Set No. 1

Code No: R10107 / R10

I B.Tech I Semester Regular/Supplementary Examinations January 2012

MATHEMATICAL METHODS

(Common to Computer Science Engineering, Electrical & Electronic Engineering, Civil Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology & Automobile Engineering.)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1.(a) Reduce the matrix $\begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ 8 & 1 & 3 & 4 \end{bmatrix}$ in to its normal form and hence find its Rank.

(b) Solve the following system of equations using gauss elimination method
$2x_1+x_2+2x_3+x_4=6$, $6x_1-x_2+6x_3+12x_4=36$

$4x_1+3x_2+3x_3-3x_4=1$, $2x_1+2x_2-x_3+x_4=10$.

[7M+8M]

2.(a) Prove that the sum of the Eigen values of a square matrix is equal to its trace of the matrix and Product of the Eigen values is equal to its determinant

(b) Verify cayley –Hamilton theorem and hence find its inverse of the matrix

$$A=\begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & -1 \\ 1 & 1 & 1 \end{bmatrix}.$$

[7M+8M]

3. Reduce the quadratic from $x^2+3y^2+3z^2+4t^2+4xy-2xz+6xt+4yt+2yz$ the canonical from and hence find the nature, index, rank , and signature of the quadratic from.

[15M]

4.(a) Find a root of the equation $x^3 - x - 4 = 0$ using regula false method.

(b) Find a real root of the equation $xe^x - \cos x = 0$ using Newton-Raphson method.

[7M+8M]

5.(a) Evaluate (i) $\tan^{-1}\left(\frac{n-1}{n}\right) = \tan^{-1}\left(\frac{1}{2n^2}\right)$ (ii) $\sin(px+q)$ (iii) e^{ax+b}

(b) Appling Newton's forward interpolation formula , compute the value of $\sqrt{5.5}$, given that $\sqrt{5}$ $=\overline{2}.236$, $\sqrt{6} = \overline{2}.449$, $\sqrt{7} = \overline{2}.646$, $\sqrt{8} = \overline{2}.828$

[7M+8M]

Code No: R10107 / R10 **Set No. 1**

6.(a) Find the first derivative of the function tabulated below at the point x=1.5.

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24	38.87	59

(b) Evaluate $\int_0^1 e^{-x^2} dx$ using

(i) Simpson's 1/3 rule taking h=0.2 (ii) Trapezoidal rule.

[7M+8M]

7. (a) Find y(0.2) using modified Euler's method given that

$$\frac{dy}{dx} = x - y,\ y(0) = 1,\ with\ h = 0.1$$

(b) Find y (0.1) and y (0.2) using Runge -Kutta method fourth order given that

$$y' = xy + y^2,\ y(0) = 1.$$

[7M+8M]

8.(a) Fit a power function to the following data and estimate y at x=12.

Price	20	16	10	11	14
Demand	22	14	120	89	56

(b) Fit a least square parabola to the following data.

x	0	0.2	0.4	0.7	0.9	1.0
y	1.016	0.768	0.648	0.401	0.272	0.193

[7M+8M]

Set No. 2

Code No: R10107 / R10

I B.Tech I Semester Regular/Supplementary Examinations January 2012

MATHEMATICAL METHODS

(Common to Computer Science Engineering, Electrical & Electronic Engineering, Civil Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology & Automobile Engineering.)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1.(a) Reduce the matrix to Echelon form and hence find its Rank

$$A = \begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & 1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$$

(b) Solve the equations

$10x_1 + x_2 + x_3 = 12$, $x_1 + 10x_2 - x_3 = 10$ *and* $x_1 - 2x_2 + 10x_3 = 9$ *by* Gauss Joldan method.

[7M+8M]

2.(a) Find the Eigen Values and Eigen vectors of A^{-1}. Where

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

(b) State and Prove Cayley – Hamilton theorem.

[7M+8M]

3. Reduce the Quadratic form $3x^2 + 3y^2 + 3z^2 + 2xy + 2xz - 2yz$ into sum of squares form by an orthogonal transformation and hence find nature, rank, index and signature.

[15M]

4.(a) Find a real root of $xe^x = 2$ using Regula–Falsi method.

(b) Find real root of the equation $1 + \tan^{-1} x - x = 0$ near $x = 1$ correct up to 4 decimal places using iteration method.

[7M+8M]

5.(a) Find f (1.28). If f (1.15) = 1.0723, f (1.20) = 1.0954, f (1.25) = 1.1180, and f (1.30) = 1.1401.

(b) Find the cubic polynomial which takes the values

x	0	1	2	5
$f(x)$	2	3	12	147

using Lagranges interpolation formula.

[7M+8M]

Code No: R10107 / R10 **Set No. 2**

6.(a) Find the values of $f'(1)$ using the data.

x	1.0	1.5	2.0	2.5	3.0
$f(x)$	27	106.75	324	783.75	1621

(b) Evaluate $\int_0^{\pi/2} e^{\sin x}.dx$ taking h=π /6 using

(i) Trapezoidal rule.
(ii)Simpson's 1/3rule.

[7M+8M]

7. Find the solution of $\frac{dy}{dx} = x - y$, $y(0) = 1$. at x = 0.4 and h = 0.1using Miline's method.
Use Euler's modified method to evaluate y(0.1), y(0.2) and y(0.3).

[15M]

8.(a) Using least square method fit a second degree polynomial estimate y at x = 6.5

x	0	1	2	3	4	5	6	7	8
y	12	10.5	10	8	7	8	7.5	8.5	9

(b) Fit a power curve of the form $y(x) = ax^b$ to the data.

x	1	2	3	4	5	6
y	4.0	5.7	6.9	8.0	8.9	9.8

[7M+8M]

Set No. 3

Code No: R10107 / R10

I B.Tech I Semester Regular/Supplementary Examinations January 2012

MATHEMATICAL METHODS

(Common to Computer Science Engineering, Electrical & Electronic Engineering, Civil Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology & Automobile Engineering.)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

****

1.(a) Find the non –singular matrices P&Q such that P A Q is in the normal from where

$$A = \begin{bmatrix} 1 & 3 & 6 & -1 \\ 1 & 4 & 5 & 1 \\ 1 & 5 & 4 & 3 \end{bmatrix}$$

(b) Solve $x + 2y + z = 3$, $2x + 3y + 2z = 5$, $3x - 5y + 5z = 2$, $3x + 9y - z = 4$.

[7M+8M]

2.(a) Find the Eigen Values and the corresponding Eigen vectors of the matrix

$$\begin{bmatrix} 2 & 1 & -6 \\ -22 & & -3 \\ - & & - \\ 1 & & 20 \end{bmatrix}$$

(b) State Cayley – Hamilton theorem. Find the characteristic Equation of the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$$ and hence find the matrix represented by

$$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I.$$

[7M+8M]

3.(a) Reduce the following Quadratic from to canonical form by diagonalization

$$6x^2 + 3y^2 + 3z^2 - 4yz - 4zx - 2xy$$

(b) Using Lagrange's reduction, transform

$x_1^2 - 4x_2^2 + 5x_3^2 + 2x_1x_2 - 4x_1x_3 + 2x_4^2 - 6x_3x_4$ to canonical form and hence find rank, nature, index and signature.

[7M+8M]

4.(a) Using Bisection method find a square root of 26 correct up to three decimal places.

(b) Using Newton Raphson method compute $\sqrt{41}$ correct to Four decimal places.

[7M+8M]

Code No: R10107 / R10 **Set No. 3**

5.(a) Using Newton's interpolation formula given $\sin 45^0 = 0.7071$ $\sin 50^0 = 0.7660$, $\sin 55^0 = 0.8192$ and $\sin 60^0 = 0.8660$ find $\sin 52^0$.

(b) Find y(-2) & y(1.5) from the following data using Lagrange's interpolation formula.

x	-4	-1	0	2	5
f(x)	1245	33	5	9	1335

[7M+8M]

6.(a) Find First and second derivatives from the data near x = 1.5 using central forward difference.

x	1	1.2	1.4	1.6	1.8	2
y	2.72	3.32	4.06	4.95	6.05	7.39

(b) Using Simpson's rule. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ dividing the range into 6 equal parts.

[7M+8M]

7. Use Milne's Method to find y (0.8) from $y' = 1+y^2$, y(0) = 0, find the initial values y(0.2) , y(0.4) and y(0.6) From Range Kutta method.

[15M]

8.(a) Fit a least square parabola to the following data

x	0	0.2	0.4	0.7	0.9	1.0
y	1.016	0.768	0.648	0.401	0.272	0.193

(b) Fit an exponential curve of the form $y(x) = ae^{bx}$ to the following data

x	1	2	3	4	5
y	2.600	3.300	4.200	5.400	6.900

[7M+8M]

Code No: R10107 / R10 **Set No. 4**

I B.Tech I Semester Regular/Supplementary Examinations January 2012

MATHEMATICAL METHODS

(Common to Computer Science Engineering, Electrical & Electronic Engineering, Civil Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology & Automobile Engineering.)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1.(a) Find the values of a and b for which the equations x + y + z = 3, x + 2y + 2z = 6, x+ ay + 3z = b have
(i) no solution (ii) infinitely number of solutions (iii) unique solutions.

(b) Solve the following system of equations using Gauss – Seidel Iteration Method
27x + 6y – z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110.

[7M+8M]

2.(a) Prove that the two Eigen vectors corresponding to the two different Eigen values are linearly independent .

(b) Diagonalize the matrix $A=\begin{matrix}1 & 1 & 1\\ 1 & 1 & 1\\ 1 & 1 & 1\end{matrix}$ and find A^4 using the model matrix.

[7M+8M]

3.(a) Reduce the Quadratic form to canonical form $3x^2+2y^2-4xz$ by using orthogonal transformation.

(b) Using Lagrange's Reduction Reduce the Quadratic Form $x_1^2 + 4x_2^2 + x_3^2 - 4x_1x_2 + 2x_3x_1 - 4x_2x_3$ to canonical form. Also find the nature, rank, index, signature.

[7M+8M]

4.(a) Using Bisection Method find the root between 2&3 of the equation $x^4-x^3-2x^2-6x-4=0$ up to three decimals

(b) using iteration method find an approximate root of the equation $x^4-x-13=0$.

[7M+8M]

5.(a) Find log 58.75 from the following data.

x	40	45	50	55	60	65
log x	1.60206	1.65321	1.69897	1.74036	1.77815	1.81291

Using Newton's backward interpolation formula.

(b) Using Gauss forward interpolation formula find the value of f(25) from the following data f(20) =24, f(24)=32, f(28)=35,f(32)=40.

[7M+8M]

Code No: R10107 / R10 **Set No. 4**

6.(a) find the values of cos (1.74) from the following data.

x	1.7	1.74	1.78	1.82	1.86
Sin x	0.9857	0.9916	0.9781	0.9691	0.9584

(b) Evaluate $\int_0^{\Pi/2} \sqrt{\sin\theta}\, d\theta$ using

(i) Simpson's 1/3 rule (ii) Simpson's 1/8 rule taking n = 6

[7M+8M]

7.(a) solve the differential equation $\frac{dy}{dx} = \frac{1}{x^2 + y}$, $y(4) = 4$ and compute y(4.2) & y(4.4) using Taylor's series method.

(b) solve $y' = y - x^2$, y(0) =1 by Picard's method up to the fourth approximation hence find the value of y(0.1) , y(0.2) .

[7M+8M]

8.(a) Using least square method, fit a second degree polynomial estimate y at x=6.5

x	0	1	2	3	4	5	6	7	8
y	12	10.5	10	8	7	8	7.5	8.5	9

(b) Fit a least square straight line for the following data.

x	1	2	3	4	5	6
y	6	4	3	5	4	2

[7M+8M]

Code No: R10106/R10 R07

I B.Tech I Semester Regular/Supplementary Examinations, Jan 2012
ENVIRONMENTAL STUDIES
(Common to Mechanical Engineering, Electronics & Communication Engineering, Chemical Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Production Technology and Mining)

Time: 3 hours Max Marks: 75 Answer any FIVE Questions

All Questions carry equal marks
? ? ? ? ?

1. (a) Write a note on the importance of education on environmental issues and concerns.
   (b) Describe the multidisciplinary nature of environmental studies. [7+8]

2. Discuss the importance of environmental studies with respect to the following state-ments.
   (a) We live in a world wherein natural resources are limited.
   (b) Green spaces and gardens are vital to the psychological and physical health of city dwellers. [7+8]

3. (a) What are the di erent tropic levels of organisms in an ecosystem ?
   (b) Why is a complex ecosystem more stable than one with few species? [9+6]

4. (a) Write a brief note on biodiversity and ecosystem diversity.
   (b) Explain the evolution of diverse species in an ecosystem. [15]

5. (a) Oceans are ultimate sink for most of the waste we produce. Explain.
   (b) List o shore sources of Marine Pollution.
   (c) Explain the e ects of oil pollution on the ocean. [7+4+4]

6. Discuss brie y the provision of the following Acts:
   (a) The Water (Prevention Control of Pollution) Act ,1974
   (b) The Air (Prevention and Control of Pollution) Act, 1981
   (c) The Wildlife Protection Act 1971
   (d) The Forest Conservation Act of 1980 [4+4+4+3]

7. Explain the relation between population and economic growth from the point of view of sustainable development. [15]

8. (a) What is the methodology to be followed for study of a studying cause and e ects of a polluted site? Write also the observations for various aspects and data to be collected.

Code No: R10106/R10 R07

(b) Write about any polluted site you have visited and describe your findings in detail. [8+7]

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Code No: R10106/R10 **Set No. 2**

I B.Tech I Semester Regular/Supplementary Examinations, Jan 2012
ENVIRONMENTAL STUDIES
(Common to Mechanical Engineering, Electronics & Communication Engineering, Chemical Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Production Technology and Mining)

Time: 3 hours Max Marks: 75 Answer any FIVE Questions

All Questions carry equal marks
? ? ? ? ?

1. Write a detailed note on the various institutions and organizations in the eld of Environment Education and training, their activities and focal areas. [15]

2. (a) Write a detailed note on the problems arising out of overexploitation of forest resources.
   (b) Describe how forest management is being done in India by citing any example. [6+9]

3. (a) Brie y write about the di erent kinds of grasslands in India, also stating the main activities in such areas.
   (b) What steps can be taken to conserve grasslands and what are the common reasons for destruction of these ecosystem? [7+8]

4. (a) What do you understand by endemic and endangered species ? How are they categorized? Give some examples of such spcies in India.
   (b) List some common plant and animal species of India. [9+6]

5. (a) Enumerate the diseases and other problems caused by soil pollution.
   (b) How do you control soil pollution? [8+7]

6. (a) Explain the phenomenon of Global Warming and the factors contributing to it.
   (b) Explain the possible impacts of Global Warming on the food supply.
   (c) What are the measures taken at Global level to control the emmission of Green House Gases? [5+5+5]

7. (a) De ne Health Impact Assement.
   (b) Outline some of the important strategies which must be taken up to minimize environmental hazards . [4+11]

8. (a) Describe how you would methodically record the elements and resources in an ecosystem and assess its functioning.
   (b) Based on your led visits, summarize your observations and ndings of the water resource ecosystem in your region. [8+7]

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Code No: R10106/R10 **Set No. 3**

I B.Tech I Semester Regular/Supplementary Examinations, Jan 2012
ENVIRONMENTAL STUDIES
(Common to Mechanical Engineering, Electronics & Communication Engineering, Chemical Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Production Technology and Mining)

Time: 3 hours Max Marks: 75 Answer any FIVE Questions

All Questions carry equal marks
? ? ? ? ?

1. Explain how the ideas and activities of some internationally known environmental thinkers has in uenced environment policy. [15]

2. (a) Why is it important to conserve forest ecosystems?
   (b) What are the ways in which forest resources are misused and what is the outcome? [8+7]

3. (a) Explain the term `energy cycle' and how the organisms in the ecosystem are dependent on it.
   (b) What is ecological succession? What are the di erent stages of development of an ecosystem? [8+7]

4. (a) Explain the concept of ex-situ conservation and illustrate your answer with examples.
   (b) What is an Integrated Protected Areas and how does it help in conservation of biological diversity. [9+6]

5. (a) List the wastes that are prohibited from processing along with municipal solid waste. Discuss.
   (b) Brie y describe the methods of heating and disposal of solid waste. [8+7]

6. (a) What are the major issues associated with resettlement and rehabilitation?
   (b) Bring out the main elements of water conservation. [8+7]

7. Explain with examples the links between the activities of man which are hazardous to human health and environment. [15]

8. List and write brie y the main characteristics of any ve plant and ve animal species which belong to your region or any area which you have studied. [8+7]

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Code No: R10106/R10 **Set No. 4**

I B.Tech I Semester Regular/Supplementary Examinations, Jan 2012
ENVIRONMENTAL STUDIES
(Common to Mechanical Engineering, Electronics & Communication Engineering, Chemical Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Production Technology and Mining)

Time: 3 hours Max Marks: 75 Answer any FIVE Questions

All Questions carry equal marks
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1. Mention brie y the contributions made by the following:
   (a) BNHS
   (b) Indira Gandhi
   (c) Botanical Survey of India
   (d) Madhav Gadgil [4+4+4+3]
2. (a) Why is it important to conserve forest ecosystems?
   (b) What are the ways in which forest resources are misused and what is the outcome? [8+7]
3. How do di erent development activities, including construction of dams, a ect the various aquatic ecosystems and what actions need to be taken to conserve them? [8+7]
4. (a) Explain the concept of in-situ conservation of biodiversity. Illustrate your answer with examples.
   (b) What is an Integrated Protected Area System? How do these contribute to preservation of biodiversity? [9+6]
5. (a) What is signi cance of the term inversion in the dissipation of pollutants in the atmosphere ?
   (b) List the meteorological parameters in uencing the disposal of air pollutants in the atmosphere. [15]
6. (a) What are the ways in which individuals can help us in environmental management.
   (b) Describe Narmada Bachao Andolan. [7+8]
7. (a) Explain the importance of value education in the context of the environment.
   (b) Write a note on environmental values. [7+8]
8. Explain the causes and e ects of air pollution by describing any urban or industrial area that you have studied. [15]

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