

Course Code	Course Name	Theory	Practical	Tutorial	Theory	Oral & Practical	Tutorial	Total
ITC301	Applied Mathematics III	04	--	01	04	--	--	05

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Oral & Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test 2	Avg. of Two Tests					
ITC301	Applied Mathematics III	20	20	20	80	--	--	--	100

Course Objectives: Students will try to learn:

1. The concepts of Set theory and Relation.
2. The concepts of Functions and define the recursive functions.
3. The concept of Laplace transforms.
4. The concept of Inverse Laplace transforms.
5. The concept of permutations and combinations.
6. The concept of variable and also identify the mapping.

Course Outcomes: Students will able to:

1. Apply the Set theory and Relation concepts.
2. Apply the Functions and define the recursive functions.
3. Apply Laplace transform to different applications.
4. Apply Inverse Laplace transform to different applications.
5. Identify the permutations and combinations.
6. Define variable and also identify the mapping.

Prerequisite: Applied Mathematics I, Applied Mathematics II

Detailed syllabus:

Sr. No.	Module	Detailed Content	Hours	CO Mapping
0	Prerequisite	Basic of AM-I and AM-II.	02	
I	Set Theory	Set Theory: Definition of Sets, Venn Diagrams, complements, cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle.	08	CO1

II	Relation & Function	<p>Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation.</p> <p>Function: Definition and types of function, composition of functions, recursively defined functions.</p>	08	CO1 CO2
III	Laplace Transform	<p>Introduction, Definition of Laplace transforms Laplace transform of constant, trigonometrical, exponential functions. Important properties of Laplace transform: First shifting theorem, Laplace transform of $L\{f(at)\}$, $L\{t^n f(t)\}$, $L\left\{\frac{f(t)}{t}\right\}$, $L\left\{\frac{d^n f(t)}{dt^n}\right\}$, $L\left\{\int_0^t f(u) du\right\}$ (all without proof).</p> <p>Unit step function, Heavi side function, Dirac-delta function, Periodic function and their Laplace transforms, Second shifting theorem.</p>	08	CO3
IV	Inverse Laplace Transform	<p>Inverse Laplace transform with Partial fraction and Convolution theorem (without proof).</p> <p>Application to solve initial and boundary value problem involving ordinary differential equations with one dependent variable and constant coefficients.</p>	08	CO4
V	Complex Variable & mapping	<p>Functions of a complex variable, Analytic functions, Cauchy-Riemann equations in Cartesian co-ordinates, Polar co-ordinates. Harmonic functions, Analytic method and Milne Thomson methods to find $f(z)$, Orthogonal trajectories.</p> <p>Conformal Mapping, Linear, Bilinear transformations, Cross ratio, fixed points and standard transformation such as rotation and magnification, inversion, translation.</p>	10	CO6
VI	Permutations, Combinations and Probability	<p>Rule of sum and product, Permutations, Combinations, Algorithms for generation of</p>	08	CO5

		Permutations and Combinations. Discrete Probability, Conditional Probability, Bayes' Theorem, Information and Mutual Information.		
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Text Books:

1. Higher Engineering Mathematics by Grewal B. S. 38th edition, Khanna Publication 2005.
2. Advanced Engineering Mathematics by Kreyszig E. 9th edition, John Wiley.
3. A Text Book of Applied Mathematics Vol. I & II by P.N.Wartilar & J.N.Wartikar, Pune, Vidyarthi Griha Prakashan, Pune.
4. Modern Digital Electronics by R. P. Jain 8th edition, Tata Mcgraw Hill
5. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", SiE Edition, TataMcGraw-Hill.

References:

1. Advanced Engineering Mathematics by C. Ray Wylie & Louis Barrett, TMH International Edition.
2. Mathematical Methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
3. Laplace Transforms by Murray R. Spiegel, Schaun's out line series-McGraw Hill Publication.

Assessment:

Internal Assessment for 20 marks:

Consisting of Two Compulsory Class Tests

Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.

End Semester Examination: Some guidelines for setting the question papers are as:

- Weightage of each module in end semester examination is expected to be/will be proportional to number of respective lecture hours mentioned in the syllabus.
- Question paper will comprise of total **six questions, each carrying 20 marks.**
- **Q.1** will be **compulsory** and should **cover maximum contents of the syllabus.**
- **Remaining question will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any other module. (Randomly selected from all the modules.)
- Total **four questions** need to be solved.