TV152780C

Reg. No:......………….

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B. Voc. DEGREE (C.B.C.S.S) EXAMINATION, APRIL 2018
(2015 Admission Supplementary)
SEMESTER – SKILL COURSE (SOFTWARE DEVELOPMENT)
VSD2S04TB - APPLIED MATHEMATICS

Time: Three Hours   **Maximum Marks: 80**

PART A

I.   Answer all questions. Each question carries 1 mark

1.   State Euler's theorem
2.   Define two dimensional Laplace Equation
3.   Differentiate $x^3 + e^x$
4.   State Cayley Hamilton Theorem
5.   State Chain rule for two variables
6.   Give the formula for implicit differentiation using chain rule

                                                                      (6x1=6)

PART B

II.   Answer any seven questions .Each question carries 2 marks

7.   Find the values of $\dfrac{\partial f}{\partial x}$ and $\dfrac{\partial f}{\partial y}$ at the point (2,-1) if $f(x,y) = 3x^3 + 4xy^2 - 2x + 4y - 5$

8.   Differentiate $x^4 + \sin x$

9.   Use Chain rule to find the derivative of $w = x^2 + y^2$ with respect to t along the path $x = \cos t, y = \sin t$ .What is the derivatives value at $t = f$.

10. The plane x=1 intersects the paraboloid $z = x^2 + y^2$ in a parabola. Find the slope of the tangent to the parabola at (1, 2, 5).

11. If $u = \log(e^x + e^y)$ .Show that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} = 1$ .Find $\dfrac{dy}{dx}$ implicitly if

     $xe^y + \sin xy + y - \ln 2 = 0$

12. If $y = \tan x$ .Prove that $\dfrac{d^2 y}{dx^2} = 2y\dfrac{dy}{dx}$

13. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -1 \\ 0 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ 3 & 5 \\ 2 & -1 \end{bmatrix}$ .Find 3A-2B.

14. Find f_x, f_y, f_z if $f(x,y,z) = \ln(x + 2y + 3z)$

15. Find the second order derivative of $x\sin x$

16. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ .Find AB and BA

                                                                      (7x2=14)

PART C

III. Answer any five questions .Each question carries 6 marks

17. Compute the second order partial derivative of the function
    $g(x, y) = x^2 y + \cos y + y \sin x$

18. Verify that $\dfrac{\partial^2 w}{\partial y \partial x} = \dfrac{\partial^2 w}{\partial x \partial y}$ when $w = x^y + \sin(xy)$

19. If $z = \ln \sqrt{x^2 + y^2}$ .Prove that $\dfrac{\partial^2 z}{\partial x^2} + \dfrac{\partial^2 z}{\partial y} = 0$

20. By reducing to echelon form, find the rank of the following matrix
    $$\begin{bmatrix} 1 & -2 & 1 \\ 2 & 1 & 1 \\ 0 & 5 & -1 \end{bmatrix}$$

21. If $f(x, y) = x \tan^{-1}(xy)$ .Find $\dfrac{\partial f}{\partial x}$ and $\dfrac{\partial f}{\partial y}$.

22. Find the derivative of

    1) $\dfrac{\sec x + \tan x}{x \log x}$ 2) $\dfrac{x^2 - x + 1}{x^2 + x - 1}$

23. If $u = \sin^{-1} \dfrac{x}{y} + \tan^{-1} \dfrac{y}{x}$ .Show that $x \dfrac{\partial u}{\partial x} + y \dfrac{\partial u}{\partial y} = 0$

24. If $u = \log(x^3 + y^3 + z^3 - 3xyz)$ .Prove that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = \dfrac{3}{x + y + z}$

(5x6=30)

PART D

IV. Answer any two questions .Each question carries 15 marks

25. If $\sin z = \dfrac{x + y}{\sqrt{x} + \sqrt{y}}$ .Prove that $x \dfrac{\partial z}{\partial x} + y \dfrac{\partial z}{\partial y} = \dfrac{1}{2} \tan z$

26. Use the chain rule to find the derivative of $w = 2ye^x - \ln z$ with respect to t along the path $x = \ln(t^2 + 1), y = \tan^{-1} t, z = e^t$ .What is the derivative's value at t=1.

27. Show that $w = 5 \cos(3x + 3ct) + e^{x + ct}$, where c is a constant satisfies the wave equation
    $\dfrac{\partial^2 w}{\partial t^2} = c^2 \dfrac{\partial^2 w}{\partial x^2}$.

28. Test for consistency and then solve the following
    $x + y + z = 3$
    $x + 2y + 3z = 4$
    $x + 4y + 9z = 6$

(2x15=30)