RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09

COURSE CODE: 301 PAPER CODE: 6200

NAME OF COURSE: ELECTRONIC COMPONENTS AND MATERIAL

COMMON WITH PROGRAM (S): E03

RATIONALE

An Electronics technician has to deal with different types of electrical and electronics materials, components and therefore a basic knowledge of this subject is conceded a necessity. This course is intended for students to understand the properties of various electrical and electronic components.
This subject involves an introduction to the engineering Materials which has assumed great significance in recent times. As such it deals with the composition, characteristics, properties and stability of engineering materials used in industry. The content is chosen to the required knowledge and also to enable the technician to make the right choice of the materials for various applications in the field of electronics.

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

- Understand the band structure of solids
- Draw the energy band diagram of insulators, Conductors and semiconductors
- Understand the construction of primary and secondary batteries.
- Know types ,operations and applications of switches and relays
- Choose appropriate connectors for applications

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 301 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC COMPONENTS AND MATERIAL
COMMON WITH PROGRAM (S): E03

Lectures: **4** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS)	TOTAL (HRS)
1.	CONDUCTORS AND INSULATORS	20	-	20
2.	MAGNETIC MATERIALS	10	-	10
3.	JOINTING AND CLEANING MATERIALS	10	-	10
4.	CELLS AND BATTERIES	10	-	10
5.	RELAYS AND SWITCHES	05	-	05
6.	CONNECTORS & PACKAGES	05	-	05
	TOTAL	60	-	60

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 301 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC COMPONENTS AND MATERIAL
COMMON WITH PROGRAM (S): E03

Lectures: **4** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Study
01.	**Conductors and Insulators** – introduction – Atomic Structure – band structure of solids – energy band diagram of Conductors, semiconductors and insulators – reliability specifications for electronic components stability, drift catastrophic failure, MTBF, MTTF – resistivity of conductivity as a basic material property , – conductivity / resistivity of different types of materials , – effect of temperature on conductivity, – low, medium & high resistivity materials , their electrical and – mechanical properties and applications. – electrical , thermal and other physical & chemical properties of – insulating materials – Classification of insulating materials. – properties & applications of Insulating materials – Difference among conductor, Insulator and semiconductors based on: atomic structure, band theory. Role of semiconductors in making semiconductor devices. – fluid and Solidifying Dielectric materials and solid dielectric materials, – Different types of fuses and their applications. – Different types of cables and their applications.	20

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 301 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC COMPONENTS AND MATERIAL
COMMON WITH PROGRAM (S): E03

02.	**Magnetic Materials** - Introduction - Properties of magnetic materials - Permeability - B-H curve and hysterisis effect - curies temperature - Residual magnetism - Factor affecting the properties of magnetic materials such as: over temperature, mechanical damage, and direction of current - Classification of magnetic materials such as: hard and soft magnetic materials, Dai, Para, ferro & ferri magnetic materials, and ferrite materials.	10
03.	**Jointing and Cleaning Materials** - Jointing techniques - Screw jointing, - Soldering and welding, - Types of screw heads, - screw shafts, - Soldering: Types of solders (soft & hard), - soldering process, - Different soldering materials used in electronics, - Adhesives. - Cleaning Materials: IPA (Isopropyl alcohol), CT(Carbon tetra chloride), Acetone Etc.	10
04.	**Cells and Batteries** – Principle of a cell , theory of operation , – Concept of Ideal voltage and current source. – internal resistance , – Ampere hour rating , – Primary and secondary cells and batteries. – Types of primary cells: carbon - zinc , mercury oxide, silver oxide , lithium. – Types of secondary cells; Lead storage battery – Solar cells. – Primary and Secondary cells & batteries. – maintenance requirements for various batteries ; – Choice of Batteries for different applications.	10

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 301 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC COMPONENTS AND MATERIAL
COMMON WITH PROGRAM (S): E03

05.	**Relays and Switches** – relay Characteristics ; – relay performance ; – Contact types; Specifications and applications of different types of relays. – Switches: Types of manually operated switches , – their features and applications – Manually operated Selector Switches , Keyboards and sensing switches . – Their principle of operation and applications. – Types, Operation, and applications of electrically operated switches.	05
06.	**Connectors and Packages** – level of connections , – generic types and specifications of connecting devices for connection levels 2,3 and 4 – ratings and specifications of connectors , – types of Connectors , Factors affecting choice of connectors ; – choice of connectors for different applications.	05

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 301 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC COMPONENTS AND MATERIAL
COMMON WITH PROGRAM (S): E03

REFERENCES

1. Electronic Component by Padmanaban
2. Electronic Component by Ramachander
3. Electronic Components & Materials - LM Prepared at IIT, Delhi under Project IMPACT
4. Electrical Engineering Materials by TTTI , Madras
5. Electrical Engineering Materials by Indulkar and Tiruvenkadam
6. Electrical Engineering Materials by M. L . Guptha.
7. Electrical Engineering by P.L.Kapoor

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6201
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

RATIONALE

Any electronic trade has its basis on a certain number of components and some basic standard circuits. These common circuits are applied in all sections of the Electronics Technology. A good understanding of the basic functioning of all these components and circuits will be a solid platform to enter into the more complex portion and specialized field of Electronics Engineering.

Emphasis has been given on the characteristics and application of semiconductor devices/ components. In the case of basic standard circuits, the focus has been made on the interaction of active and passive components and overall performance according to the stated requirements.

The laboratory course fundamentally aims at familiarizing the students with various semiconductor devices and their specific application in shaping, switching, rectification, amplification and oscillation. In addition to this the students will also be trained in electronic measurement techniques by operating measuring instruments.

Upon successful completion of this unit, the trainee will be able to:

- Describe the operation of some of the most basic electronic devices
- Practice proper laboratory procedures
- Use basic instruments in the performance of specific tasks

Describe and understand the basic building blocks of a practical power supply

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09

COURSE CODE: 302 PAPER CODE: 6200

NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS

COMMON WITH PROGRAM (S): E03

Lectures: **4** Hrs. per week

Practical: **4** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS.)	TOTAL (HRS)
1.	PN JUNCTION DIODES	10	10	20
2.	DIODE CIRCUITS	10	10	20
3.	JUNCTION TRANSISTORS	15	15	30
4.	AMPLIFIERS	10	10	20
5.	OSCILLATOR	10	10	20
6.	MULTIVIBRATORS	05	05	10
	TOTAL	60	60	120

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

Lectures: **4** Hrs. per week
Practical: **4** Hrs. per week

CONTENT DETAILS

S.No.	Course Contents	Hrs of Study
01	**PN Junction Diodes** - Basic Structure and symbol - Forward & Reverse Biasing - V-I Characteristic - Various application of Junction Diode - Special purpose Diodes: Constructional features, symbol and applications of – Zener Diode, Tunnel Diode, Schottky Diode, Varactor Diode, Photo Diode, LED, Switching (Step – recovery) Diode. - Specifications	10

02.	**Diode Circuits**
	- Need of rectification
	- Types of rectifier: Half Wave, Full Wave and Bridge rectifier
	- Comparison
	- Average, Peak and rms Values
	- Filter Circuits:
	  - Need of Filter Circuits
	  - Types of filter circuits: capacitor, L- type and pie type
	  - Ripple factor
	  - Bleeder Resistance
	  - Rectifier with filter
	- Basics of Voltage multiplier, Clipping Circuit, Clamping circuit
		10

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

03.	**Junction Transistors** - Bipolar Junction Transistor (BJT) - Basic Structure - Types: PNP & NPN transistors - Transistor action - Check and identify the transistor leads - transistor as a three terminal network - Transistor Configuration: CE, CC and CB mode - V -I characteristics: Input and Output Characteristics - Regions of Transistor operation, active, saturation & cutoff - Expression for currents: Alpha (α) and Beta (β), relation between alpha & beta - Transistor as a Switch - Transistor Biasing : fixed bias, Base Bias, Emitter feedback Bias, Collector feedback Bias, Voltage devider Bias, Emitter Bias - transistor specifications - FET (Field Effect Transistor) - Types of FET - Compare FET with BJT - FET operation - V -I characteristics - FET applications - MOSFET and CMOS - Introduction to MESFET - UJT (Unijunction Transistor) - Structural diagram of UJT - working of UJT - Applications of UJT in relaxation oscillator and blocking oscillator	15

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

04.	**Amplifiers**
	- Transistor as an Amplifier
	- CE Amplifier
	- Cascading of Amplifier
	  - Meaning & necessity of cascade amplifier
	  - Circuit Diagram of cascade amplifier with transistor coupling: RC coupling, Direct Coupling, Transformer coupling.
	- Classification of Amplifiers: Class A, class B, class AB & class C amplifier.
	- Distortion in amplifiers
	  - Amplitude or Non linear distortion
	  - Frequency Distortion
	  - Phase shift distortion
	- Frequency response of amplifier
	- Feed Back Amplifier
	  - Importance & concept of Feed Back
	  - Advantage of negative feedback, block diagram of a feedback amplifier
	- Darlington Pair
	- Power Amplifiers
	  - Audio Power Amplifier
	  - Push pull Amplifier
	- Phase Splitter
		10

05.	**OSCILLATOR**
	- Principle of Oscillator
	- Barkhausen circuit criteria for oscillation
	- Types of Oscillators:
	  - Phase shift oscillator
	  - Resonance – Circuit LC oscillator
	  - Wein Bridge oscillator
	  - Colpits Oscillator
	  - Hartley Oscillator
	  - Crystal Oscillator
		10

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

06.	**Multivibrators** - Basic form of operation - Astable (free running) multivibrator - Monostable (Single shot) multivibrator - Bistable (Trigger) Multivibrator	05

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

Lectures: **4** Hrs. per week
Practical: **4** Hrs. per week

LIST OF EXPERIMENTS

S.No.	Name of Experiment	HRS OF PRACTICAL
1.	To plot the V-I characteristics of a – (a) Silicon Diode (b) Germanium Diode	**60**
2.	To verify the action of diode as a positive clipper and negative clipper.	
3.	To verify the action of diode as a positive clamper and negative clamper.	
4.	To verify the V-I characteristics of Zener Diode.	
5.	To obtain the input and output Transistor Characteristics for CB configuration.	
6.	To obtain the input and output Transistor Characteristics for CE configuration.	
7.	To obtain the input and output Transistor Characteristics for CC configuration.	
8.	To verify the operation of FET as a switch.	
9.	To verify the V-I Characteristics of UJT.	
10.	To setup the circuit and verify the waveforms of (I) HW rectifier (ii) FW (centre tapped) rectifier (iii) Bridge rectifier	
11.	To observe the output waveform of a rectifier circuit with (I) capacitor filter (ii) L-inductive filter	
12.	To observe the performance (frequency response) of a CE amplifier.	
13.	To observe the performance (frequency response) of an emitter follower amplifier.	
14.	To determine the overall voltage gain and frequency response of two stage cascade amplifier.	
15.	To analyze the performance of a class A amplifier.	
16.	To observe the characteristics of (I) current series feedback amplifier (ii) voltage series feedback amplifier.	
17.	To setup a RC phase shift oscillator and analyze its operation.	
18.	To verify the action of UJT as a relaxation Oscillator.	
19.	To setup the circuit and observe the action of astable, monostable and bistable multivibrator	

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 302 PAPER CODE: 6200
NAME OF COURSE: ELECTRONIC DEVICES AND CIRCUITS
COMMON WITH PROGRAM (S): E03

REFERENCES

1. Electronics Principles by Malvino
2. Electronic Devices & CKTs by Mottershead
3. Integrated Electronics by Millian & Halikyas
4. Electronic Devices & Circuits By Robert Boylestad
5. Electronic Devices and Circuits by Millman & Halkias
6. Electronic Devices and Circuits by Mathur & Chadha
7. Solid State Devices by Streetman
8. Basic Electronics by V.K. Mehta

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E01

RATIONALE

Electrical circuit theory forms a base for fundamental understanding of the subjects of electrical engineering. Every electrical apparatus is studied through an electrical circuit which contains some components of which it is made and every component of an electrical circuit is made of some material. Thus there is close relationship between the electrical engineering materials and the circuits hence the materials and circuits are grouped to form one complete subject.

Introduction to materials have assumed great significance in recent times. A technician engineer must be familiar with the composition, characteristics and properties of engineering materials used in industries as well as in daily life, so that he can choose the right materials for various works in electrical and electronics industries. The syllabus is, therefore, aimed at imparting need based knowledge of electrical engineering materials.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E01
Lectures: **4** Hrs. per week
Practical: **2** Hrs. per week

SCHEME OF STUDIES

S.No.	Topics	Theory Hrs.	Practical Hrs.	Total
1.	D.C. Circuits	15	10	25
2.	A.C. Fundamentals	15	10	25
3.	Magnetic Effects of Electric current	10	-	10
4.	Heating Effects of Electric current	04	-	04
5.	Chemical Effects of Electric current	04	04	08
6.	Electrical Engineering Materials	12	06	18
		60	30	90

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E01
Lectures: **4** Hrs. per week
Practical: **2** Hrs. per week

S.No.	COURSE CONTENT	
1.	**D.C. Circuits -** Concept of charge, current, voltage, EMF, resistance, resistivity. Ohm's law, KCL, KVL. Series and parallel combination of resistances, star-delta connection, star to delta and delta to star transformation.	**15**
2.	**A.C. Fundamentals -** Concept of inductance, capacitance, reactance, impedance, admittance, phasor diagram of pure resistive, inductive and capacitive circuit. R, L, C series and parallel combinations and phasor diagram. Difference between AC and DC quantities, sinusoidal waveform, frequency, time period. Instantaneous, maximum, average and RMS value, form factor.	**15**
3.	**Magnetic effect of electric current -** Concept of lines of force, flux, MMF, reluctance, permeability, magnetic flux density, magnetic field intensity. Analogy of electric and magnetic circuit, units. Faraday's laws of electromagnetic induction, self and mutual induction. Lenz's laws, Fleming's left and right hand rule.	**10**
4.	**Heating effect of electric current -** Heat produced. Work, power and energy, units.	**4**
5.	**Chemical effect of electric current** Faradays laws of electrolysis. Primary and secondary cells.	**4**
6.	**Electrical Engineering materials -** Definition of conductors, insulators and semiconductors. Intrinsic and extrinsic semi conductor materials. Properties and applications of conducting, semi-conducting and insulating materials, classification of insulating materials on the basis of temperature. B-H curve, soft and hard magnetic materials. Different magnetic materials, properties and applications.	**12**

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E03
Lectures: **4** Hrs. per week
Practical: **2** Hrs. per week

SUGGESTED LIST OF EXPERIMENTS

1. Study of different types of meters/indicators, Ammeter, voltmeter, wattmeter etc.
2. Study of M.I. and M.C. instruments.
3. Study of Analog and digital meters
4. Measurement of current and voltage in single phase and three phase circuit series and parallel circuit.
5. Measurement of current, voltage and power in single phase circuit.
6. Measurement of current, voltage and power in three phase circuit
7. Study of different types of loads i.e. resistive, inductive and capacitive load.
8. Study of multimeter.
9. Verification of ohms law.
10. Study of different types of conducting insulating and magnetic materials.
11. Study of different types of primary and secondary cells and batteries.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E01

RATIONALE

Electrical circuit theory forms a base for fundamental understanding of the subjects of electrical engineering. Every electrical apparatus is studied through an electrical circuit which contains some components of which it is made and every component of an electrical circuit is made of some material. Thus there is close relationship between the electrical engineering materials and the circuits hence the materials and circuits are grouped to form one complete subject.

Introduction to materials have assumed great significance in recent times. A technician engineer must be familiar with the composition, characteristics and properties of engineering materials used in industries as well as in daily life, so that he can choose the right materials for various works in electrical and electronics industries. The syllabus is, therefore, aimed at imparting need based knowledge of electrical engineering materials.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E01

Lectures: **4** Hrs. per week
Practical: **2** Hrs. per week

SCHEME OF STUDIES

S.No.	Topics	Theory Hrs.	Practical Hrs.	Total
1.	D.C. Circuits	15	10	25
2.	A.C. Fundamentals	15	10	25
3.	Magnetic Effects of Electric current	10	-	10
4.	Heating Effects of Electric current	04	-	04
5.	Chemical Effects of Electric current	04	04	08
6.	Electrical Engineering Materials	12	06	18
		60	30	90

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: BASIC ELECTRICAL ENGINEERING & MATERIIALS
COMMON WITH PROGRAM (S): E01

S.No.	COURSE CONTENT	
1.	**D.C. Circuits -** Concept of charge, current, voltage, EMF, resistance, resistivity. Ohm's law, KCL, KVL. Series and parallel combination of resistances, star-delta connection, star to delta and delta to star transformation.	**15**
2.	**A.C. Fundamentals -** Concept of inductance, capacitance, reactance, impedance, admittance, phasor diagram of pure resistive, inductive and capacitive circuit. R, L, C series and parallel combinations and phasor diagram. Difference between AC and DC quantities, sinusoidal waveform, frequency, time period. Instantaneous, maximum, average and RMS value, form factor.	**15**
3.	**Magnetic effect of electric current -** Concept of lines of force, flux, MMF, reluctance, permeability, magnetic flux density, magnetic field intensity. Analogy of electric and magnetic circuit, units. Faraday's laws of electromagnetic induction, self and mutual induction. Lenz's laws, Fleming's left and right hand rule.	**10**
4.	**Heating effect of electric current -** Heat produced. Work, power and energy, units.	**4**
5.	**Chemical effect of electric current** Faradays laws of electrolysis. Primary and secondary cells.	**4**
6.	**Electrical Engineering materials -** Definition of conductors, insulators and semiconductors. Intrinsic and extrinsic semi conductor materials. Properties and applications of conducting, semi-conducting and insulating materials, classification of insulating materials on the basis of temperature. B-H curve, soft and hard magnetic materials. Different magnetic materials, properties and applications.	**12**

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: **BASIC ELECTRICAL ENGINEERING & MATERIIALS**
COMMON WITH PROGRAM (S): E01

SUGGESTED LIST OF EXPERIMENTS

12. Study of different types of meters/indicators, Ammeter, voltmeter, wattmeter etc.
13. Study of M.I. and M.C. instruments.
14. Study of Analog and digital meters
15. Measurement of current and voltage in single phase and three phase circuit series and parallel circuit.
16. Measurement of current, voltage and power in single phase circuit.
17. Measurement of current, voltage and power in three phase circuit
18. Study of different types of loads i.e. resistive, inductive and capacitive load.
19. Study of multimeter.
20. Verification of ohms law.
21. Study of different types of conducting insulating and magnetic materials.
22. Study of different types of primary and secondary cells and batteries.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 303 PAPER CODE: 6230
NAME OF COURSE: **BASIC ELECTRICAL ENGINEERING & MATERIIALS**
COMMON WITH PROGRAM (S): E01

REFERENCES

1. Basic Electrical Engineering — By Nagrath Kathari
2. Electrical Engineering Materials — TTTI Madras.
3. Basic Electrical Engineering — By Jain & Jain
4. Basic Electrical Engineering — By V.K. Mehta
5. प्रारंभिक वैद्युत अभियांत्रिकी — By एम.एफ.कुरैशी, दीपक प्रकाशन
6. विद्युत सामग्री एवं परिपथ — By एम.के.डियोडिया, म.प्र.हिन्दी ग्रन्थ अकादमी

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 304 PAPER CODE: 6233
NAME OF COURSE: ELECTRICAL & ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS

COMMON WITH PROGRAM (S): E01

RATIONALE

This subject is very important as most of the technicians who get employment in Industries, Electricity Utilities or in any electrical field are required to measure various electrical quantities and to use different electrical and electronics instruments. This subject is included as a in order to train the technician engineer to make various measurements and connect and install various measuring instruments. A technician must be well familiar with the modern developments and latest measuring instruments, and so in addition to make electrical measurements he is also called upon to make electronics measurements. The syllabus therefore includes the principles of measurement and construction of various types of measuring instruments commonly used in the filed of electrical and electronics engineering.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 304 PAPER CODE: 6233
NAME OF COURSE: ELECTRICAL & ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS
COMMON WITH PROGRAM (S): E01

Lectures: **6** Hrs. per week
Practical: **2** Hrs. per week

SCHEME OF STUDIES

S.NO.	TOPIC	TH	PR	TOTAL
1	Classification of measuring instruments	10	02	12
	Construction and operation	10	00	10
3	Wattmeter and Energy meters	08	04	12
4	Measurement of resistance	08	04	12
5	A. C. Bridges	06	04	10
6	Additional measuring instruments	08	04	12
7	Magnetic measurement	06	02	08
8	Dielectric measurement	04	04	08
9	Cathode Ray Oscilloscope	04	02	06
10	Electronic Instruments	04	02	06
11	Digital instruments	07	02	09
	TOTAL	75	30	105

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 304 PAPER CODE: 6233
NAME OF COURSE: ELECTRICAL & ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS
COMMON WITH PROGRAM (S): E01

	CONTENTS	Hours o Study
1	Classification of measuring instruments, errors and accuracies – Classification of instruments based on various effects of electric current. Indicating, recording and integrating types of meters. Accuracy, precision and sensitivity, types of errors.	10
2	Construction, operation, and other details of electrical instruments – Deflecting, controlling and damping forces, supporting systems, moving coil, electrodynamometer, moving iron and induction type instruments, simple numerical. Hot wire type instruments, vibration galvanometer, shunt and multipliers, CT & PT.	10
3	Wattmeter and Energy meters – Dynamometer and induction type wattmeter, Induction type E.M. Use of instrument transformer, measurement of 3 phase power in balance and unbalance load condition, 3 phase wattmeter .	8
4	Measurement of resistance – Classification of resistance, effect of contact resistance. Kelvin's double bridge, wheat–stone bridge, Ammeter, voltmeter method and ohmmeter, multimeter, megger. Importance of earth resistance, Earth tester.	8

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 304 PAPER CODE: 6233
NAME OF COURSE: ELECTRICAL & ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS
COMMON WITH PROGRAM (S): E01

5	A. C. Bridges – Measurement of inductance and capacitance by A.C. bridges. Maxwell, Anderson, Hays, Desautey and wien"s bridge. (no phasor diagram)	6
6	Additional measuring instruments – Electrical resonance, Weston and vibration reed frequency meter, dynamometer power factor meter, Weston synchroscope, Mertz price maximum demand meter, Rotating type phase sequence indicator.	8
7	Magnetic measurement – Balastic galvanometer, measurement of flux by B.G. Gressort flux meter, fahy simplex permameters, determination of hysteresis loop for ring and bar specimen.	6
8	Dielectric measurement. Meaning of dielectric loss, its importance, methods of measurement of dielectric loss by Wattmeter, C.R.O. Schearing bridge.	4
9	Cathode Ray Oscilloscope – CRT, Electrostatic and magnetic deflection, time base X and Y amplifiers, controls on the C.R.O. Dual beam oscilloscope. Digital storage and multi-channel CRO .	4
10	Electronic Instruments - Transistor volt meter, FETVM, balanced bridge, specification of electronic voltmeter. Single and three phase electronic energy meters, mili-voltmeter and micro-volt meters.	4
11	Digital instruments – Digital voltmeters- types, specifications. Digital multimeters. Counter / timers. Universal indicators for voltage, current, frequency, power, power factor, temperature, humidity etc. Digital tachometers (Contact & non Contact type). Digital controllers.	7

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 304 PAPER CODE: 6233
NAME OF COURSE: ELECTRICAL & ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS
COMMON WITH PROGRAM (S): E01
Lectures: **6** Hrs. per week
Practical: **2** Hrs. per week

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 304 PAPER CODE: 6233
NAME OF COURSE: ELECTRICAL & ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS
COMMON WITH PROGRAM (S): E01
Lectures: **6** Hrs. per week
Practical: **2** Hrs. per week

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 305 PAPER CODE: 6232
NAME OF COURSE: ELECTRICAL MACHINE – I
COMMON WITH PROGRAM (S): E01

RATIONALE

Electrical machines constitute the largest number of devices which use electrical power. A technician comes across a large number of situations were electrical machines are used and installed. He must be well familiar with the various parts and normal operating conditions. This subject includes the parts, their materials, working principle and performance characteristics of electrical machines in common use.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 305 PAPER CODE: 6232
NAME OF COURSE: ELECTRICAL MACHINE – I
COMMON WITH PROGRAM (S): E01
Lectures: **5** Hrs. per week
Practical: **3** Hrs. per week

SCHEME OF STUDIES

S.No.	Topics	Theory Hrs.	Practical Hrs.	Total
1.	Energy Conversion Principle	03	-	03
2.	DC Generator	18	08	26
3.	DC Motors	15	08	23
4.	Single Phase transformers	18	12	30
5.	Three phase transformers	06	02	08
		60	30	90

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 305 PAPER CODE: 6232
NAME OF COURSE: ELECTRICAL MACHINE – I
COMMON WITH PROGRAM (S): E01
Lectures: **5** Hrs. per week
Practical: **3**Hrs. per week

S.No.	**COURSE CONTENT**	
1.	Energy Conversion Principle - Law of conservation of energy, electromechanical energy conversion classification of machines.	
2.	D. C. Generator - Principle, construction, armature winding, types of winding, EMF equation, armature reaction and commutation, interpoles and compensating winding. Types of generators, characteristics and applications, losses and efficiency. Simple numerical.	
3.	D. C. Motors - Principle, production of back EMF, torque equation. Classification, characteristics and applications of motors. D. C. motor starters speed control, losses and efficiency. Brake test, Swinburn test. Simple numerical.	
4.	Single phase transformers - Principle, construction, classification. EMF equation, turns ratio, name plate rating, phasor diagram, no load and on load equivalent circuit. Voltage regulation, polarity ratio, open and short circuit tests, losses and efficiency, condition of maximum efficiency. All day efficiency and its numerical. Auto transformer. Parallel operation of single phase transformer.	
5.	Three phase transformer - Connections, groups, Scott and open delta connection. Comparison of three phase transformer with bank of three single phase transformers. Parallel operation.	

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 305 PAPER CODE: 6232
NAME OF COURSE: ELECTRICAL MACHINE – I
COMMON WITH PROGRAM (S): E01

Lectures: **5** Hrs. per week
Practical: **3**Hrs. per week

LIST OF PRACTICALS

S. No.	Experiment
1	Study of D. C. Machines (Parts)
2	Speed control of D. C. Motor (armature and field control method)
3	To perform Swinburn test of DC Motor.
4	Study of transformer (Parts) (single and three phase)
5	To perform polarity test of single phase transformer.
6	To perform ratio test of single phase transformer.
7	To perform open circuit test of single phase transformer.
8	To perform short circuit test of single phase transformer.
9	Parallel operation of single phase transformer.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 305 PAPER CODE: 6232
NAME OF COURSE: ELECTRICAL MACHINE – I
COMMON WITH PROGRAM (S): E01

REFERENCES

S. No.	Name of Book		
1	Electrical Technology Vol. II	BL Thereja	Khanna publisher
2	Electrical Machines	Bhattacharya	T.T.T.I.
3	Electrical Machines	Nagrath & Kothari	PHI
4	Electrical Machines Vol. I & II	PS Bhimbra	Khanna publishers
5	विद्युत मशीनें	एम.के.डियोडिया	हिन्दी ग्रंथ अकादमी
6	वैद्युत मशीनें	एच.एस.राय	दीपक प्रकाशन

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 306 PAPER CODE:
NAME OF COURSE: PROFESSIONAL ACTIVITIES
COMMON WITH PROGRAM (S): E01

Practical: **2** Hrs. per week

RATIONALE

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

As the student has to practice this course in all the six semesters, the guidelines given therein are common and applicable to each semester.

OBJECTIVES:

- To allow for professional development of students as per the demand of engineering profession.
- To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
- TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
- To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
- To provide time for organization of technical quiz or group discussion or any other group activity.
- To provide time for visiting library or using Internet.
- To provide time for group discussion or solving case studies.
- To provide time for personality development of students.
- To provide time for working for social cause like awareness for environmental and ecology etc.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 306 PAPER CODE:
NAME OF COURSE: PROFESSIONAL ACTIVITIES
COMMON WITH PROGRAM (S): E01

DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES:

A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.
B. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).
C. Following grade scale of evaluation of performance in PA has been established.

Grades	Level of performance
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.
E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

   Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.
F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.
G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.
H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER: THIRD SCHEME: Jul.09
COURSE CODE: 306 PAPER CODE:
NAME OF COURSE: PROFESSIONAL ACTIVITIES
COMMON WITH PROGRAM (S): E01

I. Compendium shall contain following:
   1. Record of written quiz.
   2. Report/write up of seminar presented
   3. Abstract of the guest lectures arranged in the Institution.
   4. Topic and outcome of the group discussion held.
   5. Report on the problems solved through case studies.
   6. Report on social awareness camps(organized for social and environmental prevention).
   7. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content.
   These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development.
   Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING