



DETAIL TEACHING SCHEME

SCHOOL OF ENGINEERING
ACADEMIC YEAR - 2021-22

PROGRAM: B. TECH - ELECTRICAL ENGINEERING
SEMESTER - II (Batch - 2021-25)

DEFINATION OF CREDIT: 1. Lecture (L): 1 hour/week/semester, 2. Practical (P): 2 hours/week/semester 3. Tutorial(T): 2 hours/week/semester

TEACHING SCHEME										
Course Code	Course Name	Teaching Hours			SSH	Credits	Audit course	CIE	PSEE	Remarks if any
		Lecture	Tutorial	Practical						
APS201	Vector Calculus and Linear Algebra	4	0	0	3	4	N	Y	N	
ESLB2B	English As a Second Language-Intermediate Level-II	3	0	0	2	3	N	Y	N	
WP201	Workshop Practice-II	0	0	2	2	1	N	Y	Y	
CE202	Fundamentals of Computer Programming	2	0	4	2	4	N	Y	Y	
ME126	Basics of Mechanical Engineering	1	0	2	2	2	N	Y	Y	
CV116	Basics of Civil Engineering	1	0	2	2	2	N	Y	Y	
APS141	Environmental Science	2	0	0	2	3*	N	Y	N	
EC310	Electronics Devices and Circuits-I	3	0	2	2	4	N	Y	Y	
MEN201	Mentoring	0	0	1	0	-	N	N	N	
XXXX	Elective-II	0	0	1	1	1	N	N	Y	
	Total	16	0	14	18	24				
		Total Teaching Hours 30								

HOD

Director

University Electives-I										
Course Code	Course Name	Teaching Hours			SSH	Credits	Audit course	CIE	PSEE	Remarks if any
		Lecture	Tutorial	Practical						
NSS201	National Service Scheme-II*	0	0	1	-	1	N	N	Y	-
YOG201	YOGA-II*	0	0	1	-	1	N	N	Y	-

N- No
Y - Yes

CIE - Continuous internal evaluation
PSEE - Practical semester end examination including ITD, Dissertation, Industrial project, Industrial training etc.

SSH - Self-study hours per week

Remarks: *Students are required to undergo 15 hrs. training / field visit / workshop in relevant field during semester.

Course Title	Vector Calculus and Linear Algebra
Course Code	APS201
Course Credit	Lectures : 04
	Practical : 00
	Tutorial : 00
	Total : 04

Course Learning Outcomes:

After Successful completion of the above course, students will be able to:

- **Solve** technical and computational problems using linear algebra.
- **Understand** theory for applying computational skills necessary for the concepts of calculus.
- **Apply** various methods to determine solution of the equations and analyze feasibility of the solution.
- **Perform** line, surface and volume integral and discuss their applications.

Detailed Syllabus

Sr. No.	Name of the chapter & Details	Hours Allotted
SECTION – 1		
1.	Vectors Scalar and vector product, Applications of vector product – circulation, work done.	03
2.	Matrices Types of matrices, Algebra of matrices, Elementary transformations, Determination of rank a matrix by various methods, Inverse of matrix by elementary transformations, Consistency of a system of linear simultaneous equations, Eigenvalue and eigenvector of matrix, Diagonalization of a matrices, Linear transformation of quadratic form, Canonical form or sum of squares form using the linear transformation, Canonical form or sum of squares form using the orthogonal transformation, Index and signature of the quadratic form, Cayley- Hamilton theorem, Hermitian matrix and skew-Hermitian matrix, Unitary matrix.	14
3.	Basics of Laplace Transforms Definition of Laplace transforms, Laplace transforms of elementary functions, Inverse Laplace transforms, First shifting theorem.	08

4	Linear Transformations Matrix Transformation, Linearity in picture, Onto and one-to-one transformation, Inverse transformation.	03
	Total	28
SECTION-II		
5.	Multiple Integration Evaluation of double integrals under various region in cartesian and polar coordinates, Change of variable from cartesian to polar co-ordinate and any other co-ordinates, Evaluation of triple integrals, Applications of multiple integrals-Volume of mass by double and triple integrals, Analytical solid geometry, Cartesian coordinates in space, Centre of gravity, Moment of inertia etc.	08
6.	Vector Differential Calculus Vector differentiation, Scalar and vector fields, Gradient, Divergence and curl of a vector field, Directional derivative, Irrotational, Solenoidal.	08
7.	Vector Integral Calculus Line Integral, Green's theorem. Surface integral, Divergence theorem, Volume integral, Stoke's theorem.	08
8.	Gamma and Beta Functions Gamma functions and its properties, Beta functions and its properties, Relation between Gamma and Beta function.	04
	Total	28

Instructional Method and Pedagogy:

- Main Instructional method will be conducted by usage of Black-board and Chalk duster.
- Application based learning
- Assignments based on course content will be given to students at the end of each topic/unit and will be evaluated at regular interval.
- Surprise tests/quizzes will be conducted.

Reference Books:

1. Dr. R. C. Shah , "Vector Calculus & Linear Algebra", Books India Publications.-5th edition.
2. Dr. K. R. Kachot , "Vector Calculus & Linear Algebra", Mahajan Publishing House.
3. B. S. Grewal , "Higher Engineering Mathematics", Khanna Publishers Co. Ltd., New Delhi – 39th edition.
4. Thomos George, B. weir Maurice, D. Hass Joel Giordano Frank, Prajapati Jyotindra, "Calculus", Pearson Education, Delhi – 1st edition.
5. H. Anton , "Elementary Linear Algebra with applications", Wiley India publications, New Delhi – 8th edition.
6. Gilbert Strang, "Linear Algebra and its applications", Thomson Brooks/Cole(2006).

Additional Resources:

- https://www.cse.iitb.ac.in/~cs749/spr2016/handouts/jem_graddivcurl.pdf
- <https://www.coursera.org/learn/matrix-algebra-engineers>
- <http://davidlowryduda.com/the-gamma-function-beta-function-and-duplication-formula/>
- <https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/3.-double-integrals-and-line-integrals-in-the-plane/part-a-double-integrals/>

Course Title	ENGLISH AS A SECOND LANGUAGE - Preliminary Level 2
Course Code	ESLB1B
Course Credit	Lecture : 03
	Practical : 00
	Tutorial : 00
	Total : 03

Course Learning Outcomes

At end of the course, students will be able to -

1. Identify key words and infer the exact meaning of reading texts while using paraphrasing skills.
2. Articulate a short message and or express opinions through a short message, letter or a story.
3. Summarize and correlate the audios with related texts and messages.
4. Sketch, develop and articulate their opinions, ideas & descriptions on a given topic.

Detailed Syllabus

SR No	UNITS	GRAMMAR	LISTENING	SPEAKING	READING	WRITING
1	What's your job?	Present simple vs. present continuous (for present action); state verbs; short answers	--	Part 3 Describe a picture or a photograph	Part 5 Multiple choice fill ten spaces in a short text	--
2	What did you do at school today?	Past simple; short answers; adjectives ending in -ing and -ed	Part 2 Six multiple choice one speaker or an interviewer	--	--	Part 3 Either a letter or a story
3	Around town	Prepositions of place and movement; comparative adjectives; commands	--	--	Part 3 Ten true/false questions about a longer text	--

4	Let's celebrate	Present perfect simple; just, already, yet	--	Parts 3 & 4 Student have a discussion about the photographs in part 3.	--	Part 2 A short message
5	I look forward to hearing from you	Present perfect and past simple; ago, for, since, in; been and gone; have you ever...?	Part 1 Seven multiple choice picture questions	--	--	Part 3 Either a letter or a story
6	Facts and figures	superlative adjectives; present simple passive	--	--	Part 5 Multiple choice fill ten spaces in a short text	--
7	A good read	Past continuous; past continuous vs. past simple; while/when + past continuous	--	Part 1 Give information about yourself	--	Part 3 Either a letter or a story
8	What's in fashion?	used to; too and enough with adjectives; adjective order	Part 4 Six true/false conversation between two speakers	--	--	Parts 2 & 3 A short message/ A letter or a story
9	Free time	going to future; present tense after when, after and until in future time	Part 2 Six multiple choice one speaker or an interviewer	--	--	Part 1 Rewriting sentences
10	Happy families	Verbs and expression followed by to and -ing; make and let	--	--	Part 5 Multiple choice fill ten spaces in a short text	--
11	So you think you've got talent?	Comparison of adverbs; so and such; connectives	Part 1 Seven multiple choice picture questions	--	--	Part 3 Either a letter or a story

12	Keep in touch!	Have some think done; reported commands and requests; possessive pronouns and adjectives	--	--	Part 5 Multiple choice fill ten spaces in a short text	--
13	I've got an idea	Past simple passive; future passive	Part 3 Six gaps one main speaker	--	--	Part 3 Either a letter or a story
14	Shop till you drop	Reported questions; too much, too many, not enough; verbs with two objects	--	--	Part 3 Ten true/false questions about a longer text	--
15	Persuading people	First conditional; unless; if and when	--	Part 1 & 2 Introduction & conversation	--	Part 3 Either a letter or a story
16	Blue for a boy, pink for a girl?	hardly; before / after + -ing	Part 4 Six true/false conversation between two speakers	Part 3 & 4 Student have a discussion about the photographs in part 3.	--	Part 1,2 & 3 short message letter or story paraphrasing

Reference Books -

1	Objective KET Student's Book Student Edition
2	Objective KET Teacher's Book Paperback – Teacher's Edition by Annette Capel (Author)
3	Objective KET Workbook Workbook Edition by Annette Capel (Author), Wendy Sharp (Author)
4	Cambridge Grammar for PET Book with Answers and Audio CD: Self-Study Grammar Reference and Practice
5	(Cambridge Books for Cambridge Exams) Pap/Com Edition Louise Hashemi (Author), Barbara Thomas (Author)
6	Practice Tests for the Preliminary English Test (PET) 1 Student's Book
7	Cambridge Preliminary English Test Extra Self Study
8	Cambridge Vocabulary for PET Student Book with Answers and Audio

Course Title	Workshop Practice - II
Course Code	WP201
Course Credit	Theory : 00
	Practical : 01
	Tutorial : 00
	Credits : 01

Course Learning Outcomes:

Upon successful completion of this course, the students will be able to:

- **Understand** the applications of different electronics tools.
- **Perform** the operations on voltage regulators.
- **Work** with various electrical and electronics equipment.
- **Develop** knowledge about various electronics components and equipment.
- **Implement** the circuit on breadboard and PCB.
- **Simulate and analyze** the given circuit.

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
SECTION-I		
1	Operation of three terminal fixed voltage regulators, Concept of line and load regulations.	04
2	Introduction to electrical machines: Demonstration of: a.c and d.c motors and generators. Single and Variac.	04
3	Working of UPS and home inverter, Function of SSD (Seven Segment Display) and LCD (Liquid Crystal Display).	06
Total		14
SECTION-II		
1	Implementation of simple electrical circuits on breadboard. Circuit Troubleshooting: Component fault-finding, open circuit and short circuit fault-finding.	04
2	Implementation of simple electrical circuits using various simulation tools.	06

	IC manufacturing process, electrical estimation and coating.	
3	PCB Designing: Steps of PCB Designing, Layout, Etching, Drilling, Mounting, Soldering.	04
Total		14

Instructional method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted.

Reference Books:

1. Fundamentals of Maintenance of Electrical Equipments, K. B. Bhatia Khanna Publishers
2. Principles and Reliable Soldering Techniques, Sengupta R. New Age International (P) Ltd.
3. Troubleshooting Analog Circuits-Robert A. Pease
4. Circuit analysis-Theory and practice-Robbins & Miller

Additional Resources

- <http://www.ni.com/pdf/manuals/374488e.pdf>
- <http://www.st.com/web/en/resource/technical/document/datasheet/CD00000444.pdf>
- <http://www.olabs.edu.in/?pg=topMenu&id=40>
- https://www.ee.iitb.ac.in/~wel_iitb/
- <http://www.vlab.co.in/>

Course Title	Fundamental of Computer Programming
Course Code	CE202
Course Credits	Theory :02
	Practical :02
	Tutorial :00
	Credits :04

Course Learning Outcomes:

On the completion of the course, students will be able to:

- **Understand** fundamental concepts with broad perspective of programming.
- **Write** programs in a structured style considering various programming constructs.
- **Compile** execute and debug the programs.
- **Develop** the solution into modules at the user-defined function level.

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
SECTION-I		
1.	Introduction to Programming Programing, Compiler and Interpreter, types of programming languages	2
2.	Fundamentals of C Language Basics of C, Program Structure, Keywords, Header Files, Data Types, Identifiers and Constants, Operators and Precedence	3
3.	Control Structures and Looping Decision Making Statements: Two-way, Multi-way Looping: Entry and Exit Controlled break, continue and go to statements	4
4.	Array and String Defining, Declaring and Processing of - One Dimensional and Multi-Dimensional arrays Basics of String, String Manipulation with/ without using in-built functions	5
Total		14
SECTION-II		

5.	Function Introduction, Declaring, Defining and Calling Functions, Passing Parameters, Recursion	4
6.	Pointer Basics, Different operations using Pointers, Increment and Scale Factors, Pointer to Pointer	4
7.	Structure and Union Declaration, Definition and Processing of Structure and its members, Passing Structure to Function, Structure v/s Union	4
8.	Dynamic Memory Allocation and File Management Allocating blocks of memory: malloc(), calloc(), realloc(), free() File Creation, File Processing, Opening and Closing Files	2
Total		14

Instructional method and Pedagogy:

- Detail discussion of all topics is not required in class, major focus is to be “Hands on”.
- Assignments based on course contents will be given to the students at the end of each unit/topic and will be evaluated at regular interval
- Lectures will be conducted in audio-visual class room to discuss important concepts with the help of programs and PPTs effectively.
- Problems based on concepts learnt in each unit/topic will be given followed by discussion to improve problem solving skills.
- Term work will be given such that students can apply their own logic to develop programs.
- End semester exam (TSEE) will be conducted of 50 Marks.

Reference Books:

- Title: “Programming in ANSI C”, McGraw-Hill Publications, Author: E Balagurusamy
- Title: “The Complete Reference of C”, McGraw-Hill Publications, Author: Herbert Schildt
- Title: “Computer Fundamentals and Programming in C” Author: Dey and Ghosh

Additional Resources

- <https://www.programiz.com/c-programming/>
- <http://fresh2refresh.com/c-programming>
- <https://www.tutorialspoint.com/cprogramming/>
- www.cprogramming.com/tutorial/c

Course Title	BASICS OF MECHANICAL ENGINEERING
Course Code	ME126
Course Credit	Theory :01
	Practical :01
	Tutorial :00
	Credits :02

Course Learning Outcomes:

After Successful completion of the above course, students will be able to:

- **Define** the fundamentals laws of Thermodynamics and **describe** their application in thermal systems like air standard cycles of IC engines and analyzing the gas processes.
- **Sketch & explain** the schematic diagram of various steam generators and compressors.
- **Solve** the examples based on properties of steam and **apply** the same concepts to **analyze** the steam generator performance using steam tables.
- **Apply** the theoretical and mathematical concepts to **solve** the primary problems on air compressors and IC engines.

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
SECTION-I		
1.	Introduction to Mechanical Engineering: Overview of Mechanical Branch, Different main branches of mechanical Engineering-Thermal, Design and Production	01
2	Basics of Thermal Engineering: Internal Energy and Enthalpy, Zeroth Law, First Law and Second Law of Thermodynamics	02
3	Properties of Steam: Introduction: Steam formation, Types of Steam, Enthalpy and dryness fraction of steam.	04
4	Steam Generator: Definition, Classification, General study of Cochran, Babcock Wilcox, Lancashire and locomotive boilers. Boilers mountings and accessories.	04*

5	Internal Combustion Engines: Definition, Classification and Components, Various efficiencies, Working of the two stroke and Four-stroke cycle engines, S.I. and C.I. Engines, Air standard cycles – Otto, diesel & dual cycle.	07*
6	Properties of gases: Gas laws, Boyle's law, Charles's law, Combined gas law, Gas constant, Internal energy, Relation between Cp and Cv, Enthalpy, Non flow process, Constant volume process, Constant pressure process, Isothermal process, Poly- Tropic process, Adiabatic process.	02
7	Air Compressors and Pumps: Introduction and uses of compressed air, Reciprocating compressors, Operation of a compressor, Work for compression, Power required, Reciprocating compressor efficiency, Multistage reciprocating compressors, Rotary compressors, Reciprocating pump, types and operation, Bucket pump, Air Chamber, Centrifugal pumps, Types and Priming, Rotary pumps.	05
Total		14

Instructional method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector and black board.
- Attendance is compulsory in lectures and laboratory. Minimum two internal exams will be conducted and average of two will be considered as a part of overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures. Minimum eight experiments shall be there in the laboratory related to course contents.
- Minimum six tutorials which includes solution of minimum five numerical under each head.
- * Topics will be covered during laboratory hours.
- **Final Theory Semester End Examination will be of 50 Marks.**

Reference Books:

1. K.P. Roy, S.K. Hajra Chaudhri, A.K. Hajra, Nirjhar Roy, "Elements of Mechanical Engineering"
2. S.B. Mathur & S. Domkundwar, "Elements of Mechanical Engineering", Dhanpatrai Co.

3. R.K. Rajput, "Thermal Engineering", Laxmi Publications.
4. T.S. Rajan, "Basic Mechanical Engineering", Wiley Eastern Ltd.
5. H.R. Kapoor, "Thermal Engineering, VOL-I & II", Tata McGraw Hill Co. Ltd.
6. G.S. Sawhney, "Fundamentals of Mechanical Engineering", Prentice Hall of India Publication. New Delhi.
7. Dr. D.S. Kumar, "Thermal Science and Engineering", S.K. Kataria & sons Publication New Delhi.

Additional Resources

- <http://cquestionbank.blogspot.com>
- www.intelligentedu.com/
- www.hermetic.ch/cfunlib.html.
- Steam Tables

Course Title	BASICS OF CIVIL ENGINEERING
Course Code	CV116
Course Credit	Theory :01
	Practical :01
	Tutorial :00
	Credits :02

Course Learning Outcomes:

After completion of the course students will be able to,

- **Understand and analyze** the scope of civil Engineering in the development of the country.
- **Understand** the importance and working principle of surveying.
- **Understand** the physical properties of construction materials.
- **Analyze** various components of building and their function and purposes.

Detailed Syllabus

Sr. No	Name of chapter & details	Hours Allotted
1.	Scope of Civil Engineering Impact of Infrastructural Development on the Economy of a Country, Role of Civil Engineers, Branches of civil engineering, Scope of civil engineering.	2
2.	Construction Materials Requirement, types, uses, properties and importance of Civil Engineering materials like Stone, Bricks, Lime, Cement, Timber, Sand, Aggregate, Mortar and Concrete.	3
3.	Introduction to Surveying and Levelling Surveying and levelling, Primary divisions, Fundamental principles, Classification of surveying, Units of measure, linear measurements, instruments used in linear measurements, angular measurements, instruments used in angular measurements, introduction to leveling, instruments used in leveling.	6
4.	Elements of Building Construction: Elementary principles and basic requirements of a building planning, layout of residential & industrial buildings, positioning of various components of buildings, orientation of buildings.	3

Total

14

Instructional method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, blackboard, OHP etc. Assignments based on course contents will be given to the students at the end of each unit/topic and will be evaluated at regular interval
- Minimum Six experiments shall be there in the laboratory related to course contents
- TSEE will of 50 marks of one and half hour.

Reference Books:

1. Dr.B.C.Punmia, Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol-I,16th Edition, New Delhi :Laxmi Publications(P) Ltd., 2005Engineering Material by DrS.C.Rangwala, Charotar publication house.
2. Rangwala S. C. Rangwala K. S. and Rangwala P. S., Building Construction, 26th Edition, Charotar book Distributors, Anand, 2011.
3. Gurcharan Singh, Building Planning Designing and Scheduling, 5th Edition, Standard Book House Delhi

Additional Resources

- N.P.T.E.L. Lecture Series

Course Title	ENVIRONMENTAL SCIENCE
Course Code	APS142
Course Credit	Lecture :02 + 01 (Industrial Report)
	Practical :00
	Tutorial :00
	Credits :03

Course Learning Outcomes:

After Successful completion of the above course students will be able to:

- **Understand** the importance of environment.
- **Apply** their idea to understand various type of pollution.
- **Identify** various pollution control measures to mitigate pollution.
- **Recognize** the global environmental problems associated with environment.
- **Understand** the human population dynamics.
- **Develop** awareness among the society about environment pollution.

Detailed Syllabus

Sr. No	Name of chapter & details	Hours Allotted
SECTION-I		
1.	Introduction of Environment Definition of environment, Importance and Requirement of environmental education in engineering, Component of environment, Technology, clean technology, effect of technology on environment.	02
2.	Water pollution Sources of water, Type of impurities found in waste water, *Different method to remove the impurities, *CETP, Water quality standard by WHO, *Eutrophication.	05
3.	Air pollution Composition of air, Structure of atmosphere, Sources of air pollution, Technology used in control of air pollution, Prevention for air pollution, National Ambient Air Quality Standard (NAAQS), *Bag house, *Cyclone separator, *Catalytic converter, Scrubber, *Electrostatic precipitator.	07
4.	Land pollution Structure of lithosphere, Type of solid waste, Step to control land pollution,	05

	* Landfill and incineration method to control land pollution.	
5.	Noise pollution Introduction of sound and noise, Sources of noise pollution, Effect of noise pollution, *Control of noise pollution, Noise pressure and noise level (at fetal).	02
Total		21

SECTION-II

6.	Global environmental problem Greenhouse effect and Global warming, Acid rain, Ozone layer depletion.	04
7.	Ecological aspects of environment Ecology, Ecosystem, Type of Ecosystem, Structure of ecosystem, Classification of biotic component, Function of ecosystem, Energy flow in ecosystem, Food chain, Food web, Biodiversity, Component of biodiversity, Biodiversity index, Biogeochemical cycle, Ecological pyramid.	06
8.	Human population dynamic Population, Population size, Population density, Population dispersion, Population growth, Population characteristics, Factors affecting population growth, Exponential population growth, Logistic population growth, Factors limiting population growth, Biotic potential and reproductive strategies.	04
9.	Solid Waste Management Introduction, Classification of solid waste, *Engineering system for solid waste management, *Methods for the treatment of solid waste management, Management of solid waste, Factors affecting solid waste management.	07
Total		21

Instructional method and Pedagogy:

- Delivery of lectures using multi-media projectors.
- Individual interaction with students.
- * These topics will be covered during industrial visit.
- * These topics are of 15 Hours.

Reference Books:

1. R. Rajagopalan Environmental Studies: Oxford University Press.
2. K. C. Agrawal Environmental Pollution: Causes, Effects and Control.
3. Richard T Wright and Bernard J Nebel Environmental Science.
4. Deniel B Botkin Edward A Keller Environmental Science.
5. Dr Gourkrishna Dasmohapatra Environment and Ecology.

Additional Resources

- http://en.wikipedia.org/wiki/water_pollution
- <http://environment.nationalgeographic.com/environment/global-warming/pollution-overview/>
- <http://www.nrdc.org/air/>
- <http://eschooltoday.com/pollution/noise-pollution/what-is-noise-pollution.html>
- <http://greenlining.org/issues/2014/californias-climate-revolution-change-national-conversation>

Course Title	Electronics Devices and Circuits-I
Course Code	EC310
Course Credit	Theory :03
	Practical :01
	Tutorial :00
	Credits :04

Course Learning Outcomes:

At the end of the course students will be able to;

- **Understand** the internal structure and performance of semiconductor devices.
- **Apply** the concept of semiconductor physics.
- **Understand** the basic electronics engineering principles.
- **Design** and **Perform** experimental analysis of various electronic circuits.
- **Compare** mathematical representations of circuit behavior with corresponding practical effects.
- **Develop** proficiency in simulation of basic electronics circuits using simulation tools in Laboratory and verify the same on hardware.
- **Apply** the concepts of basic electronic devices to design various circuits.
- **Understand** operation of diodes, transistors, FETs, MOSFETs in order to design basic circuits.
- **Analyze** electronic circuits.
- **Test** small electronic circuit.
- **Design** small and large signal amplifier circuits for various practical applications.
- **Analyze** the behavior of transistor at low frequency.

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
SECTION-I		
1.	Transport Phenomena in Semiconductors: Mobility and Conductivity, Electrons and Holes in an Intrinsic Semiconductor, Donor and Acceptor Impurities, Charge Densities in a Semiconductor, Electrical Properties of Ge and Si, The Hall Effect, Conductivity Modulation, Generation and Recombination of Charges, Diffusion.	04
2.	Junction –Diode Characteristics: Open –Circuited p-n Junction, p-n Junction as a Rectifier, Volt-Ampere Characteristic, Temperature Dependence of the V/I Characteristic, Diode	07

	Resistance, Space Charge, Transition Capacitance, Diffusion Capacitance, Breakdown Diodes, Tunnel Diode, Semiconductor Photodiode, Photovoltaic Effect, Light –Emitting Diodes	
3.	Diode Circuits: Diode as a Circuit Element, Load-Line Concept, Piecewise Linear Diode Model, Clipping Circuits, Clipping at Two Independent Levels, Rectifiers, Other Full-Wave Circuits, Capacitor Filters	06
4.	Power Circuits and Systems: Class A large Signal Amplifiers, Second Harmonic Distortion, Transformer Coupled Audio Power Amplifier, Efficiency, Push-Pull Amplifiers, Class B Amplifiers.	04
Total		21
SECTION-II		
5.	Transistor Characteristics: Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, CB Configuration, CE Configuration, CE Cut-off region, CE Saturation Region, Typical Transistor, CE Current Gain, CC Configuration, Phototransistor.	06
6.	Transistor Biasing and Thermal Stabilization: Operating Point, Bias Stability, Self-Bias, Stabilization against Variations in I_{CO} , V_{BE} and, General Remarks on Collector-Current Stability, Bias Compensation, Thermal Runaway, Thermal Stability.	06
7.	Transistor at Low Frequencies: Graphical Analysis of the CE configuration, Two-Port Devices and the Hybrid Model, Transistor Hybrid Model, h-Parameters, Conversion Formulas for the Parameters of Three Transistor Configurations, Analysis of a Transistor Amplifier Circuit Using h Parameters, Emitter Follower, Comparison of Transistor Amplifier Configurations, Linear Analysis of a Transistor Circuit, Miller's Theorem and its Dual, Simplified CE Hybrid Model, Simplified Calculations for the CC Configuration, CE amplifier with an Emitter Resistance, High Input Resistance Transistor Circuits	05
8.	Field Effect Transistors: Junction FET, Pinch-Off Voltage, JFET Volt-Ampere Characteristics, FET Small-Signal Model, MOSFET, Digital MOSFET Circuits, Low Frequency CS and CD Amplifiers, Biasing the FET, The FET as a Voltage Variable Resistor.	04
Total		21
Instructional method and Pedagogy:		

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/ will be conducted.

Reference Books:

1. Jacob Millman and Christos C. Halkias, Integrated Electronics, TMH.
2. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition – Pearson Education, International Edition.
3. J. B. Gupta, Electronics Devices and Circuits, S. K. Kataria and Sons.
4. A. Malvino, "Electronics Principles", Tata McGraw Hill Publication, 6th Ed, New Delhi

Additional Resources

- Website for PN Junction- <http://pveducation.org/pvcdrom/pn-junction/pn-junction-diodes>
- Basic Electronics Tutorial- <http://www.electronics-tutorials.ws/>
- Website for Electronic Circuits - <http://www.engineersgarage.com/electronic-circuits>
- Website for Simple Electronic Circuits- <http://www.eleccircuit.com/simple-electronic-circuits/>
- http://www.nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC-ELECTRONICS/home_page.htm

Course Title	National Service Scheme-II
Course Code	NSS201
Course Credit	Theory :00
	Practical :01
	Tutorial :00
	Credits :01

Course Learning Outcomes:

At the end of the course students will be able to gain knowledge about NSS and put the same into practice.

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
SECTION-I		
1.	NATIONAL SERVICE SCHEME (NSS) A student enrolling as member of NSS will have to complete 60 hours of training / social service to be eligible to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.	14
Total		14

Instructional method and Pedagogy:

- An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

Reference Books:

- Vethathiri Maharishi.T, "Simplified Physical Exercises", Vethathiri Publishers, 1987.

Course Title	YOGA-II
Course Code	YOG201
Course Credit	Theory :00
	Practical :01
	Tutorial :00
	Credits :01

Course Learning Outcomes:

At the end of the course students will be able to gain knowledge about YOGA and put the same into practice.

Detailed Syllabus

Sr. No	Name of chapter & details	Hours Allotted
1.	YOGA Benefits of Agnai Meditation -Meditation - Agnai, Asanas, Kiriyaas, Bandas, Muthras. Benefits of santhi Meditation - Meditation Santhi Physical Exercises (I&II). Lecture & Practice - Kayakalpa Yoga Asanas, Kiriyaas, Bandas, Muthras. Analysis of Thought - Meditation Santhi Physical Exercises III & IV. Benefits of Thuriyam - Meditation Thuriyam Kayakalpa Asanas, Kiriyaas, Bandas, Muthras. Attitude - Meditation Thuriyam Kayakalpa Asanas, Kiriyaas, Bandas, Muthras. Importance of Arutkappy & Blessings - Meditation Thuriyam Kayakalpa Asanas, Kiriyaas, Bandas, Muthras. Benefits of Blessings - Meditation Santhi Kayakalpa Asanas, Kiriyaas, Bandas, Muthras	14
Total		14

Instructional method and Pedagogy:

- An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

Reference Books:

- Yogiraj Vethathiri Maharishi, "Yoga for Modern Age", Vethathiri Publishers, 1989