Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech Electrical and Computer Engineering
(Applicable from the academic session 2025-2026)

Name of the course	**ELECTRIC CIRCUIT THEORY**
Course Code: PC-ECS 301	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: 1 hr/week	Assignment & Quiz: 10 Marks
Practical: 2 hrs/week	Attendance: 05 Marks
Credit Points: 3	End Semester Exam: 70 Marks

Objective:

1.	To understand the structure and properties of different type of electrical circuits, networks and sources.
2.	To apply different mathematical tools & techniques for analyzing electrical networks.
3.	To apply circuit analysis techniques to simplify electrical networks.
4.	To solve problems of electrical circuits.

Pre-Requisite:

1.	Basic Electrical Engineering (ES-EE-101)
2.	Mathematics (BS-M-102, BS-M-202)

Unit	Content	Hrs	Marks
1	**Introduction:** Continuous & Discrete, Fixed & Time varying, Linear and Nonlinear, Lumped and Distributed, Passive and Active networks and systems. Independent & Dependent sources, Step, Ramp, Impulse, Sinusoidal, Square, Saw tooth signals	**3**	
2	**Graph theory and Networks equations:** Concept of Tree, Branch, Tree link, Incidence matrix, Tie-set matrix and loop currents, Cut set matrix and node pair potentials. Duality, Solution of Problems	**4**	
3	**Coupled circuits:** Magnetic coupling, Polarity of coils, Polarity of induced voltage, Concept of Self and Mutual inductance, Coefficient of coupling, Modeling of coupled circuits, Solution of problems.	**3**	
4	**Laplace transforms:** Impulse, Step & Sinusoidal response of RL, RC and RLC circuits. Transient analysis of different electrical circuits with and without initial conditions. Concept of Convolution theorem and its application. Solution of Problems with DC & AC sources.	**8**	
5	**Fourier method of waveform analysis:** Fourier series and Fourier Transform (in continuous domain only). Application in circuit analysis, Solution of Problems	**6**	
6	**Network Theorems:** Formulation of network equations, Source transformation, Loop variable analysis, Node variable analysis. Network theorem: Superposition, Thevenin's, Norton's & Maximum power transfer theorem. Millman's theorem and its application in three phase unbalanced	**8**	

	circuit analysis. Solution of Problems with DC & AC sources.		
7	**Two port networks analysis:** Open circuit Impedance & Short circuit Admittance parameter, Transmission parameters, Hybrid parameters and their inter relations. Driving point impedance & Admittance. Solution of Problems	**4**	
8	**Filter Circuits:** Analysis and synthesis of Low pass, High pass, Band pass, Band reject, All pass filters (first and second order only) using operational amplifier. Solution of Problems	**4**	

Text books:

1. Networks & Systems, Ashfaq Husain, Khanna Book Publishing, New Delhi
2. Networks and Systems, D. Roy Chowdhury, New Age International Publishers
3. Network Analysis and Synthesis, C.L. Wadhwa, New Age International Publishers
4. Circuit and Networks: Analysis and synthesis, A. Sudhakar & S.S. Palli 4th edition. Tata Mc Graw Hill Education Pvt. Ltd.
5. Circuit theory, Dr. Abhijit Chakrabarty, Dhanpat Rai & Co Pvt. Ltd.

Reference books:

1. Network Analysis, M.E. Valkenburg, Pearson Education
2. Fundamental of Electric circuit theory, D. Chattopadhay & P.C. Rakshit, S. Chand
3. Engineering Circuit Analysis, W.H. Hyat, J.E. Kemmerly & S.M. Durbin, The Mc Graw Hill Company
4. Problems and Solutions of Electric Circuit Analysis, R.K. Mehta & A.K. Mal, CBS, New Delhi

Course Outcome:

After completion of this course, the learners will be able to

1. Describe different type of networks, sources and signals with examples.
2. Explain different network theorems, coupled circuit and tools for solution of networks.
3. Apply network theorems and different tools to solve network problems.
4. Select suitable techniques of network analysis for efficient solution.
5. Estimate parameters of two-port networks.
6. Design filter circuits.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

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Name of the course	**DATA STRUCTURE & ALGORITHMS**
Course Code: PC-ECS 302	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: Nil	Assignment & Quiz: 10 Marks
Practical: 2 hrs/week	Attendance: 05 Marks
Credit Points: 3	End Semester Exam: 70 Marks

Objective:	
1.	To understand the basics of abstract data types.
2.	To understand the principles of linear and nonlinear data structures.
3.	To build an application using sorting and searching

Pre-Requisite:	
1.	Programing for problem solving (ES-CS 201)
2.	Mathematics (BS-M-102, BS-M-202)

Unit	Content	Hrs	Marks
1	**Introduction:** Basic Terminologies, Elementary Data Organizations, **Data Structure Operations:** insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.	**10**	
2	**Stacks and Queues**: ADT Stack and its operations: Algorithms and their complexity analysis, **Applications of Stacks**: Expression Conversion and evaluation corresponding algorithms and complexity analysis. ADT queue, **Types of Queue**: Simple Queue, Circular Queue, Priority Queue; **Operations on each types of Queues**: Algorithms and their analysis.	**10**	
3	**Linked Lists:** **Singly linked lists:** Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes **Doubly linked list:** operations on it and algorithmic analysis; **Circular Linked Lists:** all operations their algorithms and the complexity analysis. **Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, **B+ Tree:** definitions, algorithms and analysis	**10**	
4	**Sorting and Hashing:** Objective and properties of different sorting	**10**	

	algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. **Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.		

Text books:

1. Data Structures and Program Design In C, 2/E by Robert L. Kruse, Bruce P. Leung. PHI
2. Data Structure & Algorithms Using C, R.S. Salaria, 5th Ed., Khanna Publishing House (AICTE Recommended – 2018)
3. Data Structures in C, Aaron M. Tenenbaum. Pearson.
4. Data Structure, S. Lipschutz.. Mc Graw Hill.

Reference books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, MIT press
2. Expert Data Structures with C++, R.B Patel, Khanna Publishing House
3. Fundamentals of Data Structures of C, Ellis Horowitz, Sartaj Sahni, Susan Andersonfreed, MIT press
4. Data Structures Using C, Reema Thareja. Oxford University press
5. Data Structure Using C, 2/e by A.K. Rath, A. K. Jagadev. SCITECH
6. Data Structures through C, Yashwant Kanetkar, BPB Publications.

Course Outcome:

After completion of this course, the learners will be able to

1. Differentiate how the choices of data structure & algorithm methods impact the performance of program.
2. Solve problems based upon different data structure & also write programs.
3. Identify appropriate data structure & algorithmic methods in solving problem.
4. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing
5. Compare and contrast the benefits of dynamic and static data structures implementations.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

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Name of the course	**ANALOG & DIGITAL ELECTRONICS**
Course Code: ES-ECS 301	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: Nil	Assignment & Quiz: 10 Marks
Practical: 2 hrs/week	Attendance: 05 Marks
Credit Points: 3	End Semester Exam: 70 Marks

Objective:	
1.	To acquire the basic knowledge of different analog components and their applications
2.	To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
3.	To prepare students to perform the analysis and design of various digital electronic circuits
Pre-Requisite:	
1.	Basic Electronics Parts I & II learned in the First year, semesters 1 & 2. Basic BJTs.
2.	Basic concept of the working of P-N diodes, Schottky diodes
3.	Basic FETs and OPAMP as a basic circuit component. Concept of Feedback

Unit	Content	Hrs	Marks
1	**Different Classes of Amplifiers** - (Class-A, B, AB and C - basic concepts, power, efficiency; Recapitulation of basic concepts of Feedback and Oscillation, Phase Shift, Wein Bridge oscillators, Astable & Monostable Multivibrators; Schimtt Trigger circuits, 555 Timer.	**9**	
2	**Binary Number System & Boolean Algebra** (recapitulation); BCD, ASCII, EBDIC, Gray codes and their conversions; Signed binary number representation with 1's and 2's complement methods, Binary arithmetic, Venn diagram, Boolean algebra (recapitulation); Representation in SOP and POS forms; Minimization of logic expressions by algebraic method. **Combinational circuits** - Adder and Subtractor circuits (half & full adder & subtractor); Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator	**11**	
3	**Sequential Circuits** - Basic Flip-flop & Latch, Flip-flops -SR, JK, D, T and JK Masterslave Flip Flops, Registers (SISO, SIPO, PIPO, PISO) Ring counter, Johnson counter, Basic concept of Synchronous and Asynchronous counters (detail design of circuits excluded), Design of Mod N Counter	**10**	
4	**A/D and D/A conversion techniques** – Basic concepts (D/A :R-2-R only, A/D: successive approximation) **Logic families**- TTL, ECL, MOS and CMOS - basic concepts.	**6**	

Text book and Reference books:

1. Microelectronics Engineering –Sedra & Smith-Oxford.
2. Analog Electronics, A.K. Maini, Khanna Publishing House (AICTE Recommended -2018)
3. Analog Electronics, L.K. Maheswari, Laxmi Publications (AICTE Recommended -2018)
4. Principles of Electronic Devices & circuits, B L Thereja & Sedha—S Chand
5. Digital Electronics – Kharate – Oxford
6. Digital Electronics – Logic & Systems by J.Bigmell & R.Donovan; Cambridge Learning.
7. Digital Logic and State Machine Design (3rd Edition) – D.J.Comer, OUP
8. Electronic Devices & Circuit Theory – Boyelstad & Nashelsky - PHI
9. Bell-Linear IC & OP AMP—Oxford
10. P.Raja- Digital Electronics- Scitech Publications
11. Morries Mano- Digital Logic Design- PHI
12. R.P.Jain—Modern Digital Electronics, 2/e , McGraw Hill
13. H.Taub & D.Shilling, Digital Integrated Electronics- McGraw Hill.
14. D.RayChaudhuri- Digital Circuits-Vol-I & II, 2/e- Platinum Publishers
15. Tocci, Widmer, Moss- Digital Systems,9/e- Pearson
16. J.Bignell & R.Donovan-Digital Electronics-5/e- Cenage Learning.
17. Leach & Malvino—Digital Principles & Application, 5/e, McGraw Hill
18. Floyed & Jain- Digital Fundamentals-Pearson.

Course Outcome:

After completion of this course, the learners will be able to

1. Realize the basic operations of different analog components
2. Realize basic gate operations and laws Boolean algebra.
3. Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

Special Remarks:

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Name of the course	**MATHEMATICS-III**
Course Code: BS-ECS 301	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: 1 hr/week	Assignment & Quiz: 10 Marks
Practical: Nil	Attendance: 05 Marks
Credit Points: 3	End Semester Exam: 70 Marks

Objective:	
1.	To know Convergence of sequence and series
2.	To know Limit, continuity and partial derivatives, Chain rule, Implicit function
3.	To know First Order Differential Equation, Exact, Linear and Bernoulli's equations, Basic Concept of graph, Walk, Path Circuit, Euler and Hamiltonian graph, diagraph
Pre-Requisite:	
1.	Concept Linear Algebra Determinant and its properties (up to third order)
2.	Minor and cofactors, Matrices, addition, multiplication and transpose of a matrix, Symmetric and skew-symmetric

Unit	Content	Hrs	Marks
1	Convergence of sequence and series, tests for convergence, power series, Taylor's series. Series for exponential, trigonometric and logarithmic functions.	**8**	
2	Limit, continuity and partial derivatives, Chain rule, Implicit function, Jacobian, Directional derivatives, Total derivative; Maxima, minima and saddle points; Gradient, curl and divergence and related problems.	**7**	
3	Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar). Theorems of Green, Gauss and Stokes (Statement only) and related problems.	**8**	
4	First Order Differential Equation, Exact, Linear and Bernoulli's equations, Equations of first order but not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's form, general & singular solution. Second order linear differential equations with constant coefficients, D-operator method, method of variation of parameters, Cauchy-Euler equation.	**9**	
5	Basic Concept of graph, Walk, Path Circuit, Euler and Hamiltonian graph, diagraph. Matrix Representation: Incidence & Adjacency matrix. Tree: Basic Concept of tree, Binary tree, Spanning Tree, KrusKal and Prim's algorithm for finding the minimal spanning tree.	**8**	

Text book and Reference books:

1. Higher Algebra, S. K. Mapa, Levant Books.
2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd.
3. Co-ordinate Geometry, S. L. Loney
4. Integral Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd.
5. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd.
6. Advanced Engineering Mathematics, E Kreyszig
7. Advanced Engineering Mathematics, Chandrika Prasad & Reena Garg, Khanna Publishing House (AICTE Recommended Textbook -2018)

Course Outcome:

After completion of this course, the learners will be able to

1. Express a logic sentence in terms of predicates, quantifiers, and logical connectives.
2. Apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
3. Use tree and graph algorithms to solve problems
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

Name of the course	**BIOLOGY FOR ENGINEERS**
Course Code: BS 301	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: Nil	Assignment & Quiz: 10 Marks
Practical: Nil	Attendance: 05 Marks
Credit Points: 3	End Semester Exam: 70 Marks

Objective:	
1.	To introduce modern biology with an emphasis on evolution of biology as a multidisciplinary field.
2.	To make students aware of application of engineering principles in biology and engineering robust solution inspired by biological examples.
Pre-Requisite:	
1.	Nil

Unit	Content	Hrs	Marks
1	Introduction Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry. Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry	**2**	
2	**Classification:** Purpose: To convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted. Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multi cellular (b) ultra structure prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricotelic, ureotelic (e) Habitata- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus.	**3**	

3	**Biomolecules** Purpose: To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine. Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.	**4**	
4	**Macromolecular analysis:** Purpose: To analyze biological processes at the reductionistic level. Proteins-structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.	**5**	
5	**Metabolism** Purpose: The fundamental principles of energy transactions are the same in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergonic reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO_2 + H_2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO_2 and H_2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge	**4**	
6	**Microbiology** Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.	**3**	
7	**Immunology** Purpose: How does the immune system work? What are the molecular and cellular components and pathways that protect an organism from infectious agents or cancer? This comprehensive course answers these questions as it explores the cells and molecules of the immune system. Immunology- Self vs Non-self, pathogens, human immune system, antigen-antibody reactions.	**5**	
8	**Information Transfer** Purpose: The molecular basis of coding and decoding genetic information is universal. Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.	**4**	
9	**Cancer biology** Purpose: A basic understanding of cancer biology and treatment. The course is not designed for patients seeking treatment guidance – but it can help to understand how cancer develops and provides a framework for understanding cancer diagnosis and treatment. Cell Identification of the major types of cancer worldwide. Description of how genes contribute to the risk and growth of cancer. List and description of the	**5**	

	ten cellular hallmarks of cancer. Definition of metastasis, and identification of the major steps in the metastatic process. Description of the role of imaging in the screening, diagnosis, staging, and treatments of cancer. Explanation of how cancer is treated.		
10	**Techniques in bio physics** Purpose: Biophysics is an interdisciplinary science that applies approaches and methods traditionally used in physics to study biological phenomena. The techniques including microscopy, spectroscopy, electrophysiology, single-molecule methods and molecular modeling	**3**	
11	**Stem cell** Purpose: Stem cells and derived products offer great promise for new medical treatments. Learn about stem cell types, current and possible uses, ethical issues.	**2**	

Text book and Reference books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, ―Biology: A global approach‖, Pearson Education Ltd, 2014.
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, ―Outlines of Biochemistry‖, John Wiley and Sons, 2009.
3. D. L. Nelson and M. M. Cox, ―Principles of Biochemistry‖, W.H. Freeman and Company, 2012.
4. G. S. Stent and R. Calendar, ―Molecular Genetics‖, Freeman and company, 1978.
5. L. M. Prescott, J. P. Harley and C. A. Klein, ―Microbiology‖, McGraw Hill Higher Education, 2005.
6. Lewis J. Kleinsmith. ―Principles of cancer biology‖, Pearson, 2016

Course Outcome:

After completion of this course, the learners will be able to

1. Describe with examples the biological observations lead to major discoveries.
2. Explain
   - the classification of kingdom of life
   - the building blocks of life
   - different techniques of bio physics used to study biological phenomena
   - the role of imaging in the screening, diagnosis, staging, and treatments of cancer.
3. Identify DNA as a genetic material in the molecular basis of information transfer
4. Analyze biological processes at the reductionistic level.
5. Apply thermodynamic principles to biological systems.
6. Identify microorganisms.

Special Remarks:

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Name of the course	**ECONOMICS FOR ENGINEERS**
Course Code: HM 301	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: Nil	Assignment & Quiz: 10 Marks
Practical: Nil	Attendance: 05 Marks
Credit Points: 3	End Semester Exam: 70 Marks

Objective:	
1.	Understand the role and scope of Engineering Economics and the process of economic decision making
2.	Understand the different concepts of cost and different cost estimation techniques
3.	Familiarization with the concepts of cash flow, time value of money and different interest formulas
4.	Appreciation of the role of uncertainty in future events and using different concepts from probability to deal with uncertainty
5.	Understand the concepts of Depreciation and Replacement analysis along with their methods of calculation
6.	Familiarization with the phenomenon of inflation and the use of price indices in engineering Economics
7.	Introduction to basic concepts of Accounting and Financial Management
Pre-Requisite:	
1.	Mathematics

Unit	Content	Hrs	Marks
1	**Economic Decisions Making** – Overview, Problems, Role, Decision making process. **Engineering Costs & Estimation** – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models – Per Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.	**9**	
2	**Cash Flow**, Interest and Equivalence: Cash Flow – Diagrams, Categories & Computation, Time Value of Money, Debt repayment, Nominal & Effective Interest. **Cash Flow & Rate of Return Analysis** – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing an Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity and Breakeven Analysis. Economic Analysis In The Public	**9**	

	Sector -Quantifying And Valuing Benefits & drawbacks.		
3	**Inflation and Price Change** – Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates. **Present Worth Analysis:** End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives. **Uncertainty In Future Events** - Estimates and Their Use in Economic Analysis, Range of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options.	**9**	
4	**Depreciation** - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements of Tax Regulations For Depreciation And Capital Allowances. **Replacement Analysis** - Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems. **Accounting –** Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.	**9**	

Text book and Reference books:

1. James L.Riggs, David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle: Engineering Economics Analysis, OUP
3. John A. White, Kenneth E. Case, David B. Pratt: Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R. Paneer Seelvan: Engineering Economics, PHI
6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pub
7. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House
(AICTE Recommended Textbook – 2018)

Course Outcome:

After completion of this course, the learners will be able to

1. Make different economic decisions and estimate engineering costs by applying different cost estimation models.
2. Create cash flow diagrams for different situations and use different interest formulae to solve associated problems.

3. Take decisions regarding different engineering projects by using various criteria like rate of return analysis, present worth analysis, cost-benefit analysis etc.
4. Incorporate the effect of uncertainty in economic analysis by using various concepts like expected value, estimates and simulation.
5. Understand the concepts of depreciation and replacement analysis and solve associated problems.
6. Understand the process of inflation and use different price indices to adjust for its effect.
7. Apply the various concepts of Accounting like balance sheet and ratio analysis.
8. Understand the scope of Finance and the role of financial planning and management.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

Name of the course	**Electric circuit theory Laboratory**
Course Code: PC-ECS 391	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: Nil	Continuous Internal Assessment:40
Tutorial: Nil	External Assessment: 60
Practical: 2 hrs/week	
Credit Points: 1	

	Laboratory Experiments:
1	Transient response of R-L and R-C network: simulation with software & hardware
2	Transient response of R-L-C series and parallel circuit: simulation with software & hardware
3	Determination of Impedance (Z) and Admittance (Y) parameter of two-port network: simulation & hardware.
4	Frequency response of LP and HP filters: simulation & hardware.
5	Frequency response of BP and BR filters: simulation & hardware
6	Generation of Periodic, Exponential, Sinusoidal, Damped Sinusoidal, Step, Impulse, Ramp signal using MATLAB in both discrete and analog form.
7	Determination of Laplace transform and Inverse Laplace transform using MATLAB.
8	Amplitude and Phase spectrum analysis of different signals using MATLAB.
9	Verification of Network theorems using software & hardware

Course Outcome:

After completion of this course, the learners will be able to

1. Determine
    - transient response of different electrical circuit
    - parameters of two port network
    - frequency response of filters.
    - Laplace transform and inverse Laplace transform
2. Generate different signals in both discrete and analog form
3. Analyze amplitude and phase spectrum of different signals.
4. Verify network theorems.
5. Construct circuits with appropriate instruments and safety precautions.
6. Simulate electrical circuit experiments using suitable software.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

Name of the course	**Data Structure & Algorithm Laboratory**
Course Code: PC-ECS 392	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: Nil	Continuous Internal Assessment:40
Tutorial: Nil	External Assessment: 60
Practical: 2 hrs/week	
Credit Points: 1	

	Laboratory Experiments:
1	**Linear Data Structure** 1 Implementation of array operations 2 Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements 3 Merging Problem: Evaluation of expressions operations on Multiple stacks & queues: 4 Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists 5 Polynomial addition, Polynomial multiplication
2	**Non Linear Data Structure** 6 Recursive and Non-recursive traversal of Trees 7 Threaded binary tree traversal. AVL tree implementation 8 Application of Trees. Application of sorting and searching algorithms 9 Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

Course Outcome:

After completion of this course, the learners will be able to

1. Differentiate how the choices of data structure & algorithm methods impact the performance of program.
2. Solve problems based upon different data structure & also write programs.
3. Identify appropriate data structure & algorithmic methods in solving problem.
4. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing
5. Compare and contrast the benefits of dynamic and static data structures implementations.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

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(Formerly West Bengal University of Technology)
Syllabus for B. Tech Electrical and Computer Engineering
(Applicable from the academic session 2025-2026)

Name of the course	**IT Workshop (Python & MATLAB)**
Course Code: PC-ECS 393	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 1 hr/week	Continuous Internal Assessment:40
Tutorial: Nil	External Assessment: 60
Practical: 2 hrs/week	
Credit Points: 1	

Laboratory Experiments:	
Python	
1	Introduction History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator
2	Conditional Statements If, If- else, Nested if-else, Looping, For, While, Nested loops
3	Control Statements Break, Continue, Pass
4	String Manipulation Accessing Strings, Basic Operations, String slices, Function and Methods
5	Lists Introduction, Accessing list, Operations, Working with lists, Function and Methods
6	Tuple Introduction, Accessing tuples, Operations, Working, Functions and Methods
7	Dictionaries Introduction, Accessing values in dictionaries, Working with dictionaries, Properties
8	Functions Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables
9	Modules Importing module, Math module, Random module, Packages, Composition, Input-Output Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions
10	Exception Handling Exception, Exception Handling, Except clause, Try? Finally clause, User Defined Exceptions.
MATLAB	
1	Programming in MATLAB Introduction Why MATLAB?
2	Starting MATLAB, Using MATLAB as a calculator, Quitting MATLAB Basics Familiar with MATLAB windows, Basic Operations, MATLAB-Data types, Rules about variable names, Predefined variables
3	Programming-I Vector, Matrix, Array Addressing, Built-in functions, Mathematical Operations, Dealing with strings (Array of characters), Array of array (cell) concept
4	Programming-II Script file, Input commands, Output commands, Structure of function file, Inline functions, Feval command, Comparison between script file and function file
5	Conditional statements and Loop Relational and Logical Operators, If-else statements, Switch-case statements,
6	For loop, While loop, Special commands (Break and continue),
7	Import data from large database, Export data to own file or database 2D Plotting In-built functions for plotting, Multiple plotting with special graphics, Curve fitting,

	Interpolation, Basic fitting interface 3D Plotting Use of mesh grid function, Mesh plot, Surface plot, Plots with special graphics

Course Outcome:

After completion of this course, the learners will be able to

7. To master an understanding of scripting & the contributions of scripting languages
8. Design real life problems and think creatively about solutions
9. Apply a solution in a program using Matlab/Python.
10. To be exposed to advanced applications of mathematics, engineering and natural sciences to program real life problems.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.

Name of the course	**Analog & Digital Electronics Laboratory**
Course Code: ES-ECS 391	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: Nil	Continuous Internal Assessment:40
Tutorial: Nil	External Assessment: 60
Practical: 2 hrs/week	
Credit Points: 1	

Laboratory Experiments:	
Analog Electronics	
1	Design a Class A amplifier
2	Design a Phase-Shift Oscillator
3	Design of a Schmitt Trigger using 555 timer
Digital Electronics	
4	Design a Full Adder using basic gates and verify its output / Design a Full Subtractor circuit using basic gates and verify its output.
5	Construction of simple Decoder & Multiplexer circuits using logic gates.
6	Realization of RS / JK / D flip flops using logic gates
7	Design of Shift Register using J-K / D Flip Flop
8	Realization of Synchronous Up/Down counter
9	Design of MOD- N Counter
10	Study of DAC

Course Outcome:

After completion of this course, the learners will be able to

1. Realize the basic operations of different analog components
2. Realize basic gate operations and laws Boolean algebra.
3. Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

Special Remarks:

The above mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.