



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

## MECHANICAL ENGINEERING

### COURSE DESCRIPTOR

|                   |   |           |         |            |         |
|-------------------|---|-----------|---------|------------|---------|
| Course Title      | PRODUCTION PLANNING CONTROL                 |           |         |            |         |
| Course Code       | AME518                                      |           |         |            |         |
| Programme         | B.Tech                                      |           |         |            |         |
| Semester          | VIII  | ME        |         |            |         |
| Course Type       | Core  |           |         |            |         |
| Regulation        | IARE - R16                                  |           |         |            |         |
| Course Structure  | Theory                                      |           |         | Practical  |         |
|                   | Lectures                                    | Tutorials | Credits | Laboratory | Credits |
|                   | 3   | -         | 3       | -          | -       |
| Chief Coordinator | Mr. V . Mahidhar Reddy, Assistant Professor |           |         |            |         |
| Course Faculty    | Mr. V . Mahidhar Reddy, Assistant Professor |           |         |            |         |

#### I. COURSE OVERVIEW:

The objective of this course is to understand the various components and functions of production product planning, process planning, production scheduling, Inventory Control. The course covers the fundamentals of Production Planning & the subsequent Production Control that follows an adaptation of product design and finalization of a production process. Production Planning & Control resolves a basic issue of low productivity, inventory management, and resource utilization and is needed for scheduling, dispatch, inspection, quality management, inventory management, supply management and equipment management. It guarantees target achievement by the production team, optimum resource utilization, quality management and cost savings.

#### II. COURSE PRE-REQUISITES:

| Level | Course Code | Semester | Prerequisites      | Credits |
|-------|-------------|----------|--------------------|---------|
| UG    | AME021      | VI       | Operation Research | 4       |
| UG    | AME018      | VII      | CAD/CAM            | 4       |

#### III. MARKS DISTRIBUTION:

| Subject                     | SEE Examination | CIA Examination | Total Marks |
|-----------------------------|-----------------|-----------------|-------------|
| Production Planning Control | 70 Marks        | 30 Marks        | 100         |

#### IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

|   |                        |   |          |   |              |   |        |
|---|------------------------|---|----------|---|--------------|---|--------|
| ✗ | Chalk & Talk           | ✓ | Quiz     | ✓ | Assignments  | ✗ | MOOCs  |
| ✓ | LCD / PPT              | ✓ | Seminars | ✗ | Mini Project | ✓ | Videos |
| ✗ | Open Ended Experiments |   |          |   |              |   |        |

#### V. EVALUATION METHODOLOGY:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into FIVE units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with “either” or “choice” will be drawn from each unit. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

|      |  |
|------|--|
| 50 % | To test the objectiveness of the concept.  |
| 50 % | To test the analytical skill of the concept OR to test the application skill of the concept. |

#### Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Quiz/ Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

| Component | Theory   |            | Total Marks |
|-----------|----------|------------|-------------|
|           | CIE Exam | Quiz / AAT |             |
| CIA Marks | 25       | 05         | 30          |

#### Continuous Internal Examination (CIE):

Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

#### Quiz / Alternative Assessment Tool (AAT):

Two Quiz exams shall be online examination consisting of 25 multiple choice questions and are be answered by choosing the correct answer from a given set of choices (commonly four). Marks shall be awarded considering the average of two quizzes for every course. The AAT may include seminars, assignments, term paper, open ended experiments, five minutes video and MOOCs.

## VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

| Program Outcomes (POs) |   | Strength | Proficiency assessed by             |
|------------------------|---|----------|-------------------------------------|
| PO 1                   | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.   | 3        | Presentation on real-world problems |
| PO 2                   | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences   | 2        | Seminar                             |
| PO 4                   | <b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. | 1        | Term Paper                          |

**3 = High; 2 = Medium; 1 = Low**

## VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

| Program Specific Outcomes (PSOs) |  | Strength | Proficiency assessed by |
|----------------------------------|--|----------|-------------------------|
| PSO 1                            | <b>Professional Skills:</b> To produce engineering professional capable of synthesizing and analyzing mechanical systems including allied engineering streams.     | 1        | Seminar                 |
| PSO 2                            | <b>Software Engineering Practices:</b> An ability to adopt and integrate current technologies in the design and manufacturing domain to enhance the employability. | -        | -                       |
| PSO 3                            | <b>Successful Career and Entrepreneurship:</b> To build the nation, by imparting technological inputs and managerial skills to become technocrats.                 | -        | -                       |

**3 = High; 2 = Medium; 1 = Low**

## VIII. COURSE OBJECTIVES:

| The course should enable the students to: |   |
|---|---|
| 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.     |

**IX. COURSE OUTCOMES (COs):**

| <b>COs</b> | <b>Course Outcome</b>  | <b>CLOs</b> | <b>Course Learning Outcome</b>   |
|------------|--|-------------|--|
| CO 1       | Understanding and appreciation of the principles and applications relevant to the planning, design, and operations of manufacturing/service firms.           | CLO 1       | Understand the core features of the operations   |
|            |  | CLO 2       | Understand production management function at the operational and strategic levels  |
|            |  | CLO 3       | specifically the relationships between people  |
|            |  | CLO 4       | Evaluate operational and strategic levels  |
|            |  | CLO 5       | Solve problems on operational and strategic management   |
| CO 2       | Develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems.           | CLO 6       | Production management basics and its history   |
|            |  | CLO 7       | Key issues on market-driven systems and global competition   |
|            |  | CLO 8       | Classification of production systems, and their definitions  |
|            |  | CLO 9       | Classification of planning and control problems, and their definitions   |
| CO 3       | Reinforce analytical skills already learned, and build on these skills to further increase your "portfolio" of useful analytical tools for operations tasks. | CLO 10      | Problem solving procedure  |
|            |  | CLO 11      | Demand forecasting and market analysis   |
|            |  | CLO 12      | Qualitative approaches to forecasting  |
|            |  | CLO 13      | A variety of quantitative forecasting techniques including the use of computer tools   |
| CO 4       | Understand how Enterprise Resource Planning and MRPII systems are used in managing operations  | CLO 14      | Decomposition of data into its components  |
|            |  | CLO 15      | The systems perspective to production planning problems and to integrate different production planning activities  |
|            |  | CLO 16      | Formulation of aggregate planning problems; their objectives, constraints and applicable solution techniques   |
|            |  | CLO 17      | Surveying, gathering and analysis of data for planning purposes  |
| CO 5       | Increase the knowledge, and broaden the perspective of the world in which you will contribute your talents and leadership in business operations.            | CLO 18      | Solving basic production planning problems   |
|            |  | CLO 19      | Solving basic inventory management problems, Importance of accuracy in estimating market share, demand, relevant costs and all requirements and the sensitivity of results to these values |

**X. COURSE LEARNING OUTCOMES (CLOs):**

| <b>CLO Code</b> | <b>CLO's</b> | <b>At the end of the course, the student will have the ability to:</b>            | <b>PO's Mapped</b> | <b>Strength of Mapping</b> |
|-----------------|--------------|---|--------------------|----------------------------|
| AME518.01       | CLO 1        | Understand the core features of the operations                                    | PO 1               | 3                          |
| AME518.02       | CLO 2        | Understand production management function at the operational and strategic levels | PO 2               | 2                          |
| AME518.03       | CLO 3        | specifically the relationships between people                                     | PO 1               | 3                          |

|            |        |  |               |   |
|------------|--------|--|---------------|---|
| AME518.04  | CLO 4  | Evaluate operational and strategic levels  | PO 1          | 3 |
| AME518.05  | CLO 5  | Solve problems on operational and strategic management   | PO 2          | 2 |
| AME518.06  | CLO 6  | Production management basics and its history   | PO 2          | 2 |
| AME0518.07 | CLO 7  | Key issues on market-driven systems and global competition   | PO 2          | 2 |
| AME518.08  | CLO 8  | Classification of production systems, and their definitions  | PO 2          | 2 |
| AME518.09  | CLO 9  | Classification of planning and control problems, and their definitions   | PO 4          | 1 |
| AME518.10  | CLO 10 | Problem solving procedure  | PO 4          | 1 |
| AMEB518.11 | CLO 11 | Demand forecasting and market analysis   | PO 2          | 2 |
| AME518.12  | CLO 12 | Qualitative approaches to forecasting  | PO 2          | 2 |
| AME518.13  | CLO 13 | A variety of quantitative forecasting techniques including the use of computer tools   | PO 1          | 3 |
| AME518.14  | CLO 14 | Decomposition of data into its components  | PO 1          | 3 |
| AME518.15  | CLO 15 | The systems perspective to production planning problems and to integrate different production planning activities  | PO 1          | 3 |
| AME518.16  | CLO 16 | Formulation of aggregate planning problems; their objectives, constraints and applicable solution techniques   | PO 1,<br>PO 2 | 3 |
| AME518.17  | CLO 17 | Surveying, gathering and analysis of data for planning purposes  | PO 1,<br>PO 2 | 3 |
| AME518.18  | CLO 18 | Solving basic production planning problems   | PO 1,<br>PO 2 | 3 |
| AME518.19  | CLO 19 | Solving basic inventory management problems, Importance of accuracy in estimating market share, demand, relevant costs and all requirements and the sensitivity of results to these values | PO 1,         | 3 |

**3 = High 2 = Medium; 1 = Low**

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

| Course Outcomes (COs) | Program Outcomes (POs) |      |      |      |
|-----------------------|------------------------|------|------|------|
|                       | PO 1                   | PO 2 | PO 4 | PSO1 |
| CO 1                  | 3                      | 2    |      | 1    |
| CO 2                  |                        | 2    | 1    |      |
| CO 3                  | 3                      | 2    | 1    |      |
| CO 4                  | 3                      | 2    |      | 1    |
| CO 5                  | 3                      | 2    |      | 1    |

**3 = High; 2 = Medium; 1 = Low**

**XII. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

| Course Learning Outcomes (CLOs) | Program Outcomes (POs) |     |     |     |     |     |     |     |     |      |      |      | Program Specific Outcomes (PSOs) |      |      |
|---------------------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|----------------------------------|------|------|
|                                 | PO1                    | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1                             | PSO2 | PSO3 |
| CLO 1                           | 3                      |     |     |     |     |     |     |     |     |      |      |      | 1                                |      |      |
| CLO 2                           |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 3                           | 3                      |     |     |     |     |     |     |     |     |      |      |      | 1                                |      |      |
| CLO 4                           | 3                      |     |     |     |     |     |     |     |     |      |      |      | 1                                |      |      |
| CLO 5                           |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 6                           |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 7                           |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 8                           |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 9                           |                        |     |     | 1   |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 10                          |                        |     |     | 1   |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 11                          |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 12                          |                        | 2   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 13                          | 3                      |     |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 14                          | 3                      |     |     |     |     |     |     |     |     |      |      |      | 1                                |      |      |
| CLO 15                          | 3                      |     |     |     |     |     |     |     |     |      |      |      | 1                                |      |      |
| CLO 16                          | 3                      | 3   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 17                          | 3                      | 3   |     |     |     |     |     |     |     |      |      |      | 1                                |      |      |
| CLO 18                          | 3                      | 3   |     |     |     |     |     |     |     |      |      |      |                                  |      |      |
| CLO 19                          | 3                      |     | 3   |     |     |     |     |     |     |      |      |      | 1                                |      |      |

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**XIII. ASSESSMENT METHODOLOGIES – DIRECT**

|                      |                     |              |                     |              |   |               |                     |
|----------------------|---------------------|--------------|---------------------|--------------|---|---------------|---------------------|
| CIE Exams            | PO1, PO2, PO4, PSO1 | SEE Exams    | PO1, PO2, PO4, PSO1 | Assignments  | - | Seminars      | PO1, PO2, PO4, PSO1 |
| Laboratory Practices | -                   | Student Viva | -                   | Mini Project | - | Certification | -                   |
| Term Paper           | PO1, PO2, PO4, PSO1 |              |                     |              |   |               |                     |

#### XIV. ASSESSMENT METHODOLOGIES – INDIRECT

|   |  |   |                           |
|---|--|---|---------------------------|
| ✓ | Early Semester Feedback                | ✓ | End Semester OBE Feedback |
| ✗ | Assessment of Mini Projects by Experts |   |                           |

#### XV. SYLLABUS

|   |  |
|---|--|
| <b>UNIT - I</b>   | <b>OVERVIEW OF PRODUCTION PLANNING CONTROL</b> |
| Introduction: Definition, Objectives of production planning and control, functions of production planning and control, elements of production control, types of production, organization of production planning and control department, internal organization of department.  |  |
| <b>UNIT - II</b>  | <b>FORECASTING</b>                             |
| Forecasting: Importance of forecasting, types of forecasting, their uses, general principles of forecasting, forecasting techniques, qualitative methods and quantitative methods; Inventory management, functions of inventories relevant inventory costs ABC analysis, VED analysis, EOQ model, inventory control systems, P-Systems and Q-Systems. |  |
| <b>UNIT - III</b>   | <b>INTRODUCTION TO MRP</b>                     |
| Introduction to MRP and ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts. Routing, definition, routing procedure Route sheets, bill of material, factors affecting routing procedure, Schedule, definition, difference with loading.  |  |
| <b>UNIT - IV</b>  | <b>SCHEDULING</b>                              |
| Scheduling Policies, techniques, Standard scheduling methods; Line balancing, aggregate planning, chase planning, expediting, controlling aspects.  |  |
| <b>UNIT - V</b>   | <b>DISPATCHING</b>                             |
| Dispatching: Activities of dispatcher, dispatching procedure, followup, definition, reason for existence of functions, types of followup, applications of computer in production planning and control.  |  |
| <b>Text Books:</b>  |  |
| 1. M. Mahajan, –Production Planning and Control, Dhanpat Rai, 1 <sup>st</sup> Edition, 2010.<br>2. Jain, Jain, –Production planning and control, Khanna Publications, 1 <sup>st</sup> Edition, 2012.  |  |
| <b>Reference Books:</b>   |  |
| 1. S. N. Chary, –Operations Management, Tata McGraw-Hill, 5 <sup>th</sup> Edition, 2013.<br>2. Chase, –Operation Management, PHI, 1 <sup>st</sup> Edition, 2013.  |  |

#### XVI. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

| Lecture No | Topics to be covered  | CLOs  | Reference          |
|------------|---|-------|--------------------|
| 1          | Introduction: Definition of production planning and control | CLO 1 | T2:2.3             |
| 2          | Introduction: Definition of production planning and control | CLO 1 | R1:2.6             |
| 3          | Objectives of production planning and control               | CLO 1 | T1:2.6             |
| 4          | Functions of production planning and control                | CLO1  | T2:2.7<br>R1:2.18  |
| 5          | Functions of production planning and control                | CLO 1 | T2:2.22            |
| 6          | Elements of production control                              | CLO 1 | T2:2.25            |
| 7          | Types of production   | CLO 1 | T2:2.26<br>R1:2.55 |
| 8          | Organization of production planning and control department  | CLO 2 | T2:2.16<br>R1:2.61 |
| 9          | Organization of production planning and control department  | CLO 2 | T2:2.30            |

| Lecture No | Topics to be covered   | CLOs   | Reference            |
|------------|--|--------|----------------------|
|            |  |        | R1:2.58              |
| 10         | Internal organization of department.                                 | CLO 3  | T2:3.6<br>R1:4.29    |
| 11         | Forecasting: Importance of forecasting                               | CLO 3  | T2:3.14<br>R1:4.31   |
| 12         | Forecasting: Importance of forecasting                               | CLO 3  | T2:3.14<br>R1:4.33   |
| 13         | Types of forecasting, their uses                                     | CLO 4  | R1:4.36              |
| 14         | General principles of forecasting                                    | CLO 4  | T2:3.18<br>R1:4.64   |
| 15         | Forecasting techniques, qualitative methods and quantitative methods | CLO 5  | T2:3.22              |
| 16         | Forecasting techniques, qualitative methods and quantitative methods | CLO 5  | T2:3.28<br>R1:4.67   |
| 17         | Inventory management, functions of inventories                       | CLO 5  | T2:4.2               |
| 18         | Inventory management, functions of inventories                       | CLO 5  | T2:4.3<br>R1:4.71    |
| 19         | Relevant inventory costs ABC analysis, VED analysis                  | CLO 5  | T1:4.8<br>R2:4.68    |
| 20         | Relevant inventory costs ABC analysis, VED analysis                  | CLO 6  | T2:4.15<br>R1:5.74   |
| 21         | EOQ model, inventory control systems                                 | CLO 6  | T1:4.12<br>R2:5.75   |
| 22         | EOQ model, inventory control systems                                 | CLO 6  | T1:4.8<br>R1:5.72    |
| 23         | P-Systems and Q-Systems  | CLO 6  | T1:5.8<br>R1:5.73    |
| 24         | P-Systems and Q-Systems  | CLO 6  | T1:5.14<br>R1:6.78   |
| 25         | Introduction to Material Requirement Planning                        | CLO 6  | T2:5.19<br>R1:6.81   |
| 26         | ERP, LOB (Line of Balance)   | CLO 7  | T1:6.4<br>R2:6.8     |
| 27         | ERP, LOB (Line of Balance)   | CLO 7  | T2:7.7<br>R1:7.74    |
| 28         | JIT inventory, and Japanese concepts                                 | CLO 7  | T1:7.12<br>R2:8.75   |
| 29         | JIT inventory, and Japanese concepts                                 | CLO 7  | T1:7.8<br>R1:8.72    |
| 30         | Definition : Routing System  | CLO 8  | T1:8.8<br>R1:8.73    |
| 31         | Routing procedure Route sheet  | CLO 8  | T1:9.14<br>R1:10.78  |
| 32         | Bill of material, factors affecting routing procedure                | CLO 8  | T2:9.19<br>R1:10.814 |
| 33         | Bill of material, factors affecting routing procedure                | CLO 9  | T1:10.4<br>R2:11.68  |
| 34         | Schedule, definition, difference with loading                        | CLO 9  | T2:10.7<br>R1:12.74  |
| 35         | Schedule, definition, difference with loading                        | CLO 10 | T1:11.12<br>R2:12.75 |
| 36         | Scheduling Policies  | CLO 10 | T2:7.7<br>R1:7.74    |
| 37         | Scheduling Policies  | CLO 11 | T1:7.12<br>R2:8.75   |
| 38         | Scheduling techniques, Standard scheduling methods                   | CLO 11 | T1:7.8<br>R1:8.72    |
| 39         | Scheduling techniques, Standard scheduling methods                   | CLO 12 | T1:8.8<br>R1:8.73    |
| 40         | Line balancing, Aggregate planning                                   | CLO 13 | T1:9.14<br>R1:10.78  |



| Lecture No | Topics to be covered   | CLOs   | Reference            |
|------------|--|--------|----------------------|
| 41         | Line balancing, Aggregate planning                           | CLO 13 | T2:9.19<br>R1:10.814 |
| 42         | Chase planning, expediting, controlling aspects              | CLO 14 | T1:10.4<br>R2:11.68  |
| 43         | Chase planning, expediting, controlling aspects              | CLO 15 | T2:10.7<br>R1:12.74  |
| 44         | Dispatching: Activities of dispatcher                        | CLO 15 | T1:11.12<br>R2:12.75 |
| 45         | Dispatching: Activities of dispatcher                        | CLO 16 | T2:7.7<br>R1:7.74    |
| 46         | Dispatching procedure  | CLO 16 | T1:7.12<br>R2:8.75   |
| 47         | Dispatching procedure  | CLO 17 | T1:7.8<br>R1:8.72    |
| 48         | Follow up, definition, reason for existence of functions     | CLO 17 | T1:8.8<br>R1:8.73    |
| 49         | Follow up, definition, reason for existence of functions     | CLO 18 | T1:9.14<br>R1:10.78  |
| 50         | Types of follow up   | CLO 18 | T2:9.19<br>R1:10.814 |
| 51         | Applications of computer in production planning and control. | CLO 19 | T1:10.4<br>R2:11.68  |
| 52         | Applications of computer in production planning and control. | CLO 19 | T2:10.7<br>R1:12.74  |

**XVII. GAPS IN THE SYLLABUS-TO MEET INDUSTRY / PROFESSION REQUIREMENTS:**

| S No | Description  | Proposed actions | Relevance with PO'S | Relevance with PSO'S |
|------|--|------------------|---------------------|----------------------|
| 1    | To improve standards and analyze the concepts.   | Seminars         | PO 1                | PSO 1                |
| 2    | To understand the technology of advanced manufacturing techniques and additive manufacturing, etc. | Seminars / NPTEL | PO 4                | PSO 1                |
| 3    | Encourage students to solve real time applications and prepare towards competitive examinations.   | NPTEL            | PO 2                | PSO 1                |

**Prepared by:**

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**HOD, ME**