STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

III SEMESTER DIPLOMA IN ELECTRICAL ENGINEERING/ ELECTRICAL & ELECTRONICS ENGINEERING.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam. (ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Applied Mathematics-I	1600301	04	03	10	20	70	100	28	40	03
2.	Electrical Circuits and Network	1620302	03	03	10	20	70	100	28	40	03
3.	Electrical Measurements	1620303	03	03	10	20	70	100	28	40	03
4.	Electrical Power Generation	1620304	03	03	10	20	70	100	28	40	03
5.	Basic Electronics	1620305	03	03	10	20	70	100	28	40	03
		Total :-	**16**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Electrical Circuits and Network Lab	1620306	02	03	15	35	50	20	01
7.	Electrical Measurements Lab	1620307	02	03	15	35	50	20	01
8.	Basic Electronics Lab	1620308	02	03	15	35	50	20	01
9.	Electrical Workshop Practice	1620309	03	03	15	35	50	20	02
		Total :-	**09**				**200**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
10.	Elements of Mechanical & Civil Engineering (TW)	1620310	04	07	18	25	10	02
11.	Professional Practices-III (TW)	1620311	04	07	18	25	10	02
		Total :-	**08**			**50**		
Total Periods per week Each of duration One Hour 33					Total Marks = **750**			**24**

APPLIED MATHEMATICS-I

(Elect./Chem./Textile/Agri./C.Sc.&E/Electro/Ceramic/Print/Ec.&Comm./Inst.& Cont.)

Subject Code	Theory						Credits
1600301	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS :THEORY

	Name of Topics	Hrs/week	Marks
Unit -1	**Integration:** 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by substitution 1.3.2 Integration of rational functions. 1.3.3 Integration by partial fractions. 1.3.4 Integration by trigonometric transformation. 1.3.5 Integration by parts. 1.4 Definite Integration. 1.4.1 Definition of definite integral. 1.4.2 Properties of definite integral with simple problems. 1.5 **Applications of definite integrals.** 1.5.1 Area under the curve. 1.5.2 Area between two curves. 1.5.3 Mean and RMS values	**12**	**20**
Unit -2	**Differential Equation** 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations. 2.3 Applications of Differential equations. 2.3.1 Laws of voltage and current related to LC, RC, and LRC Circuits.	**10**	**15**
Unit - 3	**Laplace Transform** 3.1 Definition of Laplace transform, Laplace transform of standard functions. 3.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by t^n, division by t. 3.3 Inverse Laplace transforms. Properties- linearly first shifting, second shifting. Method of partial fractions, 3.4 Convolution theorem. 3.5 Laplace transform of derivatives, 3.6 Solution of differential equation using Laplace transform (up to second order equation).	**08**	**14**
Unit - 4	**Fourier Series** 4.1 Definition of Fourier series (Euler's formula). 4.2 Series expansion of continuous functions in the intervals $(0, 2l), (-l, l), (0, 2\pi), (-\pi, \pi)$ 4.3 Series expansions of even and odd functions. 4.4 Half range series.	**08**	**07**

Unit - 5	**Numerical Methods** 5.1 **Solution of algebraic equations** Bisection method. Regularfalsi method. Newton – Raphson method. 5.2 **Solution of simultaneous equations containing 2 and 3 unknowns** Gauss elimination method. Iterative methods- Gauss seidal and Jacobi's methods.	**05** **05**	**07** **07**
	Total	**48**	**70**

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith	Tata McGraw Hill
Laplace Transform	Lipschutz	Schaum outline series.
Fourier series and boundary value problems	Brown	Tata McGraw Hill
Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Dehli
Introductory Methods of Numerical analysis	S. S. Sastry	Prentice Hall Of India, New Dehli
Numerical methods for scientific & engineering computations	M. K. Jain & others	Wiley Eastern Publication.
Rajendra Pal, S.N. Malik	Applied Mathematics	Foundation Publishing

ELECTRICAL CIRCUITS & NETWORK

(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620302	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS:THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Review of Basic concepts of electrical Circuit** 1.1 Electric Circuit Elements R,L,C 1.2 Energy Sources 1.3 A.C. waveform and definition of various terms associated with it 1.4 Response of pure R, L, and C to AC supplies. Vector Representation of alternating quantity.	**06**	**04**
Unit -2	**Single phase AC Circuits** 2.1 Series AC circuits R-L, R-C and R-L-C circuits. Impedance, reactance, phasor diagram, impedance triangle, power factor, Average power, Apparent power, Reactive power, Power triangle (Numerical) 2.2 Series Resonance, quality factor (Numerical) 2.3 Parallel AC circuits R-L, R-C and R-L-C circuits. Admittance, Susceptance, Solution by admittance method, phasor diagram and complex Algebra method. (Numerical) Parallel resonance, quality factor. 2.4 Comparison of series and Parallel circuits.	**12**	**22**
Unit - 3	**Poly phase AC Circuits** 3.1 Generation of three phase e. m. f. 3.2 Phase sequence, polarity marking 3.3 Types of three-phase connections. 3.4 Concept of unbalanced load and balanced load. 3.5 Line, phase quantities and power in three phase system with balanced star and Delta connected load & their interrelationship 3.6 Advantages of polyphase circuits over single phase circuits	**10**	**16**
Unit - 4	**Principles of circuit Analysis (AC and DC circuits)** 1.1 Mesh analysis.(Numerical) 1.2 Node analysis with voltage current source .(Numericals) Star/delta & Delta/star transformations.(Simple Numericals)	**08**	**10**
Unit - 5	**Network Theorems (Statement, procedure, applications and areas of applications, Simple Numerical)** 5.1 Superposition Theorem 5.2 Thevenin's Theorem 5.3 Norton's Theorem 5.4 Source conversion /ideal voltage and current source 5.5 Maximum power transfer Theorem	**10**	**18**
	Total	**48**	**70**

Text /Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Introductory circuit Analysis.	Boylested R.L.	Wheeler, New Delhi
Schaum online series Theory and problems of Electric circuits	Edminister	T. M. G. H. , Newyork
Circuit and network	A. Sudhakar	Tata McGraw Hill
Basic Electrical Engineering.	V.N. Mittle	Tata McGraw Hill
Electrical Technology Volume-I	B. L. Theraja	S. Chand & Co.
Electrical Circuits and Network	Umesh Kumar	Foundation Publishing

ELECTRICAL MEASUREMENTS
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620303	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS :THEORY

	Name of the Topic	Hours	Marks
Unit -1	**Fundamentals of Measurement** 1.1 Purpose of measurement and significance of measurement 1.2 Various effects of electricity employed in measuring instruments. 1.3 Desirable qualities of measuring instruments. 1.4 Classification of Instruments. 1.5 Types of errors 1.6 Different types of torque in Analog Instruments.	**05**	**08**
Unit – 2	**Measurement of Current and Voltage** 2.1 Construction and principle of PMMC, MI & Dynamometer type Instrument. 2.2 Production of torque :methods. 2.3 Principles of Voltage and Current measurement. 2.4 Range Extension of Ammeter and Voltmeter 2.5 Different Methods of range extension of Ammeter and Voltmeter. 2.6 Calibration of Ammeter and Voltmeter. 2.7 Instrument transformers (CT & PT)	**10**	**14**
Unit -3	**Measurement of Power** 3.1 Concept of power in A.C. Circuit 3.2 Principle and Construction of dynamometer type wattmeter. 3.3 Errors and their compensation. 3.4 Polyphase wattmeter. 3.5 Multiplying factor of wattmeter. 3.6 Measurements of power in 3 phase circuit for balanced and unbalanced load by one wattmeter method, two wattmeter method. 3.7 Effect of power factor variation on wattmeter readings in two wattmeter method. 3.8 Measurement of reactive power in three phase balance load by one wattmeter method and two wattmeter method. 3.9 Digital Wattmeter.	**10**	**14**
Unit -4	**Measurement of Electrical Energy** **4.1.** Concept of electrical energy. 4.2 Constructional feature & principle of working of single phase and three-phase induction type energy meter. 4.3 Different types of errors and their compensation. 4.4 Calibration of energy meter. 4.5 Electronic energy meter.	**07**	**10**
Unit -5	**Constructional features and working principles of other Meters** 5.1 Single phase and three phase Power Factor Meter(only dynamometer type). 5.2 Frequency meter (Weston and Ferro dynamic type). 5.3 Sychronoscope. 5.4 Phase sequence Indicator.(Rotating type only) 5.5 Clip-on-mmeter. 5.6 Q-meter.	**08**	**10**

Unit -6	**Measurement of Circuit Parameters** 6.1 Classification of Resistance, Low, Medium and High. 6.2 Methods of Measurements of Low, Medium and High. Resistance (Kelvin Double bridge, wheatstone bridge and Megger) 6.3 Measurement of Earth resistance- Earth tester (Analog & Digital) 6.4 Digital Multimeter. 6.5 Introduction to A.C. Bridges. 6.6 L.C.R. Meter.	**08**	**14**
	Total	**64**	**70**

Text/Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electric & Electronic Measurement and Instrumentation	A.K. Sawhney	Dhanpatrai & Sons
Electronic Instrumentation & measurement Techniques	Copper & Heltrick	Prentice Hall of India
Instrumentation Devices and System	Rangan Mani & Sarma	Tata McGraw Hill
Electronic Instrumentation	Kalsi	Tata McGraw Hill
Industrial Instrumentation & control	S.K.Singh	Tata McGraw Hill
Electrical Measurement & measuring Instrument	Golding	Wheeler
Electrical Measurement & measuring Instrument, Delhi.	N.V.Suryanaryan	S. Chand & Co.
Fundamental of Electrical Easurement	C.T. Baldwin	--
Electrical Measurements	S.N. Bhargava	Foundation Publishing

ELECTRICAL POWER GENERATION
(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620304	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the topic	Hours	Marks
Unit -1	**Basics of Power Generation** 1.1 Importance of electrical power in day today life 1.2 Various sources of energy 1.3 Overview of method of electrical power generation 1.4 Comparison of Sources of power.	**02**	**06**
Unit – 2	**Thermal Power Stations** 2.1 List of thermal power stations in the state with their capacities 2.2 Selection of site for thermal power stations. 2.3 Main parts , block diagram of thermal power stations. 2.4 Quality of fuel and its effect on quality of power generation 2.5 Operation of following components: 2.5.1 Boiler 2.5.2 Economizer. 2.5.3 Air pre heater 2.5.4 Super-heaters & re-heaters. 2.5.5 Steam prime movers. 2.5.6 Condensers. 2.5.7 Spray ponds & cooling towers. (Block diagrams & description in brief)	**07**	**10**
Unit -3	**Nuclear Power Stations** 3.1 Block diagram and working of Nuclear Power Station 3.2 Construction and working of Nuclear Reactor 3. 3 Fuels used in Nuclear Power Station 3. 4 Economics of Nuclear Power Station 3. 5 List of Nuclear power stations in state & county with their capacities.	**05**	**06**
Unit -4	**Hydro Power Stations** 4.1 List of Hydro Power stations with their capacities & number of units in the state. 4.2 Selection of site and Classification 4.3 Layout of hydro Power stations 4.4 Types of Turbines & generators used 4.5 Selection of turbine and alternator according to water head and capacity	**05**	**08**
Unit -5	**Diesel Power Stations** 5.1 Applications of diesel power stations 5.2 Diesel electric plant- Main components (Block Diagram) 5.3 Different types of engines & their working. Operation, maintenance & trouble shooting chart of diesel plant.	**05**	**07**

Unit -6	**Non-Conventional Energy Sources** 6.1 Types of non-conventional energy sources. 6.2 Solar Energy 6.2.1 Potential of solar energy. 6.2.2 Photovoltaic effect – for solar energy. 6.2.3 Construction & materials used in solar photo-voltaic cells. 6.2.4 Working & applications of solar energy. 6.3 Wind Energy. 6.3.1 Selection of site for wind mills 6.3.2 Principle of electricity generation with the help of wind energy 6.3.3 Block diagram and working of Wind energy plant and its applications 6.3.4 List of major wind farms in the state with their approximate capacities 6.4 Bio-mass & Bio-gas energy. 6.4.1 Composition of Bio-gas & its calorific value. 6.4.2 Traditional; non-traditional Biogas plants 6.4.3 Bio-mass based power generation plants & their capacities. 6.5 Geo-thermal Energy and its Applications. 6.6 Ocean energy. 6.6.1 Ocean thermal Electric conversion. 6.6.2 Energy from tides 6.6.3 Site requirements 6.6.4 Advantages and Limitations of Tidal power generation. 6.7 Fuel Cells: Construction, working and applications	**09**	**14**
Unit -7	**Economics Of Power Generation** 7.1 Terms commonly used in system operation: connected load, firm power, cold reserve, hot reserve, spinning reserve. 7.2 Terms used in system operation such as Load-curve, load duration curve, integrated duration curve. (Simple numerical based on plotting above curves.) 7.3 Factors affecting the cost of Generation: Average demand, Maximum demand, plant capacity factor& plant use factor, Diversity factor& load factor. (Simple numerical based on above) 7.4 Choice of Size & number of Generator Units, difficulties involved in it.	**09**	**10**
Unit -8	**Interconnected Power Systems** 8.1 Combined operation of power stations. 8.2 Comparison of various types of power stations 8.3 Advantages of Interconnection. 8.4 Base load & peak loads, load allocation among various types of power stations 8.5 Economic loading of interconnected stations. 8.6 Load sharing and transfer of load between power stations. 8.7 Inter connection of power stations at state and national level	**06**	**09**
	Total	**48**	**70**

Text /Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electrical Power	Dr. S. L. Uppal	Khanna Publishers.
A course in Electrical Power	Soni – Gupta - Bhatnagar	Dhanpatrai & Sons
Non conventional Energy sources	Prof. G. D. Rai	Khanna, New Delhi
A course in Power Plant Engineering	Prof. Arrora and Dr. V. M. Domkundwar	Dhanpatrai & Sons
Electrical Power Generation	P.K. Banarjee	Foundation Publishing

BASIC ELECTRONICS
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620305	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the topic	Hrs/week	Marks
Unit -1	**1.1 Semiconductor diode** 1.1.1 Rectifying diode Review of P-type and N-type semiconductor Junction of P-type & N-type i.e. PN junction Barrier voltage, depletion region, Junction Capacitance. 1.1.2 Forward biased & reversed biased junction Diode symbol , circuit diagram for characteristics (forward & reversed) Characteristics of PN junction diode 1.1.3 Specifications:- Forward voltage drop , Reversed saturation current, maximum forward current , power dissipation Package view of diodes of different power ratings (to be shown during practical hours) **1.2 Zener Diode:** Construction (reference to doping level) 1.2.1 Symbol , circuit diagram for characteristics (forward & reversed) 1.2.1 Avalanche & zener breakdown 1.2.3 Specifications:- Zener voltage, power dissipation, break over current, dynamic resistance & maximum reverse current. **1.3 Special Diodes:** Point contact diode , Schottky diode **1.4 Optical Diodes:** LED, IRLED, photo diode, laser diode. Symbol, operating principle & applications of each.	**12**	**14**
Unit -2	**2.1 Rectifiers & Filters** Need of rectifier, definition 2.1.1 Types of rectifier – Half wave rectifier, Full wave rectifier (Bridge & centre tapped) 2.1.2 Circuit operation: Input/output waveforms for voltage & Current, Average (dc) value of current & voltage (no derivation), Ripple , ripple factor , ripple frequency , PIV of diode used , transformer utilization factor , efficiency of rectifier. 2.1.3 Comparison of three types of rectifier 2.1.4 Need of filters Types of filters A] shunt capacitor B] Series inductor C] LC filter D] π filter 2.1.5 Circuit operation, dc output voltage , ripple factor (formula) , ripple frequency , Dependence of ripple factor on load . Input/output waveforms , limitations & advantages	**10**	**10**

Unit - 3	**Transistors** **3.1 Bipolar Junction Transistor(BJT)** Introduction , Basic concept 3.1.1 Types of transistors , structure & symbols Transistor operation Conventional current flow , relation between different currents in transistor 3.1.2 Transistor amplifying action Transistor configurations:- CB , CE & CC Circuit diagram to find the characteristics Input / output characteristics 3.1.3 Transistor parameters- input resistance, output resistance, α, β & relation between them. Comparison between three configurations 3.1.4 Transistor specifications: $V_{CE\ Sat}$, $I_{C\ Max}$, V_{CEO}, I_{CEO}, α , β $V_{CE\ Breakdown}$, Power dissipation (to be explained during practical using data sheets) 3.1.5 Testing of transistor using multimeter (To be shown during practical) 3.1.6 Construction, working principle, characteristics of Photo Transistor Introduction to opto-coupler **3.2 Unipolar Transistor (JFET)** Construction, working principle & characteristics. **3.3 Unijunction Transistor(UJT)** Construction, working principle& characteristics.	**12**	**14**
Unit - 4	**Biasing of BJT** 4.1Introduction , need of biasing , concept of dc load line, selection of operating point (Q point) , need of stabilization of Q point, (thermal run away concept) 4.2 Types of biasing circuits A] Fixed biased circuit B] Base biased with emitter feed back C] Base biased with collector feed back D] Voltage divider E] Emitter biased 4.3 Circuit operation of each circuit. 4.4 Introduction to two port n/w Hybrid model for CE	**10**	**10**
Unit - 5	**Regulated Power Supply** **5.1 What is a regulator?** 5.1.1 Need of regulators , voltage regulation factor 5.1.2 Concept of load regulation & line regulation 5.1.3 Basic zener diode voltage regulator **5.2 Linear Regulators** 5.2.1 Basic block diagram of dc power supply 5.2.2 Transistorised series & shunt regulator – circuit diagram	**08**	**08**

Unit - 6	**Small Signal Amplifiers** 6.1 Concept of amplification 6.1.1 Small signal amplifier using BJT 6.1.2 Graphical analysis 6.1.3 Determination of current , voltage & power gain , Input & output resistance , phase shift between input & output. 6.1.4 AC Load Line 6.1.5 Function of input & output coupling capacitors & criteria for the value selection. 6.1.6 Function of emitter bypass capacitor & its value selection. 6.2 AC equivalent circuit of transistor CE amplifier. 6.3 Single stage CE amplifier with voltage divider bias. Its explanation. 6.4 Frequency response of single stage CE Amplifier, Bel, Decibel unit. Bandwidth & its significance. Effect of coupling & emitter bypass capacitor on bandwidth. 6.5 Introduction to CB & CC amplifier & List of applications. 6.6 Cascade Amplifiers (Multistage Amplifier) 6.6.1 Need of Multistage Amplifiers, Gain of amplifier. 6.6.2 Types of amplifier coupling – RC, transformer & Direct coupling. 6.6.3 Two stage amplifier circuit diagram, working, frequency Response, merits & demerits & applications of each.	**12**	**14**
	Total	**64**	**70**

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Basic Electronics & Linear Circuits	N.N.Bhargava, D.C. Kulashreshtha, S.C. Gupta – TTTI Chandigharh	Tata McGraw Hill
Electronic Principles	Alberrt Malvino David J.Bates	Tata McGraw Hill
Electronic Devices & Components'	Allen. Mottershead	Prentice Hall of India
Basic Electronics &Devices	NIIT	Prentice Hall of India
Basic Electronics	Grob Bernard	Tata McGraw Hill
Electronics Devices & Circuits	David J. Bell	Prentice Hall of India
Basic Electronics	Amit Kumar, D.P. Verma	Foundation Publishing

ELECTRICAL CIRCUITS AND NETWORK LAB

(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620306	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

1. Interpret results
2. Calculate values of various components for given circuits
3. Select instruments

Motor Skills:

1. Connect the instruments properly.
2. Take accurate readings.
3. Draw phasor diagrams and graphs.

List of Practical:

1) To observe A.C. waveform on C.R.O.and calculates average & R.M.S. Values, frequency, Time Periods.
2) To determine impedance & Plot the phasor diagram of R-L series circuit.
3) To determine the current and P.F. of R.C. series circuit.
4) To determine the current and P.F. of R.L.C. series circuit.
5) To determine the current and P.F. in R.L. Parallel circuit.
6) To determine the current and P.F. in R.C. Parallel circuit.
7) To determine the current and P.F. in R.L.C. Parallel circuit.
8) To verify the line and phase values of voltage & current in star connected balanced load & Compare with practical situation.
9) To verify the line and phase values of voltage & Current in delta connected balanced load & Compare with practical situation.
10) To verify the superposition theorem applicable to D.C.& A.C. circuit.
11) To verify Thevenins theorem applicable to D.C.& A.C. circuit
12) To verify Norton's theorem applicable to D.C.& A.C. circuit
13) To verify the maximum power transfer Theorem applicable to D.C. & A.C. circuit.
14) To verify conditions for Series and Parallel Resonance

LIST OF PRACTICE ORIENTED PROJECTS:

1) To observe Response of R; L; and C to A.C. supply. Observe the current and voltage wave forms on C. R. O. and determine magnitude and phase angle of voltage and current.
2) To obtain Resonance in R-L-C series circuit and study the quality factor and bandwidth. Give applications
   of series resonance circuit and Draw the curve showing variation of R,XL,XC,I with F.

To verify KCL, KVL, Superposition theorem, Thevenin's theorem and maximum power transfer theorem applicable to A.C. circuits.

ELECTRICAL MEASUREMENTS LAB
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620307	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

1. Identification of instruments
2. Selection of instruments and equipment for measurement

Motor Skills:

1. Accuracy in measurement
2. Making proper connections

List of Practicals:

1. Measurement of Current and Voltages by Low range ammeter and voltmeter respectively with shunt and multiplier.
2. Measurement of Current and Voltages by Low range ammeter and voltmeter respectively by Using Current Transformer and potential Transformer.
3. Measurement of active and reactive power in three phase balanced load by single wattmeter method.
4. Measurement of active and reactive power in three phase balanced load by two wattmeter method and observe the effect of Power Factor variation on Wattmeter reading.
5. Calibration of Energy meter at various power factor by standard energy meter.
6. Measurement of energy in single phase & three phase balanced load using Electronic Energy Meter.
7. Measurement of Low resistance by Kelvin's Double Bridge.
8. Measurement of Medium resistance by Wheatstone bridge.
9. Measurement of Insulation Resistance by Megger.
10. a) Measurement of Resistance, Voltage, Current, Voltage, Current in A.C & D. C. Circuit by using digital multimeter.
    b) Measurement of A.C. Current by Clip-on ammeter
11. Measurement of Earth Resistance by Earth Tester.
12. Measurement of Circuit Parameters by LCR meter.
13. Measurement of power factor of single phase and three phase load by PF meter and verifying through I, V and P measurement.
14. Observe the phase sequence of three phase circuit Using Rotating type phase sequence Indicator.
15. Measurement of Frequency of A.C. Supply Using Weston or Ferro dynamic type Frequency meter.

BASIC ELECTRONICS LAB
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620308	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

1. Identification and selection of components.
2. Interpretation of circuits.
3. Understand working of Regulated dc power supply.

Motor skills:

1. Ability to draw the circuits.
2. Ability to measure various parameters.
3. Ability to test the components using multimeter.
4. Follow standard test procedures.

List of Practical:

1] To plot Forward & Reverse biased characteristics of diode.

2] To plot Forward & Reverse biased characteristics of Zener diode.

3] To Study the Rectifiers a] Half wave b] Full wave & draw i/p & o/p wave forms.

4] To Study the filter circuits. a] Capacitor Filter b] Inductor filter & draw wave forms.

5] To Plot Input & output characteristics of transistor in CE mode.

6] To Plot Input & output characteristics of transistor in CB mode.

7] To Plot Characteristics of FET.

8] To Plot Characteristics of UJT.

9] To study the Zener Diode as Regulator& calculate load regulation.

10] To study Transistor series and shunt regulator.

11] To study Single stage common emitter amplifier & plot its frequency response.

12] To study Two stage RC coupled amplifier & plot its Frequency response.

ELECTRICAL WORKSHOP PRACTICE

(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620309	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	03	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Note: All the experiments will be performed by using casing capping or conduit wiring, prepare schedule of material for each wiring work.

1. Identify, dismantle, sketch & assemble different Electrical accessories — 10 Hrs.
2. Wire up one lamp controlled by one SPT switch — 06 Hrs.
3. Wire up two lamps controlled by two independent SPT switches — 06 Hrs.
4. Wire up a call bell/ buzzer — 06 Hrs.
5. Wire up four power sockets controlled independently — 06 Hrs.
6. Wire up a test board — 06 Hrs.
7. Wire lighting circuit for a go down wiring — 08 Hrs.
8. Prepare & mount the energy meter board — 08 Hrs.
9. Wire up consumer's main board with ICDP & distribution fuse box & 08 Hrs. With LCB / MCB

ELEMENTS OF MECHANICAL & CIVIL ENGINEERING -TW

(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620310	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

Contents :Term Work		Hrs/week
	Name of the Topic	**Hours**
Unit -1	**Boilers, Steam Turbines, Steam Engines:** 1.1 Construction & working of Cochran &Babcock & Wilcox Boilers. 1.2 Construction & working of impulse & reaction turbines. 1.3 Construction & working of steam engine 1.4 Reasons for Malfunctioning, and remedial measures for boilers and steam turbines	**04**
Unit – 2	**I.C. Engines:** 2.1 Construction & working of two stroke & our stroke petrol & diesel engines 2.2 Reasons for Malfunctioning, and remedial measures for I. C. Engines	**04**
Unit -3	**Air Compressors:** 3.1 Uses of compressed air. 3.2 Construction & working of single stage & two stage reciprocating compressor. 3.3 Screw compressor & centrifugal compressor- construction, working & applications. 3.4 Reasons for Malfunctioning and remedial measures	**03**
Unit -4	**Pumps:** 4,1 Types of Pumps and their working 4.2 Reasons for malfunctioning and remedial measures	**03**
Unit -5	**Foundation for Machines:** 5.1 Need for foundation 5.2 Material required for foundation 5.3 Foundation Bolts: Types and Sizes 5.4 Criteria for Design of foundation	**02**
	Total	**16**

List of Term Work:-

1. Trace the flue gas path and water – steam circuit with help of boiler model.
2. Identify the possible location of fault/malfunctioning and decide how to repair them
3. Dismantling & assembly of Petrol/Diesel Engine.
4. Trial on single / multi cylinder petrol/ diesel engine.
5. Observe operation of Air Compressor and identify locations of fault and decide how to repair
6. Observe operation of a Centrifugal Pump and locations of fault and decide how to repair
7. Visit a thermal power station and observe functioning of Steam Turbine
8. Using Maintenance manuals prepare a maintenance schedule for a centrifugal Pump or Compressor

Text /Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
A Course in Thermal Engineering	P.L. Ballaney	Khanna Publishers
A test book of Thermal Engineering	R. S. Khurmi	S. Chand & Co. Ltd.
Thermal Engineering	R. K. Rajput	Laxmi Publication, New Delhi
Heat Engine Vol. I & II	Patel, Karmchandani	Achrya publication
Engineering Thermodynamics	P.K. Nag	Tata McGraw Hill
Elements of Mechanical & Civil Engineering	Deepak Singh	Foundation Publishing

PROFESSIONAL PRACTICES III - TW
(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620311	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

Contents :Term Work		Hrs/week
	Name of the Activity	**Hours**
Unit -1	**Field Visits** Structured field visits (minimum three) be arranged and report of the same should be submitted by the student, as part of the term work. The field visits may be arranged in the following areas / industries : i) Visit to Electric Power Generation Station ii) Visit to Wind Mill and/or Hybrid Power Station of Wind and Solar iii) Multi Storied Building for Power Distribution Scheme iv) Visit to a Multi Plex v) Visit to a Captive Power Plant (Thermal)	**28**
Unit – 2	**Lectures by Professional / Industrial Expert to be organized from of the following areas (any four)** i) Modern Techniques in Power Generation ii) Role of Power Factor Improvement a tool in reducing cost of generation iii) New trends for built environment iv) Software for drafting v) Digital Metering vi) Various government schemes such as EGS, vii) Industrial hygiene. viii) Hydro power generation ix) Special purpose wiring in chemical/hazardous industries	**16**
Unit -3	**Seminar :** Any one seminar on the topics suggested below: Students (Group of 4 to 5 students) has to search /collect information about the topic through literature survey, visits and discussions with experts/concerned persons: Students will have to submit a report of about 10 pages and deliver a seminar for 10 minutes. 1. Water supply schemes/Problems of drinking water in rural area 2. Role of Traffic Signals in smooth flow of vehicles 3. Gram Swaraj Yojana 4. Schemes of power of generation in coming five years 5. Impact of load shading on rural population 6. Any other suitable topic	**16**
Unit -4	**Market Survey:** A group of four students is expected to collect information from the market regarding specifications and cost of any four items, used in Electrical wiring for domestic, commercial and industrial use	**10**
	Total	**70**