



**Department of Industrial and Production Engineering**

**School of Studies of Engineering & Technology**

**Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur C.G.**

**Minutes of Meeting of BoS**

The scheduled meeting of member of Board of Studies (BoS) of Department of Industrial and Production Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the B. Tech. Third year (V and VI semesters) scheme and syllabi on May 25, 2017 at E-Class Room for the Academic Year 2017-18.

The following members were present in the meeting:

1. Prof. B.S. Chawla (External Expert Member BoS, Principal GEC Bilaspur)
2. Mr. Dalbir Singh Rekhi (Member BoS Industry Expert, J.S.P.L. Raigarh CG.)
3. Prof. Mukesh Kumar Singh (Dean, SoS, E&T, GGV, Bilaspur)
4. Mrs. Arpita Roy Choudhary (HOD, Assistant Prof., Dept. of Industrial and Production Engineering-cum Chairman, BOS)
5. Mr. C.P. Dewangan (Member BoS, Associate Professor, Dept. of Industrial and Production Engineering)
6. Mr. G.P. Shukla (Member BoS, Assistant Professor, Dept. of Industrial and Production Engineering)
7. Dr. Rajesh Kumar Bhushan (Invited Member, HOD, Dept. of Mechanical Engineering)

Following points were discussed during the meeting

1. In the meeting syllabus and scheme of B.Tech (IPE) from V Semester to VIII Semester have been discussed in detail as per Choice Based Credit System (CBCS).
2. B.Tech (Industrial and Production Engineering) Vth and VIth Semester have been approved by the B.O.S. member.
3. Syllabus from VII Semester to VIII Semester will be put in the forthcoming B.O.S meeting for approval after required correction.

**The following new courses were introduced in the of B. Tech. Third year (VI and VII Semesters):**

- ❖ METAL CUTTING (IP5TPC31)
- ❖ FLUID MACHINERY (IP5TPC32)
- ❖ MACHINE DESIGN- I (IP5TPC33)
- ❖ TURBO MACHINES (IP5TPE21)
- ❖ INTERNAL COMBUSTION ENGINE (IP5TPE22)
- ❖ MEMS AND NANO TECHNOLOGY (IP5TPE23)
- ❖ TOTAL QUALITY MANAGEMENT (IP5TPE31)
- ❖ INDUSTRIAL AUTOMATION (IP5TPE32)
- ❖ MECHATRONICS (IP5TPE33)
- ❖ FINANCIAL MANAGEMENT (IP5TOE11)
- ❖ MANAGERIAL ECONOMICS (IP5TOE12)




- ❖ FINANCIAL ACCOUNTING AND COSTING (IP5TOE13)
- ❖ METAL CUTTING LAB (IP5LPC31)
- ❖ FLUID MACHINERY LAB (IP5LPC32)
- ❖ SEMINAR (IP5LPC33)
- ❖ MACHINE DESIGN- II (IP6TPC41)
- ❖ MEASUREMENT, METROLOGY & CONTROL (IP6TPC42)
- ❖ WELDING ENGINEERING (IP6TPC43)
- ❖ MATERIAL MANAGEMENT (IP6TPE41)
- ❖ PLANT LAYOUT AND MATERIAL HANDLING (IP6TPE42)
- ❖ MAINTANCE AND RELIABILITY ENGINEERING (IP6TPE43)
- ❖ Automobile Engineering (IP6TPE51)
- ❖ POWER PLANT ENGINEERING (IP6TPE52)
- ❖ HEAT & MASS TRANSFER (IP6TPE53)
- ❖ ENTERPRISE RESOURCE PLANNING (IP6TOE21)
- ❖ Management Information System (IP6TOE22)
- ❖ SIX SIGMA AND DOE (IP6TOE23)

विभागाध्यक्ष / Head  
औद्योगिक एवं उत्पादन अभियांत्रिकी  
Industrial & Production Engineering  
सौद्योगिकी संस्थान / Engineering & Technology  
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)  
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD



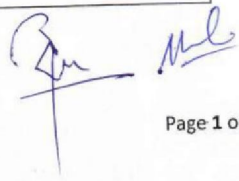
## Scheme and Syllabus

  
**INSTITUTE OF TECHNOLOGY**  
**GURU GHASIDAS VISHWAVIDHALAYA**  
 (A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY  
 ORDINANCE 2009, NO: 3 OF 2009)  
**DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING**  
**STUDY & EVALUATION SCHEME**  
**W.E.F. SESSION 2017-2018**  
**Year: B.Tech. III year**  
**SEMESTER-V**

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP5TPC31	Metal Cutting	3	0	0	40	60	100	3
2.	IP5TPC32	Fluid Machinery	3	0	0	40	60	100	3
3.	IP5TPC33	Machine Design- I	3	0	0	40	60	100	3
4.	IP5TPE2..	Elective-PE2	3	0	0	40	60	100	3
5.	IP5TPE3..	Elective-PE3	3	0	0	40	60	100	3
6.	IP5TOE1..	Elective-OE1	3	0	0	40	60	100	3
Total			18	0		240	360	600	18
<b>PRACTICALS</b>									
7.	IP5LPC31	Metal Cutting	-	-	03	30	20	50	2
8.	IP5LPC32	Fluid Machinery	-	-	03	30	20	50	2
9.	IP5LPC33	SEMINAR			03	50		50	2
Total					09	110	40	150	06

Elective-Professional Elective (PE)-2		Elective-Professional Elective (PE)-3		Elective- Open Elective (OE)-1	
S.N.	IP5TPE...	S.N.	IP5TPE...	S.N.	IP5TOE...
21.	Turbo Machines	31.	Total Quality Management	11.	Financial Management
22.	I.C. Engine	32.	Industrial Automation	12.	Managerial Economics
23.	MEMS and Nanotechnology	33.	Mechatronics	13.	Financial Accounting and Costing

  
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Date: 22/05/17  
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#### UNIT-I

**Basic concepts** - Definition and classification of metal cutting and tools, geometry of single point and multipoint cutting tools, and various angles of cutting tools and their functions, factors affecting tool geometry, Cutting tools nomenclature system, orthogonal and oblique cutting, cutting tool signature.

**Types of chips**- continuous, discontinuous and serrated built up-edge and their formation and factors.

#### UNIT-II

**Principal of metal cutting** – Elements of machining, mechanism of chip formation, forces on the chips, merchant theory and other theories of metal cutting, stresses and strain in chips, shear and strain rate, power and energy calculation.

**Theory of multipoint machining**- mechanism of drilling, machining time, torque and thrust, power calculation in drilling, milling, and broaching

#### UNIT-III

**Heat generation and cutting temperature in machining**- causes and sources of heat in cutting, heat distribution, their measurement. tool dynamometer and their types and working.

**Cutting fluids**- functions characteristics and types of cutting fluids and their application, criteria for selection of cutting fluids.

**Cutting tool materials**- requirements types and characteristics of various cutting tool materials, comparison and selections of cutting tools.

#### UNIT-IV

**Tool failures and tool life** – mechanism of tool failure, types of tool failure, tool wear and types, tool life and its measurement, Taylor's tool life equations, relationship between tool life cutting speed, feed, depth of cut, factors affecting tool life

**Control of chips and chip breakers** – methods of chip breaking, design principal of simple step type chip breakers. Working principal of chip breakers, effect of chip breaking.

#### UNIT-V

**Machinability** -definitions, evaluations, factors affecting machinability, machinability index.

**Economics of machining** – cost analysis and optimization of machining, various parameters for calculation of machining cost,

#### Text Books:

1. Manufacturing Technology Vol.-II P.N. Rao PHI
2. Manufacturing Science, Ghosh Mallick, E.W.P.

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4. Production Technology- Degarmo, P.H.I.
5. Text Book of Production Engineering- K.C. Jain & Chitale, P.H.I.
6. Machining & M/C Tools- A.B.Chattopodhyay- Willey

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#### UNIT - I

**Boundary Layer Theory:** Boundary Layer Definition and Characteristics, Momentum Equation, Laminar and Turbulent Boundary Layer, Total Drag, Separation and Control.

**Flow Around Submerged Bodies:** Force Exerted by Flowing Fluid on a Body: Drag and Lift; Stream Lined and Bluff Body, Drag on Sphere and Cylinder, Circulation and Lift on Circular Cylinder, Lift of an Air Foil.

#### UNIT - II

**Impact of Free Jets:** Impulse Momentum Principle, Force Exerted by the Jet on Stationary Flat and Curved Plate, Hinged Plate, Moving Plate and Moving Curve Vanes, Jet Propulsion of Ship.

**Impulse Turbine:** Classification of Turbine, Impulse Turbine, Pelton wheel, Construction Working, Work Done, Head Efficiency and Design Aspects, Governing of Impulse Turbine.

#### UNIT - III

**Reaction Turbine** Radial Flow Reaction Turbine, Francis Turbine: Construction, Working, Workdone, Efficiency, Design Aspect, Advantages & Disadvantages over Pelton Wheel.

**Axial Flow Reaction Turbine:** 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.

#### UNIT-IV

**Centrifugal Pumps:** 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.

#### UNIT - V

**Reciprocating Pumps:** Classification, Component and Working, Single Acting and Double Acting, Discharge, Work done and Power Required, Coefficient of Discharge, Indicator diagram, Air Vessels.

**Fluid system:** Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Press, Hydraulic Crane, Hydraulic Lift, Hydraulic Ram, Hydraulic Coupling, Hydraulic Torque Converter, Air Lift Pump, Jet Pump.

#### Text Books:

1. Mechanics of Fluid - Massey B.S. - English Language Book Society (U.K.)
2. Introduction to Fluid Mechanics and Fluid Machines - S.K. Som & G. Biswas - TMGH
3. "Fluid Mechanics & Machinery" by Agarwal, TMGH.
4. "Fluid Mechanics & Machinery" by Kothandraman & Rudra Mourthy, New Age Publication.

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5. Experiment in Hydraulics & Hydraulic M/C- Shesha Prakash- PHI
6. Fluid Mechanics & Turbo M/C- Das- PHI
7. Fundamentals of Turbo M/C- Venkanna- PHI
8. Introduction to Hydraulics & Pneumatics- Ilargo & Soundarajan- PHI

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#### UNIT-I

**Steady stresses and variable stresses in machine member**-introduction to the design process factors influencing machine design, selection of material based on mechanical properties, direct, bending and torsional stress equation, impact and shock loading, calculation of principle stresses for various load combination, eccentric loading, design of curved beams, crane hook and 'c' frame, factor of safety, theories of failure, stress concentration, fatigue design for variable loading, Soderberg, Goodman and Gerber relations.

#### UNIT -II

**Riveted joints** – failure of riveted joint, strength and efficiency of riveted joint. Design of butt and lap joint for a boiler, eccentrically loaded riveted joint.

**Design of thread joints**, bolted joint in tension, torque requirement for bolt tightening, bolted joint under fluctuating load. Eccentrically loaded joint in shear, bolted joint with combined stresses.

#### UNIT-III

**Design of cotter and knuckle joints**, socket and spigot cotter joint, sleeve and cotter joint Gib and cotter joint, design of knuckle joints.

**Welded joints**- stresses in butt and fillet welds, strength of welded joints, eccentrically loaded joint, welding joint subjected to Bending moment.

#### UNIT-IV

Design of Keys and coupling, flat and square keys, woodruff keys, splines, muff coupling, compression coupling, flange coupling, flexible coupling.

#### UNIT -V

**Design of shafts:** subjected to twisting moment, bending moment, combined twisting moment and bending moment, fluctuating loads, design of shaft on the basis of rigidity.

#### Text Books:

1. Machine Design-Bhandari, TMH
2. Machine Design:Spott, TMH
3. Machine Design: J.Shigley, TMH
4. Machine Design: Khurmi & Gupta, Khanna Publisher.
5. M/C Design- Sharma & Agrawal, Dhanpat Rai Publications.
6. Design of M/C Elements- Sharma & Purohit- PHI

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### IP5TPE21 - Turbo Machinery

#### UNIT-I

**Nozzles & Diffuser:** Nozzles & Diffuser types, their efficiency, critical pressure & velocity, relationship between area, velocity & pressure in nozzles flow.

**Steam Turbine Types:** Steam turbine-principal of operation of steam turbine, types, impulse turbine, compounding of steam turbine pressure compounded velocity compounded and pressure- velocity compounded impulse turbine.

**Velocity diagram for impulse turbine:** Force on the blade and work done, blade or diagram efficiency, gross stage efficiency, influence of ration of blade to steam speed on blade efficiency in a single stage impulse turbine, impulse blade section, choice of blade angle.

#### UNIT -II

**Impulse-reaction turbine:** Velocity diagram, degree of reaction, Impulse-Reaction turbines with similar blade section and half degree of reaction (parson's turbine) Height of reaction, blade section.

Energy losses in steam turbine-internal and external losses in steam turbine.

#### UNITS -III

**State points Locus & Reheat factors:** Factor-stage, efficiency of impulse turbine, stage point locus of an impulse turbine, state point locus for multistage turbine reheat factor. Internal efficiency, overall efficiency, relative efficiency, Design procedures of impulse & impulse reaction turbine.

**Governing of steam turbine:** Throttle governing, nozzle governing, bypass governing, combination of throttle and nozzle, governing and combination of bypass and throttle governing. Effect of governing on the performance of steam turbine.

#### UNIT -IV

**Gas turbine:** Classification of Gas turbine, simple open cycle gas turbine, ideal and actual (Brayton cycle) for gas turbine. Optimum pressure ratios for maximum specific output in actual gas turbine, Regeneration, reheat and inter cooling and effect of these modification on efficiency and output, closed cycle gas turbine.

#### UNIT -V

**Turbo compressors:** Introduction, classification of Centrifugal Compressor- Component working, velocity diagram, calculations of power and efficiencies. Slip factor, surging and choking, power and efficiencies.

**Axial Flow Compressor:** Construction and working, velocity diagram, calculation of power and efficiencies, Degree of reaction, work done factor, stalling, comparison of centrifugal and axial flow compressor.

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Books:

1. Steam and Gas Turbine – R. Yadav by C.P.H. Publication, Allahabad.
2. Turbine, Compressors and Fans – S.M. Yahya – TMH.
3. Gas Turbine – V. Ganeshan – TMH.
4. Fundamentals of Turbo Machinery- Venkanna, PHI.

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## IP5TPE22 - Internal Combustion Engine

### UNIT-I

Introduction of internal combustion engines, classification of I.C. engines, engines components, basic engine nomenclature, four stroke S.I. and C.I. engine, two stroke engines, comparison of two stroke and four stroke engines, comparison of S.I. and C.I. engines, application of IC engines.

**Air Standard Cycle:** Otto cycle, diesel cycle, dual cycle, comparison between otto, diesel and dual cycles, fuel-air cycles and actual-cycles, effect of variable specific heats and dissociation on indicator diagram.

### UNIT-II

**Combustion in S.I. Engines:** Flame development and its propagation, ignition lag, effect of engine parameters on ignition delay, preignition, knocking in S.I. engines, variables affecting knock, combustion chambers.

**Carburetor:** Principle of carburetion, elements of carburetor, parameters affecting carburetion, air-fuel mixtures, expression for air-fuel ratio.

**Fuel Ignition System:** Battery and coil ignition system, magneto ignition system, firing order, spark advancing.

**Combustion in S.I. Engines:** Flame development and Propagation, ignition lag, effect of air density, temperature, engine speed, turbulence, and ignition timings, physical and chemical aspect of detonation, effect of engine and fuel variable on knocking tendency, knock rating of volatile fuels, octane number, H.U.C.R., Action of dopes, pre-ignition, its causes and remedy, salient features of various types of combustion chambers, valve timing and firing order.

### UNIT-III

**Combustion in C.I. Engines:** Combustion phenomenon in C.I. engines, p- v diagram and their study for various stage of combustion, delay period, detonation in C.I. engines, parameters affecting detonation.

**Fuel Injection System:** Air and solid injection, fuel pump and injectors.

### UNIT-IV

**Engine Friction and Lubrication:** Total engine friction, blow by losses, pumping losses, factors effecting engine friction, mechanism of lubrication, lubrication system.

**Cooling System:** Piston and cylinder temperature distribution, parameters affecting engine heat transfer, principles and various methods of cooling.

**Two Stroke Engine:** Constructional details, scavenging parameters, models and performance of scavenging system, advantages and disadvantages of two stroke engines.

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IT- V

**Supercharging:** effect of altitude on mixture strength and output of SI engines, low and high pressure supercharging, exhaust, gas turbo-charging, supercharging of two stroke engines.

Engine friction and lubrication, Engine cooling system.

**Text Books:**

1. Mathur M.L. and R.P. Sharma, A Course in IC Engines, Laxmi Publication.
2. Ganesan.V, Internal Combustion Engines, TMGH Publication.
3. Taylor G.F., Internal Combustion Engines: Theory and Practice.
4. Stone, Richard, Introduction to IC Engine
5. Fundamentals of I.C. Engine- Gupta, PHI

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## IP5TPE23 - MEMS and Nanotechnology

### UNIT- I

**Introduction:** Definition of micro electro-mechanical systems (MEMS), micro sensor, micro actuators, microelectronic fabrications, mechanical thermal and magnetic MEMS, radio frequency (RF) MEMS, MOEMS, MEMS design consideration.

Micromachining, photolithography, structural and sacrificial materials, methods of lithography. Thin film deposition, and its developments process, LPCVD, PECVD, impurity doping, etching, problem with bulk micromachining, vapour bonding, LIGA.

### UNIT- II

**System modelling and properties of material-** System types and basic modelling elements in mechanical, thermal, fluid system. Translational and rotational pure mechanical system, hybrid system, analogy between mechanical and electrical system.

**Passive components and systems -** System on a chip, passive electronics system, passive mechanical system.

### UNIT- III

**Mechanical sensors and actuators-** Introduction, principals, micro plates, capacity impacts, piezoelectric materials, and their properties, MEMS gyroscope.

**Thermal sensor and actuators –** Introduction, thermocouple probe, micro hot plate gas sensors, mems thermo vessels, shape memory alloys.

### UNIT- IV

**Magnetic sensors and actuators-** Different types and principals.

**RF MEMS –**Introduction, RF based communication system, MEMS inductors, and tuner filter, Resonator.

### UNIT-V

**NANOTECHNOLOGY –** Introductions, nanotechnology materials, fullerenes, doping, CNT, SWCNT, MWCNT, development and application of CNT.

#### Text Books:

1. MEMS- Mahalik- McGrawHill.
2. MEMS & MOEMS Technology & Application- Rai Choudhary, PHI.

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## IP5TPE31 - Total Quality Management

### UNIT - I

**Basic concepts of Quality:** Inspection definition of quality, quality control cost of quality, Value of quality, Statistical Quality Control, Need and advantages of SQC

**Frequency Distribution:** Variables & attributes, quality characteristics, Theory of control charts, control chart for variable X & R chart, Control chart for attribution p, np, C, Chart & process capability

### UNIT - II

**Quality Assurance:** Quality assurance Manual, Quality Circle, characteristics of quality circle and the process of operation of quality circle, quality Policy & procedure & objectives.

**Acceptances Sampling:** Concept of sampling, O-C curve & its construction, Sampling plans, single, doubles & multiple sampling plans.

### UNIT - III

**Contribution of Various Quality Management Gurus:** Juran Trilogy, Deming's 14 Points, P-D-C-A Wheel, Taguchi's philosophy, Design of experiment, old and new Seven QC Tool of Quality, Philip Crosby's zero defect, seven types of waste, 5's, Quality function deployment

### UNIT - IV

**Introduction to ISO 9000:** Various models of ISO 9000, Clauses of 9000, Total Quality Control, Total Quality Management, Tool for TQC & TQM, Kaizen. 6 sigma quality, procedure of six sigma, TQM and Six Sigma

### UNIT - V

**Reliability:** Definitions, Bathtub curve, design for reliability, Failures & causes of failures, FMECA, Maintainability & Availability, MTBF, Reliability Models, system with components in series & in parallel, mixed arrangement, fault -tree-technique.

#### Text Books:

1. SQC by Grant & Leowowworth - Tata Mc. Hill
2. Quality Planning & Analysis by Juran & Gryana - Tata Mc. Hill
3. Total Quality Control By A. Feigenbaum - Mcgraw Hill
4. SQC by M.Mahajan - Dhanpat rai publication
5. Total Quality Management - Besterfield Tata Mc. Hill
6. Total Quality Management - Purnima charantimath (LowPearson Education)
7. Total Quality Management - Krishnaiya-PHI
8. Total Quality Management - Suganthi & Sannuel-PHI

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## IP5TPE32 - Industrial Automation

### UNIT-I

**Automation:** Definition; Automation in production systems; Automation principles and strategies; Basic elements of an automated system; Advanced automation functions; Levels of automation; Types of automation; Benefits and Impact of Automation in Manufacturing and Process Industries. Architecture of Industrial Automation Systems.

### UNIT -II

**Pneumatic Control Systems:** Overview of different types of valves and Actuators in Pneumatics, their applications and their ISO symbols. Design of Pneumatic circuits using Cascade method and Shift register method (up to 3 cylinders). Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves with and without grouping. Design of Pneumatic circuits using PLC Control (ladder programming only and up to 3 cylinders) with applications of Timers and Counters and concept of Flag and latching.

### UNIT -III

**Hydraulic Control Systems:** Overview of different types of valves, Actuators and Accumulators used in Oil hydraulic circuits, their applications and their ISO symbols. Basic hydraulic circuits involving linear and rotary actuators (No sequential circuits).

Fundamental concepts of digital and servo hydraulic controls. Comparison between proportional, digital and servo hydraulic control systems.

**Digital logic:** Number systems; Logic Gates; Boolean Algebra, Simplification of Boolean equations using Karnaugh Maps.

### UNIT -IV

**Microprocessors and Microcontrollers (Only basic understanding and applications) :** Concept of Microprocessor based control and its application; Parts of a Microprocessor system with block diagram of the general form of a microprocessor system; Data bus, Address bus and Control Bus; General internal Architecture of a Microprocessor; Functions of constituent parts such as ALU, Various Registers and the Control unit. Difference between a Microprocessor and a Microcontroller. General Block diagram of Microcontroller.

### UNIT-V

**Sensors and Transducers:** Fundamentals of displacement, position and Proximity Sensors; Velocity and Motion Sensors; Force and Fluid Pressure Sensors; Liquid level and Flow sensors; Temperature and light Sensors; Control of stepper motors.

#### Text Books:

1. Industrial Production & Automation- Mikel P. Grover, PHI
2. Automation Production System and CIM- Mikel P. Grover, PHI

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### IP5TPE33 - Mechatronics

#### UNIT-I

**Introduction to Mechatronics:** Sensors and actuators type, selection and interfacing, Digital electronics and microprocessors in Mechatronic systems, Mechatronic systems modeling, Analysis and control of analog, digital and hybrid systems, Mechatronic systems design principles.

#### UNIT-II

**Introduction to Mechatronics Systems:** Measurement systems control systems mechatronics approach.

**Sensors and Transducers:** Introduction performance terminology displacement, position and proximity, velocity and motion, Fluid pressure, temperature sensors, light sensors selection of sensors signal processing

#### UNIT-III

**Microprocessor:** Introduction architecture, pin configuration, instruction set, programming of Microprocessor using 8085 instructions, interfacing input and output devices, interfacing D/A converters and A/D converters, applications, temperature control, stepper motor control, traffic light controller.

#### UNIT-IV

**Programmable Logic Controller:** Introduction, basic structure, Input/Output processing, programming, Mnemonics, Timers, Internal relays and Counters, Data handling, Analog input/output selection of a PLC.

#### UNIT-V

**Design and Mechatronics:** Stages in Designing Mechatronic systems, Traditional and Mechatronic design, possible design solutions, case studies of mechatronic systems, pick and place robot, automatic car park system, engine, management system.

#### Text Books:

1. HMT Ltd, "Mechatronics", Tata McGraw Hill Publishing Co.Ltd.,1998
2. Bradley D.A., Dawson D., Burn N.C. and Loader A.J., "Mechatronics", Chapman and Hall, 1993.
3. Gaonkar Ramesh S."Microprocessor Architecture, programming and Applications", Wiley Eastern, 1997
4. Mechantronics- Singh & Joshi-PHI

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## IP5TOE11 - Financial Management

### UNIT -I

**Introduction:** Scope and objective, organisation of finance function, Time value risk and return and valuation of money, valuation of long term securities various model of pricing.

### UNIT -II

**Statement of changes in financial position:** Sources and uses of working capital ,cash flow statement, balance sheet, profit loss account and its process

**Financial ratio analysis:** Meaning, types, importance and limitations, calculation of various ratios.

### UNIT -III

**Capital budgeting:** Principals, techniques, various methods of capital budgeting. Concept and measurement of cost and capital, and various approaches for measurement of cost of capital and computation.

**Analysis of risk and uncertainty:** various approaches for risk evaluation.

### UNIT -IV

**Theory of working capital management:** Concept and definition of gross, working capital and net working capital, trade off between profitability and risk.

### UNIT -V

**Operating financial and combined leverage:** Introduction, definition and concept and various approaches.

### Text Books:

- 1 Financial Management by Khan and Jain, TMGH
3. Financial Management by Kuchhal, Vikas Publication
4. Financial Management- Paresh Shah-Willey India Pvt. Ltd.

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## IP5TOE12 - Managerial Economics

### UNIT- I

Introduction to Managerial Economics, Different Area of Managerial Economics, Micro and Macro Economics, Nature and Scope of Managerial Economics- Demand Analysis, Law of Demand and its Exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Supply Analysis, Law of Supply, Elasticity of Supply: Definition, Types, Measurement and Significance of Elasticity of Supply.

### UNIT- II

Law of Return, Revenue Analysis, Theory of Production and Cost Analysis: Production Function, Cobb-Douglas Production Function, ACMS Production Function, Investment Function.

Cost Analysis: Cost Concept, Opportunity Cost, Fixed Vs Variable Cost, Explicit Costs Vs Implicit Costs, Out of Pocket Costs Vs Imputed Costs. Break-even Analysis (BEA) - Determination of Break-even Point (Simple Problem) - Managerial Significance and Limitation of BEA.

### UNIT-III

Introduction to Market & Pricing Policies: Element of Market , Types of Market, Concept of Market, Classification of Market based on the nature of competition, Types of Competition, Features of Perfect Competition, Feature of Imperfect Competition, Monopoly and Monopolistic Competition, Price-Output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing: Introduction, Full Cost or Cost plus Pricing, Differential Pricing, Going Rate Pricing, Marginal Cost Pricing, Trade Association Pricing, Loss Leadership Pricing, Administered Pricing

### UNIT- IV

**Forms of Business Organization:** Introduction, Definition, Essential Element of Good Organization, Principles of Organization, Formal and Informal Organization, Organization Structure, Concept of Ownership Organization, Types of Ownership, Partnership, Joint Stock Company, Types of Joint Stock Company, Co-Operative Organization, Public Sector Organization.

**Capital and Capital Budgeting:** Capital and Its Classifications, Need of Working Capital and Its Assessment, Factors Affecting Working Capital, Fundamental of Accounting, Types of Capital, Method and Sources of Raising Finance ,Nature and Scope of Capital Budgeting, Features of Capital Budgeting Proposals, Method of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method ( Simple Problems).

### UNIT- V

Fundamental of Financial Accounting: Nature of Accounting, Important Accounting Terminology, Accounts and Types of Accounts, Rules of Debit and Credit, System of Book Keeping, Book of Accounts, Journal, Ledger, Trial Balance, Final Account, Trading Account, Profit and Loss Accounts and Balance Sheet.

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**Financial Analysis Through Ratios:** Classification of Financial Ratios, Liquidity Ratios, Leverage Ratios, Activity Ratios, Profitability Ratios, Current Ratio, Acid Test Ratio, Debt Equity Ratio, Assets Coverage Ratio, Debt Service Coverage Ratio, Inventory Turnover Ratio, Debtor Velocity Ratio, Creditor Velocity Ratio, Gross Profit Ratio, Net Profit Ratio, Return on Equity Ratio.

**Text Books:**

1. Managerial Economics by Yogesh Maheshwari, PHI
2. Managerial Economics By Joel Dean, PHI
3. Managerial Economics By Craig H. Petersen, W. Cris Lewis, Sudhir K Jain
4. Financial Accounting For Management By Ambrish Gupta, Pearson Education
5. Managerial Economics By H. Craig Peterson & W. Cris Lewis, PHI
6. Managerial Economics By Suma Damodaran, Oxford University Press
7. Managerial Economics and Financial Analysis By Aryasri, TMH

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### IP5TOE13 - Financial Accounting and Costing

#### UNIT-I

**Financial Accounting:** Introduction to Book keeping, Double-entry accounting, Journal & Ledger posting, Financial Statements & Analysis, Trial balance, preparation of Trading and Profit & Loss account and Balance Sheet.

#### UNIT-II

**Ratio Analysis:** Balance sheet ratios-current ratio, Fixed Asset ratio, Liquidity ratio, Capital Gearing Ratio, Profit-loss account ratios-Gross Margin ratio, Net Margin Ratio, Combined ratios-Return on Investment ratio, Net Profit to Total Assets ratio, Creditors turnover ratio.

#### UNIT-III

**Costing:** Objectives of costing, Elements of costing, methods of costing, preparation of cost sheet, job costing, Marginal costing, absorption costing, Process costing and Standard Costing-Material, labour, overhead cost variance, Activity Based Costing and Target Costing, Cost-Profit-Volume analysis and problems on cost-volume-profit analysis.

#### UNIT-IV

**Working Capital Management:** Introduction, concepts of working capital, operating and cash conversion cycle, permanent and variable working capital, balanced working capital position, determinants of working capital, Estimating working capital needs, Policies for financing current assets, Issues in working capital management.

#### UNIT-V

**Capital Budgeting:** Nature and scope of capital budgeting, features of capital budgeting, Methods of capital budgeting-DCF, NON-DCF techniques-Accounting rate of Return, Net present Value, Payback period, discounted payback period, Profitability Index.

#### Text Books:

1. T. Vijaya Kumar, Accounting for Management, 1/e, Tata McGraw-Hill, 2009.
2. I. M. Pandey, Financial Management, 9/e, Vikas Publishing House, 2009.
3. M.Y. Khan and P. K. Jain, Cost Accounting, 2/e, TMH, 2014.
4. M.Y. Khan and P. K. Jain, Management Accounting: Text, Problems and Cases, 6/e TMH, 2013.
5. M.Y. Khan, P. K. Jain, Basic Financial Management, 3/e, TMH, 2000.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER



INSTITUTE OF TECHNOLOGY  
GURU GHASIDAS VISHWAVIDHALAYA  
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009,  
NO: 3 OF 2009)  
DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING  
STUDY & EVALUATION SCHEME  
W.E.F. SESSION 2017-2018  
Year: B.Tech. III year

SEMESTER-VI

S. No	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP6TPC41	Machine Design- II	3	1	0	40	60	100	4
2	IP6TPC42	Measurement , Metrology & Control	3	1	0	40	60	100	4
3	IP6TPC43	Welding Engg.	3	0	0	40	60	100	3
4	IP6TPE4..	Elective-PE4	3	0	0	40	60	100	3
5	IP6TPE5..	Elective-PE5	3	0	0	40	60	100	3
6	IP6TOE2..	Elective-OE2	3	0	0	40	60	100	3
Total			18	2		240	360	600	20
<b>PRACTICALS</b>									
7.	IP6LPC42	Measurement and metrology lab	-	-	03	45	30	75	2
8.	IP6LPC43	Welding Engg. Lab	-	-	03	45	30	75	2
Total					06	90	60	150	04

Elective- Professional Elective (PE)-4		Elective- Professional Elective (PE)-5		Elective- Open Elective (OE)-2	
S.N.	IP6TPE4..	S.N.	IP6TPE5..	S.N.	IP6TOE2...
41.	Material Management	51.	Automobile Engg	21.	Enterprise Resource Planning
42.	Plant Layout & Material Handling	52.	Power Plant Engg	22.	Management Information System
43.	Maintenance And Reliability Engineering	53.	Heat & Mass Transfer	23.	Six Sigma And DOE

Dr. B. Singh Rishi  
22/05/17

Dr. Anurag  
22/05/17

Dr. Sandeep  
22/05/17

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**Note:** After the completion of semester exams, students will have to join industrial training of about minimum 4 weeks (5day week and 8 hours a day) in industry. The presentation and report of this will be given in 7<sup>th</sup> sem during defined schedule by Head of Department. The due credit will be awarded in 7<sup>th</sup> semester.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPC41- Machine Design-II**

**UNIT-I**

**Spring:** Spring Materials and Their Mechanical Properties, Equation for Stress and Deflection, Helical Coil Springs of Circular Section for Tension, Compression and Torsion, Dynamic Loading, Fatigue Loading, Wahl Line, Leaf Spring and Laminated Spring.

**UNIT-II**

**Gears :** Spur Gears ,Gear Drives, Classification of Gears, Selection of Type of Gears, Law of Gearing, Force Analysis, Gear Tooth Failures, Selection of Material, Number of Teeth, Face Width, Beam Strength of Gear Tooth, Effective Load on Gear Tooth, Estimation of Module Based on Wear Strength, Lewis equation, Gear Design for Maximum Power Transmitting Capacity, Gear Lubrication.

**UNIT-III**

**Helical Gears :** Helical Gears, Terminology of Helical Gears, Virtual Number of Teeth, Tooth Proportions, Force Analysis, Beam Strength of Helical Gears, Effective Load on Gear Tooth, Wear Strength of Helical Gears.

**Bevel Gears:** Bevel Gears, Terminology of Bevel Gears, Force Analysis, Beam strength of Bevel Gears, Wear Strength of Bevel Gears, Effective Load on Gear Tooth.

**UNIT-IV**

**Ball & Rolling Contact Bearings:** Types of Ball and Roller Bearings, Selection of Bearing for Radial and Axial Load, Bearing Life, Mounting and Lubrication, Shaft Scales – Contact Type and Clearance Type.

**Journal Bearings:** Types of Lubrication, Viscosity, Hydrodynamic Theory of Lubrication, Sommerfield Number, Heat Balance, Self-contained Bearings, Bearing Materials.

**UNIT-V**

**Clutches and Brakes:** Friction Clutches, Friction Materials, Torque Transmitting Capacity, Single & Multiple Plate Clutch, Centrifugal Clutches. Band and Block Brakes.

**Belt Drive:** Flat and V-belts, Belt Constructions, Geometrical Relationships for Length of the Belt, Analysis of Belt Tensions, Condition for Maximum Power, Selection of Flat & V-Belts, Adjustment of belt Tensions.

**Text Books:**

1. Design of Machine Elements V.B. Bhandari, TMH Publications.
2. Machine Design by Shigley – McGraw Hill Pub.

Page 3 of 23

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

3. Principles of Mechanical Design by R. Phelan – McGraw Hill Pub.
4. Machine Design By Spotts-PHI
5. Machine Design, by Norton.

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Page 4 of 23

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPC42 Metrology, Measurement and Control**

**UNIT-I**

**Introduction to Measurement and Measuring Instruments**, Generalized Measuring Systems and Functional Element, Static & Dynamic Performance Characteristic of Measurement Devices, Calibration, Concept of Error, Sources of Error, Analysis of Error.

**Transducers**: Types of Transducers and Their Characteristics, Measurement of Strain, Strain Gauges and Their Working, Gauge Factor, Strain Gauge Circuits, Strain Rosettes.

**UNIT-II**

**Measurement of Pressure**: Pressure Measuring Transducers, Elastic Diaphragms, Measurement of Vacuum and Low Pressure, Various Low Pressure Gauges.

**Measurement of Fluid Flow**: Various Methods of Flow Measurement and Devices  
**Temperature Measurement**: Bi-Metallic Thermometers, Thermocouples, Thermistors and Pyrometers.

**UNIT-III**

**Metrology** :Standards of Linear Measurement ,Line and End Standards System of Limit and Fits, Limit Gauges and Their Design, Measurement of Geometric Forms Like Straightness, Flatness, Roundness and Circularity ,Measurement of Surface Textures, Quantitative Evaluation of Surface Roughness and Its Measurement, Introduction of CMM, Its Working and Application.

**UNIT-IV**

**Interferometry**: Principle and Uses of Interferometry, Types of Interferometers

**Comparators**: Classification, Working Principle and Magnification Range of Mechanical, Electrical, Optical, Electronic, Pneumatic Comparators, Measurement of Screw Threads & Gears, Two Wire and Three Wire Method

**UNIT-V**

**Fundamentals of Control System**: Control system concepts, classification of control systems, mathematical representation of system equations, hydraulic, pneumatic, thermal and mechanical system and their mathematical modelling, response characteristics of components and systems through classical solution.

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**Text Books:**

1. Beckwith and Buch, Mechanical Measurement
2. Jain RK Instrumentation
3. Raven H Automatic Control Engineering
4. Donal P Eckman Automatic Process Control
5. Nakra & Choudhary Instrumentation Measurement & Analysis
6. Nakra BC Theory & Application of Automatic Controls
7. Cooper Albert D Modern Electric Instrumentation PHI

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPC43 Welding Engineering**

**UNIT-I**

**Classification of welding:** gas welding, Arc Welding and Equipments, types of welding Flames, Welding Techniques, Welding Torches and Blowholes. Submerged Arc Welding, TIG, MIG, Plasma Arc Welding and its Application.

**UNIT-II**

**Arc Welding:** Arc Welding Power Sources, Selection Factor for Power Sources, DC-Generator, rectifiers, Constant Current & Constant Voltage Machines, welding Transformers.

**Welding Electrodes:** Types, Electric Coating, Selection of Electrode, Classification, Coating of Mild Steel and Alloy Steel Electrode, Metal Transfer in Arc Welding.

**UNIT-III**

**Resistance welding Process:** Spot Welding, Seam, Projection, Butt Welding, Flash Butt Welding, Precision Welding.

**Solid State Welding Process:** Cold Welding, Diffusion Welding, Ultrasonic Welding, Explosive Welding, and Friction Welding.

**Radiant Energy Welding Process:** Electrical Beam Welding, Laser Beam Welding.

**UNIT-IV**

**Brazing, Soldering and their Application:** Weld ability of Metals: Introduction, Welding of Cast Iron, Stainless Steel, Aluminium, Copper and its Alloys, Hydrogen Induced Cracking.

**Welding Distortion:** Distortion and Residual Stresses, Types, Control of welding Distortion, Various discontinuities in welds, Trouble shooting.

**UNIT-V**

**Design of Weldment:** Weld Geometry, Eccentric Loading Designing Torsion and bending, Designing welding fixtures.

**Testing, Inspection and Specification:** Destructive and Non-destructive methods of testing Weldment, WPS, PQR, and ASME section IX Welding.

**Robotics and Automation in Welding:** Modes of Automation, Positioners, Welding Fixtures, and Arc Motion Devices, Under Water Welding.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**Text Books:**

1. American Welding Society, Hand Book VII Edition Vol. II.
2. Nadkarni S.V., Modern Arc Welding..
3. Welding Engg. , Little, TMGH.
4. Khanna O.P., Welding Technology, Dhanpat Rai & Sons.
5. Parmar R.S., Welding Processes & Technology, Khanna Publishers.
6. Parmar R.S., Welding Engg. & Technology, Khanna Publishers.
7. P.N.Rao, Manufacturing Technology Vol-I, TMH

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

### IP6TPE41 - Materials Management

#### UNIT-I

Introduction: Definition and scope, concept of integrated materials management, materials research, materials planning and budgeting, codification, standardization.

Purchasing: Objective and function of purchasing department, purchasing procedure, negotiation, and source-selection.

#### UNIT-II

Types of purchasing, buying seasonal commodities, purchasing under uncertainty, purchasing of capital equipment, international purchasing, public buying, legal concept in buying, insurance buying, price forecasting.

#### UNIT- III

Stores management, stores system and procedure, incoming material control, stores accounting and stock verification, obsolete, surplus and scrap management.

#### UNIT-IV

Basic inventory system: concept of inventory, types of inventory, relevant costs of inventory, economic order quantity, inventory control techniques, basic models of inventory.

Spare parts management: definition of spares and its classification, MUSIC-3D, view of spares, multi echelon spares inventory.

#### UNIT-V

Value analysis: value importance, normal degree value analysis applied to purchase; organizing for value analysis, cost analysis and value analysis aid purchase research. Material and process selection in VE design, material, process & supplier decisions.

#### Text Books:

1. Materials Management an integrated approach, Gopalkrishnan.P & Sundaresan.M (2002) Prentice Hall India Limited, NewDelhi.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

2. Materials Management Text and Cases, Chitlae, A.K & Gupta, R.C. (2009) Prentice Hall India Limited. New Delhi.
3. Maintenance and Spare parts Management, Pathak () Prentice Hall India Limited, New Delhi.
4. Production and Operations Management, Chary, S.N. () Tata McGraw Hill.
5. Material management: An integrated approach, Dutta ()

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPE42 - Plant Layout & Material Handling**

**UNIT-I**

**Plant facility location** –concept of plant facility, its scope, importance and objectives nature of location decision, need for facility location planning, general procedures and factors influencing location decision, facility location models, economics and cost analysis, rural and urban location pattern in India.

**UNIT-II**

**Layout Designs** –Industrial plant design consideration, types of production types of layout, factors affecting layout tools, techniques and procedure used in workstation and plant layout, quantitative technique in plant layout, developing product and process layout, comparing layouts, criteria for computerized facility layout, concept of computerized layout programs like CRAFT, CORELAP, ALDEP and PLANET.

**UNIT-III**

**Flow pattern design** -Overall system flow cycle, need and advantage of planned material flow, factors for consideration, designing flow pattern, flow patterns for production lines and assembly lines methods.

**UNIT-IV**

**Material Handling**- scope and functions of material handling, manual mechanical handling ratio, principles of material handling, analysis of material handling problem, classification of material handling system, salient features and application of general purpose material handling equipment, material handling in stores and warehouses, automation in part handling handling and industrial robots, optimum allocation of material handling equipment.

**UNIT-V**

Automated material handling system, concept of AGVs, AR/RS and Methods to minimize cost of material handling., safety in material handling , evaluation of material handling process, design procedure of cranes , lifts.

**Text Books:**

- 1 Practical plant layout by Muther
- 2 Plant layout and design by James More
- 3 Manufacturing Management- a Quantitative approach by Robert Aolsem.
- 4 Productions and Operation Management by Lockyer

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

### IP6TPE43 - Maintenance and Reliability Engineering

#### UNIT-I

**Concept of reliability:** objectives, applications, area of use, use of reliability in industry. The reliability functions, mean time between failures, hazard rate function, bath tub curve, conditional reliability, probability density function, failure rate, failure density, hazard rate, uncertainty measures.

#### UNIT-II

**Constant and time dependant failure models:** Exponential, webull, normal and lognormal Distributions, discreat distribution, binomial distribution, poisson distribution.

**Reliability of systems,** Series , parallel ,mixed connected systems, K-out -of -M system Concept of redundancy, objectives, applications, redundant standby systems, system structure functions, minimal cuts and minimal paths, common mode failures, three state devices.

#### UNIT-III

**Determination of reliability (state dependant systems):** Markov analysis, load sharing system, standby systems, degraded systems.

**Failure Analysis:** Introduction to failure mode and effect analysis, FMEA and FMECA, criticality analysis, Fault tree diagram, event tree. **Availability:** concept and definitions, types of availability model, system availability.

#### UNIT-IV

**Introduction:** Objectives and policies of maintenance, maintainability terms and definitions, maintainability organization functions and tasks. estimation of maintainance cost.

**Types of maintenance:** breakdown, predictive, replacement, on-line, off-line, preventive Maintenance, reconditioning and correction maintenance, Preventive maintenances v/s. repair, reliability centered maintainace, condition based maintainance, principals and level of CBM.

#### UNIT-V

Total productive maintainace, goals objective benefits of TPM, component of TPM, calculation of OEE.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

Training for maintainace personal, objective and level of training, types of training methodology, evaluation of maintainance department.

**Text Books:**

1. Clifton R H, "*Principles of Planned Maintenance*", McGraw Hill, New York, 2001.
2. Ebling CE, "*An introduction to Reliability and Maintainability Engineering*" Tata McGraw Hill,
3. Srinath L S "*Reliability Engineering*", Affiliated East-West Press Limited, New Delhi, 2002.
4. Dhillon B S, "*Engineering Maintainability*", Prentice Hall of India, New Delhi, 2000.
5. Maintainace and spare parts management by P. Gopal krishnan PHI.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPE51 - Automobile Engineering**

**UNIT-I**

Introduction of an automobile, component and basis structure of automobile, classification, difference between automobile and automotive, the chassis construction & classification, defect in frames, frameless construction & specifications. Wheel and tyres: Types of wheel, wheel dimension, desirable tyres properties, types of tyres, tyre material, tyre dimension, factor affecting tyre life.

**UNIT-II**

Transmission system: Function of transmission types, sliding mesh gear box, constant mesh gear box synchro mesh gear box, cylindrical gear box, torque converter, propeller shaft, universal joint, hooks joint, final drive, differential, performance of gear box.

**UNIT-III**

Clutches: Requirement, function & type of clutch, dry friction clutch, wet friction clutch, clutch plate, single plate & multiple plate clutch, centrifugal clutch, and fluid fly wheel. Suspension system function and requirement, leaf spring, torsion bar, telescopic shock absorber.

**UNIT-IV**

Brakes: Function and requirement, brake efficiency, wheel skidding, types of brake, electrical, mechanical and hydraulic & pneumatic brakes, master cylinder, wheel cylinder, self-actuating brakes, brake drum, brake liners, brake shoe, trouble shooting.

**UNIT-V**

**Front axle and suspension wheel alignment purpose**, factor of front wheel alignment, steering geometry, correct steering angle, steering mechanism, under steer and over steer, steering gear, power steering, reversibility of steering gears, steering gear ratio, calculation of turning radius.

**Engine emission:** Emission standard of vehicle in India, Euro norms, emission, testing. Principle of multipoint fuel injection (MPFI), component of MPFI, Different sensors of MPFI system; vehicle air conditioning, Catalytic connectors, engine troubles & repairs.

**Text Books:**

1. Automobile Engineering Kripal Singh Vol. I, II
2. Automobile Mechanics Joseph Heitner.
3. Automobile Engineering Giri N.K
4. Automobile Engineering by Shrinivasan T.M.H.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPE52 - Power Plant Engineering**

**UNIT-I**

**Introduction:**

Sources of energy, present power position in India, non-conventional energy and their application, steam power plant. High-pressure boilers and their classification and working. Boiler accessories and mountings, condenser and their types.

**UNIT-II**

**Solar Energy:** Solar Insulation Calculation, Flat plates and concentrating collectors for liquid and gases, construction.

Collector Area Calculation: heat removal Factor, Efficiency.

**Solar System:** Power plants, low temperature and high temperature plants, solar dryers, solar cookers, solar refrigeration systems, solar panel.

**UNIT-III**

**Nuclear Energy:** Introduction to Nuclear Engineering, Release of Energy by Nuclear Reaction, chain reaction, moderation, components of nuclear reactor, types of reactor, Pressured water reactor, CANDU reactor, Gas cooled reactor, Liquid metal cooled reactor, breeder reactor, Nuclear Materials.

**UNIT-IV**

**Geothermal power plant.** Wind energy: Type of Rotors, horizontal axis and vertical axis systems, system design and site selection blade material. Wind power scenario in India. Bio Gas Plant: Types, parameters affecting plant performance, plant design.

**UNIT-V**

**Direct Energy Conversions:** fuel Cells, Thermo-electric, Thermo ionic and MHD Systems (Magneto Hydrodynamic system), Economic analysis of Power plant tariffs.

**Text Books:**

1. Power plant Engineering, Domkundwar & Arora, Dhanpat Rai Publication.
2. Sukhatme, S.P., Solar energy, TMH Publication.
3. Duffie and Beckman, Solar Energy Thermal Processes, John Wiley.
4. P.K.Nag, Power plant Engineering.
5. Power Plant Engineering by Wakil, TMH

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TPE53 - Heat and Mass Transfer**

**UNIT-I**

**Introduction**

Various modes of heat transfer, Fourier's, Newton's and Stefan Boltzmann's law, combined modes of heat transfer, thermal transfer, thermal diffusivity, overall heat transfer coefficient.

**Conduction**

The thermal conductivity of solids, liquids and gases, factors in influencing conductivity measurement. The general differential equation of conduction, one dimensional steady state conduction, linear heat flow through a plane and composite wall, tube and sphere critical thickness of insulation, effect of variable thermal conductivity, conduction with heat generation in flat and cylinders.

**UNIT-II**

**Fins**

Conduction convection system, extended surfaces rectangular, triangular circumferential and pin fins. general conduction analysis, fins of uniform and non-uniform cross section area. Heat dissipated by a fin. Effectiveness and efficiency of fin. Approximate solution. Design a fin for maximum heat transfer. Solution for different boundary condition. Use of fins analysis for measuring temperature error of thermometer.

**Transient/ unsteady state heat conduction**

Introduction to unsteady state heating and cooling, system with negligible internal resistance, lumped capacity method and its validity. Unsteady state conduction through finite and semi-infinite slab without surface resistance, convection boundary conditions. Solution through Heisler's chart.

**UNIT-III**

**Forced Convection:** Physical mechanics of forced convection. Dimensional analysis for forced convection, velocity and thermal boundary layer, flow over plates, flow across cylinders and spheres, flow in tubes, Reynolds's analogy.

**Natural Convection** Physical mechanism of natural convection, Dimensional analysis of natural convection, empirical relationship for natural convection.

**UNIT-IV**

**Boiling and Condensation:** Boiling heat transfer, pool boiling, boiling regimes and boiling curve, heat transfer, correlations in pool boiling. Condensation heat transfer, film condensation, derivation for the average heat transfer coefficient 'h' for the case of laminar film condensation over vertical.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**Heat Exchangers:** Different type of heat exchanger. Determination of heat exchanger performance, heat exchanger transfer unit, analysis restricted to parallel and counter flow heat exchanger (LMTD and NTU method).

**UNIT-V**

**Thermal Radiation**

Introduction, absorption and reflection of radiant energy, emission, radiosity and irradiation, black and non black bodies, Kirchoff's law; intensity of radiation, radiation exchange between black surface, geometric configuration factors. Grey body relation exchange between surface of unit configuration factors.

**Introduction to mass Transfer**

Mass and mole concentrations, molecular diffusion, eddy diffusion, molecular diffusion from an evaporating fluid surface, introduction to mass transfer in laminar and turbulent convection combined heat and mass transfer.

**Text Books:**

1. Heat transfer-S.P. Sukhatme-TMH
2. Heat & Mass Transfer-Arora and Domkundwar-Dhanpat Rai
3. Heat Transfer-C P Arora, TMH
4. Heat & Mass Transfer-R.C. Sachdeva-New Age
5. Heat Transfer-J.P. Holman-TMH
6. Heat Transfer-A Practical Approach- Yunus A. Cengel

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TOE21 - Enterprise Resource Planning**

**UNIT-I**

Introduction to Enterprise resource planning, Evolution of ERP, MRP, MRP-II, e-ERP, Generic business model with reference to ERP, Structure of ERP Two tier architecture client, server, Three tier architecture, repository, RDBMS, Operating systems, Generic model of ERP system - Design tree node structure, Design of, Role/Activity Diagrams, Benchmarking, Types of Benchmarking, Process of Benchmarking.

**UNIT-II**

Introduction to Business Process Re-engineering, Procedure of BPR, Principle of BPR, Process improvement Process redesign

**UNIT-III**

Introduction : Supply chain Management and ERP, understanding the supply chain with case examples, Supply chain performance with measures, Achieving strategic fit and scope, Supply chain drivers, Supply chain obstacles, ERP Vs SCM, Benefits of supply chain improvement, Introduction of Logistics Types of Logistics, Types of Logistics, Benefits of Logistics.

**UNIT-IV**

Integrated SAP model, Integrated Data, Master Data, Transactional Data, Integrated processes, Evolution Electronic Data Interchange (EDI), Use of EDI, and Benefits of EDI, Selection of ERP: Introduction Opportunities and problems in ERP selection, Approach to ERP selection of ERP.

**UNIT-V**

Origins of SAP, SAP's Markets, SAP architecture and integration, SAP Business structure, Customization of SAP, SAP R/3 material Management, Sales and Distribution, Production, Plant Maintenance, Quality Management, Methodology for ERP implementation, Implementation phases, Implementation of Life cycle

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**Text Books:**

1. Enterprise Resource Planning: Theory and practice by Rahul V, PHI Publication.
2. Enterprise Resource Planning: Concepts and practice by V.K. Garg, TMH Publication.
3. Enterprise Resource Planning by Alexis Leon, McGraw-Hill Publication

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**IP6TOE22 - Management Information System**

**UNIT-I**

Organisation & Types, Decision Making, Cost & value of information, Introduction to information in business, types of information system, need, importance, scope and characteristics of information system. Component of information system, developing information system.

MIS concept evaluation and characteristics structure of MIS, MIS v/s data processing, MIS and DSS

**UNIT-II**

Solving Business Problems with Information System, Concept of Balanced MIS, Effectiveness & Efficiency Criteria. Tool and Techniques of MIS- dataflow diagram, flow chart etc.

Data base technology- introduction, data base and enterprise management, data independence data base approaches, data base architecture, data models, DBMS SQL and working, 4GL, data administration.

**UNIT-III**

Business application of information technology: electronic commerce Internet, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information system for managerial Decision Support, Information System for Strategic Advantage.

**UNIT-IV**

Managing Information Technology, Enterprise & Global Management, Security & Ethical Challenges, Planning & Implementing Change. Reports: Various types of MIS reports, GUI & Other Presentation tools.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

**UNIT-V**

Advanced concepts in information system: Enterprise Resource Planning: introduction, various modules like Human Resources, Finance, Accounting, Production & Logistics. Supply Chain Management, CRM, Procurement, Management System Object Oriented modeling case studies.

**Text Books:**

1. O.Brian, "Introduction to Information System", McGraw Hill.
2. O.Brian, "Management Information System", TMH.
3. MIS by Rahul De Wiley.
4. MIS Louden and lauden PHI
5. Bansal, "Information System Analysis & Design", TMH.
6. Jawadegar, "Management Information System", TMH.
7. Murdick, "Information System for Modern Management", PHI.
8. Alexis Leon. "Enterprise Resource Planning", TMH.
- 9 MIS by Sadagopan, PHI

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### IP6TOE23 Six Sigma and DOE

#### UNIT-I

**Quality Perception :** Quality in Manufacturing, Quality in Service Sector, Differences between Conventional and Six Sigma concept of quality,

**Probability Distribution:** Normal, Binomial, Poisson distribution.

**Basics of Six Sigma:** Concept of Six Sigma, Defects, DPMO, DPU, Attackson X'S, Customer focus, Six Sigma for manufacturing, Six Sigma for service, Z score, Understanding Six Sigma organization, Leadership council, Project sponsors and champions, Master Black Belt, Black Belt, Green Belts.

#### UNIT-II

**Methodology of Six Sigma:** DMAIC, DFSS, Models of Implementation of Six Sigma, Selection of Six Sigma Projects. , Introduction to software for Six Sigma, Understanding Minitab, and Graphical analysis of Minitab plots.

#### UNIT-III

**Six Sigma Tools:** Project Charter, Process mapping, Measurement system analysis, Hypothesis Testing, Quality Function deployment, Failure mode effect analysis.

#### UNIT-IV

**Design of Experiments:** Applications of experimental Design, basic principles, design guidelines, statistical design and problems. Experimental design; statistical analysis of data. Loss function and its calculations.

#### UNIT-V

**Comparative Experiments:** Statistical concepts, sampling and sampling Distributions, Inferences about the differences in means, randomized design, and inference about differences in means paired comparison design, inferences about the variances of normal distributions, problems. Experiment with single factor: the analysis of variance (ANOVA), analysis of fixed effects models, model adequacy checking, practical interpretation of results, sample computer output, determining the sample size, discovering the dispersion effect, the regression approach to the ANOVA, and non-parametric method in the ANOVA.

#### Text Book:

1. Issa Bass, Barbara Lawton, Lean Six Sigma Using Sigma XL and Minitab,

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- 1/e, Tata McGraw-Hill, 2010.
2. DOE by Phillip Ross PHI.
3. P. Pande and L. Holpp, What is Six Sigma, 1/e, Tata McGraw-Hill, 2002.
4. P. Pande, The Six Sigma Way, 1/e, Tata McGraw-Hill, 2003.
5. R. Cavanagh, R. Neuman, P. Pande, What is Design for Six Sigma, 1/e, Tata McGraw- Hill, 2005.
6. SIX SIGMA by KK BHOTE Mc-graw hill.
7. D.C. Montgomery, Design and Analysis of Experiments, 8th Edition, John Wiley.

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