Shri Rawatpura Sarkar University, Raipur

Scheme of Teaching, Examination & Syllabus

for

Diploma (Electrical Engineering)

Semester-(III)

(Effective from the session: 2022-23)

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Three Years Diploma in Engineering Programme

Scheme of Teaching and Examination of Diploma in Engineering Third Semester

(Electrical Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	DENEE301T	Elements of Electrical Engineering	2	1	-	3	30	70	100	3
2	DENEE301P	Elements of Electrical Engineering	-	-	2	1	15	35	50	-
3	DENEE302T	Basic Electronics	3	1	-	4	30	70	100	3
4	DENEE302P	Basic Electronics	-	-	2	1	15	35	50	-
5	DENEE303T	Electrical Circuits	3	1	-	4	30	70	100	3
6	DENEE303P	Electrical Circuits	-	-	2	1	15	35	50	-
7	DENEE304T	Fundamentals of Mechanical Engineering	2	1	-	3	30	70	100	3
8	DENEE304P	Fundamentals of Mechanical Engineering	-	-	2	1	15	35	50	-
9	DENEE305T	Electrical Drawing	3	1	-	4	30	70	100	3
						22			700	

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

<table>
<tr><td>Course Title</td><td colspan="5">ELEMENTS OF ELECTRICAL ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="5">DENEE301T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>2</td><td>1</td><td></td><td>3</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Physics</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• Understand concepts of electrical material, Capacitors etc.
• Understand concepts and principles of electricity.
• Understand to solve simple electric and magnetic circuit and which is the basic requirement.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT-I
Basic Concepts of Electrical Engineering
Concept of current (D.C./A.C.), Concept of voltage (D.C. /A.C.), E.M.F., Potential difference, Terminal voltage, Concept of Resistance, Properties, Classification of resistors based on ohmic value & material, Practical application of above types of resistors, Use of a rheostat in laboratory, Concept of conductor, insulator, semiconductor.
UNIT-II
Electrical Materials
Conducting materials & properties, Insulating materials & properties, Magnetic materials & properties, Semi Conduction materials & properties.
UNIT-III
Capacitors
Concept of capacitor formation, expression for capacitance, Energy stored in capacitor, Dielectric loss, Dielectric materials used in capacitors, types of capacitors, □Effect of dielectric media on capacitance, Electric field strength, Electric flux density, Permittivity, Expression for capacitance of parallel plate capacitor, Series & parallel combination of capacitors, Charging and discharging of capacitors (no derivation, onlynumerical), Concept of inter-turn capacitance, line capacitance, capacitance incables, overhead transmission & distribution lines, A.C./D.C. capacitors and applications.
Inductors
Different types of inductors Construction, Rise and decay of current in an inductor (No derivation, onlynumerical), Energy stored in inductor (No derivation, only numerical), Inductance in A.C. and D.C. circuits.

UNIT-IV
Magnetic Circuits</td></tr>
</table>

	Concept of magnetic flux, Concept of electromagnetism, Magneto motive force, Permeability, Reluctance, Magnetic leakage, leakage coefficient, Magnetic circuits, Uniformmagnetic circuits, Series & parallel circuits, Comparison of electric & magnetic circuits. **UNIT-V** **Electromagnetic Induction** Review of Faraday's laws of electromagnetic induction.Induced E M.F's. Fleming's R.H. rule; direction of induced E.M.F.Concept of self and mutual inductances.Expression for self and mutual inductances.Application of Faraday's laws.Interaction between two or more magnetic field. Force on a current carrying conductor placed in a magnetic field.Fleming's L.H. rule.Numerical on above.
Course outcomes	**At the end of this course student will be able to:** • Understand the fundamentals of electrical element. • Understand the fundamentals of electrical magnetic material. • Analyze the load profile, voltage regulations and efficiency under various operating conditions
Text Books	1. Electrical Appliances 1995 Ajwani, J.M. R.B. Publications,New Delhi 2. Study of Electrical Appliances &Devices3rd ,1991Bhatia, K.B. Khanna Publishers,Delhi 3. Principles of Electrical Engineering 1997 Bhattacharya, Tata -McGraw-Hill,New Delhi 4. Electrical Devices & Circuits 1st ,1991Bogart, T.F., Universal BookStaff, New Delhi 5. Electrical Technology 6th ,1987Cotton, H., ELBS, London 6. Electrical Application Servicing 1st .Crouse ,William H., McGraw
Reference Books	1. Electrical Engineering Vol. I & II 1st , 1980 awes, Chester, McGraw Hill, Book Co. New York 2. Principles of Electrical engineering 2nd , 1984 Del Toro, Vincent, Prentice Hall of India, New Delhi 3. Elementary Electrical Engineering 18th , 1992 Gupta, M.L.New Heights, New Delhi 4. Preventing Electrical Fires & Failures 2001 Hattangadi, A.A., Tata -McGraw-Hill, New Delhi 5. Electrical Technology 6th , 1987 Hughes, E. & Smith, I.M. ELBS/Longmans, London 6. Electrical Technology 1st , 1990 Hughes, Edward, Longman, London 7. Basic Electrical Engineering 1990 Mittle, V.N. Tata McGraw-Hill, New Delhi 8. A Textbook of Electrical Technology 13th , 1981 Theraja, B.L. &Theraja.

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<table>
<tr><td>Course Title</td><td colspan="5">BASIC ELECTRONICS</td></tr>
<tr><td>Course Code</td><td colspan="5">DENEE302T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Physics & basic atomic theory</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• To understand the basic concept electronics devices their property, behavior and application.
• To understand the concept of waves shaping circuit and constant power supply.
• To understand the concept of solid state rectifiers.
• Application of transistor as an amplifier and switch.
• To learn the concept of positive and negative feedback in amplifier.
• Gain experience in the designing of an electronics circuit.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT-I
Introduction To Semiconductor Devices
PN junction diode- concept of barrier potential, forward & reverse biasing,V-I characteristics & applications, Zener Diode- Symbol, working principle, characteristics & applications, Transistor- Basic structure, PNP & NPN types, transistor configuration, characteristics.
UNIT-II
Rectifiers & Filters
Half wave rectifiers., Full wave rectifiers (Center-tap & Bridge), Ripple factor, PIV, rectification efficiency, comparison, merits and demerits of different types of rectifier., D.C. improvement techniques - a) RC filter b) LC filter c) -filter, Zener Diode as Shunt regulator.
UNIT-III
Feedback Amplifiers
Concept of feedback, Block diagram of feedback systems, feedback factor ? (Beta). Types of feedback, strengths and limitations of negative feedback, Feedback connections- voltage-series, voltage-shunt, current-series, current shunt, Single stage amplifier – working, effect of negative feedback, Emitter follower circuit – effect of negative feedback, Feedback with & without bypass capacitor in single stage CE amplifier.
UNIT-IV
Field Effect Transistor (FET):
Introduction, Construction, Operation, V-I Characteristics, Transfer</td></tr>
</table>

	Characteristics, Drain Characteristics, Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Introduction, Construction, Operation and characteristics, Depletion MOSFET, Enhancement MOSFET **UNIT-V** **Oscillators & Wave shaping circuits** Principle of Oscillations; Barkhausen Criteria , Working of RC Oscillators – phase-shift and Wien bridge; LC Oscillators- tuned collector, tuned base, Hartley and Colpitt's, Crystal Oscillator. classification of series and parallel clipper and clamper circuits, biased and unbiased clipper and clamper circuits.
Course Outcomes	**At the end of this course student will be able to:** • Student can predict and design rectifiers and filters as per circuit requirement. • Learn to design transistor biasing circuit and calculating its stability. • Student can apply the concept of feedback in amplifier circuit. • Learn to design oscillator of desired frequency. • Gain experience in the problem finding and trouble shooting in electronics circuits consisting of diodes and transistors.
Text Books	1. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman&Halkias, TMH. 2. Electronic Devices and Circuit Theory – Boylestad&Nashelsky, 8th Ed. PHI.
Reference Books	1. Electronic Devices & Circuit Analysis – K. Lal Kishore, BS Publications 2. Principle of electronics devices - Flyod, Pearson Publication.

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<table>
<tr><td>Course Title</td><td colspan="5">ELECTRICAL CIRCUITS</td></tr>
<tr><td>Course Code</td><td colspan="5">DENEE303T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Physics</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• To study the concept & principles of solving electric & magnetic circuits.
• To study of technology courses like single phase & three phase AC circuit.
• To study of various theorems to solve circuit numerical.
• To study of complex number and their utilization in electric circuit.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT-I
Principles of Circuits
Ohms Law, Series & parallel Resistive Circuits, Kirchhoff’s voltage law, Kirchhoff’s current law, Sign convention, Application to simple circuits.
Analysis of Network Using Circuit Principles
Mesh current analysis, Node voltage analysis, Numericals on D.C.
UNIT-II
Network Theorems
Superposition theorem, Thevenin’s theorem, Norton’s theorem, Source conversion, Maximum power trasfer theorem, Star delta transformation. Numericals on D.C.
UNIT-III
Basic Concepts of A.C. Circuits
Sinusoidal A.C. voltage generation, Definition of various terms used in sine wave, Response of basic R,L and C elements to A.C
Complex Numbers
Rectangular form, Polar form, Rectangular to polar conversion, Polar to rectangular conversion
UNIT-IV
Single Phase A.C. Circuits
Series A.C. circuits. R-L, R-C, & R-L-C circuits. Impedance, reactance, phasor diagram. Impedance triangle.Power factor, Average power, Apparent power, Reactive power, Power triangle. Series resonance quality factor. Parallel A.C. circuits. R-L, R-C, & R-L-C circuits. Admittance, Susceptance.
UNIT-V
Three Phase A.C. Circuits</td></tr>
</table>

	Generation of three phase emf, Phase sequence polarity marking, Connection of three phase windings. Star connection & Delta connection, Line & phase quantities in star connected load. Line & phase quantities in delta connected load. Power in three phase system with balanced star, delta connected load. Advantage of poly phase circuits.
Course Outcomes	**At the end of this course student will be able to:** • Learn the different types of electrical sources and networks • Converting an electrical circuit into graph and will be able to analyze the circuit graphically. • Analyses circuits with ideal, independent, and controlled voltage and current sources • Find out current through or voltage across any branch of a given Electrical network using theorems. • Learn about series and parallel resonance conditions in series and parallel circuits and its impact on network voltage and current magnitudes. • Analyze the behavior of non-sinusoidal waveforms
Text Books	1 Introductory circuit analysis by Boylested R.L. 2. Schaum Online series- Theory & problems of electric circuits by Edminister. 3. Basic Electrical Engineering by V.N.Mittal.
Reference Books	1. Circuits and Networks by Sudhakar. 2. Electrical Technology Vol-I by B.L.Theraja. 3. A Text Book Of Electrical Technology by V.K.Mehta.

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Course Title	**FUNDAMENTALS OF MECHANICALENGINEERING**				
Course Code	**DENEE304T**				
Course Credits	**L**	**T**	**P**	**TC**	
	2	**1**		**3**	
Prerequisites	Science				
Course Objectives	• To learn basics of thermodynamics, material properties • To learn about strength of materials, Fluid mechanics. • To learn about hydraulics and manufacturing processes.				
Course Contents	**UNIT-I** **Materials** Introduction, Ferrous materials cast iron, Classification, Wrought iron, Steel-classification-Alloy steels Major alloying elements, Stainless steel-low carbon medium carbon and high carbon steels, Classification of alloy steels, Tools steels, Non-ferrous metals-copper properties, application, Zinc-properties, Zinc alloys, Tin properties-application. **UNIT-II** **Properties and Testing of Materials** Introduction, Mechanical properties, Stress, Strain, Strength, Elasticity, Plasticity, Ductility, Toughness, Brittleness, Hardness, Malleability, Formability, Weld ability, Destructive and non-destructive testing, Stress-strain diagram. **UNIT-III** **Metallurgical processes** Introduction-various processes, Secondary processes, Application of powder metallurgy, Advantages and disadvantages. **Fluid Mechanics** Hydrostatics- Fluids and their properties**,** Liquid pressure, Intensity of .Pascal's law**,** Pressure head of liquid, Total pressure, Concept of atmospheric pressure. **UNIT-IV** **Pump and Water Turbine** Pump - Reciprocating pump, centrifugal pump, compression between Reciprocating & centrifugal pump, Turbines- purpose, type, construction and working of Pelton wheel. **UNIT-V** **Strength of Material** Definition of cantilever, simply supported and over hanging beams withpoint & U.D.L. Theory of simple bending, bending stresses in beams.					

	Thermodynamic Properties of gases, Charle's law, Boyle's law, characteristic equation for perfect gas, 1st & 2nd law of thermodynamics, enthalpy and entropy, Ideal heat engine cycles, thermal efficiency.
Course Outcomes	**At the end of this course student will be able to:** • Work on the mechanical instrument used in electrical engineering. • Develop skill to use the above fields in the electrical engineering.
Text Books	1. Manufacturing Process Herbert W Yankee (Prentice Hall) 2. Thermodynamics R Yadav (Central Book Dept.) 3. Hydraulics & Hyd. M/cs R.S. Khurmi (S. Chand & Co)
Reference Books	1. Strength of Materials R.S. Khurmi (S.Chand& Co) 2. A Text- Book of Mechanical Technology R.S. Khurmi (S Chand & Co)

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Course Title	**ELECTRICAL DRAWING**				
Course Code	**DENEE305T**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**		**4**	
Prerequisites	Engineering drawing				
Course Objectives	• To provide basic concepts in engineering drawing. • To impart knowledge about standard principles of orthographic projection of objects. • To draw sectional views and pictorial views of solids.				
Course Contents	**UNIT-I** **Symbols and Codes** ISI Symbols in electrical engineering, Conventions for circuit and schematic representation of electrical and Electronic components, instruments and equipment **UNIT-II** **Mountings** Different types of mountings, Enclosures for electrical equipments, Panel wiring with CB, isolator, synchroscope, regulator, etc Plate & Pipe earthing **Domestic Wiring** All types of light circuit, Fluorescent tube & fan circuit wiring, Intermediate switch circuit **UNIT-III** **Instrument circuit** Connection of all types of meters (PMMC, Moving Iron, dynamo meter, Induction type. Extension of range using shunt, multiplier, CT, PT **Constructional Features of Electrical Machines** Parts of a transformer, D.C. machines, alternators, induction motors, Development diagram of windings of D.C. and A.C. machines, AC& DC Motor starter **UNIT-IV** **Power System** Transmission line structure, Bushings, insulators, Overhead conductor joints Substation drawing, lightning arrestors **UNIT-V** **Cables** Cross-section of cables, Power claying, Cable joints				

Course Outcomes	**At the end of this course student will be able to:** • Assemble single point house wiring for incandescent wiring, fans with electromechanical and electronics regulators. • Assemble single and double fluorescent tube wiring circuit • Assemble Staircase wiring using two-way switches • Assemble Godown wiring circuit • Assemble Panel board wiring using MCBs, and ELCBs.
Text Books	1. Geometrical and Machine Drawing 28th, 1993 Bhatt, N.D,:Charoter Pub., Anand Gujarat 2. Elementary Engineering Drawing 32nd, 1992 Bhatt, N.D,:Charoter Pub., Anand, Gujarat 3. Engineering Drawing 1996 Gujral and Shende, Khanna Pub. New.Delhi
Reference Books	1. Engineering Drawing 1995 Gupta, R.B. Satya Prakashan, Delhi

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Course Title	**Elements of Electrical Engineering**
Course Code	**DENEE301P**
Course Credits	**L** **T** **P** **TC** **2** **1**
Prerequisites	Elements of electrical engineering
Course Objectives	• Understand concepts and principles of electricity with practical knowledge. • Understand to solve simple electric and magnetic circuit.
Course Contents	**LIST OF EXPERIMENTS** 1. Electrical engineering laboratory practices a. Supply system & safety. b. Introduction to various measuring instruments. 2. Difference between EMF, terminal voltage & voltage drop in practice. 3. Application of rheostat as Regulator. 4. Potential divider. 5. Behaviour of fuse under normal & abnormal (overload, short circuit) operating conditions. 6. Effect of series & parallel connection of two lamps on current, voltage, power dissipated & energy consumed in a given circuit. 7. Performance of various types of capacitors. 8. Demonstration of Faraday's laws of electromagnetic induction. 9. Demonstration of force experienced by a current carrying conductor placed in a magnetic field.
Course Outcomes	**At the end of this course student will be able to:** • Understand the fundamentals of electrical element. • Understand the fundamentals of electrical magnetic material. • Analyze the load profile, voltage regulations and efficiency under various operating conditions.
Text Books	1. Electrical Appliances 1995 Ajwani, J.M. R.B. Publications, New Delhi 2. Study of Electrical Appliances & Devices 3rd , 1991 Bhatia, K.B. Khanna Publishers, Delhi 3. Principles of Electrical Engineering 1997 Bhattacharya, Tata -McGraw-Hill,

	New Delhi 4. Electrical Devices & Circuits 1st , 1991 Bogart, T.F., Universal Book Staff, New Delhi

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<table>
<tr><td>Course Title</td><td colspan="5">BASIC ELECTRONICS</td></tr>
<tr><td>Course Code</td><td colspan="5">DENEE302P</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td></td><td></td><td>2</td><td>1</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Basic electronics</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• To understand the basic concept electronics devices their property, behavior and application.
• To understand the concept of waves shaping circuit and constant power supply.
• To understand the concept of solid state rectifiers.
• Application of transistor as an amplifier and switch.
• To learn the concept of positive and negative feedback in amplifier.
• Gain experience in the designing of an electronics circuit.</td></tr>
<tr><td>Course Contents</td><td colspan="5">LIST OF EXPERIMENTS
1. V-I characteristics of pn junction diode & Zener diode.
2. Input output characteristics of Transistors
3. Performance of Half Wave & Full Wave Rectifier with filters.
4. Performance of Bridge Rectifier with filter.
5. Performance of Zener Diode Shunt Regulator.
6. Use of multimeters, CRO, signal generations.
7. Effect of negative feedback on single stage amplifier.
8. Performance LC Hartley and Colpitt's oscillator.
9. Performance RC phase shift oscillator.
10. Performance analysis of crystal oscillator.
11. Performance of Clipper.
12. Performance of Clamper.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">At the end of this course student will be able to:
• Predict and design rectifiers and filters as per circuit requirement.
• Learn design of transistor biasing circuit and calculating its stability.
• Analyze feedback in amplifier circuit.
• Design oscillator of desired frequency.
• Gain experience in the problem finding and trouble shooting in electronics circuits consisting of diodes and transistors.</td></tr>
</table>

Text Books	1. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David

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FACULTY OF ENGINEERING

Course Title	**ELECTRICAL CIRCUIT S**				
Course Code	**DENEE303P**				
Course Credits	**L**	**T**	**P**	**TC**	
			2	**1**	
Prerequisites	Electrical circuit				
Course Objectives	• To provide knowledge of Basic Electric Circuit Concepts. • To provide the concept of conversion of electrical circuits to graphs for determination of current and voltages. • To provide Knowledge of various theorems and its applications to circuits. • To give the knowledge of analysis of network reduction and calculation of various parameters. • To know the basic concepts of coupled circuits and network performance under resonance condition. • To provide knowledge of 3 phase balanced and unbalanced Poly phase Circuits and measurement of three phase power. • To provide the concept of non-sinusoidal waveforms and its impact on electrical circuits				
Course Contents	**LIST OF EXPERIMENTS** 1. Observe A.C. waveforms on CRO and find various quantities like: - Amplitude. - Average value. - R.M.S. value. - Frequency. 2. Observe response of pure resistance and inductance to A.C. 3. Determination of current & power factor in series R-L circuit. Draw phasor diagram. 4. Determination of current & power factor in series R-C circuit. Draw phasor diagram. 5. Determination of current & power factor in series R-L-C circuit. Draw phasor diagram.. 6. Verify line & phase values for star connection. 7. Verify KVL and KCL for D.C. circuits. 8. Verify superposition theorem for D.C. 9. Verify Thevenin's and Norton's theorem for D.C. 10. Verify maximum power transfer theorem for A.C. & D.C.				

	11. Solving electrical circuits with software packages.
Course Outcomes	**At the end of this course student will be able to:** • learn about the different types of electrical sources and networks • Converta electrical circuit into graph analyze the circuit graphically. • Analyze circuits with ideal, independent, and controlled voltage and current sources • Find out current through or voltage across any branch of a given Electrical network using theorems. • Students will learn about series and parallel resonance conditions in series and parallel circuits and its impact on network voltage and current magnitudes. • Analyze the behavior of non-sinusoidal waveforms
Text Books	1. Experiments in basic electrical engineering, S.K.Bhattacharya. 2. Basic shop practical, Mehta & Gupta 3. Practical in electrical engineering, Dr. N.K.Jain

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Course Title	**FUNDAMENTALS OF MECHANICAL ENGINEERING**
Course Code	**DENEE304P**
Course Credits	**L** | **T** | **P** | **TC** | | **2** | **1**
Prerequisites	Fundamentals of mechanical engineering
Course Objectives	It is strongly felt that electrical technician should have basic knowledge of thermodynamics, strength of materials, hydraulics and manufacturing processes. As such the subject Fundamental of Mechanical Engineering is kept for electrical technician.
Course Contents	**LIST OF EXPERIMENTS** 1. Study of universal testing machine 2. Study of hardness tester & impact testing m/c. 3. To perform tensile and compression test on U.T.M. 4. To Prepare joint by welding, Soldering and brazing 5. Study of reciprocating pump. 6. Study of centrifugal pump. 7. Determination of discharge through venturimeter. 8. Study of fire tube & water tube boiler. 9. Study of 2 / 4 stroke Petrol engine 10. Study of 2 / 4 stroke Diesel engine 11. Study of water turbine – impulse / reaction
Course Outcomes	**At the end of this course student will be able to:** • Develop skill to use the above fields in the electrical engineering.
Text Books	1 Manufacturing Process Herbert W Yankee (Prentice Hall) 2 Thermodynamics R Yadav (Central Book Dept.) 3 Hydraulics & Hyd. M/cs R.S. Khurmi (S. Chand & Co) 4. Strength of Materials R.S. Khurmi (S.Chand& Co)