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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

II Sem B.E. (Credit System) Mid Semester Examinations – I March 2013

12MA201 – ENGINEERING MATHEMATICS - II

Duration: 1 Hour

Max. Marks: 20

*Note: Answer **Five full** questions choosing at least **two** from **each** Part.*

Part – I

1. Solve $(x^2+y^2)dx = xydy$.
2. Solve $\left(xy^2 - e^{\frac{1}{x^3}}\right)dx - x^2ydy = 0$.
3. Solve the differential equation $\dfrac{dy}{dx} + x\sin 2y = x^3\cos^2 y$.
4. Find the orthogonal trajectory of the family of curves $r^2 = a^2\cos 2\theta$.

Part – II

5. Define (i) linear dependence (ii) linear independence of a set of vectors $\{u_1, u_2, ...u_n\}$. Check whether the set {(1, 4, 5); (4, 4, 8); (3, -3, 0)} is linearly dependent.
6. Define the rank of a matrix. Find the rank of the matrix

$$\begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 3 & 3 & -1 \\ 0 & 1 & 1 & -1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$$

by reducing to row echelon form.

7. Using Gauss-Seidel iteration method solve the system of equations:

$20x + y - 2z = 17$

$3x + 20y - z = -18$

$2x - 3y + 20z = 25$

Start with $x^{(0)} = y^{(0)} = z^{(0)} = 0$ and carryout 3 iterations.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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II Sem B.E. (Credit System) Mid Semester Examinations – I March 2013

12MA201 – ENGINEERING MATHEMATICS - II

Duration: 1 Hour Max. Marks: 20

Note: Answer **Five** *questions choosing* **at least Two from each Part.**

Part – I

Solve the differential equation $\dfrac{dy}{dx}=\dfrac{x+y-1}{x+y+1}$.

Solve the differential equation $y(x+y+1)dx+x(x+3y+2)dy=0$.

Solve the differential equation $\tan y\dfrac{dy}{dx}+\tan x=\cos y\cos^2 x$.

Find the orthogonal trajectory of the family of curves $r^n=a^n\sin n\theta$.

Part – II

Define a basis for a vector space. Check whether the set $\{(1,0,7);(1,2,4);(1,0,3)\}$ is a basis for R^3

Define rank of a matrix. Find the rank of the matrix

$$\begin{bmatrix}1 & 1 & 1 & 4\\ 2 & 1 & -1 & 1\\ 1 & -1 & 2 & 2\\ 2 & 0 & 3 & 6\end{bmatrix}$$ by reducing it to row echelon form.

Use Gauss Seidel iteration method to solve

$$5x-2y+z=3$$
$$x-4y-2z=5$$
$$4x+y+6z=-8$$

start with $x^{(0)}=y^{(0)}=z^{(0)}=0$ and carry out three iterations.

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II Sem B.E. (Credit System) Mid Semester Examinations – II, April 2013

12MA201 – ENGINEERING MATHEMATICS - II

ration: 1 Hour

Max. Marks: 20

Note: Answer ***Five*** *full questions choosing* ***at least two*** *from* ***each Part.***

Part – I

1. Solve the differential equation $\left(4D^2-1\right)y=e^{\frac{x}{2}}+12e^x+4$.
2. Solve the differential equation $\left(D^2-4D+3\right)y=\sin 3x$.
3. Using the method of variation of parameters, solve $\left(D^2+1\right)y=\sec x\tan x$.
4. Solve the differential equation $x^2\dfrac{d^2y}{dx^2}+2x\dfrac{dy}{dx}-12y=x^3$.

Part – II

5. Evaluate $\iint_D xy(x+y)\,dx\,dy$ if D is the region bounded by $y=x^2$ and $y=x$.
6. By changing the order of integration evaluate $\int_0^{\infty}\int_x^{\infty}\dfrac{e^{-y}}{y}\,dy\,dx$
7. Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix}25 & 1 & 2\\ 1 & 3 & 0\\ 2 & 0 & -4\end{bmatrix}$ by using power method. Start with the initial vector $\begin{bmatrix}1\\0\\0\end{bmatrix}$ and carry out five iterations.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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II Sem B.E. (Credit System) Mid Semester Examinations – II, April 2013

12MA201 – ENGINEERING MATHEMATICS - II

ation: 1 Hour

Max. Marks: 20

*Note: Answer **Five** questions choosing **at least two** from each Part.*

Part – I

Solve the differential equation $(D^2-4D+4)y=e^{2x}$.

Using the method of variation of parameters solve the differential equation $(D^2-2D+1)y=\frac{e^x}{x}$.

Solve the differential equation $(D^2+2D+2)y=1+3x+x^2$.

Solve the differential equation $x^2\frac{d^2y}{dx^2}-2x\frac{dy}{dx}-4y=x^2+2\log x$.

Part – II

Evaluate $\iint_D (x^2+y^2)dxdy$ if D is the region bounded between $x=2, y=1$ and $y=x^2$.

Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}\,dxdy$ by changing to polar coordinates.

Using Power method find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix}2&-1&0\\-1&2&-1\\0&-1&2\end{bmatrix}$. Take the initial eigen vector as $\begin{bmatrix}1\\0\\0\end{bmatrix}$ and carry out five iterations.

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