Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Production) Sem – III (2014 Course)

S.N	Course Title	Scheme of Teaching				Scheme of Examination									Total Credit			
		L	T	P	Total	IE	Ass	UT	ESE	Total	TW	TW/ OR	TW/ Pr	Total	TH	T	Pr	Total
1	Welding and Foundry Technology	3	-	2	5	10	10	20	60	100	-	50	-	150	3		1	4
2	Basic Electronics and Communication Engineering	3		2	5	10	10	20	60	100	-	50	-	150	3	-	1	4
3	Industrial Engineering and Management	3	1	-	4	10	10	20	60	100	-	-	-	100	3	1		4
4	Strength of Machine Elements	3	-	2	5	10	10	20	60	100	-	50	-	150	3		1	4
5	Applied Thermodynamics	3	-	-	3	10	10	20	60	100	-	-	-	100	3		-	3
6	Professional skill Development	4	-	-	4		20	-	30	50	-	-	-	50	4		-	4
7	Production Practice-II	-	-	4	4	-		-	-	0		-	50	50	-		2	2
	Total	19	1	10	30	50	70	100	330	550	0	150	50	750	19	1	5	25

Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Production) Sem – IV (2014 Course)

S.N	Course Title	Scheme of Teaching				Scheme of Examination									Total Credit			
		L	T	P	Total	IE	Ass	UT	ESE	Total	TW	TW/OR	TW/Pr	Total	TH	T	Pr	Total
1	Machining Technology	3	-	2	5	10	10	20	60	100	-	50	-	150	3		1	4
2	Material Science	3	-	2	5	10	10	20	60	100	-	50	-	150	3	-	1	4
3	Design of Machine Elements	3	-	2	5	10	10	20	60	100	-	50	-	150	3		1	4
4	Engineering Mathematics III	3	1	-	4	10	10	20	60	100	-	-	-	100	3	1	-	4
5	Production Planning and Control	3	-	-	3	10	10	20	60	100	-	-	-	100	3		-	3
6	Professional skill Development	4	-	-	4		20	-	30	50	-	-	-	50	4		-	4
7	Production Practice-III	-	-	4	4	-		-	-	0		-	50	50	-		2	2
	Total	19	1	10	30	50	70	100	330	550	0	150	50	750	19	1	5	25

WELDING AND FOUNDRY TECHNOLOGY		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hrs/Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit
	TW/OR : 50 Marks	

Course Pre-requisites:	
The Students should have	
1.	Basic knowledge of Manufacturing Processes
2.	Basic knowledge of Joining.
3.	Basic knowledge of Casting.

Course Objectives:
The student should understand the scope, objective and application of welding and foundry technology

Course Outcomes:	
Students will be able to understand	
1.	Describe the advantages and disadvantages of the different classes of manufacturing processes.
2.	Understand the different casting process
3.	Know the pattern making and mold making
4.	Choose the best casting process for a specific product.
5.	Understand the different Welding process
6.	Choose the proper process for different joining cases
UNIT-I	**Introduction Of Welding Processes** Classification of welding processes. Advantages and disadvantages of welding processes Arc welding processes-Carbon arc, Submerged arc, Tungsten inert gas (TIG), Metal inert gas (MIT), Plasma arc, Stud welding and related arc welding processes –Theory, Comparison on merits, limitation and applications, Fluxes used in arc welding. Gas welding – Processes and equipment used, Types of flames, Gas cutting– Merits, demerits and applications	**(06)**
UNIT-II	**Resistance Welding** Resistance welding –, Spot, Seam, Projection, Butt, Percussion welding, Tube	**(06)**

	welding, Electric resistance welding process, its merits, demerits and application. **Solid-State Welding** Solid-State Welding- Pressure, Diffusion, Ultrasonic, Explosive, Friction, Forge, Principle, Equipment used, Flux used, Merits demerits and application of the above process.	
UNIT-III	**Other Welding Processes** ThermitWelding,Laser beam welding, Electron beam welding, Braze welding, Welding of dissimilar metals, Welding of polymers, Welding of Cast Iron, Welding of Tool Steel, Welding of Aluminium and its Alloys, Welding inspection, Welding defects and their Classification. Welding Symbols.Importance of ASME codes, ISO standards on joiningprocesses.	**(06)**
UNIT-IV	**Pattern And Mould Making** Foundry Layout, Foundry departments and sections, Pattern and pattern making, Design and allowances for patterns, Colour codes for patterns, Storage of patterns, Moulding sand and core sands, Sand control Test, Core and core making – Introduction, Core making Procedure, Types of cores, Core print, Core boxes. Mould and mould making-Moulding Methods, Moulding processes, Gating System, Software available	**(06)**
UNIT-V	**Melting And Pouring Practice:** Melting furnaces and their selection, Cupola and its operation, Advantages and limitations, applications, Induction melting furnaces, Advantages, Limitations, applications, Pouring practice and equipments, Ladle technology, Solidification of castings, Strike out, Fettling, Cleaning and Surface preparation of castings, Inspection and testing of castings, Defects in castings.	**(06)**
UNIT-VI	**Die Casting Process:** Pressure and gravity die casting, Shell mould casting, Investment casting, Continuous casting, centrifugal casting, Applications, Merits and limitations of all, Use of robots in foundry, Production of iron Casting, Copper alloy foundry practice, Aluminium alloy foundry practice, Export potentials for cast products in Indian context.	**(06)**

Term work: **List of Experiments:** • Mechanical test on weldment (weld) - Tension bend, drop weight, tear test. • Moulding and core sand testing (Clay content test, moisture content test etc). • Fluidity test using fluidity spiral pattern • Permeability test. • Green strength mould and Green strength core. • Mould and core hardness test.	
Assignments: • Six Assignments based on above syllabus & Industrial visit **Oral/Practical** Term work and oral will be based on above syllabus **Text Books / References** • O. P. Khanna, A text book of Welding Technology, Dhanpat Rai and Sons • O. P. Khanna, A text book of Foundry Technology, Dhanpat Rai and Sons • P. N. Rao, Manufacturing Technology- Vol 1, McGraw Hill Education (India) Private Limited • Md. Ibrahim Khan, Welding science and technology, New Age International (P) Ltd. • G.R.Nagpal,Tool Engineering and Design, Khanna Publishers • B.S.Raghuwanshi, Workshop Technology,Vol-I, Dhanpat Rai & Co. • P L Jain, Principles of Foundry Technology, Tata Mc Graw-Hill, New Delhi • Steel Casting ASM Hand book, Vol. No. I.	
Syllabus for Unit Test | Unit Test 1	**Units I , II and III**
Unit Test 2	**Units IV, V and VI**		

BASIC ELECTRONICS AND COMMUNICATION ENGINEERING

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit
	TW/OR : 50 Marks	

Course Pre-requisites:

The Students have completed a course in Physics and have the knowledge of laws of Dynamics

Course Objectives:

Students will get basic knowledge of electronic components, devices, microcontroller, digital electronics and communication.

Course Outcomes:

Students will be able to understand

1.	The basic components of electronics
2.	Working of rectifiers.
3.	Basic of Microprocessor.
4.	Basics of Digital electronics
5.	Basics of analog communication.
6.	Basics of digital communication.

UNIT - I	**Electronic components:** Resistors, Inductors and Capacitors and their types, Construction and characteristics of PN junction diode Zener Diode Tunnel diode Bipolar junction transistors CB,CC,CE circuits Field Effect transistors	**(06)**
UNIT - II	**Electronic Devices and Linear ICs:** Rectifiers: Half wave, Full wave and Bridge rectifiers capacitor filter wave forms, ripple factor regulation characteristics. Special semiconductor devices: FET SCR LED VI characteristics, applications. Introduction to Op -Amp and Timers.	**(06)**
UNIT - III	**Digital electronics:** Number system: Binary system, Decimal to Binary, Octal system, Hexadecimal system, binary addition, subtraction, multiplication and division. Logic gates: OR, AND, NOT, Exclusive OR, NOR, NAND gates, Logic	**(06)**

	networks, Gate Standardization, Introduction to Logic Circuit Combinational and Sequential Circuits	
UNIT - IV	**Analog Communication:** Communication System diagram, need of modulation, amplitude modulation, frequency modulation, phase modulation.	**(06)**
UNIT - V	**Digital Communication:** Sampling process, pulse code modulation, delta modulation adaptive delta modulation**.**	**(06)**
UNIT - VI	**Microprocessor:** Architecture, Block Diagram, Instruction set, Interrupts, Timing Diagrams, Stacks, Subroutines, Serial I/O. Memory Design Concepts: Decoding, Memory Types, Design of Microprocessor based system, Interfacing Techniques; (I/O Mapping & Memory Mapping) with eg. of 8255 IC.	**(06)**

Assignment: Assignment based on above syllabus.

Any 8 practical's should be conducted from the following list:
1. To study various electronics components: Resistors, Inductors, Capacitors, diodes and transistors.
2. Binary - BCD & BCD – Binary conversion
3. Study of CRO and Different modes of operation.
4. To plot VI characteristics of PN junction diode.
5. To plot regulation characteristics of half wave rectifier with and without capacitor filter.
6. To plot regulation characteristics of Full wave rectifier with and without capacitor filter.
7. To plot input-output characteristics of CE configuration of BJT.
8. To study basic logic gates: AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR.
9. To realize the Boolean expression using basic gates.
10. Study of amplitude & frequency modulation.
11. Pulse code modulation.

Text Books/Reference Books:

1	Mottershed Allen, Electronic Devices & Circuits, PHI
2	R. P. Jain, Modern Digital Electronics, Mc Graw Hill
3	Thomas L. Floyd, Electronic Devices, Pearson Education (Sixth edition)
4	Millman&Halkis, Electronic Devices & Circuits, PHI
5	Malvino Leach, Digital Principles & Applications, Mc Graw Hill
6	Millman&Halkis, Integrated Electronics, MGH
7.	John Keneddy"Electronics communication System" Mc Graw Hill
8.	TaubSchilling"Digital Communication System" Mc Graw Hill

Syllabus for Unit Test:	
Unit Test -1	Unit I, II and III
Unit Test -2	Unit IV, V and VI

INDUSTRIAL ENGINEERING & MANAGEMENT		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Tutorial: 01 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit

Course Pre-requisites:	
The Students should have	
1.	Knowledge of basic concept of Management
2.	Basic information of Industrial engineering.
3.	Basic knowledge of human considerations in manufacturing.
Course Objectives:	
	The student should understand the scope, objective and application of industrial engineering tools and management practices in manufacturing.
Course Outcomes:	
Students will be able to understand	
1.	Definition, principles and functions of management.
2.	Types and selection of business organizations.
3.	Functioning of Personnel, Marketing and Finance Department.
4.	Method Study tool for standardizing the method.
5.	Work Measurement tool for standardizing the time.
6.	Ergonomically accepts in manufacturing.

UNIT - I	**Management-An Introduction:** Management- Meaning and Definitions, Management, Administration, and Organization concepts, Management as an Art and Science and a profession, contribution of various thinkers to management thought, Types and Functions of Management. Different approaches to management – scientific, operational, human and system approach.	**(06)**
UNIT - II	**Organization:** Different forms of business Organization –Individual proprietorship, Partnership, Joint stock company, Co-Operative enterprise, Public Sector, Undertakings, organizational structures in Industries, Line, Functional ,Line and functional , Project, Matrix Organization and Committees	**(06)**

UNIT - III	**Financial, Marketing and Personnel Management:** Personnel Management-Definitions Recruitment, Selection and training of the employees, Job valuation and Merit rating, wage administration different methods of wage payments, incentives. Marketing Management-Definitions, Marketing and Selling concept, market segmentation, distribution channels, Market Research, Advertising and sales promotion and Sales forecasting. Financial Management-Capital structure, Fixed capital, working capital, sources of finance, cost analysis, Break even analysis, Depreciation and Financial statement.	**(06)**
UNIT - IV	**Method Study:** Steps in method study, tools and techniques used, process chart symbols, flow diagrams, two handed chart, multiple activity chart, use of motion pictures and its analysis. SIMO charts, chorno & cycle graph, developing, presentation, installation and maintenance of improved methods.	**(06)**
UNIT - V	**Work Measurement :** Time Study: Aim and objectives , terminology and tools, use of stop watch procedure in making a time study, elements, selection of operations time study forms, handling of foreign elements. Performance rating. Allowances: Personal, Fatigue and other allowances. Analysis and calculation of Standard Time. Determination of number of cycles time study for indirect functions such as Maintenance , Marketing etc., Most Technique. Works Sampling: Definition, Objectives, theory of Work Sampling. Other applications of work sampling, errors in work sampling study. Synthetic and Standard data Methods: Concepts, introduction to PMTS, MTM-1, WF, Basic motion time, MTM-2, and other second – generation methods timing of group operations.	**(06)**
UNIT - VI	**Ergonomics and Industrial Safety:** Definitions, importance in industry, basic anatomy of human body, anthropometrics, measurement of physical work and its techniques, work and rest cycles, bio mechanical factors environment effects. Importance of safety, planning, training, safety precautions, safety Equipments, Government regulations on safety.	**(06)**
Assignments: Six Assignments based on above syllabus.		
Text Books/		

1.	O. P. Khanna, Industrial Engineering & Management, Dhanapat Rai & Sons.
2.	M. C. Shukla, Business Organization and Management, S. Chand & Co. Ltd, New Delhi.
3.	Harold Koontz & Heinz Enrich, Essentials of Management, McGraw Hill International.
4.	M. N. Mishra, Organizational Behavior, Vikas publishing New Delhi.
5.	Dale Yoder, Personnel Management.
6.	Work Study, ILO.
7.	S. S. Patil, Industrial Engineering & Management, Electro tech Publication.
8.	Mansoor Ali & Dalela, Industrial Engineering & Management System, Standard Publisher distributions.
9.	R. M. Currie, Work Study, ELBS.
10.	Management by James A. F. Stoner, R. Edward Freeman, PHI
11.	Management Today: Principles and Practice by Gene Burton and Manab Thakur, TMH
12.	Organizational Behavior by Keith Davis, TMH
13.	Management (Tasks, responsibilities and Practices) by Peter Drucker, Harper Business
14.	Production Management by Lockyer, ELBS
15.	Modern Production Management by E. S. Buffa (John Wiley)
16.	Financial Management by Vanhorne, PHI
17.	Financial Management (Theory and Practice) by Prasanna Chandra, TMH
18.	Marketing Management by Philip Kotler, Pearson Edition
19.	Marketing Management by Rajan Saxena, TMH
20.	Personnel Management by Edward Flippo, TMH

Syllabus for Unit Test:	
Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV,V and VI

STRENGTH OF MACHINE ELEMENTS

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: -03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit
	TW/OR : 50Marks	

Course Pre-requisites:

The Students should have

1.	Fundamentals of engineering mechanics
2.	Analysis of forces and moments
3.	Laws of motion, kinetics, kinematics
4.	Algebra and trigonometry

Course Objectives:

	To provide basic concepts of stresses and strains in machine elements.

Course Outcomes:

Students will be able to understand

1.	Stresses and strains in different materials.
2.	Shear force and bending movement of loading elements.
3.	Principal stresses and strain.
4.	Torsional, bending and axial force on the shaft.
5.	Bending stresses and shear stresses in the machine elements.
6.	Design of simple machine components.

UNIT - I	**Simple stresses & strains** Revision of Concept of stresses & strains (linear, lateral, shear, thermal & volumetric). Hooke's law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus. Stress-strain diagrams for ductile & brittle materials.. Axial force diagrams, stresses and strains in determinate & indeterminate homogeneous & composite bars under concentrated loads & self weight. Strain energy due to axial load (gradual, sudden & impact), strain energy due to self weight Introduction to thermal stresses (Theory)	**(06)**

UNIT - II	**Principal stresses & strains** Normal & shear stresses on any oblique plane. Concept of principal planes derivation of expression for principal stresses & maximum shear stress, position of principal planes & planes of maximum shear, graphical solution using Mohr's circle of stresses, combined effect of axial force, bending moment & torsional moment on circular shafts (solid as well as hollow) **Theories of elastic failure:** Maximum principal stress theory, maximum shear stress theory, Maximum distortion energy theory, maximum strain theory – their applications & limitations.	**(06)**
UNIT - III	**Shear Force & Bending Moment Diagrams** Shear forces & bending moments of determinate beams due to concentrated loads, uniformly distributed loads, uniformly varying loads & couples, relation between SF & BM diagrams for cantilevers, Simply supported beam. Maximum bending movement & positions of points of contra flexure, construction of loading diagrams & BMD from SFD & construction of loading Diagram & SFD from BMD.	**(06)**
UNIT - IV	**Torsion** Stresses, strain & deformations in determinate shafts of solid & hollow **Slope & deflection of beams** - relation between BM & slope, slope & deflection of determinate beams, double integration method (Macaulay's method), derivation of formula for slope & deflection for standard cases.	**(06)**
UNIT - V	**Stresses in Machine Elements.** **Bending stresses** : Theory of simple bending, assumptions, derivation of flexural formula, second moment of area of common cross sections(rectangular, I,T,C) with respective centroidal& parallel axes, bending stress distribution diagrams, moment of resistance & section modulus calculations. **Shear stresses** : Concept, derivation of shear stress distribution formula, shear stress distribution diagrams for common symmetrical sections, maximum and average shears stresses, shear connection between flange & web.	**(06)**
UNIT - VI	**Design of Simple Machine parts**: Machine Design, Traditional design methods, Basic procedure of Machine Design, Factor of safety, Service factor, Design of simple machine parts - Cotter joint, Knuckle joint and Levers, Eccentric loading , Stresses in curved beams.	**(06)**

	Term work:	
	The Journal containing the record of following:	
	i) Experiment on Tension test on M.S. bar.	
	ii) Experiment on Compression test on M.S. bar.	
	iii) Experiment on Shear test on M.S. bar.	
	iv) Experiment on Torsion test on M. S. bar.	
	v) Experiment on Impact test.	
	Drawing file containing two half imperial sheets:	
	i) Drawing sheet of SFD – BMD of shafts using computer.	
	ii) Drawing sheet of Mohr's circle.	
	Oral :	
	Based on above term work.	

Assignments :

Assignments based on each unit. (Each assignment consist of 5 problems)

Text Books/

1.	Timoshenko & Young, Engineering Mechanics, Tata McGraw Hill Book Publishing Co. Ltd. 1981.
2.	James Gere, Mechanics of Materials, Thomson Learning
3.	S Ramamrutham, Strength of Materials
4.	V. B. Bhandari, Design of Machine Elements, Tata McGraw Hill Publication
5.	J. E. Shigley, Mechanical Engineering Design, McGraw Hill

Syllabus for Unit Test:	
Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV,V and VI

APPLIED THERMODYNAMICS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	

Course Pre-requisites:	
The Students should have	
1.	Knowledge of basic concept of thermodynamics
2.	Knowledge of pumps and compressors
3.	Basic knowledge of I.C.Engine
Course Objectives:	
	The student should understand the scope and application of Applied Thermodynamics
Course Outcomes:	
Students will be able to understand	
1.	to apply the concepts of Carnot theorem to applications such as heat pump and refrigerator
2.	basic concepts of thermodynamics and their application to energy conversion device like Compressors
3.	basic concept of refrigeration and air conditioning system
4.	Concept of air standard cycle
5.	Concept of Internal Combustion system
6.	Heat Transfer performance

UNIT - I	**Second Law of Thermodynamics:** Limitations of first law, Heat engine, refrigerator & heat pump, Kelvin–Planks and Clausius statement, Equivalence of Kelvin -Planks and Clausius statement, Perpetual motion machine of second kind, Carnot cycle &Carnot heat engine, Entropy. **Steam Generators:** Classification, Constructional details of Process & Power boilers, boilers mountings & accessories, equivalent evaporation, boiler efficiency, energy balance, boiler draught.	**(06)**
UNIT - II	**Refrigeration** Unit of refrigeration, reversed Carnot cycle, Bell Coleman cycle, Vapour compression cycle, C. O. P , TR Capacity, Use of p-h charts, Desirable properties of refrigerants, & alternative refrigerants **Air conditing** Factors affecting human comfort, Dalton's law, psychrometry, DBT,WBT, Specific humidity, relative humidity, degree of saturation, study of	**(06)**

	psychrometric chart, psychrometric processs uchassensible heating, cooling, humidification & dehumidification, Different Air conditioning systems, Applications of air conditioning.	
UNIT - III	**Reciprocating Air Compressors:** Introduction, Use of compressed air, construction & working of reciprocating air compressors, P-V diagrams of single stage air compressor, Effect of clearance, Volumetric efficiency , Power required to drive the compressor, Isothermal efficiency, Mechanical efficiency, Multi-staging of air compressor ,perfect inter cooling, Advantages of Multi-staging **Rotary Compressor:** Introduction, classification and working principles of different types of compressors, comparison between reciprocating and rotary compressors, positive displacement and roto dynamic compressors,	**(06)**
UNIT - IV	**Air Standard Cycles** Introduction to Air Standard cycle, assumptions,AirStandardottocycle,Dieselcycle,Dualcombustioncycle,comparisonofabovecycles,Actualcycle	**(06)**
UNIT - V	**Internal Combustion Engine Systems:** **Fuel Feeding Systems:** Introduction of carburetor S.I. engines, Mixture requirements, Solex carburetor, Fuel injection systems in C.I. engines, Bosch fuel injection pump, fuel injectors, Type of nozzles. **Ignition Systems:** Battery ignition, magneto ignition, Electronic ignition systems. **Cooling and Lubrication Systems:** Necessity of cooling, Cooling systems, Types of cooling and lubrication system **Engine Testing & Performance**: Measurement of I.P, B.P, Rope brake dynamometer, Hydraulic dynamometer, Eddy current dynamometer ,Measurement of F.P, Willian's line method, Morse Test, Measurement of fuel & air, Measurement of speed, Heat balances heat.	**(06)**
UNIT - VI	**Heat transfer and applications** **Extended surfaces:** Heat Transfer through extended surfaces, derivation of differential equation for fins, Solution of differential equation for different boundary conditions having constant cross-section area, Effectiveness and efficiency of a fin.	**(06)**

	Heat Exchangers:	
	Classification, heat exchanger analysis, use of Log Mean Temperature Difference (LMTD) and effectiveness NTU method for parallel and counter flow heat exchangers.	

Assignment: Assignment based on above syllabus.

Text Books/ Reference Books:

	P.L.Ballany, "Thermal Engineering", Khanna Publications
	C.P.Arora, "Engineering Thermodynamics", Tata Mc Graw Hill Publications
	Ganesan V., "Internal Combustion Engine", Tata McGraw Hill Publications
	Arora C. P., "Refrigeration& Air-Conditioning", Tata McGrawHill Publications, New Delhi
	V. M. Domkundwar, "Thermal Engineering", Dhanpat Rai & Co.(P)Ltd
	R. K. Rajput, Engineering Thermodynamics ,EVSS Thermo Laxmi Publications
	Y.Cengel&Boles,Thermodynamics-Anengineeringapproach,TataMcGrawHill Publications
	Hawkins G. A., "Engineering Thermodynamics", John Wiley and Sons.

Syllabus for Unit Test:	
Unit Test -1	Unit I, II and III
Unit Test -2	Unit IV, V and VI

PRODUCTION PRACTICE - II		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: - Hours / Week		
Practical: 04 Hours / Week	Term Work and Practical Examination: 50 Marks	04 Credits

Course Pre-requisites:	
The Students should have	
1.	Basic Knowledge of Welding.
2.	Basic Knowledge of engineering components.
3.	Basic Knowledge of materials.

Course Objectives:	
	The student should understand the processes in casting and welding..

Course Outcomes:	
Students will be able to understand	
1.	Welding processes
2.	Pattern making process.
3.	Sand Testing methods
4.	Sand Moulding techniques.
5.	Casting process
	Term Work Each candidate shall be required to complete and submit the following jobs: 1. Welding-TIG / MIG / Arc Welding (One Job) 2. Pattern making: A solid pattern consisting of wood turning or a core box. (One Job) 3.Sand Testing.(Five test) 4. Sand Moulding. (One Job) 5. Casting.

SEMESTER IV

MACHINING TECHNOLOGY		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hrs/Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit
	TW/OR : 50 Marks	

Course Pre-requisites:	
The Students should have	
1.	Basic knowledge of cutting tools
2.	Basic knowledge of machining processes
3.	Basic knowledge materials.

Course Objectives:
The student should understand the scope, objective and application of Machining Technology

Course Outcomes:	
Students will be able to understand	
1.	To Suggest different cutting tool materials for different work piece materials according to their properties
2.	Use dynamometer for measuring the cutting forces during various cutting operations.
3.	Perform different operations on lathe machine
4.	Perform different operations on Milling machine
5.	Explain, analyzed, predict and prevent material failures in primary manufacturing processes
6.	Indicate which types of manufacturing process are suited to producing different shapes of product.

UNIT-I	**Process of Metal Cutting** Metal cutting - Introduction, principle, classification of cutting tools, Types of metal cutting process, Mechanism of chip formation, Types of chips, Concept of speed, feed & depth of cut, Cutting tool materials	**(06)**
UNIT-II	**Theory of Metal Cutting** Single point cutting tool, Tool geometry, Tool signature, selection of tools from catalogue. Systems of defining cutting angles of a single point cutting tool, Cutting forces in Orthogonal cutting, Merchant's circle of forces, Measurement of cutting forces, Tool failure - its classification, Tool wear & its types .Types of cutting Fluids.	**(06)**

UNIT-III	**Lathe** Introduction, function, types, specification of lathe machines, construction accessories, attachments, operations. Difference between capstan and turret and engine lathe, **Automatic Machines** Automatic Lathes-Introduction, function, Classification of automatic machines.	**(06)**
UNIT-IV	**Drilling machines** Drilling-Introduction, Classifications of Drills. Twist drills. Types of drilling machines, operations, cutting speed, feed and depth of cut. **Milling machines** Milling- Introduction, Types of milling machines, operations, Milling cutters, Dividing head, methods of indexing.	**(06)**
UNIT-V	**Abrasive Machining Processes** Abrasive machining, abrasive-types, size and geometry. Specifications of Grinding, grinding wheels, wheel marking, wheel selection. Wheel mounting. Types of grinding machines, Grinding faults. **Surface Finishing Processes** Honing, lapping, super finishing, buffing, burnishing process. Electroplating, phosphating, metal spraying, anodizing, shot Peening. Effects of surface treatment processes.	**(06)**
UNIT-VI	**Broaching** Broaching-Introduction, broach geometry, Types of broaching machines, Broach design. Broaching applications. **Numerical control and CNC** Introduction to NC, basic principles of NC machine, classifications of NC system. Introduction to CNC, CNC controllers, Introduction to DNC machines, machining centers.	**(06)**

Term Work:
List of Experiments: (Any Five)
   • Effect of tool geometry on cutting speed, feed, depth of cut on cutting processes
   • Measurement of cutting forces in turning, drilling & milling with the help of tool dynamometers
   • Study and demonstration of Automate Lathe
   • Study of dividing indexing mechanism on milling machine.
   • Study and demonstration of Grinding Machines.
   • Study and demonstration of NC and CNC machine program.		

Assignments • Six Assignments based on above syllabus & Industrial visit		

Text Books / References	
- G.R.Nagpal,Tool Engineering and Design, Khanna Publishers - B.S.Raghuwanshi, Workshop Technology, Vol-II, Dhanpat Rai & Co. P. N. Rao, Manufacturing Technology , Vol- II, McGraw Hill Education (India) Private Limited - HajraChaudhari, Workshop Technology, Vol.-II - Roy A. Lindberg, Process & Materials of Manufacture, PHI P. C. Sharma, Production Engineering, S. Chand Publications R. K. Jain, Production Technology, Khanna Publishers E. P. DeGrmo, J. T. Black and A. Kosher, Material and processes in manufacturing, PHI - HMT Handbook, Production Technology, TMH	
Syllabus for Unit Test	

Unit Test 1	Units I , II and III
Unit Test 2	Units IV, V ,VI

MATERIAL SCIENCE		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination 60 Marks	03 Credits
Practical: 02 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit
	TW and Oral: 50 Marks	

Course Pre-requisites:	
The Students should have	
1.	Knowledge of basic concept of Physics and chemistry
2.	Basic information of engineering materials.
3.	Basic knowledge of manufacturing processes.
Course Objectives:	
	The student should understand the scope, objective and application of material, engineering properties, practices in material testing and selections of materials as per industrial requirements.
Course Outcomes:	
Students will be able to understand	
1.	basics of crystal structure, Mechanism of plastic deformation and Annealing and re-crystallization
2.	how to measure different types of mechanical properties
3.	Use of equilibrium diagrams in selections of alloys for different applications..
4.	Concept of powder metallurgy and manufacturing of components by powder metallurgy
5.	How to manufacture composite components
6.	Basics of corrosion and Prevention of corrosion by different methods

UNIT - I	**Study of Engineering materials and Plastic Deformation**: Study of Engineering materials Study of crystal structure, Indexing of planes and directions, Imperfections in crystals, Mechanism of plastic deformation, Critical resolve shear stress, Deformation of single crystal and polycrystalline metals, Work Hardening , Cold and hot working, Annealing and re-crystallization	**(06)**
UNIT - II	**Mechanical Testing of Metals;** Study of destructive testing Tensile test, Engineering stress and true stress strain, evolution of properties, Numerical based Tensile test, Hardness testing such as Brinell, Rockwell, Vickers and Micro hardness test, Impact test, Fatigue test, Creep test, Cupping test, Non	**(06)**

	Destructive testing such as Liquid dye penetrate test, Magnaflux test, Eddy current test , Ultrasonic testing and Radiography testing.	
UNIT - III	**Study of Equilibrium Diagrams:** Related terms and their definitions, Hume Ruther's rule of solid solubility, Allotropy and polymorphism, Solidification, Dendritic growth, Cooling curves, Plotting of Equilibrium diagrams, Lever rule, Coring, Isomorphs system, Eutectic system, Partial eutectic and eutectoid system, Non Equilibrium cooling and it's effects	**(06)**
UNIT - IV	**Processing of metal powder and ceramics:** Introduction, Advantages and limitations of powder metallurgy, Production of metals powder, Characteristics of powder, Powder conditioning, Powder Compacting, Sintering and sintering furnaces, Ceramic, Properties and applications of ceramics. Manufacturing of ceramics Production of powder metallurgical parts such as self lubricating bearings, ferrites, electric contact materials, Carbide cutting tools etc.	**(06)**
UNIT - V	**Study of Composite Materials:** Introduction, Classification of composites, Types of composite, Properties, Metal matrix composite, Ceramic matrix composite, Fiber Reinforced plastic, Manufacturing methods, Applications in Different field.	**(06)**
UNIT - VI	**Corrosion and Prevention:** Introduction, Types of corrosion, Oxide film growth laws, Action of hydrogen, Polarization, Stress corrosion, Season Cracking, Prevention of corrosion, Design of component, Modification of environment, Cathodic Protection, Deposition and coating, Ion Implantation, PVD, CVD, Powder coating etc.	**(06)**
List of Experiments:		
	1.Tensile test to determine strength and other mechanical properties 2.Hardness test Brinell and Vickers 3.Rocwell and Poldi hardness test 4.Micro-Hardness test 5.Erichsen Cupping test 6.Magnetic Particle test 7.Liquid penetrate test 8.Utrasonic Test 9. Visual inspection of casting and welded components.	
	Assignments 1. Density calculations on crystal structure and miller indices for crystal structure . 2. Draw different types of curves such as , Tensile stress strain , S N curves , Creep curves , brittle transient temperature curves 3. Draw the equilibrium diagram from given data. Find out the different types of phases. 4. Collect list of components which are made from powder metallurgical technique	

	and write flow chart for production processes..
	5. Find out ten different composite parts and its composite classifications.
	6. Collect different type of old components and study the corrosion on it also study the prevision processes also
	Text Books/Reference Books:
	1. Material Science and Physical Metallurgy", Dr.V.DKodgere , Everest Publication, Pune.
	2. "Physical Metallurgy", S H Avner, Tata Micro hill Publication , Delhi
	3. "Material science and Metallurgy", O P Khanna, Khanna Publication ,Delhi.
	4. "Material Science and Engineering", R K Rajput ,S K Kataria and Sons Publication, Delhi
Syllabus for Unit Test:	
Unit Test -1	Unit I to III
Unit Test -2	Unit IV to VI

DESIGN OF MACHINE ELEMENT		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit
	TW/OR : 50 Marks	

Course Pre-requisites:

The Students should have

1.	Knowledge of basic concept of Design
2.	Basic information of Mechanical Elements
3.	Basic knowledge of design consideration into different Mechanical/Machine Elements

Course Objectives:

	The student should understand the scope, objective and application of Design of Machine Element.

Course Outcomes:

Students will be able to understand

1.	Definition, principles and functions of Design
2.	Design and selection of shafts, keys, splines and couplings
3.	Working principal of brakes and clutches
4.	Design and selection of bearings.
5.	Design and selection of joints
6.	Design and selection of power screws and springs

UNIT - I	**Introduction:** Concept of machine design, general design considerations, design procedure; factor of safety for different types of loading its significance and selection; theories of failures, Selection of engineering materials for a component considering functionality, raw material generating process, strength, cost, quantity and aesthetics, use of IS codes	**(06)**
UNIT - II	**Design of shafts, keys, splines and couplings:** Design of solid and hollow shafts for strength and rigidity against pure torsion, pure bending, combined bending, torsion and axial loads; design of keys and splines; design of rigid and flexible couplings.	**(06)**
UNIT - III	**Clutch & Brake:** Types, classification, selection of different rent type of clutch Design of multiplate clutch. Introduction: different types of clutch(cone, centrifugal clutch).Energy absorbed by brake, Design consideration of block brake ,Introduction: internal expanding shoe brake, disk brake.	**(06)**
UNIT - IV	**Rolling Contact Bearing:** Types, static and dynamic load carrying capacities, stibeck's equation used, Equivalent bearing load, load life relationship, selection of bearing life, selection of rolling contact bearing from manufacture's catalogue. Bearing with probability of survival other than 90%, lubrication and mounting of bearings	**(06)**
UNIT - V	**Design of joints:** Design of bolted joint subjected under transverse and eccentric loading, materials for bolts, initial tightening loads on bolts, effect of washer and gasket, uniform strength bolts. Adhesive joints	**(06)**
UNIT - VI	**Power screw :** Power Screws: Forms of threads, Torque analysis of power screw self locking screw, stresses in power screw, collar friction, Design of Screw Jack.	**(06)**

TERM WORK
1) Study of Engineering Materials, their applications and selection as per different standards used in practice.
2) Design of Coupling and Detailed Working drawings with assembly.
3) Design of bolted, riveted and welded joints for transverse and eccentric loading.
4) Working drawing of shafts, keys, splines and couplings.
5) Design of spring and power screw.
6) Types of bearing.
7) Types of brakes and clutches.

Text Books/Reference Books:

1.Design of Machine Elements, V. B. Bhandari, (Tata McGraw-Hill Publishing

Company Ltd.)
2. Elements of Machine Design, N. C. Pandya and C. S. Shaha, (Charotar Publishing House)
3. Mechanical Engineering design, J. E. Shigley, Mitchell, (McGraw-Hill Publishing Co. Ltd)
4. Machine Tool Design, N. K. Mehta, (Tata McGraw-Hill Publishing Company Ltd.)
5. Design of Machine Elements, Dbrovalsky (MIR Publisher)
6. A Text Book of Machine Design, R. S. Khurmi, (S. Chand)
7. Design of Machine Elements by M. F. Spoots, T.E.Shoup (PHI)
8. Machine Design, R. K. Jain, (Khanna Publishers.)
9. Engg. Design, a Materials & Processing Approach, G. Dieter, (Tata McGraw-Hill Publishing Company Ltd.)
10. Computer Aided Analysis and Design of Machine Elements by Dukki Patti, Rao, Bhat , (New Age, Delhi)
11. CMTI Machine Tool Design Handbook (TMH)
12. Design of Machine Elements, An Integrated Approach by Robert and Norton, (Pearson)
13. Machine Design by Black and Adams (McGraw-Hill Publishing Company Ltd)

Syllabus for Unit Test:	
Unit Test -1	Unit I, II and III
Unit Test -2	Unit IV, V and VI

ENGINEERING MATHEMATICS - III		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Tutorial: 01 Hour / Week	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	01 Credit

Course Pre-requisites:	
The Students should have	
1.	Basic knowledge of arithmetic calculations and engineering applications.
2.	Knowledge of basic concept of statistics
3.	Basic information of probability

Course Objectives:	
	The student should understand the scope, objective and application of statistical tools

Course Outcomes:	
Students will be able to understand	
1.	The use of statistical methodology and tools in the engineering problem solving process.
2.	The use of different measures of central value
3.	The use of correlation analysis
4.	The use of regression analysis
5.	The concept of probability, random variable and probability distribution.
6.	The concept of testing of hypothesis and experimental design.

UNIT - I	**Introduction to Statistics-** Origin and growth of statistics, statistical methods Vs experimental methods. Collection of data, primary and secondary data, sampling and sample designs, methods of sampling, merits and limitations of sampling, sampling and non-sampling errors. Diagrammatic and graphic presentation of data.	**(06)**
UNIT - II	**Measures of central value-** Arithmetic mean, median and mode, geometric mean and harmonic mean. Measures of dispersion, mean deviation, standard deviation, sqewnessmoments and qurtosis.	**(06)**

UNIT - III	**Correlation analysis** Significance of the study of correlation, types of correlation, coefficient of correlation, coefficient of determination, rank correlation	**(06)**
UNIT - IV	**Regression analysis-** Uses of regression analysis, difference between correlation and regression analysis. Regression equations, standard error of estimate, limitations of regression analysis.	**(06)**
UNIT - V	**Probability** Basics of probability, conditional probability, bayes' theorem, mathematical expectations, random variable and probability distribution, binomial, Poisson, normal distribution.	**(06)**
UNIT - VI	**Testing of hypothesis-** Z test, chi square test and goodness of fit, F test and analysis of variance. **Applications of Statistics-** Experimental designs, SQC, business forecasting.	**(06)**

Assignments-

5 Assignments based on above syllabus

These assignments may preferably completed and verified using software's.

Text Books/Reference Books:

1. S. P. Gupta: Statistical methods – S Chand and sons
2. Bhat B. R.(1981) : Modern Probability Theory –IIIrd edition :New age international (P)limited,
3. Alan Karr,(1993) : Probability Theory – Springer Verlag.
4. Billingsley P.(1986) : Probability & Measure –John Wiley and sons
5. S. J. Morrison, Statistics for Engineers an Introduction, John Wiley and Sons, 2009
6. R. E. Walpole, Essentials of Probability and Statistics for Engineers and Scientists , Peasrson, 2011
7. R. L. Scheaffer, Probability and statistics for Engineers, Cengage Learning, 2011
8. Sukhatme P. V., Sukhatme S. & Ashok C : Sampling Theory of surveys and applications – Piyush publications
9. Irwin Miller and John E. Freund, Probability and Statistics for Engineers, Prentice-Hallof India
10. W. J. DeCoursey, Statistics and Probability for Engineering Applications, Newnes,2003

Syllabus for Unit Test:	
Unit Test -1	Unit I, II and III
Unit Test -2	Unit IV, V and VI

PRODUCTION PLANNING AND CONTROL

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 03 Hrs/Week	End Semester Examination: 60 Marks	0 3 Credits
	Internal evaluation: 10 Marks Assignments : 10 Marks Unit Test : 20 Marks	

Course Pre-requisites:

The Students should have

1.	Knowledge of basic concept of Industrial Engineering &Management
2.	Knowledge of statistics.
3.	Basic knowledge of resources of production Man, Machine Material..

Course Objectives:

	The student should understand the scope, objective and application of Production Planning And Control manufacturing Industries.

Course Outcomes:

Students will be able to understand

1.	The importance of PPC in industry.
2.	The Forecasting by using different techniques.
3.	Different ideas and concept to improve PPC in industry.
4.	Different techniques for material requirement planning
5.	Different techniques used for PPC in industry.
6.	Computer Aided Process Planning.

UNIT - I	**Introduction to PPC:** Role and stages of PPC, PPC as an integrated function, Product Life Cycle Analysis, Types of Production systems.	**(05)**
UNIT - II	**Forecasting Techniques:** Use and types of forecasting, Methods of forecasting and comparison, Verification and control.	**(05)**
UNIT - III	**Techniques and Production Control:** Process sheet, Routing, Scheduling- Gantt Chart, Machine Loading Chart, Line Balancing, Dispatching rules, Sequencing - Johnson's rule, Loading, Follow- up, Evaluation, PERT, CPM.	**(06)**

UNIT - IV	**Materials Planning and Purchasing:** Scope and requirement of MRP, MRP I and MRP II, Master Production Schedule, Bill of Materials, Capacity Requirement Planning. Introduction to ERP, Purchasing - Documentation, Make or Buy decisions, Vendor Development.	**(08)**
UNIT - V	**Inventory Control:** Types of Inventory, Cost of Inventory, EOQ, Selective Inventory Control, Replenishment Systems. **Stores Management:** Types of stores, Storage layout and storage systems, Stores Documentations, Stores Control and Control of Wastage and surplus, JIT, KANBAN, KAIZEN, Value Stream Mapping.	**(08)**
UNIT - VI	**Computer Aided Production Planning and Control:** a) Machine capacity planning and utilization. b) Productivity measurement. c) Material Requirement Planning. d) Scheduling Techniques. Hands on experience of Computer aided Production Planning and Control	**(04)**

Assignments:	
Six Assignments based on above syllabus.	

Text Books/Reference Books:	
1	"Production Systems - Planning Analysis and Control, J. L. Riggs, ", JhonWiley& Sons.
2	"Operations Management - Design, Planning & Control for Manufacturing and Services, J.B. Dilworth ", McGraw Hill
3	"Production and Operation Management S N Charry " Tata McGraw Hill
4	Elements of PPC, Samuel Elion ", Universal Book Company
5	"Industrial Engineering and Production Management MartandTelsang " S. Chand and Co. Ltd.
6	" Production Planning And Inventory Control" Mager and Boodman
7	S. S. Patil, Industrial Engineering & Management, Electrotech Publication.
8	. "Production Management " Martin Star,
9	Process Engineering " Erry Johnson
10	"Production Planning and Control, A. K. Bewoor, " Satya Publication
11	"Production Planning and Cost Control Jain and Arrawal", Khanna Publisher

Syllabus for Unit Test:	
Unit Test -1	Unit I,III & II
Unit Test -2	Unit IV,V & IV

PRODUCTION PRACTICE - III		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Lectures: NIL		
Practical: 04 Hours / Week	Term Work and Practical Examination: 50 Marks	04Credits
Course Pre-requisites:		
The Students should have		
1.	Basic Knowledge of manufacturing processes.	
2.	Basic Knowledge of engineering graphics.	
3.	Basic Knowledge of materials.	
Course Objectives:		
	The student should understand the machining processes by lathe milling and grinding.	
Course Outcomes:		
Students will be able to understand		
1.	Turning process.	
2.	Taper turning process.	
3.	Threading process.	
4.	Gear cutting process..	
5.	Milling process.	
6.	Grinding process.	

	Term Work
	Each Candidate shall be required to complete and submit the following jobs: (Any Two)
	One assembled job consisting of 2 to 3 pieces as below
	    1. Operations on lathe machine (3 assembled parts)
	    2. Operations on milling machine
	    3. Operations on grinding. machine	