SCHEME OF INSTRUCTION & EXAMINATION
B.E. V - Semester
(MECHANICAL ENGINEERING)

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hr/Wk	Scheme of Examination			Credits
			L	T	P/D		CIE	SEE	Duration in Hours	
Theory Courses										
1.	PC501ME	Dynamics of Machines	4	–	–	4	30	70	3	4
2.	PC502ME	Manufacturing Processes	3	–	–	3	30	70	3	3
3.	PC503ME	Machine Design	4	–	–	4	30	70	3	4
4.	PC504ME	Heat Transfer	3	1	–	4	30	70	3	3
5.	PC505ME	Operations Research	3	–	–	3	30	70	3	3
6.	PC506ME	CAD/CAM	3	–	–	3	30	70	3	3
7.	MC	Gender Sensitization	3	–	–	3	30	70	3	0
Practical / Laboratory Courses										
8.	PC551ME	Computer Aided Production Drawing & CAM Lab	–	–	2	2	25	50	3	1
9	PC552ME	Manufacturing Processes Lab	–	–	2	2	25	50	3	1
10	PC553ME	Dynamics Lab	–	–	2	2	25	50	3	1
Total			**23**	**1**	**6**	**30**	**285**	**640**		**24**

MC: Mandatory Course **PC**: Professional Course **HS**: Humanities and Sciences
L: Lectures **T**: Tutorial **P** : Practical **D**: Drawing
CIE: Continuous Internal Evaluation **SEE:** Semester End Examination (Univ. Exam)

Note:
1. Each contact hour is a Clock Hour
2. The practical class can be of two and half hour (clock hours) duration as per the requirement of a particular laboratory.

Course Code	Course Title						Core/Elective
PC501ME	DYNAMICS OF MACHINES						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
Kinematics of Machines	4	--	--	--	30	70	4

Course Objectives:

- To know effect of inertia of links, and external forces on the input torque, and forces developed at joints in typical mechanisms in motion; understand the gyroscopic couple and its effect on vehicles in motion.
- To know the working principles and characteristics of typical governors, as also the function of flywheels.
- To know the concept of unbalanceing rotating and reciprocating masses in single and multi-cylinder in line and radial engines.
- To understand the phenomena of free of free and forced, including the effect of damping for single dof systems, and concepts of isolating vibration.
- To determine natural frequencies of undamped, damped and forced vibrating systems of one, two and multi degree freedom systems.

Course Outcomes:

- To understand various methods of static and dynamic analysis of planar and spatial mechanisms
- To understand and apply the gyroscopic effects in ships, aero planes and road vehicles.
- To analyze balancing problems in rotating and reciprocating machinery
- To apply the concepts of free and forced vibrations of single degree freedom systems in real time systems
- To analyze and design various types of governors like Watt, Porter, Proell, Hartnell governors

UNIT-I

Static and Dynamic Force Analysis: Force analysis of four bar and slider crank mechanisms. Study of Dynamically Equivalent System. Inertia forces on Connecting Rod.

Gyroscope: Gyroscopic Couple, gyroscopic effects in vehicles.

UNIT-II

Governors: Classification of governors, Watt, Porter, Hartnell and Hartung governors, Controlling Force, Stability, Isochronism, Sensitivity, Power and Effort of governors.

Flywheels: Functions, Differences between flywheel and governor. Turning moment diagrams, flywheel analysis for I-C Engines and presses.

UNIT –III

Balancing of Forces: Forces on bearings due to rotating shaft carrying several masses in several planes. Determination of balance masses from the forces on the

bearings, Shaking forces in single cylinder engine, Partial balancing of reciprocating engine. Balancing of multi cylinder in line engines. Balancing of radial engines by direct and reverse cranks method.

UNIT –IV

Vibrations: Vibrations of Single degree, freedom system (axial, transverse and torsional), Equivalent system of combination of springs, Stepped shaft, Whirling speed of shafts.

Damped Vibrations: Types of damping, Vibrations with viscous damping.

Forced Vibrations: Vibrating with harmonically .applied force with viscous damping. Dynamic magnifier, Resonance, Vibration isolation and Transmissibility.

UNIT –V

Vibration Analysis of Multi Degree Freedom Systems: Torsional Vibrations of Two rotor, three rotor and Geared systems. Natural frequencies of two degree freedom systems. Modes of vibration. Approximate methods for determining natural frequencies: Dunkerley's method, Rayleigh's method and Holzer's method for multi rotor system .

Suggested Reading:

1. *S.S. Rattan, Theory of Machines, McGraw Hill, 2010*
2. *Thomas Bevan, The Theory of Machines, CBS Publishers & Distributors, 2004.*
3. *John J.Uicker, Jr.Gordon R.Pennock, Joseph E.Shigley, Theory of Machines and Mechanisms, Oxford University Press, 2003.*
4. *I.S. Rao and Gupta, Theory and Practice ot Mechanical Vibrations, Prentice Hall, 1984.*
5. *R.L.Nortan, "Kinematics and Dynamics of Machinery", Tata McGraw Education Pvt. Ltd , New Delhi, 2009.*
6. *Ghosh and Mallik, Theory of Mechanisms nd Machines, Affiliated Est-West Press, 1988.*

Course Code	Course Title						Core/Elective
PC502ME	MANUFACTURING PROCESSES						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	3	--	--	--	30	70	3

Course Objectives:

- To understand the basic principles of the major manufacturing processes such as metal casting, welding and forming of engineering materials.
- To know the advantages and limitations of each process.
- To be able to select the optimal process to produce a product.
- To know the basic principle of advanced forming processes.

Course Outcomes:

- Describe the concepts of Foundry Technologies consisting of pattern making, mould making, gating design and solidification.
- Discuss the importance of special casting processes, categorize various casting defects and describe the processing of plastics.
- Classify and differentiate various Arc welding, Gas welding and Advanced welding processes, discuss their advantages, applications and limitations.
- Differentiate various Solid State welding and Resistance welding processes, discuss their applications, and identify various welding defects.
- Describe various forming processes, sheet metal operations and discuss the importance of unconventional forming processes.

UNIT-I

Casting Process : Casting terms, pattern materials, types of patterns, pattern allowances, colour code for patterns, Moulding sands, core sands, properties of moulding sand and its ingredients, different types of moulding machines, Directional solidification, use of chaplets, chills, riser and gating design.

UNIT-II

Special Casting Processes: Shell moulding, Co2 moulding, die casting, centrifugal casting, investment or lost wax process; Casting defects, causes and remedies, Inspection and testing of casting.

Processing of Plastics - Extrusion, Injection moulding, Blow moulding and Thermoforming.

Introduction to Ceramics and MEMS.

UNIT-III

Welding Processes: Introduction, Classification of welding processes, principle of gas welding, equipment and techniques, types of flames and applications, advantages, limitations and applications of Gas welding; Arc welding equipment electrode materials and

specifications, polarity, types of arc welding.-
SMAW, SAW, GMAW, GTAW, PAW, Atomic hydrogen welding, principle of Electro slag welding, Soldering and Brazing, Gas cutting.

UNIT-IV

Solid State Welding Process: Forge Welding, Friction Welding, Friction Stir Welding, and Explosive Welding.

Resistance welding processes - Spot welding, Projection welding, Percussion welding ,Seam welding, Butt welding, weldability, Welding defects.

UNIT-V

Forming Processes: Cold & Hot working, Yield criteria, Process description of Forging, Rolling, Extrusion, Wire drawing,

Sheet Metal Operations: Blanking, Piercing, Bending, Deep drawing, Stretch forming, Spinning.

Introduction to Unconventional Forming Processes- Explosive forming, Electro-magnetic forming, Electro-hydraulic and rubber pad forming

Suggested Reading:

1. *P.N.Rao, "Manufacturing Technology," Vol. 1, Tata McGraw Hill Publ., 3nd Ed., 2011*
2. *Amitabh Ghosh & Mallick, "Manufacturing Science", Assoc. East west Press Pvt. Ltd. 4th Ed., 2011*
3. *Roy A. Lindberg, "Materials & Process of Manufacturing", Prentice Hall of India, 5th Ed.l992.*
4. *Serope Kalpakjian, "Manufacturing Engineering and Technology", Addison, Wesley Publishing Company, 2006*
5. *George.E. Dieter, "Mechanical Metallurgy", SI Metric Edition McGraw-Hill Book Company*
6. *J.P.Kaushish, "Manufacturing Processes", PHI Learning Pvt. Ltd., 2nd, 2010*

Course Code	Course Title						Core/Elective
PC503ME	MACHINE DESIGN						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
Design of Machine Elements	4	--	--	--	30	70	4

Course Objectives:

- To know the design of helical and leaf springs for various load considerations from stress and energy consideration;
- To understand the design of gears such as spur, bevel and worm gears from strength and wear considerations; types of gear failure and preventive measures;
- To understand the types of bearings used in different applications and classification;
- To know the application of different design concept to the design of the various components of an IC engine such as a piston connecting rod.

Course Outcomes:

- Classify different types of springs and their applications, and to design the springs for static and fluctuating loads according to working environment.
- Distinguish different types of gears and to design spur, helical, bevel and worm gears under strength and wear considerations.
- Identify different types of tooth failures with their remedial measures and design spur and helical gears under dynamic considerations for suitable applications.
- Understand the principles of hydrostatic and hydrodynamic lubrication, and estimate the load carrying capacity of bearings for axial and thrust loads, subjected to static and cyclic loads.
- Practice design of IC engine components like pistons, crank shafts, connecting rod and flywheels subjected to both mechanical and thermal loads.
- Differentiate between curvature and straight beams and apply the design principles for the crane hooks, C-clamp and machine frames.

UNIT-I

Mechanical Springs: Types of springs and materials used. Design of helical springs on stress, deflection and energy considerations. Design for fluctuating loads. Concentric springs.

Leaf Springs: Stresses and Deflection. Principles of Limit design. Nipping of Leaf springs.

UNIT-II

Gears: Types of gears and materials used. Standards for gear specifications. Design of Spur, Helical, Bevel and Worm Gears - Strength and Wear considerations. Types of failure of gear tooth and preventive measures.

UNIT-III

Bearings: Materials used for Bearings. Classification of Bearings. Viscosity of Lubricants. Theory of Hydrostatic and Hydrodynamic lubrication. Design of sliding contact bearings - for axial and thrust loads.

Rolling Contact Bearings: Different types of rolling element bearings and their constructional details. Static and Dynamic load carrying capacity, Load-life relationship. Design for cyclic loads.

UNIT-IV

I.C. Engine Parts: Design of piston, connecting rod and crank shafts (single throw and overhang). Design of Flywheels for I.C. Engines and presses.

UNIT-V

Theory of Bending: Theory of bending of members with initial curvature - rectangular, circular and Trapezoidal sections. Design of crane Hooks, Machine flames and C-clamps.

Suggested Reading:

1. *M.F. Spotts, "Design of Machine Elements", Pearson Edu, 7th Edn. 2003.*
2. *V. B. Bhandari, "Machine Design", Tata McGraw-Hill Publ, 2010.*
3. *P.C.Sharma & D.K. Aggarwal, "Machine Design", S.K. Kataria & Sons, 10th Edn, 2003.*
4. *P. Kannaiah, "Machine Design", Sci- Tech Publ., 2009.*
5. *J.E. Shigley & Charles R. Mischke, " Mechanical Engineering Design", Tata McGraw-Hill., 6th ed. 2003.*

Course Code	Course Title						Core/Elective
PC504ME	**HEAT TRANSFER**						**Core**
Prerequisite	**Contact Hours per week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
Thermodynamics	**3**	**1**	**--**	**--**	**30**	**70**	**4**

Course Objectives:

- To understand the basic concepts of heat transfer.
- To study the concepts of conduction, convection, radiation and heat exchangers applicable for commercial and industrial use.
- To understand the applications of various experimental heat transfer correlations in engineering applications.
- To learn thermal analysis and sizing of heat exchanger.
- To study and solve problems on different modes of heat transfer which are related to thermal power plants, refrigeration and air conditioning.

Course Outcomes:

- To formulate heat conduction problems in rectangular, cylindrical and spherical coordinate system by transforming the physical system into a mathematical model.
- Familiarize with time dependent heat transfer and compute convective heat transfer coefficients in forced, natural convection.
- To understand radiation heat transfer, heat exchangers and mechanism involved in boiling and condensation.

UNIT-I

Modes of Heat Transfer, Laws of Heat Transfer - Fourier, Newton, Stefan-Boltzmann General conduction equation in cartesian, cylindrical and spherical coordinates, One dimensional steady state conduction through slabs, hollow cylinders and spheres with and without heat generation, Effects of variable thermal conductivity in heat transfer of one dimensional steady state conduction of plate, cylinders and spheres, Steady state heat transfer through composite slabs, cylinders and spheres, Critical radius of insulation, Two dimensional analysis of steady state heat transfer in a plate with prescribed temperature on one boundary, Application of finite difference technique to two dimensional steady state conduction of a plate.

UNIT-II

Fins: Heat transfer analysis of tips with heat dissipation environment - rectangular straight and pin fins, Application of fin to temperature measurement, unsteady state conduction, Lumped parameter, analysis of a body with negligible internal temperature gradients, Transient heat transfer analysis of finite slab with specified temperature and convective boundary conditions, Use of Grober and Heisler charts for solving problems of infinite slabs, cylinders and spheres.

UNIT-III

Convection: Dimensional analysis and its use in free and forced convection, Buckingham theorem, Physical significance of different dimensionless numbers, Application of Von-Karman integral equation for the analysis of thermal boundary layer in forced convection of flat plate, Reynold's analogy for flow over plane surfaces, calculation of heat transfer for flow over plates, cylinders and for flow through tubes in free and forced convection using empirical formulae.

UNIT-IV

Radiation: Definition of absorptivity, reflectivity and transmissivity, Concept of black-body and emissivity. Kirchoffs law, Planck's black body spectral distribution, Wien's and Steffan Boltzmann law, Monochromatic and total emissive power, radiant heat exchange between two gray surfaces, Shape factor, Thermal circuit for radiant heat exchange between infinite parallel plates and between concentric, cylinders, Enclosures with black and gray surfaces, Radiation shields and re-radiation surfaces.

UNIT-V

Heat Exchangers: Classification and applications of heat exchangers in industry, Analysis and design of counter flow and parallel flow heat exchanger, Fouling factors, solving problems for multi pass heat exchanger using non dimensional parameter plots.

Change of Phase: Boiling-pool boiling regimes nucleate pool boiling, effect of surface wettability on bubble contact angle, Critical heat flux, boiling in forced convection, Condensation: Film condensation, Drop wise condensation, Condensation film thickness, Heat transfer coefficient in film condensation.

Suggested Reading:

1. *Holman, J.P., "Heat Transfer", McGraw Hill Publication, New Delhi, 2010*
2. *Rajput, R.K., "Heat and Mass Transfer", S. Chand & Company Ltd, New Delhi, 2004.*
3. *Yadav, R., Sanjay. and Rajay., "Heat and Mass Transfer ', Central Publishing House, Allahabad, 2004*
4. *Sachdeva,R.C., "Fundamentals of Engineering Heat and Mass Transfer ", New Age International (P) Ltd Publishers, New Delhi,*
5. *Arora, S.C. and Domkandwar., "A course in Heat and Mass Transfer ", Dhanpat Rai & Sons, New Delhi, 2004.*

Course Code	Course Title						Core/Elective
PC505ME	OPERATIONS RESEARCH						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	3	--	--	--	30	70	3

Course Objectives:

- To use variables for formulating complex mathematical models in management science, industrial engineering and transportation models.
- To use the basic methodology for the solution of linear programming problems.
- Understand the mathematical tools that are needed to solve optimization problems like Transportation models and Assignment models.
- To understand the replacement models with change in money value considering with time and without time.
- Model a system as a queuing model and compute important performance measures

Course Outcomes:

- To prepare the students to have the knowledge of Linear Programming Problem in Operations Research at the end students would be able to understand the concept and develop the models for different applications.
- To make students understand the concept Replacement models at the end students would able to explain various features and applications of replacement models in real time scenario.
- To prepare the students to understand theory of Game in operations research at the end students would able to explain application of Game theory in decision making for a conflict
- To prepare the students to have the knowledge of Sequencing model at the end student would able to develop optimum model for job scheduling.
- To prepare students to understand Queuing theory concepts and various optimization techniques at the end students would able to develop models for waiting line cases.

UNIT-I

Introduction : Definition and Scope of Operations Research.

Linear Programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, simplex method, maximization and minimization, Degeneracy in LPP, Unbounded and, Infeaseable solutions.

UNIT-II

Duality : Definition, Relationship between primal and dual solutions, Economic Interpretation, Post optimal of sensitivity analysis, Dual Simplex Method.

UNIT-III

Transportation Models : Finding an initial feasible solution - North West corner method, Least cost method, Vogel's Approximation method, Finding the optimal solution, optimal solution by stepping stone and MODI methods, Special cases in Transportation problems - Unbalanced Transportation problem.

Assignment Problems : Hungarian method of Assignment problem, Maximization in Assignment problem, unbalanced problem, problems with restrictions, travelling salesman problems.

UNIT-IV

Replacement Models : Introduction, replacement of items that deteriorate igoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly - Individual replacement policy, Group replacement policy.

Game Theory: Introduction, 2 person zero sum games, Maximin - Minimax principle, Principle of Dominance, Solution for mixed strategy problems, Graphical method for 2 x n and m x 2 games.

UNIT-V

Sequencing Models : Introduction, General assumptions, processing n jobs through 2 machines, processing 'n' jobs through m machines, Processing 2 jobs through m machines.

Queuing Theory : Introduction, single channel - poisson arrivals - exponential service times with infinite population & finite population, Multi channel - poisson arrivals - Exponential service times with infinite population.

Introduction to Optimization Techniques: Single objective & Multi objective optimization Techniques like G.A, NSGA, P.Q.O. & MPSO Techniques.

Suggested Reading:

1. *Hamdy, A. Taha, Operations Research-An Introduction, Sixth Edition, Prentice Hall of India Pvt. Ltd., 1997.*
2. *S.D. Sharma, Operations Research, Kedarnath, Ramnath & Co., Meerut,2009.*
3. *Hrvey M. Wagner, Principles of Operations Research, Second Edition, Prentice Hall of India Ltd., 1980.*
4. *V.K. Kapoor, Operations Research , S. Chand Publishers,New Delhi, 2004.*
5. *R. Paneer Selvam, Operations Research , Second Edition, PHI Learning Pvt. Ltd., New Delhi, 2008.*
6. *Data Reconciliation by Prof. Shanker Narasimha.*

Course Code	Course Title						Core/Elective
PC506ME	CAD/CAM						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	3	--	--	--	30	70	3

Course Objectives:

- To know the basic design process, design criteria to find alternative solution; understand parametric representation of cubic spline, Bezier and B-spline curves along with concepts of NURBS.
- To understand the concepts of surface modeling, analytical surface, solid modeling and their different approaches like C-rep and B-rep along with mass property calculations, mechanical tolerance.
- To know the principles of CAD database and its structure and learn the different neutral file formats, like IGES and PDES.
- To know the different types of numerical control machine tools its features and elements; the basic concept of part families, its layout along with CAD/CAM integration and rapid prototyping concepts.\

Course Outcomes:

- Explain the concepts and theory of modeling and design in engineering applications.
- Compare the different types of modeling techniques and explain the central role solid models play in the successful completion of CAD/CAM-based product development
- Recognize the design applications and perform 2D transformations about arbitrary point.
- Write part programs for simple components.
- Describe the current state-of-the-art CAD/CAM technologies

UNIT-I

Design Processes: Design criteria, Alternative solutions, Alternative design, Computer Aided Design and Review.

Drafting Techniques: Basic geometric elements and their creation.

Geometric Modelling: Wireframe entities and their definition, Interpolation and Approximation curves. Concept of parametric and non parametric representation of a circle and helix curves, properties of splines.

Synthetic curves: Parametric representation of cubic spline, Bezier and B-spline curves, continuity, properties and characteristics. Concept of NURBS.

UNIT-II

Surface Modeling: Analytic surfaces: Definitions of planar, surface of revolution, Tabulated cylinder, synthetic surfaces: Cubic and Bezier surfaces and coons surface

Solid Modeling: C - rep and B - rep approaches feature based and parametric modelling

Design Applications: Mass property calculations, Mechanical tolerance, Finite Element Analysis, Design Review.

2D Transformations: Translation, Scaling and Rotation about arbitrary point, Shearing and Reflection, Homogeneous representation, concatenation.

UNIT-III

CAD Database and Data Exchange: CAD Database and Structure, **CAD Exchange format :** IGES, STEP and STL format.

Numerical Control Machine Tools: Features and elements of NC, Positional, paraxial and contouring types. Definitions of axes. Definitions of interpolation, post - processor, preparatory and miscellaneous functions, Canned cycles, Tool length and cutter radius compensation. Manual and computer aided part programming (APT) for simple components. Programming with MACROS.

UNIT-IV

Computer Numerical Control: CNC, DNC and Adaptive control systems. Typical configurations and relative features. Machining centers, Introduction to FANUC, SINUMERIC controllers.

Industrial Robots: Robot Anatomy, Configurations, Controls, Drivers, Programming methods and Applications.

UNIT-V

GT: Part families, layout, part classification and coding system. Opitz, MICLASSCODE system **CAPP:** Variant and Generative process planning.

FMS & CMS: Building blocks of Flexible Manufacturing systems and their control, Elements of CIMS.

Computer Aided Inspection and QC:

Coordinate Measuring Machine, Non contact inspection: Machine vision, Scanning Laser Beam Devices Quality control. CAD/CAM Integration, Turnkey CAD/CAM Systems, Introduction to Rapid Prototyping Technique, Reverse Engineering.

Suggested Reading:

1. *Arvid R. Eide, Roland D. Jenison, Lane H. Mashaw, Larry L. Northup, "Introduction to Engineering Design" McGraw -Hill, 1998.*
2. *Ibrahim Zeid. CAD/CAM, "Theory and Practice", McGraw. Hill Inc. New York, 2011.*
3. *Grover, MP and Zimmers E.W. "CAD/CAM", Prentice Hall of India, 1989.*
4. *Rao, PN. "CAD/CAM: Principles and Applications", 2nd Edition, Tata McGraw Hill, New Delhi, 2004.*
5. *Yoram Koren, "Computer Control of Manufacturing Systems", McGraw Hill Int, New York, 1994.*
6. *Elanchezhian. C. Sunder Selwyn. T. Shanmuga Sunder, G, "Computer Aided" Manufacturing, Laxmi Publications (P) Ltd., 2nd Edition, New Delhi, 2007.*

Course Code	Course Title						Core/Elective
MC	GENDER SENSITIZATION						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	3	--	--	--	30	70	0

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT I:

Understanding Gender

Gender: Why Should We Study It? Socialization: Making Women, Making Men
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together as Equals
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers.
Rosa Parks-The Brave Heart.

UNIT – II
Gender and Biology
MissingWomen:
Sex Selection and Its Consequences Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary Two or Many? Struggles with Discrimination.Our Bodies Our Health

UNIT – III
Gender and Labour
Housework: The Invisible Labour "My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics Fact and Fiction. Unrecognized and Unaccounted work. Wages and Conditions of Work.

UNIT – IV
Issues of Violence
Sexual Harassment: Say No! Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment "Chupulu".
Domestic Violence: Speaking Out
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. New Forums for Justice.
Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life.."The Caste Face of Violence.

UNIT – V
Gender Studies
Knowledge Through Lens Of Gender
Point Of View – Gender and the structure of knowledge – Unacknowledged women artists of Telangana; Whose History? Questions For Historians and Others: Reclaiming a past – Writing other histories – Missing Pages from modern Telangana History

Suggested Reading

1. *A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu " Towards a World of Equals" A Bilingual Textbook on Gender by Telugu Akademi, Hyderabad,Telangana., 1ST Edition,2015*.

Course Code	Course Title				Core/Elective		
PC551ME	COMPUTER AIDED PRODUCTION DRAWING & CAM LAB				Core		
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
Machine Drawing	--	--	--	2	25	50	1

Course Objectives:

- To learn design criteria of machine components, selection of materials and manufacturing Process.
- To learn application of principles to design helical coiled and leaf springs, gears, curved beams, sliding contact and rolling element bearings, chain drives, IC engine components and fly wheels.
- To familiarize with NC features, part programming using G and M codes, APT, CNC, DNC and FMS etc.

Course Outcomes:

- Create the models of the components
- Demonstrate the documentation and presentation skills
- Prepare the production drawings of the parts from the given assembly drawing
- Generate the bill of materials and indicate details pertaining to manufacturing requirements.
- To recognize the importance of Computer Aided Manufacturing and prepare a simple part program to perform machining on a CNC machine.
- To produce various machine components by performing different machining operations.

LIST OF EXPERIMENTS

1) Part modeling from given assembly drawings using any solid modeling package.
2) Geometrical dimensioning and tolerance representation on part drawings.
3) Conventional practices indicating Dimensional, Form & Position tolerances.
4) Calculation of limits, suggestion of suitable fits for mating parts with Interference detection.
5) Surface finish, surface treatments- specification and indication methods on the drawings.
6) Generation of production drawings in 2D from part models representing Limits, fits, tolerances, Surface finish, geometrical and form tolerance etc.
7) Preparation of Process sheet incorporating Tool work orientation diagrams.
8) Facing, Turning, Step turning, Taper turning & Contouring on CNC Lathe.

9) Pocketing and Contouring on CNC Milling.
10) Simulation and Development of NC code using CAM software.
11) Programming for integration of various CNC machines, robots and material handling system.
12) Develop simple objects using 3D printing technology.

Note: Minimum ten experiments should be conducted in the semester

Course Code	Course Title						Core/Elective
PC552ME	MANUFACTURING PROCESSES LAB						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	--	--	--	2	25	50	1

Course Objectives:

- To gain knowledge and skill in various manufacturing processes such as casting, welding and forming.
- To understand and perform operations like pattern making, sand testing and casting.
- To join metal pieces by various welding techniques and gain hands on experience
- To understand the working principle and produce some components by various metal forming techniques.

Course Outcomes:

- Conduct experiments and put hands-on experience on various processes in foundry, welding, forging, forming and plastic manufacturing technologies.
- Demonstrate the understanding of the theoretical concepts of above technologies while working in small groups.
- Demonstrate writing skills through clear laboratory reports.
- Identity the defects / imperfections and discuss their causes and suggest remedies to eliminate them.
- Transfer group experience to individual performance of exercises and demonstrate effective oral communication skills.

LIST OF EXPERIMENTS

Foundry

1. Single piece pattern making with wood as material considering allowances (Draft, Shrinkage and Machining)
2. Green sand mould making processes with complete sprues, gates, riser design.
3. Testing of green sand properties
4. Melting and casting of aluminum metal.

Welding

I : Evaluation of strength and hardness of a

1. Butt Joint prepared by gas welding using different types of flames
2. Lap joint by resistance welding process
3. V-Joint by Arc welding process

II: Exercises using TIG and MIG welding processes.

Forming

1. Evaluation of formability using Erichsen cupping test
2. Performing wire drawing operation on different materials (ex. Cu, Al, etc)
3. Performing blanking and piercing operations using hydraulic/fly presses.
4. Manufacturing of a simple component using Plastic Injection moulding machine

Note: Minimum ten experiments should be conducted in the semester

Course Code	Course Title						Core/Elective
PC553ME	DYNAMICS LAB						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	--	--	--	2	25	50	1

Course Objectives:

- To understand the effects and importance of kinematic and dynamic analysis of mechanisms
- To understand effects and analysis of Single degree freedom vibration systems
- To study the gyroscope, governors and cams
- To carry out the static and dynamic analysis of four bar mechanisms and drives

Course Outcomes:

- To find out natural frequencies of various beams with different constraints
- Evaluate static and dynamic balancing of masses
- To find the gyroscopic effect on vehicles
- To find out kinematic and dynamic behavior of mechanisms

List of Experiments

Governors

1. Centrifugal Governors: Experiment on Performance Characteristic Curves

Gyroscope

2. Estimation of Gyroscopic Couple & Understanding of Gyroscopic Effects on a rotating disc.

Static And Dynamic Balancing Equipment

3. Static and Dynamic Balancing of Rotating Masses

Moment of Inertia

4. Determination of Moment of Inertia of Flywheel and Connecting Rod

Universal Vibration System

5. Damped and Undamped Torsional Vibrations of Single and Double Rotor System.
6. Single DOF (Degrees of Freedom) of Spring Mass Damper System. (Damped and Undamped Systems)
7. Free and Forced Vibration of Simply Supported Cantilever Beam
8. Dunkerley Method to Find Fundamental Frequencies.
9. Modal Analysis of Beam & Disc.

Cam And Follower Apparatus

10. Dynamic Forces In Cams

Gear Trains

11. Velocity Ratios of Simple, Compound, Epicyclic and Diffrential Gear Trains.
12. Critical Speed Of Shaft.

Note: Minimum ten experiments should be conducted in the semester