B.K.N. Govt. Polytechnic Narnaul Haryana
Electrical Engineering Department
Lesson Plan

Name of Faculty	**Sh. Kuldeep Mittal**
Discipline	**Electrical Engineering**
Semester	**5th**
Subject	**Electrical Machines-II**
Lesson Plan Duration	**15/09/2022 to 16/01/2023**
Work load [Theory + Practical] Per Week	**[04+02]**

Week	Day	Theory Topic/ Assignment/ Test	No.	Practical
1st	1	Unit1: Introduction Synchronous Machines	1	Demonstration of revolving field set up by a 3-phase wound stator
	2	Constructional features of synchronous machine		
	3	Generation of three phase emf		
	4	Production of rotating magnetic field in a three phase winding		
	5	Revision/ Review of above Topics		
2nd	1	Concept of distribution and coil span factor	2	To plot relationship between no load terminal voltage and excitation current in a synchronous generator at constant speed
	2	Drive Emf equation, synchronous speed		
	3	Armature reaction at unity, lag and lead power factor		
	4	Voltage regulation using synchronous impedance method		
	5	Revision/ Review of Topics		
3rd	1	Need and necessary conditions of parallel operation of alternators	3	Determination of the relationship between the voltage and load current of an alternator, keeping excitation and speed
	2	Operation of synchronous machine as a motor –its starting methods		
	3	Effect of change in excitation of a synchronous motor		
	4	Concept and Cause of hunting and its prevention		
	5	Revision/ Review of above Topics		
4th	1	Rating and cooling of synchronous machines	4	Revision/ file checking
	2	Applications of synchronous machines (as an alternator, as a synchronous condenser)		
	3	Revision of important topics		
	4	Assignment / Class test		
	5	Revision/ Review of above Topics		
5th	1	Problem solution/ test check	5	Determination of the regulation and efficiency of alternator from the open circuit and short circuit test
	2	Unit2: Introduction to Induction Motors		
	3	constructional features of squirrel cage and slip ring 3-phase induction Motors		
	4	Principle of operation, slip and its significance		
	5	Revision/ Review of above Topics		
6th	1	Locking of rotor and stator fields	6	Synchronization of polyphase alternators and load sharing
	2	Rotor resistance, inductance		
	3	Emf Equation and current relations		
	4	Relationship between copper loss and motor slip		
	5	Revision/ Review of above Topics		
	1	Power flow diagram of an induction motor		

7th	2	Factors determining the torque, Torque-slip curve, stable and unstable zones	7	Determination of the effect of variation of excitation on performance of a synchronous motor
	3	Effect of rotor resistance upon the torque slip relationship		
	4	Double cage rotor motor and its applications		
	5	Revision/ Review of above Topics		
8th	1	Starting of 3-phase induction motors, DOL	8	Study of ISI/BIS code for 3-phase induction motors
	2	Star-delta, auto transformer starting		
	3	Causes of low power factor of induction motors		
	4	Testing of 3-phase induction motor on no load		
	5	Revision of Unit No-01		
9th	1	And blocked rotor test and to find efficiency	9	Revision/ file checking
	2	Speed control of induction motor		
	3	Harmonics and its effects		
	4	cogging and crawling in Induction Motors		
	5	Revision of Unit No-01		
10th	1	Revision of important topics	10	Determination of efficiency by (a) no load test and blocked rotor test on an induction motor
	2	Assignment / Class test		
	3	Problem solution/ ClassTest check		
	4	Unit3: Fractional Kilo Watt (FKW) Motors		
	5	And its description		
11th	1	Single phase induction motors	11	Determination of effect of rotor resistance on torque speed curve of an induction motor
	2	Construction characteristics and applications		
	3	Nature of field produced in single phase induction motor		
	4	Split phase induction motors		
	5	Type of Induction Motor		
12th	1	Capacitors start and run	12	Revision/ file checking
	2	Shaded pole, Reluctance start motor		
	3	Alternating current series motor and universal motors		
	4	1-phase synchronous motor Reluctance type		
	5	Brief description about Synchronous Motor		
13th	1	Hysteresis motor	13	To study the effect of a capacitor on the single phase induction motor to reverse the direction of rotation.
	2	Revision of important topics		
	3	Assignment / Class test		
	4	Problem solution/ test check		
	5	Revision of important topics		
14th	1	Unit4:Special Purpose Machines	14	Quiz /viva-voice related to electrical machine
	2	Construction and working principle of linear induction motor		
	3	stepper motor		
	4	Servomotor		
	5	Revision of important topics		
15th	1	submersible motor	15	Quiz /viva-voice related to electrical machine
	2	introduction to energy efficient motors		
	3	Assignment / Class test		
	4	Problem solution/ test check		
	5	Problem solution/ test check		
16th	1	Problem solution/ test check	16	Internal Practical
	2	Revision/Review/Test of old HSBTE Papers		
	3	Revision/Review/Test of old HSBTE Papers		

B.K.N. Govt. Polytechnic Narnaul Haryana

Electrical Engineering Department

Lesson plan

Name of Faculty	**Sh. Sandeep Kumar**
Discipline	**Electrical Engineering**
Semester	**5th (odd- semester)**
Subject	**Electrical Power- I**
Lesson Plan Duration	**15/09/2022 to 16/01/2023**
Work load (Theory + Practical) Per Week	**(04+00)**

Week	Day	Topics
1st	1	Unit1:introduction to Power Generation
	2	Main resources of energy, conventional and non-conventional
	3	Different types of power stations, thermal power plant
	4	Hydro Power plant Flow diagrams and operation
2nd	1	Gas power plant Flow diagrams and operation
	2	diesel power station Flow diagrams and operation
	3	nuclear power Plant Flow diagrams and operation
	4	comparison of the generating stations on the basis of running cost, site, starting, maintenance
3rd	1	Revision/Assignment/ Class Test
	2	Unit2: Introduction to Economics of Generation
	3	Fixed and running cost, load estimation, load curves
	4	Demand factor, load factor, diversity factor
4th	1	Power factor and their effect on cost of generation
	2	Simple problems based on above relations
	3	Revision/Assignment/ Class Test
	4	Base load and peak load power stations
5th	1	inter-connection of power stations and its advantages
	2	Concept of regional and national grid
	3	Revision/Assignment/ Class Test
	4	Revision/Assignment/ Class Test
6th	1	Unit3: Introduction toTransmission Systems
	2	Layout of transmission system, selection of voltage for H.T and L.T lines
	3	advantages of high voltage for Transmission of power in both AC and
	4	Comparison of different systems: AC versus DC for power transmission,
7th	1	material and sizes from standard tables
	2	Constructional features of transmission lines
	3	Types of supports
	4	Types of insulators
8th	1	Types of conductors, Selection of insulators
	2	conductors, earth wire and their accessories
	3	Transposition of conductors and string efficiency of suspension type insulators, Bundle Conductors
	4	Mechanical features of line
9th	1	Importance of sag, calculation of sag,
	2	effects of wind and ice related problems
	3	Indian electricity rules pertaining to clearance
	4	Electrical features of line: Calculation of resistance, inductance and capacitance

10th	1	A.C. transmission line, voltage regulation, and concept of corona. Effects of corona and remedial measures
	2	Transmission Losses
	3	Revision/Assignment/ Class Test
	4	Revision/Assignment/ Class Test
11th	1	Unit 4: Distribution System Lay out of HT and LT distribution system
	2	constructional feature of distribution lines and their erection
	3	LT feeders and service mains
	4	Simple problems on AC radial distribution system
12th	1	Determination of size of conductor
	2	Preparation of estimates of HT and LT lines
	3	Constructional features of LT (400 V), HT (II kV) underground cables
	4	Advantages and disadvantages of underground system with respect to overhead system.
13th	1	Calculation of losses in distribution system
	2	Faults in underground cables-determine fault location by
	3	Murray Loop Test, Varley Loop Test
	4	Revision/Assignment/ Class Test
14th	1	Revision/Problem solution/ Class Test
	2	Unit 5: Substations: Brief idea about substations
	3	Outdoor grid sub-station 220/132 KV, 66/33 KV outdoor substations
	4	Pole mounted substations and indoor substation
15th	1	Layout of 33/11 distribution substation and various auxiliaries
	2	Layout of kV/400V distribution substation and various auxiliaries
	3	Revision/Assignment/ Class Test
	4	Unit 6: power factor, reasons and disadvantages of low power factor
16th	1	Methods for improvement of power factor using capacitor banks, VAR Static Compensator (SVC)
	2	Revision and problem solution
	3	Revision/Review/Test of old HSBTE Papers
	4	Revision/Review/Test of old HSBTE Papers

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Electrical Engineering Department
Lesson Plan

Name of Faculty	**Sh. Kuldeep Mittal**
Discipline	**Electrical Engineering**
Semester	**5th**
Subject	**Instrumentation (Theory)**
Lesson Plan Duration	**15/09/2022 to 16/01/2023**
Work load [Theory + Practical] Per Week	**[04+02]**

Week	Theory	
	Lecture day	**Topic (Including assignment/test)**
1st	Ist	Importance of measurement Need of measurement
	2nd	Basic measurement system Advantages & Limitations of each measuring systems
	3rd	Generalized measurement system Signal conditioning system
2nd	4th	Display devices, Introduction of transducer,importance of transducer
	5th	Characteristics of transducer ,construction
	6th	Use of resistance, inductance transducer
3rd	7th	Use of capacitive ,electromagnetic transducer
	8th	Use of piezo electric type transducer,application of transducer
	9th	Displacement Measuring Devices: wire wound potentiometer
4th	10th	Assignment work
	11th	Assignment work
	12th	Sessional test
5th	13th	LVDT, strain gauges
	14th	Different types such as inductance type, resistive type
	15th	Capacitive type,wire and foil type
6th	16th	Different types of force measuring devices and their principle
	17th	load measurements by using elastic transducers and electrical strain gauges
	18th	Gauge factor, gauge materials and their selections
7th	19th	Use of electrical strain gauges
	20th	strain gauge bridges and amplifiers
	21th	Different types of force measuring devices and their principles

8th	22th	load measurements by using elastic transducers and electrical strain gauges
	23th	Load cells, measurements of torque by brake, dynamometer
	24th	electrical strain gauges
9th	25th	Assignment work
	26th	Assignment work
	27th	Sessional test
10th	28th	speed measurements; different methods, devices.
	29th	Bourdon pressure gauges
	30th	Electrical pressure pick ups and their principle
11th	31th	Construction and applications. Use of pressure cells.
	32th	Basic principles of magnetic
	33th	Ultrasonic flow meters
12th	34th	Bimetallic thermometer
	35th	Thermoelectric thermometers, resistance thermometers
	36th	Thermocouple, thermisters
13th	37th	Pyrometer,Temperature recorders
	38th	Measurement of other non electrical quantities such as humidity
	39th	Measurement of other non electrical quantities such as pH
14th	40th	Measurement of other non electrical quantities such as level
	41th	Inductive & capacitive method of level measurement
	42th	Measurement of other non electrical quantities such as vibrations
15th	43th	Assignment work
	44th	Assignment work
	45th	Sessional test

B.K.N. Govt. Polytechnic Narnaul Haryana
Electrical Engineering Department
Lesson Plan

Name of Faculty	**Sh. Kuldeep Mittal**
Discipline	**Electrical Engineering**
Semester	**5th**
Subject	**Instrumentation (Practical)**
Lesson Plan Duration	**15/09/2022 to 16/01/2023**
Work load [Theory + Practical] Per Week	**[04+02]**

Week	Practical	Day
	Practical Day	**Topic**
1st	1st	To measure the level of a liquid using a transducer
	2nd	To measure temperature using a thermocouple
2nd	3rd	To measure temperature using a thermocouple
	4th	To measure the level of a liquid using a transducer
3rd	5th	Study and use of digital temperature controller
	6th	Use of themistor in ON/OFF transducer
4th	7th	viva
	8th	viva
5th	9th	Use of themistor in ON/OFF transducer
	10th	Study and use of digital temperature controller
6th	11th	Study of variable capacitive transducer
	12th	Draw the characteristics of a potentiometer
7th	13th	Draw the characteristics of a potentiometer
	14th	Study of variable capacitive transducer
8th	15th	To measure linear displacement using LVDT
	16th	To study the use of electrical strain gauge
9th	17th	To study the use of electrical strain gauge
	18th	To measure linear displacement using LVDT

10th	19th	viva
	20th	viva
11th	21th	To study weighing machine using load cell
	22th	To study pH meter
12th	23th	To study pH meter
	24th	To study weighing machine using load cell
13th	25th	review of practical 1-5
	26th	review of practical 1-5
14th	27th	review of practical 6-10
	28th	review of practical 6-10
15th	29th	viva
	30th	viva

Lesson Plan

Name of the faculty : Sh. Jagdeep

Discipline : Electrical Engg.

Semester : 5th

Subject : Minor Project Work

Lesson Plan Duration : **15/09/2022 to 16/01/2023**

Work Load : Practicals — 06

Week	Practical	
	Practical Day	**Topic**
1st	1st	❖ Introduction about project based study and its benefits ❖ Explaining the different areas related to electrical engineering for carrying out project work (As given in syllabus, in addition to this, students are also allowed to choose solar energy based projects if they wants to work in this field). ❖ How to identify project work in collaboration with industry?
	2nd	❖ Making of groups according to the area of interest of the students. ❖ Finalization of the projects name for each group.
2nd	3rd	Planning for the execution of the project selected by each group.
	4th	Assignment from each group for providing the following information: ❖ Name of the project ❖ List of equipment required to complete the project work ❖ Steps involved in completing the project work
3rd	5th	Discussion on assignments submitted by each group.
	6th	—Continued— Discussion on assignments submitted by each group.
4th	7th	Suggesting modification in planning stage, if required, after the discussion on assignments submitted by each group.
	8th	To start work on the project as per the steps provided in the assignments.
5th	9th	To check and review the project work carried out by each group.
	10th	—Continued— To check and review the project work carried by out each group.
6th	11th	Taking doubts from the students of each group regarding the project work.
	12th	—Continued— Taking doubts from the students of each group regarding the project work and providing the solution of their problems.
7th	13th	To check and review the project work carried out by each group.
	14th	—Continued— To check and review the project work carried out by each group.

8th	15th	To analyze the knowledge of students regarding material used in ongoing project.
	16th	—Continued— To analyze the knowledge of students regarding material used in ongoing project.
9th	17th	To analyze the knowledge of students regarding circuit diagram and working of the project.
	18th	—Continued— To analyze the knowledge of students regarding circuit diagram and working of the project.
10th	19th	Giving instructions for preparing the project report.
	20th	Taking doubts related to the project report.
11th	21st	Discussion on report writing.
	22nd	Review the project report and suggesting modification, if any found.
12th	23rd	Review the project report after the modification.
	24th	Finalizing the project report.
13th	25th	To prepare the students for presenting their projects in exhibition.
	26th	To arrange an exhibition of the projects in the class room by inviting the students of other group.
14th	27th	Viva preparation
	28th	To analyze following: ❖ Quality of performance ❖ Sense of responsibility ❖ Self-expression/communication skills ❖ Interpersonal skills/human relations ❖ Report writing skills
15th	29th	—Continued— To analyze following: ❖ Quality of performance ❖ Sense of responsibility ❖ Self-expression/communication skills ❖ Interpersonal skills/human relations ❖ Report writing skills
	30th	To conduct viva-voce examination for determining the final result for the internal award.

LESSON PLAN

Name of the faculty: Sh. Kuldeep Mittal
Discipline : Electrical Engg.
Semester : 5th
Subject : Programmable logic controllers and Microcontrollers

Lesson Plan Duration : w.e.f. **15/09/2022 to 16/01/2023**

Work load (Lecture/Practical) per week : Lectures-05, Practicals-04

Week	Theory		Practical	
	Lecture day	**Topic**	**Practical day**	**Topic**
1st	1	What is PLC, concept of PLC	1st	Components/ subcomponents of a PLC and learning functions of different modules of a PLC system
	2	Building blocks of PLC		
	3	Functions of various blocks of PLC		
	4	Limitations of relays, Advantages of PLCs over electromagnetic relays		
	5	Revision and class test		
2nd	6	Different programming languages,	2nd	Practical steps in programming a PLC using hand held programmer
	7	PLC manufacturers and applications of PLC		
	8	Basic operation of PLC-		
	9	Principles of PLC		
	10	Revision and class test		
3rd	11	Architectural details of Processor-Part-I	3rd	Practical steps in programming a PLC using computer interfacing
	12	Architectural details of Processor-Part-II		
	13	Memory Structures		
	14	Input/output structures		
	15	Revision and class test		
4th	16	Programming Terminals of PLC	4th	Introduction to step 5programming language, ladder diagram concepts, instruction list syntax
	17	Power supply to PLC		
	18	Basic instructions for latch		
	19	Master control self holding relays		
	20	Revision and class test		
5th	21	Timer instructions-ON and OFF delay	5th	Basic logic operations, AND, Or, NOT functions
	22	Retentive timers, resetting of timers		
	23	Counter instructions like up counter, down counter, resetting of counters		
	24	Arithmetic Instructions (ADD,SUB,DIV,MUL etc.)		
	25	Revision and class test		
6th	26	MOV instruction, RTC (Real Time Clockfunction)	6th	Logic control systems with time

	27	Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal		response as applied to clamping operation
	28	Programming on Basic instructions		
	29	Programming on Timer instructions		
	30	Revision and class test		
7th	31	Programming on Counter instructions	7th	Sequence control system in lifting a device for packaging and counting
	32	Programming on Sequencer instructions		
	33	Programming on comparison instructions		
	34	Revision of Ladder diagram Programming		
	35	Revision and class test		
8th	36	Assembly line, Packaging, Process control	8th	Use of PLC for Door Bell operation
	37	Car parking, Doorbell operation, Traffic light control		
	38	Microwave oven, Washing machine, Motor in forward and reverse direction		
	39	Star delta, DOL Starter, paint industry ,filling of bottles, room Automation		
	40	Revision and class test		
9th	41	Microcontroller -Overview	9th	Use of PLC for Traffic light system
	42	Block diagram and architecture of Microcontroller		
	43	Overview of MCS-51		
	44	8051 -Pin details		
	45	Revision and class test		
10th	46	Input port structures	10th	Use of PLC for Packing process control
	47	Output port structures		
	48	Memory organisation		
	49	Special function registers		
	50	Revision and class test		
11th	51	Revision of Microcontroller	11th	Use of PLC for Car parking system
	52	Instruction set of MCS-51		
	53	Addressing modes		
	54	Timer operation		
	55	Revision and class test		
12th	56	Serial port operation and communication	12th	Familiarization with the study of architecture of 8085 kit, basic sub systems and input output connectors, function keys
	57	Interrupts and its types		
	58	Assemblers operations & compilers		
	59	Assembler directives		
	60	Revision and class test		
13th	61	keypad interfacing	13th	Familiarization of Microcontroller 8051 kit
	62	7- segment interface, LCD		
	63	Stepper motor interfacing		
	64	A/D, D/A interfacing		
	65	Revision and class test		
14th	66	RTC interfacing	14th	Testing of general input/output on

	67	Introduction of PIC Micro controllers		microcontroller board
	68	Features of PIC 16C84		
	69	Architecture of PIC 16C84		
	70	Revision and class test		
15th	71	Applications of microcontrollers	15th	Development of Electrical, Instrumentation applications using 8051 microcontroller
	72	Radio control system		
	73	Revision of complete syllabus		
	74	Revision and class test		
	75	Discussion of previous year HSBTE question papers		

Lesson Plan

Name of the faculty : Sh. Kuldeep Mittal
Discipline : Electrical
Semester : **5**th
Subject : Utilization of electrical engineering
Lesson Plan Duration : w.e.f. **15/09/2022 to 16/01/2023**
Work load per week : Lectures-04

Week	Theory	
	Lecture day	**Topic (Including assignment/test)**
1st	Ist	Introduction
	2nd	Nature of light, visibility spectrum curve of relative sensitivity of human eye and wave length of light
	3rd	Definition: Luminous flux, solid angle, luminous intensity, illumination, luminous efficiency, depreciation factor, coefficient of utilization, space to height ratio, reflection factor, glare, shadow, lux.
	4th	Laws of illumination simple numericals
	5th	Different type of lamps, construction and working of incandescent , fittings required for filament lamp,
2nd	Ist	construction and working of discharge lamps – their characteristics,mercury vapour sodium lamp, fluorescent lamp,
	2nd	halogen lamp, neon lamp construction and working
	3rd	compact filament lamp(CFL), LED Lamp, comparison of incandescent, fluorescent, CFL & LED
	4th	Calculation of number of light points for interior illumination, calculation of illumination at different points, considerations involved in simple design problems.
	5th	Illumination schemes; indoor and outdoor illumination levels
3rd	Ist	Main requirements of proper lighting
	2nd	absence of glare, contrast and shadow
	3rd	Awareness about time switches, street lighting, flood lighting, monument lighting and decorative lighting, light characteristics etc.
	4th	Advantages of electrical heating
	5th	Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, domestic water heaters and other heating appliances, thermostat control circuit
4th	Ist	Induction heating; principle of core type and coreless induction furnace, their construction and applications
	2nd	Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace
	3rd	Dielectric heating, applications in various industrial fields
	4th	Infra-red heating and its applications (construction and working of two appliances
	5th	Microwave heating and its applications (construction and working of two appliances
5th	Ist	Solar Heating Calculation of resistance heating elements (simple problems)
	2nd	Calculation of resistance heating elements (simple problems)
	3rd	revision & Copy check
	4th	revision & Copy check
	5th	Advantages of electric welding
	Ist	Welding method 3.2.1 Principles of resistance welding, types – spot, projection, seam and butt welding,
	2nd	welding equipments

6th	3rd	Principle of arc production, electric arc welding, characteristics of arc; carbon arc
	4th	metal arc, hydrogen arc welding method and their applications.
	5th	Power supply requirement. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits, welding of aluminum and copper
7th	Ist	revision & Copy check
	2nd	. Electrolytic Processes: (10 hrs) 4.1 Need of electro-deposition
	3rd	2 Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing and buffing
	4th	Equipment and accessories for electroplating
	5th	Factors affecting electro-deposition
8th	Ist	Principle of galvanizing and its applications
	2nd	6 Principles of anodizing and its applications
	3rd	Electroplating of non-conducting materials 4.8 Manufacture of chemicals by electrolytic process Power supplies for electroplating
	4th	Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers,introduction
	5th	5.1 Principle of air conditioning, vapour pressure, refrigeration cycle,
9th	Ist	eco-friendly refrigerants
	2nd	Description of Electrical circuit used in Refrigerato
	3rd	Description of Electrical circuit used in Air-conditioner
	4th	Description of Electrical circuit used in Water cooler
	5th	revision & Copy check
10th	Ist	Advantages of electric drives
	2nd	Characteristics of different mechanical loads
	3rd	Types of motors used as electric drive
	4th	Electric braking Plugging
	5th	Rheostatic braking
11th	Ist	Regenerative braking
	2nd	General idea about the methods of power transfer by direct coupling by using devices like belt drive, gears, chain drives etc.
	3rd	Examples of selection of motors for different types of domestic loads
	4th	Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane and lift etc.
	5th	Application of flywheel.
12th	Ist	Specifications of commonly used motors e.g. squirrel cage motors,
	2nd	Specifications of commonly used motors slip ring induction motors,
	3rd	Specifications of commonly used motors AC series motors,
	4th	Specifications of commonly used motors Fractional kilo Watt(FKW) motors
	5th	Specifications of commonly used motors Fractional kilo Watt(FKW) motors
13th	Ist	Selection of motors for Domestic Appliances
	2nd	revision & Copy check
	3rd	Electric Traction: (10 hrs)
	4th	Advantages of electric traction over other types of traction. 7.2 Different systems of electric traction, DC and AC systems, diesel electric system
	5th	Types of services – urban, sub-urban, and main line and their speed-time curves
14th	Ist	Different accessories for track electrification; such as overhead catenary wire, conductor rail system, current collector-pentagraph
	2nd	Factors affecting scheduled speed 7
	3rd	Electrical block diagram of an electric locomotive with description of various equipment and accessories used.
	4th	Types of motors used for electric traction
	5th	Power supply arrangements

15th	Ist	Starting and braking of electric locomotives
	2nd	Introduction to EMU and metro railways
	3rd	Train Lighting Scheme Note: Students should be taken for visits to nearest electrified railway track and railway station to study the electric traction system.
	4th	revision & Copy check
	5th	revision & Copy check