

KLS Gogte Institute of Technology, Belagavi (Autonomous) Year: 2016-17

Department of Mathematics

First Internal Assessment Test

Subject: Engineering Mathematics-I

Sub Code: 16MAT11

Semester: I

CHEMISTRY GROUP (H, I, J, K, L, M)

Date: 01-09-2016

Max. Marks: 25

Duration: 1 hour

Answer ALL FIVE questions. (Each question carries FIVE marks)

1. Test the consistency and hence solve $x - 2y + 3z = 8$; $2x - 3y = -5$; $x + y + z = 9$. [L3]
2. Show that the transformation $y_1 = x_1 + 2x_2 + 5x_3$; $y_2 = 2x_1 + 4x_2 + 11x_3$; $y_3 = -2x_2 + 2x_3$ is regular. Also find inverse transformation. [L3]
3. Solve by Gauss-Seidel method, $28x + 4y - z = 32$; $2x + 17y + 4z = 35$; $x + 3y + 10z = 24$; taking $x_0 = 0$, $y_0 = 0$, $z_0 = 0$ as initial approximation. Perform three iterations. [L3]
4. Use Rayleigh's power method to find the dominant eigen value and corresponding eigen vector of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ taking $[1 \ 1 \ 1]^T$ as initial eigen vector. Perform 5 iterations. [L3]
5. Given the eigen value $\lambda = 0, 3, 15$ of $A = \begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$, find the modal matrix. [L3]

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PHYSICS GROUP (A,B,C,D,E,F,G)

Date: 01-09-2016

Max. Marks: 25

Duration: 1 hour

Answer ALL FIVE questions. (Each question carries FIVE marks)

1. Test the consistency and hence solve $x + 2y + z = 3$; $2x + 3y + 2z = 5$; $x - 5y + 5z = 2$;
 $3x + 9y - z = 4$. [L3]
2. Show that the transformation $y_1 = 2x_1 + x_2 + x_3$; $y_2 = x_1 + x_2 + 2x_3$; $y_3 = -x_1 - 2x_3$ is regular. Also find inverse transformation. [L3]
3. Solve by Gauss-Seidel method, $20x + y - 2z = 17$; $3x + 20y - z = -18$; $2x - 3y + 20z = 25$; taking $x_0 = 0$, $y_0 = 0$, $z_0 = 0$ as initial approximation. Perform three iterations. [L3]
4. Use Rayleigh's power method to find the dominant eigen value and corresponding eigen vector of $\begin{bmatrix} 1 & -3 & 2 \\ 4 & 4 & -1 \\ 6 & 3 & 5 \end{bmatrix}$ taking $[1 \ 0 \ 1]^T$ as initial eigen vector. Perform 5 iterations. [L3]
5. Given the eigen values $\lambda = 0, 3, 15$ of $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$, find the modal matrix. [L3]

KLS Gogte Institute of Technology, Belagavi (Autonomous) Year: 2016-17

Department of Mathematics

Second Internal Assessment Test

Subject: Engineering Mathematics-I

Sub Code: 16MAT11

Semester: I CHEMISTRY GROUP (A,B,C,D,E,F,G)

Date: 6-10-2016

Max. Marks: 25

Duration: 1 hour

Answer ALL FIVE questions. (Each question carries FIVE marks)

1. Evaluate $\int_0^{\frac{\pi}{6}} \cos^6(3\theta) \sin^4(3\theta) d\theta$ using the reduction formula. [L3]
2. Find the area of the loop $3ay^2 = x(x-a)^2$ [L3]
3. Evaluate $\int_0^4 x^3 \sqrt{4x-x^2} dx$ using reduction formula [L3]
4. If $z = e^{ax+by} f(ax-by)$ then prove that $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y} = 2abz$ [L2]
5. If $u = x \phi\left(\frac{y}{x}\right) + \varphi\left(\frac{y}{x}\right)$ then prove that $x^2 u_{xx} + 2xu_{xy} + y^2 u_{yy} = 0$ [L3]

KLS Gogte Institute of Technology, Belagavi (Autonomous) Year: 2016-17

Department of Mathematics

Second Internal Assessment Test

Subject: Engineering Mathematics-I

Sub Code: 16MAT11

Semester: I PHYSICS GROUP (A,B,C,D,E,F,G)

Date: 6-10-2016

Max. Marks: 25

Duration: 1 hour

Answer ALL FIVE questions. (Each question carries FIVE marks)

1. Evaluate $\int_0^{\frac{\pi}{6}} \cos^4(3x) \sin^3(3x) dx$ using the reduction formula. [L3]
2. Find the perimeter $r = a(1 + \cos\theta)$ [L3]
3. Evaluate $\int_0^{\infty} \frac{x^2}{(1+x^2)^2} dx$ using reduction formula [L3]
4. If $z = f(x + ct) + g(x - ct)$ then prove that $\frac{\partial^2 z}{\partial t^2} = c^2 \frac{\partial^2 z}{\partial x^2}$ [L2]
5. If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x + y}\right)$ then prove that $x^2 u_{xx} + 2xu_{xy} + y^2 u_{yy} = \sin 4u - \sin 2u$ [L3]

KLS Gogte Institute of Technology, Belagavi (Autonomous) 2016-2017

Department of Mathematics

Third Internal Assessment Test

**Subject:Engineering Mathematics –I
16MAT11**

Sub Code:

Semester: I Chemistry Group (H,IJ,K,L,M)

Date 11-11-2016

Max marks:25

Duration 1 Hr

-----Answer ALL FIVE questions (Each question carries FIVE marks)

- 1 Find the angle between surfaces $x \log z = y^2 - 1$ and $x^2 y = 2 - z$ at (1,1,1) (L3)
2. Find the value of constant 'a', if the vector field $\vec{F} = (x + y)\mathbf{i} + (y + 2z)\mathbf{j} + (y + az)\mathbf{k}$ is solenoidal. (L3)
3. If $\vec{F} = (2x^2 + 4y^2 - 3z^2)\mathbf{i} + (8xy - y^2 + 2yz)\mathbf{j} + (3z^2 + y^2 - 6xz)\mathbf{k}$ is velocity of fluid flow, show that is irrotational . Also find scalar potential. (L3)
4. Find n^{th} derivative of $\sin 6x \cdot \cos 2x$ (L2)
5. If $x = \sin t$, $y = \cos pt$ then prove that $(1 - x^2) y_{n+2} - (2n + 1) x y_{n+1} - (n^2 - p^2) y_n = 0$ (L2)

KLS Gogte Institute of Technology, Belagavi (Autonomous) 2016-2017

Department of Mathematics

Third Internal Assessment Test

Subject: Engineering Mathematics –I

Sub Code: 16MAT11

Semester: I

Physics Group(A,B,C,D,E,F,G)

Date 11-11-2016

Max marks:25

Duration 1 Hr

Answer ALL FIVE questions (Each question carries FIVE marks)

1 Find the angle between surfaces $x^2 + y^2 + z^2 = 9$ and $x^2 + y^2 - z = 3$ at $(2, -1, 2)$

(L3)

2. Find the value of constant 'a', if the vector field

$\vec{F} = (ax^2y + yz)\mathbf{i} + (xy^2 - xz^2)\mathbf{j} + (2xyz - 2x^2y^2)\mathbf{k}$ is solenoidal. (L3)

3. If $\vec{F} = (6xy + z^3)\mathbf{i} + (3x^2 - z)\mathbf{j} + (3xz^2 - y)\mathbf{k}$ is velocity of fluid flow, show that it is irrotational. Also find scalar potential. (L3)

4. Find n^{th} derivative of $\sin 5x \cdot \cos 2x$ (L2)

5. If $y = \tan^{-1} x$ then prove that $(1 + x^2) y_{n+2} + (n + 1) 2xy_{n+1} + (n^2 + n)y_n = 0$

(L2)
