ODE AND VC[CIVIL QUESTION BANK]

UNIT – 1(D.E of first order and its applications)

2-Marks

1. Find I. F. of + =0
2. Define exact differential equation.
3. Find the orthogonal trajectory of passing through the points

(2, 1)

1. check whether the D.E. is exact or not

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1. Define Integrating factor
2. Define linear differential equation
3. Write the condition for the exact differential equation
4. Find I. F. of + =0
5. State Newton’s law of cooling

10)State law of Natural growth

Essay Questions

1) Solve (5M)

2) Solve (6M)

3) Solve 0 (4M)

4) Solve = 0 (5M)

5) Solve

6) Solve) (10M)

7) Solve =y (10M)

1. Solve (10M)
2. Find orthogonal trajectories of the family of circles (10M)
3. Prove that system of parabolas is self orthogonal (6M)
4. Prove that the system of confocal conics,where is a parameter is self orthogonal (10M)
5. Find orthogonal trajectories of the family of cardiods r = a(1-cos),where a is the parameter (6M)
6. Find orthogonal trajectories of the family of curves is (10M)
7. Find orthogonal trajectories of (6M)
8. An object whose temperature is cools in an atmosphere of constant temperature at the rate k,being the excess temperature of the body over the temperature ,if after 10 minutes the temperature of the object falls to ,find its temperature after 20 minutes, find the time required to cool down to (10M)
9. Bacteria in a culture grows exponentially so that the initial number has doubled in three hours. How many times the initial number will be present after 9 hours (10M)
10. A Radioactive substance disintegrates at a rate proportional to its mass. When mass is 10mgm,the rate disintegration is 0.051mgm per day. How long will it take for the mass to be reduced from 10mgm to 5mgm (10M)
11. A Bacterial culture , growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours (10M)

**UNIT – 2 & UNIT-3**

2-Marks

1. Find the P.I. of
2. Solve
3. First General solution of
4. Find P.I of (D2+6D+9)Y = 2
5. Solve (D2+D+1)Y=0
6. Solve (D3+3D2+3D+1)Y = 0

**Essay Questions**

1. (6M)
2. (4M)
3. Solve ((6M)
4. (6M)
5. (10M)
6. Find the P.I. of x (4M)
7. (10M)
8. (10M)
9. (10M)

10) (10M)

(10M)

12) y = 10 (10M) **[UNIT-3]**

13) y = x (10M) **[UNIT-3]**

14) (10M)

15 (10M)

16) (10M)

17)

18) (10M) **[UNIT-3]**

19) (10M)

20)y = 3x. (10M) **[UNIT-3]**

21)y = 8. (10M) **[UNIT-3]**

22)y = 3. (10M) **[UNIT-3]**

23) = x2 +2logx (10M) **[UNIT-3]**

24) = logxsin(logx) (10M) **[UNIT-3]**

25) =ex (10M) **[UNIT-3]**

26)Solve ,(10M) **[UNIT-3]**

27)Solve ,=0(10M) **[UNIT-3]**

28)Solve , with x(0)=6.y(0)=-2. (10M) **[UNIT-3]**

29)Solve (10M) **[UNIT-3]**

30) y=4coslog(1+x). (10M) **[UNIT-3]**

UNIT-4(vector differentiation)

2-Marks

1.Show that curl is a solenoidal vector

2. Define gradient of a scalar point function.

3. Define divergence of a vector point function.

4. Define curl of a vector point function.

5. Find a unit normal vector to the given surface at the point

(2,-2,3)

6. Prove that div curl = 0.

7. Prove that curl grad

8. If = 2z then find div at (1,-1,1)

9. If +4 then find grad at (1,2,1)

10. If =( +( +( then find curl

Essay questions

1. Prove that (6M)
2. Show that vector (+(+( is irrotational and find its scalar potential. (6M)
3. Find the directional derivative of +4 at (1,1,-1) in the direction of 2 + - . (6M)
4. Find the angle between the surface z = 3x+ and 3 at (1,-2,1) (4M)
5. Prove that curl ( x ) = 2a where is constant vector
6. Prove that curl ( = div - div + ( . ∇) - ( . ∇) (5M)
7. Prove that if is the position vector of any point in space, then is irrotational (6M)
8. Prove that + (5M)
9. Find the directional derivative of the function

at the point (1,1,1) (6M)

1. Prove that +(2y x)+(3x) is irrotational (4M)

**UNIT-V**(Vector integration & vector integral theorems)

2-Marks

1. State gauss divergence theorem.
2. State Greens theorem in a plane.
3. Define surface integral and write the formulas when the projections is in XY,YZ,ZY planes.
4. If F = 3xy - , then . where C is the curve y= XY – plane from (0,0)to (1,2)
5. State stoke’s theorem

Essay Questions

1. Use greens theorem for dy where ‘c’ is the region bounded by x=0, y=0,andx+y=1. (6M)
2. Evaluate the line integral where C is the square formed by the lines x=±1 and y=±1 (6M)
3. Verify gauss divergence theorem for F = taken over the cube bounded by x=0,x=a,y=0,y=a,z=0,z=a. (10M)
4. Find the work done by = 2z along the straight line from (0,0,0) to (2,1,3) (6M)
5. Using stoke’s theorem evaluate the integral where
6. F = 2 + z k and C is the boundary of the triangle whose vertices are (0,0,0) ; (1,0,0); (1,1,0) (6M)
7. Find the work done by =(2x – y -3) + (x +y -z) + (3x – 2y – 5z) along a curve C, x2 + y2 = 4 : z = 0 (6M)
8. If F = 3xy - , then find . where C is the curve y= XY – plane from (0,0)to (1,2) (6M)
9. IfF = 4xz - +yz d s where S is the surface of the cube bounded by x=0,x=a, y=0,y=a, z=0,z=a (10M)

10 )Verify stokes theorem for F = y2 I + y j – 3 x k and S is the upper half of the sphere x2 + y2 + z2 = a2 and z ≥ 0 (10M)

11)Verify greens theorem for dy

where ‘c’ is the region bounded by x=0, y=0, and x+y=1. (10M)

12)Evaluate the line integral where C is

thesquare formed by the lines x=±1 and y=±1 (10M)

13)Verify gauss divergence theorem for F = taken over the cube bounded by x=0,x=a,y=0,y=a,z=0,z=a (10M)

14) verify greens theorem in the plane for

-2xy ) dy where c is a square with vertices (0,0),(2,0) ,(2,2),(0,2) (10M)