K18U 1003

Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination, May 2018
(2014 Admn. Onwards)
COMPLEMENTARY COURSE IN MATHEMATICS
4C04 MAT-CS : Mathematics for Computer Science – IV

Time : 3 Hours Max. Marks : 40

SECTION – A

All the first **4** questions are **compulsory**. They carry **1** mark **each** :

1. Find a parametric representation of the circle of radius, center (4, 6).

2. Define line integral of a vector function over a curve.

3. Define interpolation.

4. Give Picard's iteration formula to solve the differential equation $y' = f(x, y)$ $y(x_0) = y_0$. **(4×1=4)**

SECTION – B

Answer **any 7** questions from among the questions **5** to **13**. These questions carry **2** marks **each**.

5. Find the first and second derivative of F = 4cos ti + 4 sin tj + 2t.

6. Find the divergence of the vector function $\lfloor x^2 + y^2, 2xyz, z^2 + x^2 \rfloor$.

7. Check whether the integral $\int_{(0,0)}^{(4,\pi 2)} e^x \sin y dx + e^x \cos y dy$ is independent of the path.

8. Evaluate using Green's theorem evaluate $\int_C F(r).dr$ for the function F = y sin xi + 2xy cos y where c is the rectangle with vertices (0, 0), (π/2, 0) (π/2, π/2) and (0, π/2).

P.T.O.

9. Evaluate the flux integral $\iint_S F.ndA$ for the following data $F = \lfloor x^2, y^2, z^2 \rfloor$

$S : x + y + z = 4x \geq 0\ y \geq 0\ z \geq 0.$

10. Evaluate using Divergence theorem $\iint_S F.ndA$, $F = [x, y, x]$ and Sis the surface of the sphere $x^2 + y^2 + z^2 = 9$.

11. Obtain a root of $x^3 - x - 4 - 0$ using bisection method.

12. Find the cubic polynomial which takes the following values $y(0) = 1$ $y(1) = 0$ $y(2) = 1$ $y(3) = 10$.

13. Explain second order Runga-Kutta Method. **(7×2=14)**

SECTION – C

Answer **any 4** questions from among the questions **14** to **19**. These questions carry **3** marks **each**.

14. If f is a differentiable scalar function, show that cutl(gradf) = 0.

15. Evaluate $\iint_S G(r)dA$ where $G = \cos y + \sin x$ and $S : x + y + z = 2x \geq 0\ \ y \geq 0\ z \geq 0$.

16. Use Stoke's theorem to evaluate $\oint_C F.dr$, $F = [4z, -2x, 2x]$ C is the intersection of $x^2 + y^2 = 1$ and $z = y + 1$.

17. Find a real root of the equation $f(x) = x^3 - 2x - 5 = 0$ using the method of false position.

18. Form a table of difference for the function
$f(x) = x^3 + 5x - 7$ $x = -1, 0, 1, 2, 3, 4, 5$. Obtain f(6) from the table.

19. Using Euler's method find y(0.01) y(0.03) given that $y' = -y$ $y(0) = 1$. **(4×3=12)**

SECTION – D

Answer **any 2** questions from among the questions **20 to 23. These questions carry** 5 marks **each**.

20. Let $f = zy + yx$ $v = [y, z, 4z - x]$ verify that $\text{curl}(fv) = \text{grad}f \times v + f\text{curl}v$.

21. Verify Green's theorem for $F = \lfloor y^2 - 7y, 2xy + 2x \rfloor$ and c is the circle $x^2 + y^2 = 1$.

22. Evaluate $\int_1^3 \frac{1}{x} dx$ by Simpson's 1/3 rule with 4 steps.

23. Given $\frac{dy}{dx} = 1 + y^2$ where y = 0 when x = 0 Find y(0.2) and y(0.4) using fourth order Runge Kutta Method. **(2×5=10)**