SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)

SYLLABUS

For

Diploma in Electrical Engg.

Semester -III & IV

Swami Vivekanand University, Sironja Sagar
2013-2014

SWAMI VIVEKANAND UNIVERSITY,SAGAR(M.P)

PROGRAMME NAME :.ELECTRICAL ENGG

Scheme of Studies and Examinations for : THIRD SEMESTER

COURSE CODE	COURSE TITLE	PAPER CODE	THEORY COMPONENT								PRACTICAL COMPONENT						TOTAL CREDIT	GRAND TOTALOF MARKS
			LECTURES	CONTINUOUS EVALUATION			END OF THE TERM/ SEMESTER EVALUATION			THEORY CREDIT	PRACTICAL Hrs. Per Week	CONTINUOUS EVALUATION	END OF THE TERM/ SEMESTER EVALUATION			PRACTCAL CREDIT		
			Hrs. Per Week	TERM WORRK QUIZ, ASSIGNMENT	MID TERM TEST (TWO) I	MID TERM TEST (TWO) II	THEORY PAPER NO.	THEORY PAPER MARKS	THEORY PAPER DURATION(Hrs)			LAB. WORK QUIZ, ASSIGNMENT	PRACTICAL / ORAL EXAMIN ATION (VIVA) NO.	PRACTICAL / ORAL EXAMIN ATION (VIVA) MARKS	PRACTICAL / ORAL EXAMIN ATION (VIVA) DURATION(Hrs.)			
DEE301	ELECTRICAL CIRCUIT AND ANALYSIS	6250	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DEE302	ELECTRICAL,DESIGN,DRAWING AND ESTIMATING-I	6251	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DEE303	ELECTRO-MECHANICAL ENERGY CONSERVATION DEVICES	6063	03	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DEE304	ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS	6252	02	10	10	10	01	70	3 hrs	04		-	-	-	-	-	04	100
DIP 305	ENGLISH COMMUNICATION	6253	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	08	150
	Professional activities										02							
	total		20	50	50	50		350		20	18	80		120		08	30	700

Theory Credits	**:20**	**Theory Marks**	**:350**
Practical Credits	**:10**	**Practical Marks**	**:**120
Total Credits	**:30**	**Quiz, Mid Term, Lab. Work : 230**	
		Total	**: 700**

Minimum Pass Grade in (Theory & Practical'D')

PROGRAMME NAME :.ELECTRICAL ENGG

Scheme of Studies and Examinations for :FOURTH SEMESTER

COURSE CODE	COURSE TITLE	PAP ER CODE	THEORY COMPONENT								PRACTICAL COMPONENT							GRAND TOTAL OF MARKS
			LECTURES	CONTINUOUS EVALUATION			END OF THE TERM/ SEMESTER EVALUATION			THEORY CREDIT	PRACTICAL Hrs. Per Week	CONTINUOUS EVALUATION	END OF THE TERM/ SEMESTER EVALUATION			PRACTCAL CREDIT	TOTAL CREDIT	
			Hrs. Per Week	TERM WORRK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		THEORY PAPER					LAB. WORK QUIZ, ASSIGNMENT	PRACTICAL / ORAL EXAMIN ATION (VIVA)					
					I	II	NO.	MARKS	DURATION(Hrs)				NO.	MARKS	DURATION(Hrs.)			
DEE401	ELECTRICAL INSTRUMENTATIONS AND MEASUREMENTS	6254	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DEE402	ELECTRICAL MACHINE	6255	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DEE403	CONTROL SYSTEM	6256	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DEE404	ELECTRICAL,DESIGN,DRAWING AND ESTIMATING-II	6257	04	10	10	10	01	70	3 hrs	04	04	20	01	30	3hrs	2	06	150
DIP 405	TECHNICAL COMMUNICATION	6258	04	10	10	10	01	70	3 hrs	04	-	-		-	-	-	04	100
	Professional activities										02					02	02	
	total		20	50	50	50		350		20	18	80		120		10	30	700

Theory Credits	: 20	Theory Marks	: 350
Practical Credits	:10	Practical Marks	: 120
Total Credits	:30	Quiz, Mid Term, Lab. Work	: 230
		Total	: 700

Minimum Pass Grade in (Theory & Practical'D')

ELECTRICAL CIRCUIT AND ANALYSIS

Third Semester

	L	T	P	C
Course Code: DEE301	**3**	**2**	**-**	**4**

Course Contents

Unit I

D.C. Network Theory (with independent source): Circuit theory concepts-Mesh and node analysis. Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Star Delta transformation. **(Lectures 08)**

Unit II

D.C. Network Theory (with dependent source): -Mesh and node analysis. Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem. **(Lectures 08)**

Unit III

A.C network Theory: Review on basic of R-L-C circuits on AC.Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum transfer theorem. **(Lectures 08)**

Unit IV

Resonance: Resonance in series RLC circuit, waveforms for voltage, current, Power Factor and impedence, Quality factor, expression for quality factor, selectivity, resonance in parallel RLC circuit. **(Lectures 08)**

Unit V

Phase A.C. Circuits: Star-Delta connections, line and phase voltage/current relations, three phase power and its measurement. **(Lectures 08)**

Project work

A project work will be assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his/her practical skill & knowledge.

Text books:

1. Hayt W H, Kemmerly J E, McGraw-Hill, "*Engineering Circuit Analysis*", 2002
2. Nilsson J W, Riedel S A, "*Electric Circuits*", Prentice-Hall, 2000.

Reference Books:

1. Asfaq Hussain "Network Analysis and synthesis", Dhanpat Rai
2. J.B.Gupta *"Basic Electrical Engineering"* , Kataria & Sons.

ELECTRICAL DESIGN, DRAWING & ESTIMATING-I

Third Semester

	L	T	P	C
Course Code: DEE302	**3**	**2**	**-**	**4**

Course Contents

Unit: - I

Electrical Symbols and Diagrams:

(i) Need of symbols; List of symbols for electrical equipments and accessories used in electrical works.

Light, fan and power circuits, alarm and indicating circuit, contactor control circuits as per I.S.S.

(ii) Type of diagrams - Wiring diagrams (multiple and single line representation) and schematic diagrams as per I.S.S.(* One Drawing Sheet for at least - 50 symbols)**.** **(8 Lectures)**

Unit:- II

Wiring materials and accessories:

(1) Brief description, general specifications (as per I.S.S.) and approximate cost of different types of wires, cables, switches, distribution board, switch board, boxes, batten and its accessories, conduit and its accessories, lamp holders, socket out lets, plug ceiling roses. Fuse and energy meter used in domestic and power wiring installations.

(ii) Brief description, general specifications and approximate cost of switches, push buttons, bells, indicating lights, indicating panels, relays used in alarm circuits. **(8 Lectures)**

Unit:- III

Light and Fan Circuits:

Schematic and wiring diagrams (multiline and single line both) using junction boxes and looping systems for the following types of circuits:-

(i) Light and fan controlled by necessary switches and regulators.

(ii) Stair case wiring

(iii) Corridor lighting

(iv) One lamp controlled by three or more switches. **(8 Lectures)**

Unit:- IV

Estimation of Domestic Internal Wiring Circuits:

(i) Description of various wiring systems and methods.

(ii) Need of earthing and point to be earthed in internal wiring system as per IE rules.

(iii) I.S. specifications, calculation of No. of points (light, fan, socket outlet), calculation of total load including domestic power, determination of no. of circuits, size of wires and cables, switches and main switch, distribution board and switch board, batten conduit and other wiring accessories.

(iv) Layout of installation plan, single line wiring, diagram, calculation of length of batten/conduit of different sizes and wire length; schedule of materials. **(8 Lectures)**

Unit:- V

Assembly Drawings:-

(i) Assembly drawing of simple electrical equipment from actual piece or from a pictorial view (carbon brush holder, open knife switch, miniature circuit breaker, motor terminal block, and similar other electrical items) (2-Drawing sheets)

(ii) Poles, towers cables and insulators (2- Drawing sheets) **(8 Lectures)**

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Text Books:

1. S.K Bhattacharya, *"Electrical Engineering Drawing & Design Estimating"*. Wiley Eastern Ltd. New Delhi.
2. Surjeet Singh, *"Electrical Eesign & Drawing"* S.K.Kataria & Sons New Delhi.

Reference Books:

1. O. P. Soni,*" Electrical Engg. Design & Drawing*" Satya Prakashan Delhi.

ELECTRO-MECHANICAL ENERGY CONSERVATION DEVICES

Third Semester

	L	T	P	C
Course Code: DEE303	**3**	**2**	**-**	**4**

Course Contents:

Objective: This paper develops methodology in the experimental research of the dynamics of electromechanical pulse energy conversion systems (PECSs)

Course Contents

Unit I

D.C. Machines: Principle of electromechanical energy conversion, types of d.c. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, need of Starter, three point starter and speed control of DC motors, their applications. **(Lectures 08)**

Unit II

Transformer(single phase): Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single phase transformer, O.C. and S.C. tests.

(Lectures 08)

Unit III

Transformer (Three phase): Three – phase unit transformer and Bank of three single phase transformers with their advantages, Three-phase transformer Groups (Phasor groups) and their connections. **(Lectures 08)**

Unit IV

Three phase induction Motor: Principle of operation, types and methods of starting, slip-torque characteristics, and applications.

Synchronous Machines: Principle of Operation of Alternator and synchronous motor.

(Lectures 08)

Unit V

Single phase Motors:

Principle of operation and methods of starting of single phase induction motor, capacitor start motor, capacitor start capacitor run motor, split phase motor, shaded pole motor and Universal motor.

(Lectures 08)

Project work

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Text Books

1. Asfaq Hussain “Basic Electrical Engineering”, Dhanpat Rai
2. Nagrath I.J., *Basic Electrical Engineering*, Tata McGraw Hill.

Reference Books

1. A.E. Fitgerald, D.E., Higginbotham and A Grabel, *Basic Electrical Engineering*, McGraw Hill.
2. H. Cotton, *Advanced Electrical Technology*, Wheeler Publishing.

ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS

Third Semester

	L	T	P	C
Course Code: DEE304	**3**	**2**	**-**	**4**

Objective: The objective is to study about materials used in electrical engineering equipment.

Course Contents:

Unit I

Classification

Classification of materials into conducting, semiconducting and insulating materials with reference to their atomic structure and energy bands.

Conducting Materials: Resistivity and factors affecting resistivity, such as temperature, alloying. Super conductivity and super conducting material. Low resistivity materials e.g. copper, aluminum and steel, their general properties as conductor e.g. resistivity, temperature co-efficient, mechanical properties, corrosion, solar ability, contact resistance and practical application. High resistivity materials: manganin, carbon, tungsten, their practical applications**.** **(8 Lectures)**

Unit- 2

Insulating Materials

Properties of insulating material:- Electrical properties, Mechanical properties, Physical properties, Thermal properties, Chemical properties, Insulating materials and their application-Definition and classification of Thermo setting materials e.g. Phenol Formaldehyde, Resins (i.e. Bakelite), Thermo Plastic materials e.g. Polyvinyl Chloride (P.V.C.), ,Natural Insulating Materials- Mica and Asbestos,Gaseous Materials e.g. Air, Hydrogen and SF6. **(8 Lectures)**

Unit-3

Magnetic Materials:

B-H curve of magnetic materials, Classification of magnetic materials into soft and hard magnetic materials. Soft magnetic materials - high silicon alloy steel for transformers and low silicon alloy steel, for electric rotating machine cold rolled grain oriented and non-oriented steel, Nickel iron alloy, soft ferrites, their properties and uses. Hard magnetic materials - tungsten steel, chrome steel, cobalt steel, hard ferrites, their properties and applications. **(8 Lectures)**

Unit-4

Semiconductor Materials

Introduction, semiconductor and their applications, Different semiconductor materials used in manufacturing various semiconductors (Si & Ge), Material used for electronic components like resister, capacitor, diode, transistors and inductors. **(8 Lectures)**

Unit-5

Special Purpose Materials:

Thermocouple, bimetals, lead soldering and fuses material, mention their applications, Introduction of various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc. **(8 Lectures)**

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Text Books:

1. Bhattacharya SK*, Electrical and Electronics Engineering Materials*, Khanna Publishers New Delhi.

2. Grover and Jamwal, *Electronics Components and Materials*, Dhampat Rai and Co. New Delhi.
3. Dhir SM, *Electrical Engineering Materials*, Tata Mc Graw Hill, New Delhi.

Reference Books:

1. Kapoor PL, *Electrical Engineering Materials*, Khanna Publishers, New Delhi.
2. Sharma BR and Others, *Electrical and Electronics Engineering Materials*, Sayya Parkashan.
3. DR. Arora, *Electrical and Electronics Engineering Mate*rials, Ishan Publications, Ambata City.
4. Dogra Rakesh, *Electrical Engineering Materials*, SK Kataria and Sons, New Delhi.

ENGLISH COMMUNICATION

Third Semester

Course Code: DIP 301	L	T	P	C
	2	0	2	3

Course Content:

Unit I

Functional Grammar: Active, Passive voice, Conditional Sentences, Syntax, Concord, Common Errors. **(8 hours)**

Practical (oral): To make students practice the above mentioned grammatical RULES in the practical classes. **(2 hours)**

Unit II

Communication: Meaning & Importance of Communication, Process of Communication, Language as a tool of Communication. **(8 hours)**

Practical (Oral): To make students speak on their understanding of Communication in English. **(2 hours)**

Unit III

Writing Skills: Reporting events, Writing newspaper reports, Bio-data making, Writing of C.V. & Resumes, Writing job application. **(8 hours)**

Practical (Oral): To make students practice writing on the above mentioned processes. **(2 hours)**

Unit IV

Listening Skills: The listening process, hearing & listening, types of listening, Barriers to listening. **(8 hours)**

Practical (oral): To make student develop the skills of listening & thus improve their speaking skills. **(2 hours)**

Recommended Books:

1. Raman Meenakshi & Sharma Sangeeta – Technical Communication – Principles & Practices, - ONP, N. Delhi
2. Wren & Martin : High School English Grammar & Composition- S.Chand & Co. N.Delhi

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

ELECTRICAL CIRCUIT LAB

Third Semester

	L	T	P	C
Course Code: DEE351	**-**	**-**	**6**	**3**

LIST OF EXPERIMENTS

(Minimum of Six experiments should be done)

1. Determine the loop currents in any DC network
2. Determine the node voltages in any DC network
3. Verification of principle of superposition with DC sources.
4. Verification of Thevenin, theorems in DC circuits
5. Verification of Norton theorems in DC circuits
6. Verification of Maximum power transfer theorems in DC circuits
8. Study of RLC series resonance
9. Study of RLC Parallel resonance

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)</td><td rowspan="2">VIVA
(10 MARKS)</td><td rowspan="2">TOTAL
INTERNAL
(50 MARKS)</td></tr>
<tr><td>EXPERIMENT
(25 MARKS)</td><td>ATTENDANCE
(10 MARKS)</td><td>QUIZ
(5 MARKS)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

External Evaluation (50 marks)

The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

ELECTRICAL WORKSHOP
Third Semester

	L	T	P	C
Course Code: DEE352	**-**	**-**	**6**	**3**

LIST OF EXPERIMENTS

1. Study the construction, working & circuit of the following: Fluorescent lamp (tube light), Sodium vapour lamp, Mercury vapour lamp, Halogen lamp and Neon lamp.
2. Make the tube light connection and to measure the following: Power factor of the circuit, Voltage across the tube, Voltage across the chock, Power drawn by the circuit form the supply to draw phasor diagram for the circuit.
3. Importance of wire joints, mechanism of failure of joint, methods of minimizing joint failures. Importance of lugs in joints, bus bars, methods of reducing the contact/join resistance, How to join the dissimilar metal joints, Use of multimeter and meggar.
4. (a) Study the different types of wires and wiring accessories.
   (b) To make the house wiring for the following : ?House wiring having 3 fans, 2 tube lights, one – 3 pin socket, and one lamp showing the ear thing of each appliance.
5. Make the circuit for staircase wiring.
6. Assemble and disassemble a table fan & ceiling fan. To learn about their nature of winding, No. Of poles and starting capacitor. To draw winding diagrams and phasor diagram.
7. Study the various types of earthing for electrical appliances/systems, Practice of earthing.
8. Study the construction & working of single-phase transformer & design a small single-phase transformer of given rating.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (25 MARKS)	ATTENDANCE (10 MARKS)	QUIZ (5 MARKS)		

External Evaluation (50 marks)
The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

ELECTRO-MECHANICAL ENERGY CONSERVATION DEVICES LAB

Third Semester

	L	T	P	C
Course Code: DEE353	**-**	**-**	**6**	**3**

LIST OF EXPERIMENTS

1. To obtain load characteristics of a DC shunt and series generator
2. To obtain load characteristics of a DC compound generator
(a) cumulatively compounded
(b) differentially compounded
3. To obtain speed – torque characteristics of a DC shunt motor
4. Speed control of DC shunt motor by field control
5. Speed control of DC shunt motor by armature control
6. To obtain efficiency & voltage regulation of a single phase transformer
7. O.C and S.C test in a single phase transformer
8. To obtain the V curve of the synchronous motor
9. Study of single phase induction starting
10. Load test on three phase induction motor

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

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<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)</td><td rowspan="2">VIVA
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(25 MARKS)</td><td>ATTENDANCE
(10 MARKS)</td><td>QUIZ
(5 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

INDUSTRIAL EXPOSURE

	L	T	P	C
Course Code: DEE 355	**-**	**-**	**-**	**4**

Students will undergo Industrial exposure of two to three weeks in any industry or reputed organization after the II semester examination in summer vacation. The evaluation of this training shall be included in the III semester evaluation.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the II semester and shall be the nodal officer for coordination of the training.

Students will also be required to prepare an exhaustive technical report of the exposure during the III semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Principal of the Polytechnic.

The student at the end of the III semester will present his report about the training before a committee constituted by the Principal of the Polytechnic which would be comprised of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Principal. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Principal.

The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.

Not more than three students would form a group for such industrial exposure submission.

The marking shall be as follows.

Internal: 50 marks
By the Faculty Guide - 25 marks
By Committee appointed by the Principal – 25 marks

External: 50 marks
By Officer-in-charge trainee in industry – 25 marks
By External examiner appointed by the University – 25 marks

ELECTRICAL INSTRUMENTS AND MEASUREMENTS

Fourth Semester

	L	T	P	C
Course Code: DEE401	**3**	**2**	**-**	**4**

Objective: The objective is to study about electrical and electronics instruments used for measurement of electrical parameters.

Course Contents

UNIT-1

Introduction to electrical measuring instruments: Electrical quantities and instruments for their measurements. Measurement and Errors, Accuracy, precision, types of errors, sensitivity, resolution and stability. Types of electrical measuring instruments, indicating, integrating and recording instruments. Essentials of indicating instruments, deflecting, controlling and damping torques.

(8 Lectures)

UNIT-2

Ammeters and voltmeters: Construction and working principle of moving coil moving iron instruments. Merits and demerits, Instrument Transformer and their application in the extension of instrument range and simple problems. **(8 Lectures)**

UNIT-3

Wattmeter and Energy Meter: Construction, working principle, merits and demerits of dynamometer type wattmeter, Sources of errors, Power measurement in three phase circuit by two wattmeter and three wattmeter methods, simple problems, Energy meter (Induction type), Construction, working principle, merits and demerits of single-phase Energy meter.

(8 Lectures)

UNIT-4

Parameter Measurements:

Phase sequence indicator, Synchronoscope, Different methods of measuring low, medium and high Resistance Inductance and Capacitance using Maxwell bridge, Wein's bridge and Schering bridge, potentiometers. **(8 Lectures)**

UNIT-5

Miscellaneous Measuring Instruments:

The construction, working principle and application of ohm-meter, meggar, earth tester, multimeter, frequency meter (reed-type) single phase power factor meter (Electrodynamometer type), Cathode Ray Oscilloscope, construction, working of various controls of CRO. **(8 Lectures)**

Project work

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Text Book:

1. Golding E.W. & F.C. Widdis, A.W. Wheeler "*Electrical Measurement & Measuring Instrument*", & Co. Pvt. Ltd. India.
2. Sawhney A.K., Dhanpat Rai & Sons, India *"Electrical & Electronic Measurement & Instrument",* .

Reference Books:

1. Forest K. Harries "*Electrical Measurement*", , Willey Eastern Pvt. Ltd. India .
2. Stout" M.B. "*Basic Electrical Measurement*, Prentice hall of India ,India.
3. Cooper W.D. "*Electronic Instrument & Measurement Technique*", , prentice hall International.
4. Prashad Rajendra "*Electrical Measurement &Measuring Instrument*", , Khanna Publisher.

Gupta J.B. "*Electrical Measurements and Measuring Instruments*", S.K. Kataria &

ELECTRICAL MACHINES
Fourth Semester

	L	T	P	C
Course Code: DEE402	**3**	**2**	**-**	**4**

Course Contents:

Unit I

Induction Motor:-

Rotating magnetic field for 3 phase concept of motors and its reversing. Construction and working of 3 phase induction motor (squirrel cage and wound rotor motor). Double squirrel cage induction motor. Rotor frequency, rotor e.m.f., rotor current and rotor power factor. Torque equation Torque- slip characteristics. Principle and methods of speed control. Methods of starting of induction motor. On line, auto transformer, star delta manual/automatic starters for induction motor. Starter for slip ring induction motor. Application of induction motor. **(8 Lectures)**

Unit II

Synchronous Motor:-

Construction, working principle, effect of load on synchronous motor, vector diagram of synchronous motor, effect of change in excitation on the performance of synchronous motor, V curves, torque & mechanical power developed, condition for max. mechanical power, synchronous condenser, hunting and its elimination, comparison between induction motor and synchronous motor, starting methods and uses of synchronous motor. **(8 Lectures)**

Unit:- III

F.H.P. Motors:-

Classification of F.H.P. motors, Production of rotating Magnetic field in 1 phase motors., Double revolving field theory, Construction working and application of- **(i)** Capacitor motor (all types), **(ii)** Shaded pole motor, **(iii)** 1 phase synchronous motor, **(iv)** 1 phase series and universal motor, **(v)** Servo Motor. **(8 Lectures)**

Unit:- IV

Electric Drives:-

Advantages of electric drives, Characteristics of different mechanical loads., Types of motors used in electric drive, Use of fly wheels for fluctuating load (only physical concept), Types of enclosures, Methods of power transfer by devices like belt drive, gears, pulley, Examples of selection of motors for particular loads. **(8 Lectures)**

Unit:- V

Converting Apparatus:-

Introduction to different types of converting apparatus e.g. metal rectifier etc. **(8 Lectures)**

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2. H. Cotton, *Advanced Electrical Technology*, Wheeler Publishing.

CONTROL SYSTEM
Fourth Semester

	L	T	P	C
Course Code: DEE403	**3**	**2**	**-**	**4**

Objective: The objective is to study about theory of control system and its various system representations

Course Contents

UNIT-1.

Introduction: Need of automatic control, Concept of open loop and closed loop control, Block diagram of feedback control system and its basic elements, relative advantages and disadvantages of open loop and closed loop control system, definition and explanation of given control system: Linear and Non-Linear Systems, Continuous and discrete Systems, Static and Dynamic Systems, Single Input Single Output (SISO) System and Multi-input Multi-output (MIMO) System. **(Lectures 08)**

UNIT-2

Components & Devices Used In Control System:

Brief description and working of potentiometer, self balancing potentiometer, differential transformer, synchros, servomotors, tacho generators, saturable core reactor and magnetic amplifier. **(Lectures 08)**

UNIT-3

Input Output Relationship of System & Control system Components:

Concept of transfer function and its use in control system, Derivation of transfer function of given systems: Simple RC low pass network, Lag, Lead, Lag-Lead compensating networks, DC servomotor and DC Tachogenerator, derivation of transfer function by block reduction technique and signal flow graph. **(Lectures 08)**

UNIT-4

Performance of Control System:

Step, Ramp, Pulse and sinusoidal type of inputs and their Laplace Transforms, Definitions of Rise time, Peak overshoot, Settling time, Natural frequency and Damping Ratio pertaining to second order system, Initial value and final value theorems and their use in control systems, Types of feedback systems and error constants. **(Lectures 08)**

UNIT-5

Stability Criterion:

Bounded Input and Bounded Output (BIBO) System, Concept of Stability, stability criteria, different techniques of determining stability e.g. Routh, Nyquist criteria, bode plot and their applications to simple system. Electric Controller: On-OFF controller, Proportional, Proportional plus integral (PI), Proportional plus integral plus derivative (PID) controllers. **(Lectures 08)**

Project work

A project work will be assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his/her practical skill & knowledge.

Text Books:

1. Norman S. Mise "*Control System Engineering*",Wiley Publishing Co.
2. M.Gopal, "*Control System; Principle and design*", Tata McGraw Hill.
3. M.Gopal, "*Modern Control system*", Tata McGraw Hill.
4. D.Roy Choudhary, "*Modern Control Engineering*",Prentice Hall of India.

Reference Books:

1. I.J. Nagrath and M. Gopal –Control Systems Engineering, 3rd Ed., New Age Publication
2. K. Atsuhiko Ogata: Modern Control Engineering, PHI

ELECTRICAL DESIGN DRAWING & ESTIMATING II

Fourth Semester

	L	T	P	C
Course Code: DEE404	**3**	**2**	**-**	**4**

Course Contents:

Unit:- I

Principles of Estimating and Costing:

Purpose of estimating and costing, essentials of estimating and costing-market survey, price list and net prices, preparation of list of materials, calculation of material and labour cost, contingencies, overhead charges, profit and total cost, quotations-comparative statement and orders, idea about tender forms. Use of E.S.R (state PWD and CPWD). **(8 Lectures)**

Unit:- II

Earthing:-

Need for earthing of electrical installations, advantages and disadvantages, effect of improper earthing, I.S. specifications regarding earthing of electrical installations, points to be earthed as per I.E. rules. Methods of earthing-plate and pipe earthing. Determination of size of earth wires and earth plates for different capacities of electrical installations, specification of earthing materials and their cost, Earthing of power plant and grid substation. **(8 Lectures)**

Unit:- III

Estimation of Power Wiring:-

I.S. specifications and I.E. rules, calculation of current for single and three phase motors. Determination of sizes of cables, conductors distribution board, main switches and starters for power circuits. Cost of equipments and accessories and schedule of materials. Estimation and cost of material and work for motors up to 20 H.P., pump sets and small workshops. **(8 Lectures)**

Unit:- IV

Estimation of Overhead and Underground Distribution Lines:-

Main components of overhead lines-line supports, cross-arm, clamps, conductors and stay sets, lightening arrestors, danger plates, ant climbing devices, bird guards, jumpers etc., concreting of poles, earthing of transmission line, formation of lines, specification of materials for O.H. lines, I.S. specification and I.E. rules. Cost of material and work for overhead and underground lines upto 11 KV only. **(8 Lectures)**

Unit:- V

Estimation of Small Sub-Station

Main equipments and auxiliaries installed on the substation. Estimation of materials required for a small distribution substation (indoor and outdoor type-platform and pole mounted). Costing of material and work of above substations. **(8 Lectures)**

Project work

A project work will be assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his/her practical skill & knowledge.

Text Books:

1. S.K Bhattacharya, "*Electrical Engineering Drawing & Design Estimating"*. Wiley Eastern Ltd. New Delhi.
2. Surjeet Singh, *"Electrical Eesign & Drawing*" S.K.Kataria & Sons New Delhi.

Reference Books:

1. O. P. Soni*," Electrical Engg. Design & Drawing*" Satya Prakashan Delhi.

TECHNICAL COMMUNICATION
Fourth Semester

Course Code: DIP 401

L	T	P	C
2	0	2	3

Course Content:

Unit I

Pre-requisites of Technical Written Communication: One Word Substitution, Spelling process, words often confused and misused, Technical terms. **(8 hours)**

Practical (oral):

To make students practice the above mentioned topics & take care of the technical terms & also use those in different sentences. **(2 hours)**

Unit II

Technical Communication: Nature, origin & development, salient features, significance, Difference between Technical Communication & General Writing. **(8 hours)**

Practical (oral) : To make students speak on the development of Technical Communication. **(2 hours)**

Unit III

Forms of Technical Communication: What is a Report ? Characterstics of Report, steps to be followed for Report writing, Structure of Report, Importance of Report Writing. **(8 hours)**

Practical (oral): To make students practice how to write a report and then speak on the subject matter of the report. **(2 hours)**

Unit IV

Technical Proposal: What is Proposal ? Significance of proposal, format of proposal, characteristics' of a good proposal. **(8 hours)**

Practical (oral): To make students practice writing a proposal. **(2 hours)**

Recommended Books:

1. Raman Meenakshi & Sharma Sangeeta – Technical Communication – Principles & Practices, - ONP, N. Delhi
2. Mohan K. & Sharma R – Business Correspondence & Report Writing – TMH N.Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

ELECTRICAL INSTRUMENTS AND MEASUREMENTS LAB

Fourth Semester

	L	T	P	C
Course Code: DEE451	**-**	**-**	**4**	**2**

List of Experiments

1. Calibration of ammeter and voltmeter
2. Measurement of self inductance by Maxwell bridge
3. Measurement of self inductance by Hay bridge
4. Measurement of self inductance by Owen,s bridge
5. Measurement of self Capacitance by Schering bridge
6. Low resistance measurement by Kelvin,s Double Bridge
7. To study the CRO function

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (25 MARKS)	ATTENDANCE (10 MARKS)	QUIZ (5 MARKS)		

External Evaluation (50 marks)

The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

ELECTRICAL MACHINE LAB
Fourth Semester

	L	T	P	C
Course Code: DEE452	**-**	**-**	**4**	**2**

List of Experiments

1. To determine performance characteristics of a polyphase induction motor. (load v/s efficiency, load v/s power factor, load v/s slip)
2. To start a 3 phase induction motor and to determine its slip at various loads.
3. To connect and start an induction motor by using star delta starter, auto transformer starter, rotor starter and to change its direction of rotation.
4. To perform open circuit and block rotor test on a 3 ph. induction motor and to determine its efficiency.
5. Determination of performance curve and hence the coreloss of a single phase series motor.
6. Voltage and current ratio of metal rectifier.
7. Sequential operation of motors using timers.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (25 MARKS)	ATTENDANCE (10 MARKS)	QUIZ (5 MARKS)		

External Evaluation (50 marks)

The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

CONTROL SYSTEM LAB

Fourth Semester

	L	T	P	C
Course Code: DEE453	**-**	**-**	**4**	**2**

LIST OF EXPERIMENTS

1. To determine response of first order and second order systems for step input for various values of constant 'K' using linear simulator unit and compare theoretical and practical results.
2. To study P, PI and PID temperature controller for an oven and compare their performance.
3. To study and calibrate temperature using resistance temperature detector (RTD)
4. To design Lag, Lead and Lag-Lead compensators using Bode plot.
5. To study DC position control system
6. To study synchro-transmitter and receiver and obtain output V/S input characteristics
7. To determine speed-torque characteristics of an AC servomotor.
8. To study performance of servo voltage stabilizer at various loads using load bank.
9. To study behaviour of separately excited DC motor in open loop and closed loop conditions at various loads.
10. To study PID Controller for simulation proves like transportation lag.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (25 MARKS)	ATTENDANCE (10 MARKS)	QUIZ (5 MARKS)		

External Evaluation (50 marks)

The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

ELECTRICAL DESIGN, DRAWING & ESTIMATING II LAB

Fourth Semester

	L	T	P	C
Course Code: DEE454	**-**	**-**	**8**	**4**

DRAWING WORK:-

1.	Earthing	**1 sheet**
2.	Commercial and industrial buildings	**1 sheet**
3.	Power wiring layout and circuits	**1 sheet**
4.	Stays, line crossings, line earthing, end poles and terminal poles, junction poles/ towers and transposition pole/towers.	**1 sheet**
5.	Substation layout and busbar arrangements	**1 sheet**
6.	Machine drawings-induction and synchronous machines.	**1 sheet**
7.	Winding of induction machine, 3 ph; 1 ph.	**1 sheet**
8.	Reading and interpreting practical drawing of wiring installation and control circuits.	

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (40 MARKS)			VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (25 MARKS)	ATTENDANCE (10 MARKS)	QUIZ (5 MARKS)		

External Evaluation (50 marks)

The evaluation would also be done by the external Examiner based on the experiment conducted during the examination.