MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department :	**Instrumentation & Control Engineering**			
Course Name & code :	**Control System Components**		**ICE 3151**	
Semester & branch :	**V**	**E & I**		
Name of the faculty :	**K Ramakrishna Kini & C. R. Srinvasan**			
No of contact hours/week:	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

LESSON PLAN

L No	TOPICS	Course Outcome Addressed
1	Electric motors – A revisit of different motors (AC and DC motors)	CO1
2	Servo motors – Basics	CO1
3	Types and working of motors, characteristics	CO1
4	Electronic drive circuits and applications	CO1
5	Tachogenerators – Principle of operation	CO1
6	Synchros – Theory of operation and Construction	CO1
7	Synhcro as error detector and Differential generators	CO1
8	Residual Voltage & Phase Shift, Zeroing of Synchros	CO1
9	Stepper motor: single and multi-stack	CO1
10	Permanent magnet and Hybrid stepper motor	CO1
11	Drive circuits and high-speed operations.	CO1
12	Actuator systems – Flapper Nozzle and I/P converters	CO2
13	Issues in Control Valves, Valve positioner, Valve Selection, Cavitation and Flashing	CO2
14	Valve shapes and slection guide	CO2
15	Pneumatic & hydraulic actuated valves, Quick exhaust valve	CO2
16	Time delay valve, Shuttle valve, Twin pressure valve, Solenoid operated valve	CO2
17	Introduction to control valve sizing	CO2
18	Definition of Cv, Equations for Calculation of Cv, Pressure Drop Calculation.	CO2
19	Electro-pneumatic systems: Spring Diaphragm Actuator	CO3
20	Rotary Valve Actuator. Pneumatic Hydraulic Actuator	CO3
21	Rotary Pneumatic: Force Balance and Motion Balance Positioners	CO3
22	Pneumatic Relays and Piston Actuators	CO3
23	Gears: Classification and Different types	CO3
24	Backlash in Gear, Speed-Torque, Teeth Ratio, Gear Train Design	CO3
25	Cams and Followers -Definitions and Types of Cams	CO3
26	Applications of Cams and Followers	CO3
27	Principle of operation of fluid control devices and fluidic logic gate	CO4
28	Relays and actuators	CO4
29	Principle of operation of pneumatic control devices and pneumatic gates	CO4
30	Pump Controlled & Valve Controlled Hydraulic Systems and its application	CO4
31	Gear Pump, Vane Pump, Ball Pump, Spool Type Pilot Valve	CO4
32	Centrifugal Pump and Displacement Pump	CO4
33	Special machines: Variable Reluctance motors: applications	CO5
34	Linear induction motors, Applications	CO5
35	Gyroscopes: Theory and operation of gyroscopes	CO5
36	Ring laser gyrocopes and Gyroscope applications	CO5