

## Detailed Teaching Plan

Lecture No.	Unit No.	Topic to be covered	Books & Page Nos.	Notes Page Nos.	Slide Nos.	A/V Resource
1	1	Group Drive; Individual Drive; Multi-motor Drive				
2	1	DC Series Motor; DC Shunt Motor; DC Separately Excited Motor; Three-Phase Induction Motor				
3	1	Nature of load; Speed control; Starting torque; Efficiency; Cost; Environmental conditions				
4	1	DC Series – High starting torque, variable speed; DC Shunt – Nearly constant speed; DC Separately Excited – Wide speed control; Three-Phase Induction Motor – Slip dependent characteristics				
5	1	Heating curves; Cooling curves; Losses (Copper, Iron, Mechanical); Insulation classes (A, B, F, H)				
6	1	Standard ratings; Duty classes (S1–S8); Ambient temperature effect; Temperature rise; Short-time rating; Application-based selection				
7	1	Continuous load; Short-time load; Intermittent load; Fluctuating load; Reversing load; Impact load				
8	2	Clean and smokeless, High efficiency, Uniform heating, Accurate temperature control, Low maintenance, Safe operation, No fuel storage required				
9		High melting point, High resistivity, Low temperature coefficient, Oxidation resistance, Mechanical strength, Long life				
10		Nichrome, Kanthal, Tungsten, Platinum, Iron-Chromium-Aluminium alloy				
11		Oxidation, Overheating, Corrosion, Mechanical damage, Thermal stress, Over-voltage				
12		Heat produced due to I <sup>2</sup> R loss; used in heaters and furnaces				

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13		Heat produced by electric arc between electrodes							
14		Heating using high frequency current							
015		Heat produced by induced eddy currents in metal							
16		Heating of non-conducting materials using high frequency electric field							
17		Spot welding, Seam welding, Projection welding, Butt welding							
18		Depends on material thickness, type of metal, welding current, applied pressure							
19		Welding by arc between electrode and workpiece							
20		Bare electrodes, Coated electrodes, Consumable electrodes, Non-consumable electrodes							
21		Transformer steps down voltage & gives high current; Rectifier converts AC to DC for stable arc welding							

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			Page Nos.	Page Nos.	Nos.	Resource
22	3	Luminous flux, Luminous intensity, Illumination, Luminance, Candle power, Brightness, Mean spherical candle power				
23		Inverse square law, Lambert's cosine law				
24		Electric arc, Incandescent lamps, Gaseous discharge lamps, Fluorescent lamps				
25		Produce light by electric arc between electrodes; high intensity				
26		Light produced by heating filament (tungsten); simple construction				
27		Light Amplification by Stimulated Emission of Radiation; highly directional and monochromatic light				
28		Light Emitting Diode; high efficiency, long life, low power consumption				
29		Gas discharge lamp using neon gas; used in indicators and sign boards				
30		Improved incandescent lamp with halogen gas; higher efficiency and longer life				
31		High efficiency discharge lamp; yellow light; used in street lighting				
32		Low-pressure mercury vapour lamp with phosphor coating; high efficiency				
33		90-100% light directed downward; high efficiency				
34		60-90% light downward, rest upward				
35		60-90% light upward, rest downward				
36		90-100% light directed upward; glare-free				
37		Uniform lighting for entire area				
38		Uniform illumination, proper spacing, glare control, high efficiency lamps				
39		High illumination level, shadow reduction, safety-focused lighting				
40		High intensity lighting for large outdoor areas like stadiums and monuments				

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28	4	High starting torque, Quick acceleration & retardation, High efficiency, Low maintenance, Simple speed control, Reliable braking system, Less weight				
29	4	Clean and pollution-free, High efficiency, Smooth operation, High acceleration, Less maintenance cost				
30	4	High initial cost, Requires track electrification, Power failure affects service				
31	4	Uses DC supply (600V-3000V); good speed control; used in urban transport				
32	4	Uses high voltage AC (15kV-25kV); economical for long distances				
33	4	Uses 3-phase supply; requires two overhead wires; better efficiency				
34	4	Combination of AC & DC systems; AC supply converted to DC for motors				
35	4	Robust construction, High torque capacity, Good ventilation, Shock resistance				
36	4	High overload capacity, Efficient cooling, Simple control, Reliable insulation				
37	4	Devices to collect current from overhead line; Pantograph, Bow collector, Trolley collector				
38	4	High starting torque, Suitable for traction, Speed varies with load				
39		Rugged, Low maintenance, High efficiency, Used in modern electric locomotives				
40	4	Reversing motor connections to produce braking torque Kinetic energy converted into heat in resistors				
		Kinetic energy converted into electrical energy and fed back to supply system				

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41	5	Long distance service, High speed, Few stops				
42	5	Short distance, Frequent stops, Moderate speed				
43	5	Medium distance, More stops than main line, Used between city and suburbs				
44	5	Long free running period, High maximum speed, Few stops				
45	5	Moderate free running, More acceleration and braking				
46	5	Short distance, Frequent stops, No free running period				
47	5	Graph between speed and distance; shows acceleration, constant speed and braking zones				
48	5	Maximum speed attained during run				
49	5	Total distance divided by actual running time				
50	5	Total distance divided by total time including stops				
51	5	Total time taken including stopping time				
52		Distance between stops, Acceleration, Braking, Track condition, Gradient				
53		Represents acceleration, constant speed and braking in trapezoidal shape				
54		Includes acceleration, free running, coasting and braking periods				
55		Pulling force exerted by locomotive to move train				

*Dr. K. S. Reddy*

56		Energy consumed per ton-km						
57		Weight of locomotive without load						
58		Equivalent weight including rotating parts						
60		Weight available for traction between wheel and rail						
61		Ratio of adhesive force to normal force						
62		Energy saving, Reduced wear, Improved efficiency						
63		High initial cost, Complex control system, Requires compatible supply system						

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Signature of Lecturer  
Signature of HOD