



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Mechatronics Engineering

Subject Code: DI04020021

Subject Name: Production & Operations Management

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - I

Prerequisite:	Zeal to learn the subject.
Rationale:	In today's era of globalization, productivity of organizations and quality of product are key indicators for growth of any nation. There is continuous demand from management to meet and improve set standards of production in terms of quality, quantity and productivity for competing not only domestic but also international market. Therefore, this course attempts to develop abilities in students to achieve higher productivity and better-quality tools/standards through constant endeavor in design and installation of integrated systems. Production and operation management always aims to achieve higher productivity and better standards of quality through its constant endeavor in design, improvements and installation of integrated systems of human resource, machines and methods.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Acquire the necessary knowledge and experience in order to recognize the production management and planning problems.	U
02	Improve productivity by analyze work content and calculate standard time in a given situation.	A
03	Apply production planning and control with its applications in industry.	A
04	Appreciate the quality management and Statistical Quality Control (SQC) Tools for improving industrial efficiency and quality.	R/A

**Revised Bloom's Taxonomy (RBT)*



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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE(E)	PA(M)	PA(I)	ESE(V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Production and Operation Management: 1.1 Introduction of Production & Operation Management 1.2 System and function view of organizations, scope, Evolution and future of production and operation management. 1.3 Process design-different types of process with its. Merits and demerits. 1.4 Process classification based on order, process selection, different type of manufacturing process, process performance and evaluation etc. 1.5 Product design; types of products and designing, evaluation of design.	5	10 (7 Marks)
2.	Productivity Improvement Technique: 2.1 Work study- Introduction, definition, techniques and role to enhance productivity. Basic procedure of method study. 2.2 Methods of recording data for method study using standard symbols, process charts and diagrams. 2.3 Preparation of operation (outline) process chart for given mechanical assembly components. 2.4 Preparation of flow process chart and flow diagram. Multiple activity charts. 2.5 Develop questioning techniques in analyzing data for method study. Also develop and improve the method, based on analysis of given data for operation process chart and flow diagram. 2.6 Principles of motion economy applied in (a) use of human body, (b) design of work place layout & (c) design of tools and equipment. 2.7 Micro motion study. 2.8 Basic procedure of work measurement and equipment used in time study. Work elements and their types.	14	35 (24 Marks)



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	2.9 Cumulative and fly back time measurement method. Concept of rating & rating scale. 2.10 Time study Allowances-type, normal values and applications. 2.11 Work content and Calculation of basic time and standard time (Numerical example) . 2.12 Concept of work sampling/ activity sampling.		
3.	Production Planning & Control: 3.1 Production Planning and Control (PPC)- Introduction, Major functions. 3.2 Concept of Critical Path Method (CPM). 3.3 Basics of plant layout, Types of Production i.e. Mass Production, Batch Production and Job Order Production. 3.4 Economic Batch Quantity (EBQ), Make or Buy decision 3.5 Techniques of Production Control. 3.6 Inventory control and its function and techniques. 3.7 Concept of zero inventory, Just in time (JIT) 3.8 Artificial Intelligence in Production monitoring and automation i.e. I.O.T, Robotics and autonomous systems.	12	24 (17 Marks)
4.	Quality Management: 4.1 Quality Control: Definition, Objectives, Types of Inspection: First piece, Floor and Centralized Inspection, Advantages and Disadvantages. 4.2 Quality characteristics of goods and services. 4.3 Tools and techniques for quality improvement. Check sheet, histogram, scatter diagram, cause and effect diagram, Pareto chart, process diagram, statistical process control chart, Quality assurance. 4.4 Statistical Quality Control (SQC), Types of Measurements, Variable and attribute type control charts, Uses of charts interpretations & its numerical examples . 4.5 Total quality management (TQM), Service quality. 4.6 Concept of Lean manufacturing and Six Sigma and its Applications. 4.7 Quality circle, zero defects, 5S concept.	14	31 (22 Marks)
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
21	28	21	-	-	-



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Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr. No.	Title of Book	Author	Publication
1.	Industrial Engineering & Management	S. C. Sharma, T. R. Banga	Khanna Book Publishing Co. (P) Ltd., New Delhi
2.	Industrial Engineering and Management	O.P. Khanna	Dhanpat Rai Publications (P) Ltd., New Delhi
3.	Statistical Quality Control	Eugene Grant, Richard Leavenworth	McGraw Hill Education (India) Private Limited, Noida
4.	Management: A Global, Innovative and Entrepreneurial Perspective	Heinz Weihrich, Mark V. Cannice, Harold Koontz	McGraw Hill Education (India) Private Limited, Noida
5.	Essentials of Management	Joseph L. Massie	Prentice Hall India Learning Private Limited, New Delhi
6.	Principles of Management	Premvir Kapoor	Khanna Publishing House, New Delhi

(b) Open-source software and website:

1. <https://www.minitab.com/en-us/products/minitab/free-trial/> (Minitab Free Trial)
2. https://www.youtube.com/watch?v=qliO4B_ZQko (Plant Safety)
3. <https://tinyurl.com/ycybfkuj> (Work Study)
4. <https://youtu.be/5V84h5PAjAQ?si=3mh9S5XE33ejFdLF> (Method Study)
5. <https://youtu.be/TlPJPJfstB8?si=sL4yqzsQqAfqfJSL> (Time & Motion Study)
6. <https://www.youtube.com/watch?v=0ufrez3JMIQ> (Work Measurement & methods)
7. <https://www.youtube.com/watch?v=1GjR6zySO04> (Standard time calculation)
8. <https://www.youtube.com/watch?v=7y-Iom0RTO4> (Critical Path Method)
9. <https://www.youtube.com/watch?v=dDzsFuOR-8o> (Economic Batch Quantity)
10. <https://www.youtube.com/watch?v=ZaHiNsloTm0> (Acceptance Sampling)
11. <https://www.youtube.com/watch?v=4EDYfSl-fmc> (Six Sigma)
12. <https://www.youtube.com/watch?v=7YZaWarCpQ> (Sustainable Manufacturing)



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Suggested Course Practical List:

Sr. No.	Practical Outcomes (PrOs)	Approx. Hrs. Required
01	To Study of Production System. (Input–Process–Output Model)	02
02	To study & Prepare Operation Process Chart (OPC) for given assemblies.	04
03	To study & Prepare Flow Diagram & Flow Process Chart for given assemblies.	02
04	To study & Prepare Man-Machine Chart for the given situation.	02
05	To study & calculate co-efficient of correlation for time study person using performance rating technique.	02
06	To study & calculate standard time for a given job.	02
07	To construct and interpret X bar & R chart for given data of production.	02
08	To construct and interpret c & p chart for given data of production.	02
09	To calculate all required data & prepare charts given in experiment no 8 & 9 using software tool.	02
10	To prepare sampling plan & decide about acceptance or rejection of a particular product using specific sampling plans for given data.	04
11	Presentation/Seminar on any topics given in Unit– 4 .	04
12	<i>Industrial Visit:</i> Visit at least one/two related industries. Prepare the report as per given guidelines provided in notes.	-
Total (Hours)		28

List of Laboratory/Learning Resources Required:

Sr. No.	Equipment/instrument name with broad specification	Qty.
1.	Decimal stopwatch (Non fly back type)	02 pcs.
2.	Decimal stopwatch (Fly back type)	02 pcs.
3.	Playing cards	2 sets
4.	MS Pins 10 mm diameter × 15 mm length with tolerance of $\pm 0.01\text{mm}$	100 pcs.
5.	Buttons of 6 different colors	100 of each
6.	Sampling rack with 1000 washers	1 set



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Suggested Project List:

A representative list of projects is given here. The concerned faculty can add similar projects based on student activities (chart/presentation/report/model/animation):

1. Case study on accident happened in any industry with root cause and remedies.
2. Prepare a display chart of OPC, FD, FPC & Man-machine chart (anyone chart).
3. Prepare a summary report of different software tools used for SQC.
4. Case study on Critical Path Method (CPM) for projects/tasks used in industry (like <https://blacksmithint.com/understanding-critical-path-in-manufacturing/>).
5. Application of TQM in any industry.
6. Case study on application of Quality circle, zero defect concept and 5S Concept in organization (anyone concept).
7. Make a PowerPoint presentation on anyone recent trend applied in industry relevant to subject.
8. Application of Production & Operation Management techniques and tools in any industry.

Suggested Activities for Students:

These are sample strategies that the course teacher can use to accelerate the attainment of the various outcomes in this course.

Sr. No.	Unit	Unit Name	Activities
1	I	Introduction to Production and Operation Management	Videos on topic and safety manuals / guidelines.
2	II	Productivity Improvement Technique	Videos on work study, live discussion at workshop place, presentations.
3	III	Production Planning & Control	Videos on (PPC), live cases during industrial visits, power point presentations,
4	IV	Quality Management	Videos on topics of Quality Management industrial visits, power point presentations.

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