16U312 (Pages:2) Name: ……………………….

Reg. No……………………..

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2017
(Regular/Supplementary/Improvement)
(CUCBCSS-UG)
Mathematics - Complementary Course
CC15U MAT3 C03- MATHEMATICS III
(2015 Admission onwards)

Time: Three Hours   Maximum: 80 Marks

PART A
Answer *all* questions. Each question carries 1 mark

1. Solution of a first order differential equation involving an arbitrary constant is called ……….
2. A differential equation of the form = where f(x,y) and g(x,y) are homogeneous polynomial functions of same degree in x and y is called ………
3. Solve y' = -y.
4. Is the matrix singular or nonsingular.
5. Rank of the matrix is …….
6. State Cayley Hamilton theorem.
7. Find the value of such that the vectors [2, 3, 4] and [3, 2, -] are perpendicular.
8. The directional derivative of at P in the direction of is ……..
9. Give the parametric representation of the plane 3x+2y+z = 6.
10. The line integral .d over C is path independent if and only if …….. is a zero vector.
11. A vector is said to be ……… if div = 0.
12. Define a simply connected domain D.

(12 x 1=12 Marks)

PART B
Answer any *nine* questions. Each question carries 2 marks

13. Solve the IVP:y' = -2xy, y(0) = 1.
14. Solve xy' = x+y.
15. Represent xy = c by a differential equation.
16. Obtain the row equivalent canonical form of the matrix.
17. Find the augmented matrix of the following system of equations:
    2x+y-3z = 5, 2x-y = 3, 3x+4y+z = 2.
18. Find the eigen values of .
19. Find the component of [-2, 3,-1] in the direction of [4,-2, 0].
20. Find a normal vector to the plane through the points (1,3,0), (2,0,8) and (0,2,2).
21. Find div [$3x^2$, $5xy^3$, x^2yz^3].

22. A force $= [3, 0, -6]$ acts on a line through a point $(0, -1, 4)$. Find the moment vector of about a point $(4, 6, -1)$.

23. Find the gradient of $\ln(x^2+y^2)$ at $(2, 0)$.

24. Find over the straight line from $(0, 0)$ to $(1, 1)$.

(9x2=18 Marks)

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

25. Find the integrating factor of $(y^2+2x^2)dx + (2x^3-xy)dy$ and solve.

26. Solve $=$.

27. Find the rank of $A =$ by reducing it into normal form.

28. Test the consistency and solve the system of equations

   $x+2y-z = 3; 3x-y+2z = 1; 2x -2y+3z = 2; x-y+z = -1$.

29. Find the total work done in moving a particle in a force field given by

   $= 3xy -5z +10x$ along the curve $x = t^2+1$, $y = 2t^2$, $z = t^3$ from $t = 1$ to $t = 2$.

30. Find a, b, c if $(x+y+az) + (bx+2y-z) +(-x+cy+2z)$ is irrotational.

31. If $= (y+y^2+z^2) +(x+z+2xy) +(y+2zx)$, find the potential function such that $(1,1,1) = 3$.

32. Using Green's theorem evaluate the area enclosed by the ellipse .

33. Evaluate the surface integral of $= [x-z,y-x,z-x]$ over the surface $S:[u\cos v, u\sin v, u]$, $0u$

(6x5=30 Marks)

PART D
Answer *any two* questions. Each question carries 10 marks

34. Find the orthogonal trajectories of the family of circles $x^2+(y-c)^2 = c^2$.
35. Find the eigen values and the corresponding eigen vectors of the matrix .
36. Verify Gauss's divergence theorem for ,where $= (x^2-yz) + (y^2-zx)+(z^2-xy)$ over the

   rectangular parallelepiped $0, 0$ 0 .

(2x10=20 Marks)

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