

DSE Syllabus - Semester III

Engineering Mathematics :- III

Teaching Scheme

Theory : 03 Hrs/Week

Tutorial : 01 Hr/Week

Examination Scheme

Mid-term Test : 20 Marks

Internal Assessment: 20 Marks

End Semester Exam: 60 Marks

Duration: 03 Hrs.

Course Contents:

Unit 1: Laplace Transform

Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n , scale change property, transforms of functions divided by t , transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function.

[07 Hours]

Unit 2: Inverse Laplace Transform

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

[07 Hours]

Unit 3: Fourier Transform

Definitions – integral transforms ; Fourier integral theorem (without proof) ; Fourier sine and cosine integrals ; Complex form of Fourier integrals ; Fourier sine and cosine transforms ; Properties of Fourier transforms ; Parseval's identity for Fourier Transforms.

[07 Hours]

Unit 4: Partial Differential Equations and Their Applications

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation

equation (i.e. Laplace equation: $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$).

$\left(\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2} \right)$, and two dimensional heat flow equation

[07 Hours]

The following two topics are not so important, so it could be learned through self-study mode.

[Topic for Self Study] Unit 5: Functions of Complex Variables (Differential calculus)

Limit and continuity of $f(z)$; Derivative of $f(z)$; Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Mapping: Translation, magnification and rotation, inversion and reflection , bilinear transformation; Conformal mapping.

[07 Hours]

[Topic for Self Study] Unit 6: Functions of Complex Variables (Integral calculus)

Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs).

[07 Hours]

Text Books

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3. A Course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
4. Integral Transforms and Their Engineering Applications by Dr. B. B. Singh, Synergy . Knowledge ware, Mumbai.
5. Integral Transforms by I. N. Sneddon, Tata McGraw-Hill, New York.

General Instructions:

1. The tutorial classes in Engineering Mathematics-III are to be conducted batchwise. Each class should be divided into three batches for the purpose.
2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.
3. The minimum number of assignments should be eight covering all topics.

BTEEC 304 MEASUREMENT AND INSTRUMENTATION

Teaching scheme:

Theory: 2 hrs

Tutorial: 1 hr

Total credit: 3

Examination Scheme:

Mid-term test: 20 Marks

Internal Assessment: 20 Marks

End semester exam: 60 Marks

Syllabus to be Taught

Unit 1: Philosophy of Measurement

Unit 2: Analog Measurement of Electrical Quantities

Unit 3: Measurement of Parameters

Unit 4: Digital Measurement of Electrical Quantities

Unit 5: Transducers: Definition - different types of transducers – criteria for selection –general characteristics– dynamic characteristics – transducers for measurement of displacement (RVDT &LVDT), speed, angular rotation, altitude, force, torque, humidity and moisture, pressure, strain and temperature (Thermocouple and RTD method), Hall Effect transducer and applications Instrumentation amplifiers – differential amplifiers)

Syllabus for Self Study

Unit 5: Transducers: Data transmission and telemetry – methods of data transmission, General telemetry systems – Digital methods of frequency, phase, time and period measurements.

Unit 6: Display methods, recorders: Display methods and devices

BTEEC 302. NETWORK ANALYSIS AND SYNTHESIS.

Teaching scheme:

Theory: 2 hrs
 Tutorial: 1 hr
 Total credit: 3

Examination Scheme:

Mid-term test: 20 Marks
 Internal Assessment: 20 Marks
 End semester exam: 60 Marks

Pre requisite	Basic electrical engineering	
Course Outcome	To review basic components of electric network. To design and develop network equations and their solutions. To apply Laplace theorem for electric network analyses To analyze AC circuit.	
Unit	Contents	Cont act Hrs
1	Active & Passive Circuit Element: Independent & dependent voltage & current sources, R, L, C & mutual inductance circuit parameters, Their mathematical modes, Voltage current power relations. Classification of element: Lumped distributed, Linear & non-linear, Unilateral, Bilateral, Time invariant & variant, Pace invariant & variant, Super position, Thevenin's, Norton's Reciprocity, Maximum power transfer, Substitution, Tellegen's theorem.	6
2	Network Equations: Network topology, Graph, Tree, Branches, Chords, Equilibrium equation on loop basis & node basis Number of network equation required, Choice between nodal & loop analysis, Source transformation, Network mutual inductance, Dot conventions, Concept of super mesh, Super node Concept of duality & dual networks.	6
3	Solution of Network Equations: Classification solution of first, Second order differential equations of series & parallel R-L, R-C, R-L-C circuits, General & particular solutions, Particular integral & complimentary functions, Time constant, Mathematical analysis of circuit transients, initial conditions in network, Procedure of evaluability, Conditions in network problems, Solution of D.C. resistive network & A. C. sinusoidal steady state networks, Writing loop equations, Node equations directly in matrices form. Numericals	6
4	Concept of complex frequency, Transform impedance & transform admittance, Series & parallel combination of these transform networks. (Topic for Self Study) : Application of Laplace's Transform: Solution of differential equation using Laplace transform, Unit step, Impulse & ramp functions, Laplace transform of singular & shifted function, Convolution integral	6
5	Two port network: Terminals & terminal pairs, Driving points & transfer admittance, Transfer functions, Concept of poles & zeroes, Two port networks, Z, Y & the transmission parameters relationship between parameter sets.	6
6	Sinusoidal Steady State A. C. Circuit: R-L-C series circuits, Series resonance Variation of Z with frequency, maximum value of VC & VL, Magnification, Bandwidth, Q factor. Parallel Resonance: Resonance frequency for tank circuit frequency, Locus diagram of series R-L, R-C with variable R & X. (Topic for Self Study) : Filter: Introduction classification, Low pass, High pass, Band pass & band reject filter, active & passive filters. Application of Fourier series, Expansion for periodic & non-sinusoidal waveforms.	6
	Ref Books: 1. Mac.E Van Valkenburg, "Network Analysis", 2. Franklin Fa-Kun. Kuo, "Network Analysis & Synthesis", John Wiley & Sons. 3. M. L. Soni, J. C. Gupta, "A Course in Electrical Circuits and Analysis", 4. Mac.E Van Valkenburg, "Network Synthesis", 5. Joseph A. Edminister, Mahmood Maqvi, "Theory and Problems of Electric Circuits", Schaum's Outline Series,	