



**INSTITUTE OF TECHNOLOGY**  
**GURU GHASIDAS VISHWAVIDHALAYA**  
 (A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO3 OF 2009)  
**DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING**  
**STUDY & EVALUATION SCHEME**  
**W.E.F. SESSION 2011-2012**

**SEMESTER: VI<sup>TH</sup>**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			Credits
			L	T	P	SESSIONAL EXAM	ESE	SUB TOTAL	
<b>(THEORY )</b>									
1.	IPE-361	Fluid Machines	3	1	-	40	60	100	4
2.	IPE-362	Machine Design-II	3	1	-	40	60	100	4
3.	IPE-363	Managerial Economics	3	1	-	40	60	100	4
4.	IPE-364	Power Plant Engineering	4	-	-	40	60	100	4
5.	IPE-365	Metrology, Measurements & Control	3	1	-	40	60	100	4
<b>( PRACATICALS) Total</b>			16	04					
6.	IPE-366	Fluid Machines	-	-	5	45	30	75	3
9	IPE-367	Metrology, Measurements & Control	-	-	5	45	30	75	3
<b>Total</b>					10			650	26

Total Credits: 26

Total Contact Hour: 30

Total Marks: 650

\* **INTERNAL ASSESSMENT**-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes Discussion Etc.) Group

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

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH VI Sem	IPE-361	FLUID MACHINES	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

### **IPE-361 FLUID MACHINES**

#### **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.

#### **Suggested Text Books & References:**

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.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH VI Sem	IPE-362	MACHINE DESIGN- II	3	1	-	4	Max Marks-60 Min Marks- Duration-4 Hrs

### IPE-362 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

**Bearings:** 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, Selfcontained 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 from V.B. Bhandari, TMH Publications.
2. Machine Design by Shigley – McGraw Hill Pub.

#### REFERENCE BOOKS

1. Principles of Mechanical Design by R. Phelan – McGraw Hill Pub.
2. Machine Design By Spotts-PHI
3. Machine Design, theory & Practice by Michels Walter, J, Wilson Charles E. & Add, MacMilan Publishers, New York.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH VI Sem	IPE-363	MANAGERIAL ECONOMICS	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

### **IPE-363 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 Organisation, Organisation Structure, Concept of Ownership Organization, Types of Ownership, Partnership, Joint Stock Company, Types of Joint Stock Company, Co-Operative Organization, Public Sector Organisation. **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.

**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

### **REFERENCE BOOKS**

1. Financial Accounting For Management By Ambrish Gupta, Pearson Education
2. Managerial Economics By H. Craig Peterson & W. Cris Lewis, PHI
3. Managerial Economics By Suma Damodaran, Oxford University Press
4. Managerial Economics and Financial Analysis By Aryasri, TMH

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B.TECH VI Sem	IPE-364	POWER PLANT ENGINEERING	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

### **IPE-364 POWER PLANT ENGINEERING**

#### **UNIT I**

Sources of Energy, Present Position in India, Non Conventional Energy and Their Application.  
High Pressure Boilers and Their Classification and Working  
Boiler Accessories and Mountings , Condensers ,Cooling Tower & 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

#### **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**

Geo Thermal Power Plant, Tidal Power Plant.  
Wind Energy: Types of Rotors, Horizontal Axis and Vertical Axis Systems, System Design and Site selection Blade Material Wind Power Scenario in India.  
Hydro Electric Power Plant; Site Selection, Hydrology, Main Elements of Hydroelectric Power Plant, Classification.

#### **UNIT V**

Direct Energy Conversions : Fuel Cells ,Thermo Electric ,Thermo Ionic and MHD Systems (Magneto Hydrodynamic System ) ,Economic Analysis of Power Plant Tariffs : Load Curve ,Various Factors Related to Power Plant ,Effect of Load Factors on Costs .

#### **Recommended books :**

1. Power Plant Engineering , Domkundwar & Arora ,Dhanpat Rai Publication
2. Sukhatme ,SP ,Solar Energy ,TMGH
3. Duffie and Bechman ,Solar Energy ,Thermal Processes ,John Wiley
4. P.K.Nag ,Power Plant Engineering
5. Fundamentals of Power Plant Engineering ,Dr.R Yadav ,Central Publishing House

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B.TECH VI Sem	IPE-365	Metrology, Measurement and Control	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

### **IPE-365 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**

Process Control System Components & Its Block Diagram Representation, Transfer Functions of Control System & Physical System, Open Loop & Closed Loop Control System, Automatic Controllers and Their Classification, Working, Objective, Benefits and Laws of Control System.

#### Recommended books:

1. Benhwith 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