks)$**

1. Define rank of a matrix.
2. Find the characteristic equation of $\begin{pmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{pmatrix}$.
3. Find $\frac{dy}{dx}$ if $y = \frac{4}{x^3}$
4. Verify that $x^4 + y^4 = c$ is a solution of $x^3 + y^3y' = 0$.
5. Evaluate $\int x \sin x \, dx$
6. $\int_0^{2\pi}(1 + \cos x)\, dx$ =……
7. Find the order of $y'' + 2y' + 2y = 0$.
8. Solve $y' = \sin 3x$
9. Differential equation associated with $y^2 = 4ax$ is……
10. Find $\vec{a} \cdot \vec{b}$ if $\vec{a} = 3\hat{\imath} - 2\hat{\jmath} + \hat{k}$ and $\vec{b} = 4\hat{\imath} + \hat{\jmath} - \hat{k}$

II Answer *all* questions **$(5x2 = 10marks)$**

11. Find A^{-1} if $A = \begin{pmatrix} -5 & 2 \\ 2 & -2 \end{pmatrix}$.
12. Find $\frac{dy}{dx}$ if $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.
13. Solve $y'' - 4y' + 4y = 0$.
14. Evaluate $\int \frac{\sin x}{2 - \cos x}\, dx$
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 = $\begin{pmatrix} 4 & 3 \\ 7 & 2 \\ 9 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 5 \\ 1 & 6 \end{pmatrix}$.

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 $\int cos^3 x \, sinx \, dx$

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

21. Find the derivative of $y = x^2$ using the first principle.

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

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

IV Answer *any five* questions **$(5x8 = 40marks)$**

24. If $A = \begin{bmatrix} 5 & 1 & -1 \\ -1 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ find the characteristic equation and show that A satisfies the characteristic equation.

25. Solve by Gauss Elimination method

$$7y + 3z = -12$$
$$2x + 8y + z = 0$$
$$-5x + 2y - 9z = 26$$

26. Evaluate $\int \frac{(x^2+5x+41)}{(x+3)(x-1)(2x-1)} \, dx$

27. Evaluate $\int \frac{x^5}{\sqrt{1+x^3+x^6}} \, dx$

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

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

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

31. Solve $y'' + 2y' - 35y = 12e^{5x} + 37\sin 5x$.

****