FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Electrical Engineering)**

Semester: **VII**

Course Code: **202050705**

Course Title: **Electric Traction and Control**

Course Group: **Professional Elective Course-III**

Course Objectives: To study fundamental knowledge about the application of electrical engineering. This subject gives a comprehensive idea in utilization of electrical power such as Electric drives, electric heating, electric welding, illumination, electric traction, electrolysis.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25/9	25 / 9	150 / 53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Electrical Drives** Introduction of Electric Drives and their functions, Types of Drives, Types of Loads, Characteristics of different mechanical loads, Types of motors used in electric drive, Electric braking, Plugging, Rheostat braking, Regenerative braking, Methods of power transfer by direct coupling by using devices like belt drive, gears, pulley drives etc.	05
2	**Illumination:** Different type of lamps, construction and working of incandescent and discharge lamps , mercury vapor lamp, fluorescent lamp, metal halide lamp, neon lamp	05

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3	**Electric Heating & Electric Welding** Advantages of electrical heating, Heating methods, Resistance heating – direct and indirect resistance heating, properties of resistance heating elements, Induction heating; principle of core type and coreless induction furnace , Electric arc heating, direct and indirect arc heating, Dielectric heating & applications, Infra-red heating and its applications ,Microwave heating, Advantages of electric welding , Welding methods, Principles of resistance welding, types – spot, projection seam and butt	**07**
4	**Electrolytic Processes:** Need of electro-deposition, Laws of electrolysis, process of electrodeposition - clearing, operation, deposition of metals, Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers	**05**
5	**Electric Traction:** Electric traction, Advantages of electric traction, Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main lines and their speed time curves , Electrical block diagram of an electric locomotive with description of various equipment and accessories, Types of motors used for electric traction, Introduction to EMU and metro railways	**11**
6	**Electric Locomotives and Traction Distribution system:** Important features of electric locomotives, Different types of locomotives & Auxiliary Equipment, Current collecting equipment, Traction sub-station requirements and selection, Method of feeding the traction sub- station	**09**

List of Practicals / Tutorials:

1	To study methods of Electric Braking for D.C.Motor
2	To study methods of Electric Braking for Induction Motor
3	To study operation and working for different Electrical lamps
4	To study different methods of Electrical Heating
5	To study different methods of Electrical welding
6	To Study Electrodeposition Process
7	To study the traction system
8	To analyse speed time curve for the electric traction
9	To analyse the specific energy consumption and factors affecting it.
10	To study the types of motors used for traction system
11	To study different components used for the distribution system for electric traction.
12	To analyse series and parallel operation of electric motor for traction purpose.

Reference Books:

1	Utilization of Electrical Energy by J. B. Gupta, Kataria Publications
2	Generation and Utilization of Electrical Energy by S. Sivanagaruju, Pearson
3	Utilization of Electrical Energy by O. S. Taylor, Pitman Publications

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4	Generation, Distribution and Utilization if Electrical Power by C. L.Wadhwa, Wiley Eastern
5	Art and Science of Utilization of Electrical Energy by H.Partap, Dhanpat Rai & Sons

Supplementary learning Material:	
1	http://www.nptel.ac.in
2	http://www.elektra.eu/pdf_en/content/elektra_guide_book.pdf
3	http://www.vssut.ac.in/lecture_notes/lecture1424084684.pdf

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects

Internal Evaluation: The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20%	30%	20%	10%	10%	10%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the Electrical drive technology in efficient utilization of electrical power	**20**
CO-2	To understand the lighting lamp technology and its illumination for its efficient utilization in lighting systems	**10**
CO-3	To understand the heating & welding technology in efficient utilization of electrical power	**20**
CO-4	Evaluate the use of power utilization Technologies in various process control systems	**10**
CO-5	Analyze effective utilization of Power Electronic Technologies in Electrical Traction systems	**20**
CO-6	Describe traction system auxiliaries & distribution system for Electrical traction systems	**20**

Curriculum Revision:	
Version:	**1.0**
Drafted on (Month-Year):	Jun-2020
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2025

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