

## LECTURE SCHEDULE

**Department: Dairy Engineering**

**Course No. - DTE- 124**

**Course Title: Basic Electrical Engineering      Credit Hrs - 3 (2+1)**

**Course Teacher: Dr. Jahangir Badshah.**

### Theory

<b>S. No.</b>	<b>Topics to be covered</b>	<b>No. of Classes</b>
1	Alternating current fundamentals: Generation of alternating current or voltage, magnitude of induced E.M.F.	01
2	Alternating current, R.M.S value and average value of an alternating current and Numericals.	01
3	Alternating Current: Phase relation and vector representation. Cycle, Time period, Frequency, Amplitude, Phase and Phase Difference, Root – Mean Square Value.	01
4	Alternating Current: Average value, Form Factor, Crest or Amplitude Factor.	01
5	Poly-phase Circuit: - Generation of Poly-phase Voltage, Phase Sequence.	01
6	Interconnection of Three Phases such as Star Connection and Delta Connection and their respective value of current and voltages.	01
7	Numerical on star and delta connection for three phase alternating Current.	01
8	Energy Measurement by using Single and Two Watt-meters.	01
9	Transformers: - Working Principle of Transformer, Construction features of Core and Shell type transformer.	01
10	Elementary theory of an Ideal Transformer, E.M.F. Equation of a Transformer.	01
11	Numerical on E.M.F. Equation of transformer.	01
12	Vector diagram of transformer with and without load and Transformer losses and numerical solutions.	01
13	Voltage regulation and efficiency of transformer and Numerical solution on efficiency.	01
14	Construction and working on an Single Auto-transformer,	01
15	Different parts of a 11/0.4 KV, Distribution Transformer.	01
16	Three Phase Induction Motor: - Fundamental working principles, Production of rotating magnetic fields.	01
17	Construction, Different types of Rotor such as Squirrel Cage and Phase wound rotors.	01

18	Starting of induction motors using Direct on Line (DOL) and Star-Delta Starter.	01
19	Starting of motor using Soft starter and variable frequency drives.	01
20	Single Phase Induction Motors: - Introduction, Different types of single phase induction motors such as Split Phase, Capacitor type, Shaded Pole type.	01
21	Study of Universal or AC series motors, Repulsion start induction run motor, Repulsion – induction motor.	01
22	DC Machine: - Construction and operation of DC generator, types of generators and their various characteristics.	01
23	DC motors: Torque speed characteristics of DC motors and related Numerical.	01
24	Starting and speed control of DC motors by using 3-point DC Starter.	01
25	Alternators:- Elementary working principles, Different parts of an Alternators	01
26	Alternators: Relation between Speed and Frequency, E.M.F. equation in Alternators.	01
27	Different types of Circuit Breaker and its use.	01
28	Introduction to DG set system and decision of capacity.	01
29	Electric Power Economics: - Economics of Generation of electrical energy and related important terms such as, load curve, connected load, <u>Maximum Demand</u> .	01
30	Demand Factor, Average load or demand, Load Factor, Diversity factor and its significance, Capacity Factor or Plant factor,	01
31	Utilization Factor, Plant Operating Factor and Selection of Units and related numerical.	01
32	Various types of Tariff used for calculation of electricity bill.	01
33	Lighting system: Introduction to industrial lighting system.	01
34	Energy Management and Power Factor Corrections: - Types of energy, Energy Management, Concept of Energy Audit.	01
35	Concept of Power Factor, Disadvantages of low power factor, Causes of low power factor,	01
36	Various methods of improving low power factor, Location of power factor correction equipment	01
37	Advantages of power factor improvement and numerical on power factor.	01
38	Alternating current fundamentals: Generation of alternating current or voltage, magnitude of induced E.M.F.	01
	Total	38

### Practical (DTE -124)

S. No.	Practical to be covered	No. of Classes
1	Introduction to various basic circuits of parallel wiring and stair case wiring.	01
2	Study of fluorescent light fitting.	01
3	Study of voltage and current relationship in case of Star connected load.	01
4	Study of voltage and current relationship in case of Delta connected load.	01
5	Measurement of power in 3-phase circuit; for a balanced load, using watt meters.	01
6	Measurement of power in 3-phase circuit; for a unbalanced load, using watt meters.	01
7	Measurement of iron losses of Single Phase transformer by conducting open circuit test.	01
8	Measurement of Copper losses of Single Phase transformer by conducting short circuit test.	01
9	Starting and reversing the speed of a single phase induction motor.	01
10	Starting and reversing the speed of a three phase induction motor using Direct on Line (DOL) Starter.	01
11	Starting and reversing the speed of a three phase induction motor using manual Star Delta Starter.	01
12	Starting and reversing the speed of a DC shunt motor using 3-point DC Starter.	01
13	Starting of slip-ring induction motor by manual and automatic Slip-ring Induction Motor Starter.	01
14	To determine the relation between induced armature voltage and speed of	01
15	Visit to Electrical Generators and Transformer in a dairy Plant.	01
16	Visit to Electrical Induction Motors in Refrigeration Machines, Air Compressors and Boiler accessories pump etc.	01
17	Introduction to various basic circuits of parallel wiring and stair case wiring.	01
	Total	17

#### **Suggested Reading:**

1. A Textbook of Electrical Technology by B. L. Theraja and A. K. Theraja (2018), S. Chand & Company Ltd., Ram Nagar, New Delhi -110 055.
2. An Integrated Course in Electrical Engineering (3<sup>rd</sup> Edition) by J. B. Gupta (2018), KATSON Publisher. Upkar'S Objective Electrical Engineering by P. K. Mishra (2018), Upkar Prakashan Agra -2
3. Basic Electrical Engineering by C. L. Wadhwa (2016), New Age International Publisher.
4. Fundamentals of Electrical Engineering by Dr. Bharti Dwivedi and Dr. Anurag Tripathi (2018), Wiley Precise Textbook.