JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)

Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)

Scheme of Study and Examination   (w.e.f. July 2010)

BE (PTDC)   **Sem : Third**   **Branch : Mechanical Engineering**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
ME-13	Manufacturing Science - I	3	1	-	10	20	30	70	100	4
ME-10	Fluid Mechanics	3	1	-	10	20	30	70	100	4
ME-23	Internal Combustion Engines	3	1	-	10	20	30	70	100	4
ME-25	Energy Conversion Systems	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
ME-11L	Fluid Mechanics Lab	-	-	2	20	-	20	30	50	2
ME-18L	Solid Modelling Lab	-	-	2	20	-	20	30	50	2
ME-24L	Internal Combustion Engines Lab	-	-	2	20	-	20	30	50	2
ME-57L	Professional Activity - II	-	-	2	20	-	20	30	50	2
	Total	**12**	**4**	**8**	**150**	**80**	**230**	**370**	**600**	**24**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total
Marks 600 Total Periods : 24, Total Credits : 24

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	MANUFACTURING SCIENCE	ME13	Min "D"	Min "D"	5.0

Manufacturing Science

Unit-I Metrology: Standards of Measurements, Linear and angular instruments; slip gauges, sine bar, angle gauges, screw thread measurements, limit gauges, limits fits and tolerances, introduction to surface roughness measurement, comparators and coordinate measuring machine;

Unit-II Rolling General description of machines and process; rolling of structural sections plates and sheets; construction of hulls; hot and cold rolling techniques,

Unit-III Pattern Making: Pattern and pattern making, pattern allowances; pattern design considerations, core, core boxes, types of patterns.

Molding and Foundry: core sands and their properties, gating, runners, risers, solidification, defects and elimination, molding machines, centrifugal casting, dye casting, shell molding; Lost wax molding; continuous casting; cupola description and operation.

Unit-IV Forging: Theory and application of forging processes description; principle of toleration of drop and horizontal forging machines; General principle of designs.

Press working: Description and operation of processes, process of shearing, punching, piercing, blanking, trimming, perfecting, notching, lancing, embossing, coining, bending, forging and drawing; press, tool dies, auxiliary equipment, safety devices, stock feeders, scrap cutters. forces, pressure and power requirements, requirements of stock material.

Unit-V Welding: Gas welding method, flames, gas cutting, Electric arc welding, AC and DC welding machines and their characteristics/flux, electrodes, submerged arc welding, TIG & MIG welding; pressure welding; electric resistance welding spot, seam and butt welding; Thermit chemical welding; brazing and soldering, introduction to spinning.

Reference Books:

1. Anderson and Tetro; Shop Theory; TMH
2. Kaushish JP; Manufacturing Processes; PHI
3. Bawa; Manufacturing Processes; TMH
4. Rao PN; Manufacturing Tech- Vol 1 and 2; TMH
5. Schey JA; Introduction to manufacturing processes; McGraw Hill
6. Chapman; Workshop Technology:
7. Begeman; Manufacturing Process: John Wiley
8. Raghuvanshi; Workshop Technology:; DhanpatRai.
9. Ravi B; Metal Casting- CAD analysis; PHI.
10. Hajra Choudhary; Workshop Technology:, Vol I
11. Pandya & Singh; Production Engineering Science:
12. PC. Sharma: Production Technology, S.chand and co. New Delhi.

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	FLUID MECHANICS	ME10	Min "D"	Min "D"	5.0

FLUID MECHANICS

Unit-I : <u>Review of Fluid Properties</u>: Engineering units of measurement, mass, density, specific weight, volume- and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. <u>Fluid Static's</u> : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and Tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit-II : <u>Kinematics of Flow</u> : Types of flow-ideal & real , steady & unsteady, uniform & non uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets their utility

Unit-III <u>Dynamics of Flow</u>: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. **<u>Fluid Measurements</u>:** Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-meter, weirs and notches).

Unit-IV <u>Dimensional Analysis and Dynamic Similitude</u>: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.)

Unit-V <u>Laminar Flow</u>: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates

References: -

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Streeter VL, Wylie EB, Bedford KW; Fluid Mechanics; TMH
3. Som and Biswas; Fluid Mechnics and machinery; TMH
4. Cengal; Fluid Mechanics; TMH
5. White ; Fluid Mechanics ; TMH
6. Gupta; Fluid Mechanics; Pearson
7. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt.-(ANSTI)
8. R Mohanty; Fluid Mechanics; PHI

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	INTERNAL COMBUSTION ENGINES	ME23	Min "D"	Min "D"	5.0

INTERNAL COMBUSTION ENGINES

Unit-I : Internal Combustion Engine : S.I. and C.I. engines of two and four stroke cycles, real cycle analysis of SI and CI engines, determination of engine dimensions, speed, fuel consumption, output, mean effective pressure, efficiency, factors effecting volumetric efficiency, heat balance, performance characteristics of SI and CI engines, cylinder arrangement, firing order, power balance for multi-cylinder engines, value timing.

Unit – II : Combustion in SI engines : Flame development and propagation, ignition lag, effect of air density, temperature, engine speed, turbulence and ignition timings, physical and chemical aspects of detonation, effect of engine and fuel variables on knocking tendency. Knock rating of volatile fuels, octance number, H.U.C.R, action of dopes, pre-ignition, its causes and remedy, salient features of various type combustion chambers, valve timing and firing order.

Unit – III : Combustion in C.I. Engines : Times base indicator diagrams and their study, various stages of combustion, delay period, diesel knock, cetane number, knock inhibitors, sailent features of various types of combustion chambers, fuel ignition, cooling, exhaust and lubrication systems, simple problems on fuel injection.

Unit – IV: (a) I.C. Engine System : Ignition systems, cooling, exhaust/scavenging and lubrication system. Fuel metering in SI Engine : Fuel injection in SI engine (MPFI & TBI) Theory of carburetion, simple problems on carburetion. Fuel metering in CI engines : Fuel injection in CI engine and simple problems.

(b) Various types of engines, their classification and salient features, rotary I.C. engines their principles and working.

Unit –V : Supercharging : Effect of altitude on mixture strength and output of S.I. engines, low and high pressure super charging. Exhaust, gas turbo-charging, supercharging of two stroke engines.

(b) Fuels : Conventional fuels and alternate fuels, engine exhaust emission, carbon monoxide, un-burnt hydro carbon, oxides of nitrogen, smoke, density, measurement and control hydrogen as alternate fuel.

References :

1. Ganeshan v. Internal Combustion Engines TMH
2. Mathur M.L. & Sharma R.P. A course in IC Engines, Dhanpat Rai Pub.
3. Gupta H.N. Fundamentals of I.C. Engines PHI
4. Srinivasan S, Automotive Engines, TMH
5. Halderman JD and Mitchell CD, Automotive Engines Theory and Servicing, Pearson
6. Domkundwar, Internal Combustion Engines, Dhanpat Rai Pub.
7. Taylor GF, Internal Combustion Engines Theory & Practice MIT Press
8. Richard Stone, Introduction to IC Engines, Society of Automotive Engr (Palgrave Mc Millan)

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**ENERGY CONVERSION SYSTEMS**	ME25	Min "D"	Min "D"	5.0

Unit – I : Steam Generators : Classification, conventional boilers, high-pressure boilers-lamont benson, loeffler and velox steam generators, performance and rating of boilers, equivalent evaporation, boiler efficiency, heat balance sheet, Draught : Definition and classification Natural draught. Chimney height efficiency of chimney Artificial drought forced induced balanced draught. Combustion in boilers, minimum or theoretical air required for combustion mass of actual air and excess air supplied per unit mass of fuel.

Unit –II : Phase change Cycles : Vapor camot cycle and its limitation, Rankin cycle, effect of boiler and condenser pressure and superheat on end moisture and efficiency of cycle, modified Rankine cycle, reheat cycle, ideal and actual regenerative cycle with single and multiple feed water open and closed type of feed water heaters, regenerative-reheat cycle binary-vapor cycle, work done and effifiency calculations.

Unit – III : Gas Dynamics : Speed of sound, in a fluid mach number, mach cone, stagnation properties, one dimensional isentropic flow of ideal gases through variable area duct, (Mach) number variation, area ratio as a function of Mach number, mass flow rate and critical pressure ratio, effect of friction, velocity coefficient, coefficient of discharge, diffusers, introduction to normal shock.

Unit – IV : Reciprocating Air Cimpressor : working, work input for single stage compression different compression processes, effect of clearance, volumetric efficiency real indicator diagram, isentropic & isothermal and mechanical efficiency, multi stage compression, intercooling, condition for minimum work done.

Unit – V : (a) Steam Nozzles : Isentropic flow of vapours, flow of steam through nozzles, condition for maximum discharge, effect of friction, super-saturated flow.

(b) Steam Condensers : Cooling towers : introduction, types of condensers, back pressure and its effect on plant performance air leakage and its effect on performance of condensers, various types of cooling towers.

References :
1. Gordon J. Van Wyien : Thermodynamics
2. T.D. Eastop & A Mc Conkey :
3. D.S. Kumar – Thermal Science & Engg.
4. Dr. R. Yadav Engineering Thermodynamics Vol – I & II
5. P.L, Ballaney Thermal Engineering
6. Yahya S.M. Fundamentals of Compressible flow, New Age
7. Rajput R. K.Thermal Engg.

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	FLUID MECHANICS LAB	ME11L	Min "D"	Min "D"	5.0

List of Experiment (Expandable) :

1. To determine the local point velocity with the help of pitot tube.

2. To find out the terminal velocity of a spherical body in water.

3. Calibration of Orifice meter and Venturi meter

4. Determination of C_c, C_v, C_d of Orifices

5. Calibration of Nozzle meter and Mouth Piece

6. Reynolds experiment for demonstration of stream lines & turbulent flow

7. Determination of meta-centric height

8. Determination of Friction Factor of a pipe

9. To study the characteristics of a centrifugal pump.

10. Verification of Impulse momentum principle.

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	SOLID MODELLING LAB	ME18L	Min "D"	Min "D"	5.0

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	INTERNAL COMBUSTION ENGINES LAB	ME24L	Min "D"	Min "D"	5.0

Suggested List of Experiments

1. Determination of Valve timing diagram

2. Load test on Petrol Engine

3. Heat Balance of SI engine

4. Heat Balance of CI Engine

5. Study of Battery ignition System and Electronic ignition System

6. Study of Diesel fuel pump

7. Study of Diesel fuel injectors

8. Study of Carburetors

9. Study of Fuel Injection system in SI Engine

10. Study of Lubricating system in CI Engine

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**PROFESSIONAL ACTIVITY - II**	ME57L	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY- II
(Suggested Exercise)

- Student shall visit a nearby Industry and shall prepare a technical report suggesting some improvement in operation.
- Student shall Design and fabricate a new laboratory equipment. He shall prepare a design report.
- Student shall improve an existing lab equipment and prepare chart or lab manual .
- Student shall publish a review paper in some Indian Journal.
- Student shall make a report on an Industry employing latest technology/ Innovation.
- Student shall prepare a working model of a machine part.
- Student shall make a software/ comp. program for the Institute to enhance efficiency in its working.
- Student shall prepare a detailed project report to start a small-medium enterprise.
- A group of student shall register with the Industry cell and submit a report on work done there about Institute-Industry linkage.
- Experimental work on a new set of equipments.
- Seminar Presentation with a report submitted to the supervisor.

Note : The list of activities can be modified as per requirements of the
      department.

    A hand written report of about 30 pages duly signed by the student and the concerned teacher should be submitted.

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)