COURSE NAME : ELECTRICAL ENGINEERING GROUP

COURSE CODE : EE/EP

SEMESTER : FIFTH

SUBJECT TITLE : ELECTRIC TRACTION - I (ELECTIVE-I)

SUBJECT CODE : 9088

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25#	25@	150

Note: 1) This subject is prerequisite for Electric Traction – II of Sixth Semester.

Rationale:

Electric traction means a locomotion in which the driving force is obtained from electric motors. One of the practical applications of electricity, which enters into the everyday life of many of us, is its use in service of mass transport – the electric propulsions of vehicles – electric trains, trolley buses, tram cars and in the latest developments such as metro and sky bus.

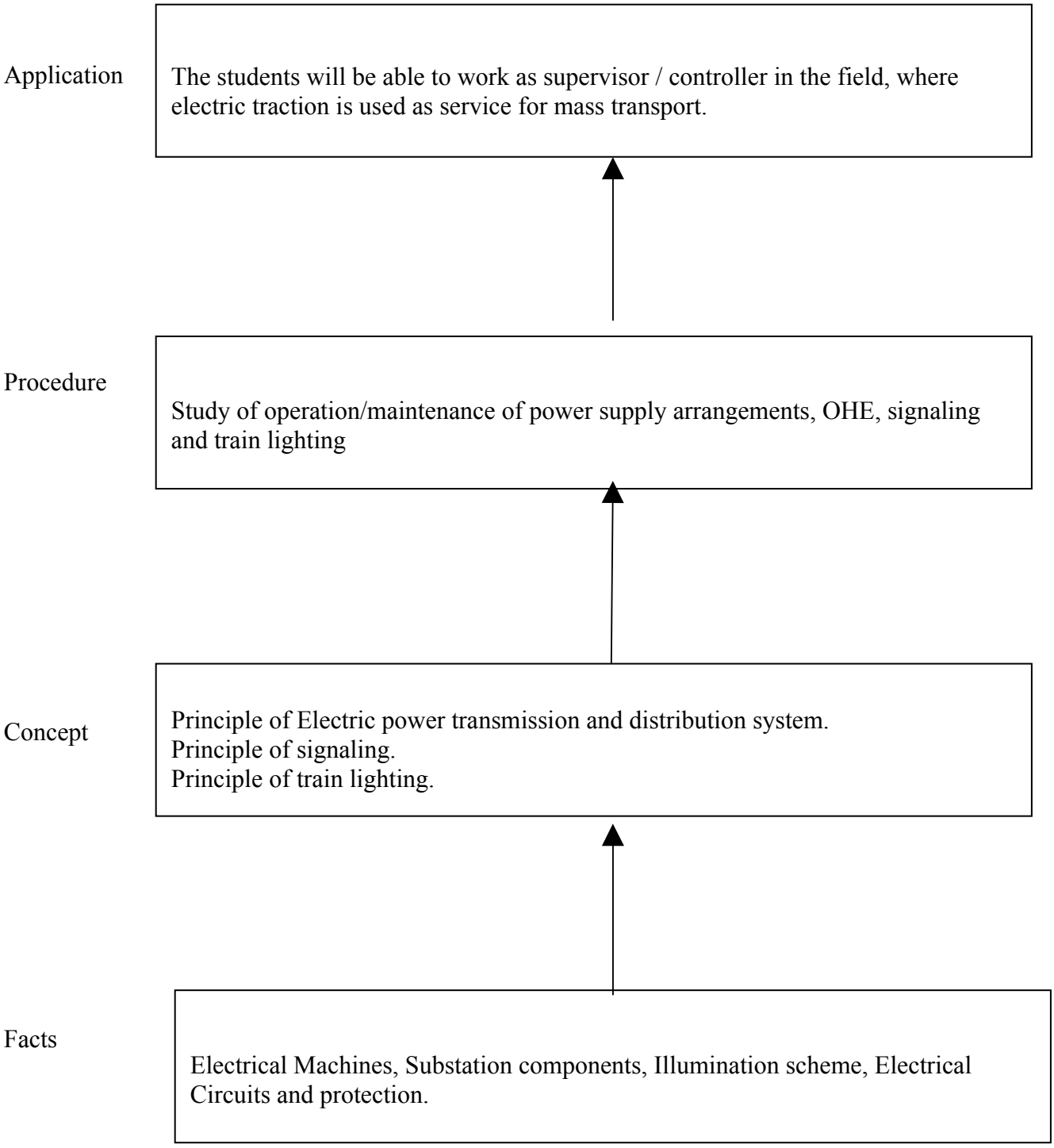
In view of the growing importance and technological developments, which have come about in this area in the recent past, for Electrical Engineering students it is desirable to study the course dealing with electric traction. This subject belongs to technology area.

Objectives:

The students will be able to:

1. Identify and explain use of components of the power supply arrangements for electric traction.
2. Maintain different overhead equipments.
3. Differentiate the various types of current collecting systems and current collecting gears based on utility.
4. Explain the different types of signals and track circuits.
5. Explain supervisory control used in electric traction.
6. Explain special requirements of train lighting and various systems of train lighting.

Learning Structure:



Contents: Theory:

Chapter	Topics	Hours	Marks
01	**Power Supply Arrangements:** 1.1 – Introduction 1.2 – High Voltage Supply. 1.3 – Constituents of Supply System. - Substations. - Feeding Posts. - Feeding and Sectioning Arrangements. - Sectioning and Paralleling Post. - Sub sectioning and Paralleling Post. - Sub sectioning Post. - Elementary Section. Miscellaneous Equipments at Control Post or Switching Stations. 1.4 – Major Equipments at Substation. - Transformer. - Circuit Breaker. - Interrupter. Protective System for AC Traction – Transformer Protection and 25 KV Catenary Protection 1.5 – Location and Spacing of Substations.	12	20
02	**Overhead Equipments:** 2.1 – Overhead Equipments (OHE). 2.2 – Principles of Design of OHE: - Composition of OHE. - Height of Contact Wire. - Contact Wire Gradient. - Encumbrances. - Span Length. 2.3 – Automatic Weight Tension and Temp. Compensation. 2.4 – Uninsulated Overlaps. 2.5 – Insulated Overlaps. 2.6 – Neutral Section. 2,7 – Section Insulator. 2.8 – Isolator. 2.9 – Polygonal OHE: - Single Catenary Construction. - Compound Catenary Construction. - Stitched Catenary Construction. - Modified Y Compound Catenary. 2.10 – Effect of Speed on OHE. 2.11 – OHE Supporting Structure.	12	16

	2.12 – Different types of signal boards of OHE. 2.13 – Maintenance of OHE: - OHE Maintenance Schedule. (No Derivation and No Numerical)		
03	**Current Collecting Equipments:** 3.1 – Introduction. 3.2 – Systems of Supplying Power in Electric Traction: Third Rail or Conductor Rail System. Overhead System. 3.3 – Current Collectors for Overhead System: - Trolley Collector or Pole Collector, Bow Collector, Pentograph Collector. 3.4 – Types of Pentographs: Diamond Pentograph and Faiveley Type. 3.5 – Construction of Faiveley Type Pantograph. 3.6 – Methods of Raising and Lowering of Pentograph. 3.7 – Maintenance of Pentograph.	08	16
04	**Signalling and Supervisory Control:** 4.1 – Requirements of Signalling System 4.2 – Types of Signals. 4.3 – Colour Light Signals. 4.4 – Three and Four Aspects of Colour Light Signals. 4.5 – Track Circuits. 4.6 – DC Track Circuit. 4.7 – AC Track Circuit. 4.8 – Supervisory Control: - Introduction. - Advantages of Remote Control. Systems of Remote Control: DC versus Voice Frequency (VF) Signalling. Remote Control System Equipment and Network. - Mimic Diagram. - Control Desk for TPC. - Remote Control Switching Equipments. - The F.M.V.F.T. - Power Supply. - Controlled Station Equipments. -	08	16
05	**Train Lighting:** 5.1 – Systems of Train Lighting. 5.2 – Special Requirements of Train Lighting. 5.3 – Method of obtaining Unidirectional Polarity. 5.4 – Method of obtaining Constant Output. 5.5 – Single Battery System. 5.6 – Double Battery Parallel Block System. 5.7 – Failure of Under frame Generating Equipments. 5.8 – End on Generation. 5.9 – Railway Coach Air Conditioning: - Requirements.	08	12

	- Types of Installations. - Air Conditioned Rolling Stock. 5.10 – Air Conditioning Equipments on Coaches.		
	Total	**48**	**80**

Assignments:

Drawing Sheets:

(i) Drawing on half Imperial sheet for Traction Substation Layout or Feeding Post.

(ii) Drawing of half Imperial sheet for Pentagonal OHE Catenary, Different Catenary. according to speed limit, Cantilever assembly OHE Supporting structure, Pentograph, Cross section of Contact Wire.

Note: Students should be able to identity, explain the functions of various components of substation and OHE.

Visits:

Visit to Traction Substation (for substation layout and OHE) **or** Railway Station (for signaling and train lighting) and writing a report.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	H. Partab	Modern Electric Traction	Dhanpat Rai & Sons
02	J. Upadhyay S. N. Mahendra	Electric Traction	Allied Publishers Ltd.
03	Om Prakash Kesari	Viddut Engine Parichay (In Hindi)	S. P. Graphics, Nashik.