## V.P. & R.P.T.P. Science College, V.V.Nagar

Internal Test: 2014-15

Subject : Mathematics

US04CMTH02 Differential Equations

Date: 18/03/2015

Timing: 10.30 am - 12.00 pm

Instructions : (1) This question paper contains FIVE questions.(2) The figures to the right side indicate full marks of the corresponding question/s(3) The symbols used in the paper have their usual meaning, unless specified.

Q: 1. Answer the following by choosing correct answers from given choices.

- [1] Integral curve of 2xdx = dy = 2zdz is given by
  - [A]  $x^2 + y = c_1, y + z^2 = c_2$ [C]  $x^2 + y = c_1, y + z^2 = c_2$ [B]  $x^2 + y = c_1, y - z^2 = c_2$ [D]  $x^2 - y = c_1, y - z^2 = c_2$
- $\begin{bmatrix} 2 \end{bmatrix} ax + by z = 1 \text{ is a solution of} \\ \begin{bmatrix} A \end{bmatrix} px-qy-z=1 \\ \begin{bmatrix} C \end{bmatrix} p+y-z=1 \end{bmatrix}$
- [3] Integral surface of the linear partial differential equation  $x^2p y^2q = z^2$  can be

obtained by solving the differential equation

[A]  $\frac{dx}{z^2} = -\frac{dy}{x^2} = \frac{dz}{y^2}$  [B]  $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{z^2}$ [C]  $\frac{dx}{y^2} = -\frac{dy}{z^2} = \frac{dz}{x^2}$  [D]  $\frac{dx}{x^2} = -\frac{dy}{y^2} = \frac{dz}{z^2}$ 

[B] qx-py-z=1

px+qy-z=1

[D]

Q: 2. Answer any TWO of the following.

[1] Find the integral curves of the equations  $\frac{dx}{1+x} = \frac{dy}{1+y} = \frac{dz}{z}$ 

- [2] Obtain partial differential equation of ax by + 4z = 12
- [3] Find a differential equation which can be solved to obtain integral curve of the linear partial differential equation  $px^2 + qy^2 = z$
- **Q: 3.** Solve the equation  $\frac{dx}{y + \alpha z} = \frac{dy}{z + \beta x} = \frac{dz}{x + \gamma y}$

OR

- **Q: 3.** Find the orthogonal trajectories of hyperboloids  $x^2 + y^2 z^2 = 1$  of the conics in which it is cut by the planes x + y = c
- Q: 4. Define Paffian differential equation. Also prove that a necessary and sufficient condition that the Pfaffian differential equation X.dr = 0 is be integrable is that X.curl X = 0

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**Q:** 4 [A] Eliminate the arbitrary function f from the function z = x + y + f(xy)

[B] Solve : 
$$x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = (x+y)z$$

OR

Q: 5. Find the integral surface of the equation  $x^2p + y^2q = -z^2$  which passes through the hyperbola xy = x + y, z = 1

## OR

Q: 5. Find the surface which is orthogonal to one parameter system  $z = cxy(x^2 + y^2)$ and which passes through the hyperbolas  $x^2 - y^2 = a^2$ ; z = 0



[3] Integral matters of the hoster part of differential equation in p. – p. p. – 1. (a) or orthogod by solwing the differential equation.

 $g_{\mu\nu} = A_{\mu\nu} g_{\mu\nu} + g_{\mu\nu} = TMG$  of the following:

(1) Fine the integral curves of the equations  $\frac{61}{1+1} = \frac{61}{2} = \frac{61}{2}$ 

[2] Ohtala ya tuli differentul weedlar of dr. - fy 4 dr. - 12

 $\mathbb{R}^{2}$ . Find a differential equation which can be solved to obtain integral integral integral  $\mathbb{R}^{2}$  with the obtain integral int

 $\mathbf{Q}_{1}(\mathbf{I}_{1}) = Solve the equation <math>\frac{dx}{d^{1} + az} = \frac{dy}{d^{1} + az} \cdot \frac{dy}{d^{1} + dz}$ 

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- Q: 3. Paul the orthogonal trajectories of hyperboloids  $x^* + y^* \gamma = 1$  of the contex in which the cut by the planes x + y = x
- Qu  $k_{i}$  . Define Pathan differential equation (Also prove that a accessiry and sufficient) condition that the Phillian differential equation X at a 0 is be integrable is that X (and Y = 0.

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