

Module	Detailed Contents	Hrs.
01	<p><b>Module: Complex Integration</b></p> <p>1.1 Line Integral, Cauchy's Integral theorem for simple connected and multiply connected regions (without proof), Cauchy's Integral formula (without proof).</p> <p>1.2 Taylor's and Laurent's series (without proof).</p> <p>1.3 Definition of Singularity, Zeroes, poles of <math>f(z)</math>, Residues, Cauchy's Residue Theorem (without proof).</p> <p><b>Self-learning Topics:</b> Application of Residue Theorem to evaluate real integrations, Z- Transform.</p>	7
02	<p><b>Module: Statistical Techniques</b></p> <p>2.1 Karl Pearson's Coefficient of correlation (<math>r</math>).</p> <p>2.2 Spearman's Rank correlation coefficient (<math>R</math>) (repeated and non-repeated ranks)</p> <p>2.3 Lines of regression.</p> <p>2.4 Fitting of first and second degree curves.</p> <p><b>Self-learning Topics:</b> Covariance, fitting of exponential curve.</p>	6
03	<p><b>Module: Probability Distributions</b></p> <p>1.1 Baye's Theorem, Random variable: Probability distribution for discrete and continuous random variables, Density function and distribution function.</p> <p>3.2 Expectation, mean and variance.</p> <p>3.3 Probability distribution: Poisson &amp; normal distribution.</p> <p><b>Self-learning Topics:</b> Moments, Moment Generating Function, Applications of Probability Distributions in Engineering.</p>	7
04	<p><b>Module: Linear Algebra: Vector Spaces:-</b></p> <p>4.1 Vectors in <math>n</math>-dimensional vector space, norm, dot product, The CauchySchwarz inequality (with proof), Unit vector.</p> <p>4.2 Orthogonal projection, Orthonormal basis, Gram-Schmidt process for vectors.</p> <p>4.3 Vector spaces over real field, subspaces.</p> <p><b>Self-Learning Topics:-</b> Linear combinations, linear Dependence and Independence, QR decomposition.</p>	6
05	<p><b>Module: Linear Algebra: Quadratic Forms</b></p> <p>5.1 Quadratic forms over real field, Linear Transformation of Quadratic form, Reduction of Quadratic form to diagonal form using congruent transformation.</p> <p>5.2 Rank, Index and Signature of quadratic form, Sylvester's law of inertia, Value-class of a quadratic form-Definite, Semidefinite and Indefinite.</p> <p>5.3 Reduction of Quadratic form to a canonical form using congruent transformations.</p> <p>5.4 Singular Value Decomposition.</p> <p><b>Self-learning Topics:</b> Orthogonal Transformations, Applications of Quadratic forms and SVD in Engineering.</p>	7

06	<b>Module: Calculus of Variations:</b> 6.1 Euler- Lagrange equation (Without Proof), When F does not contain y, When F does not contain x, When F contains x, y, y'. 6.2 Isoperimetric problems- Lagrange Method. 6.3 Functions involving higher order derivatives: Rayleigh-Ritz Method.  <b>Self-Learning Topics:-</b> Brachistochrone Problem, Variational Problem, Hamilton Principle, Principle of Least action , Several dependent variables.	6
	<b>Total</b>	39

### References:

1. Complex Variables and Applications, Brown and Churchill, McGraw-Hill education.
2. Probability, Statistics and Random Processes, T. Veerarajan, McGraw-Hill education.
3. Advanced engineering mathematics H.K. Das, S. Chand, Publications.
4. Higher Engineering Mathematics B. V. Ramana, Tata Mc-Graw Hill Publication
5. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa publication
6. Advanced Engineering Mathematics Wylie and Barret, Tata Mc-Graw Hill.
7. Beginning Linear Algebra Seymour Lipschutz Schaum's outline series, Mc-Graw Hill Publication
8. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication

### Term Work (25-Marks):

#### General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practicals.
2. Students must be encouraged to write at least 6 class tutorials on entire syllabus.
3. A group of 4-6 students should be assigned a self-learning topic. Students should prepare a presentation/problem solving of 10-15 minutes. This should be considered as mini project in Engineering mathematics. This project should be graded for 10 marks depending on the performance of the students.

The distribution of Term Work marks will be as follows –

1. Attendance (Theory and Tutorial)	05 marks
2. Class Tutorials on entire syllabus	10 marks
3. Mini project	10 marks

### Internal Assessment Test (25-Marks):

Assessment consists of two class tests of 20 marks each. The first-class test (Internal Assessment I) is to be conducted when approx. 40% syllabus is completed and second class test (Internal Assessment II) will be based on remaining contents (approximately 40% syllabus but excluding contents covered in Test I). Duration of each test shall be one hour.

### End Semester Theory Examination (80-Marks):

Weightage to each of the modules in end-semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.



1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Question No: 01 will be compulsory and based on entire syllabus wherein 4 to 5 sub-questions will be asked.
3. Remaining questions will be mixed in nature and randomly selected from all the modules.
4. Weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
5. Total 04 questions need to be solved.

muquestionpapers.com