# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

## MECHANICAL ENGINEERING

## COURSE DESCRIPTION FORM

| | | | | |
|---|---|---|---|---|
| **Course Title** | **PRODUCTION PLANNING AND CONTROL** | | | |
| **Course Code** | **A80366** | | | |
| **Regulation** | **R13-JNTUH** | | | |
| **Course Structure** | Lectures | Tutorials | Practicals | Credits |
| | 4 | - | - | 4 |
| **Course Coordinator** | Mr. S. Lokesh, Assistant Professor, Department of Mechanical Engineering. | | | |
| **Team of Instructors** | Mr. S. Lokesh, Assistant Professor.<br>Mrs. G. Karunya, Assistant Professor. | | | |

### I. COURSE OVERVIEW:

This course introduces the PPC function in industrial manufacturing scenario. Apply forecasting techniques for different types of products. Knowledge in optimal inventory control and capacity planning. Comprehensive understanding of different manufacturing processes for product development. Select process parameters, equipment for material processing.

### II. PREREQUISITE(S):

| Level | Credits | Periods / Week | Prerequisites |
|---|---|---|---|
| UG | 4 | 4 | Production Technology, Operations Research |

### III. MARKS DISTRIBUTION:

| Sessional Marks (25) | University End Exam Marks | Total Marks |
|---|---|---|
| **Continuous Assessment Tests (Midterm examinations)**:<br>There shall be 2 midterm examinations. Each midterm examination consists of one objective paper, one subjective paper and two assignments. The objective paper is for 10 marks and subjective paper is for 10 marks, with duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for subjective paper). Objective paper is set for 20 bits of – multiple choice questions, fill-in the blanks, 10 marks. Subjective paper contains of 4 full questions (one from each unit) of which, the student has to answer 2 questions, each question carrying 5 marks.<br>First midterm examination shall be conducted for 2.5 units of syllabus and second midterm examination shall be conducted for another 2.5 units. 5 marks are allocated for Assignment. The total marks secured by the student in each midterm examination are evaluated for 25 marks. | 75 | 100 |

## IV. EVALUATION SCHEME:

| S. No. | Component | Duration | Marks |
|---|---|---|---|
| 1 | I Mid Examination | 80 minutes | 20 |
| 2 | I Assignment | | 5 |
| | | **TOTAL** | **25** |
| 3 | II Mid Examination | 80 minutes | 20 |
| 4 | II Assignment | | 5 |
| | | **TOTAL** | **25** |
| 5 | EXTERNAL Examination | 3 hours | 75 |
| | | **GRAND TOTAL** | **100** |

## V. COURSE OBJECTIVES:

**The objectives of the course are to enable the student;**

I. Understand the PPC function in industrial manufacturing scenario.
II. Apply forecasting techniques for different types of products.
III. Knowledge in optimal inventory control and capacity planning.

## VI. COURSE OUTCOMES:

**On successful completion of the course, the student will be able to:**

1. Understand different types of manufacturing process and apply the Technology Systems Model to manufacturing.
2. Identify, illustrate, solve, formulate, distinguish and compare different working process.
3. Understand the design a system, component or process to meet desired needs within, realistic constraints such as manufacturability ,economic , environmental, safety and sustainability etc.,
4. Apply knowledge of mathematics, science and engineering, to Identify, define, and clearly state a manufacturing design problem.
5. Identify, formulates, analyzes and solves Engineering Problems in Optimum time.
6. Demonstrate ability to welding and conduct experiments, analyze and interpret data.
7. Apply the techniques, skills and modern engineering tools necessary for engineering practice with the concept of virtual work.
8. Recognize the need for, and an ability to engage in self education and life-long learning.
9. Apply forecasting techniques for different types of products.
10. Apply stochastic models for discrete and continuous variables to control inventory

## VII. HOW COURSE OUTCOMES ARE ASSESSED:

| Program Outcomes | | Level | Proficiency assessed by |
|---|---|---|---|
| PO1 | **Engineering knowledge**: Capability to apply the knowledge of Mathematics, Science and Engineering in the field of Mechanical Engineering. | H | Assignments, Tutorials |
| PO2 | **Problem analysis**: An ability to analyze complex engineering problems to arrive at relevant conclusions using knowledge of Mathematics, Science and Engineering. | H | Assignments |
| PO3 | **Design/development of solutions**: Competence to design a system, compone nt or process to meet societal needs within realistic constraints. | N | ----- |
| PO4 | **Conduct investigations of complex problems**: To design and conduct research oriented experiments as well as to analyze and implement data using research methodologies. | S | Projects |
| PO5 | **Modern tool usage**: An ability to formulate, solve complex engineering problems using modern engineering and Information Technology tools. | S | Mini Projects |

| | | | |
|---|---|---|---|
| PO6 | **The engineer and society**: To utilize the Engineering practices, Techniques, skills to meet needs of the health, safety, legal, cultural and societal issues. | H | Assignment |
| PO7 | **Environment and sustainability**: To understand impact of Engineering solutions in the societal context and demonstrate the knowledge for sustainable development. | N | -- |
| PO8 | **Ethics**: An understanding and Implementation of professional and Ethical responsibilities. | N | ---- |
| PO9 | **Individual and teamwork**: To function as an effective individual and as a member or leader in Multi-disciplinary environment and adopt in diverse teams. | N | -- |
| PO10 | **Communication**: An ability to assimilate, comprehends, communicate, give and receive instructions to present effectively with engineering community and society. | S | Mini Project |
| PO11 | **Project management and finance**: An ability to provide leadership in mana ging complex engineering projects at Multidisciplinary environment and to become a professional engineer. | N | -- |
| PO12 | **Life-long learning**: Recognition of the need and an ability to engage in life-long learning to keep abreast with technological changes. | S | Guest Lecture |

## VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

| Program Specific Outcomes | | Level | Proficiency assessed by |
|---|---|---|---|
| PSO1 | **Professional Skills:** To produce engineering professional capable of synth esizing and analyzing mechanical systems including allied engineering streams. | H | Lectures, Assignments |
| PSO2 | **Design/Analysis:** An ability to adopt and integrate current technologies in the design and manufacturing domain to enhance the employability. | H | Projects |
| PSO3 | **Successful Career and Entrepreneurship:** To build the nation, by imparting technological inputs and managerial skills to become Technocrat. | S | Guest Lectures |

## IX.SYLLABUS:

**UNIT – I**

**Introduction**: Definition of production planning and control - Objectives of production planning and control - Functions of production planning and control - Elements of production planning and control – Organization of production planning and control department -internal Organizations department

**UNIT-II**

Introduction to Forecasting - Importance of Forecasting - Types of Forecasting - Uses of Forecasting - Principles of Forecasting Techniques - Qualitative methods - Quantitative methods

**UNIT-III**

Introduction to Inventory Management - Functions and Classification of Inventory - Inventory costs (Cost Associated with Inventories) - ABC Analysis - VED Analysis - EOQ Model - Inventory Control Systems - P – Systems and Q – Systems. Introduction to MRP And ERP, LOB( Line Of Balance), Concept of Just-In-Time Manufacturing (JIT).

**UNIT-IV**

Introduction to Routing and its Definition – Routing Procedure - Route Sheet - Bill of Material - Factors Affecting Routing Procedure - Definition of Scheduling, Difference with Loading Policies and Techniques for Project Scheduling - Standard Scheduling Methods - Job Shop - Flow Shop.

**Unit – V**

Concept of Line Balancing – Aggregate Planning - Methods for Aggregate Planning - Chase Planning - Expediting of Aggregate Planning - Control Accepts of Aggregate Planning

Dispatching - Activities of Dispatcher – Dispatching Procedure - Reasons for Existence of Functions - Types of Follow-up - Computer Aided Production Planning & Control - Advantages of Using Computer in PPC

## TEXT BOOKS:

**T1:** Production Planning and Control – M. Mahajan- Dhanpati rai & Co
**T2:** Production Planning and Control- Jain & Jain – Khanna publications

## REFERENCE BOOKS:

**R1:** Production Planning and Control – Test & cases/ SK Mukhopadhyaya / PHI
**R2:** Production and operations Management – R.Panner Selvam- PHI
**R3:** Operations Management by Chase/PHI
**R4:** Management Science – A R Aryasri-4e-TMH
**R5:** Operations management – Heizer- Pearson

## X. COURSE PLAN:

The course plan is meant as a guideline. There may probably be changes.

| Lecture No. | Course Learning Outcomes | Topics to be covered | Reference |
|---|---|---|---|
| 1 | Purpose of production planning and control | **UNIT-I Introduction** Overview of production planning and control | T2 1.1 R1 1.1 |
| 2 | Define production planning and control | Definition of production planning and control | T1 1.2, T2 1.2 |
| 3 | Categorize & Describe production planning and Control | Objectives of production planning and control | T1 1.3, T2 1.4 |
| 4 | Classify production planning and control department | Functions of production planning and control | T1 1.4, T2 1.5 |
| 5 | Analyze control department | Organization of production planning and control department | T1 1.6 R2 1.5 |
| 6 | Explain Elements of production planning and Control | Elements of production planning and control | T1 1.7, R3 1.6 |
| 7 | Categorize & Describe production systems | Types of production systems | T1 1.8, R1 1.7 |
| 8 | Categorize & Describe Types of production systems | Types of production systems | T1 1.8 , R11.7 |
| 9 | Organizing Production Planning | Organization of Production planning and control | T1 1.9 |
| 10 | Purpose Forecasting | UNIT-II Introduction to Forecasting | T1 2.1, T2 2.1 |
| 11 | Classify Importance of Forecasting | Importance of Forecasting | T2 2.2 |
| 12 | Evaluate Forecasting | Objectives of Forecasting | T2 2.3 |
| 13 | Categorize & Describe Forecasting | Types of Forecasting | T1 2.4, R2 2.2 |
| 14 | Classify Forecasting | Uses of Forecasting | T1 2.5, T2 2.4 |
| 15 | Explain Forecasting Techniques | Principles of Forecasting Techniques | T1 2.6, R3 2.5 |
| 16 | Classify Limitations of Forecasting | Advantages and Limitations of Forecasting | T1 2.7, T2 2.5 |
| 17 | Categorize & Describe | Factors affecting Forecasting | T1 2.8, R3 2.6 |
| 18 | Describe Qualitative methods | Qualitative methods | T1 2.9, T2 2.7 |
| 19 | Describe Quantitative methods | Quantitative methods | T1 2.9, T2 2.7 |
| 20 | Purpose Inventory Management | **UNIT-III** Introduction to Inventory Management | T1 3.1, T2 3.1 |

| | | | |
|---|---|---|---|
| 21 | Categorize & Describe Classification of Inventory | Functions and Classification of Inventory | T1 3.2, R1 3.1 |
| 22 | Explain Inventory costs | Inventory costs (Cost Associated with Inventories) | T1 3.3, T2 3.2 |
| 23 | Formulate ABC Analysis | ABC Analysis | T1 3.4, R2 3.3 |
| 24 | Formulate VED Analysis | VED Analysis | T1 3.4, T2 3.3 |
| 25 | Formulate EOQ Model | EOQ Model | T1 3.4, T2 3.3 |
| 26 | Evaluate Inventory Control Systems | Inventory Control Systems | T1 3.5, R4 3.4 |
| 27 | Purpose P – Systems and Q-Systems | P – Systems and Q –Systems | T1 3.6, R3 3.5 |
| 28 | Explain Concept of Material Requirement Planning | Concept of Material Requirement Planning (MRP) | T1 3.7, T2 3.6 |
| 29 | Analyze Inputs to MRP | Inputs to MRP | T1 3.8, T2 3.6 |
| 30 | Purpose Benefits and Limitation of MRP | Benefits and Limitation of MRP | T1 3.9, T2 3.7 |
| 31 | Classify Enterprise Resource Planning (ERP) | Enterprise Resource Planning (ERP) | T1 3.9.1, T2 3 .7 |
| 32 | Analyze Line of Balance (LOB) | Methods of Line of Balance (LOB) | T 1 3.10, R4 3.9 |
| 33 | Evaluate Just-In-Time Manufacturing | Concept of Just-In-Time Manufacturing (JIT) | T1 3.11, T2 3.9 |
| 34 | Analyze Elements of JIT | Characteristics and Elements of JIT | T1 3.12, T2 3.9 |
| 35 | Evaluate Japanese Concepts | Japanese Concepts | T1 3.13, |
| 36 | Purpose Routing and its Definition | **UNIT-IV** Introduction to Routing and its Definition | T1 5.1, T2 4.1 |
| 37 | Evaluate Routing Procedure | Routing Procedure | T1 5.2, T2 4.2 |
| 38 | Analyze Route Sheet | Route Sheet | T15.3, T2 4.3 |
| 39 | Analyze Bill of Material | Bill of Material | T1 5.4, T2 4.4 |
| 40 | Classify Routing Procedure | Factors Affecting Routing Procedure | T1 5.5, T2 4.5 |
| 41 | Analyze Scheduling, Difference with Loading | Definition of Scheduling, Difference with Loading | T15.6, T2 4.6 |
| 42 | Classify Factors Affecting Scheduling | Factors Affecting Scheduling | T1 5.7, T2 4.7 |
| 43 | Categorize & Describe Project Scheduling | Policies and Techniques for Project Scheduling | T1 5.8, T2 4.8 |
| 44 | Evaluate Scheduling Methods | Standard Scheduling Methods | T1 5.9, T2 4.9 |
| 45 | Formulate Job Shop | Job Shop | T1 5.10, T2 4.9 |
| 46 | Formulate Flow Shop | Flow Shop | T1 5.11 |
| 47 | Formulate Basic Scheduling Problems | Basic Scheduling Problems | T2 4.9 |
| 48 | Analyze | **UNIT-V** Concept of Line Balancing | T1 7.1, R2 5.1 |
| 49 | Analyze | Aggregate Planning | T1 7.2, R3 5.2 |
| 50 | Categorize & Describe Aggregate Planning | Methods for Aggregate Planning | T1 7.3, R4 5.4 |
| 51 | Classify Chase Planning | Chase Planning | T1 7.4, T2 5.4 |
| 52 | Analyze | Expediting of Aggregate Planning | T1 7.5, R1 5.5 |
| 53 | Evaluate Accepts of Aggregate Planning | Control Accepts of Aggregate Planning | T1 7.6, T2 5.5 |
| 54 | Purpose Dispatching | Concept of Dispatching | T1 7.7 |
| 55 | Categorize & Describe Activities of Dispatcher | Activities of Dispatcher | T1 7.8 |
| 56 | Purpose Dispatching Procedure | Dispatching Procedure | T1 7.9, T2 5.6 |

## XI. MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

| Course Objectives | Program Outcomes | | | | | | | | | | | | Program Specific Outcomes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| I | H | H | S | S | | H | | H | | S | | S | H | | |
| II | H | | S | | S | | | | | H | | | | S | S |
| III | H | H | S | S | | | | S | | | | S | S | H | |

**S =Supportive** **H=Highly Related**

## XII. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

| Course Outcomes | Program Outcomes | | | | | | | | | | | | Program Specific Outcomes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| 1 | H | S | S | S | S | H | | S | | S | | S | H | S | |
| 2 | S | H | S | | | S | | H | | | | | S | H | |
| 3 | S | | S | S | S | H | | | | S | | S | | S | |
| 4 | | S | S | S | S | S | | S | | S | | S | S | | S |
| 5 | | S | | | | | | | | | | | | | |
| 6 | H | | | S | | | | | | | | S | H | S | |
| 7 | S | | | H | | | | S | | | | | S | | |
| 8 | S | H | | | | | | | | | | | | | |
| 9 | | | H | H | S | | | | | H | | S | | H | |
| 10 | H | | | S | | H | | | | | | | H | S | |

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**Prepared By:**
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**HOD, MECHANICAL ENGINEERING**