19U118A (Pages: 2) Name: ……………………..

Reg. No………...………….

FIRST SEMESTER DEGREE EXAMINATION NOVEMBER 2019

(Supplementary/Improvement)

(CUCBCSS - UG)

CC15U BCA1 C01 - MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS

(Mathematics - complementary)

(2015 & 2016 Admissions)

Time: Three Hours   Maximum: 80 Marks

PART A

Answer *all* questions. Each question carries 1 mark

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_o^{2\pi}(1 + sinx) \, dx = $ ………….

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 $\vec{a} = 3\hat{\imath} + 5\hat{\jmath} + 7\hat{k}$ and $\vec{b} = 3\hat{\imath} + 4\hat{\jmath} - \hat{k}$

(10 x 1 = 10 Marks)

PART B

Answer *all* questions. Each question carries 2 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

(5 x 2 = 10 Marks)

PART C
Answer any *six* questions. Each question carries 5 marks.

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

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 $y'' - a^2 y = 0$

(5 x 4 = 20marks)

PART D
Answer any *five* questions. Each question carries 8 marks

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

    characteristic equation

25. Solve by Gauss Elimination method
$$x + y - z = 9$$
$$8y + 6z = -6$$
$$-2x + 4y - 6z = 40$$

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

(5 x 8 = 40 Marks)

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