| | | |
|---|---|---|
| **Name of Programme** | **: EE / ET / CM / IT** | |
| **Programme Code** | **:  02/03/06/07** | |
| **Name of Course** | **: ENGINEERING  MATHEMATICS III** | |
| **Course Code** | **: SC282** | |

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 02 | 32 |
| Term work / Practical | 01 | 16 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration | Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Rationale:**

- The student shall learn various techniques in integration and differential equations and use these techniques to their related Engineering problems.

**Course Outcomes:**

After completing this course students will be able to

1. Apply the definition of integration as inverse of differentiation to solve problems.

2. Apply various methods of integration..

3. Apply Mathematical principle to solve engineering problems.

4. Apply differential equation for solving problems in different engineering fields.

5. Apply the knowledge of Laplace transform to solve engineering problems.

6. Draw and come to a valid conclusion.

7. Locate the exceptional and critical points in an engineering system.

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**Course Contents: (Course Name: Engineering Mathematics III – SC282)**

**A.  Theory :**

| Specific Learning Outcomes (Cognitive Domain) | Topics and subtopics | Hrs. |
|---|---|---|
| **Units 1 : Integration** | | **10** |
| 1.Define integration as anti derivative.<br>2. Integrate function using different method | 1.1 Definitions, standard formulae, integration of algebraic sum of two or more functions, integration by substitutions and by trigonometric transformations, integration of $1/ax^2+bx+c$, $1/\sqrt{ax^2+bx+c}$, integration by parts, integration by partial fractions | |
| **Unit 2: Definite integrals** | | **04** |
| 1 Solve problems on definite integrals using the properties | 2.1 Definition and properties of definite integrals Example based on these properties. | |
| **Unit 3: Applications of integration** | | **04** |
| 1. Find mean and R.M.S. value | 3.1Mean value and root mean square value. | |
| **Unit 4: Differential Equations** | | **05** |
| 1. Define order and degree of differential equation<br>2. Solve the differential equation of first order and first degree<br>2. Solve different engineering problems using differential equation | 4.2 Definition, order and degree of differential equations.<br>Formation of differential equations.<br>Solution of differential equations : (using following methods)<br>i) Variable separable (ii) Reducible to variable separable.<br>(iii) Homogeneous differential equations.<br>(iv) Exact diff. equations.<br>(v) Linear differential equations. | |
| **Unit 5: Complex number** | | **05** |
| 1.Define complex number<br>2. Define modulus ad amplitude<br>3.Solve examples on complex number using De Moivre's theorem<br>4.Find roots of complex number. | 5.1Definition and algebra of a complex numbers. Geometrical representation (Argand's diagram), modulus and amplitude of a complex number. De Moivre's theorem (without proof), roots of complex number. | |
| **Unit 6:Laplace Transform** | | **04** |
| 1.Define Laplace transform, inverse transform , and Convolution theorem.<br>2. Solve examples on L.T. and Inverse L.T.<br>3.Solve differential equation using L.T. | 6.1Definition, Laplace Transforms of elementary functions, important properties of Laplace Transforms, Inverse of Laplace Transforms, Convolution Theorem and application of Laplace Transform for solving differential equations. | |
| | **Total Hrs.** | **32** |

## B. List of Practicals /Laboratory Experiences/Assignments:

| Practical No. | Specific Learning Outcomes (Psychomotor Domain) | Units | Hrs. |
|---|---|---|---|
| 1. | Integration based on standard formulae. | Integration | 1 |
| 2. | Integration by substitution method | | 1 |
| 3. | Integration on the type $1/ax^2+bx+c$, $1/\sqrt{ax^2+bx+c}$ ,$1/a\sin x+b\cos x+c$ , $1/a\sin^2 x +b\cos^2 x +c$. | | 1 |
| 4. | Integration using By Part Rule and integration by partial fraction method. | | 1 |
| 5 | Examples on Definite integral and it's properties | Definite integrals. | 1 |
| 6. | Examples on Mean and R.M.S. value | Applications of integration | 1 |
| 7. | Examples on order ,degree and formation of differential equation. | Differential Equation | 1 |
| 8. | Solution of first order first degree D.E. using various methods. | | 1 |
| 9 | Examples on algebra of complex number and determination of modulus and amplitude. | Complex Number | 1 |
| 10 | Examples on De Moivre's theorem and roots of complex number. | | 1 |
| 11 | Examples on Laplace transform and inverse Laplace transform. | Laplace Transform | 1 |
| 12 | Examples on Convolution theorem and Solution of D.E. by Laplace transform. | | 1 |
| | Skill Test | | 02 |
| | | **Total Hrs.** | **14** |

## Instructional Strategy:

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Integration | Class room teaching , chalk board |
| 2 | Definite integration | Class room teaching , chalk board |
| 3 | Applications of integration | Class room teaching , chalk board |
| 4 | Differential equation | Class room teaching , chalk board |
| 5 | Complex number | Class room teaching , chalk board |
| 6 | Laplace transform | Class room teaching , chalk board |

**Specification Table for Theory Paper:**

| Unit No. | Units | Levels from Cognition Process Dimension | | | Total Marks |
|---|---|---|---|---|---|
| | | **R** | **U** | **A** | |
| 01 | Integration | 08(04) | 16(08) | 00(00) | 24(12) |
| 02 | Definite Integrals | 04(04) | 04(00) | 00(00) | 08(04) |
| 03 | Applications of integration | 00(00) | 00(00) | 08(04) | 08(04) |
| 04 | Differential Equation | 04(00) | 08(04) | 04(04) | 16(08) |
| 05 | Complex number | 04(04) | 04(02) | 04(00) | 12(06) |
| 06 | Laplace transform | 04(02) | 04(00) | 04(04) | 12(06) |
| | **Total** | **24(14)** | **36(18)** | **20(08)** | **80(40)** |

R-Remember          U – Understand          A – Analyze / Apply

**Question Paper Profile For Theory Paper:**

| Q. No | Bit 1 | | | Bit 2 | | | Bit 3 | | | Bit 4 | | | Bit 5 | | | Bit 6 | | | option |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **T** | **L** | **M** | **T** | **L** | **M** | **T** | **L** | **M** | **T** | **L** | **M** | **T** | **L** | **M** | **T** | **L** | **M** | |
| **01** | 1 | R | 4 | 1 | R | 4 | 1 | U | 4 | 1 | U | 4 | 1 | U | 4 | 1 | U | 4 | **4/6** |
| **02** | 1 | U | 4 | 2 | R | 4 | 2 | R | 4 | 2 | U | 4 | 3 | A | 4 | 3 | A | 4 | **4/6** |
| **03** | 4 | R | 4 | 4 | U | 4 | 4 | U | 4 | 4 | U | 4 | 4 | A | 4 | 4 | A | 4 | **4/6** |
| **04** | 5 | R | 4 | 5 | R | 4 | 5 | R | 4 | 6 | A | 4 | 6 | A | 4 | 6 | A | 4 | **4/6** |
| **05** | 1 | R | 2 | 1 | R | 2 | 1 | U | 2 | 1 | U | 2 | 3 | A | 2 | 3 | A | 2 | **8/12** |
| | 5 | U | 2 | 5 | U | 2 | 5 | U | 2 | 6 | R | 2 | 6 | R | 2 | 6 | R | 2 | |

T= Unit/Topic Number          L= Level of Question          M = Marks

R-Remember                    U-Understand                    A-Analyze/ Apply

**(Course Name: Engineering Mathematics III – SC282)**

**Assessment and Evaluation Scheme:**

| | | What | To Whom | Frequency | Max Marks | Min Marks | Evidence Collected | Course Outcomes |
|---|---|---|---|---|---|---|---|---|
| **Direct Assessment  Theory** | **CA** (Continuous Assessment) | PT | Students | Two PT (average of two tests will be computed) | 20 | -- | Test Answer sheets | 1,2,3,4,5,6,7 |
| | | Class Room Assignments | | Assignments | -- | -- | Assignment Book | 1,2,3,4,5,6,7 |
| | | | | TOTAL | 20 | | | |
| | **TEE** (Term End Examination) | End Exam | Students | End Of the Course | **80** | **28** | Theory Answer sheets | 1,2,3,4,5,6,7 |
| **Direct Assessment  Practical** | **CA** (Continuous Assessment) | -- | Students | -- | -- | -- | -- | -- |
| | | -- | | -- | -- | -- | -- | -- |
| | | | | | | | | |
| | **TEE** (Term End Examination) | -- | Students | -- | **--** | **--** | -- | -- |
| **Indirect Assessment** | | Student Feedback on course | Students | After First PT | Student feed back form | | | |
| | | End Of Course | | End Of The Course | Questionnaires | | | |

**Scheme Of Practical Evaluation:**

| S.N. | Description | Max. Marks |
|---|---|---|
| 1 | Observations, | N.A. |
| 2 | Calculations and Result | N.A. |
| 3 | Viva voce | N.A. |
| | **TOTAL** | |

**Mapping Course Outcomes With Program Outcomes:**

| Course Outcomes | Program Outcomes (POs) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **1** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 2 |
| **2** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| **3** | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 3 |
| **4** | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 3 |
| **5** | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 3 |
| **6** | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| **7** | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

**Reference & Text Books:**

| S.N. | Title | Author, Publisher, Edition and Year of publication | ISBN Number |
|---|---|---|---|
| 1 | Higher Engineering Mathematics | Khanna Publishers, New Delhi Grewal B.S | |
| 2 | Engineering Mathematics Vol.II | Satya Prakashan, New Delhi Vishwanath | |
| 3 | Mathematics for Polytechnic students | Pune Vidyarthi Griha Prakashan S.P. Deshpande | |
| 4 | Engineering Mathematics Part II | S. Chand & Co. Ltd. Delhi ,H.K. Dass | |

**List Of Experts & Teachers Who Contributed For This Curriculum:**

| S.N. | Name | Designation | Institute / Industry |
|------|------|-------------|----------------------|
| 1. | | Chairman PBOS | |
| 2. | Shri. V.B.Shinde | Faculty from Institute | Govt. Polytechnic ,Pune |
| 3. | | Faculty from Institute | |
| 4. | | Consultant from Industry | |
| 5. | | Faculty from nearby Institute | |
| 6. | | R.B.T.E.Representative. | |

**Prepared by**

**(            )**          **(Member Secretary PBOS)**          **(Chairman PBOS)**