R19

COURSE STRUCTURE AND SYLLABUS

For

B.Tech

ELECTRICAL AND ELECTRONICS ENGINEERING

(*Applicable for batches admitted from 2019-20*)

PRAGATI ENGINEERING COLLEGE

(AUTONOMOUS)

Permanently Affiliated to JNTUK, Kakinada, Accredited by NAAC with "A" Grade
Recognized by UGC 2(f) and 12(b) under UGC act, 1956
1-378, ADB Road, Surampalem – 533 437
Near Peddapuram, E.G.Dist, Andhra Pradesh

PRAGATI ENGINEERING COLLEGE : SURAMPALEM
(Autonomous)
ELECTRICAL AND ELECTRONICS ENGINEERING

Semester – 0
3 weeks Induction Program to be conducted at the beginning of First year

Zero Semester

Induction program (mandatory)	**3 weeks duration**
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch and Innovations

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days. We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.2 The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

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I Year – I Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Humanities and Social Sciences	19HE1T01	Professional Communicative English	3	--	--	3
2	Basic Sciences	19BM1T01	Linear Algebra and Differential Equations	3	--	--	3
3	Basic Sciences	19BM1T02	Numerical Methods and Multivariable Calculus	3	--	--	3
4	Basic Sciences	19BC1T02	Applied Chemistry	3	--	--	3
5	Engineering Sciences	19CS1T01	Programming for Problem Solving using C	3	--	--	3
6	Basic Sciences	19BC1L02	Applied Chemistry Laboratory	--	--	3	1.5
7	Humanities and Social Sciences	19HE1L01	Professional Communicative English Laboratory- I	--	--	3	1.5
8	Engineering Sciences	19CS1L01	Programming for Problem Solving using C Laboratory	--	--	3	1.5
9	Mandatory Courses	19HM1T07	Professional Ethics and Human Values	2	--	--	0
Total Credits							**19.5**

I Year – II Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Basic Sciences	19BM2T03	Integral Transforms and Vector Calculus	3	--	--	3
2	Basic Sciences	19BP2T02	Applied Physics	3	--	--	3
3	Engineering Sciences	19EE2T03	Electrical Circuit Analysis-I	3	--	--	3
4	Engineering Sciences	19CS2T02	Fundamentals of Computer Science	3	--	--	3
5	Engineering Sciences	19EC2T03	Basic Electronic Devices and Circuits	3	--	--	3
6	Engineering Sciences	19ME2T01	Engineering Drawing	1	--	3	2.5
7	Humanities and Social Sciences	19HE2L02	Professional Communicative English Laboratory- II	--	--	3	1.5
8	Basic Sciences	19BP2L02	Applied Physics Laboratory	--	--	3	1.5
9	Mandatory Courses	19HM2T05	Constitution of India	2	--	--	0
Total Credits							**20.5**

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I Year I Semester

PROFESSIONAL COMMUNICATIVE ENGLISH

Course Category	Humanities and Social Sciences	**Course Code**	**19HE1T01**
Course Type	Theory	**L-T-P-C**	3 – 0 – 0 – 3
Prerequisites	LSRW + Vocabulary Synonyms, antonyms, Grammar.	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts. To develop extensive reading skill and comprehension for pleasure and profit.
2	The lesson centres on the pros and cons of the development of science and technology. To develop extensive reading skill and comprehension for pleasure and profit.
3	Depicts of the symptoms of Cultural Shock and the aftermath consequences. To develop extensive reading skill and comprehension for pleasure and profit.
4	Portrays the ways of living life in its true sense. To develop extensive reading skill and comprehension for pleasure and profit.
5	Supports the developments of technology for the betterment of human life. To develop extensive reading skill and comprehension for pleasure and profit.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Emphasizes that the ultimate aim of education is to enhance wisdom and inspires the readers to serve their nation with their self-enrichment.
CO2	Enables the learners to promote peaceful co-existence and universal harmony in the society and empowers the learners to have initiation in innovation.
CO3	Imparts the students to manage different cultural shock due to globalization and to develop multiculturalism to appreciate diverse cultures and also motivates the learners to contribute to their nation.
CO4	Arouse the thought of life to lead in a well path by recognizing the importance of work besides enhancing their LSRW skills.
CO5	Inspires the learners at the advancement of software by the eminent personalities and motivates the readers to think and tap their innate talents.

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Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	-	-	-	-	2	1	-	-	1	-	3	-	-
CO2	2	1	-	-	-	1	3	1	-	1	-	1	-	-
CO3	-	-	-	-	-	1	2	-	-	1	-	-	-	-
CO4	-	-	-	-	-	1	-	1	2	-	-	-	-	-
CO5	-	-	1	2	1	-	-	-	-	1	-	-	-	-

COURSE CONTENT	
UNIT I	1. ‘The Greatest Resource- Education' from Professional Communicative English. 2. 'War' from ‘Panorama: A Course on Reading'
UNIT II	1. ' A Dilemma' from Professional Communicative English. 2. 'The Verger' from ‘Panorama: A Course on Reading'
UNIT III	1. 'Cultural Shock': Adjustments to new Cultural Environments from Professional Communicative English. 2. ' The Scarecrow' from Panorama: A Course on Reading
UNIT IV	1. ‘The Secret of Work’ from Professional Communicative English. 2. 'A Village Lost to the Nation' from Panorama: A Course on Reading
UNIT V	1. ' The Chief Software Architect' from Professional Communicative English. 2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

TEXT BOOKS	
1.	PROFESSIONAL COMMUNICATIVE ENGLISH. Published by Maruthi Publishers.
2.	PANORAMA: A COURSE ON READING, Published by Oxford University Press India
REFERENCE BOOKS	
1.	ENGLISH GRAMMAR AND COMPOSITION – WREN & MARTIN
2.	LEARNER’S ENGLISH GRAMMAR AND COMPOSITION – N.D.V. Prasada Rao
WEB RESOURCES	
1.	**Online Dictionaries:** https://dictionary.cambridge.org/ https://www.oxfordlearnersdictionaries.com/
2.	**Grammar:** https://www.oxfordlearnersdictionaries.com/grammar/ https://dictionary.cambridge.org/grammar/british-grammar/
3.	**Synonyms and Antonyms:** https://www.thesaurus.com/browse/search https://www.englishclub.com/vocabulary/synonyms-antonyms.htm

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I Year I Semester

LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Course Category	Basic Sciences	**Course Code**	**19BM1T01**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Basics of matrices, Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	solve systems of linear equations, determine the rank, find the eigen values and eigenvectors, diagonalization of a matrix.	K3
CO2	identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics.	K2
CO3	solve first order differential equations and its applications	K3
CO4	solve the linear differential equations with constant coefficients by appropriate method	K3
CO5	find partial derivatives of multivariable functions and apply them to find extreme values of a function.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

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COURSE CONTENT	
UNIT I	**Solving system of linear equations, Eigen Values and Eigen vectors** Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss elimination method for solving system of equations – Eigenvalues and Eigen vectors and their properties.
UNIT II	**Cayley-Hamilton Theorem and Quadratic forms** Cayley-Hamilton theorem (without proof) – Finding inverse and powers of a matrix by Cayley-Hamilton theorem – Reduction to diagonal form-Quadratic forms-nature of the quadratic form - reduction of quadratic form to canonical form by orthogonal transformation.
UNIT III	**Differential equations of first order and first degree** Linear – Bernoulli – Exact – Reducible to exact. **Applications:** Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories.
UNIT IV	**Linear differential equations of higher order** Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x^n, $e^{ax}V(x)$, $x^mV(x)$ - Method of Variation of parameters.
UNIT V	**Partial differentiation** Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized Mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series expansion of functions of two variables – Jacobian – Functional dependence. **Applications:** Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

TEXT BOOKS	
1.	**B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
WEB RESOURCES	
1.	**UNIT I: Solving system of linear equations, Eigen Values and Eigen vectors** https://en.wikipedia.org/wiki/System_of_linear_equations https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
2.	**UNIT II: Cayley-Hamilton Theorem and Quadratic forms** https://www.math.hmc.edu/calculus/tutorials/eigenstuff/ https://en.wikipedia.org/wiki/Quadratic_form
3.	**UNIT III: Differential equations of first order and first degree** https://en.wikipedia.org/wiki/Differential_equation http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode https://www.khanacademy.org/math/differential-equations/first-order-differential-equations
4.	**UNIT IV: Linear differential equations of higher order** https://en.wikipedia.org/wiki/Differential_equation http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode https://nptel.ac.in/courses/122107037/20
5.	**UNIT V: Partial Differentiation** https://en.wikipedia.org/wiki/Partial_derivative https://www.whitman.edu/mathematics/calculus_online/section14.03.html

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ELECTRICAL AND ELECTRONICS ENGINEERING

I Year I Semester

NUMERICAL METHODS AND MULTI-VARIABLE CALCULUS

Course Category	Basic Sciences	**Course Code**	**19BM1T02**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	apply Newton, Gauss and Lagrange interpolation formulae to find interpolating polynomials for the given data.	K3
CO2	find the approximate roots of transcendental equations by using different numerical methods	K2
CO3	solve initial value problems by using different numerical schemes	K3
CO4	find areas and volumes using double and triple integrals	K2
CO5	apply a range of techniques to find solutions of standard PDEs	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

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COURSE CONTENT	
UNIT I	**Interpolation** Introduction– Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences –Central differences –properties – Differences of a polynomial- Newton's formulae for interpolation –Gauss formulae for interpolation- Interpolation with unequal intervals – Lagrange's interpolation formula.
UNIT II	**Solution of Algebraic and Transcendental Equations** Introduction- Bisection method – Method of false position – Secant method- Iteration method – Newton-Raphson method (One variable).
UNIT III	**Numerical Integration and solution of Ordinary Differential equations** Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).
UNIT IV	**Multiple integrals** Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration. **Applications:** Finding Areas and Volumes.
UNIT V	**Partial Differential Equations** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

TEXT BOOKS	
1.	**B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6.	**T. Amarnath,** An Elementary Course in Partial Differential Equations, Narosa Publications
WEB RESOURCES	
1.	**UNIT I: Interpolation** https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation
2.	**UNIT II: Solution of Algebraic and Transcendental Equations** https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving https://www.slideshare.net/100005232690054/algebraic-and-transcendental-equations
3.	**UNIT III: Numerical Integration and solution of Ordinary Differential Equations** https://nptel.ac.in/courses/111107063/
4.	**UNIT III: Multiple Integrals** https://en.wikipedia.org/wiki/Multiple_integral http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx
5.	UNIT V: **Partial Differential Equations** https://en.wikipedia.org/wiki/Partial_differential_equation

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I Year I Semester

APPLIED CHEMISTRY

Course Category	Basic Sciences	Course Code	**19BC1T02**
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Intermediate Chemistry	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES	
1	To learn about Electrochemical cells, Batteries and Fuel cells
2	To know about spinels, magnetic materials and semi conductors
3	To study about Nano materials, their preparation, characterization, applications and also about principles of green chemistry and green engineering applications
4	To know about Polymers, plastics and Elastomers
5	To learn about non conventional energy sources and also Spectroscopic techniques

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	To compare different types of batteries and explain the merits of fuel cell.	K1
CO2	Discuss the use and importance of semiconductors, magnetic materials and spinels.	K4
CO3	To explain the Green methods of Synthesis and applications of Green technologies.	K3
CO4	Analyze the importance of polymers in engineering applications.	K4
CO5	List out various sources of non conventional energy**.**	K5

	PO1	**PO2**	**PO3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	2	2	2		2				2		1	
CO2	2	2	1			1	1				1			
CO3	1	1		1	2							1		
CO4	2	2		1			1					1		
CO5	**1**	1	1				1				2	1	1	

COURSE CONTENT	
UNIT I	**ELECTROCHEMICAL ENERGY SYSTEMS 9hrs** Electrode Potential, Nernst Equation for a single electrode, EMF of the cell, Electro chemical

	Series and uses, Types of Electrodes - Hydrogen and Calomel electrode, Electrochemical Cell, Galvanic Cell vs Electrolytic Cell, Types of Ion Selective Electrodes- glass membrane electrode **Batteries**- Characteristics, classification and Important applications. Classical batteries- Dry/Lechlanche cell, Modern batteries- Zinc air, Lithium cells-Li MnO_2 cell. **Fuel cells**- Introduction, H_2-O_2 fuel cell. **Learning outcomes:** After the completion of the Unit I, the student will be able to • **Explain** the significance of electrode potentials.**(L-2)** • **Compare** different types of cells and batteries. **(L-2)** • **Classify** ion selective electrodes. (**L-2**) • **Explain** the concepts involved in the construction of lithium cells. **(L-2)** • **Apply** redox principles for construction of batteries and fuel cells. (**L-3)**
UNIT II	**SOLID STATE CHEMISTRY** Solids – Crystalline and amorphous solids- 2D and 3D close packing of atoms and ions - spinels - normal and inverse spinels, semi conductor – Elemental semi conducting materials - Non-elemental semiconducting Materials:- Stoichiometric, non stoichiometric controlled valency & Chalcogen semiconductors, Preparation of Semiconductors by Zone refining and Czocharlski crystal pulling method. Semiconducting Devices - p-n junction diode as rectifier and junction transistor. Electrical Insulators and Applications of solid, liquid and gaseous insulators. Magnetic materials- Ferro and ferri magnetism. Hall effect and its applications. **Learning Outcomes:** After the completion of the Unit II, the student will be able to • Explain 2D and 3D close packing of crystals (**L-3**) • identify different types of spinels. (**L-3**) • describe the mechanism of photo copying. (**L-2**) • explain the applications of electrical insulators. (**L-3**)
UNIT III	**NANOMATERIALS AND GREEN CHEMISTRY** **7+5 hrs** **III-A: Nano Materials:** Introduction to Nano materials, Preparation of Carbon Nano Tubes(CNTs) by Laser Ablation and Chemical Vapor Deposition Methods, Fullerenes - Preparation, Properties and Applications; Chemical synthesis of nano materials : Sol-gel method, Characterization of nano mateirals by BET & TEM (basic principles), Applications of nano materials in waste water treatment, lubricants, Medicine and sensors. **III-B: Green Chemistry:** Introduction-Principles of green chemistry, Green synthesis Methods- Phase Transfer Catalysis (PTC), Super critical fluid extraction method, Green engineering applications in environmental and power quality monitoring. **Learning outcomes:** After the completion of the Unit III, the students will be able to • **explain** the basic principles of green chemistry. **(L-3)** • **identify** different preparation methods of CNTs**. (L-3)** • **discuss** the applications in green engineering. **(L-2)**
UNIT IV	**POLYMER CHEMISTRY** **10hrs** **Polymers**: Introduction-Methods of Polymerization (Emulsion and Suspension), Conducting polymers – Mechanism of conduction in poly acetylene – applications, Bio – degradable

	polymers. **Plastics**: Thermoplastics and thermo setting resins; Preparation, properties and applications of Polystyrene and Bakelite. **Elastomers**: Natural Rubber, Vulcanization of rubber; Synthetic Rubbers -Preparation, properties and applications of Buna-S and Thiokol. **Learning Outcomes:** ***At the end of this unit, the students will be able to*** ● **explain** different types of polymerisation mechanisms (**L-2**) ● **distinguish** between thermoplastic and thermo setting resigns **(L-4)** ● **explain** the preparation, properties and applications of Bakelite and polystyrene (**L-2**) ● **describe** the mechanism of conduction in conducting polymers (**L-2**) ● **discuss** Buna-S and Thiokol elastomers and their applications (**L-2**)
UNIT V	**Non Conventional Energy Sources & Spectroscopic Techniques 9 hrs** Non Conventional Energy Sources : Introduction-Photo voltaic cell & Organic Photo voltaic cell - Design, Principle, advantages and disadvantages; Hydropower-Geo thermal Power - Tidal Power-Ocean thermal Energy Conversion. Spectroscopic Techniques: Electro Magnetic Spectrum- Introduction, Principles of UV and IR Spectroscopic techniques and their applications. **Learning outcomes** After the completion of the Unit V, the student will be able to • **list** different non conventional energy sources. (**L-1)** • **explain** the basic principle involved in the working of power plants. (**L-2)** • **compare** Spectroscopic techniques and their importance . **(L-2)**

TEXT BOOKS	
1.	P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2	Engineering Chemistry by Shikha Agarwal: Cambridge University Press,2019 edition
REFERENCE BOOKS	
1.	Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
2.	B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
3.	S.S. Dara, A Textbook of Engineering Chemistry, S.Chand & Co, (2010)
WEB RESOURCES	
1.	Electrochemical Energy Systems https://en.wikipedia.org/wiki/Electrochemical_cell
2.	Solid state chemistry https://en.wikipedia.org/wiki/Solid-state_chemistry www.engineeringenotes.com › Engineering › Electronics › Semiconductors
3.	Nanomaterials and Green Chemistry https://en.wikipedia.org/wiki/Green_chemistry https://www.acs.org/.../greenchemistry/principles
4.	Polymer Chemistry https://en.wikipedia.org/wiki/Polymer_chemistry
5.	Non Conventional Energy Sources & Spectroscopic Techniques

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	https://en.wikipedia.org/wiki/Geothermal_power; https://en.wikipedia.org/wiki/Ocean_thermal_energy_conversion www.rsc.org/learn-chemistry/collections/spectroscopy/introduction

I Year I Semester

PROGRAMMING FOR PROBLEM SOLVING USING C

Course Category	Engineering Science	**Course Code**	**19CS1T01**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To impart adequate knowledge on the need of programming languages and problem solving techniques.
2	To develop programming skills using the fundamentals of C Language.
3	To enable effective usage of arrays, structures, functions, pointers and dynamic memory allocation.
4	To make use of file handling functions in programming.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Apply the fundamentals of C Programming for Problem solving.	K3
CO2	Identify the appropriate Decision statement and Loops for a given Problem.	K2
CO3	Make use of Arrays and Strings to solve the problems in C.	K3
CO4	Apply the concepts of Functions and Pointers in Problem solving.	K3
CO5	Develop solutions for problems using Structures, Unions and Files.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	1	0	0	0	0	0	0	0	1	1	0
CO2	3	3	3	3	1	0	0	0	0	0	0	0	1	1	0
CO3	3	3	3	2	1	0	0	0	0	0	0	0	2	1	0

CO4	2	3	3	3	1	0	0	0	0	0	0	0	2	2	0
CO5	3	3	3	3	1	0	0	0	0	0	0	0	2	2	0

COURSE CONTENT	
UNIT I	**Introduction to Programming**–Introduction to Computer Software, Classification of Computer Software, Representation of Data – Bits and Bytes, Programming Languages – High and Low Level Languages, Generation of Programming Languages, Program Design Tools: Algorithms, Flowcharts, Pseudocode, Types of Errors, Testing & Debugging Approaches. **Introduction to C –** Structure of a C Program, Writing the First C Program, Header Files used in C Program, Compiling and Executing C Programs.
UNIT II	**Tokens in C:** Basic Data Types in C – Keywords, Identifiers, Variables, Constants, Input / Output statements in C, Operators in C, Precedence and Associativity Rules, Type Casting Types. **Decision Control**: Decision Control Statements: Conditional Branching Statements - if, if – else, nested if, if – else – if, and Switch – Case. **Basic Loop Structures**: Iterative Statements - for, while and do - while, Nested Loops, The 'Break', 'Continue', and 'goto' statements.
UNIT III	**Arrays:** Declaration and Initialization of Arrays, Accessing & Storing the elements of an Array, Operations on Arrays: Traversing, Inserting, Deleting, Searching, Two Dimensional Arrays: Declaring, Initializing, Accessing, Operations on Two Dimensional Arrays (Matrices), Applications of Arrays. **Strings:** String Fundamentals, String Input and Output, String Library Functions
UNIT IV	**Functions:** Function Declaration / Function Prototypes, Function Definition, Function Call (Call by Value), Passing Parameters to Functions, Return Statement, Storage Classes, Recursive Functions, Arrays as Function Arguments. **Pointers**: Declaring Pointer Variables, Pointer Arithmetic, Passing Arguments to Function using Pointers (Call by Reference), Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation – Malloc, Calloc, Realloc, Free.
UNIT V	**Structures**: Introduction to Structures, Nested Structures, Array of Structures. **Unions:** Introduction, Array of Union Variables, Union inside Structure, Enumerated Data Types, Bit Fields. **Files**: Declaring, Opening, and Closing File, Reading from and Writing to Text Files.

TEXT BOOKS	
1.	Programming in C, Reema Thareja, 2nd Edition, Oxford University Press.
2.	The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education
REFERENCE BOOKS	
1.	Programming in C – Ashok N.Kamthane, Amit Ashok Kamthane, 3rd Edition, Pearson.
2.	C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
3.	Programming in C (A Practical Approach) – Ajay Mittal, First Edition, Pearson.
WEB RESOURCES	
1.	http://nptel.ac.in/courses/106104128/
2.	http://students.iitk.ac.in/programmingclub/course/#notes
3.	http://c-faq.com/~scs/cclass/cclass.html

4.	http://www.youtube.com/watch?v=b00HsZvg-V0&feature=relmfu
5.	http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/

I Year I Semester

APPLIED CHEMISTRY LABORATORY

Course Category	Basic Science	**Course Code**	**19BC1L02**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	Basic Chemistry	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Students will learn to estimate the given amount of dissolved compounds in water by using volumetric analysis and preparation of polymers and nano particles	K3
CO2	Students will be able to learn compelxometric titrations to determine the concentration of different metal ions present in water and determine the % moisture in a coal sample.	K3
CO3	Students will be able to identify the accurate value of conductivity of given solutions. and to estimate the viscosity and surface tension of given solutions.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0
CO2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0
CO3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0

COURSE CONTENT(Any 10 of the following listed 14 experiments)	
1.	Estimation of HCl using standard Na_2CO_3 solutions

2.	Determination of alkalinity of a sample containing Na_2CO_3 and NaOH
3.	Estimation of $KMnO_4$ using standard Oxalic acid solution.
4.	Estimation of Ferrous iron using standard $K_2Cr_2O_7$ solution
5.	Determination of Temporary and permanent Hardness water using standard EDTA solution.
6.	Determination of % moisture content in a coal sample.
7.	Determination of Mg^{2+} present in an antacid
8.	Conductometric Titrations between strong acid and strong base
9.	Conductometric Titrations between strong acid and weak base
10.	Estimation of Vitamin – C
11.	Preparation of Phenol - Formaldehyde Resin
12.	Determination of viscosity of a liquid
13.	Determination of surface tension of a liquid
14.	Preparation of Nano particles.(Cu/Zn)

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I Year I Semester

PROFESSIONAL COMMUNICATIVE ENGLISH LABORATORY – I

Course Category	Humanities and Social Sciences	**Course Code**	**19HE1L01**
Course Type	Theory	**L-T-P-C**	0 – 0 – 3 – 1.5
Prerequisites	LSRW + Vocabulary Synonyms, antonyms, Grammar.	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

CO	Course Outcomes Description	COGNITIVE LEVEL
CO1	Interpret and responding appropriately in various day to day contexts and will be able to use speech sounds effectively.	K2
CO2	Apply stress, intonation and pronunciation in conversations and learn formal communicative expressions.	K3
CO3	Attain the collection of dialogues and acclimate them to their real life situations with proper intonation.	K2

K1- Remembering, K2- Understanding, K3-Applying, K-4 Analyzing, K5- Evaluating, K6- Creating

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-

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PRESCRIBED LAB MANUAL FOR SEMESTER I:

'**STRENGTHEN YOUR STEPS**: A Multimodal Course in Communication Skills' Published by Maruthi Publications.

Objectives:
To enable the students to learn the communication skills; listening, speaking, reading and writing.
Outcome:
The course enables the learner to acquire communication skills which will help the students to become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:
Hello, I'm ……
Consonant Sounds

UNIT 2:
I would love to …. But,
Vowel Sounds

UNIT 3:
With your Permission, I would like to
Syllable and Accent

UNIT 4:
Why don't we……

Pronunciation and Rhythm

UNIT 5:
Could you please ……

Tones

UNIT-6: Dialogues

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I Year I Semester

PROGRAMMING FOR PROBLEM SOLVING USING C LABORATORY

Course Category	Engineering Science	**Course Code**	**19CS1L01**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To learn various steps in program development using Raptor.
2	To write C programs using basic concepts in C like operators, control statements etc.,
3	To design modular, reusable and readable C programs using concepts like Arrays, Functions and Pointers.
4	To write programs using Structures and Unions.
5.	To write programs to perform file operations.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Translate given algorithms to a working programs.	K2
CO2	Design programs using Pointers to access Arrays, Strings and Functions.	K3
CO3	Develop programs using Structures, Unions and File operations.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	2	0	0	0	0	0	0	0	2	2	1
CO2	3	3	3	3	2	0	0	0	0	0	0	0	2	2	1
CO3	3	3	3	3	2	0	0	0	0	0	0	0	2	2	1

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<table>
<tr><th colspan="2">COURSE CONTENT</th></tr>
<tr><td>1.</td><td>Construct flowcharts using Raptor Tool to
a) calculate the maximum, minimum and average of three numbers
b) calculate area of a triangle given three sides using Heron’s formula.</td></tr>
<tr><td>2.</td><td>Construct flowcharts using Raptor Tool to
a) calculate simple interest for various parameters specified by the user.
b) swapping of two numbers with and without using the third variable.</td></tr>
<tr><td>3.</td><td>Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers.</td></tr>
<tr><td>4.</td><td>Write a C Program to find the Grade of a student by taking input of percentage using all Relational Operators (>, >=, <, <=, ==, !=)
<table>
<tr><th>Theory (%)</th><th>Letter Grade</th><th>Level</th></tr>
<tr><td>≥ 90</td><td>O</td><td>Outstanding</td></tr>
<tr><td>≥ 80 to < 90</td><td>S</td><td>Excellent</td></tr>
<tr><td>≥ 70 to < 80</td><td>A</td><td>Very Good</td></tr>
<tr><td>≥ 60 to < 70</td><td>B</td><td>Good</td></tr>
<tr><td>≥ 50 to < 60</td><td>C</td><td>Fair</td></tr>
<tr><td>≥ 40 to < 50</td><td>D</td><td>Satisfactory</td></tr>
<tr><td><40</td><td>F</td><td>Fail</td></tr>
</table></td></tr>
<tr><td>5.</td><td>Write a C Program to swap two given input numbers
a) With using a temporary variable. b) Without using a temporary variable.</td></tr>
<tr><td>6.</td><td>Write a C Program to implement arithmetic operations using two operands and one operator using
a) if – else – if condition. b) Switch – Case statement.</td></tr>
<tr><td>7.</td><td>Write a C Program to print the following patterns
a) Floyd’s Triangle. b) Pascal Triangle.</td></tr>
<tr><td>8.</td><td>Write a C Program
a) To find the sum of its individual digits for a given positive number.
b) To check whether the given number is Prime or not.</td></tr>
<tr><td>9.</td><td>Write a C Program
a) To check whether the given number is a Palindrome or not.</td></tr>
</table>

	b) To check whether the given number is an Armstrong or not
10.	Write a C Program using Functions to find both the largest and smallest number in an given array numbers.
11.	Write C programs to perform swapping of two numbers by passing a value and reference.
12.	Write a C Program for two Matrices by checking the compatibility a) Addition. b) Multiplication.
13.	Write a C program on Strings to implement the following operations without string handling functions a) Concatenation of two given input strings. b)Length of a string. c) Reverse of a given string.
14.	Write C programs that use both recursive and non-recursive functions for the following i) To find the factorial of a given integer. ii) To find the GCD (greatest common divisor) of two given integers. iii) To find Fibonacci sequence
15.	Write a C program using Pointers to work on a) Matrix Addition. b) Transpose of a Matrix.
16.	Write a C program to read and print the details of an Employee (Name, Date of the Birth, Designation, Salary) using Structures.
17.	Write a C program a) to read and print the student details (Name, Register number, Address, Intermediate %) using Union. b) to display the name of the colour using Enum data type
18.	Write a C Program to a) Copy one file to another. b)Count the number of characters, words and lines in a file.

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I Year I Semester

PROFESSIONAL ETHICS AND HUMAN VALUES

Course Category	Mandatory Courses	**Course Code**	19HM1T07
Course Type	Theory	**L-T-P-C**	2 -0 -0 - 0
Prerequisites		**Total Marks (Internal Assessment)**	100

Course Outcomes		**Blooms Taxonomy Level**	
On successful completion of the course, the student will be able to			
CO 1	Understand different concepts in Professional Ethics and Human Values.	Understanding	K1
CO 2	Apply ethical principles to resolve the problems that arise in work place.	Applying	K3
CO 3	Make use of Engineers rights to fulfill their responsibilities.	Applying	K3
CO 4	Understand the responsibility of an engineer in designing safety.	Understanding	K2
CO 5	Analyze the social media accounts in order to create and maintain a positive digital footprint.	Analyzing	K4

Contribution of Course Outcomes towards achievement of Program												
Outcomes: 1 – Low, 2 - Medium, 3 – High												
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	0	0	2	0	0	3	2	3	0	2	0	1
CO2	0	0	2	0	0	2	2	3	0	1	0	2
CO3	0	0	2	0	0	3	2	3	0	2	0	1
CO4	0	0	2	0	0	3	2	3	0	2	0	1
CO5	0	0	2	0	0	2	2	3	0	1	0	1

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COURSE CONTENT	
UNIT I	**Professional Ethics and Human values:** Ethics -History of Ethics-Types of Ethics, Professional Ethics and its forms - Morals, Values – Integrity –Civic Virtue –Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time –Co-operation – Loyalty- Collegiality-Commitment – Empathy – Self-confidence – Spirituality- Character.
UNIT II	**Engineering & Organization Ethics:** Engineering Ethics-Meaning & Purpose of Engineering Ethics- Consensus and Controversy – Work Place Ethics and Business Ethics –Ethics in HRM, Finance & Marketing – Ethical Theories-Meaning & Uses of Ethical Theories-Theories of moral Development-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.
UNIT III	**Engineers Responsibilities and Rights:** Key Characteristics of Engineering Professionals – Professional Roles to be played by an Engineer - Ethical egoism-Collective bargaining-Confidentiality- Acceptance of Bribes/Gifts when is a Gift and a Bribe-examples of Gifts v/s Bribes-Whistle Blowing and its types-when should it be attempted-preventing whistle blowing.
UNIT IV	**Engineers' Responsibility for Safety and Risk:** Concept of Safety-Types of Safety, Risk-Types of Risks, Voluntary v/s Involuntary Risk-Short term v/s Long term Consequences- Expected Probability- Reversible Effects-Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.
UNIT V	**Ethical issues in Social Media:** Social Media- Various Social Media Platforms: Google, Facebook, YouTube, Instagram - Social Media set-up and Uses-Ethical use of Social media-Effects of Social Media on Public-Social Media (vs) News- Social Media Fame and Reputation-Trolling, Harassing, and Hating on Social Media-Legal Aspects of Social Media.

Reference Books	
1.	"Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2.	"Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana- Maruthi Publications.
3.	"Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications
4.	"Professional Ethics and Human Values" by Prof.D.R.Kiran-
5.	"Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication
6.	"Ethics in Engineering" by Mike W. Martin and Roland Schinzinger -Tata McGraw- Hill -2003
7.	"Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

WEB RESOURCES (Suggested)	
1.	https://study.com/academy/lesson/ethical-issues-in-internet-social-media-marketing.html
2.	https://www.tutorialspoint.com/engineering_ethics/engineering_ethics_rights_of_engineers
3.	https://link.springer.com/article/10.1007/s11948-997-0039-x

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I Year II Semester

INTEGRAL TRANSFORMS AND VECTOR CALCULUS

Course Category	Basic Sciences	**Course Code**	**19BM2T03**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NIL	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	examine the properties of Laplace transformation	K3
CO2	solve ordinary differential equations by using Laplace transformation technique	K2
CO3	expand a periodic function as a Fourier series and find Fourier transform of a given function.	K3
CO4	understand vector differential properties of scalar and vector point functions and their applications.	K2
CO5	apply Green's, Stokes and Divergence theorem to evaluate line, surface and volume integrals.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-

CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Laplace transforms:** Laplace transforms of standard functions – Properties - Periodic functions - Unit step function – Dirac's delta function.
UNIT II	**Inverse Laplace transforms:** Inverse Laplace transforms – Properties – Convolution theorem (without proof). **Applications:** Solving ordinary differential equations (initial value problems) using Laplace transforms.
UNIT III	**Fourier Analysis:** Introduction- Periodic functions – Dirichlet's conditions - Fourier series of a function, even and odd functions –Change of interval – Half-range sine and cosine series. Fourier integral theorem (without proof) – Fourier sine and cosine integrals – sine and cosine transforms – Inverse transforms.
UNIT IV	**Vector Differentiation:** Gradient - Directional derivative - Divergence – Curl – Laplacian and second order operators – Vector identities.
UNIT V	**Vector Integration:** Line integral – Work done – Potential function – Area, Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

TEXT BOOKS	
1.	**B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6.	**Murray R Speigel,** Schaum's Outline of Vector Analysis, Schaum's Outline.
7.	**Shanti Narayan**, Integral Calculus – Vol. 1 & II
WEB RESOURCES	
1.	**UNIT I: Laplace transforms** https://en.wikipedia.org/wiki/Laplace_transform https://web.stanford.edu/~boyd/ee102/laplace.pdf
2.	**UNIT II: Inverse Laplace transforms** https://www.intmath.com/laplace-transformation/7-inverse-laplace-transform.php
3.	**Unit – III: Fourier Series** https://www.mathsisfun.com/calculus/fourier-series.html https://lpsa.swarthmore.edu/Fourier/Xforms/FXformIntro.html
4.	**UNIT IV: Vector Differentiation** https://en.wikipedia.org/wiki/Vector_calculus
5.	**UNIT V: Vector Integration** https://en.wikipedia.org/wiki/Divergence_theorem http://tutorial.math.lamar.edu/Classes/CalcIII/StokesTheorem.aspx

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I Year II Semester

APPLIED PHYSICS

Course Category	BASIC SCIENCES	**Course Code**	**19BP2T02**
Course Type	Theory	**L-T-P-C**	3 - 0 - 0-3
Prerequisites	Intermediate Physics	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
2	Understand the physics of Semiconductors and their working mechanism for their utility in Engineering applications.
3	Impart the knowledge of Dielectric materials with characteristic utility in appliances.

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Analyze the optical applications using the concepts of Interference and diffraction.	Analyze (K4)
CO2	Apply the concepts of quantum mechanics for calculation of free quantum particle energies.	Applying (K3)
CO3	Apply the basics of Laser Mechanism and fiber optics for the communications systems.	Applying(K3)
CO4	Understand the electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect.	Understanding (K2)
CO5	Understand the polarization phenomenon in dielectric materials and Dielectric Materials to study dependence on temperature and frequency response.	Understanding(K2)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0
CO 2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0
CO 3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
CO	3	2	2	0	0	0	0	0	0	0	0	1	0	0	0

4															
CO 5	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0

COURSE CONTENT	
UNIT I	**WAVE OPTICS** **(10 hrs)** **INTERFERENCE** Introduction-Principle of Superposition – Coherent Sources – Interference in parallel and non - parallel thin films (reflection geometry), Newton's rings & Applications. **DIFFRACTION** Introduction- Differences between Interference and Diffraction, Differences between Fresnel and Fraunhoffer diffraction Fraunhoffer diffraction in single slit (Qualitative), Fraunhoffer diffraction Double slit(Qualitative), Grating equation (analytical Treatment)- Rayleigh criterion of resolution and Resolving power of grating,
UNIT II	**QUANTUM MECHANICS (8hrs)** Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainty Principle –interpretation of wave function – Schrödinger Time Independent and Time Dependent wave equations – Particle in a potential box
UNIT III	**LASERS (11 hrs)** Introduction-Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Pumping Mechanisms - Ruby laser – Helium Neon laser – Semiconductor laser– Applications **FIBER OPTICS:** Introduction- Structure of Optical Fiber – Total Internal Reflection-Numerical Aperture and Acceptance Angle-classification of Optical fibers- optical fiber communication system-Advantages of Optical fibers- Applications.
UNIT IV	**SEMICONDUCTOR PHYSICS (8 hrs)** Introduction–Intrinsic semi conductors - density of charge carriers- Electrical conductivity – Fermi level – extrinsic semiconductors - p-type &n-type - Density of charge carriers -Hall effect- Hall coefficient - Applications of Hall effect
UNIT V	**DIELECTRICS (11 hrs)** Introduction - Dielectic polarization– Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations- Electronic Ionic and Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation -Applications of dielectrics. **MAGNETICS PROPERTIES** Inroduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials(Analytical)--Hysteresis-soft and hard magnetic materials & applications

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TEXT BOOKS	
1.	"A Text book of Engineering Physics"by M.N.Avadhanulu, P.G.Kshirsagar -S.Chand Publications,
2.	"Engineering Physics" by M.R.Srinivasan, New Age international publishers.
3.	"Solid State Physics" by SO Pilai., - New age International Publishers
REFERENCE BOOKS	
1.	Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition
2.	Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited
WEB RESOURCES	
1.	https://youtu.be/NVllY3LlNqc https://youtu.be/1TRdOjVpm-0 https://youtu.be/0tHcWDNCJ-o
2.	https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html https://www.youtube.com/watch?v=uPvWlwOhCTo
3.	https://www.youtube.com/watch?v=fdS12EaXH3A http://folk.uio.no/ravi/cutn/cmp/band1.pdf
4.	https://www.electronics-tutorials.ws/diode/diode_1.html https://youtu.be/3csUvwZdsOg https://www.youtube.com/watch?v=_40dpUzzfhA
5.	https://youtu.be/TuvLv6SBO5s https://youtu.be/u0Qf9jVh2kc

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I Year II Semester

ELECTRICAL CIRCUIT ANALYSIS-I

Course Category	Engineering Sciences	**Course Code**	**19EE2T03**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	**NA**	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To Study the concepts of electrical networks and magnetic coupled circuits
2	To Understand the concepts of single phase AC system and components in electrical wiring
3	To Study the concepts of R,L,C circuits, resonance in series, parallel circuits and locus diagrams
4	To Understand various forms of powers of R, L, C network with sinusoidal excitation
5	To Solve electrical networks with respect to resonance concepts.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Analyze various electrical networks in presence of active and passive elements.	Analyzing	K4
CO2	Solve magnetic circuits with various dot conventions.	Applying	K3
CO3	Analyze different periodic waveforms and get explore on the basic techniques for wiring.	Analyzing	K4
CO4	Understand various forms of powers of R, L, C network with sinusoidal excitation	Understanding	K2
CO5	Solve electrical networks with respect to resonance concepts.	Applying	K3

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	0	0	0	2	0	0	0	0	0	1	2	2
CO2	3	2	0	0	0	0	0	0	0	0	0	0	0	2
CO3	3	3	0	0	0	0	0	0	0	0	0	0	1	2
CO4	3	2	2	0	0	0	0	0	0	0	0	0	2	1

CO5	3	2	0	0	0	0	0	0	0	0	0	0	2

COURSE CONTENT	
UNIT I	**Introduction to Electrical Circuits:** Passive components and their V-I relations. Sources (dependent and independent) -Kirchhoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta- to-star transformation). source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources.
UNIT II	**Magnetic Circuits:** Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits. Faraday's laws of electromagnetic induction Concept of self and mutual inductance. Dot convention - coefficient of coupling and composite magnetic circuit. Analysis of series and parallel magnetic circuits**.**
UNIT III	**Single Phase A.C Systems and Components of Electrical Wiring:** Periodic waveforms (determination of rms, average value and form factor).Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks. Basic components in electrical wiring, Types of wiring, Connection diagrams of SPST, Staircase, Godown, ceiling fan and Tube light connection, Purpose of earthing.
UNIT IV	**Analysis of AC Networks-I:** Complex and polar forms of representations, Steady state analysis of R, L and C circuits. Power Factor and its significance, real, reactive power and apparent power, waveform of instantaneous power and complex power
UNIT V	**Analysis of AC Networks-II:** Extension of node and mesh analysis to AC networks, Series and parallel resonance, Selectivity, band width and Quality factor, Introduction to locus diagrams.

TEXT BOOKS	
1.	Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley and Steven M.Durbin, Tata McGraw Hill Company, 9th Edition
2.	Network Analysis by M.E.Van Valkenburg; Pearson publications Revised Third Edition
3.	Fundamentals of Electrical Circuits by Charles K.Alexander and Matthew N.O.Sadiku, Tata McGraw Hill Education (India) 6th Edition.
4.	Electrical Wiring ,Estimating & costing by S.L.Uppal Khanna Publishers
REFERENCE BOOKS	
1.	Network Theory by N C Jagan & C Lakshminarayana, BS Publications.
2.	Linear Circuit Analysis by De Carlo, Lin, Oxford publications Second Edition
3.	Electric Circuits by David A. Bell, Oxford publications
4.	Circuit Theory(Analysis and Synthesis) by A Chakrabarthi, Dhanpat Rai & Co. Revised Sixth Edition
5.	A course in Electrical Installation, Estimation & costing by J.B.Gupta by katson books.
WEB RESOURCES (Suggested)	
1.	http://pdf-ebooks-for-free.blogspot.in/2015/01/network-theory-by-alaxender-and-sadiku.html
2.	https://nptel.ac.in/courses/108102042/3

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3.	https://lecturenotes.in/notes/28-notes-for-network-theory-nt-by-verified-writer

I Year II Semester

FUNDAMENTALS OF COMPUTER SCIENCE

Course Category	Engineering Science	**Course Code**	**19CS2T02**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To understand the concept of Computer Hardware and Software.
2	To learn the concepts of Memory Management and I/O Management.
3	To understand different Network Topologies.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Identify the internal organization of digital computer.	K2
CO2	Distinguish types of memories and memory mapping.	K2
CO3	Illustrate various data representation techniques.	K2
CO4	Summarize the functionalities of Operating System.	K2
CO5	Categorize different Network Topologies.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	1	0	0	0	0	0	0	0	0	0	1	0
CO2	3	1	2	0	0	0	0	0	0	0	0	0	1	0
CO3	3	1	0	0	0	0	0	0	0	0	0	0	1	0
CO4	3	1	2	0	0	0	0	0	0	0	0	0	1	0
CO5	3	1	1	0	0	0	0	0	0	0	0	0	1	0

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COURSE CONTENT	
UNIT I	**Introduction to Computer :** Digital and analog Computers, Characteristics of computers, History of computers, Generations of Computers, Classification of Computers, Application of Computers. **The Computer system Hardware:** CPU-ALU,CU,MU ,Instruction format, Instruction set, Inside a computer Cabinet.
UNITII	**Computer Memory:** Memory representation ,Memory Hierarchy, CPU Registers, Cache Memory, Primary Memory, Secondary Memory, Storage Devices-Magnetic Disk Type, Optical Disk Type. **Input and Output Devices:** Input output Unit, Input Devices, Output Devices, I/O Port, Working of I/O System
UNITIII	**Data Representation:** Number System- Decimal, Binary, Octal, Hexadecimal, Conversion of Decimal to Binary ,Octal ,Hexadecimal, Conversion of Binary, Octal ,Hexadecimal to Decimal Number System. **User Computer Interface:** Types of Software - System software and application software. System software-Operating System, Device Drivers , System Utility.
UNITIV	**Operating System:** Objectives of Operating System,Types of OS, Functions of OS, Processing Management-CPU Scheduling, Process synchronization, Memory Management-Memory allocation, Virtual Memory, File management, Device management.
UNITV	**Data Communications and computer Networks:** Data Transmission Media- Twisted pair, Coaxial Pair, Optical Fiber, Radio Transmission, Computer Network: Network Types-LAN, WAN, MAN, LAN Topologies- Bus ,Ring, Star Topologies. Network Devices –Network Interface card, Bridge, Hub, Switch, Router, Gateway. **The Internet and Internet Services:** The internet Architecture, Internet Connections-Dial-up Access, DSL(Digital subscriber Line), ISDN(Integrated Service Digital Network), Cable Model, World wide Web, Web Browsers, URL.

TEXT BOOKS	
1.	Computer Fundamentals by Anitha Goel, Pearson education
2.	Norton Peter, “Introduction to Computers”, 4th Ed., TMH
REFERENCE BOOKS	
1.	Computer Fundamentals By PK Sinha, 6th Editions, BPB publications
2.	Fundamentals of Computers by E. Balagurusamy, McGrawHill editions
WEB RESOURCES	
1.	https://www.tutorialspoint.com/computer_fundamentals
2.	https://www.javatpoint.com/computer-fundamentals-tutorial
3.	https://www.wisdomjobs.com/e-university/computer-fundamentals-tutorial-392.html.
4.	https://nptel.ac.in/courses/106103068/29

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I Year II Semester

BASIC ELECTRONIC DEVICES AND CIRCUITS

Course Category	Engineering Science	**Course Code**	**19EC2T03**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To learn the basics concepts of semiconductor physics, the construction details, operation and characteristics of various Semiconductor diodes
2	To understand the operation and analysis of rectifiers with and without filters.
3	To study the characteristics of bipolar junction transistors in different configurations and characteristics of different types of FET.
4	To understand the concepts of transistor amplifiers, FET amplifiers and Feedback amplifiers.
5	To understand the concepts of various oscillator circuits.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the concepts various semiconductor devices.	K2
CO2	Design rectifiers and filter circuits for the given specifications.	K3
CO3	Understand the concepts of BJT and FET for various configurations.	K2
CO4	Design amplifiers using BJT and FET with & without feedback.	K3
CO5	Understand the concepts of various types of Oscillators.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2								1	3	2
CO2	3	3	2	2								1	3	2
CO3	3	3	2	2								1	3	2
CO4	3	3	2	2								1	3	2
CO5	3	3	2	2								1	3	2

COURSE CONTENT	
UNIT I	**SEMICONDUCTOR DEVICES** **PN Junction Diode:** Introduction to Semiconductor Physics-Classification of Materials,

	Charge densities in semiconductors, Fermi Level in intrinsic and Extrinsic semiconductors.Open circuited PN junction, Biased PN junction, DiodeEquation, Volt-Ampere Characteristics, Temperaturedependence of V-I characteristics, Diode Resistance and Diode Capacitance. **Special Purpose Electronic Devices:** Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics, Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode, LED, Photo Diode.
UNIT II	**RECTIFIERS AND FILTERS** **Rectifiers:** Introduction**,** half wave rectifier, full wave rectifier, bridge rectifier circuit diagrams operation, input and output waveforms, derivations of $I_{dc,}$ $I_{RMS,}$ efficiency, ripple factor, TUF, PIV, voltage regulation, Zener diode as a voltage regulator. **Filters:** Series Inductor filter, Shunt Capacitor filter, L- section filter, Π- section filter, Multiple L- section Filter, derivation for ripple factor in each case.
UNIT III	**TRANSISTOR CHARACTERISTICS** BJT: Introduction, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations. SCR, UJT, FET, MOSFET, DIAC, TRIAC: Introduction, construction, V-I characteristics.
UNIT IV	**AMPLIFIERS:** Analysis of BJT CE & CC amplifiers, FET amplifier, Concept of Negative feedback & its characteristics, Feedback Amplifiers using BJT- classification, Calculation of transfer gain(A_{vf}), Input resistance (R_{if}), output resistance(R_{of}) and bandwidth.
UNIT V	**OSCILLATORS:** Oscillator principle, conditions for oscillations, types of oscillators – RC phase shift, Wein bridge, generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT and FET, Frequency and amplitude stability of oscillators.

TEXT BOOKS	
1.	Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, McGraw Hill Education. 4e, 2015,
2.	Electronic Devices and Circuits – Mohammad Rashid, Cengage Learning, 2013
3.	Semiconductor Physics and Devices-Donald A. Neamen, Third Edition , McGraw-Hill Higher-Education
4.	Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford.
REFERENCE BOOKS	
1.	Electronic Devices and Circuits – BVRao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2nd edition
2.	Electronic Devices and Circuit Theory – RL Boylestad and LouisNashelsky, Pearson Publications, 10thEdition
3.	Electronic Devices and Circuits – B P Singh, RekhaSingh,PearsonPublications,Second Edition.
WEB RESOURCES	
1.	https://electronicsforu.com/resources/electronic-devices-and-circuit-theory
2.	https://www.electronics-tutorials.ws/diode/diode_1.html
3.	https://www.electronicshub.org/power-amplifier/
4.	https://www.allaboutcircuits.com/technical-articles/a-review-on-power-semiconductor-devices/

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ELECTRICAL AND ELECTRONICS ENGINEERING

I Year II Semester

ENGINEERING DRAWING

Course Category	Engineering Science	**Course Code**	**19ME2T01**
Course Type	Theory	**L-T-P-C**	1-0-3-2.5
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To introduce the students to use drawing instruments and to draw polygons, Engineering Curves and Scales.
2	To introduce the students to use orthographic projections, projections of points and lines.
3	To make the students draw the projections of the planes.
4	To make the students draw the projections of the various types of solids.
5	To represent the object in 3D view through isometric views.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level***
CO1	Construct polygons, scales and engineering curves.	K3
CO2	Identify the position of points and lines with use of orthographic projections.	K3
CO3	Analyze the location and position of plane figures through orthographic projections.	K4
CO4	Analyze the location and position of solid bodies through orthographic projections.	K4
CO5	Develop 2D and 3D objects by converting their views.	K6

*k1- Remembering, k2- Understanding, k3- Applying, k4- Analyzing, k5- Evaluating, k6- Creating

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1	1	1	-	-	-	-	-	1	-	-	-
CO2	3	2	1	2	1	-	-	-	-	-	1	-	-	-

CO3	3	2	1	2	1	-	-	-	-	-	1	-	1	1
CO4	3	2	1	2	1	-	-	-	-	-	1	-	1	1
CO5	3	2	1	3	3	-	-	-	-	-	1	-	2	2

COURSE CONTENT	
UNIT I	Introduction to Engineering Drawing. **Polygons:** Constructing regular polygons by general method. **Curves:** Parabola, Ellipse and Hyperbola by general methods tangent & normal for the curves. Cycloid and Involutes. **Scales:** Vernier and Diagonal scales.
UNIT II	**Orthographic Projections:** Introduction, importance of reference lines, projections of points in various quadrants. Projections of straight lines inclined to both the planes, determination of true lengths and angle of inclination.
UNIT III	**Projections of planes:** Regular planes perpendicular/parallel to one plane. Regular planes inclined to one plane and parallel to other, inclined to both the planes.
UNIT IV	**Projections of Solids:** Simple positions of Prisms, Pyramids, Cones and Cylinders. Solids inclined to both the planes.
UNIT V	**Isometric Projections:** Introduction, Conversion of isometric views to orthographic views, Conversion of orthographic views to isometric views. Introduction to AutoCAD (Demo only)

TEXT BOOKS	
1	Engineering Drawing by N.D. Bhatt, Chariot Publications, 56th Edition.
2	Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age International (P) Limited (2008).
REFERENCE BOOKS	
1	Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers, 3rd Edition.
2	Engineering Graphics for Degree by K.C. John, PHI Publishers.
3	Engineering Graphics by PI Varghese, Mc Graw Hill Publishers, 2013.
4	Engineering Drawing by Basant Agarwal, Tata McGraw Hill Publishers, 2014.
5	B.V.R. Gupta & M. Raja Roy, Engineering Drawing, I.K. International Publishing House Pvt. Ltd., 2009.
WEB RESOURCES	
1	http://nptel.ac.in/courses/112103019/
2	http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html
3	https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_health_science_students/engineeringdrawing.pdf

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I Year II Semester

PROFESSIONAL COMMUNICATIVE ENGLISH LABORATORY- II

Course Category	Humanities and Social Sciences	**Course Code**	**19HE2L02**
Course Type	Theory	**L-T-P-C**	0 – 0 – 3 – 1.5
Prerequisites	LSRW + Vocabulary Synonyms, antonyms, Grammar.	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

CO	Course Outcomes Description	COGNITIVE LEVEL
CO1	Develop the required communication skills to present effective presentations and interviews with clarity and impact.	K2
CO2	Able to create constructive and elaborative discussions to share their ideas on several issues.	K3
CO3	Ensure to use of argumentative and critical thinking skills by elaborating ideas relevantly and improve team work.	K3

K1- Remembering , K2- Understanding, K3-Applying, K-4 Analyzing, K5- Evaluating, K6- Creating

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-

PRESCRIBED LAB MANUAL FOR SEMESTER II:

'**STRENGTHEN YOUR STEPS**: A Multimodal Course in Communication Skills', Published by Maruthi Publications.

OBJECTIVES: To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME: A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT-1:

Small Talk & JAM Session

UNIT-2:

Interviews

UNIT-3:

Effective Telephonic Interviews

UNIT-4:

Group Discussions

UNIT-5:

Presentations & Public Speaking

UNIT-6:

Debates

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I Year II Semester

APPLIED PHYSICS LABORATORY

Course Category	BASIC SCIENCES	**Course Code**	**19BP2L02**
Course Type	Lab	**L-T-P-C**	0 - 0 - 3-1.5
Prerequisites	Intermediate Physics	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The student will have exposure to various experimental skills which is essential for an Engineering student.
2	To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics.
3	Apply the Analytical techniques and graphical analysis to the experimental data

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Understand the basics of Interference, Diffraction in Physics using instruments like Spectrometer, Travelling microscope.	Understanding(K 2)
CO2	Determine the Magnetic and Dielectric constants of materials.	Application(K3)
CO3	Apply the basics of Current Electricity and Semiconductors in engineering application	Application(K3)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO 2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO 3	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0

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COURSE CONTENT: (Any 10 of the following listed 12 experiments)	
1.	Determination of wavelength of laser by diffraction grating.
2.	Determination of wavelength of a source-Diffraction Grating-Normal incidence.
3.	Newton's rings – Radius of Curvature of Plano - Convex Lens.
4.	Determination of thickness of a spacer using wedge film and parallel interference fringes.
5.	Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
6.	Energy Band gap of a Semiconductor p - n junction.
7.	Characteristics of Thermistor – Temperature Coefficients
8.	Determination of dielectric constant by charging and discharging method
9.	Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10.	Dispersive power of diffraction grating.
11.	To Study the V-I Characteristics and determine the breakdown voltage of a Zener Diode
12.	Determination of Hall Voltage and Hall coefficients of a given semiconductor using Hall effect.

TEXT BOOKS	
1.	Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
REFERENCE BOOKS	
1.	College customized manual
WEB RESOURCES	
1.	https://www.youtube.com/watch?v=h_hUBXz-G-Y
2.	https://youtu.be/dgxFFw_1gMo
3.	https://www.youtube.com/watch?v=v2B0QyW8XJ0
4.	https://www.youtube.com/watch?v=AYQLmFqFtlw
5.	https://youtu.be/toggy3WVxV4
6.	https://youtu.be/1CyFsGk-_l4

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CONSTITUTION OF INDIA

I Year II Semester

Course Category	Humanities including Management	**Course Code**	19HM2T05
Course Type	Theory	**L-T-P-C**	2 -0 -0 - 0
Prerequisites		**Total Marks (Internal Assessment)**	100

Course Outcomes		**Blooms Taxonomy Level**	
On successful completion of the course, the student will be able to			
CO 1	Understand the evolution of Constitution of India	Understanding	K2
CO 2	Make use of their Fundamental rights.	Application	K3
CO 3	Understand the functioning of the Union Government	Understanding	K2
CO 4	Understand the functioning of the State and local self Government.	Understanding	K2
CO 5	Understand the value of Indian Constitution in functioning of the country.	Understanding	K2

Contribution of Course Outcomes towards achievement of Program

Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	0	0	0	0	0	3	0	3	0	1	0	2
CO2	0	0	0	0	0	1	0	2	1	1	0	1
CO3	0	0	0	0	0	1	0	1	1	1	0	0
CO4	0	0	0	0	0	1	0	1	1	1	0	0
CO5	0	0	0	0	0	1	1	1	1	1	0	2

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COURSE CONTENT	
UNIT I	**Introduction to Indian constitution:** Meaning of the term constitution - History and development – Preamble of the Constitution – Constituent Assembly – The salient features of Indian Constitution.
UNIT II	**Fundamental Rights and Directive principles of state policy:** Individual and Collective Rights – Limitations of the fundamental Rights – Judicial Interpretation of Fundamental Rights.
UNIT III	**Union Government:** Union Legislature – Lok sabha and Rajya sabha (powers and functions) – President of India (powers and functions) – Prime minister of India (powers and functions) – Union Judiciary (supreme court powers and functions).
UNIT IV	**State and Local self Government:** **State Government:** State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) – Powers and functions of state legislature – The Chief Minister of the state (powers and functions) **Local Self Government:** Election commission of India (Powers and Functions)- The Union Public Service Commission (Powers and Functions)
UNIT V	**Working of the Indian Constitution** The values of the Indian Constitution and Ushering of Social Revolution in India – Nature and Role of Higher Judiciary in India – Amendments (Recent)

Reference Books	
1.	'Indian Polity' by Laxmikanth
2.	'Indian Administration' by Subhash Kashyap
3.	'Indian Constitution' by D.D. Basu
4.	'Indian Administration' by Avasti and Avasti

WEB RESOURCES (Suggested)	
1.	https://www.clearias.com/historical-background-of-indian-constitution/
2.	https://www.civilserviceindia.com/subject/General-Studies/notes/functions-and-responsibilities-of-the-union-and-the-states.html
3.	https://www.tutorialspoint.com/indian_polity/indian_polity_how_constitution_works

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II Year – I Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Professional Core Courses Courses	19EE3T04	Electrical Circuit Analysis-II	3	--	--	3
2	Professional Core Courses Courses	19EE3T05	Electrical Machines-I	3	--	--	3
3	Professional Core Courses Courses	19EE3T06	Electromagnetic Fields	3	--	--	3
4	Engineering Sciences	19ME3T03	Thermal and Hydro Prime Movers	3	--	--	3
5	Professional Core Courses Courses	19EC3T05	Digital Electronics	3	--	--	3
6	Engineering Sciences	19EE3L04	Electrical Circuits Laboratory	--	--	3	1.5
7	Engineering Sciences	19ME3L04	Thermal and Hydro Prime Movers Laboratory	--	--	3	1.5
8	Engineering Sciences	19EE3L03	Electrical and IT Workshop	--	--	3	1.5
9	Project work, Seminar and Internship	19EE3P01	Socially Relevant Activity*	--	--	--	0.5
10	Mandatory Courses	19BE3T01	Environmental Studies	2	--	--	0
Total Credits							**20**

*** 15hours in semester**

II Year – II Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Professional Core Courses Courses	19EE4T07	Electrical Machines-II	3	--	--	3
2	Professional Core Courses Courses	19EE4T08	Control Systems	3	--	--	3
3	Professional Core Courses Courses	19EE4T09	Electrical Power Generation and Distribution	3	--	--	3
4	Professional Core Courses Courses	19EE4T10	Electrical Measurements and Instrumentation	3	--	--	3
5	Humanities and Social Sciences	19HM4T01	Managerial Economics and Financial Analysis	3	--	--	3
6	Professional Core Courses Courses	19EC4T09	Signals and Systems	3	--	--	3
7	Professional Core Courses Courses	19EE4L05	Electrical Machines-I Laboratory	--	--	3	1.5

8	Engineering Sciences	19EC4L02	Basic Electronic Devices and Circuits Laboratory	--	--	3	1.5
9	Mandatory Courses	19HM4T06	Essence of Indian Traditional Knowledge	2	--	--	0
Total Credits							**21**

II Year I Semester

ELECTRICAL CIRCUIT ANALYSIS-II

Course Category	Professional Core Courses	**Course Code**	**19EE3T04**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Electrical Circuit Analysis-I	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To understand the applications of network theorems for analysis of electrical networks.
2	To study the transient behavior of electrical networks with different types of excitations.
3	To study the performance of a network based on input and output excitation/response.
4	To study the concepts of balanced and unbalanced three-phase circuits.
5	To understand the application of Fourier series and Fourier transforms for analysis of electrical circuits

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Apply the principles of network theorems to the electrical networks	Applying	K3
CO2	Analyze the transient response of electrical networks for different types of excitations.	Analyzing	K4
CO3	Solve the parameters for different types of network.	Applying	K3
CO4	Solve three- phase circuits under balanced and unbalanced condition.	Applying	K3
CO5	Understand different harmonics components from the response of an electrical network using Fourier series and Fourier transforms.	Understanding	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	0	0	0	0	0	0	0	0	0	0	0	2
CO2	3	3	1	1	1	0	0	0	0	0	0	0	1	0
CO3	3	2	1	0	0	0	0	0	0	0	0	0	0	0

CO4	3	2	2	2	0	0	0	0	0	0	0	0	0	0
CO5	3	2	2	1	1	0	0	0	0	0	0	0	0	0

COURSE CONTENT	
UNIT I	**Network Theorems (DC & AC Excitations)** Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.
UNIT II	**Transient Analysis in DC and AC circuits** Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.
UNIT III	**Two Port Networks** Two port network parameters – Z, Y, ABCD, inverse Transmission, hybrid and inverse hybrid parameters and their relations. Cascaded networks - poles and zeros of network functions- Relationship between parameter sets simplification of cascaded and parallel networks. Network functions for the Two-Port bridged – T, Pie and Lattice networks.
UNIT IV	**Three Phase Circuits** Phase sequence- star and delta connection - relation between line and phase voltages and currents in balanced systems - Analysis of balanced three phase circuits. Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter method for measurement of three phase power.
UNIT V	**Fourier Analysis and Transforms** Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms. Fourier integrals and Fourier transforms – properties of Fourier transforms physical significance of the Fourier Transform and its application to electrical circuits.

TEXT BOOKS	
1.	Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, Mc Graw Hill Company, 6th Edition.
2.	Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India), 6th Edition.
3.	Network Analysis by M.E.Van Valkenburg; Pearson publications Revised Third Edition
REFERENCE BOOKS	
1.	Networks and Systems by D. Roy Choudhury, New Age International publishers, 2nd Edition.
2.	Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, Dhanpat Rai & Co, 7th Edition.
3.	Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications, 1st Edition.
4.	A. Sudhakar, Shyammohan S. Palli, "Circuits and Networks Analysis and Synthesis", Tata McGraw-Hill, 2nd Edition.
5.	Networks and Systems, Asfaq Hussain, Khanna Publishing House, Delhi, 2nd Edition.

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WEB RESOURCES (Suggested)	
1.	https://circuitglobe.com/circuit-analysis-of-3-phase-system-balanced-condition.html
2.	https://nptel.ac.in/courses/108105053/pdf/L-10(GDR)(ET)%20((EE)NPTEL).pdf
3.	https://www.tutorialspoint.com/network_theory/network_theory_twoport_networks
4.	www.electrical4u.com/network-synthesis-hurwitz-polynomial-positive-real-functions
5.	https://www.electrical4u.com/fourier-series-and-fourier-transform/
6.	http://nptel.ac.in/courses/108105065/4

II Year I Semester

ELECTRICAL MACHINES - I

Course Category	Professional Core Courses	**Course Code**	**19EE3T05**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To understand construction, operation and modeling of single phase transformers.
2	To analyze the performance of transformers and testing.
3	To Analyze the three phase transformers and achieve three phase to two phase conversion, Understand construction, principle of operation & performance of DC generators
4	To Learn the characteristics and performance of DC machines
5	To Learn the methods of speed control of DC motors and testing methods of DC machines

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive level**	
CO1	Understand the construction, operation and modeling of single phase transformers.	Understanding	K2
CO2	Analyze the performance of single phase transformers.	Analyzing	K4
CO3	Understand three phase transformers for analysis of power systems Understand construction, principle of operation & performance of DC generators	Understanding	K2
CO4	Analyze the performance of DC machines.	Analyzing	K4
CO5	Analyze the methods of speed control and testing methods of DC motors.	Analyzing	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	0	0	0	0	0	0	0	0	0	1	2	2
CO2	3	2	0	0	0	0	0	0	0	0	0	0	0	2
CO3	3	3	0	0	0	0	0	0	0	0	0	0	1	2

CO4	3	2	2	0	0	0	0	0	0	0	0	0	2	1
CO5	3	2	0	0	0	0	0	0	0	0	0	0	0	2

COURSE CONTENT	
UNIT I	**Transformers -I** Types and constructional details - principle of operation - emf equation - operation on no load and on load phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.
UNIT II	**Transformers-II** Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses – parallel operation with equal voltage ratios – auto transformer – comparison with two winding transformers.
UNIT III	**Transformers-III** Poly phase connections -Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ- Scott Connection - Three winding transformers. **Construction and operation of DC Machines** Constructional details - principle of operation of DC machines – EMF and Torque – Classification of DC machines based on excitation – Armature reaction and commutation in DC Machines.
UNIT IV	**Performance of D.C Machines** Characteristics of SEDC, shunt, series and compound generators - applications of DC generators - Characteristics of SEDC, shunt, series and compound motors - applications of DC motors - loss and efficiency calculations - Necessity of starter – Starting by 3 and 4 point starter,
UNIT V	**Speed Control and Testing of D.C. Machines** Speed control by armature voltage and field control - Testing of DC machines - brake test, Swinburne's method – retardation test - principle of regenerative or Hopkinson's method– Field's test- separation of losses.

TEXT BOOKS	
1.	Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education, 5th Edition.
2.	Electric Machinery by A. E. Fitzgerald, Charles kingsley, Stephen D.Umans, TMH, 7th Edition.
3.	Electrical Machines – P.S. Bhimbra, Khanna Publishers, 7th Edition.
4	Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 4th edition
REFERENCE BOOKS	
1.	Electrical Machines by Ashfaq Husain, Dhanpat rai & Co & Sons, 3rd Edition.
2.	Electrical Machines by R.K.Rajput, Lakshmi publications, 5th Edition
3	Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw-Hill Education, 1st Edition.
4	Electric Machines by Mulukutla S. Sarma & Mukeshk. Pathak, CENGAGE Learning, 2nd Edition.
5	Principles of Alternating Current Machinery By Ralph R. Lawrence, McGraw-Hill Book Company, 4th Edition.

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WEB RESOURCES (Suggested)	
1.	http://www.electrical4u.com/principle-of-dc-generator/
2.	https://studyelectrical.com/2014/12/working-principle-of-dc-motor.html
3.	http://www.electrical4u.com/single-three-phase-transformer-vs-bank-of-three-single-phase-transformers/
4	https://www.electronics-tutorials.ws/transformer/transformer-basics.html
5	https://www.allaboutcircuits.com/textbook/alternating-current/chpt-10/three-phase-transformer-circuits/
6	https://www.electricaleasy.com/2014/05/three-phase-transformer-connections.html

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ELECTRICAL AND ELECTRONICS ENGINEERING | II Year I Semester

ELECTROMAGNETIC FIELDS

Course Category	Professional Core Courses	**Course Code**	**19EE3T06**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To study the production of electric field and potentials due to different configurations of static charges.
2	To study the properties of conductors and dielectrics, calculate the capacitance of different configurations. Understand the concept of conduction and convection current densities.
3	To study the magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations and to study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
4	To develop the concept of self and mutual inductances and the energy stored.
5	To study time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced EMF

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Describe static electric field and their behavior in different media.	Understanding	K2
CO2	Explain the properties of materials under the influence of electric field.	Understanding	K2
CO3	Apply Biot Savart's Law & Ampere Circuit Law for calculation of magnetic force on current carrying conductors.	Applying	K3
CO4	Calculate self and mutual inductance and energy stored in magnetic fields.	Applying	K3
CO5	Relate Electric and Magnetic fields (time varying) by using Maxwell's Laws.	Understanding	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	2	1	0	0	0	1	0	1	2	1	2
CO2	3	2	2	2	1	0	0	0	1	0	1	2	1	2
CO3	3	3	2	2	1	0	0	0	1	0	1	2	1	2
CO4	3	3	2	2	1	0	0	0	1	0	2	2	1	2
CO5	2	3	2	2	1	0	0	0	1	0	2	2	1	2

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COURSE CONTENT	
UNIT I	**Electrostatics** Scalar and Vector fields, Orthogonal Coordinate Systems & Review of Vector Calculus: Rectangular, Cylindrical, Spherical coordinate systems. Differential length, area and volume. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential, Potential gradient – gauss's law in terms of (integral form and point form) Maxwell's first law, div(D)=ρv Laplace's and Poison's equations.
UNIT – II	**Conductors – Dielectrics and Capacitance** Electric dipole – dipole moment – potential and EFI due to an electric dipole, Torque on an Electric dipole in an electric field conductors and Insulators – their behavior in electric field. Polarization, boundary conditions between conduction to dielectric and dielectric to dielectrics. Capacitance of parallel plates, spherical and coaxial cables with composite dielectrics, energy stored and energy density in a static electric field, current density, conduction and convection current densities, Ohm's law in point form – equation of continuity.
UNIT III	**Magnetostatics, Ampere's Law** Static magnetic field – Biot-Savart's law – Magnetic Field Intensity (MFI) – MFI due to a straight current carrying filament, circular, square and solenoid current carrying wire – Maxwell's second Equation, div(B)=0, Ampere's circuital law and its applications. MFI due to an infinite sheet of current and a long filament carrying conductor, point form of Ampere's circuital law, field due to a rectangular loop, Maxwell's third equation. Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.
UNIT IV	**Self and Mutual Inductance** Scalar and vector magnetic potentials, Self & Mutual Inductance, Self Inductance determination of solenoid and toroid, mutual inductance determination between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.
UNIT V	**Time Varying Fields** Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms, - Displacement current – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs.

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ELECTRICAL AND ELECTRONICS ENGINEERING

TEXT BOOKS	
1.	Engineering Electromagnetic by William H. Hayt & John. A. Buck McGraw-Hill Companies A. Buck
2.	Introduction to Electrodynamics D J GRIFFITHS, PHI 4th Edition,2013
3.	Principles of Electromagnetics", Sadiku, Kulkarni, OXFORD University Press, 6th Edition ,2015
REFERENCE BOOKS	
1.	Electromagnetic Fields and Waves by R. L. Yadava, Khanna Publication House, 1st Edition,2019
2.	Engineering Electromagnetic by Nathan Ida, Springer 3rd Edition,2015
3	Electromagnetic Field Theory by Yaduvir Singh, Pearson,1st Edition,2011
4	Fundamentals of Engineering Electromagnetic by Sunil Bhooshan, Oxford higher education,1st
5	Electromagnetism: Problems with solutions by Ashutosh Pramanik, PHI Publications,vol-2,2014
WEB RESOURCES (Suggested)	
1.	http://bookboon.com/en/essential-electromagnetism-ebook
2.	https://nptel.ac.in/downloads/115101005/
3.	https://ocw.mit.edu/courses/physics/8-07-electromagnetism-ii-fall-2012/

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ELECTRICAL AND ELECTRONICS ENGINEERING

II Year I Semester

THERMAL AND HYDRO PRIMEMOVERS

Course Category	Engineering Science	**Course Code**	**19ME3T03**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To understand the basic concepts of thermodynamic and fluid mechanics.
2	To study the basic cycle of Steam Power Plant and their components.
3	To impart the knowledge of gas power plant and the methods to improve the efficiency.
4	To impart the knowledge of diesel power plant, its components and I.C Engines.
5	To impart the knowledge of various types of turbines, their constructional features, working and performance.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level***
CO1	Demonstrate basics of thermodynamics, properties of steam, fluid and analyze jet impact on vanes.	K2
CO2	Illustrate the working of steam boilers, steam turbines and steam condensers.	K2
CO3	Analyze the performance of the gas turbines.	K4
CO4	Classify IC engines and its performance.	K2
CO5	Analyze the performance of the hydraulic turbines.	K4

*1- Remembering, 2- Understanding, 3- Applying, 4- Analyzing, 5- Evaluating, 6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	1	-	3	2	-	-	2	3	1	1	-
CO2	3	3	2	1	-	3	2	-	-	2	3	2	2	-
CO3	3	3	2	1	-	3	2	-	-	2	3	2	2	-
CO4	3	3	2	1	-	3	2	-	-	2	3	2	2	-
CO5	3	3	2	1	-	3	2	-	-	2	3	2	2	-

COURSE CONTENT	
UNIT I	**Basics of Thermodynamics**: Thermodynamic systems and state, process and cycle. Laws of thermodynamics (statements only) - first law of thermodynamics and analysis of various thermodynamic processes. **Steam Properties**: Properties of the steam, use of steam tables, temperature to entropy and enthalpy to entropy diagrams. **Properties of Fluids:** Density, specific weight, specific volume, specific gravity, viscosity,

	surface tension and capillarity. **Impact of Jets**: Impulse momentum equation, impact of jet on stationary vanes (flat and curved), and impact of jet on moving vanes (flat and curved).
UNIT II	**Steam Power Plant:** Schematic layout of steam power plant, site selection for steam power plant, advantages and disadvantages. **Vapor Power Cycles:** Rankine Cycle- analysis of simple Rankine cycle. **Steam Boilers:** Classification and working principle of simple vertical, Bobcock & Wilcox and Lamont boilers. **Steam Turbines:** Classification of steam turbines working principles of simple impulse turbine and Parson's reaction turbine- compounding in turbines- velocity diagrams, work done and efficiency for simple impulse. **Steam Condensers:** Classification, surface Condensers working principle and efficiencies .
UNIT III	**Gas Power Plant**: Classification of gas power plants, applications, advantages and disadvantages of gas power plant. Working principles of closed cycle and open cycle gas power plant. **Methods to Improve the Performance**: Analysis of simple open cycles & cycles with inter cooling, Reheating and Regeneration.
UNIT IV	**Diesel Power Plant:** Schematic layout of diesel power plant, site selection for diesel power plant, advantages and disadvantages. **IC Engines**: Classification of I.C. Engine, working principles of 4 stroke and 2 stroke engines, valve and port timing diagrams - Engine systems: fuel injection, carburetion, ignition, cooling and lubrication systems – Engine performance evaluation.
UNIT V	**Hydraulic Power Plant:** Schematic layout of hydraulic Power Plant, site selection for hydraulic power plant, advantages and disadvantages. **Hydraulic Turbines**: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Performance equations of turbine; Governing of turbines.

TEXT BOOKS	
1	Thermal engineering by RK Rajput, 10th Edition, Lakshmi Publishers.
2	Fluid mechanics and hydraulic machines by RK Bansal, 8th Edition, Lakshmi Publishers.
REFERENCE BOOKS	
1	Engineering Thermodynamics by PK Nag, McGrawHill Publisher, 6th Edition.
2	I.C Engines, V.Ganesan , 3rd Edition Tata Mcgraw-Hill.
3	Fluid Mechanics- fundamentals and applications, Y.A.Cengel & J.M.Cimbala, Mcgrawhill Publications.
4	Fluid mechanics and hydraulic machines by Modi and Seth, Standard Book House publishers.
5	Applied Thermodynamics by Eastop & McConkoy, 5th Edition, Pearson Education
WEB RESOURCES	
1	https://nptel.ac.in/noc/individual_course.php?id=noc17-me12
2	https://nptel.ac.in/noc/individual_course.php?id=noc18-me34
3	https://ekeeda.com/course/sem-iv/jawaharlal-nehru...hydraulic-machines/4548,
4	https://www.classcentral.com › Subjects › Engineering

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ELECTRICAL AND ELECTRONICS ENGINEERING

II Year I Semester

DIGITAL ELECTRONICS

Course Category	Professional Core Courses	**Course Code**	**19EC3T05**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To solve a typical number base conversion and analyze new error coding techniques.
2	Theorems and functions of Boolean algebra and behavior of logic gates, Boolean function simplification using Karnaugh maps and Quine-McCluskey methods
3	To understand concepts of combinational circuits
4	To understand concepts of basic sequential circuits
5	To develop advanced sequential circuits

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Classify different number systems and apply to generate various codes.	K2
CO2	Use the concept of Boolean algebra in minimization of switching functions	K2
CO3	Design different types of combinational logic circuits	K3
CO4	Apply knowledge of flip-flops in designing of Registers and counters	K3
CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	2							1			1	
CO2	2	2	2							1			2	
CO3	1	2	3							1				2
CO4	2	1	3							1			1	
CO5	2	2	3							1				1

COURSE CONTENT	
UNIT I	**NUMBER SYSTEM AND LOGIC GATES** Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving. 4 bit codes, BCD, Excess-3, 9's compliment code etc., Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS,

	Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations. **B**asic gates implementation using diodes
UNIT II	**MINIMIZATION TECHNIQUES** Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 5 variables, Tabular method, problem solving (code-converters using K-Map etc..).
UNIT III	**COMBINATIONAL CIRCUITS -I** Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit. **COMBINATIONAL CIRCUITS -II** Design of decoder, de-multiplexer, 7 segment decoder, higher order de-multiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.
UNIT IV	**SEQUENTIAL CIRCUITS I** Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.
UNIT V	**SEQUENTIAL CIRCUITS II** Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

TEXT BOOKS	
1.	Switching and finite Automata theory - Zvi kohavi, third edition, Cambridge university press
2.	Switching Theory and Logic Design by A. Anand Kumar, PHI, 3rd Edition.
3.	Digital Logic and Computer Design by M Morris Mano, PHI.
REFERENCE BOOKS	
1.	Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH second edition
2.	Modern Digital Electronics by RP Jain, TMH, 4th Edition.
3.	Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition
4.	Digital electronics logic and design-Cherry Bhargava, BS Publications, 2019
WEB RESOURCES	
1.	http://logos.cs.uic.edu/366/notes/ErrorCorrectionAndDetectionSupplement.pdf
2.	https://www.tutorialspoint.com/digital_circuits/digital_circuits_quine_mccluskey_tabular_method.htm
3.	https://www.electronicshub.org/sequential-circuits-basics/
4.	http://people.ee.duke.edu/~jmorizio/ece261/classlectures/SeqPart2.pdf
5.	https://www.electronics-tutorials.ws/combination/comb_1.html

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ELECTRICAL AND ELECTRONICS ENGINEERING | II Year I Semester

ELECTRICAL CIRCUITS LABORATORY

Course Category	Professional Core Courses Courses	**Course Code**	**19EE3L04**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	Electrical Circuit Analysis-I	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To verify and demonstrate various theorems, locus diagram, response and two port networks.
2	To determine self and mutual inductance of a magnetic circuits , parameters of a given coil.
3	To measure 3-phase power.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Employ various theorems applied to electrical circuits.	Applying	K3
CO2	Determine self and mutual inductances, two port parameters of a given electric circuits, time constant of RL and RC circuits.	Evaluating	K5
CO3	Draw locus diagrams and to measure the power in different load conditions.	Understanding	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	0	0	0	0	3	2	1	0	2	2
CO2	3	3	1	2	2	0	0	0	3	2	1	0	2	2
CO3	3	3	1	2	2	0	0	0	3	2	1	0	2	2

LIST OF EXPERIMENTS:	
Any 10 of the following experiments are to be conducted	
Experiment 1	Verification of Thevenin's and Norton's Theorems.
Experiment 2	Verification of Superposition theorem and Maximum Power Transfer Theorem.
Experiment 3	Verification of Compensation Theorem.
Experiment 4	Verification of Reciprocity, Millman's Theorems.
Experiment 5	Locus Diagrams of RL and RC Series Circuits.
Experiment 6	Series and Parallel Resonance.
Experiment 7	Determination of Self, Mutual Inductances and Coefficient of coupling.
Experiment 8	Z and Y Parameters.
Experiment 9	Transmission & Hybrid Parameters.
Experiment 10	Time response of RL & RC series circuits.
Experiment 11	Measurement of three phase active power using two wattmeter method for balanced and unbalanced loads.
Experiment 12	Parameters of a choke coil

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ELECTRICAL AND ELECTRONICS ENGINEERING

II Year I Semester

References – Lab Manuals will be provided

THERMAL AND HYDRO PRIMEMOVERS LABORATORY

Course Category	Professional Core Courses	**Course Code**	**19ME3L04**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To impart practical knowledge on the performance evaluation methods of various internal combustion engines.
2	To impart practical knowledge on the performance evaluation methods of various flow measuring devices.
3	To impart practical knowledge on the performance evaluation methods of various hydraulic machines.

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Evaluate the performance of various internal combustion engines.	K5
CO2	Evaluate the performance of flow measuring devices.	K5
CO3	Evaluate the performance of hydraulic turbines and pumps.	K5

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	-	3	3	-	2	-	-	3	-	2
CO2	-	3	3	-	-	-	2	-	-	-	-	-	3	-
CO3	-	-	3	-	-	3	3	-	-	-	-	-	3	-

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LIST OF EXPERIMENTS

A. Thermal Engineering

1. I.C. Engines valve timing diagrams.
2. I.C. Engines port timing diagrams.
3. Engines performance test on 4 -stroke Diesel engine.
4. I.C. Engines performance test on 2-stroke petrol engine.
5. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
6. Determination of FP by retardation and motoring test on IC engine
7. I.C. Engines heat balance on petrol / Diesel engines.

B. Hydraulic Machines

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Calibration of Venturi meter.
5. Calibration of Orifice meter.
6. Determination of Friction factor for a given pipe line.

Note: From each section a minimum of 5 experiments and a total of 10 experiments should be conducted.

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ELECTRICAL AND IT WORKSHOP

Course Category	Professional Core Courses Courses	**Course Code**	**19EE3L03**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To study various electric tools and symbols.
2	To Study the basic Techniques for different types of wiring.
3	To Identify types of resistors and capacitors.
4	To study different types of earthing.
5	To impart trouble shooting of Hardware, Software and Installation of Operating system.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Explain the limitations, tolerance, safety aspects of electrical systems and wiring.	Understanding	K2
CO2	Select wires/cables and other accessories used in different types of wiring.	Understanding	K2
CO3	Make simple lighting and power circuits.	Applying	K3
CO4	Measure current, voltage and power in a circuit.	Evaluating	K5
CO5	Demonstrate the disassembling, assembling of a computer and hardware, software trouble shooting.	Applying	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	0	3	0	0	2	3	0	0	0	0	0	3	1
CO2	3	1	1	0	0	1	1	0	0	0	0	0	3	1
CO3	3	0	1	0	0	1	3	0	0	0	0	0	3	1
CO4	3	1	1	0	0	0	0	0	0	0	0	0	3	1
CO5	3	1	1	0	0	0	0	0	0	0	0	0	1	0

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LIST OF EXPERIMENTS:	
Any 10 of the following experiments are to be conducted	
Experiment 1	Study of various electrical tools and symbols.
Experiment 2	Identification types of resistors and capacitors.
Experiment 3	Wiring of light/fan circuit using two way control (stair case wiring)
Experiment 4	Godown wiring/Tunnel wiring.
Experiment 5	Measurement of voltage, current, resistance in DC circuit.
Experiment 6	Types of earthing, physical implementation.
Experiment 7	Identification of peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O devices, power rating of computers.
Experiment 8	A practice on disassembling the components of a PC and assembling them to back to working condition.
Experiment 9	**Hardware trouble shooting (Demonstration):** Identification of a problem and fixing a defective PC (improper assembly of peripherals).
Experiment 10	**Software troubleshooting (Demonstration):** Identification of a problem and fixing the PC for any software issues.
Experiment 11	**MS Word**-Formatting, Page Border, Equations and Symbols. **MS Excel**-Organize data, Usage of formula, graphs and Charts. **MS Power Point**-Guidelines for preparing an effective presentation.
Experiment 12	**Operating system installation:-** Install Windows Operating Systems along with necessary Device Drivers.

References – Lab Manuals will be provided

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II Year I Semester

ENVIRONMENTAL STUDIES

Course Category	Mandatory Courses	**Course Code**	**19BE3T01**
Course Type	Theory	**L-T-P-C**	2 – 0 – 0 – 0
Prerequisites	Exposure Basic Knowledge in Environment and protection.	**Internal Assessment** **Semester End Examination** **Total Marks**	0 0 0

COURSE OBJECTIVE:	
1	To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Recognize the interconnectedness of human dependence on the earth's ecosystems	K2
CO2	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities	K1
CO3	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century	K2
CO4	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.	K2
CO5	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices	K3
CO6	Influence their society in proper utilization of goods and services.	K1

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO 1	1	0	1	0	0	1	2	0	0	0	1	0	0	0
CO 2	0	1	0	0	0	0	1	0	0	0	0	0	0	0
CO 3	0	0	0	0	2	0	1	0	0	0	0	0	0	0
CO 4	0	0	0	0	1	1	3	0	0	0	0	0	0	0
CO 5	0	0	0	0	0	0	3	1	0	0	0	0	0	0

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COURSE CONTENT	
UNIT I	**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance-Need for public awareness. **Natural Resources:** Forest resources : deforestation – Mining, dams and other effects on forest and tribal people. Water resources :Use and over utilization of surface and groundwater. Food resources:World food problems, effects of modern agriculture, fertilizer-pesticide problems. Energy resources: renewable and nonrenewable energy sources. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.
UNIT II	**Ecosystems, Biodiversity and its conservation:** Definition of Ecosystem and its structure, Functions Biodiversity Definition-Value of biodiversity, India as a mega-diversity nation, Threats to biodiversity, Conservation of biodiversity
UNIT III	**Environmental Pollution:** Definition, Cause, Effects of Air pollution, Water pollution, Noise pollution, Radioactive pollution, Role of an individual in prevention of pollution. **Solid Waste Management:** Sources, effects and control measures of urban and industrial waste.
UNIT IV	**Social Issues and the Environment:** Air (Prevention and Control of Pollution) Act 1981. –Water (Prevention and control of Pollution) Act 1974,EPA act 1986 ,Issues involved in enforcement of environmental legislation**,** Rain water harvesting, Global Environmental challenges climate change and mitigations and Adaptations (Engineering technologies)
UNIT V	**Human population and the Environment:** Population growth,Women and child welfare, Role of Information technology in environment and human health Awareness to Environmental Assessment& clearance ,Audit .Environmental Governance in india E-Waste management Rules (Biomedical Waste, Solid Waste) **Field work: A** mini project related to Environmental issues / To visit a local polluted site (Submission of project by every student)

TEXT BOOKS	
1.	Environmental Studies for undergraduate courses by ErachBharucha,UGC.
2.	A Textbook of Environmental Studies by Dr.S.AzeemUnnisa,Acadamic publishing company.
3.	Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai
4.	A Textbook EIA Notification 2006(2019)
REFERENCE BOOKS	
1.	Text Book of Environmental Studies by Deeshita Dave & P. UdayaBhaskar, Cengage learning.
2.	Glimpses of Environment by K.V.S.G. Murali Krishna Published by Environmental Protection Society, Kakinada, A.P.
3.	Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
WEB RESOURCES	
1.	http://www.defra.gov.uk/environment/climatechange
2.	http://conbio.net/vl/ and www.biodiversitya-z.org/content/biodiversity

3.	https://www.omicsonline.org/environment-pollution-climate-change.php and
4.	http://www.publichealthnotes.com/solid-waste-management/
5.	**http://IPCC.com**

ELECTRICAL MACHINES-II

Course Category	Professional Core Courses	**Course Code**	**19EE4T07**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Electrical Machines-I	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To Understand the principle of operation and determine the equivalent circuit parameters of 3-phase induction motor.
2	To Deal with the detailed analysis of 3-phase induction motors and quantify the performance of induction motor and induction generator in terms of torque and slip.
3	To Understand the construction, operation and types of single phase motors and understand the constructional features of synchronous generators
4	To Study various methods of finding the regulation of Synchronous generators and their parallel operation.
5	To Impart knowledge on principle of operation and factors affecting the performance of synchronous motor.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Understand the factors affecting the performance of 3-phase Induction Motor from its equivalent circuit.	Understanding	K2
CO2	Analyze the performance of 3-phase Induction Motor under different operating conditions using circle diagram.	Analyzing	K4
CO3	Identify the suitable motor such as single-phase Induction Motor and Understand the construction details of synchronous machine.	Analyzing	K4
CO4	Understand the regulation of synchronous generators using various methods and know their parallel operation.	Understanding	K2
CO5	Draw the power circles and excitation circles of synchronous motor to determine optimum operating point.	Understanding	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	1	2	0	0	0	0	0	0	1	1	2
CO2	3	2	2	1	2	0	0	0	0	0	0	1	1	2

CO3	3	2	2	1	2	0	0	0	0	0	0	1	1	2
CO4	3	2	2	1	2	0	0	0	0	0	0	1	1	2
CO5	3	2	2	1	2	0	0	0	0	0	0	1	1	2

COURSE CONTENT	
UNIT I	**3-phase Induction Motors** Construction details of cage and wound rotor machines – rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and pf at standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their inter relationship – equivalent circuit – phasor diagram.
UNIT II	**Characteristics, starting and testing methods of Induction Motors** Torque equation - expressions for maximum torque and starting torque - torque slip characteristic – double cage and deep bar rotors - crawling and cogging Speed control methods of induction motor (stator voltage, rotor emf injection, v/f) - no load and blocked rotor tests - circle diagram – starting methods.
UNIT III	**Single Phase Motors** Double revolving field theory - equivalent circuit - Constructional features, Problems of starting. Starting Methods of single phase induction motors - universal motor - Applications. **Synchronous Generators** Constructional features of non – salient and salient pole type – Armature windings – Distribution factor – Pitch factor – E.M.F equation - Phasor diagrams.
UNIT IV	**Voltage Regulation and Parallel operation of Synchronous Generators** Armature reaction – Voltage regulation by synchronous impedance method – MMF method and Potier triangle method –Two reaction theory - Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing – Control of real and reactive power.
UNIT V	**Synchronous Motors** Operating principle - Phasor diagram – Methods of starting – Variation of current and power factor with excitation – power developed - Synchronous condenser – Hunting and its suppression – Applications.

TEXT BOOKS	
1.	Electric Machinery by A. E. Fitzgerald, Charles kingsley, Stephen D.Umans, TMH 7th Edition.
2.	Electrical Machines – P.S. Bhimbra, Khanna Publishers 7th Edition.
3.	Alternating Current Machines by M. G. Say, Longman Scientific and Technical, 5th Edition.
REFERENCE BOOKS	
1.	Electric Machines by Asfaq Husain,Haroon Ashfaq Dhanpat Rai & co, 2nd Edition
2.	Theory & Performance of Electrical Machines by J. B. Guptha, S. K. Kataria & Sons, 4th Edition.
3.	Electrical Machines by D. P. Kothari, I .J .Nagarth, McGrawHill Publications, 4th Edition
4.	Electrical Machines by R. K. Rajput, Lakshmi publications, 5th edition
5.	Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill education, 1st Edition.
6.	Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill Education, 4th Edition.
WEB RESOURCES (Suggested)	

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ELECTRICAL AND ELECTRONICS ENGINEERING

1.	http://www.electricaleasy.com/
2.	http://electrical-engineering-portal.com/rotating-magnetic-field-ac-machines
3.	http://nptel.ac.in/courses/108106072/pdf/2_6.pdf

II Year II Semester

CONTROL SYSTEMS

Course Category	Professional Core Courses	**Course Code**	**19EE4T08**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
2	To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers and to investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
3	To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
4	To discuss basic aspects of design and compensation of linear control systems using Bode plots.
5	To formulate state models and analyze the systems. To learn the concepts of Controllability and Observability.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Analyze the transfer function of physical systems for modeling of control systems.	Analyzing	K3
CO2	Understanding the time domain specifications to the second order systems and Analyze the stability of control system to know the behavior of the system	Understanding	K2
CO3	Analyze the stability of LTI systems in frequency domain	Analyzing	K4
CO4	Analyze Lag, Lead, Lag-Lead compensators to improve system performance of control systems.	Analyzing	K4
CO5	Summarize the physical systems as state models and determine the response	Understanding	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	2	0	0	0	0	0	0	1	0	1
CO2	3	3	2	2	2	0	0	0	0	0	0	1	1	1
CO3	3	2	2	2	2	0	0	0	0	0	0	1	0	1

CO4	3	2	2	2	2	0	0	0	0	0	0	1	0	1
CO5	3	3	2	3	2	0	0	0	0	0	0	1	1	1

COURSE CONTENT	
UNIT I	**Mathematical modeling of control systems** Classification of control systems, open loop and closed loop control systems and their differences, Feedback characteristics, transfer function of linear system, mathematical modeling of mechanical systems (translational and rotational) - mathematical modeling of electrical circuits, DC servo motor, AC servo motor, synchro, transmitter and receiver – block diagram reduction –signal flow graphs – Mason's gain formula.
UNIT II	**Time response analysis** Standard test signals – time response of first and second order systems – time domain specifications, steady state errors and error constants, effects of proportional (P), proportional integral (PI), proportional derivative (PD), proportional integral derivative (PID) systems. **Stability and root locus technique** The concept of stability – Routh's stability criterion – limitations of Routh's stability, root locus concept – construction of root loci (simple problems), Effect of addition of Poles and zeros to the transfer function on stability.
UNIT III	**Frequency response analysis** Introduction to frequency domain specifications – Bode diagrams – transfer function from the Bode diagram- Polar plots. Stability analysis from Bode plots, phase margin and gain margin, Nyquist stability criterion.
UNIT IV	**Classical control design techniques** Lag, lead, lag-lead compensators, design of compensators using Bode plots
UNIT V	**State space analysis of LTI systems** Concepts of state, state variables and state model, state space representation of transfer function, diagonalization, solving the time invariant state equations, State Transition Matrix and its properties.

TEXT BOOKS	
1.	Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2.	Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.
3.	Control Systems Engineering by Norman Nise Wiley India Edition, 7th Edition.
4	Control System Engineering by I. J. Nagarath and M. Gopal – 5th Edition, New Age International Publishers.
REFERENCE BOOKS	
1.	Control Systems, Manik Dhanesh N, Cengage publications .
2.	Control Systems principles and design, M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
3.	Control Systems Engineering, S.Palani, Tata Mc Graw Hill Publications.
4.	Control system by A.Anand Kumar –Second Edition , PHI Learning Private Limited , 2014
5.	Control Systems by William Bolton -1st Edition, Newnes Publishers, 2002,UK.

WEB RESOURCES (Suggested)	
1.	www.electrical4u.com/control systems

2.	www.electrical4u.com/state space analysis
3.	www.tutorialspoint.com/control_systems/control_systems_bode_plots
4.	https://en.wikibooks.org/wiki/Control_Systems/Bode_Plots.
5.	https://www3.nd.edu/~pantsakl/Publications/348A-EEHandbook05.pdf

ELECTRICAL POWER GENERATION AND DISTRIBUTION

Course Category	Professional Core Courses	**Course Code**	**19EE4T09**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To study the principle of operation of different components of a thermal power stations
2	To study the principle of operation of different components of Hydro, Gas, and Nuclear power stations.
3	To study the constructional and operation of different components of an Air and Gas Insulated substations.
4	To study the constructional details of different types of cables.
5	To study different types of load curves and tariffs applicable to consumers.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Identify the different components of thermal power plants.	Remembering	K1
CO2	Identify the different components of hydro, gas, nuclear Power plants.	Remembering	K1
CO3	Identify the different components of air and gas insulated substations.	Remembering	K1
CO4	Identify single core and three core cables with different insulating materials.	Remembering	K1
CO5	Analyze the different economic factors of power generation and tariffs.	Analyzing	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	1	1	0	1	0	0	0	0	1	1	2
CO2	3	2	2	1	1	0	1	0	0	0	0	1	1	2
CO3	3	1	2	1	1	0	0	0	0	0	0	1	1	1
CO4	3	2	1	1	1	0	0	0	0	0	0	1	1	2
CO5	3	1	1	2	1	0	0	0	0	0	0	1	1	2

COURSE CONTENT	
UNIT I	**Thermal Power Stations** Selection of site, General layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators steam Turbines : Impulse and reaction

	turbines, Condensers, feed water circuit, Cooling towers and Chimney.
UNIT II	**Hydro, Gas and Nuclear Power Stations** Hydro Power Plant: Layout and working, Types of hydroelectric power plants, Advantages of hydro generation. Gas power plant: Layout, Components of a gas turbine, Open and Combined cycle power stations. Nuclear Power Plant: Location, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR.
UNIT III	**Substations** **Air Insulated Substations (AIS) -** Indoor & Outdoor substations, Substations Layouts of 33/11KVshowing the location of all substation equipment, Bus bar arrangements in the Sub-Stations: Single bus bar, sectionalized single bus bar, Double bus bar arrangements with one and two circuit breakers, Main and Transfer bus bar system with relevant diagrams. **Gas Insulated Substations (GIS)** – Advantages of GIS, Different types of GIS, Single line diagram of GIS, Constructional aspects of GIS, Installation and maintenance of GIS, Comparison of AIS with GIS
UNIT IV	**Underground Cables** Types of Cables, Construction, Types of insulating materials, Calculation of insulation resistance, stress in insulation and power factor of cable, Capacitance of single and 3-Core belted Cables, Grading of Cables-Capacitance grading and Inter-sheath grading,
UNIT V	**Economic Aspects of Power Generation & Tariff** **Economic Aspects -** Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants. **Tariff Methods** - Costs of Generation and their division into Fixed, Semi fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods

TEXT BOOKS	
1.	Electric Power Generation, Transmission & Distribution by Leonard L. Grigsby, CRC Press Taylor & Francis group, 3rd Edition.
2.	A Text Book on Power System Engineering by M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.
3.	Generation of Electrical Energy by B.R.Gupta S.Chand Publications 7th Edition.
REFERENCE BOOKS	
1.	A Course in Power Systems by J.B. Gupta, S. K. Kataria & sons, 2009 Edition.
2.	Principles of power system by V.K.Mehta & Rohit Mehta, S.Chand Publications
WEB RESOURCES (Suggested)	
1.	**https://www.ntpc.co.in/en/power-generation**
2.	**https://energy.economictimes.indiatimes.com/tag/power+generation**
3.	**https://www.sciencedirect.com/topics/engineering/electric-power-distribution**

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II Year II Semester

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Category	Professional Core Courses	**Course Code**	**19EE4T10**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To study the principle of operation and working of different types of instruments for measurement of Electrical Quantities.
2	To study the working principle of operation of different types of instruments for measurement of power and power factor.
3	To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
4	To understand the principle of operation and working of transducers.
5	To study the principle of operation and working of DVMS, Power Analyser and applications of CRO.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Select the right type of instrument for measurement of AC and DC. Electrical Quantities.	Analyzing	K4
CO2	Understand the construction and principle of operation of instruments for measurement of Power and Power Factor.	Understanding	K2
CO3	Calculate the unknown resistance, inductance, capacitance by using DC and AC bridges.	Applying	K3
CO4	Identify the various transducers used for various applications.	Remembering	K1
CO5	Analyze digital meters for the measurement of voltage, frequency, speed and Energy.	Analyzing	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	2	0	0	0	0	0	0	0	0	0	1
CO2	2	3	3	2	0	0	0	0	0	0	0	0	0	1
CO3	2	2	2	2	0	0	0	0	0	0	0	0	0	1
CO4	2	2	2	2	0	0	0	0	0	0	0	0	0	1

CO5	3	3	3	2	0	0	0	0	0	0	0	0	1	1

COURSE CONTENT	
UNIT I	**Measuring Instruments** Classification – Deflecting, control and damping torques – PMMC, moving iron type and electro static instruments, Construction, Torque Equation, Range Extension – Effect of temperature -- Errors and compensations–Advantages and Disadvantages – Instrument Transformer : Current Transformers and Potential transformers– Construction ,theory, Errors.
UNIT II	**Analog wattmeters and Power factor Meters** Electrodynamometer type wattmeter (LPF and UPF) , Power factor meters – Dynamometer and M.I. Type (single phase and three phase): Construction, Theory, Torque Equation, advantages and disadvantages.
UNIT III	**Measurement of Electrical Parameters** **DC Brides :** Methods of measuring low, medium and high resistance – Sensitivity of Wheatstone's bridge — Kelvin's double bridge for measuring low resistance– Loss of charge method for measurement of high resistance ,Megger– Measurement of earth resistance. **AC Bridges:** Measurement of inductance– Quality Factor – Maxwell's bridge–Hay's bridge –Anderson's bridge–Measurement of capacitance and loss angle – Desauty's bridge– Schering Bridge–Wagner's earthing device–Wien's bridge.
UNIT IV	**Transducers** Definition of transducers – Classification of transducers –Resistive, Inductive and Capacitive Transducers – LVDT – Strain gauge– Thermistors – Thermocouples – Piezoelectric and Photo diode Transducers –Digital Shaft encoders , Hall effect Sensors.
UNIT V	**Digital meters** Digital Voltmeter–Successive approximation type DVM, Ramp type DVM and integrating type DVM –Digital frequency meter, Digital multimeter, Digital Tachometer, Digital Energy meter, LCR Q Meter, Power Analyzer–Measurement of Phase difference and frequency, hysteresis loop using lissajous patterns on CRO.

TEXT BOOKS	
1.	Electrical Measurements and Measuring Instruments by F. W. Golding and Widdis, Wheeler publishing, 5th Edition.
2.	Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrick and W.D. Cooper, Pearson/Prentice Hall of India ,5th Edition -2002
3.	A Course in Electrical and Electronics Measurements and Instruments by A. K. Sawhney Dhanpat Rai and sons publications, Delhi.
4.	Electronic Instrumentation and Measurements by David A Bell Oxford University Press, 2nd Edition.
REFERENCE BOOKS	
1.	Electrical and Electronics Measurements and Instrumentation by R.K.Rajput, S.Chand publications.
2.	Electrical Measurements by Buckingham and Price,Prentice-Hall
3.	Electrical Measurements by Forest K. Harris ,John Wiley and sons.

4.	Electrical Measurements: Fundamentals, Concepts, Applications by Reissland, M.U, New Age International (P) Ltd. Publishers.
WEB RESOURCES (Suggested)	
1.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-071j-introduction-to-electronics-signals-and-measurement-spring-2006/index.htm
2.	http://lrf.fe.uni-lj.si/fkkt_ev/Literatura/Electrical_and_Electronics_Measurment.pdf
3.	https://nptel.ac.in/syllabus/108106070/
4.	https://lecturenotes.in/subject/265/electrical-measurement-and-instrumentation-emi/note?orderBy=desc&sortBy=popular
5.	http://www.vssut.ac.in/lecture_notes/lecture1423813026.pdf

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

CourseCategory	Humanities including Management	**Course Code**	**19HM4T01**
CourseType	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

Course Outcomes		**Blooms Taxonomy Level**	
On successful completion of the course, the student will be able to			
CO 1	Make use of the concepts of managerial economics and demand in managerial decision making and predicting demand for goods and services	Applying	K3
CO 2	Assess the functional relation among production, cost of production, cost concepts and Break-Even Analysis.	Evaluating	K5
CO 3	Classify market structures as perfect and imperfect markets for price and output decisions	Understanding	K2
CO 4	Appraise the forms of business organizations and trade cycles in economic growth.	Evaluating	K5
CO 5	Apply accounting and capital budgeting techniques in financial decision making	Applying	K3

Contribution of Course Outcomes towards achievement of Program											
Outcomes: 1 – Low, 2 - Medium, 3 – High											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	0	2	0	0	0	0	0	0	0	0	0	0
CO2	0	1	0	0	0	0	0	0	0	0	3	0
CO3	0	1	0	0	0	0	0	0	0	0	0	0
CO4	0	0	0	0	0	0	0	0	0	0	0	1

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CO5	0	3	0	0	0	0	0	0	0	0	1	0

COURSE CONTENT	
UNIT I	**Introduction to Managerial Economics and demand Analysis:** Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Basic Economic Tools used in Managerial Economics-Concepts of Demand-Types-Determinants-Law of Demand its Exceptions-Elasticity of Demand-Types and Measurement- Law of Supply -Demand forecasting and Methods of demand forecasting.
UNIT II	**Production and Cost Analysis:** Production function- Law of Variable proportions- Iso-quants and Isocosts- Laws of Returns to Scale-Cobb-Douglas Production function-Economies of Scale-Cost Concepts- Fixed vs Variable Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problems).
UNIT III	**Introduction to Markets:** Market Structures: Perfect Competition, Monopoly, Monopolistic and Oligopoly – Features – Price and Output Determination. **Theories of the Firm & Pricing Policies:** Managerial Theories of firm: Marris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.
UNIT IV	**Types of Business Organization and Business Cycles:** Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycles.
UNIT V	**Introduction to Accounting and Capital Budgeting:** Introduction to Double Entry Systems-Journal-Ledger- Trail Balance - Preparation of Financial Statements **Capital Budgeting**: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS	
1.	Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
2.	Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
3.	Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH
REFERENCE BOOKS	
1.	V. Maheswari: Managerial Economics, Sultan Chand.
2.	Suma Damodaran: Managerial Economics, Oxford 2011.
3.	Prof. J.V.PrabhakaraRao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.
4.	Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5.	Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6.	
WEB RESOURCES (Suggested)	
1.	https://economictimes.indiatimes.com/definition/law-of-supply

2.	https://sites.google.com/site/economicsbasics/managerial-theories-of-the-firm
3.	https://www.managementstudyguide.com/capitalization.htm

II Year II Semester

SIGNALS AND SYSTEMS

Course Category	Professional Core Courses	**Course Code**	**19EC4T09**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	Representation and classification of signals and systems, Representation of signals using Fourier series
2	Representation of signals using Fourier transform, properties of Fourier transform and sampling theorem for band limited signals.
3	Time - Domain and Frequency Domain aspects of signals and systems
4	Representation of signals in S-Domain using Laplace transform and ROC
5	Z-Transform of sequences, properties of Z-Transform

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Characterize the signals and systems and analyze the continuous-time signals and continuous-time systems using Fourier series	K1
CO2	To analyze Fourier transform and its applications. apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruction.	K2
CO3	Understand the concepts of different types of systems and convolution, correlation operations	K2
CO4	To apply the concepts of Laplace transform for different types of signals along with ROC	K3
CO5	Apply z-transform to analyze discrete-time signals and systems.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**

CO1	3	2										3	1
CO2	3	2										3	1
CO3	3	2										3	1
CO4	3	2										3	1
CO5	3	2										3	1

COURSE CONTENT	
UNIT I	**INTRODUCTION:** Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on Signals and Systems. Basic Signals (impulse function, step function, signum function, ramp function, Complex exponential and sinusoidal signals). Representation of periodic signals in frequency domain using Fourier series.
UNIT II	**FOURIER TRANSFORM and SAMPLING THEOREM:** Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, **SAMPLING THEOREM:** Graphical and analytical proof for Band Limited Signals, impulse sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing.
UNIT III	**ANALYSIS OF LINEAR SYSTEMS:** Linear system, impulse response, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer functions of a LTI system. Filter characteristics of linear systems, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Concept of convolution in time domain and frequency domain using integral equations. Cross-correlation and auto-correlation of functions, properties of correlation function. Relation between convolution and correlation, Extraction of signal from noise by filtering
UNIT IV	**LAPLACE TRANSFORMS :** Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal.
UNIT V	**Z–TRANSFORMS** Fundamental difference between continuous-time and discrete-time signals, Concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS	
1.	Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn 2018.
2.	Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
3.	Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub 2011
REFERENCE BOOKS	
1.	Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2.	Signals and Systems – A.Anand Kumar PHI, 2nd Edn 2012
3.	Signals and Systems – Signals and Systems – M.J. Roberts,3rd Edition,MC Graw-Hill,2019
4.	Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
5.	Signals and Systems – T K Rawat , Oxford University press, 2011
WEB RESOURCES	
1.	https://nptel.ac.in/downloads/117101055/

2.	http://fourier.eng.hmc.edu/e102/lectures/FourierTransforms/
3.	http://fourier.eng.hmc.edu/e102/lectures/Laplace_Transform/
4.	http://fourier.eng.hmc.edu/e102/lectures/Z_Transform/
5.	http://fourier.eng.hmc.edu/e102/lectures/sampling/

ELECTRICAL MACHINES-I LABORATORY

II Year II Semester

Course Category	Lab Course	**Course Code**	**19EE4L05**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	Electrical Machines-I	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To determine the performance of DC Machine and Transformer
2	To control the speed of the DC Motor
3	To Obtain three phase to two phase transformation

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Determine the performance of DC Machines and Transformers	Evaluating	K5
CO2	Control the speed of DC motor	Applying	K3
CO3	Obtain three phase to two phase transformation	Applying	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	2	2	1	0	1	0	0	2	0	0	1	2	1
CO2	3	2	2	1	0	1	0	0	2	0	0	1	2	1
CO3	3	2	2	1	0	1	0	0	2	0	0	1	2	1

LIST OF EXPERIMENTS:	
Any 10 of the following experiments are to be conducted	
Experiment 1	Magnetization characteristics of DC shunt generator.
Experiment 2	Swinburne's test and Brake test on dc shunt motor.
Experiment 3	Hopkinson's test on DC shunt machines.
Experiment 4	Speed control of DC shunt motor by Field and armature voltage Control.
Experiment 5	Retardation test on dc shunt motor.
Experiment 6	Separation of losses in dc shunt motor
Experiment 7	OC & SC test on single phase transformer.
Experiment 8	Sumpner's or Back to back test on identical single phase transformers.
Experiment 9	Scott connection of single phase transformers.
Experiment 10	Separation of core losses of a single phase transformer.

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Experiment 11	Parallel operation of single Phase Transformers.
Experiment 12	Load Test on DC shunt Generator.
Experiment 13	Load test on single phase transformer.

References – Lab Manuals will be provided

II Year II Semester

BASIC ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Category	Lab Course	**Course Code**	**19EC4L02**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	BEDC	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	To plot the V-I characteristics of semi conductor diodes, transistors.
2	To calculate ripple factor and efficiency of rectifiers
3	To plot the frequency response of different amplifiers and design of oscillator circuits

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the basic knowledge and analyze the characteristics of PN DIODE, TRANSISTOR, FET, UJT, SCR.	K2
CO2	Calculate the ripple factor for half wave and full wave rectifiers with and without filters	K2
CO3	Analyze ce, cc amplifiers and oscillators.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2								1	3	2
CO2	3	3	2	2								1	3	2
CO3	3	3	2	2								1	3	2

LIST OF EXPERIMENTS:

PART A:

ELECTRONIC WORKSHOP PRACTICE

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter,

Function Generator, Regulated Power Supply and CRO.

PART B: Any 10 of the following experiments are to be conducted

Experiment 1	P-N junction diode (Forward Bias & Reverse Bias)
Experiment 2	Zener diode (V-I Characteristics & Load Characteristics)
Experiment 3	Rectifiers without filter (Half Wave & Full Wave)
Experiment 4	Rectifiers with C-filter (Half Wave & Full Wave)
Experiment 5	BJT CE Characteristics (Input & Output Characteristics)
Experiment 6	FET CS Characteristics (Transfer & Drain Characteristics)
Experiment 7	Silicon Controlled Rectifier Characteristics
Experiment 8	Uni Junction Transistor Characterisctics
Experiment 9	BJT CE Amplifier
Experiment 10	BJT CC Amplifier(Emitter Follower)
Experiment 11	R-C coupled amplifier
Experiment 12	R-C phase shift Oscillator
Experiment 13	Current series feedback amplifier

References – Lab Manuals will be provided

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II Year II Semester

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Course Category	Mandatory Courses	**Course Code**	19HM4T06
Course Type	Theory	**L-T-P-C**	2 -0 -0 - 0
Prerequisites		**Total Marks (Internal Assessment)**	100

Course Outcomes		**Blooms Taxonomy Level**	
On successful completion of the course, the student will be able to			
CO1	Understand the evolution of Constitution of India	Understanding	K2
CO2	Make use of their Fundamental rights.	Application	K3
CO3	Understand the functioning of the Union Government	Understanding	K2
CO4	Understand the functioning of the State and local self Government.	Understanding	K2
CO5	Understand the value of Indian Constitution in functioning of the country.	Understanding	K2

Contribution of Course Outcomes towards achievement of Program

Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO 1	**PO2**	**PO 3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**	**PO11**	**PO12**
CO1	0	0	0	0	0	3	0	3	0	1	0	2
CO2	0	0	0	0	0	1	0	2	1	1	0	1
CO3	0	0	0	0	0	1	0	1	1	1	0	0
CO4	0	0	0	0	0	1	0	1	1	1	0	0
CO5	0	0	0	0	0	1	1	1	1	1	0	2

COURSE CONTENT

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UNIT I	**Introduction to Traditional Knowledge**: Define Traditional Knowledge- Nature and Characteristics- Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in global economy.
UNIT II	**Basic structure of Indian Knowledge System**: Astadash Vidya- 4 Ved - 4 Upaved (Ayurved,Dhanurved,GandharvaVed&SthapthyaAdi),6vedanga(Shisha,Kalppa,Nirukha,Vykaran,Jyothisha&Chand),4upanga(Dharmashastra,Meemamsa,purana&Tharka Shastra).
UNIT III	**Modern Science and Indian Knowledge System**-Indigenous Knowledge, Characteristics- Yoga and Holistic Health care-cases studies.
UNIT IV	**Protection of Traditional Knowledge**: The need for protecting traditional knowledge -Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.
UNIT V	**Impact of Traditions:** Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain &Boudh - Indian Artistic Tradition - Chitra kala, Moorthi kala, Vasthu kala , Sthapthya, Sangeetha, NruthyaYevamSahithya

REFERENCE BOOKS	
1.	Traditional Knowledge System in India, by Amit Jha, 2009.
2.	Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3.	Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya
4.	Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
5.	Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
6.	Pramod Chandra, India Arts, Howard Univ. Press, 1983
7.	Krishna Chaitanya, Arts of India, Abhinav Publications, 1987
WEB RESOURCES	
1.	https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
2.	http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf
3.	https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_text.pdf

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