CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

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

Semester: **VI**

Course Code: **202050621**

Course Title: **Electrical Power Utilization**

Course Group: **Open Elective Course -II**

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	0	3	50/18	50/17	NA	NA	100/35

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

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Electrical Drives:** Block diagram of drive – Components of Electrical Drives and their functions, Classification of Electrical Drives, Advantages of electrical drives, Factors influencing the choice of electrical drives. Nature of Electric supply, Types of Drives, Types of Loads, Types of loads, Quadrantal diagram of speed-torque characteristics, Load torque- Time Characteristics, Dynamics of motor-load combination, 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. Applications of AC & DC Motors	10
2	**Illumination:** Nature of light, visibility spectrum curve of relative sensitivity of human eye and wavelength of light, Different type of lamps, construction and working of incandescent and discharge lamps , mercury vapor lamp, fluorescent lamp, metal halide lamp, neon lamp	06

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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, construction, working and applications of arc furnace, Dielectric heating, applications in various industrial fields, Infra-red heating and its applications, Microwave heating, Advantages of electric welding, Welding methods, Principles of resistance welding, types – spot, projection seam and butt, Principle of arc production, electric arc welding, carbon arc, metal arc, hydrogen arc welding and their applications, comparison between AC and DC arc welding.	**10**
4	**Electrolytic Processes:** Need of electro-deposition, Laws of electrolysis, process of electrodeposition - clearing, operation, deposition of metals, polishing, buffing Factors affecting electrodeposition, Principle of galvanizing and its applications, Principle of Anodizing and its applications, Electroplating on non-conducting materials. Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers: Principle of air conditioning, vapor pressure, refrigeration cycle, Description of Electrical circuit used in refrigerator, air conditioner and water cooler	**06**
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.	**10**

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
4	Generation, Distribution and Utilization if Electrical Power by C. 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

Pedagogy:
Direct classroom teaching
Audio Visual presentations/demonstrations
Assignments/Quiz
Continuous assessment
Interactive methods

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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**	
30%	30%	40%	0%	0%	0%	

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.

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	**20**
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	**20**
CO-5	Analyze effective utilization of Power Electronic Technologies in Electrical Traction systems	**20**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	Jun-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2025

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