GOVERNMENT OF RAJASTHAN

BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

VI SEMESTER

(SESSION 2021-2022 & ONWARDS)

ENTREPRENEURSHIP AND START-UPS

Course Code	ME 6111(Same in All Branches of Engg.)
Course Title	Entrepreneurship and Start-ups
Number of Credits	4 (L-3 ,T-1, P-0)
Prerequisites (Course code)	None
Course Category	HS

COURSE LEARNING OBJECTIVES:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with varioususes ofhuman resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship-its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

LEARNING OUTCOME:

Upon completion of the course, these student will be able to demonstrate knowledge of the following topics:

1. Understanding the dynamic role of entrepreneurship and small businesses
2. Organizing and Managing a Small Business
3. Financial Planning and Control
4. Forms of Ownership for Small Business
5. StrategicMarketing Planning
6. New Productor Service Development
7. Business Plan Creation

COURSE CONTENTS:

1. INTRODUCTION TO ENTREPRENEURSHIP AND START–UPS

1.1. Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
1.2. Types of Business Structures,
1.3. Similarities / differences between entrepreneurs and managers.

2. BUSINESS IDEAS AND THEIR IMPLEMENTATION

2.1. Discovering ideas and visualizing the business
2.2. Activity map
2.3. Business Plan

3. IDEA TO START-UP

3.1. Market Analysis– Identifying the target market,
3.2. Competition evaluation and Strategy Development,
3.3. Marketing and accounting,
3.4. Risk analysis

4. MANAGEMENT

4.1. Company's Organization Structure,
4.2. Recruitment and management of talent.
4.3. Financial organization and management

5. FINANCING AND PROTECTION OF IDEAS

5.1. Financing methods available for start-ups in India
5.2. Communication of Ideas to potential investors– Investor Pitch
5.3. Patenting and Licenses

6. EXIT STRATEGIES FOR ENTREPRENEURS ,BANKRUPTCY, AND SUCCESSION AND HARVESTING STRATEGY

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN–978-0984999392
2.	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN–978-0670921607
3.	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN–978-0755388974
4.	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Chris Tensen	Harvard business ISBN:978-142219602

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:

a. https://www.fundable.com/learn/resources/guides/startup
b. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatehstructure/
c .https://www.finder.com/small-business-finance-tips
d. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

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PROJECT MANAGEMENT

CourseCode	ME 62001(Same in All Branches of Engg.)
CourseTitle	Project Management
NumberofCredits	3(L:3,T:0,P:0)
Prerequisites	NIL
CourseCategory	OE

COURSE LEARNING OBJECTIVES

•To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.

•To develop an understanding of key project management skills and strategies.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the importance of projects and its phases.
CO2	Analyze projects from marketing, operational and financial perspectives.
CO3	Evaluate projects based on discount and non-discount methods.
CO4	Develop network diagrams for planning and execution of a given project.
CO5	Apply crashing procedures for time and cost optimization.

COURSE CONTENTS

1. **CONCEPT OF A PROJECT**:
   - 1.1. Classification of projects
   - 1.2. Importance of project management
   - 1.3. The project Life cycle
   - 1.4. Establishing project priorities (scope-cost-time)
   - 1.5. Project priority matrix
   - 1.6. Work break down structure.

2. **CAPITAL BUDGETING PROCESS:**
   - 2.1. Planning -Analysis-Selection-Financing-Implementation-Review.
   - 2.2. Generation and screening of project ideas
   - 2.3. Market and demand analysis
   - 2.4. Demand forecasting techniques.
   - 2.5. Market planning and marketing research process
   - 2.6. Technical analysis

3. **FINANCIAL ESTIMATES AND PROJECTIONS:**
   - 3.1. Cost of projects
   - 3.2. Means of financing
   - 3.3. Estimates of sales and production-cost of production
   - 3.4. Working capital requirement and its financing
   - 3.5. Profitability project , cash flow statement and balance sheet.
   - 3.6. Breakeven analysis.

4. **BASIC TECHNIQUES IN CAPITAL BUDGETING**:
   - 4.1. Non discounting and discounting methods
   - 4.2. pay-back period
   - 4.3. Accounting rate of return
   - 4.4. Net present value
   - 4.5. Benefit cost ratio
   - 4.6. Internal rate of return.
   - 4.7. Project risk.
   - 4.8. Social cost benefit analysis andeconomic rate of return.
   - 4.9. Non-financial justification of projects.

5. **PROJECT ADMINISTRATION**:
   - 5.1. Progress payments,

5.2. Expenditure planning,
5.3. Project scheduling and network planning,
5.4. Use of Critical Path Method(CPM),
5.5. Schedule of payments and physical progress,
5.6. time-cost trade off.
5.7. Concepts and uses of PERT
5.8. Cost as a function of time,
5.9. Project Evaluation and Review Techniques
5.10. Cost mechanisms.
5.11. Determination of least cost duration.
5.12. Post project evaluation.
5.13. Introduction to various Project management softwares.

REFERENCE BOOKS

1.Project planning, analysis, selection, implementation and review –Prasannachandra–Tata McGraw Hill
2.Project Management – the Managerial Process– Clifford F. Gray & Erik W. Larson-McGrawHill
3.Project management- David I Cleland- Mcgraw Hill International Edition, 1999
4.Project Management– Gopala krishnan– Mcmillan India Ltd.
5.Project Management- Harry – Maylor – Peason Publication

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RENEWABLE ENERGY TECHNOLOGIES

CourseCode	ME 62002(Same in All Branches of Engg.)
CourseTitle	Renewable Energy Technologies
NumberofCredits	3 (L:3,T:0,P:0)
Prerequisites	NIL
CourseCategory	OE

COURSE LEARNING OBJECTIVES

•To understand present and future scenario of world energy use.
•To understand fundamentals of solar energy systems.
•To understand basics of wind energy.
•To understand bio energy and its usage in different ways.
•To identify different available non-conventional energy sources.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand present and future energy scenario of the world.
CO2	Understand various methods of solar energy harvesting.
CO3	Identify various wind energy systems.
CO4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5	Identify suitable energy sources for a location.

COURSE CONTENTS

1. **INTRODUCTION:**
   - 1.1. World Energy Use;
   - 1.2. Reserves of Energy Resources;
   - 1.3. Environmental Aspects OF Energy Utilisation;
   - 1.4. Renewable Energy Scenario in India and around the World;
   - 1.5. Potentials; Achievements/ Applications;
   - 1.6. Economics of renewable energy systems.

2. **SOLAR ENERGY:**
   - 2.1. Solar Radiation;
   - 2.2. Measurements of Solar Radiation;
   - 2.3. Flat Plate and Concentrating Collectors;
   - 2.4. Solar direct Thermal Applications;
   - 2.5. Solar thermal Power Generation
   - 2.6. Fundamentals of Solar Photo Voltaic Conversion;
   - 2.7. Solar Cells;
   - 2.8. Solar PV Power Generation;
   - 2.9. Solar PV Applications.

3. **WIND ENERGY:**
   - 3.1. Wind Data and Energy Estimation;
   - 3.2. Types of Wind Energy Systems;
   - 3.3. Performance; Site Selection;
   - 3.4. Details of Wind Turbine Generator;
   - 3.5. Safety and Environmental Aspects.

4. **BIO-ENERGY:**
   - 4.1. Bio mass direct combustion;
   - 4.2. Bio mass gasifiers;
   - 4.3. Bio gas plants;
   - 4.4. Digesters;
   - 4.5. Ethanol production;
   - 4.6. Bio diesel;

4.7. Cogeneration;
4.8. Bio mass Applications.

5. OTHER RENEWABLE ENERGY SOURCES:

5.1. Tidal energy;
5.2. Wave Energy;
5.3. Open and Closed OTEC Cycles;
5.4. Small Hydro Geothermal Energy;
5.5. Hydrogen and Storage;
5.6. Fuel Cell Systems;
5.7. Hybrid Systems.

REFERENCE BOOKS

1. Non-Conventional Energy Sources, Rai. G. D., Khanna Publishers, New Delhi, 2011.
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN SponLtd.,UK,2 006.
3. Solar Energy, Sukhatme. S. P., Tata Mc Graw Hill Publishing CompanyLtd. ,New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, G N Tiwari and M K Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment A Policy Analysis for India ,NH Ravindranath, U K Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, R A Ristinen and J J Kraushaar, second edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, J W T widell and A D Weir, ELBS, 2006.

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PRODUCT DESIGN

CourseCode	ME 63001(Same in All Branches of Engg.)
CourseTitle	Product Design
NumberofCredits	3 (L:3,T:0,P:0)
Prerequisites	NIL
CourseCategory	OE

COURSE LEARNING OBJECTIVES

•To acquire the basic concepts of product design and development process
•To understand the engineering and scientific process in executing a design from concept to finished product
•To study the key reasons for design or redesign.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the basic concepts of product design and development process.
CO2	Illustrate the methods to define thecustomer needs.
CO3	Describe an engineering design and development process.
CO4	Understand the intuitive and advanced methods used to develop and evaluate a concept.
CO5	Apply modelling and embodiment principles in product design and development process.

COURSE CONTENTS

1. **DEFINITION OF A PRODUCT**
   - 1.1. Types of product;
   - 1.2. Levels of product;
   - 1.3. Product-market mix;
   - 1.4. New prod-uct development (NPD) process;
   - 1.5. Idea generation methods;
   - 1.6. Creativity;
     - 1.6.1. Creative attitude;
     - 1.6.2. Creative design process;
   - 1.7. Morpho logical analysis;
   - 1.8. Analysis of inter-connected decision areas;
   - 1.9. Brain storming.

2. **PRODUCT LIFECYCLE;**
   - 2.1. The challenges of Product development;
   - 2.2. Product analysis;
   - 2.3. Product characteristics;
   - 2.4. Economic considerations;
   - 2.5. Production and Marketing aspects;
   - 2.6. Characteristics of successful Product development;
   - 2.7. Phases of a generic product development process;
   - 2.8. Customer need identification;
   - 2.9. Product development practices and industry-product strategies.

3. **PRODUCT DESIGN**
   - 3.1. Design by evolution;
   - 3.2. Design by innovation;
   - 3.3. Design by imitation;
   - 3.4. Factors affecting product design;
   - 3.5. Standards of performance and environmental factors;
   - 3.6. Decision making and iteration;
   - 3.7. Morphology of design (different phases);
   - 3.8. Role of aesthetics in design.

4. **INTRODUCTION TO OPTIMIZATION IN DESIGN**
   - 4.1. Economic factors in design;

4.2. Design for safety and reliability;
4.3. Role of computers in design;
4.4. Modeling and Simulation;
4.5. The role of models in engineering design;
4.6. Mathematical modeling;
4.7. Similitude and scale models;
4.8. Concurrent design;
4.9. Six sigma and design for six sigma;
4.10. Introduction to optimization in design;
4.11. Economic factors and financial feasibility in design;
4.12. Design for manufacturing;
4.13. Rapid Proto typing (RP);
4.14. Application of RP in product design;
4.15. Product Development versus Design.

5. DESIGN OF SIMPLE PRODUCTS DEALING WITH VARIOUS ASPECTS OF PRODUCT DEVELOPMENT;

5.1. Design Starting from need till the manufacture of the product

REFERENCE BOOKS

1.Product Design and Development, Karl T.Ulrichand Steven D.Eppinger, TataMc Graw–Hill edition.
2.Engineering Design– George E. Dieter.
3.An Introduction to Engineering Design methods Vijay Gupta.
4.Merie Crawford: New Product management, McGraw-Hill Irwin.
5.Chitale A K and Gupta R C," Product Design and Manufacturing", Prentice Hall of India, 2005.
6.Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pears on education.

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DISASTER MANAGEMENT

Course Code	ME 63002(Same in All Branches of Engg.)
Course Title	Disaster Management
Number of Credits	3 (L: 3, T: 0 ,P :0)
Prerequisites	NIL
Course Category	OE

COURSE LEARNING OBJECTIVES

Following are the objectives of this course:

•To learn about various types of natural and man-made disasters.
•To know pre and post-disaster management for some of the disasters.
•To know about various information and organizations in disaster management in India.
•To get exposed to technological tools and their role in disaster management.

COURSE OUTCOMES:

1.1. After competing this course, student will be:
1.2. Acquainted with basic information on various types of disasters
1.3. Knowing the precautions and awareness regarding various disasters
1.4. Decide first action to be taken under various disasters
1.5. Familiarised with organization in India which are dealing with disasters
1.6. Able to select IT tools to help in disaster management

COURSE CONTENTS

1. UNDERSTANDING DISASTER

1.1. Understanding the Concepts and definitions of Disaster,
1.2. Hazard,
1.3. Vulnerability,
1.4. Risk,
1.5. Capacity–Disaster and Development,
1.6. Disaster management.

2. TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS

2.1. Geological Disasters (earth quakes, land slides,tsunami, mining);
2.2. Hydro-Meteorological Di-sasters (floods, cyclones, lightning, thunder-storms, hailstorms, avalanches, droughts, cold and heat waves)
2.3. Biological Disasters (epidemics, pestattacks, forestfire);
2.4. Technological Disasters (chemical, industrial, radiological, nuclear)
2.5. Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters)
2.6. Global Disaster Trends
2.7. Emerging Risks of Disasters
2.8. Climate Change and Urban Disasters.

3. DISASTER MANAGEMENT CYCLE AND FRAME WORK

3.1. Disaster Management Cycle
3.2. Paradigm Shift in Disaster Management.
3.3. Pre-Disaster
3.4. Risk Assessment and Analysis,
3.5. Risk Mapping,
3.6. Zonation and Microzonation,
3.7. Prevention and Mitigation of Disasters,
3.8. Early Warning System
  3.8.1. Preparedness,
  3.8.2. Capacity Development;
  3.8.3. Awareness.
3.9. During Disaster
  3.9.1. Evacuation
  3.9.2. Disaster Communication
  3.9.3. Search and Rescue

3.9.4. Emergency Operation Centre
3.9.5. Incident Comm and System
3.9.6. Relief and Rehabilitation
3.10. Post-disaster
3.10.1. Damage and Needs Assessment,
3.10.2. Restoration of Critical Infra structure
3.10.3. Early Recovery Reconstruction and Redevelopment;
3.10.4. IDNDR, Yokohama Stretegy, Hyogo Frame-work of Action.

4. DISASTER MANAGEMENT IN INDIA

4.1. Disaster Profile of India
4.2. Mega Disasters of India and Lessons Learnt.
4.3. Disaster Management Act 2005
4.4. Institutional and Financial Mechanism,
4.5. National Policy on Disaster Management,
4.6. National Guidelines and Plans on Disaster Management;
4.7. Role of Government (local, state and national),
4.8. Non-Government and Inter Governmental Agencies

5. APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT

5.1. Geo informatics in Disaster Management (RS, GIS, GPS and RS).
5.2. Disaster Communication System (Early Warning and Its Dissemination).
5.3. Land Use Planning and Development Regulations,
5.4. Disaster Safe Designs and Constructions,
5.5. Structural and Non Structural Mitigation of Disasters
5.6. S & T Institutions for Disaster Management in India

REFERENCES

1.Publications of National Disaster Management Authority (NDMA) on Various Templates and Guide lines for Disaster Management
2.Bhandani, R. K., An over view on natural & man-made disasters and their reduction, CSIR, New Delhi
3.Srivastava, H. N., and Gupta G. D. , Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4.Alexander, David, Natural Disasters, Kluwer Academic London
5.Ghosh, G .K. ,Disaster Management, APH Publishing Corporation
6.Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

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INDIAN CONSTITUTION

CourseCode	ME 6333(Same in All Branches of Engg.)
CourseTitle	Indian Constitution
NumberofCredits	0 (L:2,T:0;P:0)
Prerequisites(Coursecode)	None
CourseCategory	AU

COURSE CONTENT

1. THE CONSTITUTION –

1.1. Introduction
1.2. The History of the Making of the Indian Constitution
1.3. Preamble and the Basic Structure, and its interpretation
1.4. Fundamental Rights and Duties and their interpretation
1.5. State Policy Principles

2. UNION GOVERNMENT

2.1. Structure of the Indian Union
2.2. President– Role and Power
2.3. Prime Minister and Council of Ministers
2.4. Lok Sabha and Rajya Sabha

3. STATE GOVERNMENT

3.1. Governor– Role and Power
3.2. Chief Minister and Council of Ministers
3.3. State Secretariat

4. LOCAL ADMINISTRATION

4.1. District Administration
4.2. Municipal Corporation
4.3. Zila Panchayat

5. ELECTION COMMISSION

5.1. Role and Functioning
5.2. Chief Election Commissioner
5.3. State Election Commission

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L.Fadia	Sahitya Bhawan; New edition(2017)
3.	Introduction to the Constitution of India	D D Basu	Lexis Nexis; Twenty-Third 2018 edition

SUGGESTED SOFTWARE / LEARNING WEBSITES:

1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/

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DESIGN OF MACHINE ELEMENTS

Course Code	:	*ME 6001(Same in MA 6001)
Course Title	:	Design of Machine Elements
Number of Credits	:	3 (L: 2, T: 1, P: 0)
Prerequisites	:	Engineering Mechanics (2005) Strength of Materials Engineering (ME 402) Theory of Machines & Mechanisms Engineering (ME 502)
Course Category	:	PC

COURSE OBJECTIVES:

- To enable the student to design and draw simple machine components used in small and medium scale industries.
- Tounderstand the basic philosophy and fundamentals of Machine Design.
- To understand the modes of failures of m/c components and decide the design criteria and equations.
- To analyze and evaluate the loads, forces, stresses involved in components and subassemblies and decide the dimensions.
- To develop analytical abilities to give solutions to engineering design problems.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Analyze the various modes of failure of machine components under different load patterns.
CO2	Design and prepare part and assembly drawings.
CO3	Use design data books and different codes of design.
CO4	Select standard components with their specifications from manufacturer's catalogue.
CO5	Develop drawings on CAD software.

COURSE CONTENT:

1. INTRODUCTION TO DESIGN

1.1 Machine Design philosophy and Procedures
1.2 General Considerations in Machine Design
1.3 Types of loads
1.4 Concepts of stress, Strain
1.5 Stress – Strain Diagram for Ductile and Brittle Materials
1.6 Types of Stresses
  1.6.1 Bearing pressure Intensity
  1.6.2 Crushing
  1.6.3 Bending
  1.6.4 Torsion
1.7 Principal Stresses
1.8 Simple Numericals
1.9 Fatigue
1.10 Endurance Limit
1.11 Factor of Safety and Factors governing selection of factor of Safety
1.12 Stress Concentration
  1.12.1 Causes & Remedies
1.13 Converting actual load or torque into design load or torque using design factors like
  1.13.1 Factor of safety
1.14 Properties of Engineering materials

1.15 Theories of Elastic Failures
1.15.1 Principal normal stress theory
1.15.2 Maximum shear stress theory
1.16 Use of design data book

2. DESIGN OF SIMPLE MACHINE PARTS:
2.1 Cotter Joint
2.2 Knuckle Joint
2.3 Turnbuckle
2.4 Design of Levers
2.4.1 Hand/Foot Lever
2.4.2 Bell Crank Lever
2.5 Arm of Pulley
2.6 Antifriction Bearings
2.6.1 Classification of Bearings
2.6.1.1 Sliding contact
2.6.1.2 Rolling contact
2.6.2 Terminology of Ball bearings
2.6.2.1 Life Load relationship
2.6.2.2 Basic static load rating
2.6.2.3 Basic dynamic load rating
2.6.2.4 Limiting speed
2.6.3 Selection of ball bearings using manufacturer's catalogue

3. DESIGN OF SHAFTS, KEYS, COUPLINGS AND SPUR GEARS
3.1 Types of Shafts
3.2 Shaft materials
3.3 Standard Sizes
3.4 Design of Shafts (Hollow and Solid) using strength and rigidity criteria
3.5 ASME code of design for line shafts supported between bearings with one or two pulleys in between or one overhung pulley
3.6 Design of Sunk Keys
3.7 Design of Couplings
3.7.1 Muff Coupling
3.7.2 Protected type Flange Coupling

4. DESIGN OF POWER SCREWS
4.1 Thread Profiles used for power Screws
4.1.1 Relative merits and demerits of each
4.2 Torque required to overcome thread friction
4.3 Self-locking and overhauling property
4.4 Efficiency of power screws
4.5 Types of stresses induced
4.6 Design of Screw Jack
4.7 Design of springs
4.7.1 Classification and Applications of springs
4.7.2 Spring terminology
4.7.3 Materials and Specifications
4.7.4 Stresses in springs
4.7.5 Wahl's correction factor
4.7.6 Deflection of springs
4.7.7 Energy stored in springs
4.7.8 Design of Helical, Tension and Compression springs subjected to uniform applied loads like I.C. engine valves, Weighing balance, Railway buffers and Governor springs
4.7.9 Leaf springs: Construction and Application

5. DESIGN OF FASTENERS
5.1 Stresses in Screwed fasteners

5.2 Bolts of Uniform Strength
5.3 Design of Parallel and Transverse fillet welds
5.3.1 Design of eccentrically loading welded joints

5.4 Axially loaded symmetrical section
5.5 Merits and demerits of screwed and welded joints

REFERENCE BOOKS:

1. Machine Design – Sadhu Singh, Khanna Book Publishing Co., Delhi (ISBN: 978-9382609-575).
2. Machine Design Data Book – Sadhu Singh, Revised Edition, Khanna Book Publishing Co.,Delhi (ISBN: 978-9382609-513).
3. Introduction to Machine Design – V.B.Bhandari, Tata Mc- Graw Hill, New Delhi.
4. Mechanical Engineering Design – Joseph Edward Shigley, Tata Mc- Graw Hill, New Delhi.
5. Machine design – Pandya & Shah, Dhanpat Rai & Son, New Delhi.
6. Machine design – R.K.Jain, Khanna Publication, New Delhi.
7. Design Data Book – PSG Coimbtore, PSG Coimbtore.
8. Hand Book of Properties of Engineering Materials & Design Data for Machine Elements – Abdulla Shariff, Dhanpat Rai & Sons, New Delhi.

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PRODUCTION & OPERATIONS MANAGEMENT

Course Code	:	ME 6002
Course Title	:	PRODUCTION & OPERATIONS MANAGEMENT
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	PC

COURSE OBJECTIVES:

- One of the most critical areas for success in any business enterprise is how Production and Operations are managed.
- To study the statistics, economics, finance, organizational behaviour and strategy into a consolidated production and operation related decisions.
- To discuss the role of location strategy and the criteria for location decisions.
- To define quality and explain quality management, including TQM and its tools.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Define operations management and explain its relationship to productivity. And also understand tools and techniques.
CO2	Describe the importance of forecasting and explain the effective application of the different forecasting approaches and methods.
CO3	Explain layout strategy and how operations managers determine facility arrangements and size.
CO4	Describe how operations managers achieve a reasonable work environment and set expectations related to employee productivity.
CO5	Understand make-or-buy decisions, and the selection and integration of suppliers. And how much to order and when to order.

COURSE CONTENT:

1. PROCESS PLANNING AND PROCESS ENGINEERING

1.1 Process Planning: Introduction, Function, Pre-requisites and steps in process planning
1.2 Factors affecting process planning, make or buy decision, plant capacity and machine capacity
1.3 Process Engineering
1.4 Preliminary Part Print Analysis: Introduction, Establishing the General Characteristics of work piece, determining the principal Process, Functional surfaces of the work piece, Nature of the work to be Performed, Finishing and identifying operations
1.5 Dimensional Analysis: Introduction, types of dimensions, measuring the Geometry of form, Baselines, direction of specific dimensions. Tolerance Analysis: Causes of work piece variation, Terms used in work piece dimensions, Tolerance stacks
1.6 Work piece Control: Introduction, Equilibrium Theories, Concept of location, Geometric Control, Dimensional control, Mechanical control

2. PRODUCTION FORECASTING

2.1 Introduction of production forecasting
2.2 The strategic role of forecasting in supply chain, Time frame, Demand behavior
2.3 Forecasting methods- Qualitative and Quantitative
2.4 Forecast accuracy
2.5 Scheduling
  2.5.1 Introduction
  2.5.2 Objectives in scheduling,
  2.5.3 Loading
  2.5.4 Sequencing
  2.5.5 Monitoring
  2.5.6 Advanced Planning

2.5.7 Scheduling Systems
2.5.8 Theory of Constraints
2.5.9 Employee scheduling

3. BREAK-EVEN ANALYSIS

3.1 Introduction
3.2 Break-even analysis charts
3.3 Breakeven analysis for process
3.4 Plant and equipment selection
3.5 Aggregate Operations Planning
3.5.1 Aggregate production planning
3.5.2 Adjusting capacity to meet the demand
3.5.3 Demand management
3.5.4 Hierarchical and collaborative planning
3.5.5 Aggregate planning for services

4. ASSEMBLY LINE BALANCING

4.1 Assembly lines
4.2 Assembly line balancing
4.3 Splitting tasks
4.4 Flexible and U-shaped line layouts
4.5 Mixed model line balancing
4.6 Current thoughts on assembly lines
4.7 Computerized assembly line balancing

5. MATERIAL MANAGEMENT

5.1 Introduction
5.2 Importance and objectives
5.3 Purchasing and Stores
5.4 Policies and procedures
5.5 Vendor development
5.5.1 Selection
5.5.2 Analysis
5.5.3 Rating

REFERENCE BOOKS:

1. Production and Operations Management – K.Aswathappa, K.Shridhara Bhat, Himalaya Publishing House, 2014.
2. Production and Operations Management – Shailendra Kale, McGraw Hill Educations(India) Private Limited,2013.
3. Production and Operations Management – R.Paneerselvam, PHI Learning Private Limited, 2013.
4. Operations Management – Joseph Monk, TMH Publishers, New Delhi, 2004.
5. Modern Production /Operations Management – Buffa Elwood S, John Wiley Publishers, Singapore, 2002.

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