

G, H, I, J, K, L

USN

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H

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 $(xy^2 - e^{\frac{1}{x^3}})dx - x^2ydy = 0$.
3. Solve the differential equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$.
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 $\{u_1, u_2, \dots, u_n\}$.
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.

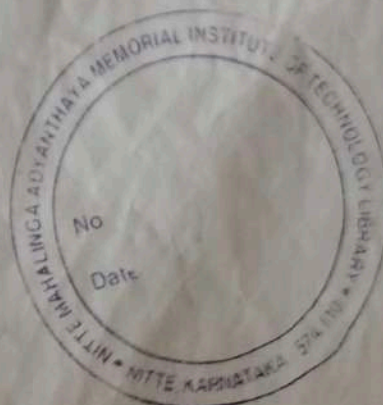
7. Using Gauss-Seidel iteration method solve the system of equations:

$$20x + y - 2z = 17$$

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

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

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



B, C, D, E, F

USN

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3

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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 $\frac{dy}{dx} = \frac{x+y-1}{x+y+1}$.

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

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

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

$$5x - 2y + z = 3$$

$$x + 4y - 2z = 5 \quad \text{start with } x^{(0)} = y^{(0)} = z^{(0)} = 0 \text{ and carry out three iterations.}$$

$$4x + y + 6z = -8$$



Sections: G,H,I,J,K,L

USN

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2

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

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

12MA201 – ENGINEERING MATHEMATICS - II

Max. Marks: 20

Duration: 1 Hour

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

Part – I

1. Solve the differential equation $(4D^2 - 1)y = e^{\frac{x}{2}} + 12e^x + 4$.

2. Solve the differential equation $(D^2 - 4D + 3)y = \sin 3x$.

3. Using the method of variation of parameters, solve $(D^2 + 1)y = \sec x \tan x$.

4. Solve the differential equation $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3$.

Part – II

5. Evaluate $\iint_D xy(x+y) dx dy$ if D is the region bounded by $y=x^2$ and $y=x$.

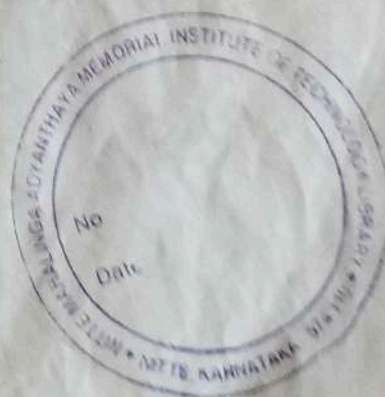
6. By changing the order of integration evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$

7. Find the largest eigen value and the corresponding eigen vector of the matrix

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

iterations.

by using power method. Start with the initial vector $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ and carry out five



Sections: A, B, C, D, E & F

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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 – II, April 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 $(D^2 - 4D + 4)y = e^{2x}$.

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

Part – II

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

Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$ 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.

