a) Construct a partial differential equation from the relation

$f(x^2 + y^2 + z^2, z^2 - 2xy) = 0.$

b) Solve $z^2(p^2 + q^2 + 1) = a^2$.

Unit-V

5. a) Solve $\dfrac{\partial^3 z}{\partial x^3} - 4\dfrac{\partial^3 z}{\partial x^2 \partial y} + 5\dfrac{\partial^3 z}{\partial x \partial y^2} - 2\dfrac{\partial^3 z}{\partial y^3} = e^{2x+y}$.

b) Using the separation of variables, solve

$3u_x + 2u_y = 0$ with $u(x, 0) = 4e^{-x}$.

OR

a) Solve $\dfrac{\partial^3 z}{\partial x^3} - 2\dfrac{\partial^3 z}{\partial x^2 \partial y} = 3x^2 y$.

b) Solve $(2D^2 - 5D' + 2D'^2)z = 5\sin(2x + y) + e^{x-y}$.

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Total No. of Questions :5] *[Total No. of Printed Pages :4*

Roll No ....

MA-111

B.E. (All Branches), I Year II Semester

Examination, June 2016

Choice Based Credit System (CBCS)

Mathematics - II

Time : Three Hours

Maximum Marks: 60

Note: i) Question paper is divided into five units.

ii) Attempt all questions.

iii) All questions carry equal marks.

Unit-I

1. a) Find the normal form of the given matrix and also find its rank.

$$A = \begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$$

b) Determine the Eigen values and Eigen vector of the matrix.

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$$

OR

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a) If matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, then verify Cayley-Hamilton theorem. Hence find A^{-1}.

b) Find that for what values of λ, μ the equations $x+y+z=6$; $x+2y+3z=10$; $x+2y+\lambda z=\mu$ have

i) no solution

ii) a unique solution and

iii) infinite number of solution

Unit-II

2. a) Solve the differential equation

$$(y+x-5)\,dy-(y-x+1)\,dx=0$$

b) Solve $\dfrac{d^3y}{dx^3}+\dfrac{d^2y}{dx^2}-\dfrac{dy}{dx}-y=\cos 2x+3e^x$

OR

a) Solve $(1+x^2)\dfrac{dy}{dx}+2xy=\cos x$

b) Solve $(D^2+5D+6)y=e^{-2x}\sin 2x$

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Unit-III

3. a) Solve $x^2\dfrac{d^2y}{dx^2}+2x\dfrac{dy}{dx}-20y=x^2$

b) Find the complete solution of the differential equa

$$\left(1-x^2\right)\frac{d^2y}{dx^2}-2x\frac{dy}{dx}+y=0, \text{ if } y=x \text{ is one solutic}$$

it.

OR

a) Solve by the method of variation of parameters,

$$\frac{d^2y}{dx^2}+4y=4\tan 2x$$

b) Solve the following simultaneous differential equati

$$\frac{dx}{dt}+5x+y=e^t;\ \frac{dy}{dt}-x+3y=e^{2t}$$

Unit-IV

4. a) Solve the p.d. equation

$$x(z^2-y^2)p+y(x^2-z^2)q=z(y^2-x^2)$$

b) Solve the following p.d. equation by Charpit's methc

$2xz-px^2-2qxy+pq=0.$

OR

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