

4217 – MACHINE TECHNOLOGY									
Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)				
Lectures	Practical	Credits			Theory		Practical Ex.	Total	
3	2	5	25	25	3Hrs.	100	-		150
Pre-requisite		Source	Semester	Theory	Test	Total	TW	PR	Gr Total
2001		INC		75	25	100	25	-	125

Rationale: This course of machine technology aims to absorb basic knowledge about a machine. It also explores the various mechanisms of the machines and their modes of transmission. The course also provides brief know-how of the working principles. Construction accessories and applications of these machines used in the field by an Instrumentation Engineer.

COURSE CONTENTS		Hrs	Mks
1. BASIC CONCEPT OF A MACHINE		8	18
Definition of machine, Kinematic Link, Kinematic Pairs, Kinematic Chain, Mechanism Slider Crank Mechanism, First Inversion, Second Inversion, Whitworth's Quick Return Mechanism, Fourth Inversion, Double Slider Crank Mechanism, First Inversion, Second Inversion, Oldham's coupling.			
2. MECHANICAL AMPLIFIERS AND TRANSMISSION		10	25
Levers, Definition of lever, Law of Lever, Simple and Compound levers, Lever type Systems - The Analytical Balance, Platform Scale, Huggenberger Extensometer. Belt Drive, Flat belt, Effects of thickness and slip on belts, Length calculations for Open and Cross belt drive, Power transmitted by belt drive, Law of belting, Chain drive, Power transmitted by chain drive. Gear Drive, Classification of gears, Terminology used in gears (Mention), Law of gearing, Worm and Worm gear, Gear Trains: (without problems): Simple gear train, Compound gear train, Epicycle gear train. Couplings, Fixed coupling, Flexible coupling.			
3. STEAM GENERATOR		8	17
Classification of boilers, Distinguish between Fire tube and Water tube boilers, Lancashire Boiler, Babcock Wilcox Boiler, Boiler Mountings – Water Level Indicator, Pressure gauge, Stop Valve, Feed check valve, Fusible plug, Safety valves. Boiler Accessories – Economiser, Super-heater, Air – preheaters, Injectors, Fans.			
4. HEAT EXCHANGERS		6	10
Condenser as a Heat Exchanger, Need of a Condenser: 1. Jet Condenser:- Low level, Ejector; 2. Surface Condenser:- Two pass, Modern, Evaporative.			
5. STEAM TURBINES		4	8
Principles of a turbine, De Laval Nozzle, Simple Impulse turbine, Pressure Compounded turbine, Velocity compounded turbine, Pressures – Velocity Compounded turbine			
6. AIR COMPRESSORS		6	12
Reciprocating Air Compressor, Mechanical details:- Reed type valve, Plate type valve and Combined valve. Rotary Compressors:- Roots Blower, Vane type, Centrifugal Compressor.			
7. PUMPS		6	10
Types of pumps: - Centrifugal pump, Rotary pump, Reciprocating pump, Water ring vacuum pump (Treatment in brief only, in respect to – Principle of Operation, Construction, Trouble shooting); Air and Vacuum Chambers.			
Total		48	100

PRACTICALS:

Minimum of eight to be performed

1. To study the various inversions of the Slider Crank Mechanism.
2. To study the various inversion of the Double Slider Crank Mechanism.
3. To verify the quick return in case of Whitworth's Quick Return Mechanism.
4. To study various cycles in case of Lancashire boiler using a model.
5. To study various cycles in case of Babcock Wilcox Boiler using a model.
6. To observe the performance characteristics of a Compressor.
7. To study the various types of Couplings, with the help of the working models.
8. To study any one type of Surface condenser.
9. To study pump characteristic curves for a centrifugal pump.

REFERENCE BOOKS:

1. Theory of Machines by P.L. Ballaney
2. Thermal Engineering by P. L. Ballaney
3. Pumps by Perry O. Black

