

Discipline- Electrical Engg.	Semester-5 th	Ashirbad Behera
Subject- EM & ST	No of days/week class allotted-4	No of weeks-15 from 15/09/2022
Week	Class day	Theory topic
1	1 st	Entrepreneurship – What is Entrepreneurship? And about it.
	2 nd	Concept /Meaning of Entrepreneurship
	3 rd	Need of Entrepreneurship
	4 th	Characteristics, Qualities of an Entrepreneur
2	1 st	Types of entrepreneur and their function
	2 nd	What are the barriers present in entrepreneurship
	3 rd	Entrepreneur Vs Manager
	4 th	Forms of Business Ownership: Sole proprietorship, partnership forms and others
3	1 st	Entrepreneurial support agencies at National, State, District Level(Sources)
	2 nd	Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks
	3 rd	DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC
	4 th	Different Start ups and types of industries.
4	1 st	Market Survey and opportunity identification – Business planning
	2 nd	SSI, Ancillary Units, Tiny Units, Service sector Units
	3 rd	Time schedule Plan, Agencies to be contacted for Project Implementation
	4 th	Assessment of Demand and supply and Potential areas of Growth
5	1 st	Identifying Business Opportunity
	2 nd	Final Product selection
	3 rd	Monthly test
	4 th	Doubt Clearing Class
	1 st	Project report Preparation – Preliminary project report
	2 nd	Detailed project report, Techno economic Feasibility
	3 rd	Project Viability
	4 th	Final Report preparation
7	1 st	Management Principles - Definitions of management
	2 nd	Principles of management
	3 rd	Functions of management (planning, organizing, staffing, directing and controlling etc.)
	4 th	Level of Management in an Organization
8	1 st	Functional Areas of Management -
	2 nd	Production management – Functions, activities,

	3 rd	Quality Control and Production planning
	4 th	Inventory Management - Need for Inventory management Models/Techniques of Inventory management
9	1 st	Human Resource Management - Functions of Personnel Management
	2 nd	Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages
	3 rd	Financial Management - Functions of Financial management
	4 th	Management of Working capital , Break even Analysis
10	1 st	Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)
	2 nd	Concept of Marketing and Marketing Management
	3 rd	Marketing Techniques (only concepts)
	4 th	Concept of 4P s (Price, Place, Product, Promotion)
11	1 st	Smart Technology – Different Smart technology
	2 nd	Concept of IOT, How IOT works
	3 rd	Components of IOT, Characteristics of IOT, Categories of IOT
	4 th	Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.
12	1 st	Leadership and Motivation - Leadership
	2 nd	Definition and Need/Importance
	3 rd	Quality and Function of leader
	4 th	Difference between Leader and Manager
13	1 st	Style of leadership – Autocratic, Democratic
	2 nd	Motivation (Definition and Characteristic)
	3 rd	Importance of motivation and factors effecting motivation
	4 th	Maslow (Theories of motivation), Types and barriers of Communication
14	1 st	Work Culture, TQM & Safety - Human relationship and Performance in Organization
	2 nd	Relations with Peers, Superiors and Subordinates
	3 rd	TQM concepts: Quality Policy, Quality Management, Quality system
	4 th	Accidents and Safety, Cause, preventive measures, General Safety Rules , Personal Protection Equipment(PPE)
15	1 st	Legislation - Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights
	2 nd	Features of Factories Act 1948 with Amendment (only salient points)

	3 rd	Features of Payment of Wages Act 1936 (only salient points)
	4 th	Doubt clearing classes

Discipline- Electrical Engg.	Semester-5 th	Name of the teaching faculty- Amit Kumar Swain
Subject- Ec-II	No of days/week class allotted-5	No of weeks-15 From 15/9/22
Week	Class day	Theory topic
1	1 st	THREE PHASE INDUCTION MOTOR-Introduction
	2 nd	Explain and derive production of rotating magnetic field
	3 rd	Explain constructional feature of Squirrel cage and Slip ring induction motors
	4 th	Explain principles of operation of 3-phase Induction motor
	5 th	Explain slip speed, slip and slip relation with rotor quantities
2	1 st	Numerical problems
	2 nd	Derive Torque during starting conditions for maximum torque. (solve numerical problems)
	3 rd	Derive Torque during running conditions for maximum torque. (solve numerical problems)
	4 th	Numerical problems
	5 th	Derive Torque-slip characteristics
3	1 st	Derive relation between full load torque and starting torque etc. (solve numerical problems)
	2 nd	Numerical problems
	3 rd	Determine the relations between Rotor Copper loss, Rotor output and Gross Torque, and relationship of slip with rotor copper loss. (solve numerical problems)
	4 th	Numerical problems
	5 th	Explain principle of Induction Generator and state its applications
4	1 st	Explain and state Methods of starting and different types of starters.
	2 nd	Explain speed control by Voltage Control, Rotor resistance control, pole changing, frequency control methods.
	3 rd	Describe plugging applicable to three phase induction motor
	4 th	Describe different types of motor enclosures
	5 th	Doubt clearance
5	1 st	ALTERNATOR-
	2 nd	Introduction
	3 rd	State types of alternator and their constructional features
	4 th	Explain working principle of alternator and establish the relation between speed and frequency

	5 th	Explain terminology in armature winding
6	1 st	derive expressions for winding factors (Pitch factor & distribution factor)
	2 nd	Solve numerical
	3 rd	Explain harmonics, its causes and impact on winding factor
	4 th	Derive E.M.F equation. (Solve numerical problems)
	5 th	Solve Numericals
7	1 st	Explain Armature reaction and its effect on emf at different pf of load
	2 nd	Draw the vector diagram of loaded alternator. (Solve numerical problems)
	3 rd	Solve Numericals
	4 th	State and explain testing of alternator -open circuit Test & Short circuit test
	5 th	Solve Numericals
86	1 st	Determination of voltage regulation of Alternator by direct loading and synchronous impedance method
	2 nd	Explain parallel operation of alternator using synchro-scope, dark and bright lamp method
	3 rd	Explain distribution of load by parallel connected alternators
	4 th	SYNCHRONOUS MOTOR- Explain constructional feature of Synchronous Motor
	5 th	Explain principles of operation, concept of load angle
9	1 st	Explain effect of varying load with constant excitation Explain effect of varying excitation with constant load
	2 nd	Derive torque, power developed - solve numerical
	3 rd	Explain power angle characteristics of cylindrical rotor motor
	4 th	Explain effect of excitation on Armature current and power factor
	5 th	Explain Hunting & function of Damper Bars
10	1 st	State application of synchronous motor
	2 nd	Describe method of starting of Synchronous motor
	3 rd	Doubt clearance
	4 th	SINGLE PHASE INDUCTION MOTOR-
	5 th	Explain Rotating – field theory of 1-phase induction motor
11	1 st	Explain Ferrari's principle
	2 nd	Explain Working principle, Torque speed characteristics, performance characteristics and application of Split phase motor

	3 rd	Explain Working principle, Torque speed characteristics, performance characteristics and application of Capacitor Startmotor
	4 th	Explain Working principle, Torque speed characteristics, performance characteristics and application of Capacitor start, capacitor runmotor
	5 th	Explain Working principle, Torque speed characteristics, performance characteristics and application of Permanent capacitor typemotor
12	1 st	Explain Working principle, Torque speed characteristics, performance characteristics and application of Shaded polemotor
	2 nd	Explain the method to change the direction of rotation of Split phasemotor, Capacitor Startmotor, Capacitor start, capacitor runmotor, Permanent capacitor typemotor & Shaded polemotor
	3 rd	Doubt clearance
	4 th	COMMUTATOR MOTORS- introduction
	5 th	Explain construction of single phase seriesmotor
13	1 st	working principle, running characteristic and application of single phase seriesmotor
	2 nd	Explain construction, working principle and application of Universal motors
	3 rd	Explain working principle of Repulsion start Motor, Repulsion start Induction run motor
	4 th	Explain working principle of Repulsion Inductionmotor
	5 th	Brief discussion about all the motors-Doubt clearance
14	1 st	Principle of Steppermotor
	2 nd	Classification of Steppermotor
	3 rd	Principle of variable reluctant steppermotor
	4 th	Principle of Permanent magnet steppermotor
	5 th	Principle of hybrid steppermotor Applications of Steppermotor
15	1 st	THREE PHASE TRANSFORMERS-introduction
	2 nd	Explain Grouping of winding,Advantages
	3 rd	Explain parallel operation of the three phasetransformers
	4 th	Explain tap changer (On/Off load tapchanging)
	5 th	State maintenance ofTransformers

Discipline- Electrical Engg.	Semester-5 th	Name of the teaching faculty- Sidharth Sankar Sahu & SwarnaprabhaPanigrahi
Subject- Electrical Machine Lab-II	No of days/week class allotted- 6	No of weeks-15 From 15/9/22
Week	Class day	Practical topic
1	1 st	Study of (Manual and Semi automatic) Direct on Line starter, Star-Delta starter, connection and running a 3-phase Induction motor and measurement of starting current
	2 nd	Practical observation, conclusion ,record correction
2	1 st	Study of (Manual and Semi automatic) Auto transformer starter and rotor resistance starter connection and running a 3-phase induction motor and measurement of starting current
	2 nd	Practical observation, conclusion ,record correction
3	1 st	Study and Practice of connection & Reverse the direction of rotation of Three Phase Induction motor
	2 nd	Practical observation, conclusion ,record correction
4	1 st	Study and Practice of connection & Reverse the direction of rotation of Single Phase Induction motor
	2 nd	Practical observation, conclusion ,record correction
5	1 st	Heat run test of 3-phase transformer
	2 nd	Practical observation, conclusion ,record correction
6	1 st	OC and SC test of alternator and determination of regulation by synchronous impedance method
	2 nd	Practical observation, conclusion ,record correction
7	1 st	Determination of regulation of alternator by direct loading
	2 nd	Practical observation, conclusion ,record correction
8	1 st	Parallel operation of two alternators and study load sharing
	2 nd	Practical observation, conclusion ,record correction
9	1 st	Measurement of power of a 3-phase Load using two wattmeter method and verification of the result using one 3-phase wattmeter
	2 nd	Practical observation, conclusion ,record correction

10	1 st	Connection of 3-phase energy meter to a 3-phase load
	2 nd	Practical observation, conclusion ,record correction
11	1 st	Study of an O.C.B
	2 nd	Practical observation, conclusion ,record correction
12	1 st	Study of induction type over current / reverse power relay
	2 nd	Practical observation, conclusion ,record correction
13	1 st	Study of Buchholz's relay
	2 nd	Practical observation, conclusion ,record correction
14	1 st	Study of an earth fault relay
	2 nd	Practical observation, conclusion ,record correction
15	1 st	End-sessional evaluation
	2 nd	Doubt Clearance

Discipline- Electrical Engg.	Semester-5 th	Name of the teaching faculty- Sidharth Sankar Sahu
Subject- Power Electronics & PLC Lab	No of days/week class allotted-1	No of weeks-15 From 15/9/22
Week	Class day	Practical topic
1	1 st	Study of switching characteristics of a power transistor
2	1 st	Study of V-I characteristics of SCR & TRIAC
3	1 st	Study of V-I characteristics of DIAC.
4	1 st	Study of drive circuit for SCR & TRIAC using DIAC. Study of voltage source Inverter
5	1 st	To study phase controlled bridge rectifier using resistive load
6	1 st	Study of drive circuit for SCR & TRIAC using UJT.
7	1 st	To study phase controlled bridge rectifier using resistive load.
8	1 st	To study series Inverter & Study of voltage source Inverter
9	1 st	To perform the speed control of DC motor using Chopper To study single-phase Cyclo-converter
10	1 st	Introduction/Familiarization PLC Trainer & its Installation with PC Learn the basics and hardware components of PLC Understand configuration of PLC system
11	1 st	Study various building blocks of PLC Determine the No. of digital I/O & Analog I/O
12	1 st	Execute the different Ladder Diagrams Demonstrate PLC and Ladder diagram-Preparation downloading and running Execute Ladder diagrams for different Logical Gates
13	1 st	Execute Ladder diagrams using timers & counters & Execute the Ladder Diagrams with model applications (i) DOL starter (ii)Star- Delta starter
14	1 st	Execute Ladder diagrams with model applications (i) Stair case lighting (ii) Traffic light controller
15	1 st	Practical observation, conclusion ,record correction ,End-sessional evaluation Practical observation, conclusion, record correction

Discipline- Electrical Engg.	Semester-5 th	Name of the teaching faculty- Sidharth Sankar Sahu
Subject- Power electronics & PLC	No of days/week class allotted-4	Semester from- 15/9/2022 No of weeks-15
Week	Class day	Theory topic
1	1 st	Construction, Operation , V-I characteristics & application of power diode, SCR, DIAC, TRIAC, Power MOSFET, GTO & IGBT.
	2 nd	Two transistor analogy of SCR , Gate characteristics of SCR
	3 rd	Switching characteristic of SCR during turn on and turn off, Turn on methods of SCR
	4 th	Numerical related to gate turn on and off of MOSFET, BJT
2	1 st	Different Commutation techniques (Load commutation , voltage commutation and current commutation)
	2 nd	SCR protection (Gate Protection)
	3 rd	Voltage protection and current protection
	4 th	Firing Circuits (General layout diagram of firing circuit)
3	1 st	R firing circuits, R-C firing circuit
	2 nd	UJT pulse trigger circuit and Synchronous triggering (Ramp Triggering)
	3 rd	Limitations of R and RC firing circuits
	4 th	Design of Snubber Circuits and numerical to find the value of R and C.
4	1 st	Doubt clearing and revision class
	2 nd	Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
	3 rd	Working of single-phase half wave controlled converter with Resistive and R-L loads
	4 th	Problem solving and realising the wave forms.
5	1 st	Understand need of freewheeling diode.
	2 nd	Working of single phase fully controlled converter with resistive and R- L loads.
	3 rd	Working of three-phase half wave controlled converter with Resistive load
	4 th	Working of three phase fully controlled converter with resistive load.
6	1 st	Doubt clearing and problem solving
	2 nd	Working of single phase AC regulator.
	3 rd	Working principle of step up & step down chopper
	4 th	Control modes of chopper
7	1 st	Operation of chopper in all four quadrants
	2 nd	UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS , Classify inverters.
	3 rd	Explain the working of series inverter

	4 th	Explain the working of parallel inverter
8	1 st	Explain the working of single-phase bridge inverter.
	2 nd	Explain the basic principle of cyclo converter
	3 rd	Explain the working of single-phase step up & step down Cyclo-converter
	4 th	Applications of Cyclo-converter
9	1 st	Problem solving on inverter and chopper
	2 nd	UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS , List applications of power electronic circuits
	3 rd	List the factors affecting the speed of DC Motors
	4 th	Speed control for DC Shunt motor using converter
10	1 st	Speed control for DC Shunt motor using chopper
	2 nd	List the factors affecting speed of the AC Motors
	3 rd	Speed control of Induction Motor by using AC voltage regulator
	4 th	Speed control of induction motor by using converters and inverters (V/F control)
11	1 st	Working of UPS with block diagram
	2 nd	Battery charger circuit using SCR with the help of a diagram
	3 rd	Basic Switched mode power supply (SMPS) - explain its working & applications
	4 th	Numerical on cyclo-converter
12	1 st	PLC AND ITS APPLICATIONS , Introduction of Programmable Logic Controller(PLC)
	2 nd	Advantages of PLC
	3 rd	Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.
	4 th	Applications of PLC
13	1 st	Different Ladder diagrams
	2 nd	Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v) branching
	3 rd	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate
	4 th	Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT
14	1 st	Timers-i)T ON ii) T OFF and iii)Retentive timer
	2 nd	Counters-CTU, CTD
	3 rd	Ladder diagrams using Timers and counters
	4 th	PLC Instruction set
15	1 st	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii)

		Traffic light Control (iv) Temperature Controller
	2 nd	Special control systems- Basics DCS & SCADA systems
	3 rd	Computer Control–Data Acquisition, Direct Digital Control System (Basics only)
	4 th	Doubt Clearance

LESSON PLAN OF UTILIZATION OF ELECTRICAL ENERGY AND TRACTION FOR SEM-2020-21

DISCIPLINE	SEMESTER	Name of the teaching faculty- SWARNAPRABHA PANIGRAHI
SUB-UEET	5th	
	4days/week	No of Weeks-15 from 15/9/22
1st	1 st	Ch-1 Electrolytic process
	2 nd	Definition and basic principle of electro deposition
	3 rd	Important terms regarding electrolysis
	4 th	Faraday's law of electrolysis
2nd	1 st	current efficiency, energy efficiency
	2 nd	Principle of electro deposition, and factors affecting the amount of electro deposition
	3 rd	Factors governing the electro deposition
	4 th	Simple example related to extraction of metals
3rd	1 st	Application of electrolysis
	2 nd	Ch-2 Advantage of electrical heating
	3 rd	Mode of heat transfer and stephen's law
	4 th	Principle of resistance heating(direct , indirect)
4th	1 st	working principle of direct Arc furnace and indirect arc furnace
	2 nd	Principle of induction heating
	3 rd	Working principle of direct core type vertical core type and indirect core type induction furnace
	4 th	Principle of coreless induction furnace and skin effect
5 th	1 st	Principle of dielectric heating and application
	2 nd	Principle of Microwave heating and its application
	3 rd	Ch-3 explain principle of arc welding
	4 th	D.C and A.C arc phenomena
6th	1 st	D.C and A.C arc welding plants of single type
	2 nd	D.C and A.C arc welding plants of Multi operation type
	3 rd	Types of arc welding
	4 th	Principle of resistance welding
7th	1 st	Descriptive study of different resistance welding methods
	2 nd	Ch-4 illumination, nature of radiation and its spectrum
	3 rd	Luminous intensity, lumen , intensity of illumination, MHCP,MSCP, MHSCP, brightness, solid angle Luminous efficiency
	4 th	Inverse square law and the cosine law
8th	1 st	Polar curves

LESSON PLAN OF UTILIZATION OF ELECTRICAL ENERGY AND TRACTION FOR SEM-2020-21

	2 nd	Describe light distribution and control panel
	3 rd	Ch-6 maintenance factor and depreciation factor, simple lighting schemes and lighting factor
	4 th	Constructional feature and working of filament lamps, effect of variation of voltage on working of filament lamps
9th	1 st	Discharge lamps
	2 nd	Constructional features of and operation of fluorescent lamp
	3 rd	Sodium vapour lamp, high pressure mercury vapour lamps
	4 th	Neon sign lamp ,
10th	1 st	High lumen output & low consumption fluorescent lamp
	2 nd	Ch-5 industrial drive , group and individual drive
	3 rd	Methods of choice of electric drive
	4 th	Starting and running characteristics of DC and AC motor
11th	1 st	Application of DC motor, 3-ph induction motor
	2 nd	Application of 3-ph synchronous motor,
	3 rd	Application 1-ph induction motor, series motor ,
	4 th	Application universal motor and repulsion motor
12th	1 st	Ch-6 Electric traction
	2 nd	System of traction
	3 rd	System of tracking electrification
	4 th	Running characteristics of DC traction motor
13th	1 st	Running characteristics of AC traction motor
	2 nd	Control of motor
	3 rd	Tapped field control
	4 th	Rheostatic control
14th	1 st	Series parallel control
	2 nd	Metadyne control
	3 rd	Braking
	4 th	Magnetic braking
15th	1 st	Braking with 1-ph series motor
	2 nd	Regenerative braking
	3 rd	Numerical practice
	4 th	Overall discussion