

**Government Polytechnic Asthawan ,Nalanda (Bihar)**  
**(Department of Electrical Engineering)**

Lecture Plan:- Theory

Name of the Faculty :- **DILIP KUMAR**

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Semester/Branch:- 5 th / Electrical Engg .

Subject Name (Subject Code):- Utilization of Electrical Energy (1620503)

Lecture/Week :- 4 Periods/Week = 4 hrs per week .

Units	Week	Lecture Day	Topics	Mode of Teaching
Illumination	1	1.	Definitions of Terms Used in Illumination: Light, Luminous Flux, Luminous Intensity, Lumen, Candle Power, Illumination,	Pdf , Lecture , Video
		2.	Lux or Meter Candle, Mean Horizontal Candle Power (MHCP), Mean Spherical Candle Power (MSCP).	Pdf , Lecture , Video
		3.	Mean Hemi-spherical Candle Power (MHSCP), Reduction Factor, Lamp Efficiency, Specific Consumption, Glare.	Pdf , Lecture , Video
		4.	Space-Height Ratio, Utilization Factor, Maintenance Factor, Depreciation Factor , Waste Light Factor ,Absorption Factor,	Pdf , Lecture , Video
	2	1.	Reflection Factor, Solid Angle. Laws of Illumination , Law of Inverse Squares	Pdf , Lecture , Video
		2.	Lambert's Cosine Law. (No Numerical), Sources of Light:- intro	Pdf , Lecture , Video
		3.	Construction, Working and Applications of Following Lamps: - Incandescent Lamps. - Halogen Lamps.	Pdf , Lecture , Video
		4.	Low Pressure Mercury Vapour Lamps (Fluorescent Tube). - High Pressure Mercury Vapour Lamps. - Sodium Vapour Lamps .	Pdf , Lecture , Video
	3	1.	Compact Fluorescent Lamps (C.F.L.) - Metal Halide Lamps - LED Lamps - Neon Signs, Basic Principles of Light Control.	Pdf , Lecture , Video
		2.	Types of Lighting Schemes. Direct, Semi-direct, Semi-indirect, Indirect, General Lighting,Design of Lighting Scheme .	Pdf , Lecture , Video
		3.	Objectives of Lighting Scheme. Factors to be considered While Designing the Lighting Scheme. ( Simple Numericals).	Pdf , Lecture , Video
		4	Factory Lighting ,General Requirements - Types of Installations: General Lighting, Local Lighting, Emergency Lighting .	Pdf , Lecture , Video
	4	1.	Lumen or Light Flux Method of Lighting Calculations. ( Simple Numericals) , Flood Lighting .	Pdf , Lecture , Video
		2.	Flood Lighting Purposes. - Classification of Projectors. - Location and Mounting of Projectors. (Simple Numericals)	Pdf , Lecture , Video
		3	Assignment of Illumination	Pdf/Google form

Unit 2  Electric Heating and Welding: Electric Heating	4.	Electric Heating and Welding: Electric Heating:– Advantages of Electric Heating.	Pdf , Lecture , Video	
	5	1.	Modes of Transfer of Heat: - Conduction, Convection and Radiation.	Pdf , Lecture , Video
		2	Classification of Electric Heating Methods: Resistance Heating:(Construction & Operation)	Pdf , Lecture , Video
		3	Direct Resistance Heating: Salt Bath Furnace. - Indirect Resistance Heating: Resistance Ovens, Requirements of Heating Element Material.	Pdf , Lecture , Video
		4	Causes of Failure of Heating Elements, Methods of Temperature Control. - Applications of Resistance Heating.	Pdf , Lecture , Video
	6	1	Arc Heating: (Construction & Operation) - Direct Arc Furnace: - Indirect Arc Furnace. - Applications of Arc Heating.	Pdf , Lecture , Video
		2	Induction Heating: (Construction & Operation) - Core Type Induction Furnaces: Ajax Wyatt Furnace. - Coreless Induction Furnace.	Pdf , Lecture , Video
		3	Applications of Induction Heating. (Simple Numericals on Melting Furnaces) ,Dielectric Heating: - Principle of Dielectric Heating.	Pdf , Lecture , Video
		4	Advantages of Dielectric Heating - Limitations of Dielectric Heating Applications of Dielectric Heating. (Simple Numericals on Dielectric Heating),.	Pdf , Lecture , Video
	7	1	Electric Welding:- Methods of Electric Welding: Electric Arc Welding Resistance Welding: - Principle and Advantages of Resistance Welding	Pdf , Lecture , Video
		2	Types of Resistance Welding - (Only List),Spot Welding Machine.	Pdf , Lecture , Video
		3	Electric Arc Welding: - Formation and Characteristics of Electric Arc	Pdf , Lecture , Video
		4	Effect of Arc Length. - Arc Blow ,Polarity in DC Welding	Pdf , Lecture , Video
	8	1	Electrodes for Metal Arc Welding:	Pdf , Lecture , Video
		2	V-I Characteristics of Arc Welding DC Machines	Pdf , Lecture , Video
		3	Arc Welding Machines:--DC Welding Machines , MG Set, AC Rectified Welding Unit , AC Welding Machines , Welding Transformer	Pdf , Lecture , Video
		4	Assignment of Electric Heating and Welding: Electric Heating	Pdf/Google form
	UNIT – III	1	Elevators: - Types of electric elevators	Pdf , Lecture , Video

Elevators	9			
		2	Size and shape of elevator car	Pdf , Lecture , Video
		3	Speed of elevators	Pdf , Lecture , Video
		4	Location of elevator machine	Pdf , Lecture , Video
	10	1	Types of elevator machines, elevator motors	Pdf , Lecture , Video
		2	Power transmission gears braking	Pdf , Lecture , Video
		3	Safety in elevators	Pdf , Lecture , Video
		4	Bombay lift act	Pdf , Lecture , Video
	11	1	Assignment of Elevators	Pdf/Google form
		2	Electric Drives – Introduction: - What is drive? - Drives – Mechanical Drive and Electric Drive	Pdf , Lecture , Video
		3	Advantages and Disadvantages of Electric Drive.	Pdf , Lecture , Video
4		Factors Governing Selection of Electric Motors.	Pdf , Lecture , Video	
UNIT IV  Electric Drives	12	1	Nature of Electric Supply: 3 $\phi$ & 1 $\phi$ AC and DC	Pdf , Lecture , Video
		2	Type of Drive: Group Drive & Individual Drive.	Pdf , Lecture , Video
		3	Nature of Load: Nature of the Mechanical Load, Matching of the Speed Torque Characteristics of the Motor with that of the Load,	Pdf , Lecture , Video
		4	Starting Conditions of the Load, Electrical Characteristics: Three Phase Induction Motors are to be dealt (Only DC Serieses )	Pdf , Lecture , Video
	13	1	Single Phase Induction Motors are to be dealt ,Running Characteristics: Three Typical Speed Torque Characteristics – Inverse, Constant Speed and Drooping.	Pdf , Lecture , Video
		2	Starting Characteristics: Starting Torque only(No Starters).	Pdf , Lecture , Video
		3	Speed Control: Suitability to Economic and Efficient Speed Control Methods (Above and Below Normal Speed).	Pdf , Lecture , Video

		4	Braking Characteristics: Plugging, Rheostatic Braking and Regenerative Braking, as Applied to DC Series and Three Phase Induction Motor	Pdf , Lecture , Video
	14	1	Mechanical Features: - Type of Enclosure as per IS - Type of Bearings - Type of Transmission for Drive - Noise Level	Pdf , Lecture , Video
		2	Size of Motor: - Load Conditions – Continuous Loads, Short Time Loads, Intermittent Loads, Continuous Operation with Short Time Loads and Continuous Operation with Intermittent Loads	Pdf , Lecture , Video
		3	Duty Cycles. - Standard Ratings for Motors as per ISS. Estimation of Rating of a Motor	Pdf , Lecture , Video
		4	Load Equalisation- (Simple Numericals on Estimating Size of Continuously Rated Motor)(No Calculations)	Pdf , Lecture , Video
	15	1	Cost: - Capital Cost - Running Cost (Losses, p.f., Maintenance)	Pdf , Lecture , Video
		2	Assignment of Electric Drives	Pdf/Google form
Unit 5		3	Economic Aspects of Utilising Electrical Energy.	Pdf , Lecture , Video
		4	Costing of Electrical Energy: Fixed Charges, Semi Fixed Charges and Running Charges.	Pdf , Lecture , Video
Economic Aspects of Utilising Electrical Energy	16	1	Formulation of Electrical Tariffs	Pdf , Lecture , Video
		2	Various Types of Tariffs: Tariffs in force for Domestic, Commercial and Industrial Consumers	Pdf , Lecture , Video
		3	Power Factor Improvement: Causes of Low Power Factor, Disadvantages of Low Power Factor	Pdf , Lecture , Video
		4	Power Factor Improvement by using Static Capacitors, Location of Capacitors for Power Factor Improvement,	Pdf , Lecture , Video
	17	1	Most Economical Power Factor. Automatic Power Factor Controller (Derivation and Simple Numerical)	Pdf , Lecture , Video
		2	Energy Conservation: Importance and need of Energy Conservation	Pdf , Lecture , Video
		3	Measures for Energy Conservation in (i) Electric Drives (ii) Electric Traction	Pdf , Lecture , Video
		4	Measures for Energy Conservation in. (iii) Electric Heating (iv) Refrigeration and Air Conditioning (v) Illumination.	Pdf , Lecture , Video
		1	Assignment of Economic Aspects of Utilising Electrical Energy.	Pdf/Google form
	Total	64		