SANKAR POLYTECHNIC COLLEGE (AUTONOMOUS)

SANKAR NAGAR

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

N-SCHEME (Full Time)

II and III year

2020 onwards

CURRICULUM OUTLINE
Diploma in Electrical and Electronics Engineering (Full Time)
N– Scheme
III SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
N331	Electrical Circuit Theory	6	--	6
N332	Electrical Machines-I	5	--	5
N333	Digital Electronics	5	--	5
N334	Electrical Machines I Practical	--	6	6
N335	Digital Electronics Practical	--	6	6
N336	Electrical Workshop I Practical	--	3	3
N337	Computer Applications Practical	--	3	3
	Seminar	1	--	1
	Total Hours	**17**	**18**	**35**

IV SEMESTER

Subject code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
N341	Electrical Machines – II	5	--	5
N342	Measurements, Instrumentation and Transducers	4	--	4
N343	Generation Transmission and Switchgear	5	--	5
N344	Electrical Estimation and Energy Auditing	5	--	5
N345	Electrical Machines II Practical	--	6	6
N346	Electrical Work Shop II Practical	--	6	6
N347	Life and Employability Skill Practical	--	4	4
	Total Hours	**19**	**16**	**35**

V SEMESTER

Subject code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
N351	Distribution and Utilization	5	--	5
N352	Operation and Maintenance of Electrical Equipments	5	--	5
N353	Microprocessor and Micro Controller	5	--	5
N3541	Control of Electrical Machines	5	--	5
N355	Computer Aided Electrical Drawing Practical	--	3	3
N356	Microprocessor and Micro Controller Practical	--	6	6
N3571	Control of Electrical Machines Practical	--	6	6
	Total Hours	**20**	**15**	**35**

VI SEMESTER

Subject code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
N361	PLC and SCADA	5	--	6
N362	Power Electronics and Drives	5	--	6
N3631	FACTS Devices	5	--	5
N364	PLC Practical	-	6	6
N365	Electrical Circuits Simulation Practical	--	4	4
N366	Power Electronics and Drives Practical	--	6	6
N367	Project Work	--	3	3
	Seminar	1	--	1
	Total Hours	**16**	**19**	**35**

Elective subjects

Any one of the following theory subject and practical may be selected as Elective – I

Elective Theory – I		Elective Practical – I	
N3541	Control of Electrical Machines	N3571	Control of Electrical Machines Practical
N3542	Electrical Machine Design	N3572	Electrical Machine Design practical
N3543	Renewable Energy Technology	N3573	

Elective subjects

Any one of the following theory subject may be selected as Elective – II

Elective Theory – II	
N3631	FACTS Devices
N3632	Bio-Medical Instrumentation
N3633	Computer Hardware and Network

SCHEME OF EXAMINATION
ELECTRICAL AND ELECTRONICS ENGINEERIING
THIRD SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	End Examinations	Total Marks	Minimum for Pass	Duration of Exam Hours
N331	Electrical Circuit Theory	**25**	**75**	**100**	**40**	**3**
N332	Electrical Machines-I	**25**	**75**	**100**	**40**	**3**
N333	Digital Electronics	**25**	**75**	**100**	**40**	**3**
N334	Electrical Machines I Practical	**25**	**75**	**100**	**40**	**3**
N335	Digital Electronics Practical	**25**	**75**	**100**	**50**	**3**
N336	Electrical Workshop I Practical	**25**	**75**	**100**	**50**	**3**
N337	Computer Applications Practical	**25**	**75**	**100**	**50**	**3**
	Total	**175**	**525**	**700**		

FOURTH SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	End Examination	Total Marks	Minimum for Pass	Duration of Exam Hours
N341	Electrical Machines – II	**25**	**75**	**100**	**40**	**3**
N342	Measurements, Instrumentation and Transducers	**25**	**75**	**100**	**40**	**3**
N343	Generation Transmission and Switchgear	**25**	**75**	**100**	**40**	**3**
N344	Electrical Estimation and Energy Auditing	**25**	**75**	**100**	**40**	**3**
N345	Electrical Machines II Practical	**25**	**75**	**100**	**50**	**3**
N346	Electrical Work Shop II Practical	**25**	**75**	**100**	**50**	**3**
N347	Life and Employability Skill Practical	**25**	**75**	**100**	**50**	**3**
		175	**525**	**700**		

FIFTH SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	**End Examinations**	**Total Marks**	**Minimum for Pass**	**Duration of Exam Hours**
N351	Distribution and Utilization	**25**	**75**	**100**	**40**	**3**
N352	Operation and Maintenance of Electrical Equipments	**25**	**75**	**100**	**40**	**3**
N353	Microprocessor and Micro Controller	**25**	**75**	**100**	**40**	**3**
N3541	Control of Electrical Machines	**25**	**75**	**100**	**40**	**3**
N355	Computer Aided Electrical Drawing Practical	**25**	**75**	**100**	**50**	**3**
N356	Microprocessor and Micro Controller Practical	**25**	**75**	**100**	**50**	**3**
N3571	Control of Electrical Machines Practical	**25**	**75**	**100**	**50**	**3**
		175	**525**	**700**		

SIXTH SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	**End Examinations**	**Total Marks**	**Minimum for Pass**	**Duration of Exam Hours**
N361	PLC and SCADA	**25**	**75**	**100**	**40**	**3**
N362	Power Electronics and Drives	**25**	**75**	**100**	**40**	**3**
N3631	FACTS Devices	**25**	**75**	**100**	**40**	**3**
N364	PLC Practical	**25**	**75**	**100**	**40**	**3**
N365	Electrical Circuits Simulation Practical	**25**	**75**	**100**	**50**	**3**
N366	Power Electronics and Drives Practical	**25**	**75**	**100**	**50**	**3**
N367	Project Work	**25**	**75**	**100**	**50**	**3**
		175	**525**	**700**		

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N331**
Semester : **III**
Subject Title : **ELECTRICAL CIRCUIT THEORY**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL CIRCUIT THEORY	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	a. ELECTROSTATICS b. DC CIRCUITS	8 8
II	THEOREMS IN DC CIRCUITS	14
III	a. SINGLE PHASE CIRCUITS b. THREE PHASE CIRCUITS	8 8
IV	RESONANT CIRCUITS	14
V	STORAGE BATTERIES	14
Revision and Test		10
Total		84

RATIONALE:

Electric circuit analysis is the process of finding the voltages across, and the currents through, every component in the network. There are many different techniques for calculating these values. This subject is course on the basics of Network Analysis, introduction to network elements and explained all the possible method for finding voltage and current across any network Component with DC, single phase AC and 3 phase ac sources. It aims at making the student conversant with different techniques of solving the problems in the field of Electric circuits and analysis.

OBJECTIVES:

The students should be able to:

- Explain the concept of electrostatics and capacitance effect and analyze different Circuit Elements, Energy Sources and analysis of Network by Kirchhoff's Laws.
- Analyze the concept of Node and Mesh Analysis; analyze different theorems for dc circuits.
- Analyze single phase circuits using resistor, inductor & capacitor elements.
- Explain and analyze series and parallel resonant behavior of a circuit.
- Analysis of balanced three phase ac circuit and three phase power measurement.
- Know the constructional details, working principle, testing and capacity of battery.

N331 – ELECTRICAL CIRCUIT THEORY

Detailed Syllabus

UNIT- I

(a) ELECTROSTATICS **8**

Concept of inductance-energy stored in an inductor - Coulomb's laws of electrostatics-concept of capacitance - Relationship between Voltage, Charge and capacitance – energy stored in a capacitor – capacitors in series and in parallel – Problems in above topics.

(b) DC CIRCUITS **8**

Basic concepts of current, emf, potential difference, resistivity, – Ohm's Law –application of Ohm's law – work, power energy – relationship between electrical, mechanical and thermal units – resistance –series circuits – parallel and Series parallel circuits – Kirchhoff's laws – Problems in the above topics.

UNIT- II

THEOREMS IN DC CIRCUITS **14**

Mesh equations – Nodal equations – star/delta transformations – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem. - Problems in the above topics.

UNIT- III

(a) SINGLE PHASE CIRCUITS **8**

Sinusoidal voltage and current – instantaneous, peak, average and effective values – form factor and peak factor(derivation for sine wave)– pure resistive, inductive and capacitive circuits –Simple Problems in RL,RC, RLC series circuits (No Derivations) – impedance – power and power factor – power triangle – apparent power, active power and reactive power – parallel circuits(theory only) - Conductance, susceptance and admittance.

(b)THREE PHASE CIRCUITS **8**

Three phase systems - concept of balanced and unbalanced load - balanced star &delta connected loads – relation between line and phase voltages and currents – three phase power and power factor measurement by single wattmeter and two wattmeter methods – Problems in all above topics.

UNIT- IV

RESONANT CIRCUITS **14**

Series resonance – parallel resonance (R,L &C; RL&C only) –quality factor – dynamic resistance – comparison of series and parallel resonance – Problems in the above topics – Applications of resonant circuits.

UNIT- V

STORAGE BATTERIES **14**

Classification of cells –construction – chemical action and physical changes during charging, discharging - internal resistance and specific gravity of lead acid, nickel iron and nickel cadmium cells – indication of fully charged and discharged battery –defects and their remedies – capacity – methods of charging – maintenance – applications.

REFERENCE BOOKS:

1. Electric Circuit Theory,Dr.M.Arumugam,Dr.N.Premkumaran -Khanna Publishers, New Delhi.
2. Circuits and Networks Analysis and Synthesis.A. Sudhakar Shyammohan S Palli- Tata McGraw Hill Education Private Ltd.,
3. Electric Circuits, Mahamood Nahvi Joseph A Edminister- Tata McGraw Hill Education Private Ltd.,
4. Elements Of Electrical Engineering , Maria Louis Prentice - Hall Of India Pvt Ltd.,
5. Electrical Machines, Nagarath- TMH Publications.
6. Electrical Machines ,Bhattacharya -TMH Publications.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N332**
Semester : **III**
Subject Title : **ELECTRICAL MACHINES – I**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL MACHINES – I	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	DC GENERATORS	12
II	DC MOTORS	12
III	SINGLE PHASE TRANSFORMERS	14
IV	THREE PHASE TRANSFORMERS	12
V	SINGLE PHASE MOTORS	10
Revision and Test		10
Total		70

RATIONALE:

This subject is classified under core technology group which intends to teach the facts, concepts, principles of electrical machines, such as DC generators, DC motors, single & three phase transformers and Single phase induction motors.

Student will be able to analyze the characteristics of DC generators and motors, Transformers, induction motor & Qualitative parameters of these static and dynamic machines. These machines are used in transmission, distribution and utilization systems.

Knowledge gained by students will be helpful in study of technological subjects such as utilization of electrical energy, switchgear & protection, manufacturing processes & maintenance of electrical machines.

OBJECTIVES:

Students will be able to:

- Know the constructional details & working principles of dc machines and transformers.
- Evaluate the performance of dc generators, motors & transformers.
- Decide the suitability of dc generator, motor & transformer for particular purpose.
- Write the specifications of dc machines & transformers as per requirement.
- Know the constructional details, working principle of single phase induction motors.

N332 – ELECTRICAL MACHINES - I

Detailed Syllabus

UNIT- I

DC GENERATORS **12**

Review of electromagnetic induction – Faraday's laws – Fleming's right hand rule – Principle of operation of D.C. generators –Construction of D.C. machines –Types of armature windings – Define lap and wave windings- Difference between lap and wave winding – EMF equation – Types of D.C. generators – Building up of voltage of D.C. Shunt Generator – No load characteristics of DC Shunt Generator - Determination of critical field resistance – Causes of failure to build-up voltage and remedy – Load characteristics of series and shunt generators – load characteristics of cumulatively and differentially compounded generators – Applications – Problems in above topics – armature reaction – methods of compensating armature reaction – process of commutation .

UNIT- II

DC MOTORS **12**

Principle of operation of D.C. Motors – Fleming's left hand rule –Back emf – Torque equation – Types of motors –Torque-current, Speed-current, Speed-Torque characteristics of DC motors– Speed control of DC motors– Armature and Field control methods – necessity of Starters– 3 Point and 4 Point starters –losses in D.C. Machines – Testing of D.C. machines – Predetermination of efficiency of motor and generator by Swinburne's test – Problems in the above topics – Applications of D.C. Motors.

UNIT- III

SINGLE PHASE TRANSFORMER **14**

Principle of operation – Constructional details of core, shell type transformers – EMF Equation – Voltage ratio –Transformer on No load – Transformer on load – Current ratio – Phasor diagram on no load and on load at different power factors – O.C. test, S.C. test – Determination of equivalent circuit constants– losses in transformer -voltage regulation and efficiency – Condition for finding maximum efficiency– All day efficiency – Problems on the above topics - polarity test–Parallel operation of single phase transformers– Auto transformer – principle – saving of copper – applications.

UNIT- IV

THREE PHASE TRANSFORMER **12**

Three phase Transformer construction – Types of connections –Star-star, Star-Delta, Delta-Star, Delta-delta connections – Scott connection - V connection of transformer – Parallel operation of three phase transformers - Conditions –grouping of transformers–Phasing out test – Pairing of transformer - Load sharing of transformers with equal voltage ratings –Cooling of transformers – Various cooling arrangements – Transformer accessories – conservator – breather –explosion vent – Bucholz relay–ON load and OFF load tap changer –Transformer oil tester – Acidity test .

UNIT- V

SINGLE PHASE MOTORS **10**

Single phase induction motors – not self starting –methods of making itself starting – construction, working principle–slip torque characteristics- split phase motor -capacitor start and capacitor run motor - shaded pole motor - repulsion motor – universal motor-Applications .

Reference Books:

1. A Text Book Of Electrical Technology -Volume II B.L. Theraja, publication S.Chand & Co . New Delhi.
2. Electrical Machines Bhattacharya, TMH Publications.
3. Electrical Machines Nagarath, TMH Publications.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N333**
Semester : **III**
Subject Title : **DIGITAL ELECTRONICS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
DIGITAL ELECTRONICS	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	DIGITAL PRINCIPLES	12
II	CODE CONVERSION AND BOOLEAN ALGEBRA	12
III	COMBINATIONAL CIRCUITS	12
IV	SEQUENTIAL CIRCUITS	12
V	MEMORY DEVICES & TIMER	12
Revision and Test		10
Total		70

RATIONALE:

The subject of Digital Electronics holds applications in all branches of engineering. This subject will impart in depth knowledge of operational amplifier, Logics of Combinational & Sequential circuits and also about various & recent Memory devices and timers.

OBJECTIVES:

- To understand concepts of op-amps.
- To understand basic Boolean postulates and laws.
- To understand the De-Morgan's theorem.
- To understand the concept of Karnaugh Map.
- To Study about Boolean techniques.
- To learn arithmetic circuits-adder/subtractor, BCD adder.
- To understand the encoder/decoder & MUX / DEMUX

- To understand the concept of parity Generator, and checkers.
- To understand various types of flip-flops.
- To understand various types of counters and shift registers.
- To understand the concept of RAM & ROM and its types.
- To understand the function of timer.

N333 – DIGITAL ELECTRONICS
Detailed Syllabus

UNIT- I

DIGITAL PRINCIPLES **12**

Digital logic families –Fan in , Fan out, Propagation delay –DTL, TTL, CMOS Logics and their characteristics - comparison and applications –Tristate logic. Definitions- bit-byte-word and parity bit-Number system-definition-Types- radix- decimal -BCD-binary , Signed binary numbers and hexadecimal-BCD addition-Binary addition-Subtraction-Multiplication-Division-1's and 2's complement.-Hexadecimal addition-Subtraction-Multiplication- advantages

UNIT- II

CODE CONVERSION AND BOOLEAN ALGEBRA **12**

CODE CONVERSION

Conversion- Binary, Octal, Decimal, Hexadecimal - Conversion from one to another.-Binary codes – BCD code, ASCII, Gray code, Excess 3 code and list applications.

BOOLEAN ALGEBRA

Boolean Algebra- Boolean postulates and laws- De-Morgan's theorem Simplification of Boolean expressions using Karnaugh map (up to 4variables-pairs, quad, octets)- Don't care conditions and constructing the logic circuits for the Boolean expressions.

UNIT- III

COMBINATIONAL CIRCUITS **12**

Arithmetic circuits - Half Adder- Full Adder- Half Subtractor – Full Subtractor- Parallel and serial Adders- BCD adder. Encoder and decoder – 3 to 8 decoder, BCD to seven segment decoder- Multiplexer-basic 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX - applications of the MUX – Demultiplexer – 1 to 2 Demultiplexer, 1 to 4 Demultiplexer, 1 to 8 De multiplexer - Parity Generator and Checker.

UNIT- IV

SEQUENTIAL CIRCUITS **12**

SYNCHRONOUS CIRCUITS

FLIP -FLOPS – SR, JK, T, D FF, JK- MS FF - Triggering of FF – edge &level , Counters – 4 bit Up - Down Asynchronous / ripple counter - Decade counter- Mod 3, Mod 7 counter. 4 bit Synchronous Up - Down counter - Johnson counter, Ring counter

SHIFT REGISTERS 4-bit shift register- Serial IN Serial OUT- Serial IN Parallel OUT – Parallel IN Serial OUT- Parallel IN Parallel OUT.

UNIT- V

MEMORY DEVICES & TIMER **12**

Classification of memories - RAM organization - Address Lines and Memory Size - Read /write operations- Static RAM - Bipolar RAM cell- Dynamic RAM- SD RAM- DDR RAM.- Read only memory – ROM organization- Expanding memory- PROM- EPROM- and EEPROM - Flash memory- Anti Fuse Technologies.

OP-AMP

Operational amplifier(IC 741)-Inverting -Non-inverting- comparator - Integrator-differentiator-summing and differential amplifier.

TIMER

Timer(IC 555)-pin diagram-working-applications-multivibrators - monostable – astable - bistable.

REFERENCE BOOKS:

1. Principles of Digital Electronics - K.Meena -PHI – 2011

2. Modern Digital Electronics - R.P.Jains - TMH -2003

3. Electronics Principles by Malvino and Leach, Mc. Graw Hill, Third edition. 2000.

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N334**

Semester **: III**

Subject Title **: ELECTRICAL MACHINES I PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL MACHINES I PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Circuit Diagram	40
2	Connection	30
3	Execution	15
4	Result and Graph	10
5	Viva voce	5
Total		100

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Electrical Machines I.

OBJECTIVES

On completion of this practical subject, the students will be able to

- Make the various circuit connections.
- Practically prove the RLC Series resonance.
- Understand the characteristics of electrical machine and to determine the efficiency of the machines.
- Test the transformer to find its efficiency, voltage regulation and characteristics.
- Various speed control methods of DC motor.

List of Experiments

1. No Load and Load characteristics of self-excited DC shunt Generator.
2. Load Characteristics of self-excited DC series Generator.
3. Load Test on DC shunt motor and draw the Performance Curves.
4. Load Test on DC series motor and draw the performance curve.
5. Predetermine the efficiency of DC machine by Swinburn's test.
6. Speed Control of DC Shunt motor by
    a) Armature control method.
    b) Field control method.
7. Load Test on a Single phase Transformer.
8. Load test on a Three-Phase Transformer.
9. Find the equivalent circuit constants of a Single phase Transformer by conducting OC and SC tests.
10. Connect two single phase transformer for parallel operation by conducting Polarity test.
11. Load test on single phase induction motor.
12. Construct RLC Circuit for Series Resonance and draw the Frequency Response curve.

S.NO	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	DC Shunt Motor 3/5 KW (or more) with loading arrangement	2
2	DC Series Motor 3/5 KW (or more) with loading arrangement	1
3	DC Shunt Generator 3/5 KW (or more) coupled with prime mover	1
4	DC Series Generator 3/5 KW (or more) coupled with prime mover	1
5	Single phase induction motor with staring and loading arrangement 2HP, 250V, 10A, 1440 rpm.	1
6	1 phase Transformer 1KVA (or more) 220V/110V	3
7	3 phase Transformer 1KVA (or more) 440V/220V	1
8	1 phase induction motor 2HP (or more) with loading arrangement	1
9	1 phase Variac 15 amps	2
10	3 phase Variac 15 amps	1
11	Dual Regulated Power Supply 0-30V/2A	2
12	Single Regulated Power Supply 0-30V / 2A	2
13	Series RLC Resonance Kit	1
14	Single phase Resistive Load 3/5 KW, 220V	2
15	Three Phase Resistive Load 3KW,415V	1
16	Tachometer Analog type	2
17	Tachometer Digital	1
18	Rheostat – various ranges 50Ω/5A,100 Ω/5A, 300 Ω/2A, 600 Ω/2A (or equivalent)	15
19	AC Ammeter – various ranges 0-500mA, 0-1/2A, 0-5/10A,0-10/20A (or equivalent)	12
20	DC Ammeter – various ranges 0-500mA, 0-2A,0-5A,0-10A,0-15/30A (or equivalent)	15
21	DC Voltmeter – 0-5/10V, 0-30V, 0-300V	10
22	AC Voltmeter – 0-75V, 0-150V, 0-300V, 0-600V	10
23	Wattmeter – various ranges LPF 150/300/600V 2.5A/5A,1/2.5A	6
24	Wattmeter – various ranges UPF 75/150/300,5/10A	6
25	Wattmeter – various ranges UPF 150/300/600V 10/20A	8

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N335**

Semester **: III**

Subject Title **: DIGITAL ELECTRONICS PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
DIGITAL ELECTRONICS PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Circuit Diagram	40
2	Connection	30
3	Execution	15
4	Result and Graph	10
5	Viva voce	5
Total		100

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Digital Electronics.

OBJECTIVES

On completion of this practical subject, the students will be able to

- Make the various circuit connections.
- Practically prove the basic gates.
- Understand the function of op amps and timers.
- Verify the various ALU functions using gates.

List of Experiments

1. Realization of basic gates using NAND & NOR gates.
2. Realization of logic circuit for a given Boolean expression.
3. Half adder, Full adder using ICs.
4. Half subtractor, full subtractor using ICs.
5. Construction and verification of truth table for Decoder/Encoder.
6. Multiplexer/De-multiplexer using ICs.
7. Parity generator and checker using ICs.
8. Construction and verification of truth table for RS, D, T & JK flip-flop.
9. 4- bit ripple counter using FF
10. Construct a Single digit Decade Counter with 7 segment display.
11. Inverting Amplifier and Non inverting Amplifier, Summing Amplifier, Comparator using OP-AMP.
12. Integrator and Differentiator using OP-AMP.
13. Mono Stable and Astable Multi vibrator using IC 555.

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N336**

Semester **: III**

Subject Title **: ELECTRICAL WORKSHOP I PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL WORKSHOP I PRACTICAL	3	42	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Wiring Diagram / Assembling and Dismantling	40
2	Connection	30
3	Execution	15
4	Result and Graph	10
5	Viva voce	5
Total		100

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Electrical Wiring.

OBJECTIVES

On completion of this practical subject, the students will be able to

- Make the various circuit connections.
- Understand the various wiring connections eg. Tunnel wiring, test board with indicator etc.,.
- Know how to assemble and dismantle the home appliance eg. mixer, grinder, etc.

List Of Experiments:

WIRING

Familiarization of different types of accessories used in electrical wiring. (Different types of wires and cables (single strand, multi strand, gauges of wire, wire gauge, current ratings of cables- UG cables etc). different types of switches and protecting switches (SPST, SPDT, TPTT, ICDP, ICTP, knife switch, push button switch, toggle switch, rotary switch, push pull switch, limit switch).

1. Combined Series parallel wiring using two way switch.
2. Emergency alarm wiring with 3 bells and 3 push buttons.
3. Tunnel wiring using 4 lamps.
4. Control three lamps with individual switch and provide MCB for master control.
5. Design and implement a test board with indicator lamp, fuse unit, three pin plug with switch to test electrical appliances.
6. To prepare a wiring circuit to check the availability of R/Y/B phases using one lamp only by operating individual switches for each phase and test it.

Assembling and Dismantling

7. Assembling and testing of 10 serial lamps.
8. Dismantling of Electrical iron box, identifying the parts, checking the conditions, assembling and testing.
9. Dismantling of Mixer Grinder, identifying the parts, checking the conditions, assembling and testing.
10. Dismantling of Wet Grinder, identifying the parts, checking the conditions, assembling and testing.

LIST OF EQUIPMENTS

S.No	Description	Specification	QUANTITY
1	Tools: Screw driver, Cutting pliers, Wire Stripper, Hammer,Spanner set, Line Tester, Nose pliers.		Req.Qty
2	Personal Protective Equipments: Safety helmet, Google, Safety gloves, Nose mask, Ear plug, Safety Belt.		Req.Qty
3	Automatic Iron Box		Req.Qty
4	Wet Grinder		Req.Qty
5	Mixer Grinder		Req.Qty
6	LED Light, PCB,Driver Circuit and Outer Cover		Req.Qty
7	Push button switch	250V/5A	Req.Qty
8	Electric bell	250V/5A	Req.Qty
9	2 plate ceiling rose	250V/5A	Req.Qty
10	Fluorescent tube light with electronic	40W	Req.Qty
11	choke and holder		Req.Qty
12	Two way flush type switch	250V/5A	Req.Qty
13	Wooden box	30 cm*15cm	Req.Qty
14	PVC pipe	¾”/1″	Req.Qty
15	Saddle clips	¾”/1 ″	Req.Qty
16	Copper wire	2.5 Sq.Mm,	Req.Qty
17	Copper wire	1.5 Sq.Mm	Req.Qty
18	1” junction box	1way,2way,3way	Req.Qty
19	Screws		Req.Qty

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N337**

Semester **: III**

Subject Title **: COMPUTER APPLICATIONS PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
COMPUTER APPLICATIONS PRACTICAL	3	42	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

S.No	Allocation	Marks
1	Writing Procedure – One Question from Section I	20
2	Demonstration	20
3	Results with Printout	05
4	Writing Procedure – One Question from Section II	20
5	Demonstration	25
6	Results with Printout	05
7	Viva Voce	05
	TOTAL	100

GUIDELINES:

- All the experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The computer systems should be 1:1ratio for practical classes.

List Of Experiments

SECTION – I

GRAPHICAL OPEARTING SYSTEM

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin ; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts &Autostart; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hard ware & Software program on your computer - Copying in CD/DVD settings – Recording Audio files.

Exercises

1. a) Installing screen saver and change the monitor resolution by 1280X960
   b) Setting wall papers
   c) Creating, moving, deleting and renaming a folder
   d) Copy, paste and cut a folder/file
   e) Displaying the properties for a file or folder

2. a) Restoring files and folders from Recycle bin
   b) Creating short cuts for folder/file
   c) Finding a file or folder by name
   d) Selecting and moving two or more files/folders using mouse
   e) Sorting folders/files.

WORD PROCESSING

- Introduction to Word Processing – Examples- Creation of new documents, opening document,
- Insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker.
- Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading, Templates, wizards, drawing objects, mail merge.

Exercises

3. Create the following table and perform the operations given below

DAYS	1	2	3	4	5	6	7	8
MON	←TEST→		A: JPP B:RDBMS			CA	RDBMS	TUT
TUE	CA	OOP	CN	RDBMS	A: RDBMS B: JPP			
WED	CN	RDBMS	OOP	RDBMS	COMMUNICATION		CN	CA
THU	OOP	A: JPP B: RDBMS			CA	RDBMS	CN	OOP
FRI	COMMUNICATION		A: RDBMS B: JPP		OOP	CN	RDBMS	CA
SAT	OOPS	RDBMS	CN	CA	---------			

4. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.

5. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction to Analysis Package – Examples - Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Exercises

6. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

- Result is Distinction if Total >= 70 %
- First Class if Total > = 60 % and < 70 %
- Second Class if Total >= 50 % and < 60 %
- Pass if Total >= 35 % and < 50 %
- Fail otherwise

Create a separate table based on class by using auto filter feature.

7. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue color and lowest donation with red colour. The table should have a heading.

8. Create line and bar chart to highlight the sales of the company for three different periods for the following data.

SALES BAR CHART

Period	Product1	Product2	Product3	Total
JAN	35	40	50	125
FEB	46	56	40	142
MAR	70	50	40	160

SECTION – II

DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

9. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.
- Name should be not null
-

10. Create a students table with the following fields: Sr.No, Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

PRESENTATION

Introduction - Opening new presentation, Parts of PowerPoint window – Opening - Saving and closing presentations - Features of PowerPoint, Background design, Word art, Clip art, Drawings,3D settings - Animations, Sound, Views, types of views - Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show - Creating custom presentations, action setting, auto content wizard, working with auto content wizard

Exercises

12. Make a marketing presentation of any consumer product with at least 10 slides.
Use different customized animation effects on pictures and clip art on any four of the ten slides.

13.Create a Presentation about our institution or any subject with different slide transition with sound effect.

INTERNET

Introduction – Getting acquainted with Internet Connection - Browsers – Website URL - Open a website – Net Browsing - Email: Creating E-mail id – Sending , receiving and deleting E-mail -Email with Attachments – CC and BCC - Chatting – Creating Group mail - Google docs – Search Engines – Searching topics.

Most Popular Social Networking Sites: History – Features – Services – Usage of Face book,Twitter and Linkdln.

Transferring data through wifi / bluetooth among different devices.

Introduction to cybercrime – Software Piracy – Viruses – Antivirus Software

Exercises

14. Create an e-mail id and perform the following

- Write an e-mail for applying Campus interview.
- Make your own signature and add it to the e-mail message.
- Attach a word file.
- Send the e-mail to at least 5 top companies.

15. Create a presentation on Google docs. Ask your friend to review it and comment on it. Use "Discussion" option for your discussions on the presentation.

16. Find out the direction and distance about road travel from Delhi to Agra using google maps. Also make a report of the Map and other details like places of interest Hotels to stay. Write your experience and create this as a blog.

LIST OF EQUIPMENTS

Hardware Requirements:

- Computers – 36Nos
- Intel Core i3 Processor with 500 GB Hard Disk, 2 MB RAM 14” Monitor
- Projector – 1 Nos
- Laser Printer – 1 No
- Internet Connection – Minimum of 512 KB

Software Requirements:

- Any GUI Operating System
- Open Source Software / MS- Office

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code : **N341**

Semester : **IV**

Subject Title : **ELECTRICAL MACHINES – II**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL MACHINES – II	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	ALTERNATORS	12
II	ALTERNATORS PERFORMANCE AND TESTING	12
III	THREE PHASE INDUCTION MOTORS	12
IV	A. THREE PHASE INDUCTION MOTOR STARTERS B. SYNCHRONOUS MOTOR	12
V	A. SPECIAL AC MACHINES B. SPECIAL DC MACHINES	12
Revision and Test		10
Total		70

RATIONALE:

- This subject is classified under core technology group intended to teach students facts, concepts, Principles of electrical machines such as induction motor, alternator, synchronous motor and special ac and dc machines.
- Student will be able to analyze the characteristics and qualitative parameters of these machines. These machines are widely used in industries and for generation of electricity.
- The knowledge gained by the student is useful in the study of technological subjects such as Utilization System, Manufacturing Processes and Testing and Maintenance of Electrical machines.
- The knowledge and skills obtained will be helpful in discharging technical functions such as Supervision, controlling and as R & D technician.

OBJECTIVES

The students should be able to Study

- 1.Alternator Principle, Construction, Types, EMF Induced and cooling Performance of an Alternator, Testing, Characteristics, parallel operation, Load sharing etc.,
- 2.3-Φ Induction Motor, Principle, Construction, Types, Characteristics and Applications, starting Methods.
- Synchronous Motor, Starting, Construction, Characteristics and Applications Special AC machines and DC machines Construction, Characteristics and Applications.

N341 – ELECTRICAL MACHINES - II

Detailed Syllabus

UNIT- I

ALTERNATORS **12**

Basic principle of alternators – Types of alternators –field system – advantages of rotating field –Construction details of alternator – Salient pole rotor – Cylindrical type rotor – Types of A.C. armature windings – Types of slots –Full pitch and short pitched windings – Phase spread angle and effect of distribution factor – pitch factor – relation between frequency, speed and number of poles – EMF equation –Problems – methods of obtaining sine wave – Critical speed of rotor – Ventilation of turbo alternators – advantages of hydrogen cooling and its precaution – excitation and exciters.

UNIT- II

ALTERNATORS PERFORMANCE AND TESTING **12**

Load characteristics of alternators – reason for change in terminal voltage –Qualitative treatment of armature reaction for various power factor loads – effective resistance – leakage reactance – synchronous reactance, synchronous impedance –Voltage regulation – Determination of voltage regulation by synchronous impedance method (simple problems)- MMF method– potier method. Necessity and conditions for parallel operation of alternators – synchronizing by dark lamp method, bright lamp method ,dark - bright lamp method and synchroscope method–synchronizing current, synchronizing power and synchronizing torque – load sharing of alternators –infinite bus bar .

UNIT- III

THREE PHASE INDUCTION MOTORS **12**

Rotating magnetic field – Principle of operation of three phase induction motors – slip and slip frequency – comparison between cage and slip ring induction motors – development of phasor diagram – expression for torque in synchronous watts –slip-torque characteristics – stable and unstable region – no load test and blocked rotor test – development of approximate equivalent circuit – problems on the above topics – simplified circle diagram – determination of maximum torque, slip (problems not required) – starting torque and starting current expression –relationship between starting

torque and full load torque – speed control of induction motors.

UNIT- IV

A. THREE PHASE INDUCTION MOTOR STARTERS **4**

Starters of induction motors – direct on line starter and its merits for cage motors – star delta starter- auto transformer starter-rotor resistance starter – cogging –crawling in induction motor–double cage induction motor-induction generator.

B. SYNCHRONOUS MOTOR **8**

Principle of operation –not self starting – methods of starting–effects of excitation on armature current and power factor– 'V' curve and inverted 'V" curve of synchronous motor –the phenomenon of hunting and prevention of hunting by damper winding – comparison between synchronous motor and three phase induction motor -applications - power factor improvement.

UNIT- V

A. SPECIAL AC MACHINES **6**

Permanent magnet Synchronous motors – Construction and performance – Advantages – Applications –Synchros –Constructional features – Control Transmitter – Control receiver -Applications of synchros– A.C. Servo motors – Two phase A.C.Servo motor – Linear induction motor.

B. SPECIAL DC MACHINES **6**

Permanent Magnet D.C. Motor – Construction–Working principle – Speed control – Advantages – Applications – Servo motors – D.C. Servomotors – Stepper motors – Variable reluctance stepper motor – Permanent magnet stepper motor.

Reference Books:

1. A Text Book Of Electrical Technology Volume IIB.L. Theraja, publication S.Chand & Co . New Delhi.
2. Electrical Machines Bhattacharya, TMH Publications.
3. Electrical Machines Nagarath, TMH Publications.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code : **N342**

Semester : **IV**

Subject Title : **MEASUREMENTS, INSTRUMENTATION AND TRANSDUCERS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
MEASUREMENTS, INSTRUMENTATION AND TRANSDUCERS	4	56	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	a. CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS b. INDICATING INSTRUMENTS	5 5
II	a. DC BRIDGES b. AC BRIDGES AND CRO	5 5
III	MEASUREMENT OF WATTMETERS AND DIGITAL METERS	8
IV	SENSORS AND TRANSDUCERS	8
V	SIGNAL CONDITIONERS	10
Revision and Test		10
Total		56

Rationale:

Measurement is the basic and primary operation, the result of which is used only to describe the system and hence treated as an independent operation. Automation of any kind begins with the measurement of certain system parameters; In fact, industrial growth moves hand in hand with the growth of the measurement of Science and technology. Therefore it is highly essential for Electrical students to study about the measurement of various electrical parameters in a system and the construction and working of different instruments used in measurement of such parameters.

Objectives:

- To define basic measurement terms.
- To learn about various operating forces and effects used in instruments.
- To study the construction and working of Moving coil and Moving Iron instruments, CT and PT and electrostatic voltmeter.
- To understand the measurement of resistance using different means.
- To study Single phase and Three phase power measurement using wattmeter.
- To study the construction and working of single phase, three phase energy meter and study about calibration
- To study the construction and working of Power factor meters, and phase sequence indicators.
- To study about the frequency measurement using different types of frequency meters.
- To learn about the measurement of inductance and capacitance using bridges.
- To study about CRO and its applications.

N342 – MEASUREMENTS, INSTRUMENTATION AND TRANSDUCERS

Detailed Syllabus

UNIT- I

a. CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS **5**

General - Definition of Measurement – functions of Measurement system (Indicating, Recording and controlling function) – Applications of measurement systems – classification – Absolute and secondary instruments – Indicating Recording and Integrating Instruments –Analog and Digital – Definition of True value, accuracy, precision, error and error correction – Instrument efficiency – Effects used in instruments – operating forces – Deflecting, controlling and damping forces – constructional details of moving system – Types of Supports - Balancing – Torque weight ratio – control system (spring control and gravity control) Damping systems – Magnets – pointers and scales.

b. INDICATING INSTRUMENTS **5**

Construction and operation of moving coil, moving iron voltmeter and ammeter-. Tong tester – Electrostatic voltmeter – Rectifier type instruments – Instruments transformers CT and PT- Classification of Resistance measurement using conventional method – (Ammeter – voltmeter method)

UNIT- II

a. DC BRIDGES **5**

Measurement of low resistance using Kelvin's Bridge ohmmeter – measurement of Medium resistance using Wheatstone bridge – High resistance using Megger - Multimeters.

b. AC BRIDGES AND CRO **5**

Measurement of Inductance – Maxwell's Inductance bridge – Andersons bridge – Measurement of capacitance using Schering bridge.CRO – Block diagram – CRT – Applications -Measurements of voltage, frequency and phase difference using CRO - Time base and synchronization – Dural trace CRO – Digital storage oscilloscope – Block diagram

UNIT- III

MEASUREMENT OF WATTMETERS AND DIGITAL METERS **8**

Power in D.C and A.C Circuits – watt meters in power measurement – Electrodynamometer type and LPF watt meters – Three phase power measurement using Three phase wattmeter- Single phase and Three phase energy meters construction and operation- Digital Energy meter- Three phase Electro dynamometer type – Tri-vector meter – Merz price maximum demand Indicator- Weston type – Digital Frequency meter.

UNIT- IV

SENSORS AND TRANSDUCERS **8**

Sensors – types of sensors – active and passive transducers-Proximity sensor - Peizo-electric, Opto-sensor- Meaning of transducers, selection of transducers, strain gauges-LVDT, RVDT, Thermocouple, Pyrometer, Photo electric transducer, Load cell, Hall effect transducer, Bellows and bourdon tubes- Bolometer for measuring AF & RF power measurements, applications.

UNIT- V

SIGNAL CONDITIONERS **10**

Need for signal conditioning, block diagram of a.c. and d.c. signal conditioning, applications explain with a circuit diagram, - Active filters – operational amplifier with capacitive transducer – operational amplifier as instrumentation amplifiers – bridge amplifier – active filters using op. Amp – LPF, HPF – LPF as integrator – HPF as differentiator - Successive approximation type ADC – R-2R ladder network DAC – wein bridge oscillator using op.amp –op.amp as zero crossing detector.

Reference Books:

1. A course in Electrical and Electronic Measurement and Instrumentation – UmeshSinha - SatyaPrakashan New Delhi.
2. Transducers and Instrumentation - DVS Murty - PHI 2009.
3. Sensor and Transducers - D. Patranabis - PHI 2011.
4. A Course in Electrical and Electronics Measurements and Instrumentation – A.K.Sawhney, Puneet Sawhney – Dhanpat Rai& Co (P) Ltd., New Delhi 1993.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code : **N343**

Semester : **IV**

Subject Title : **GENERATION, TRANSMISSION AND SWITCHGEAR**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
GENERATION, TRANSMISSION AND SWITCHGEAR	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	GENERATION OF ELECTRICAL POWER	12
II	A.C. AND H.V.D.C TRANSMISSION	12
III	LINE INSULATORS AND UNDERGROUND CABLES	12
IV	CIRCUIT BREAKERS AND OVER VOLTAGE PROTECTION	12
V	PROTECTIVE RELAYS AND GROUNDING	12
Revision and Test		10
Total		70

Rationale:

Energy is the basic necessity for the economic development of a country. As a matter of fact, there is a close relationship between the energy used per person and his standard of living. The greater the per capita consumption of energy in a country, the higher is the standard of living of its people. The modern society is so much dependent upon the use of electrical energy that it has become a part of our life. So to have adequate knowledge in Electrical power generation and transmission it becomes necessary to include this subject.

Objectives:

To Understand

- Conventional power plants-Layout and choice of site.
- Renewable energy sources and power generation.
- Grid system and Economics of power generation.
- A.C Transmission-Supports, conductors, Effects, Regulation and Efficiency H.V.D.C Transmission.
- Line Insulators and underground cables.
- Circuit breakers, Fuses and Lightning arrester.

N343 – GENERATION, TRANSMISSION AND SWITCHGEAR

Detailed Syllabus

UNIT- I

GENERATION OF ELECTRICAL POWER **12**

Introduction - Conventional methods of power generations –schematic arrangement and choice of site for Hydel, Thermal, Nuclear power plants-Advantages and Disadvantages-comparison of these power plants -Principle and types of co generation. Schematic arrangement of Diesel, Gas, Pumped storage schemes-Advantages and Disadvantages- Renewable Energy sources-Basic principle of Solar Energy, Grid Connected Solar PV System, Standalone Solar PV System, Hybrid Solar PV System, Wind Power Generation. Grid or Inter connected system-Advantages of Inter connected systems- Load Transfer through Inter connector-Load curves and Load duration curves-connected load-Average load-Maximum Demand Factor- Plant capacity factor-Load factor and its significance-Diversity factor-Tariff – Types- Factors influencing tariff, Simple problems - Load sharing between base load and peak load plants-Load Dispatching centre stand- alone system.

UNIT- II

A.C. AND H.V.D.C TRANSMISSION **12**

A.C. Transmission:

Introduction -Typical Layout of A.C Power supply scheme various system of power Transmission-Advantages and Disadvantages of A.C Transmission- High Transmission Voltage-Advantages-Economic choice of Transmission voltage-Elements of a Transmission Line- Economic choice of conductor size-Kelvin's Law- Its limitation-over Head Line-Conductor materials and their properties-Line supports-its properties-Types of supports and their applications-spacing between conductors-length of span-Sag in over head lines-Calculation of Sag-When the supports are at equal and unequal levels-Problems- Effect of wind and ice loading over the line conductor (Qualitative treatment only) -constants of a Transmission line- Transposition of Transmission lines-Skin Effect-Ferranti Effect-Corona formation and corona loss-Factors affecting corona-Advantages and Disadvantages-Classification of O.H. Transmission lines- performance of single phase short Transmission line - voltage regulation and Transmission Efficiency-

Problems.

H.V.D.C Transmission:

Advantages and Disadvantages of D.C Transmission-Layout Scheme and principle of High Voltage D.C Transmission-D.C link configurations (mono polar, Bipolar and Homo polar)-HVDC convertor Station (Schematic diagram only)

UNIT- III

LINE INSULATORS AND UNDERGROUND CABLES 12

Line Insulators:

Introduction - Line Insulator materials-Properties of Insulators-Types & causes of failure of Insulators-Testing of Insulators-Potential Distribution over suspension Insulator string-String Efficiency - Methods of improving string efficiency- problems.

Underground cables:

Introduction-Advantages and requirement of cables-construction- of a three core cable-Insulating materials for cables-properties of Insulating materials used in cables-classification of cables-cables for three phase service-construction of Belted cable, screened cable, Pressure cables-Laying of underground cables-Direct laying, Drawing system, Advantages and Disadvantages-Grading of cables- capacitance grading, Inter sheath grading (No derivation and Problems)-cable faults-O.CS.C and Earth faults.

UNIT- IV

CIRCUIT BREAKERS AND OVER VOLTAGE PROTECTION 12

Switch gear-Essential features of Switch gear-faults in a Power system (definition only).

Circuit Breakers

Basic principle of circuit Breaker -Arc Phenomenon-methods of Arc extinction-Arc voltage –Restriking voltage and recovery voltage-Rate of rise of restriking voltage-current chopping-Interruption of capacitive current -resistance switching-C.B ratings – Breaking capacity, making capacity, short time rating - Auto reclosing in circuit Breakers - Classification of Circuit Breakers – Construction and Working principle of Oil Circuit Breaker, Air blast Circuit Breaker, E.L.C.B, Miniature circuit breaker (M.C.B) , Residual current circuit breaker , SF6 and vacuum Circuit Breaker D.C breaking -Problems of D.C breaking-Schematic for HVDC CB producing current zero. Fuses-Desirable

characteristics-Fuse Element materials-current rating of fuse elements-fusing current-Cut off current- L.V fuses- Rewirable fuse, HRC cartridge fuse, HRC fuse with tripping device -H.V. fuses & cartridge type, liquid type and metal clad-fuses-Comparison of fuse and circuit breaker.

Over voltage protection:

Voltage surge- causes of over voltage-Lightning-Types of lightning strokes -Direct stroke, indirect stroke-Harmful Effects of lightning -Protection against lightning- Earthing screen, overhead ground Wires, Lightning arresters- Expulsion type, Gapless arrester.

UNIT- V

PROTECTIVE RELAYS AND GROUNDING **12**

Protective relays:

Basic principled-Fundamental requirements of protective relaying- Primary and back up Protection-relay characteristics-relay timing -Instantaneous relay -Inverse time relay and Definite time lag relay- Inverse definite minimum time relay classification of relays-Construction, Principle of operation and applications of Induction type over current relay Directional and Non directional),Distance relay, Differential relay, Negative sequence relay, Induction type reverse power relay, Earth leakage relay. Static relays- Basic elements of static relay

Grounding:

Introduction-Equipment grounding- system grounding-ungrounded grounding, Resistance grounding Reactance grounding, resonant Neutral system-Necessity of Neutral grounding -methods-solid grounding- Earthing Transformer

Reference Books:

1. Principles of Power System - V.K.Metha - S.Chand& Company, New Delhi, Edition Reprint 2007.
2. Electrical Power System – C.L.Wadhawa - New Age International New Delhi, New Delhi - Fourth Edition, 2009.
3. A course in Electrical power - Soni, Gupta - DhanpathRai&Co (P) Ltd, New Delhi.
4. Electrical Power - S.L Uppal - Khanna Publishers, Delhi.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code : **N344**

Semester : **IV**

Subject Title : **ELECTRICAL ESTIMATION AND ENERGY AUDITING**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL ESTIMATION AND ENERGY AUDITING	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	SYSTEMS OF INTERNAL WIRING AND EARTHING	12
II	DOMESTIC AND INDUSTRIAL ESTIMATE	12
III	ENERGY MANAGEMENT& AUDIT AND ELECTRICALSYSTEM	12
IV	ELECTRIC MOTORS & LIGHTING SYSTEM	12
V	DIESEL GENERATING SYSTEM & ENERGY EFFICIENTTECHNOLOGIES IN ELECTRICAL SYSTEMS	12
Revision and Test		10
Total		70

Rationale:

The students must understand various types of materials required for wiring and the estimation of a domestic installation, industrial installation, earthing systems, and the IE standards related to the estimation. And to teach the energy auditing techniques and how to use energy efficiently.

Objectives:

To Understand

- To comprehend various wiring system used in domestic wiring.
- To compute the conductor size and the procedure for determines the size.
- To define the circuits and sub circuits.
- To draw the layout of wiring.
- To describe the preparation of the estimate and cost of materials used for internal wiring of different buildings in surface conduit system.
- To describe the preparation of the estimate and cost of materials used for internal wiring of different buildings in concealed system.
- To describe the purpose of earthing and types of earthing.
- To prepare the estimate and cost of materials used for a standard pipe and plate earthing.
- To prepare the estimate and cost of wiring small workshop with the given capacity of Machines.
- To know how to done energy auditing and their types.
- To learn how to utilize energy efficiently.

N344 – ELECTRICAL ESTIMATION AND ENERGY AUDITING

Detailed Syllabus

UNIT I

SYSTEMS OF INTERNAL WIRING AND EARTHING **12**

Need of electrical symbols – List of symbols – Brief study of important Indian Electricity Rules 1956 - Methods of representation for wiring diagrams – Looping back system and Joint box system and tree system of wiring - Types of internal wiring – Service connection (Overhead and Underground) - Protection of electrical installation against overload, short circuit and earth fault –protection against electric shock – Effects of electric shock –Recommended first aid for electric shock - Treatment for electric shock - Construction and working of ELCB – Overview of Busbar Trunking and Cable tray. Necessity – General requirements of Earthing – Earthing and Soil Resistivity – Earth electrodes – Methods of earthing -Plate earthing - Pipe earthing - Rod earthing – Soil Resistivity –Methods of improving earth resistance - Size of earth continuity conductor - Difference between Neutral and Earth Wires. Safety signs showing type of PPE to be worn, Prohibition Signs, Warning Signs, Mandatory Signs, Advisory or Safe Condition Signs.

UNIT II

DOMESTIC AND INDUSTRIAL ESTIMATE **12**

General requirements of electrical installations for Residential, Commercial and Industrial – Lighting and power sub-circuits – Diversity factor for sub circuits -Location of outlets, control switches, main board and distribution boards – Permissible voltage drops and size of wires - Steps to be followed in preparing electrical estimate. Estimate the quantity of material required in Electrical Installation for

1. Small residential building/Flat
2. Factory Lighting scheme
3. Computer centre having 10 computers, a/c unit, UPS, light and fan.
4. Street Light service having 12 lamp light fitting
5. Workshop with one number of 3Φ, 15hp induction motor.
6. Small Workshop with 3 or 4 Machines.

UNIT III

ENERGY MANAGEMENT& AUDIT AND ELECTRICAL SYSTEM **12**

Energy Management & Audit

Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach- Understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit Instruments.

Electrical system:

Electricity billing, Electrical load management and maximum demand control, Power factor improvement and its benefit, Selection and location of capacitors, Performance assessment of PF capacitors, Distribution and transformer losses.

UNIT IV

ELECTRIC MOTORS & LIGHTING SYSTEM **12**

Electric motors

Types, Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, Energy saving opportunities with energy efficient motors.

Lighting System

Light source, Choice of lighting, Luminancer equirements, and Energy conservation avenues.

UNIT V

DIESEL GENERATING SYSTEM & ENERGY FFICIENTTECHNOLOGIES IN ELECTRICAL SYSTEMS **12**

Diesel Generating system

Factors affecting selection, Energy performance assessment of diesel conservation avenues.

Energy Efficient Technologies in Electrical Systems:

Maximum demand controllers, Automatic power factor controllers, Energy efficient motors, Soft starters with energy saver, Variable speed drives, Energy efficient transformers, Electronic ballast, Occupancy sensors, Energy efficient lighting controls, Energy saving potential of each technology.

REFERENCE BOOKS

1. Electrical Design Estimating And Costing - K.B.Raina&S.K.Battacharya, New age International Ltd.
2. Electrical Wiring, Estimating and Costing - Dr.S.L.Uppal G.C. GargKhanna publishers – Sixth 2011.

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N345**

Semester **: IV**

Subject Title **: ELECTRICAL MACHINES II PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL MACHINES II PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Circuit Diagram	40
2	Connection	30
3	Execution and Equipment handling	15
4	Result and Graph	10
5	Viva voce	5
Total		100

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Electrical Machines II and Measurements and Instrumentation subjects.

OBJECTIVES

- On completion of this practical subject the students will be able to understand the characteristics machines.
- Make various electrical measurements.
- Use transducers in non electrical quantity measurement.

List Of Experiments

1. Predetermine the regulation of alternator by EMF method.
2. Load test on 3 phase alternator.
3. Synchronization of 3Φ alternators.
4. Load test on 3 phase squirrel cage induction motor.
5. Load test on 3 phase slip ring induction motor.
6. Determine the equivalent circuit constants of 3 phase induction motor.
7. Predetermine the performance of a 3 phase induction motor.
8. V Curve and Inverted V Curve of Synchronous motor.
9. Calibration of given ammeter and voltmeter, wattmeter.
10. Calibration of 1 phase energy meter.
11. Calibration of 3 phase energy meter.
12. Measurement of alternator winding resistance using Wheatstone bridge
13. Measurement of value of unknown capacitance using Schering Bridge.
14. Measurement of value of unknown inductance using Anderson Bridge.
15. Displacement measurement using LVDT.

S.NO	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	Three Phase Squirrel cage Induction motor 5 HP, 440V,1440 rpm with starting and loading arrangement	1
2	Three Phase Squirrel cage Induction motor 5 HP,440V,1440 rpm without starting and loading arrangement	1
3	Three phase Slip ring Induction motor 5HP, 440V, 940/1450 rpm with starting and loading arrangement	1
4	Wheatstone bridge.	1
5	Anderson Bridge.	1
6.	Schering Bridge.	1
7	1 Phase Energy meter induction type, 250V, 10A.	1
8	3 Phase Energy meter Induction type 440V, 10/20A.	1
9	Earth megger with necessary connecting leads and rods.	1
10	3 phase Alternator with prime mover.	1
11	Synchronizing panel.	1
12	PF meter (power factor meter).	1
13	LVDT trainer.	1
14	3 phase capacitor bank rating of 1KVAR, 400/440 V.	1

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N346**

Semester **: IV**

Subject Title **: ELECTRICAL WORKSHOP II PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL WORKSHOP II PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Wiring diagram /Design	40
2	Making the correct circuit connections	30
3	Execution	15
4	Result	10
5	Viva voce	5
Total		100

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Electrical wiring and winding.

OBJECTIVES

On completion of this practical subject, the students will be able to

- Make the various circuit connections.
- Practically wiring a single phase induction motor, three phase induction motor, etc.
- Conduct tests for electrical installations.
- Design and winding a transformer.
- Dismantling and assembling of induction heater, Microwave oven, Ceiling fan.

LIST OF EXPERIMENTS

WIRING

Familiarization of tools used for different types of accessories used in electrical wiring.
(Different types of wires, switches, fuses like cartridge and HRC , MCB, ELCB, RCCB etc, line tester).

1. Wiring of single phase motor using single phase main switch, D.O.L starter and MCB.
2. Wiring of Three phase induction motor with main switch, Star/delta starter and ELCB.
3. House wiring for a service connection with single phase digital Energy meter cutout, main switch, 4way D.B, Indicator lamp.
4. Conduct testing of electrical installation (must be performed on a real existing installation like wiring in the college building.)
    a. Insulation resistance test between conductors using an insulation tester.
    b. Insulation resistance test between conductor and earth using an insulation tester.
    c. Polarity test.
    d. Measure the resistance of the existing earthing arrangement using megger and earth tester.
5. Dismantling of induction heater, identifying the parts, checking the conditions, assembling and testing.
6. Dismantling of microwave oven, identifying the parts, checking the conditions, assembling and testing.
7. Assembling the accessories of ceiling fan, test the connections of winding & capacitor and run the fan with speed regulator.
8. Connect the battery and inverter to supply partial load in a domestic wiring during mains failure.
9. Wiring of sodium vapour and mercury vapour Lamp.
10. Battery charging through solar panel. Connect solar panel to charge battery through charge controller.

WINDING

1. Design, construct and test a 230/12-0-12 volt, 500mA Transformer.
2. Design No volt coil for a 230/440 AC contactor.
3. Dismantling a faulty ceiling fan and identify the fault, run the fan after rectifying the fault.
4. Demonstrate the end connection for a 3 phase induction motor winding for a 2 poles / 4pole operations.

LIST OF EQUIPMENTS

S.NO.	DESCRIPTION	SPECIFICATION	QTY
1	SPST Flush type switch	250V/5A	Req.Qty
2	Batten Lamp holder		Req.Qty
3	Round block		Req.Qty
4	Switch board	20cm*15 cm	Req.Qty
5	Switch board	10cm*10cm	Req.Qty
6	M.C.B.	250V/10A ,2 pole	Req.Qty
7	Push button switch	250V/5A	Req.Qty
8	2 plate ceiling rose	250V/5A	Req.Qty
9	Single phase D.P.I.C. Main switch	250V/16A	Req.Qty
10	Single phase D.O.L. Starter	250V/10A	Req.Qty
11	Three phase T.P.I.C. Main switch	500V/30A	Req.Qty
12	Star / delta starter	440V/5HP	Req.Qty
13	E.L.C.B.	30mA/100mA	Req.Qty
14	Single phase, Digital Energy meter	250V/15A,50HZ	Req.Qty
15	Cut out	16A	Req.Qty
16	Single phase, 4 way distribution Box	250V/15A	Req.Qty
17	Mercury vapour lamp with accessories		Req.Qty
18	Sodium vapour lamp with accessories		Req.Qty
19	Two way flush type switch	250V/5A	Req.Qty
20	Wooden box	30 cm*15cm	Req.Qty
21	PVC pipe	¾”/1″	Req.Qty
22	Saddle clips	¾”/1 ″	Req.Qty
23	Copper wire	2.5 Sq.Mm,	Req.Qty
24	Copper wire	1.5 Sq.Mm	Req.Qty
25	1” junction box	1 way,2way,3way	Req.Qty
26	Screws		Req.Qty
27	Bare copper wire	2.5 Sq.Mm	Req.Qty
28	Lamps (C.F.L. or Incandescent)	Different ratings	Req.Qty
29	EI60 type stampings of 0.35 mm thickness		Req.Qty
30	Readymade bobbins (EI60/21)	25 SWG	Req.Qty
31	Enameled copper wire	36 SWG	Req.Qty
32	Enameled copper wire	37 SWG	Req.Qty
33	Enameled copper wire	38 SWG	Req.Qty
34	Winding machine		Req.Qty
35	Ceiling fan		Req.Qty
36	Single phase induction motor		Req.Qty
37	Three phase squirrel cage induction motor 0.5 HP/50HZ,240V		Req.Qty
38	Gauge plate for measurement of SWG		Req.Qty
39	Winding study motor (3Φ squirrel cage type) 3HP, 500 V, 50 Hz		Req.Qty
40	Ceiling Fan		Req.Qty
41	LED Light, PCB, Driver Circuit and Outer Cover		Req.Qty
42	Lead Acid Battery		Req.Qty

43	Inverter		Req.Qty
44	Solar Photo Voltaic Module		Req.Qty
45	Charge controller		Req.Qty
46	Microwave oven		Req.Qty
47	Multimeter		Req.Qty
48	Induction Heater		Req.Qty
49	Earth megger with necessary connecting leads and rods.		Req.Qty
50	Induction Heater		Req.Qty

N - SCHEME

Course Name **: All branches of Diploma in Engineering**
Subject code : **N347**
Semester : III Semester and IV Semester
Subject Title: **COMMUNICATION SKILL PRACTICAL**
TEACHING AND SCHEME OF EXAMINATION

Number of weeks per semester: 14 weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
COMMUNICATION SKILL PRACTICAL	4 Hrs.	56 Hrs.	25	100*	100	3 Hrs

*Examination will be conducted for 100 Marks and it will be reduced to 75 Marks.

Topics and Allocation of Hours:

UNIT	TOPIC	TIME
1	Listening Skill	12
2	Reading Skill	11
3	Speaking Skill	11
4	Writing Skill	11
5	Computer Aided Communication	11
	Total	**56 Hrs**

RATIONALE:

- "The quality of your life is in the quality of your communication" opined Antony Robins. Language is the means of self expression and one of the prime most tools for communication. Communicative fluency augments one's personal, academic, social and professional life.
- The present syllabus, focusing on four communication skills viz Listening, Reading, Speaking and writing, enables the students at Diploma level gain confidence and fluency in communication which in turn would enhance them face their career commitments with globalized standards.

OBJECTIVES:

At the completion of the study, the students will be able to

- Improve their auditory skills to attentively listen, effectively comprehend and to identify important information and key words.
- Fine tune reading skills.
- Perfect their reading comprehending skills using the techniques like skimming to get the general idea and scanning to grasp specific information.
- Widen up their horizon of knowledge by reading news items and spice their language with acronyms and abbreviations when and where necessary.
- Pronounce words with renewed confidence.
- Expressing their needs, obligations, suggestions, gratitude and apology with poise and conviction.
- Introduce themselves and others in a self assuring manner.
- Partake in face to face conversation with skilled agility.
- Describing places, machines, events and experiences adeptly.
- Emphatically writing and completing the missing parts.
- Acquire a sound knowledge on the usage of non verbal communication.

DETAILED SYLLABUS

Contents: **Practical**

Unit	Name of Topics	Hours
1	1. Listening to speeches by Great Speakers (Assessment through Note Taking) 2. Listening to Indian English (Assessment through presenting core Ideas) 3. Listening to Short Stories (Assessment through vocabulary check)	**12**
2	1. Tongue Twisters / Modulators / Conditioners 2. Skimming and Scanning 3. Reading Newspaper 4. Frequently Mispronounced Words.	**11**
3	1. Expressions (Greeting, Requesting, Thanking, Apologizing, Opinions and Suggestions) 2. Introducing oneself / others 3. Face to face Conversation 4. Description of object	**11**
4	1. Thought Fillers 2. Newspaper Comprehension 3. Non-Verbal Communication	**11**
5	1. Listening and Responding to Talks 2. Preparing Word Cloud 3. Interpreting a Picture	**11**

COMMUNICATION SKILL PRACTICAL QUESTION PATTERN

Time: 3 Hours **Max. Marks: 100**
Name: **Date:**
Register Number: **Dept:**

A. LISTENING (20 Marks)

1. Listen to the legendary speech and take down notes/hints 05 marks
2. Listen to the passage and answer the following questions. 10 marks
3. Listen to the story and fill in the blanks with the exact words heard. 05 marks

B. READING (20 Marks)

1. Read out the following tongue twister loudly with correct pronunciation. 05 marks
2. Read out the following passage and retrieve the information from the text by skimming and scanning. 05 marks
3. Read out the content from the newspaper with correct accent, intonation and pronunciation. 05 marks
4. Read out the given words with correct pronunciation (Frequently mispronounced words). 05 marks

C. SPEAKING (20 Marks)

1. Say any five expressions commonly used in communication. 05 marks
2. Introduce yourself before the interview committee. 05 marks
3. Speak with the clerk in the bank regarding the opening of a savings account. 05 marks
4. Describe the features of a new mobile you bought recently. 05 marks

D. WRITING (20 Marks)

1. Fill in the blanks with correct thought fillers in the following sentences. 05 marks
2. Read the news paper report carefully and answer the following questions. 10 marks
3. Explain the different types of non verbal communication. 05 marks

E. COMPUTER AIDED COMMUNICATION (20 Marks)

1. Watch out the short speech video on the computer and give out your comments. 05 marks
2. Frame five sentences of your own and create a word cloud out of them. 10 marks
3. Study the following visual and interpret it in your own words 05 marks

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N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N351**
Semester : **V**
Subject Title : **DISTRIBUTION AND UTILIZATION**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
DISTRIBUTION AND UTILIZATION	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	DISTRIBUTION	16
II	INDUSTRIAL DRIVES	15
III	ELECTRIC TRACTION	16
IV	ILLUMINATION AND ELECTRIC HEATING	14
V	ELECTRIC FURNACES	13
Revision and Test		10
Total		84

RATIONALE:

Distribution system is that part of power system which distributes power to the consumers for utilization. So to have adequate knowledge in distribution and utilization of Electrical energy it becomes necessary to include this subject.

OBJECTIVES:

Students will be able to:

- Substation arrangements.
- Distribution -classification and scheme of connection. Drives-Suitability for different applications.
- Track Electrification-Traction mechanics. Traction motors and control.
- Illumination -Design of lighting scheme-sources of light. Electric Heating- Different methods.
- Electric furnaces and Temperature control. Electric welding and welding equipments.

N351 – DISTRIBUTION AND UTILIZATION

Detailed Syllabus

UNIT- I

DISTRIBUTION **16**

Substation:

Introduction-Sub stations-classification of sub stations-Indoor and outdoor S.S – Gas insulated S.S-comparisons-Layout 110/11KV Substation and 11KV/400V Distribution Substation-substation equipments-Bus bar- Types of bus bar arrangement -Advantages and Disadvantages.

Distribution:

Distribution system-Requirements of a Distribution system-part of Distribution system-classification of Distribution systems- comparison of different distribution systems (A.C and D.C) -A.C Distribution –Types- connection schemes of Distribution system-A. C Distribution calculations-Calculation of voltage at load points on single phase distribution systems (With concentrated load only)- Distribution fed at one end, both ends and ring mains-Simple problems- Three phase, four wire, Star connected unbalanced load circuit- Simple Problems-consequence of Disconnection of Neutral in three phase four wire system (illustration with an example).

UNIT- II

INDUSTRIAL DRIVES **15**

Introduction-Electric drive- Advantages-parts of Electric drives- Transmission of power-Types of Electric drives-Individual, group and multi motor drives – Advantages and disadvantages of Individual and group drive –Factors governing the selection of motors-Nature and classification of load Torque-Matching of speed Torque characteristics of load and motor-Standard ratings of motor- classes of load duty cycles-Selection of motors for different duty cycles-Selection of motors for specific application-Braking- Features of good braking system- Types of Braking- Advantages of- Electric braking-Plugging, Dynamic and Regenerative braking-As applied to various motors.

UNIT- III

ELECTRIC TRACTION **16**

Introduction-Traction systems-Advantages and Disadvantages of Electric Traction**.**

System of Track Electrification:

Methods of supplying power-Rail connected system and over head system-O.H. equipments-contact wire, centenary and droppers-current collection gear for OHE-Bow and pantograph collector-Different systems of Track Electrification-Advantages of single phase low frequency A. C. system-Booster Transformer-Necessity- Methods of connecting B.T-Neutral sectioning

Traction Mechanics:

Units and notations used in Traction mechanics-Speed time curve for different services - simplified speed time curve-Derivation of maximum speed-crest speed, Average speed, Schedule speed (definitions only)-Tractive effort and power requirement- Specific energy output- specific energy consumption.

Traction motors and control

Desirable characteristics of Traction motors-Motors used for Traction purpose-Methods of starting and speed control of D.C Traction motors-Rheostatic Control-energy saving with plain rheostatic control series- parallel control- Energy saving with series parallel starting - Shunt Transition -Bridge-Transition- multiple unit control –Regenerative braking. Recent trends in Electric Traction-Magnetic Levitation (MEGLEV) - Suspension systems

UNIT- IV

ILLUMINATION AND ELECTRIC HEATING **14**

ILLUMINATION

Introduction - Definition and units of different terms used in illumination-plane Angle, Solids angle, Light, Luminous flux, Luminous Intensity, Luminous Efficacy candle power, Lumen, Illumination, M.S.C.P, M.H.C.P, M.H.S.C.P- Reduction factor, Luminance, glare Lamp efficiency. Space-height ratio, Depreciation factor Utilization factor, waste light factor, Absorption factor, Beam factor, Reflection factor- Requirements of good lighting system-Laws of Illumination-problems. Types of lighting scheme- Factors to be considered while designing lighting scheme- Design of lighting Scheme (Indoor and outdoor)- Problems-Lighting systems- Factory lighting, Flood lighting, Street lighting. Sources of light-Arc lamp, Incandescent lamp, Halogen Lamp, Sodium vapour lamp, High pressure mercury vapour lamp, Fluorescent Tube –Induction Lamp- Energy saving lamps (C.F.L and L.E.D lamps)-limitation and disposal of C.F.L-benefits of led lamps-comparison of lumen output for led CFL and incandescent lamp.

ELECTRIC HEATING

Introduction -Advantages of Electric heating-modes of heat transfer- classification of Electric Heating - Power frequency electric heating- Direct and Indirect resistance heating-Infrared heating-Arc heating –High frequency Electric heating- Induction heating-Induction Stove – Eddy current heating and Dielectric heating.

UNIT- V

ELECTRIC FURNACES **13**

Resistance furnace-Requirements of Heating elements- commonly used heating element materials-Resistance furnace for special purposes-Temperature control of resistance furnace-Arc furnace -Direct and Indirect Arc furnace- Temperature control of Arc furnace- Reasons for employing low voltage and high current supply – Induction furnace-Direct and Indirect core type Induction furnace-coreless Induction furnace-Power supply for coreless Induction furnace.

Electric welding: Introduction-Types of Electric welding-Requirements of good weld-Preparation of work -Resistance welding- Butt welding, Spot welding, Seam welding, Projection welding and Flash welding-Arc welding-Carbon Arc welding, metal Arc welding, Atomic hydrogen Arc welding, Inert gas metal arc welding-Comparison between Resistance and Arc welding. Radiation welding - Ultrasonic welding, Electron beam welding, LASER beam welding-Electric welding equipments (A.C. and D.C)

Reference Books:

1. A Course in Electrical Power - Soni& Gupta - DhanpatRai& Sons, Delhi.
2. Electric Power - SL Uppal - Khanna Publishers, New Delhi.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N352**
Semester : **V**
Subject Title : **OPERATION AND MAINTANENCE OF ELECTRICAL EQUIPMENTS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
OPERATION AND MAINTANENCE OF ELECTRICAL **EQUIPMENTS**	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	INTRODUCTION TO MAINTENANCE, SAFE WORKING OF ELECTRICAL EQUIPMENT, BUILDING ELECTRICAL INSTALLATIONS	12
II	OPERATION & MAINTENANCE OF TRANSFORMER	12
III	OPERATION & MAINTENANCE OF GENERATORS, SUB-STATIONS AND CIRCUIT BREAKER	12
IV	OPERATION & MAINTENANCE OF AC MOTORS AND STARTERS	12
V	OPERATION & MAINTENANCE OF LIGHTING, TRANSMISSION AND DISTRIBUTION LIGHTING	12
Revision and Test		10
Total		70

RATIONALE:

Electricity is generated in power station transmitted through transformer lines and Distributed through Distribution systems. The various activities concerning operation and maintenance of electrical equipments are dealt in this subject.

OBJECTIVES:

Students will be able to:

- Understand building electrical installation and electrical safety. Understand operation and maintenance of transformer.
- Understand operation and maintenance of Generators, substations and circuit breakers.
- Understand operation and maintenance of AC motors and Starters. Understand operation and maintenance of Lighting transmission and distributions.

N352 – OPERATION AND MAINTANENCE OF ELECTRICAL EQUIPMENTS

Detailed Syllabus

UNIT- I

INTRODUCTION TO MAINTENANCE, SAFE WORKING OF ELECTRICAL EQUIPMENT, BUILDING ELECTRICAL INSTALLATIONS **12**

Introduction to Maintenance

Importance of plant maintenance, preventive maintenance – Breakdown maintenance -- Production maintenance – Role of maintenance engineer -- Industrial hazard , Causes of accident and their prevention -- Protective devices - - Role of safety engineer -- I.E. Rules on safety – Rule 33 : Earthed terminal consumer premises – Rule 43: Provision applicable to protective equipment - Rule 44: Instruction of restoration of person suffering from electric stock – Rule 48: precautions against leakage before connections – Rule 67 : connection with earth.

Safe Working of Electrical Equipment-

Authorized Person, Procedure for Shutdown, and Testing device for Electricity, Special shutdown precautions in substations and Power House.

Building Electrical Installations-

Points to be inspected, Insulation Resistance Measurement Procedure, Points to be checked in switches & Fuses, Points to be inspected in Potable equipments, Action to be taken if an electrical equipment catches fire, Different types of Fire extinguishers & their applications.

UNIT- II

OPERATION & MAINTENANCE OF TRANSFORMER **12**

Forces generated in transformer during short circuit - Noise in operation – Reason for temperature rise- -insulation resistance-Drying out- precaution for paralleling of transformers-inrush current and remedy- insulation co-ordination-effect on insulation during star point earthing –transformer maintenance schedule – action to be taken while transformer oil, temperature rises unduly – points to be checked if oil level tends to fall down – attention required for bushing and insulator.

UNIT- III

OPERATION & MAINTENANCE OF GENERATORS, SUB-STATIONS AND CIRCUIT BREAKER **12**

Generators-

Parallel operation of Alternators, Real power and Reactive power adjustment between alternator running in parallel, AVR role, Causes for Alternator fails to buildup, Instability in Alternator, Cyclic speed irregularity, Protective & Indicative equipments for Alternator, Causes of overheating of armature & field winding of Alternators, Causes of circulating current between Alternators running in parallel, Causes of pitting of Alternator bearings, Reverse current protection & its necessity,

Sub-stations and Circuit Breaker-

Difference between Isolator & Circuit breaker, Rupturing capacity of Circuit breaker, Short-circuit calculations, Conditions for a circuit breaker to trip, Auto reclose breaker, Fault clearance time, Inverse time overload relay, Procedure to ensure proper operation of

Circuit breaker in the event of a fault, Maintenance requirement for Oil Circuit Breakers, Attention required for the contacts of Contactors, Maintenance requirement of SF6 Circuit breakers

UNIT- IV

OPERATION & MAINTENANCE OF AC MOTORS AND STARTERS 12

Change the direction of Rotation, Role of Single phase preventer, Types of enclosures, Permissible overload, effect of ambient temperature, Insulation classification, Indicating & Protecting devices for Large Size Motors, If overload mechanism trips frequently what action to be taken, Control devices for motors, role of relays in motor, Points to be attended during periodical maintenance, Air gap measurement, Ball & Roller bearing usage, precautions in fitting bearings, bearing problems, Alignment of directly coupled motors, Static and Dynamic balancing of rotor, Causes of low insulation resistance, rectification of low insulation resistance problem, drying out of motors, Steps to be taken if a motor is unduly hot, Vacuum impregnation, Selection of starters for High/Low starting torque applications.

UNIT- V

OPERATION & MAINTENANCE OF LIGHTING, TRANSMISSION AND DISTRIBUTION LIGHTING 12

Glare reduction, Stroboscopic Effect and methods to reduce, Steps in Designing Lighting Installation, Troubleshooting in Fluorescent Lamp and Discharge Lighting, Street Light Control methods, Fluorescent Lamp Disposal, precautions in Erecting Lighting Installations. Symptoms to identify the end of the useful life of Lamp, Causes for lowering of Illumination level

Transmission and Distribution

permissible limit for variation of voltage/frequency as per IS Standard, Factor of Safety, Safety devices for overhead Transmission lines, Minimum clearance between conductors & building, Advantages & Limitations of Steel Cored Aluminium Conductors (ACSR), Purpose of continuous earth wire, Points to be checked when carrying out inspection in overhead transmission lines, Prevent rusting of Steel post, Protection requirements for Transmission lines, Insulation level & Co-ordination, Precautions in erecting UG Cable, Causes for failure of UG Cable, Cable fault locations, Fall of potential method, Murray loop test method, Locating cable discontinuity.

Reference Books:

1. Operation and Maintenance of Electrical Equipment - B.V.S.Rao - Media Promoters & Publishers Private Limited, Mumbai - 1st Edition, 1st Reprint 2011 – Volume I & II.

2. Testing, Commissioning, Operation and Maintenance of Electrical Equipments - S.Rao - Khanna Publishers, Sixth Edition, New 2010 – Delhi.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N353**
Semester : **V**
Subject Title : **MICROPROCESSOR AND MICROCONTROLLER**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
MICROPROCESSOR AND MICROCONTROLLER	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	MICROPROCESSOR – 8085 & INSTRUCTION SET AND PROGRAMMING OF 8085	12
II	ARCHITECTURE AND INSTRUCTION SET OF 8051	12
III	PROGRAMMING ,I/O PROGRAMMING AND TIMERS OF 8051	12
IV	SERIAL COMMUNICATION AND INTERRUPTS IN 8051	12
V	INTERFACING TECHNIQUES OF 8085 AND 8051	12
Revision and Test		10
Total		70

RATIONALE:

Microprocessors are mainly used in designing general purpose systems from small to large and complex systems like super computers. Microcontrollers are used in automatically controlled devices. ... A microcontroller based system can perform single or very few tasks. Microprocessors have integrated Math Coprocessor.

a) Interpret the salient features of various types of microcontrollers.
b) Interpret the salient features of microcontroller IC 8051
c) Maintain the program features of the Microcontroller based applications

OBJECTIVES:

Students will be able to:

- Explain Architecture of 8051 Microcontroller.
- Explain the functions of various registers.
- Understand interrupt structure of 8051.
- Understand serial data communication concepts.
- Understand the programming techniques.
- Explain various addressing modes.
- Write simple programs using 8051.
- Understand the block diagram and control word formats for peripheral devices.
- Understand how to interface with RS232C.
- Understand how to interface with 8255.
- Understand various application of 8051 Microcontroller.

N353 – MICROPROCESSOR AND MICROCONTROLLER

Detailed Syllabus

UNIT- I

MICROPROCESSOR – 8085 & INSTRUCTION SET AND PROGRAMMING OF 8085 **12**

MICROPROCESSOR – 8085

Evolution of microprocessor 8085 – Architecture of 8085 - Memory mapped I/O and I/O mapped I/O and its Comparison. Machine cycle – Opcode fetch - memory read- memory write- I/O read, I/O write - Instruction cycle (Timing diagram) for MOV r1, r2 instruction.

INSTRUCTION SET AND PROGRAMMING OF 8085

Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction And Data Formats, assembly language program for 8 bit Addition , Subtraction, Multiplication and Division-Searching largest and smallest data-Hexadecimal to ASCII and ASCII to Hexadecimal conversions.

UNIT- II

ARCHITECTURE AND INSTRUCTION SET OF 8051 **12**

ARCHITECTURE OF 8051

Comparison of Microprocessor and Microcontroller – Block diagram of Microcontroller – Functions of each block - Pin details of 8051 – ALU –ROM– RAM – Memory Organization of 8051 -Special function registers –Program Counter – PSW register –Stack - I/O Ports – Timer – Interrupt –Serial Port – Oscillator and Clock - Clock Cycle – State - Machine Cycle – Instruction cycle – Reset – Power on Reset – Overview of 8051 family

INSTRUCTION SET OF 8051

Instruction set of 8051 – Classification of 8051 Instructions -Data transfer instructions – Arithmetic Instructions – Logical instructions –Branching instructions – Bit Manipulation Instructions-Assembling and running an 8051 program –Structure of Assembly Language – Assembler directives – Different addressing modes of 8051

UNIT- III

PROGRAMMING, I/O PROGRAMMING AND TIMERS OF 8051 **12**

PROGRAMMING EXAMPLES AND I/O PROGRAMMING OF 8051

Multi byte Addition – 8 Bit Multiplication and Division – Biggest Number / Smallest Number – Ascending order / Descending order BCD to ASCII Conversion – ASCII to Binary Conversion –Odd Parity Generator – Even Parity Generator- Logical operations using AND,OR and XOR -Time delay Routine- Bit addresses for I/O and RAM – I/O programming – I/Obit manipulation programming.

TIMER OF 8051

Programming 8051 Timers – Timer 0 and Timer 1 registers –Different modes of Timer – Mode 0 Programming – Mode 1Programming - Mode 2Programming - Counter programming – Different modes of Counter – Mode 0 Programming – Mode 1Programming -Mode 2 Programming (simple programs

UNIT- IV

SERIAL COMMUNICATION AND INTERRUPTS IN 8051 12

SERIAL COMMUNICATION IN 8051

Basics of Serial programming – RS 232 Standards – 8051connection to RS 232 – 8051 Serial Communication Programming – Programming 8051 to transmit data serially -Programming 8051 to Receive data serially.

INTERRUPT IN 8051

8051 Interrupts – Programming Timer Interrupts – Programming external hardware interrupts – Programming the serial communication interrupt –Interrupt priority in 8051 (simple programs).

UNIT- V

INTERFACING TECHNIQUES OF 8085 AND 8051 12

IC 8255

IC 8255 – Block Diagram – Modes of 8255.

INTERFACING TECHNIQUES USING 8051

Interfacing external memory to 8051– 8051 interfacing with the 8255 –Relays – Sensor interfacing – ADC interfacing - Keyboard interfacing – Seven segment LED Display Interfacing - Stepper Motor interfacing –DC motor interfacing using PWM-Traffic light control interfacing.

INTERFACING TECHNIQUES USING 8085

Interrupts In 8085- interfacing of DAC to generate waveforms (square, rectangular, sawtooth) - LCD interfacing.

Reference Books:

1. Microcontrollers, Principles and Applications - Ajit pal - PHI Ltd. - 2011.
2. 8051 Microcontroller and Embedded Systems using Assembly and Mazidi,Mazidi and D.MacKinlay - Pearson Education Low Price Edition,2006
3. Microprocessor and Microcontroller - R.Theagarajan - Sci Tech Publication, Chennai

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N3541**
Semester : **V**
Subject Title : **CONTROL OF ELECTRICAL MACHINES**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
CONTROL OF ELECTRICAL MACHINES	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	CONTROL CIRCUIT COMPONENTS	12
II	DC MOTOR CONTROL CIRCUITS AND AC MOTOR CONTROL CIRCUITS	12
III	INDUSTRIAL CONTROL CIRCUITS	12
IV	TESTING OF TRANSFORMER, BUS BARS AND REACTORS	12
V	TESTING OF CIRCUIT BREAKERS, RELAYS AND LIGHTNING ARRESTOR	12
Revision and Test		10
Total		70

RATIONALE:

Various control operations are to be performed on the electrical machines to suit the industrial requirements. Technician is mainly employed to look after the control panels. To make our students employable, they have to be trained in using various control components and circuits. This subject fulfills that requirement.

OBJECTIVES:

Students will be able to:

- Electrical control circuit elements including various types of industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.
- AC motor control circuits for acceleration control, speed control, direction control, braking control and jogging using contactors.
- Different control circuits for industrial applications.

N3541 – CONTROL OF ELECTRICAL MACHINES

Detailed Syllabus

UNIT- I

CONTROL CIRCUIT COMPONENTS **12**

Switches – Push button, selector, drum, limit, pressure temperature (Thermostat), float, zero speed and proximity switches. Relays – Voltage relay, DC series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer).Over current relay – Bimetallic thermal over load relay and Magnetic dash pot oil filled relay. Timer – Thermal Pneumatic and Electronic timer. Solenoid Valve, Solenoid type contactor (Air break contactor),Solid state relay, Simple ON-OFF motor control circuit, Remote control operation and interlocking of drives.

UNIT- II

DC MOTOR CONTROL CIRCUITS AND AC MOTOR CONTROL CIRCUITS **12**

DC MOTOR CONTROL CIRCUITS

Current limit acceleration starters – Series relay and counter EMF starters - Definite Time acceleration starters – Field failure protection circuit – field acceleration protection circuit – field deceleration circuit. Jogging control, dynamic braking control, reversing control and plugging control circuits.

AC MOTOR CONTROL CIRCUITS

Motor current at start and during acceleration – No load speed and final speed of motor– Starter for two speed two winding motor – Reversing the direction of rotation of induction motor – Dynamic Braking – Three step rotor resistance starter for wound induction motor – Secondary frequency acceleration starter.

UNIT- III

INDUSTRIAL CONTROL CIRCUITS **12**

Planner machine control – Skip hoist control – Automatic control of a water pump – Control of electric oven – Control of air compressor – Control of over head crane – control of conveyor system– Control of elevator - Trouble spots in control circuits – General procedure for trouble shooting-Microcontroller based DC Motor speed control-Fuzzy logic-Process control in thermal plant and cement plant.

UNIT- IV

TESTING OF TRANSFORMER, BUS BARS AND REACTORS **12**

High voltage testing of electrical power apparatus as per International and Indian standards.

TRANSFORMERS - **Preliminary tests** - 4 Preliminary tests on transformer - core insulation Test - Core loss test - ratio test - polarity test, **Final tests** - 3 final tests - routine Tests - type tests - Special tests, **Impulse Test** - Lighting impulse test Circuit - switching impulse test Circuit - Recording and Measurement of Impulses- fault detection, **Partial discharge Testing** - Define partial discharge - the typical test circuit arrangement for partial discharge - different methods of locating partial discharge

Current Transformer & Potential Transformer Testing - various routine tests on CTs - error Measurement Tests - turns ratio test - exciting current test - polarity test - Insulation Tests - over voltage inter turn test - precautions to be taken while using CTs.

BUS BARS - Temperature rise test - Short time current test - Momentary current test - High Voltage test - Vibration test on Bus Bars.

ISOLATORS - the different types of tests on isolators.

REACTORS - Routine Tests - inter turn over voltage withstand test - Separate source voltage withstand test, **Type Tests** - lighting impulse voltage withstand Test - switching impulse voltage withstand Test - temperature rise Test - Measurement of zero sequence Impedance - measurement of vibration and noise level - Measurement of 3rd harmonics **Special tests** - short circuit current withstand test -specialty of reactor testing.

UNIT- V

TESTING OF CIRCUIT BREAKERS, RELAYS AND LIGHTNING ARRESTOR **12**

CIRCUIT BREAKERS

Type Tests - Type tests on High voltage Circuit breakers - endurance Test - temperature rise Test - milli volt drop test - Dc resistance test -dielectric Test.

Routine tests, **Short circuit Testing of CB** - short circuit tests on CBs - stresses on CBs during short circuits - layout of simple SC Testing station.

Direct Testing - direct testing Of CBs - rules for Type Tests - short time current test on CBs - Critical current tests - short line fault tests - Line Charging Breaking current Tests - out of phase switching tests - capacitive current switching Tests - small inductive current Breaking Tests.

Indirect testing - unit testing - Parallel current injection method - series current injection method - Brown Boveri 's synthetic testing Circuit.

PROTECTIVE RELAYS - List the four classes of tests on Relays- acceptance tests-installation tests-maintenance Tests-repair tests. Test equipment - Primary and secondary current injection test set - testing circuit for differential relays and BuchHolz relays.

LIGHTNING ARRESTOR - Tests on lightning arrestors-List the various tests on lightning arrestors- the various tests on lightning arrestors.

Reference Books:

1. Control of Electrical Machines - S.K. Bhattacharya - New Age International Publishers, New Delhi.
2. Industrial motor control - Stephen Herman, 6th Edition – Cengage Learning.
3. Testing, Commissioning, Operation and Maintenance of Electrical Equipments - S.Rao - Khanna Publishers, Sixth Edition, New 2010 – Delhi.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N3542**
Semester : **V**
Subject Title : **ELECTRICAL MACHINE DESIGN**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL MACHINE DESIGN	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	ELECTRICAL MACHINE DESIGN AND BASIC CONSIDERATION	12
II	MAGNETIC CIRCUIT CALCULATION	12
III	DESIGN OF TRANSFORMER	12
IV	DESIGN OF DC MACHINES	12
V	DESIGN OF AC MACHINES	12
Revision and Test		10
Total		70

RATIONALE:

Throughout the country there are many electrical industries and manufacturing different kinds of electrical machines like transformers, DC generators, DC motors, AC motors, and alternators. Their rating starts from hundreds of WATTS / VA to few KW / KVA or even in MW / MVA. These Industries have R&D center, Diploma or Graduate engineers as R&D engineers for product development. Hence it is necessary to include electrical machine design as one of the subject at diploma level courses.

OBJECTIVES:

Students will be able to:

- Static and Rotating Electrical Machine specifications, materials, losses and effects of temperature rise.
- Magnetic force, magnetic force gap, teeth and leakage flux in static and rotating electrical machines.
- Designing of single phase, three phase transformer, core and coil.
- Designing of dc machines.
- Designing of 3phase induction motor and 3phase synchronous machines

N3542 – ELECTRICAL MACHINE DESIGN

Detailed Syllabus

UNIT- I

ELECTRICAL MACHINE DESIGN – BASIC CONSIDERATION **12**

Design definition – Design consideration – limitation – constructional elements of Transformers and rotating machines – constructional materials of electrical machines – conducting magnetic and insulating materials standard specification – general design process – main dimensions of rotating machines – electrical and magnetic losses – temperature – rise – class of duty – limits of temperature rise.

UNIT- II

MAGNETIC CIRCUIT CALCULATIONS **12**

Magnetic circuits of DC machines, round rotation AC machines, salient poles AC machines and Transformer – Specific magnetic and electrical loading – Factor influencing the specific and magnetic loading – Magnetic leakages – magnetering curves – calculation of magnetizing force for the air gap of rotating machines and for teeth – leakage flux – leakage reactance – armature slot leakage reactance

UNIT- III

DESIGN OF TRANSFORMER **12**

Important considerations – core and shell types – distribution transformers and power transformers – core section – clearance – yoke section – main dimension – single phase core type transformers – three phase core type transformer – output coefficient - voltage per turn – specific magnetic and electric loading of transformer – Winding design – cross over, helix, disc helix.

UNIT- IV

DESIGN OF DC MACHINES **12**

Important design consideration – number of poles – advantages of large number of poles - air gap – armature slot – current density – field system – commutator – design of large dc motor. Specific magnetic and electric loading of dc machines.

UNIT- V

DESIGN OF AC MACHINES **12**

AC machine design consideration – power equation – separation of diameter and length – problems. Three phase induction motor – important design consideration – standard frames and stampings – gap length – flux density – current density – power factor – efficiency – slot combination – winding - design of 3 phase induction motors. Three phase synchronous machines – important design consideration – radial gap length – stator slot – stator coil – rotor construction – design of 3 phase synchronous machines.

Reference Books:

1. A Course in electrical machine design - A.K.Sawhney - Dhanrai publishing company
2. Electrical Machine Design - A.NagoorKani - RBA Publications
3. Performance and Design of AC Machine - M.G.Say - CBS Publisher & Distributor

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N3543**
Semester : **V**
Subject Title : **RENEWABLE ENERGY TECHNOLOGIES**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
RENEWABLE ENERGY TECHNOLOGIES	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	INTRODUCTION	12
II	SOLOR ENERGY	12
III	WIND ENERGY	12
IV	BIO ENERGY	12
V	OTHER RENEWABLE ENERGY SOURCES	12
Revision and Test		10
Total		70

RATIONALE:

Using more renewable energy can lower the prices of and demand for natural gas and coal by increasing competition and diversifying our energy supplies. And an increased reliance on renewable energy can help protect consumers when fossil fuel prices spike. The clear understanding of electricity generated from solar, wind, ocean, Tidel, biomass, geothermal resources, and bio-fuels and hydrogen derived from renewable resources are also taught in this subject.

OBJECTIVES:

On completion of the following units of syllabus contents, the students can

- To understand present and future scenario of world energy use.
- To understand fundamentals of solar energy systems.
- To understand basics of wind energy.
- To understand bio energy and its usage in different ways.
- To identify different available non-conventional energy sources.

N3543 – RENEWABLE ENERGY TECHNOLOGY

Detailed Syllabus

UNIT- I

INTRODUCTION **12**

World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

UNIT- II

SOLOR ENERGY **12**

Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

UNIT- III

WIND ENERGY **12**

Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

UNIT- IV

BIO ENERGY **12**

Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

UNIT- V

OTHER RENEWABLE ENERGY SOURCES **12**

Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Reference Books:

1. Non-Conventional Energy Sources, Rai. G.D., Khanna Publishers, New Delhi, 2011.
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J J Kraushaar, second edition, John Willey & Sons, New York, 2006.

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N355**

Semester **: V**

Subject Title **: COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL	3	42	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Symbols in CAD	10
2	Manual Drawing Of Electrical Connection Diagram	40
3	Electrical Connection Diagram In CAD	35
4	Print out and result	10
5	Viva voce	5
Total		100

LIST OF EXPERIMENTS

PART-A

1.INTRODUCTION TO CAD

a) Review and practice the basic CAD commands.
b) Practice essential commands like – line types, line weight, scale, unit, layer, block, insert, explode, purge, table , attribute, quick select, view, multiview, break, join, filter, find, pan, list match properties and related commands.
c) Use of command reference in help menu to understand the commands.
d) Understand various settings in tools - options dialog box.
e) Set drawing units as per requirements
f) Create blocks of generally required fixtures in electrical wiring.
g) Use of design centre and templates.
h) Understand model space and layout space.

PART-B

2. ELECTRICAL SYMBOLS-DRAWING (5 x 2 = 10)

a) Draw the symbols for components: Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, and Gates AND, OR, NOT, NAND, NOR, EXOR.
b) Draw the symbols used in electrical wiring: Relays, contactors, fuses, main switch, electric bell, earth, DPST, DPDT, TPST, Neutral link.
c) Draw the symbols for instruments: Ammeter, Voltmeter, Wattmeter, Energy meter, Frequency meter, Power factor meter, Timer and Buzzers.
d) Draw the symbols for machines: Armatures, Alternators, Field winding (Shunt, Series and Compound) Transformer and Autotransformer.

PART-C

3.WINDING DIAGRAM

a. D.C. machines

i) Main pole and field coil assembly
ii) Yoke and pole assembly
iii) 24conductors, 4 pole Double layer progressive simplex lap winding with commutator connections and brush positions.

b. A.C. machines

i) Rotor of a salient pole alternator (4 pole only)
ii) Rotor of a three phase squirrel cage Induction motor
iii) 3 phase 4 pole 24 conductors full pitch Double layer lap winding.

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ELECTRICAL CONNECTION DIAGRAMS- DRAWING

4. Draw the circuit of three phase transformers in parallel.
5. Draw the mush winding diagram of a three phase induction motor.
6. Draw the control circuit of jogging.
7. Draw the Single Line diagram of three phase MCB Distribution board.
8. Draw the Single Line diagram of typical MV Panel.
9. Draw the Single Line diagram of Motor Control Centre (MCC) Panel.
10. Draw the Single Line diagram of fire alarm riser arrangement in multi-storey building.
11. Draw the front end schematic diagram of typical Sub switch board (SSB).
12. Draw the control and main circuit of automatic star delta starter.
13. Draw the single line diagram of 110 KV / 11 KV receiving substation.

NOTE FOR EXAMINERS

- Five symbols should be asked from part B exercise 1to 4 with at least one from each.
- One sketch should be asked from part C.
- Printed output of the given symbols and sketch is to be evaluated

LIST OF EQUIPMENTS

S.NO.	DESCRIPTION	QTY
1	PC with any suitable simulation software	30 Nos
2	UPS 5KVA with half an hour battery back up	1
3	Printer	1

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N356**

Semester **: V**

Subject Title **: MICROPROCESSOR AND MICROCONTROLLER PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
MICROPROCESSOR AND MICROCONTROLLER PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	**PROGRAM**	40
2	**DEBUGGING AND EXECUTION**	35
3	**OUTPUT AND RESULT**	20
4	**VIVA VOCE**	5
Total		100

LIST OF EXPERIMENTS

1. Write an Assembly Language Program for Multi-byte Addition and execute the same in the 8051 Kit.
2. Write an Assembly Language Program for Arranging the given data in Ascending order and execute the same in the 8051 Kit.
3. Write an Assembly Language Program for ASCII to Binary and logical operation using AND and OR execute the same in the 8051 Kit.
4. Write an Assembly Language Program for Parity bit generation and execute the same in the 8051 Kit.
5. Write an Assembly Language Program for using timer / Counter and execute the same in the 8051 Kit.
6. Write an Assembly Language Program for Subtraction, Multiplication, Division of two 8-bit numbers and execute the same in the 8085 Kit. .
7. Write an Assembly Language Program for searching the largest data in and execute the same in the 8085 Kit.
8. Write an Assembly Language Program for Hexadecimal to ASCII and execute the same in the 8085 Kit.

INTERFACING WITH APPLICATION BOARDS

1. Write an Assembly Language Program for interfacing Traffic light control and test using 8051.
2. Write an Assembly Language Program for interfacing STEPPER MOTOR and test using 8051.
3. Write an Assembly Language Program for interfacing seven segment LED display and test using 8051.
4. Write an Assembly Language Program for Sending data through serial port between 8051 controller kits and test it.
5. Write an Assembly Language Program for interfacing LCD and test using 8085.

LIST OF EQUIPMENTS

S.NO.	DESCRIPTION	QTY
1	8051 Microcontroller Kit	18
2	8085 Microporcessor Kit	5
3	LCD interface board	2
4	Seven segment LED display Interface Board	2
5	Traffic light Interface Board	2
6	STEPPER MOTOR CONTROL Interface Board	2
7	Sending data through serial port between controller kits	2

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N3571**

Semester **: V**

Subject Title **: CONTROL OF ELECTRICAL MACHINES PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
CONTROL OF ELECTRICAL MACHINES PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	**CONTROL CIRCUIT**	40
2	**CONNECTION AND EXECUTION**	35
3	**OUTPUT AND RESULT**	20
4	**VIVA VOCE**	5
Total		100

LIST OF EXPERIMENTS

1. a) Perform breakdown test and determine the dielectric strength of transformer oil.

   b) Conduct acidity test on transformer oil.

2. Test the timing characteristics of thermal over load relay.
3. Wire and test the control circuit for jogging in cage induction motor.
4. Wire and test the control circuit for semi-automatic star –delta starter.
5. Wire and test the control circuit for automatic star –delta starter.
6. Wire and test the control circuit for dynamic braking of cage motor.
7. Wire and test the control circuit for two speed pole changing motor.
8. Wire and test the control circuit for forward and reverse operation.
9. Wire and test the control circuit for automatic rotor resistance starter.
10. Test the working of single phase preventer.

LIST OF EQUIPMENTS

1	Transformer oil Tester Kit, Acidity test kit	Each 1
2	Thermal Overload Relay	3
3	AC contactor 230v/440v, 16A	26
4	Push Button With NO/NC Elements	30
5	Induction motor 440 V, 1440 rpm, any HP rating (apart from EM II lab)	3

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N3572**

Semester **: V**

Subject Title **: ELECTRICAL MACHINE DESIGN PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL MACHINE DESIGN PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

For exercises requiring circuit diagram and connection

Sl.No	Allocation	Marks
1	Circuit Diagram	40
2	Making the correct circuit connections	30
3	Reading and Calculation	15
4	Graph and Result	10
5	Viva voce	5
Total		100

For other exercises

S. NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	Design Particulars / Theory behind exercises	50
2	work menship& finishing / carrying of the test & finding the result	45
3	VIVA VOCE	05
	TOTAL	100

LIST OF EXPERIMENTS

1. By simple experiment, verify the magnetic laws using Coil, permanent magnet and Galvanometer.
2. Verify the rotating magnetic field with stator and ball.
3. Measure magnetic flux using flux meter.
4. Using Crawler test the windings.
5. Design a 1 phase 1 KVA ,230/15V core type transformer and assemble the core.
6. Design a 1 phase 1KVA, 230/15V shell type transformer and assemble the core.
7. Design 3 phase 1 KVA transformer and assemble winding, core, etc.,
8. Design 3 phase 1 KVA transformer (delta/star connected) and wind one coil set.
9. Design armature for 5 KWdc machine and insert one coil set.
10. Design field pole for 5 KWdc machine and assemble one pole and insert in the body.
11. Assemble the given dc machine (pole, inter pole, armature, commutator, brush etc).
12. Design and assemble ceiling fan.
13. Design and assemble a 3 HP induction motor.
14. Design and assembled 3phase 3HP synchronous motor.
15. Dismantle and assemble a 3 phase wound rotor induction motor.
16. Design and assembled 1phasesalient pole 5KVA alternator.

LIST OF EQUIPMENTS

1	Permanent Magnets	2
2	Galvanometers	2
3	Flux meter	1
4	Growler	1
5	3Phase induction motor stator with winding	1
6	1KVA Single phase 230/15 loading Transformer	1
7	1KVA 3 phase Transformers (or) E & I type stampings for 1KVA Transformer	3
8	Primary Coils & Secondary Coils for 1KVA Transformer	9
9	5KW DC armature without winding	1
10	5KW DC machine with inter poles	2
11	Stator with winding, rotor and end covers with bearing of a 3HP cage induction motor	2 sets
12	5KVA Single phase alternator	1
13	3phase 3HP wound rotor induction motor	2
14	Ceiling Fans	2
15	Motor coil winding machines	2

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N361**
Semester : **VI**
Subject Title : **PLC AND SCADA**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
PLC AND SCADA	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	INTRODUCTION TO PLC	10
II	INPUT / OUTPUT MODULES	13
III	PLC PROGRAMMING	14
IV	NETWORKING	11
V	DATA ACQUISITION SYSTEMS	12
Revision and Test		10
Total		70

RATIONALE:

Various control operations are to be performed automatically and sequentially on the electrical machines to suit the industrial requirements. Programmable controllers are mainly employed to control the process in industries. In order to impart knowledge on programmable Logic Controller this theory subject is introduced.

OBJECTIVES:

- After completing this chapter, students should able to:
- Explain the meaning of automation and List the types of automation Define PLC and Explain why their use is valuable
- Explain what PLC can do

- Compare fixed and modular PLC Explain the advantages of PLC
- Explain the functions of various elements of power supply unit
- Know the difference between digital and analog input and output signals Observe how digital field device information gets into a PLC
- Observe how analog field device information gets into a PLC
- Understand I/O addresses and how they are used in a PLC
- Describe PLC timer instruction and differentiate between a non-retentive and retentive timer
- Program the control of outputs using the timer instruction List and describe the functions of PLC counter instructions
- Create PLC programs involving program control instructions, math instructions
- Explain the functionality of different levels of industrial network Explain the concept of network topology and network protocols Explain the concept of I/O bus networks etc.,
- Describe the computer control of process Explain the operation of SCADA . Explain the functions of the major components of a process control system Explain how on/off control and PID control work.

N361 – PLC AND SCADA

Detailed Syllabus

UNIT- I

INTRODUCTION TO PLC **10**

Automation – Types of Automation (manufacturing and Non-Manufacturing) – Advantages of automation - PLC Introduction -Definition – Block diagram of PLC – Principle of operation – Modes of operating – PLC Scan - Hardwire control system compared with PLC system - Advantages and Disadvantages of PLCs – Criteria for selection of suitable PLC –Memory organization – Input Types –Discrete input – Analog in/out - Elements of Power supply unit – PLC Types (Fixed I/O and Modular I/O) - List of various PLCs available –Applications of PLC.

UNIT- II

INPUT/OUTPUT MODULES **13**

The I/O Section - Discrete I/O modules (DC and AC) –Analog I/O modules - Special I/O Modules– I/O Module Specification -Typical Discrete and Analog I/O field Devices –Sensors – Limit switch– Reed switch – Proximity sensor (Inductive and Capacitive) – Types of Photo Electric Sensor - Sinking and Sourcing I/O modules–TTL output module – Relay output module –Isolated output module Input/output Addressing scheme in important commercial PLCs.

UNIT- III

PLC PROGRAMMING **14**

Types of programming methods – Types of programming devices – Logic Functions – AND Logic – OR Logic – NOT Logic – Relay type instructions –Timer Instructions – ON Delay and OFF Delay Timer – Retentive Timer Instruction – Cascading Timers –Counter Instruction – UP Counter – DOWN Counter – UP/DOWN Counter – Cascading Counters – Program Control Instructions – Data Manipulation Instruction – Data Compare Instructions – Math Instructions - Sequencer Instructions - PID Instruction – PWM Function – Simple programs using above instructions. Develop ladder logic for: Bottle filling system – Automatic car parking system - EB to Generator Changeover system – Batch process – Elevator system - Automatic Star-Delta Starter – Traffic light control.

UNIT- IV

NETWORKING **11**

Levels of industrial network – Network Topology –Network Protocol – OSI Reference Model - Networking with TCP / IP Protocol -I/O Bus networks – Block diagram of I/O Bus networks – Types of I/O Bus networks - Protocol standards – Advantages of I/O Bus networks -Gateway – Token passing – Data Highway – Serial Communication –Device Net – Control Net – Ether Net – Mod bus – Field bus – Profi bus-Sub netting – Subnet mask - File transfer protocol.

UNIT- V

DATA ACQUISITION SYSTEMS **12**

Computers in Process control – Types of processes- Structure of control system– ON/OFF Control – Closed loop control - PID Control – Motion Control –Block diagram of Direct Digital Control - Supervisory Control and Data Acquisition (SCADA)–Block diagram of SCADA – Features of SCADA – Functions of SCADA - SCADA software - Data Loggers –

Tags – Alarms - landlines for SCADA – use of modems in SCADA – Real time monitoring and control using SCADA – Remote terminal unit (RTU) – Power system automation – Benefits – Classification of power system automation – Problem description – Implementation of power system automation and protection using SCADA.

Reference Books:

1. Introduction to Programmable Logic Controllers - Gary Dunning – Cengage Learning India Pvt Ltd – Third Edition 2011
2. Technician's Guide to Programmable Logic Controllers - Richard A. Cox - Delmer – Sixth Edition 2011
3. Programmable Logic Controllers Principle and Applications - John W. Webb - Prentice Hall
4. Programmable Logic Controllers: Programming Controllers, Programming - John R Hackworth and Fredrick D. Hackworth - Pearson Education
5. Programmable Logic Controllers - W. Bolton - Newness
6. Programmable Controller Theory and Implementation - L.A.Bryan, E.A.Bryan - An Industrial Text Company Publication – Second Edition 1997

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N362**
Semester : **VI**
Subject Title : **POWER ELECTRONICS AND DRIVES**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
POWER ELECTRONICS	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	POWER SEMI –CONDUCTOR DEVICES	12
II	LINE COMMUTAED PHASE CONTROLLED CONVERTERS	12
III	CHOPPERS AND INVERTERS	12
IV	DC MOTOR DRIVES	12
V	AC MOTOR DRIVES	12
Revision and Test		10
Total		70

RATIONALE:

Developments in Electronics have their own impact in other fields of Engineering. Today all the controls and drives for the electrical machines are formed by electronic components and there are many electronic devices available to handle eclectic power in terms Kilo-Amps and Kilo-Volts. This subject gives a comprehensive knowledge base about the devices and circuits used in electrical power control.

OBJECTIVES:

Students should be able to know

- Explain the scope and application of power electronics
- Explain the operating region and rating of SCR.
- Draw, explain and state the application for commutation circuits and trigger circuits of SCR.
- Familiarize the phase controlled rectifier and know the applications of the phase controlled rectifier.

- Draw and describe the working of half wave controlled rectifier circuit with R and RL load, single phase Semi Converter Bridge, Single phase full Converter Bridge for RL load, single phase and three phase full converter with RL load.
- Familiarizes the dual converter and twelve pulse converters. Study the complete protection of converter circuits.
- Understand the working choppers and inverters. Know the applications of choppers and inverters.
- Explain the various types of choppers with circuit diagram.
- Describe the various methods of inverters with circuit diagram.
- Failure of AC voltage controller & cyclo converter.
- Understand the application of power electronics devices as CB,UPS and VAR compensator
- Understand the control of DC Drives.
- Know the various methods of speed control of DC drives.
- Familiarize the control of AC drives.
- Know the torque - speed characteristics of three phase induction motor.
- Study the speed control of three phase induction motor using PWM and slip power recovery scheme.
- Understand the closed loop control of AC drive.
- Know the operation of single phase and three phase cyclo converter.
- Understand the micro controller based fault diagnosis in three phase thyristor converter circuits.
- Study the need of DSP based motor control.

N362 – POWER ELECTRONICS

Detailed Syllabus

UNIT- I

POWER SEMI –CONDUCTOR DEVICES **12**

Power electronics-Definition - Types of Power Electronic Circuits -Design of Power Electronics Equipment-Power module –Intelligent module. Study of switching devices-SCR,MOSFET,IGBT,GTO (working and VI-Characteristics only), IGCT - Effect of dv/dt-Effect of Rate of Rise in Current(di/dt) - Thyristor Gate Requirements-Triggering Circuits - Resistance Triggering Circuits, RC Trigger Circuits, UJT based Trigger Circuits-Driver and Buffer Circuits for Thyristor - Thyristor Commutation Techniques-Class A, Class-B, Class C, Class D, Class E Types.

UNIT- II

LINE COMMUTAED PHASE CONTROLLED CONVERTERS **12**

Line Commutated Converters(Controlled Rectifiers)-Principle of Phase Controlled Converter Operation-Single Phase Full Converters (R,RL load) -Single Phase Dual Converters -Three Phase Full Converters (R,RL load)-Three Phase Dual Converters-12 Pulse converters. Applications-Lamp Dimmer.

AC Voltage Controllers-Principle of Phase Control-Single phase Bidirectional controllers with Resistive Load-Single Phase Controller with Inductive Load-Three Phase Full Wave Controllers- Cyclo Converters-Single Phase Cyclo Converters-Three Phase Cyclo Converters.

UNIT- III

CHOPPERS AND INVERTERS **12**

CHOPPERS

DC-DC Switch-Mode Converters (Choppers)-Control of DC - DC Converters-Step-Down(BUCK) Converter-Continuous-Conduction Mode of Step-Up(BOOST)Converter, BUCKBOOST Converters ,Cuk DC-DC Converters– Continuous Conduction Mode.

INVERTERS

Introduction- DC-AC Switch-Mode Inverters -Principle of Operation-Single Phase Bridge Inverters-Three Phase Inverters-180 degree Conduction Mode-120 degree Conduction Mode-Voltage Control of Single Phase Inverter- Pulse Width Modulated Inverters-Single Pulse Width Modulation-Multiple Pulse Width Modulation-Sinusoidal Pulse Width Modulation-Voltage Control of Three Phase Inverter-Application- UPS (ON Line & OFF Line).

UNIT- IV

DC MOTOR DRIVES **12**

Introduction-Advantages of electrical drives-classification of electrical drives- single phase Half wave controlled rectifier fed DC drive -single phase semi converter fed DC drive- single phase fully controlled rectifier fed separately excited DC motor drive-Three phase fully controlled rectifier fed separately excited DC motor drive-Four Quadrant operation of DC drive-Closed loop control of electric drive –Speed control, Armature voltage control.

UNIT- V

AC MOTOR DRIVES **12**

Introduction-Difference between ac and dc drives-Stator voltage control-Stator frequency control(V/F control)-Rotor side speed control (Slip power recovery system-Kramer system and Scherbius system)- Variable frequency Converter Classifications -Variable frequency PWM-VSI Drives – Soft Start of induction motor – PLL - closed loop speed control-Single quadrant close loop speed control.

Reference Books:

1. Power Electronics - MD Singh, KB - McGraw Hill Publishing Company, New Delhi, Seventeenth reprint 2005.
2. Power Electronics – A - Mohammed H.Rashid - New Age Publication – Third Edition,2004.
3. Power Electronics – B - Mohan, Undeland, Robbins - Wiley India Edition, Media Enhanced Third Edition.
4. Power Electronics – C - Dr.P.S.Bimbhra – Khanna Publishers, Fourth Edition, 2011.
5. Power Electronics – D - M.S.Jamil Asghar - PHI Learning Private LimitedEastern Economy Edition, 2010.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N3631**
Semester : **VI**
Subject Title : **FACTS DEVICES**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
FACTS DEVICES	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	POWER FLOWS & ISSUES	12
II	TRANSMISSION LINE COMPENSATION & REACTIVE POWER COMPENSATION	12
III	STATIC SHUNT COMPENSATOR & VARIABLE IMPEDANCE TYPE VAR GENERATOR	12
IV	STATIC SERIES COMPENSATOR	12
V	COMBINED SERIES AND SHUNT COMPENSATOR	12
Revision and Test		10
Total		70

RATIONALE:

The FACTS is a concept based on power-electronic controllers, which enhance the value of transmission networks by increasing the use of their capacity. As these controllers operate very fast, they enlarge the safe operating limits of a transmission system without risking stability. Needless to say, the era of the FACTS was triggered by the development of new solid state electrical switching devices. Gradually, the use of the FACTS has given rise to new controllable systems.

Knowledge gained by students will be helpful in study of technological subjects such as utilization of electrical energy, control of transmitting power.

OBJECTIVES:

Students will be able to:

- Know the power flows in transmission line and reactive power compensation.
- Know the performance of the shunt compensator.
- Know the performance of series compensator.
- Know how to provide reactive power and real power compensation using advanced FACTS devices like UPFC and UPQC.

N3631 – FACTS DEVICES

Detailed Syllabus

UNIT- I

POWER FLOWS & ISSUES **12**

Transmission – Interconnection –Power flow in Power system -Steady state & dynamic problems in AC systems – Voltage regulation & Reactive power flow control in Power systems – Control of dynamic power unbalance in power system – Power flow control – Constraints of maximum transmission line in loading – Benefits of FACTS.

UNIT- II

TRANSMISSION LINE COMPENSATION & REACTIVE POWER COMPENSATION **12**

Transmission Line compensation – Compensation by a series capacitor connected at the mid point of the line, Shunt compensation connected at the mid point of the line- Phase angle control. Reactive power compensation – Principles of Shunt Compensation –Principle of Series Compensation – Reactive compensation at transmission and distribution level.

UNIT- III

STATIC SHUNT COMPENSATOR & VARIABLE IMPEDANCE TYPE VAR GENERATOR **12**

Objectives – Methods of controllable VAR generation – Working of Static VAR Compensator (SVC) – Working principle of Static Compensator (STATCOM), Comparison between SVC & STATCOM. Variable Impedance type VAR Generator – Working principle Thyristor Controlled Reactor (TCR), Thyristor Switched Reactor (TSR), Thyristor Switched Capacitor (TSC), Fixed Capacitor – Thyristor Controlled Reactor (FC – TCR).

UNIT- IV

STATIC SERIES COMPENSATOR **12**

Objectives – Variable Impedance type compensator – Working principle of Thyristor Controlled Switched Capacitor (TCSC), Gate Controlled Series Capacitor (GCSC), Thyristor Switched Series Capacitor(TSSC)– Switching Converter type Series compensator – Static Synchronous Series Compensator (SSSC) and Dynamic Voltage Restorer (DVR) (working principle only). Power Quality Definitions and Issues - Transients, Short Duration Voltage Variations, Long Duration voltage variations, Voltage Imbalance, Waveform Distortion, Voltage fluctuations, Notching in load voltage, DC offset in loads.

UNIT- V

COMBINED SERIES AND SHUNT COMPENSATOR **12**

Principle of operation of Unified Power Flow Control (UPFC) – Independent real & reactive power controller – Interline DVR – Interline Power Flow Control (IPFC) – Unified Power Quality Conditioner (UPQC) (Basic operating principle) – Block diagram and working of Left

Shunt UPQC - Block diagram and working of Right Shunt UPQC – Comparison between Left shunt UPQC and Right Shunt UPQC – Comparison Between UPQC and STATCOM.

Reference Books:

1. Understanding of FACTS Concepts & Technology of Flexible AC Transmission Systems, Narain. G, Hingorani, Laszlo Gyugi, IEEE Press, wiley, India.
2. FACTS Controller in Power Transmission & Distribution, K. R. Padiyar, International Publishers.

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N3632**
Semester : **VI**
Subject Title : **BIO – MEDICAL INSTRUMENTATION**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
BIO – MEDICAL INSTRUMENTATION	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	BIO – ELECTRIC SIGNALS AND ELECTRODES & CLINICAL MEASUREMENT	12
II	BIO – MEDICAL RECORDERS	12
III	THERAPEUTIC INSTRUMENTS	12
IV	BIOTELEMETRY AND PATIENT SAFETY	12
V	MODERN IMAGING TECHNIQUES	12
Revision and Test		10
Total		70

RATIONALE:

Bio medical engineering education is in the growing stage. But every year, there is a tremendous increase in the use of modern medical equipment in the hospital and health care industry therefore it is necessary for every student to understand the functioning of various medical equipments. This subject to enable the students to learn the basic principles of different biomedical instruments viz Clinical measurement, Bio - medical recorders, Therapeutic instruments, Biotelemetry and Modern imaging techniques instruments

OBJECTIVES:

After learning this subject the student will be able to understand the about

- The generation of Bio-potential and its measurement using various electrodes.
- The measurement of blood pressure. The measurement of lung volume.
- The measurement of respiration rate.
- The measurement of body temperature and skin temperature. The principles of operations of ECG recorder.
- The principles of operations of EEG recorder. The principles of operations of ENG recorder. The working principles of audio meter.
- The principles of operations of pacemaker. The basic principle of dialysis.
- The basic principle of short wave diathermy. The basic principle of ventilators.
- The working principles of telemetry. The basic principle of telemedicine. To learn about patient safety.
- The various methods of accident prevention. The basic principle of various types of lasers. The basic principle of CT and MRI scanner.

N3632 – BIO MEDICAL INSTRUMENTATION

Detailed Syllabus

UNIT- I

BIO – ELECTRIC SIGNALS AND ELECTRODES & CLINICAL MEASUREMENT **12**

BIO-ELECTRIC SIGNALS AND ELECTRODES

Elementary ideas of cell structure, Bio – potential and their generation – resting and action potential – propagation of action potential. Electrodes – Micro – Skin surface – needle electrodes.

CLINICAL MEASUREMENT:

Measurement of Blood pressure (direct, indirect) – blood flow meter (Electro magnetic& ultrasonic blood flow meter) – blood Ph measurement - Measurement of Respiration rate – measurement of lung volume – heart rate measurement – Measurement of body and skin temperature - Chromatography, Photometry, Flurometry.

UNIT- II

BIO - MEDICAL RECORDERS **12**

Electro cardiograph (ECG) – Lead system – ECG electrodes – ECGamplifiers – ECG recording units – analysis of ECG curves. Nervous system – EEG recorder – 10-20 lead system – recording techniques – EEG wave types – Clinical use of EEG – brain tumour Electro – myograph (EMG) – EMG waves – measurement of conduction velocity – EMG recording techniques – Electro – retinograph (ERG) Audiometer – principle – types – Basics audiometer working.

UNIT- III

THERAPEUTIC INSTRUMENTS **12**

Cardiac pacemaker – classification – External pace makers – implantable pacemaker – pacing techniques – programmable pacemaker – Cardiac defibrillators – types – AC and DC defibrillators - Heart lung machine with Block diagram. Dialysis – Hemo dialysis – peritoneal dialysis. Endoscopes Endoscopic laser coagulator and applications – physiotherapy equipment – short wave diathermy – micro wave diathermy – ultrasonic therapy unit (block / circuit) – Ventilators – types – modern ventilator block diagram.

UNIT- IV

BIOTELEMETRY AND PATIENT SAFETY **12**

Introduction to biotelemetry – physiological – adaptable to biotelemetry – components of a biotelemetry system – application of telemetry – elements of biotelemetry; AM, FM transmitter and receiver – requirements for biotelemetry system – radio telemetry with sub carrier – single channel and multi channel telemetry – Telemedicine; introduction, working, applications. Patient safety: Physiological effects of electric current – Micro and macro shock – leakage current – shock hazards from electrical equipment. Methods of Accident Prevention – Grounding – Double Insulation – Protection by low voltage – Ground fault circuit interrupter – Isolation of patient connected parts – Isolated power distribution system. Safety aspects in electro surgical units – burns, high frequency current hazards, Explosion hazards.

UNIT- V

MODERN IMAGING TECHNIQUES **12**

LASER beam properties – block diagram – operation of CO2 and NDYag LASER – applications of LASER in medicine. X ray apparatus – block diagram – operation – special techniques in X-ray imaging –Tomogram – computerized Axial tomography – Ultrasonic imaging techniques – Echo cardiography – Angiography – CT scanner - Magnetic resonance imaging techniques

Reference Books:

1. Biomedical Instrumentation - Dr.M. Arumugam - Anuradha publications, Chennai Page No. 1-15, 21-33, 117-136,142-159,164-179, 182-195, 202-209, 212-215, 255 – 256, 274-277, 285-286, 266-268, 293-297, 299- 310, 319-320, 329 – 340, 347-358, 360-367, 374-390, 390-400

N-SCHEME

(Implements from the Academic year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**
Subject Code : **N3633**
Semester : **VI**
Subject Title : **COMPUTER HARDWARE AND NETWORKS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **14 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/Sem	Internal Assessment	End Examination	Total	Duration
COMPUTER HARDWARE AND NETWORKS	5	70	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	**Topic**	**Time (Hrs)**
I	MOTHERBOARD COMPONENTS AND MEMORY STORAGEDEVICES	12
II	I/O DEVICES AND INTERFACE	12
III	BIOS, POST and Mobile Phone Servicing	12
IV	COMPUTER NETWORK DEVICES AND OSI LAYERS	12
V	802.X AND TCP/IP PROTOCOLS	12
Revision and Test		10
Total		70

RATIONALE:

Maintaining and servicing the computers, laptops and peripherals are essential requirements of the computer students. The clear understanding of computer network devices and protocols are also taught in this subject.

OBJECTIVES:

On completion of the following units of syllabus contents, the students can

- Identify the major components that make up the system unit.
- Understand the principle of operations of Keyboard, mouse and Displays.
- Study about the specification of I/O Ports of all I/O devices like serial, parallel, USB – Game port, Blue tooth and IP Connectors
- Understand the technology of high quality multiple color graphic output devices like Dot matrix, Inkjet, Laser, Line, MFP and computer system.
- Understand the operations to Power Supply devices. Know the use of diagnostic Software.
- Identify the major components of Laptop. Troubles shoot the problems in Laptop.
- Understand the concept of data communication.
- Discuss the advantages and disadvantages of different network topologies. Compare different network classifications based on different category.
- Know the use of different network devices.
- Understand the different layers of OSI and their functions. Compare different LAN protocols.
- Identify the protocols used in TCP /IP and compare with OSI model. Understand IP address concepts and TCP/IP suite.

N3633 – COMPUTER HARDWARE AND NETWORKS

Detailed Syllabus

UNIT- I

MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES **12**

Introduction: Parts - Mother board, sockets, expansion slots, memory, power supply,drives and front panel and rear panel connectors – Hardware, Software and Firmware.

Processors: Architecture and block diagram of multi core Processor(any one), Featuresof new processor(Definition only)-chipsets (Concepts only)

Bus Standards Overview and features of PCI, AGP, USB, PCMCIA, Processor BUS–High

Primary Memory: Introduction-Main Memory, Cache memory–DDR2- DDR3, RAM versions – 1TB RAM – Direct RDRAM

Secondary Storage: Hard Disk–Construction–Working Principle–Specification of IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting. Troubleshooting hard disk drives.

Removable Storage: CD&DVD construction–reading & writing operations; CD-R,CD-RW; DVD-ROM, DVD-RW; construction and working of DVD Reader / Writer.

Blue-ray: Introduction – Disc Parameters – Recording and Playback Principles – Solid state memory devices.

UNIT- II

I/O DEVICES AND INTERFACE **12**

Keyboard and Mouse: Keyboard: Signals–operation of membrane and mechanical keyboards–troubleshooting; wireless Keyboard**.** Mouse- types, connectors, operation of Optical mouse and Troubleshooting.

Printers: Introduction–Types of printers–Dot Matrix, Laser, line printer, MFP, (Multi Function Printer), Thermal printer - Operation –Construction – Features and Troubleshooting

I/O Ports: Serial, Parallel, USB, Game Port, Bluetooth interface, IR connector, fireware, Signal specification problems with interfaces.

Displays and Graphic Cards: Panel Displays–Principles of LED, LCD and TFT Displays. SVGA Port signals – common problems and solutions.

Power Supply: SMPS: Principles of Operation and Block Diagram of ATX Power Supply, connector specifications

UNIT- III

BIOS, POST and Mobile Phone Servicing **12**

BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS -setup.

POST: Definition–IPL hardware–POST Test sequence–beep codes and error messages.

M**obile phone components:** Basics of mobile communication. Components - battery-antenna-ear piece- microphone -speaker-buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones.

Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and de-soldering components using different soldering tools - Use of multimeter and battery booster.

Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions.

Software and Antivirus: Flashing- Formatting- Unlocking -Use of secret codes-Downloading-Routing; Mobile Viruses – Precautions – Antivirus Software.

UNIT- IV

COMPUTER NETWORK DEVICES AND OSI LAYER **12**

Data Communication: Components of a data communication–Data flow: simplex–half duplex – full duplex; Networks – Definition - Network criteria – Types ofConnections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid –Advantages and Disadvantages of each topology.

Types of Networks: LAN–MAN–WAN–CAN–HAN–Internet–Intranet–Extranet,Client-Server, Peer To Peer Networks.

Transmission Media: Classification of transmission media - Guided–Twisted pair,Coaxial, Fiber optics; Unguided – Radio waves – Infrared – LOS – VSAT – cabling andstandards.

Network devices: Features and concepts of Switches–Routers(Wired and Wireless)–Gateways.

Network Models: Protocol definition - standards - OSI Model–layered architecture – functions of all layers.

UNIT- V

802.X AND TCP/IP PROTOCOLS **12**

Overview of TCP / IP : OSI & TCP/IP–Transport Layers Protocol–connectionoriented and connectionless Services – Sockets – TCP & UDP.

802.X Protocols : Concepts and PDU format of CSMA/CD (802.3)–Token bus (802.4)– Token ring (802.5) – Ethernet – type of Ethernet (Fast Ethernet, gigabit Ethernet) –Comparison between 802.3, 802.4 and 802.5

Network Layers Protocol: IP–Interior Gateway Protocols (IGMP, ICMP, ARP, RARPConcept only).

IP Addressing: Dotted Decimal Notation –Subnetting & Supernetting – VLSMTechnique-IPv6 (concepts only)

Application Layer Protocols: FTP– Telnet – SMTP– HTTP – DNS – POP

Reference Books:

1. Computer Installation and Servicing - D.Balasubramanian - Arasan Ganesan Institute of Technology – 1993.
2. The complete PC upgrade and Maintenance - Mark Minasi - BPB Publication – 1997.
3. Troubleshooting, Maintaining and Repairing PCs - Stephen J Bigelow -Tata MCGraw Hill Publication – 2004.
4. Computer Networks - Andrew S.Tanenbaum - Prentice-Hall of India, New Delhi -2002.

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N364**

Semester **: VI**

Subject Title **: PLC PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
PLC PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Drawing Connection/Ladder Diagram	40
2	Making the correct circuit connections	30
3	Conducting the Experiment - Following the correct procedure - Verifying the operation / appropriate readings - Following the appropriate safety procedure	15
4	Tabulation of Readings / Interpretation of Results Graphical Representation (If required)	10
5	Viva voce	5
Total		100

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of PLC programming.

OBJECTIVES

On completion of this practical subject, the students will be able to

- Make the various circuit connections
- Practically control all the machines using PLC.
- Learn how to draw the PLC ladder diagram.
- Learn how to control the real time applications using PLC example water level, fire alarm, change over switch, traffic light control etc.,.

LIST OF EXPERIMENTS

1. Interfacing of Limit switch, Reed switch and Proximity switch with PLC.
2. DOL starter with single phase prevention.
3. EB to Generator Change over switch implementation with interlocking.
4. Star Delta starter
   a) Single phasing prevention
   b) Adjustable star-delta transfer time
   c) Pre-settable overload trip time
5. Automatic load transfer
   a) Transfers load from one phase to another when one phase in a three phase system fails.
   b) Automatically restores when power is resumed.
   c) Time delays are effected to prevent action during short time failure
6. Fill the water in water tank and maintain the water level.
   a) When water level comes below lower level switch ON the pump.
   b) When water level reaches the high level switch OFF the pump.
   c) Include manual switch to operate the pump at any level of water.
7. Fire alarm
   a) Multiple alarms
   b) Sound alarm
   c) If not acknowledged, Sound alarms 1 and 2
   d) Similarly go up to 4 alarm conveyor belt sorting
8. Three floor Lift control.
9. Traffic light control.
10. Automatic operation of double acting pneumatic cylinder – Multi cycle
11. Sequential operation of two Double Acting Cylinders for the sequence A+,B+, B-,A-
12. Analog input to PLC as a set of valve for a comparator function block.
    The input is multilevel illumination control. The input is setting is by means of a potentiometer in an analog input to the PLC. The outputs turn on several groups of lamps to obtain desired level illumination.
13. Heater control with PID function of the PLC.
    A 1000 W water heater is controlled using the PID function of the PLC. The temperature transducer is a temperature transmitter with 4 to 20 mA output and Pt 100 Probe.
14. Round table liquid filling system.
    Dropping of Reagents into test tubes. The feedback is from potentiometer. The program must ensure that the end limits of the pot are never reached by carefully balancing the clockwise and anti-clockwise revolution.
15. Slow speed motor control using PWM function of the PLC
    Slow speed 12V DC 18W permanent magnet motor with fly wheel is controlled with the PWM output and feedback from a low resolution encoder.

LIST OF EQUIPMENTS

S.NO	DESCRIPTION	QTY
1	PLC suitable to conduct above experiments	3
2	Limit switch	1
3	Reed switch	1
4	Inductive proximity sensor	1
5	Capacitive proximity sensor	1
6	PC laptop	5

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N365**

Semester **: VI**

Subject Title **: ELECTRICAL CIRCUITS SIMULATION PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
ELECTRICAL CIRCUITS SIMULATION PRACTICAL	4	56	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Circuit Diagram (Manual Diagram)	40
2	Development of circuit diagram	30
3	Simulation Performance & print out	25
4	Viva voce	5
Total		100

RATIONALE

All the Engineering applications are simulated through computers. They are tested and then built using real components for commercial implementation. Simulation software is available for all Engineering fields. Hers is an attempt to impart the knowledge of using simulation software for realizing some of the Electrical and Electronics circuits for the Diploma students.

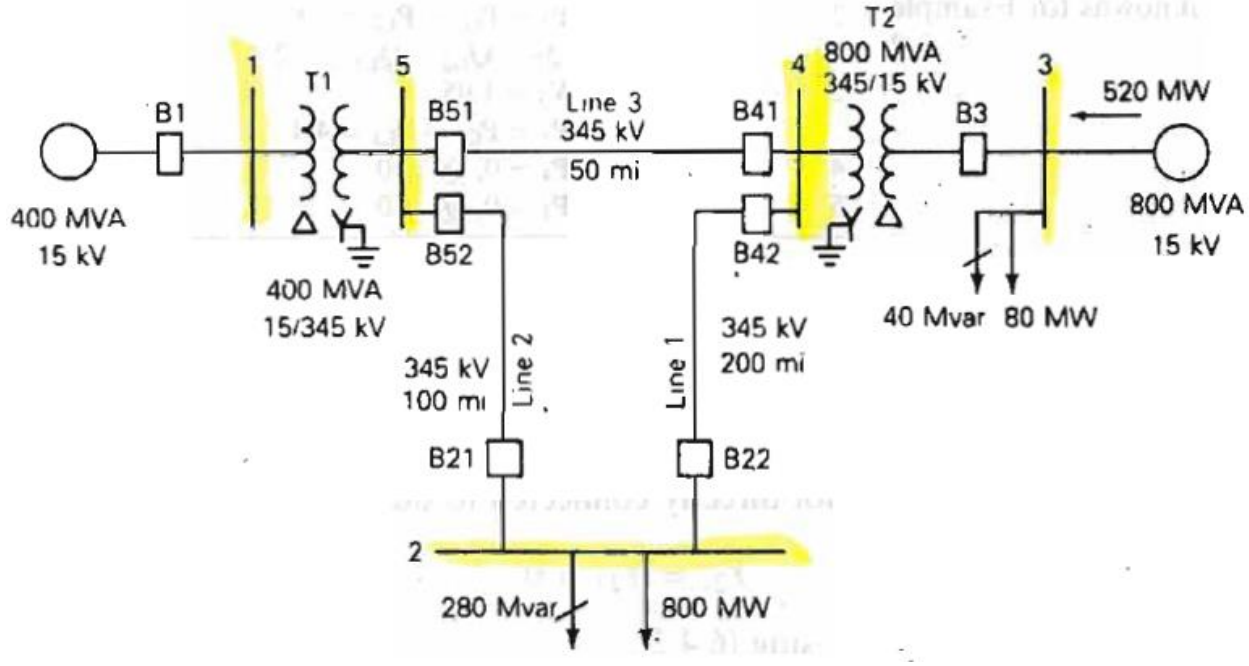
OBJECTIVES

At the end of this practical subject the students should be able to

- Know the various aspects of simulation software
- Simulate and test the simple electrical and electronics circuits Simulate and test the wave generating circuits
- Simulate and prove the simple theorems
- Simulate and test the performance characteristics of converters
- To design and verify the results of various electric circuits using simulation software.

LIST OF EXPERIMENTS

1) a) Generate sinusoidal waveform for different RMS voltage and frequency.
   b) Generate a complex signal comprising of fundamental, 5^{th} harmonics and 7^{th} harmonics frequency.
2) a) Simulation of RLC series response circuits
   b) Simulation of RLC parallel response circuits
3) a) Simulation of half wave rectifier.
   b) Simulation of full wave rectifier.
4) a) Simulation of single phase, semi converter with RL load.
   b) Simulation of single phase full converter with RL load.
5) Simulation of DC step down chopper.
6) Simulation of single phase inverter.
7) Simulation of three phase voltage source inverter supplying R-load
8) a) Simulation of three phase star connected balanced load
   b) Simulation of three phase delta connected unbalanced load
9) a) Simulation of three phase non-linear star connected load with three phase 3 wire system.
   b) Simulation of three phase non-linear star connected load with three phase 4 wire system.
10) Simulation of Armature control of DC Shunt motor.
11) Simulate the given single line diagram using Power World Simulator.



1. Perform DC power flow analysis for the above power system.

LIST OF EQUIPMENTS

S.NO.	DESCRIPTION	QTY
1	PC with any suitable simulation software	30 Nos
2	UPS 5KVA with half an hour battery back up	1
3	Printer	1

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N366**

Semester **: VI**

Subject Title **: POWER ELECTRONICS AND DRIVES PRACTICAL**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
POWER ELECTRONICS PRACTICAL	6	84	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Allocation of marks:

Sl.No	Allocation	Marks
1	Circuit diagram	40
2	Making the correct circuit connections	30
3	Execution	15
4	Output and Result	10
5	Viva voce	5
Total		100

RATIONALE

The advent of thyristors has revolutionized the art of electric power conversation and its control. The use of the power electronic devices has pervaded the industrial applications relating to the field of Electrical, Electronics, Instrumentation and Control Engineering. This subject is introduced to impart practical skills to the students in using some important power electronic devices and circuits.

OBJECTIVES

Construct and test DC-DC, DC-AC, AC-DC, AC-AC converters using power switching devices and control circuits for the same.

LIST OF EXPERIMENTS

1. Construct the Line synchronized Ramp trigger circuit using UJT with AC load to measure firing angles.
2. Construct Lamp control circuit using DIAC – TRIAC to measure various output voltage for firing angles.
3. Construct and test the SCR commutation circuits (Class B & Class D)
4. Construct and test the Single phase fully controlled bridge with RL- Load
5. Construct and test the Half controlled bridge rectifier with R- Load.
6. Construct and test the step up chopper.
7. Design the PWM based step down chopper using MOSFET/IGBT.
8. Construct and test the Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT.
9. Construct and test the open loop speed control circuit for DC shunt motor
10. Construct and test the control circuit using TRIAC for Universal motor.
11. Construct and test the Open loop speed control of Single phase AC motor.
12. Construct and test the Single phase parallel inverter using MOSFET/IGBT
13. Construct and test the Single phase to single phase cyclo converter.

LIST OF EQUIPMENTS

S.NO	DESCRIPTION	QTY
1.	Line synchronized Ramp trigger circuit using UJT trainer kit.	1
2.	Lamp control circuit using DIAC – TRIAC trainer kit.	1
3.	SCR commutation circuits (Class B & Class D)	1
4.	Single phase fully controlled bridge with RL- Load trainer kit.	1
5.	Half wave controlled rectifier with R- Load trainer kit.	1
6.	Step up chopper trainer kit.	1
7.	PWM based step down DC chopper using MOSFET/IGBT trainer kit.	1
8.	Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT trainer kit.	1
9.	Open loop speed control circuit for DC shunt motor trainer kit	1
10.	Control circuit using TRIAC for Universal motor trainer kit.	1
11.	Open loop speed control of Single phase AC motor trainer kit.	1
12.	Single phase parallel inverter using MOSFET/IGBT trainer kit	1
13.	Single phase to single phase cycloconverter trainer kit.	1
14.	CRO with power probe	4
15.	Multi meter	3
16.	R-load	2
17.	RL load	2

N SCHEME

(Implemented from the Academic Year 2019-2020 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Subject Code **: N367**

Semester **: VI**

Subject Title **: PROJECT WORK**

Teaching and Scheme of Examination:

Number of Weeks/ Semester: 14 Weeks

Subject	Instruction		Examination			
	Hrs/ Week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
PROJECT WORK	3	42	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

OBJECTIVES

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics. Understand what entrepreneurship is and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional Knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Understand the facts and importance of environmental management. Understand and gain knowledge about disaster management.

N 367 PROJECT WORK

ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings -Cyclone shelters – Warning systems.

Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services -Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances –Rehabilitation.

LIST OF QUESTIONS

A. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste?
7. Define Industrial waste management.

8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?

C. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamil Nadu lie:
    (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones