List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : ***Mechanical Engineering***

Programme Name : ***B.Tech.***

Academic Year : 2020-21

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	ME03TPC01	Mechanics of Solid-I
02.	ME03TPC02	Kinematics of Machine
03.	ME03TES04	Engineering Thermodynamics
04.	ME04THS31	Business Communication and Presentation Skill
05.	ME04TPC03	Fluid Mechanics
06.	ME03TPC04	Dynamics of Machine
07.	ME04TPC05	Machine Drawing
08.	ME04TPC04	Manufacturing Science-I
09.	ME04PPC03	Fluid Mechanics Lab
10.	ME04PPC04	Dynamics of Machine Lab
11.	ME05TPC07	Fluid & Turbo Machinery
12.	ME05TPC08	Internal Combustion Engine
13	ME05TPC09	Machine Design – I
14.	ME05TPC10	Mechanics of Solid-II
15.	ME05TPE23	CAD/CAM
16.	ME05PPC05	Fluid Machinery lab
17.	ME05PPC06	Internal Combustion Engine Lab
18.	ME05PPE01	CAD / CAM Lab
19.	ME06TPC11	Heat and Mass Transfer
20.	ME06TPC12	Manufacturing Science-II
21.	ME06PPC07	Heat and Mass Transfer Lab
22.	ME06PSC01	Seminar
23.	ME06PPC08	Manufacturing Science Lab
24.	ME06TPE31	Measurement Metrology and Control
25.	ME06TOE21	Machine Design-II
26.	ME06TOE13	Operations Research
27	ME7TPC15	Power Plant Engineering

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28	ME7TPC16	Refrigeration & Air Conditioning
30	ME7TPC17	CAD-CAM
31	ME7LPC16	Refrigeration & Air Conditioning Lab
32	ME7LMP01	Minor Project
33	ME7LPS02	Seminar on Summer Training
34	ME8TPC18	Auto Mobile Engineering
35	ME8TPC19	Turbo Machinery
36	ME-5111	Theory of Vibration
37	MEP001	Machine Design Practical
38	ME-5104	Computer Aided Design
39	ME-5105	Mechatronics
40	MEPHDT01	Mechatronic System Design
41	MEPHDT02	Reliability and Maintenance Engineering
42	MEPHDT03	Composite Materials
43	MEPHDT04	Material Characterization Techniques
44	MEPHDT05	Advanced Machining Processes
45	MEPHDT06	Micro and Precision Manufacturing
46	MEPHDT07	Industrial Automation
47	MEPHDT08	Engineering Design Methodology
48	MEPHDT09	Finite Element Methods in Engineering
49	MEPHDT10	Fracture, Fatigue and Failure Analysis
50	MEPHDT11	Metal Forming and Theory Of Plasticity
51	MEPHDT12	Energy Conservation and Waste Heat Recovery
52	MEPHDT13	Advanced Thermodynamics

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Scheme and Syllabus

Department of Mechanical Engineering, School of Engineering & Technology, GGV, Bilaspur (C.G.)

INSTITUTE OF TECHNOLOGY, (SCHOOL OF ENGINEERING &TECHNOLOGY)
GURU GHASIDAS VISHWAVIDHALAYA, (A CENTRAL UNIVERSITY)
DEPARTMENT OF MECHANICAL ENGINEERING
CBCS-NEW, STUDY & EVALUATION SCHEME
W.E.F. SESSION 2019-2020

Year: B.Tech. 2ND year

SEMESTER- III

SN	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME03THS02	Elective from Humanity Science HS-02	3	0	-	30	70	100	3
2.	ME03TBS05	Statistical Methods	3	1	-	30	70	100	4
3.	ME03TPC01	Mechanics of Solid-I	3	1	-	30	70	100	4
4.	ME03TPC02	Kinematics of Machine	3	1	-	30	70	100	4
5.	ME03TES04	Engineering Thermodynamics	3	1	-	30	70	100	4
6.	ME03TPE01	Professional Electives-01	3	0	-	30	70	100	3
		Total	**18**	**4**	**-**	**180**	**420**	**600**	**22**
PRACTICALS									
1.	ME03PPC01	Kinematics of Machine Lab	-	-	2	30	20	50	1
2.	ME03PPC02	Mechanics of Solid-I Lab	-	-	2	30	20	50	1
Total			**0**	**0**	**4**	**60**	**40**	**100**	**2**

Total Credits: 24
Total Contact Hour: 26
Total Marks: 700
*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.
L-LECTURE,T-TUTORIAL,P-PRACTICAL, ESE –END SEMESTER EXAMINATION

ME03THS02 Electives from Humanity Science-02	**ME03TPE01 Professional Electives-01**
ME03THS21 Engineering Economics	ME03TPE11 Material Science & Metallurgy
ME03THS22 Work study and ergonomics	ME03TPE12 Powder Metallurgy
ME03THS23 Employee Relations	ME03TPE13 Material Management

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W.E.F. SESSION 2020-2021

Year: B.Tech. 3rdyear

SEMESTER- V

SN	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME05TPC07	**Fluid & Turbo Machinery**	3	0	-	30	70	100	3
2.	ME05TPC08	Internal Combustion Engine	3	0	-	30	70	100	3
3.	ME05TPC09	Machine Design – I	3	1	-	30	70	100	4
4.	ME05TPC10	Mechanics of Solid-II	3	1	-	30	70	100	4
5.	ME05TPE02	Professional Elective-02	3	0	-	30	70	100	3
		Total	**15**	**2**	**-**	**150**	**350**	**500**	**17**
PRACTICALS									
1.	ME05PPC05	Fluid Machinery lab	-	-	2	30	20	50	1
2.	ME05PPC06	Internal Combustion Engine Lab	-	-	2	30	20	50	1
3	ME05PPE01	CAD / CAM Lab			2	30	20	50	1
Total			**0**	**0**	**4**	**90**	**60**	**150**	**3**

Total Credits: 20
Total Contact Hour: 21
Total Marks: 650
*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.
L-LECTURE,T-TUTORIAL,P-PRACTICAL, ESE –END SEMESTER EXAMINATION

ME05TPE02 Professional Elective-02
ME05TPE21 Innovation and Technology Management
ME05TPE22 Innovation and Entrepreneurial Skills
ME05TPE23 **CAD/CAM**

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W.E.F. SESSION 2020-2021

Year: B.Tech. 3rd year

SEMESTER- VI

SN	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME06TPC11	Heat and Mass Transfer	3	1	-	30	70	100	4
2.	ME06TPC12	Manufacturing Science-II	3	0	-	30	70	100	3
3.	ME06TPE03	Professional Elective-03	3	0	-	30	70	100	3
4.	ME06TOE01	Open Elective-01	3	0	-	30	70	100	3
5.	ME06TOE02	Open Elective-02	3	1	-	30	70	100	4
6.	ME06TMC03	Essence of Traditional Knowledge	3	0	-	-	-	-	-
		Total	**18**	**2**	**-**	**150**	**350**	**500**	**17**
PRACTICALS									
1.	ME06PPC07	Heat and Mass Transfer Lab	-	-	3	30	20	50	1.5
2.	ME06PSC01	Seminar	-	-	2	50	-	50	1
3	ME06PPC08	Manufacturing Science Lab	-	-	3	30	20	50	1.5
Total			**0**	**0**	**6**	**110**	**40**	**150**	**4**

Total Credits: 21
Total Contact Hour: 26
Total Marks: 650
*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.
L-LECTURE,T-TUTORIAL,P-PRACTICAL, ESE –END SEMESTER EXAMINATION

ME06TPE03 Professional Elective-03	**ME06TOE01 Open Elective-01**
ME06TPE31 Measurement Metrology and Control	ME06TOE11 Enterprise Resource Planning
ME06TPE32 Industrial Automation	ME06TOE12 Decision Support and Executive Information System
ME06TPE33 Advanced Manufacturing System	**ME06TOE13 Operations Research**
ME06TOE02 Open Elective-02	
ME06TOE21 Machine Design-II	
ME06TOE22 Mechatronics	
ME06TOE23Robotics and Robot Applications	

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W.E.F. SESSION 2018-2019

Year: B.Tech. IV year

SEMESTER- VII

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME7TPC15	Power Plant Engineering	3	1	0	40	60	100	4
2.	ME7TPC16	Refrigeration & Air Conditioning	3	1	0	40	60	100	4
3.	ME7TPC17	CAD-CAM	3	1	0	40	60	100	4
4.	ME7TPE04	Professional Elective-PE04	3	0	0	40	60	100	3
5.	ME7TOE03	Open Elective-OE03	3	0	0	40	60	100	3
		Total	15	03	0	200	300	500	18
PRACTICALS									
1.	ME7LPC16	Refrigeration & Air Conditioning Lab	-	-	3	30	20	50	2
3.	ME7LMP01	Minor Project	-	-	4	50	-	50	2
4.	ME7LPS02	Seminar on Summer Training (About 30 Days)**	-	-	3	50	-	50	2
Total					10	130	20	150	6

** 30 days summer training after the end semester examination of VI semester and students are required to submit certificate, detailed training report &make presentation during the seventh semester.

Total Credits: 24, Total Contact Hour: 28, Total Marks: 650

*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, one Class Test of 10 marks. Assignment/Quizzes/Group Discussion etc. of 10 marks

L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

Professional Elective –PE4	**Open Elective-OE03**
ME7TPE04	**ME7TOE03**
ME7TPE41 Analysis and Synthesis of Mechanism	**ME7TOE31**Principle of Management
ME7TPE42 Gas Dynamics and Jet propulsion	**ME7TOE32** Optimization in Engineering Design
ME7TPE43 Theory of Vibration	**ME7TOE33** Microprocessors in Automation

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W.E.F. SESSION 2018-2019

Year: B.Tech. IV year

SEMESTER- VIII

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME8TPC18	Auto Mobile Engineering	3	0	0	40	60	100	3
2.	ME8TPC19	Turbo Machinery	3	1	0	40	60	100	4
3.	ME8TPE05	Professional Elective-PE05	3	0	0	40	60	100	3
4.	ME8TOE04	Open Elective-04	3	0	0	40	60	100	3
Total			12	1	0	160	240	400	13
PRACTICALS									
4.	ME8LMP02	Major Project	-	-	12	120	80	200	10
Total					12	120	80	200	10

Total Credits: 23, Total Contact Hour: 25, Total Marks: 600
INTERNAL ASSESSMENT- (MSE- Mid Semester Examination of 20 Marks, One Class Test of 10 marks, Assignment /Quizzes/Group Discussion etc. of 10 marks.
L-LECTURE, T-TUTORIAL, P-PRACTICAL, CT-CLASS TEST, E.S.E – END SEMESTER EXAMINATION

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Professional Elective –PE5	Open Elective –OE4
ME8TPE05	**ME8TOE04**
ME8TPE51 Total Quality Management	**ME8TOE41** Supply Chain Management
ME8TPE52 Cryogenic Engineering	**ME8TOE42** Operation Research
ME8TPE53 Robotics and Robot Applications	**ME8TOE43** Maintenance Management
ME8TPE54 Finite Element Analysis	**ME8TOE44** Intellectual Property Rights

Department of Mechanical Engineering, School of Engineering & Technology, GGV, Bilaspur (C.G.)

SCHEME OF STUDY AND SYLLABUS

M. Tech (Machine Design) 1st year

w.e.f. 2019-2020

Semester: -I

S. No.	Course Code	SUBJECT	CONTACT HOURS /WEEK	EVALUATION SCHEME			Credits
(THEORY)				INTERNAL ASSESSMENT	ESE	SUB TOTAL	
1.	ME-5101	Advanced Engineering Mathematics	3	40	60	100	3
2.	ME-5110	Advance Mechanics of Solid	3	40	60	100	3
3.	ME-5111	Theory of Vibration	3	40	60	100	3
4.	ME-	Elective-I	3	40	60	100	3
5.	ME-	Elective-II	3	40	60	100	3
		Total	**15**	**200**	**300**	**500**	**15**
(PRACTICALS)							
6.	**MEP001**	Machine Design Practical	3	30	20	50	2
		Total	**18**	**230**	**320**	**550**	**17**

Total credit =17, Total Marks = 550, Contact Hours= 18

List of Electives approved for the semester for the Machine Design Specialization

1. ME-5102 Theory of Elasticity
2. ME-5103 Systems Dynamics
3. ME-5104 Computer Aided Design
4. ME-5105 Mechatronics
5. ME-5106 Advanced Mechanism Design
6. ME-5107 Experimental Mechanics and Non Destructive Testing
7. ME-5108 Engineering Design
8. ME-5109 Design of Pressure Vessels and Piping

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EVALUATION SCHEME OF Pre-Ph. D COURSE WORK

EFFECTIVE FROM SESSION 2018-19

SN.	Name of the Subject	Subject Code	Periods / Week L – T – P	ESE Duration	ESE MARKS		Credits
					Max.	Min. 50%	
1	Research Methodology in Engineering	ETPHDT00	3 – 1 – 0	3 Hrs.	100	50	4
2	Elective - I	**	3 – 1 – 0	3 Hrs.	100	50	4
3	Elective - II	**	3 – 1 – 0	3 Hrs	100	50	4
4	Seminar	ETPHDS00	-	-	-	-	-
Total			**9 – 3 – 0**	**-**	**300**	**-**	**12**

LIST OF ELECTIVES		**	LIST OF ELECTIVES		**
SN	Name of the Subject	Subject Code	SN	Name of the subject	Subject Code
1	Mechatronic System Design	MEPHDT01	8	Engineering Design Methodology	MEPHDT08
2	Reliability and Maintenance Engineering	MEPHDT02	9	Finite Element Methods in Engineering	MEPHDT09
3	Mechanics Of Composite Materials	MEPHDT03	10	Fracture, Fatigue and Failure Analysis	MEPHDT10
4	Material Characterization Techniques	MEPHDT04	11	Metal Forming and Theory Of Plasticity	MEPHDT11
5	Advanced Machining Processes	MEPHDT05	12	Energy Conservation and Waste Heat Recovery	MEPHDT12
6	Micro and Precision Manufacturing	MEPHDT06	13	Advanced Thermodynamics	MEPHDT13
7	Industrial Automation	MEPHDT07			

L: Lecture, T: Theory, P: Practical, ESE: End Semester Examination

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(ME03TPC01) MECHANICS OF SOLID-I

Course Objectives:

- To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
- To study engineering properties of materials, force-deformation and stress-strain relationship
- To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition in linear solids and structures
- To analyze; determinate and indeterminate axial members, torsional members and beams to determine axial forces, torque, shear forces, bending moments, slopes and deflection.
- To determine stress, strain, and deformation of bars, beams and springs.
- To be able to perform structural analysis by hand computations and design axial and torsion members.

Course outcomes:

- Apply knowledge of mechanics of deformable body for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts mechanics of solid in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

Unit-I

Introduction: State of stress and strain at a point: Engineering stress and strain, Two dimensional and one dimensional state of stress as a particular case of three dimensional stress system, Members under axial compression and tension, temperature stresses and strains in composite members, Principal stresses and Principal planes for Two dimensional stress system, Mohr's stress circle, Hooke's law and stress strain relation, Ductile and Brittle materials, Relationship between elastic constants.

Unit-II

Bending of beams: Shear force and bending moment diagram in beams and calculation of maximum BM and SF and the point of contra flexure,

Bending and shear stresses: Bending and shear stresses in different sections, composite beams, application of moments.

Unit-III

Slope and deflection of beams: Relationship between moment, slope and deflection, double integration method, area moment method, Macaulay's methods, Conjugate beam method, method of superposition and other methods.

Unit-IV

Torsion: Torsion of circular shaft: Derivation of torsion equation and its assumptions, solid and hollow circular shafts, torsional rigidity, combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion, torsion of thin hollow sections, analysis of closed coil helical spring.

Unit-V

Thin Cylinders and Spheres: Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.

Stability of Structure: Columns under uni-axial load, Buckling of Columns, Slenderness ratio and conditions. Derivations of Euler's formula for elastic buckling load, equivalent length. Rankine Gordon's empirical formula.

Text Books:

1. Mechanics of material by F.P. Beer & E.R. Johnson Jr. Tata McGraw Hill.
2. Engineering Mechanics of solids by Egor P. Popov., PHI
3. Introduction of solid mechanics by I. H. Shames.

Reference books;

1. An Introduction of mechanics of solid by Crandall, Dahl &Lardnee Tata McGraw Hill.
2. Advance Strength of Materials by L.S. Srinath
3. Strength of Materials by Timoshenko.
4. Strength of Materials by Sadhu Singh
5. A Textbook of Strength of Materials by R K Bansal.
6. A Textbook of Strength of Materials by R K Rajput.

(ME03TPC02)KINEMATICS OF MACHINES

Course Objectives:

- To impart knowledge on various types of Mechanisms
- To impart skills to analyse the position, velocity and acceleration of mechanisms
- To familiarize higher pairs like cams and gears
- To understand the concept of clutch & brakes

Course Outcomes:

- To present a problem oriented in depth knowledge of kinematics of machines.
- To understand the basic concepts and methods behind kinematics of machines.
- Student can find the applications of all the areas in day to day life.

Unit-I

Mechanism and Machines

Links, kinematics pair, classification of kinematics pair, kinematics chain, degree of freedom & constrained motion, mechanism, inversion problem of slider crank mechanism & its inversion, four bar chain etc. equivalent linkage, mechanism with lower pairs, pantograph.

Unit-II

Velocity and Acceleration in Mechanism

Plane motion, absolute and relative motion, velocity and acceleration of a point, velocity and acceleration of a mechanism by relative velocity diagram, coriolis components.

Unit-III

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Gear and Gear Train

Classification of gears, spur, helical, bevel, worm gears, spur gear, conjugate action, law of gearing, involutes and cycloidal tooth's profiles, interference and under cutting, contact ratio, gear train, simple, compound and epicyclical gear trains.

Unit-IV

Cams and Followers

Classification of cam and follower, types of follower motion, uniform, simple harmonic, parabolic, cycloid, Cam's profile by graphical method.

Unit – V

Clutch: single plate and multi plate clutch, cone clutch

Brakes: Analysis & simple brakes assuming uniform pressure and uniform wear, band brake, block brake, internal shoe brake.

Text books:

1. Mechanism of machines ByGhosh and Mallck East West Press
2. Theory of machine By S. Ratan TMGH
3. Theory of Machine ByThomosBeven, C.B.S. Publications

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(ME03TES04) ENGINEERING THERMODYNAMICS

Course Objectives:

- To provide a mature approach to the basic principle of classical thermodynamics and to apply it to system surroundings interactions involving work and heat transfer with associated property changes.
- To Use classical thermodynamics principles to develop algebraic relationships among key physical parameters and variable based on analysis of a specified system
- Use references that provide tabulated physical data that are useful to mechanical engineers.
- Familiarity with construction and performance parameters of Boilers

Course outcomes:

- Apply knowledge of classical thermodynamics for formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of thermal sciences in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering
- in particular.
  Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Skilfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.
- To continue the study of the applied thermodynamics.

Unit–I

First Law of Thermodynamics

First Law of thermodynamics, Closed system, work done, change in Internal energy, heat transferred during various thermodynamic processes, P-V diagrams. Open system, Thermodynamic analysis of control volume, Conservation of energy principle, the steady flow process applied to (i) Nozzles and Diffuser (ii) Turbines and Compressor, (iii) Throttle valve. Unsteady flow process (Simple system like Charging & Discharging of tanks)

Unit-II

Second Law of Thermodynamics

Second law of Thermodynamics, Introduction (Law of degradation of Energy) Thermal Energy reservoir, Kelvin-Plank &Clausius Statement, Heat engine, Refrigerator and Heat pump, Reversible and Irreversibleprocesses, Carnot cycle, Thermodynamic temperature scale. Entropy: The Clausius Inequality, Entropy, Principle of increaseof entropy, Change in entropy for Closed and steady flow open systems.Second law analysis of engineering system, availability, reversible work and irreversibility.

Unit–III

Vapour power cycles

Property of steam , P-V chart , T-S chart , H-S chart and application of these chart Carnot and Rankine cycles; Reheating and regenerative feed heating Rankinecycles;Binary vapour cycle; Thermal efficiency and work ratios; Factors affecting efficiency and work output. Condenser, classification, vacuum efficiency, cooling towers, types and application.

Department of Mechanical Engineering, School of Engineering & Technology, GGV, Bilaspur (C.G.)

Unit-IV

Thermodynamic (PVT) relations of Working Fluids Equation of state for ideal gas; Behaviour of real gasesand compressibility factor; Generalized, empirical and theoretical equations of statefor real gases; Law of corresponding states and use of generalized compressibility chart; Helmoltz and Gibbs functions; Maxwell's relations; Enthalpy, entropy, internal energy, and specific heat relations; Clausius-Clapeyron's equation; Applications to ideal and real gases Joule-thomson coefficient.

Unit-IV

Gas power Cycles

The Carnot cycle, Atkinson cycle, Ericsson cycle, Brayton Cycle, Air standard cycles- Otto cycle, Diesel Cycle and Dual cycle, comparison among cycles.

Text Books:

1. Nag, P.K.," Engineering Thermodynamics", Tata McGraw Hill, New Delhi
2. Thermal Engg. By C.P.Arora Tata McGraw –Hill, New Delhi
3. Engg.Thermodynamic& Approach, Cengel& Boles, TMH
4. Engg. Thermodynamic, John Hawkins
5. Reyner Joel; Engineering Thermodynamics, 5th Ed; Addison Wesley, 1999

Department of Mechanical Engineering, School of Engineering & Technology, GGV, Bilaspur (C.G.)

(ME03TPE11) MATERIAL SCIENCE & METALLURGY

Course Objectives:

- To understand various mechanical properties of materials.
- To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.
- To understand how and why the structure and composition of a material may be controlled by processing.
- To understand the inter-relationship between composition, structure and properties of engineering materials.
- Get knowledge about different materials, their properties and application.

Course outcomes:

- Acquire knowledge and hands-on competence in applying the concepts of material science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering .
- Identify, analysis, and solve mechanical engineering problems useful to the society.

Unit-I

Introduction: Classification of engineering Materials, metals, non-metals, plastics, ceramics and composites. Crystalline structure of solids: concepts of unit cell and space lattice, miller indices, crystal structure determination by X-ray diffraction. Crystal structure of ferrous and non-ferrous metals, crystal imperfections.

Plastic Deformation: Mechanisms of plastic deformation, role of dislocation, slip and twinning, slip mechanism, strain hardening.

Unit-II

Phase Diagrams, Phases, phase rules, concept of equilibrium, Phase diagram, lever rule, eutectic, eutectoid, peristaltic and peritectoid systems, iron–carbon diagram, and simplified IC diagram. Heat TreatmentIsothermalTransformationof austenite (TTT diagram), Transformations of austenite upon continuous cooling, annealing, normalizing, hardening, tempering, hardenability of steel, Surface hardening, tempering, case hardening, Jominy test forhardenability, recovery, recrystallization and grain growth, Age hardening.

Unit-III

Corrosion: Principles of corrosion forms of corrosion, factors affecting the rate of corrosion. Corrosive agents and protection against corrosion.

Creep: Introduction to creep mechanism, creep curves, creep resistant materials, introduction to fatigue, cold working of metals and hot working.

Department of Mechanical Engineering, School of Engineering & Technology, GGV, Bilaspur (C.G.)

Unit-IV

Engineering Materials:

Ferrous: Cast irons, carbon and alloy steels and their coding, Non-ferrous: Aluminum, copper, nickel, chromium, zinc, lead, tin, tungsten, etc. and their alloys. Classification, structure, general properties and applications of polymers, ceramics and composites.

Unit-V

Powder Metallurgy: Characteristics of metal powder, Particle size, shape and size distribution, Characteristics of powder mass such as apparent density, tap density, flow rate, friction conditions. Properties of green compacts and sintered compacts. Machining, milling, atomization, electro-deposition, reduction from oxide, carbonyl process, production of alloy powders, New development. Powder rolling, powder forging, powder extrusion and explosive forming technique.

Text Books

1. Raghavan, Material Science and Engineering.
2. Swamp, Elements of Metallurgy.
3. Vanvlack, Elements of Material Science and Engineering.
4. Aagarwal B.K., Introduction to engineering Materials.

COURSE TEMPLATE

1.	**Department/Centre proposing the course**	Mechanical Engineering
2.	**Course Title**	Fluid and Turbo Machinery
3.	**L-T-P structure**	3-1-0
4.	**Credits**	4
5.	**Course number**	**ME5TPC07**
6.	**Status** (*category* for *program*)	

7.	**Pre-requisites** (course no./title)	Thermodynamics, Fluid Mechanics
8.	**Status vis-à-vis other courses** *(give course number/title)*	
8.1	Overlap with any UG/PG course of the Dept./Centre	No
8.2	Overlap with any UG/PG course of other Dept./Centre	No
8.3	Supercedes any existing course	No

9		

10	**Frequency of offering**	Every sem☒ 1st sem☒ 2nd sem☒ Either sem☒
11	**Faculty who will teach the course**	
12	**Will the course require any visiting faculty?**	

13	**Course objective:** • The course aims at giving an overview of different types of fluid machines used for energy transformation, such as hydraulic and steam turbines, gas turbines, compressors, and pumps. • It focuses on applications in power generation, transport, refrigeration. • The main purpose of implementing this course in the curriculum is to learn about how the power is transferred in a turbomachine.

14	**Course contents:** **Unit-1** **Fundamentals:** Classification, Applications of turbomachines, Performance

	parameters, Specific speed, Basic laws and equations, Velocity triangles. **Unit-2** **Hydraulic turbines:** Specific applications, types, construction, working, and performance of various types of hydraulic turbines (Pelton, Francis, and Kaplan turbines), Cavitation in turbines, and water hammer effects, Draft tube: Types, applications, and performance analysis. **Unit -3** **Centrifugal pumps:** Theory, types, components, and working characteristics, Cavitation, NPSH,Priming, Axial flow pumps, Practical problems, and remedies. **Unit-4** **Thermal turbines:** Steam turbine basic cycles, impulse and reaction turbines, Multistage turbines,Governing systems, Effects of reheating and regeneration, Application of Mollier diagram, Gas turbine basic cycle, Application of intercooling, reheating and regeneration, Introduction to wind turbines, Power and efficiency calculations. **Unit-5** **Air compressors:** Radial and axial compressors, Construction and performance analysis, Surging and stalling, Slip.

15. Lecture Outline *(with topics and number oflectures)*

Module no.	Topic	No. of hours
1.	Introduction to turbomachinery, Basic principles, Classification, Impulse and Reaction type, Fundamental equations, Euler's equation, Introduction to hydro-electric power plants, major components, Surge tanks, etc.	05
2.	Hydraulic Turbines: Classification of Turbine, Impulse Turbine, Pelton wheel, Construction and working, Work done, Head efficiency and Design aspects, Governing of Impulse turbine.	06
3.	Radial flow reaction turbine, Francis turbine: Construction and working, Work done, efficiency, Design aspect, Advantages and disadvantages over Pelton wheel.	05
4.	Propeller and Kaplan turbine, Bulb or Tubular turbine, Draft tube, Specific speed, Unit quantities, Cavitation, Degree of reaction, Performance characteristics, Surge tanks, Governing of Reaction turbine.	05
5.	Classification of Pumps, Centrifugal Pump, Construction, Working, Work Done, Heads, Efficiencies, Multistage Centrifugal Pump, Pump in Series and Parallel, Specific Speed, Characteristic, Net Positive Suction Head, Cavitation.	06
6.	Steam Turbines:Classification, Single-stage impulse turbine, condition for maximum blade efficiency, stage efficiency, Need and methods of compounding, Multi-stage impulse turbine, Problems.Parson's turbine, condition for efficiency, reaction staging, Problems.	7
7.	Gas turbine: components, fuels, materials, Different cycle, analysis, Optimum pressure ratio for maximum specific output, the effect of modification on efficiency and output, Ideal and actual cycle.	05

COURSE TEMPLATE

1.	**Department/Centre proposing the course**	Mechanical Engineering
2.	**Course Title**	**INTERNAL COMBUSTION ENGINES**
3.	**L-T-P structure**	3-0-0
4.	**Credits**	3
5.	**Course number**	**ME5TPC08**
6.	**Status** (*category* for *program*)	CORE

7.	**Pre-requisites** (course no./title)	Thermodynamics
8.	**Status vis-à-vis other courses** *(give course number/title)*	
8.1	Overlap with any UG/PG course of the Dept./Centre	No
8.2	Overlap with any UG/PG course of other Dept./Centre	No
8.3	Supercedes any existing course	No

9		

10	**Frequency of offering**	Every sem☒ 1st sem☒ 2nd sem☒ Either sem☒
11	**Faculty who will teach the course**	
12	**Will the course require any visiting faculty?**	**No**

13	**Course objective:** • To familiarize with the terminology associated with IC engines. • To understand the basics of IC engines. • To understand combustion and various variables affecting it in various types of IC engines. • To learn about various devices used in IC engines and the type of IC engine required for various applications. **Course Outcome:** • At the end of this course, the students will be able to understand the working of an I. C. Engines (i.e. S. I. and C. I. engine) and their applications. • To understand the combustion process in I. C engines and different type's fuels, their stoichiometric compositions. • To understand and identify various systems (ignition, injection, and cooling and lubrication system) of an I.C. Engine.

	• To understand and analyze the performance characteristics of an I. C engine and their emissions from of I. C. engines.

14	**Course contents**

Unit 1

Introduction of internal combustion engines: Engine classification, Air standard cycles, Otto cycle, Diesel cycle, Dual cycle, Comparison of Otto, Diesel, and Dual cycles. Stirling cycle, Ericsson cycles, Two and four-stroke engines, SI and CI engines, Valve timing diagram, Fuel air cycle, factors affecting it, Actual cycle analysis, Actual Cycle.

Unit 2

SI Engines - Combustion in SI engine, Flame speed, Ignition delay, Abnormal combustion and it's control, Combustion chamber design for SI engines, Carburetion, Mixture requirements, Carburetor types, Theory of carburetor, MPFI, Ignition system requirements, Magneto and battery ignition systems, Ignition timing and sparkplug, Electronic ignition, Scavenging in 2 Stroke engines, Supercharging and its effect.

Unit 3

CI Engine - Combustion in CI engines, Ignition delay, Knock and it's control, Combustion chamber design of CI engines.

Fuel injection in CI engines, Requirements, Types of injection systems, Fuel pumps, Fuel injectors, Injection timings.

Unit 4

Engine Cooling - Different cooling systems, Radiators, and cooling fans.

Lubrication - Engine friction, Lubrication principle, Type of lubrication, Lubrication oils, Crankcase ventilation,

Fuels -Fuels for SI and CI engine, Important qualities of SI and CI engine fuels, Rating of SI engine and CI engine fuels, Dopes, Additives, Gaseous fuels, LPG, CNG, Biogas, Producer gas, Alternative fuels for IC engines.

Unit 5

Testing and Performance - Performance parameters, Basic measurements, Blow by measurement, Testing of SI, and CI engines.

Emission and Pollution: S. I. Engine and C. I. Engine emissions and its control and comparison. Effect of pollution on Human health and biosphere.

15. Lecture Outline *(with topics and number oflectures)*

Module no.	Topic	No. of hours
1	**Introduction to I.C Engines** - Engine classification, Air standard	09

COURSE TEMPLATE

1.	**Department/Centre proposing the course**	Mechanical Engineering
2.	**Course Title**	**Machine Design –I**
3.	**L-T-P structure**	4-0-0
4.	**Credits**	4
5.	**Course number**	ME05TPC09
6.	**Status** (*category* for *program*)	CORE

7.	**Pre-requisites** (course no./title)	Engg. Mechanics Mechanics of Solid-1
8.	**Status vis-à-vis other courses** *(give course number/title)*	
8.1	Overlap with any UG/PG course of the Dept./Centre	NA
8.2	Overlap with any UG/PG course of other Dept./Centre	NA
8.3	Supercedes any existing course	NO

9.	**Not allowed for** (indicate program names)	
10.	**Frequency of offering**	EveryOdd Sem
11.	**Will the course require any visiting faculty?**	NO
12.	**Courseobjective***(about50words)*: Provide students with the ability to apply design procedure with specificdesign tools representing empirical, semi-empirical and analytical approaches. Usinganalytical and computer aided design with real world problems.The detailed design of mechanical systems considers realistic examples from the mechanical Laboratories/workshop. Design a mechanical power transmission system given the power tobe transmitted, speed ratio, orientation and center distance of the shafts. Failure analysis, factor of safety, types of loading, selection of appropriate materials,lubrication, design for manufacturing, fits and tolerance will also be covered for the use in allthe above case based designs.	
13.	**Course Outcome:** At the end of this course, the students will be able to 1. Apply the various stress based theories to design machine components 2. Select appropriate design data from Design data book. 3. Design basic machine elements like Keys, joints, coupling and shafts. 4. Design and select power transmission systems- belt and chain drives. 5. Design various types of joints-threaded, riveted and welded.	