LESSON PLAN FOR

PE 2101: MODLLEING OF ELECTRICAL MACHINES

ELECTIVE FOR M.E III SEMESTER POWER ELECTRONICS AND DRIVES SPECIALIZATION

INSTRUCTOR: M. ARUN NOYAL DOSS, ASSOCIATE PROFESSOR

S.NO	UNIT NO.	TOPIC TITLE	NO. OF HOURS	REFERENCE
1	**1**	**UNIT TITLE: REFERENCE FRAME THEORY**	9	1+instructor's notes
1.1		**Theory of transformation**	1	3
1.2		**Transformation matrix (phase transformation): sign conventions, concept of a phasor, commonly used transformations**	2	3
1.3		**Invariance of power, conditions for, proof, power variant transformation**	1	3
1.4		**Static and rotating reference frames, arbitrary reference frame (ARF)**	1	3
1.5		**Voltage, flux linkage and torque equations in ARF**	2	3
1.6		**Balanced steady-state voltage and toque equations**	2	3
2	**2**	**UNIT TITLE: MODELLING OF D.C MACHINES**	9	3
2.1		**Introduction + separately excited DC machines: Speed-torque characteristics, voltage equations, torque equation + computer simulation**	3	3
2.2		**Introduction + series excited DC machines: Speed-torque characteristics**	2	3
2.3		**Introduction + shunt excited DC machines: Speed-torque characteristics, voltage equations, torque equation + computer simulation**	3	3
2.4		**Introduction + compound DC machines: Speed-torque characteristics**	1	3

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S.NO	UNIT NO.	TOPIC TITLE	NO. OF HOURS	REFERENCE
3	**3**	**UNIT TITLE: MODELLING OF POLYPHASE INDUCTION MACHINES**	9	1+instructor's notes
3.1		**Introduction + equivalent circuit**	1	3
3.2		**Complete speed-torque characteristics: transient and steady-state.**	2	3
3.3		**Voltage, flux linkage and torque equations in static and rotating reference frames (ARF)**	3	3
3.4		**Analysis of steady-state and dynamic operations: dynamics during starting and braking, accelerating time through computer simulation**	3	3
4	**4**	**UNIT TITLE: MODELLING OF SYNCHRONOUS MACHINES**	9	1+instructor's notes
4.1		**Introduction + voltage equations**	1	3
4.2		**Flux linkage and torque equations in static and rotating reference frames (ARF)**	2	3
4.3		**Equivalent circuit, phasor equations, phasor diagrams**	2	3
4.4		**Power-angle characteristics, machine reactances and time constants**	1	3
4.5		**Analysis of steady-state and dynamic operations: dynamics under balanced and unbalanced fault conditions**	3	3
5	**5**	**UNIT TITLE: SINGLE-PHASE MACHINES AND AC COMMUTATOR MACHINES**	9	3
5.1		**Introduction to single-phase induction motors and revolving field theory**	1	3
5.2		**Equivalent circuit and cross-field theory**	2	3
5.3		**Starting methods and maximum starting torque conditions**	1	3
5.4		**Introduction to AC commutator machines and generalized theory of electrical machines**	1	3
5.5		**Modeling of AC series motor**	1	3
5.6		**Analysis of repulsion motor**	1	3
5.7		**Analysis of Schrage motor**	2	3

REFERENCE

1. **P.C. KRAUSE, O. WASYNCZUK, S.D. SUDHOFF, *ANALYSIS OF ELECTRIC MACHINERY AND DRIVE SYSTEMS*, IEEE PRESS, SECOND EDITION, 2002.**

2. **R. KRISHNAN, *ELECTRIC MOTOR DRIVES, MODELING, ANALYSIS AND CONTROL*, PRENTICE-HALL OF INDIA, 2002.**

3. **P.S. BHIMBRA, *GENERALIZED THEORY OF ELECTRICAL MACHINES*, KHANNA PUBLISHERS, 1995.**