

**COURSE STRUCTURE & SYLLABUS FOR
MINOR IN MECHANICAL ENGINEERING
(offered by Mechanical Engineering Department)**

FIFTH SEMESTER (Minor Course)

Sl. No.	Course No.	Name of the Course	L	T	P	CH
THEORY						
1.	MCM15101	Manufacturing Technology	3	1	0	7
PRACTICAL & OTHERS						
2.	MCM15201	Manufacturing Technology	0	0	3/2	1.5
Total Credit Hours			3	1	1.5	8.5
Total Contact Hours = 5.5						

SIXTH SEMESTER (Minor)

Sl. No.	Course No.	Name of the Course	L	T	P	CH
THEORY						
1.	MCM16101	Mechanical Engineering Design	3	3	0	9
Total Credit Hours			3	3	0	9
Total Contact Hours = 6						

SEVENTH SEMESTER (Minor)

Sl. No.	Course No.	Name of the Course	L	T	P	CH
THEORY						
1.	MCM17101	Hydraulic Machines	3	1	0	7
PRACTICAL & OTHERS						
2.	MCM 17201	Hydraulic Machines	0	0	3/2	1.5
Total Credit Hours			3	1	1.5	8.5
Total Contact Hours = 5.5						

EIGHTH SEMESTER (Minor)

Sl. No.	Course No.	Name of the Course	L	T	P	CH
THEORY						
1.	MCM18101	Heat Engine	3	1	0	7
PRACTICAL & OTHERS						
2.	MCM 18201	Heat Engine	0	0	3/2	1.5
Total Credit Hours			3	1	1.5	8.5
Total Contact Hours = 5.5						

Detailed Syllabus

FIFTH SEMESTER

THEORY
MCM 15101 MANUFACTURING TECHNOLOGY (3-1-0)
Introduction of manufacturing processes, Metal Forming Processes: Elastic & plastic deformation, yield criteria, hot working vs. cold working, bulk deformation processes, Sheet Metal working processes, Die & punch assembly, Lubrication, defects in metal forming processes. Casting process: Basic principle & survey of casting processes, patterns, moulding sand, gating system, Solidification of casting, casting defects, melting practices. Metal Cutting: Introduction, Cutting tool, Mechanics of chip formation, Cutting fluids/lubricants, Tool materials, Tool wear mechanism, tool life, Machinability, Machine tools. Welding processes – Introduction and classification of welding processes, application and welding defects. References: <ol style="list-style-type: none">1. Materials and Processes in Manufacturing, Degarmo, J. T. Black, Prentice Hall of India Pvt Ltd.2. Manufacturing Processes for Engineering Materials, Kalpakjian and Schmid, Prentice Hall.3. Fundamentals of modern manufacturing processes, M. P. Groover.
PRACTICAL
MCM 15201 MANUFACTURING TECHNOLOGY (0-0-3/2)
<ol style="list-style-type: none">1. Study of the machine tools like Milling Machine, Gear Hobbing Machine, Gear Shaper, Tool & Cutter Grinder2. Gear manufacturing on gear hobbing/gear shaping machine tool.3. Sand preparation and testing: specimen preparation for testing permeability, clay content, grain fineness number, moisture content, green compression strength, green shear strength, splitting strength, hardness, etc.;4. Casting of metals after preparation of suitable moulds; Experiments on properties of post casting, fettling, cleaning, deburring, and polishing operations;5. Experiments on different welding process.6. Inspection of welded joints as per BIS.

SIXTH SEMESTER

THEORY
MCM 16101 Mechanical Engineering Design (3-3-0)
Introduction to Engineering Design: Philosophy of engineering Design, mechanical engineering design, design process, design considerations. Selection of Materials: classification, mechanical properties and application of Ferrous, Non -Ferrous metals and their alloys, Non-Metallic materials. Static failure theories for ductile Materials: The Von Mises theory, maximum shear stress theory, maximum normal stress theory Introduction of fatigue failure: Endurance limit, S-N Curve, Goodman, Gerber

Soderberg diagram

Joints: Classification, uses of different type of permanent and detachable joints, design procedures for Riveted, Welded joint

Shaft Design: Design for steady, combined and fluctuating loads,

Design of Power Screws: Design and Selection of different components of Power Screw

References:

1. Mechanical Engineering Design, J. E. Shigley, Mischkee & R. Charles.
2. Machine Design, Robert L. Norton
3. Design of Machine Elements, M. F. Spotts & T. E. Shamp..

SEVENTH SEMESTER

THEORY

MCM 17101 Hydraulic Machine (Theory) (3-1-0) (CR-7)

Introduction to Hydraulic machines, Classification and field of application of Hydraulic machines, Impacts of Jet and Jet Propulsion,

Introduction and classification of hydropower plant, Hydro Turbines- classification, heads and efficiencies -Pelton wheels-velocity triangles and work done, -Radial flow reaction turbines-main parts, inward and outward radial flow, Francis turbine, -Axial flow reaction turbine, Kaplan turbine, -Governing of water turbines, selection of hydraulic turbine

Dimensional and Model Analysis of Hydraulic Machines

Centrifugal Pumps- main parts, work done, -Heads and efficiencies, minimum starting speed, multistage, priming, specific speeds, characteristic curves, selection of centrifugal pumps

Reciprocating Pumps- types, main parts, working, discharge work done power required, single acting and double acting, slip -Effects of acceleration on piston, -Effects of friction in pipes, -indicator diagrams

Hydraulic Coupling, torque converter

References:

1. Fluid Mech. And Hydraulic Machines – R K Basnal
2. Hyd. & Fluid Mech. – J. Lal
3. Fluid Mech. And Fluid Power Engg. – D.S.Kumar
4. Fluid Mech. – Streeter & Wilie
5. Fluid Mech – Som and Biswas

PRACTICAL

MCM 17201 Hydraulic Machine (Practical) (0-0-3/2) (CR-1.5)

1. Study on components of Hydropower Plant
2. Study on impact of jets on different blades
3. Performance test on Pelton turbine
4. Performance test on Francis turbine
5. Performance test on Kaplan turbine
6. Study of construction and working of different types of pumps
7. Performance test on centrifugal pump

EIGHTH SEMESTER

THEORY		
MCM18201	Heat Engines	3-1-0
<p>Introduction to Heat Engines, Internal and External Combustion Engines.</p> <p>Introduction to I C Engines, Classification and nomenclature of I C Engines, 2-S and 4-S Engines, CI and SI Engines, Air Standard Thermodynamic cycles like, Otto, Diesel and Dual cycle</p> <p>Introduction to conventional and non-conventional fuels used in engines, rating of fuel.</p> <p>Fuel Injection systems in CI and SI Engines, Classification of fuel injection systems, Fuel pump and Fuel injector, MPFI systems.</p> <p>Ignition systems in SI Engines, Battery and Magneto ignition systems.</p> <p>Requirements of lubrication, different types of lubrication systems. Wet sump lubrication system.</p> <p>Requirement of cooling systems, different types of cooling systems.</p> <p>Introduction to Turbo-charging in I C Engines.</p> <p>Introduction to Exhaust Gas Emission in I C Engines.</p> <p>Introduction to Steam power systems, Classification of boilers, fire and water tube boilers, boiler mountings and accessories, boiler efficiency.</p> <p>Steam properties, wet and saturated steam, dryness fraction and Steam Table.</p> <p>Basic Steam Power cycle, Rankine cycle, Modified Rankine cycle.</p> <p>Steam Turbines, Classification of steam Turbines, Impulse and Reaction Turbine, compounding of steam turbines,</p> <p>Introduction to Gas Turbines, Classification of Gas Turbines, Air compressors, Brayton cycles, Open and closed cycle gas turbines.</p> <p>References:</p> <ol style="list-style-type: none">1. V.Ganeshan, Internal Combustion Engines, Tata McGraw- Hill Publishing Company Ltd., New Delhi, Second Edition,2004.2. C.P.Kothandaraman and S.Domkundwar, A Course in Thermal Engineering, Dhanpat Rai & Co., New Delhi, 2011.3. P.K.Nag, <i>Power Plant Engineering</i>, Tata McGraw Hill, 2000.		
PRACTICAL		
MCM18201 Heat Engines (Practical)		0-0-3/2
<ol style="list-style-type: none">1. Performance Test on 4-S, Single cylinder Petrol Engine2. Performance Test on 4-S Single cylinder Diesel Engine3. Performance Test on 4-S Multi cylinder petrol Engine4. Performance Test on 2-S Single Cylinder Petrol Engine5. Performance Test on Steam turbine		