GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD,GUJARAT

COURSECURRICULUM
COURSE TITLE: QUALITY, PRODUCTIVITY & SAFETY MANAGEMENT
(COURSE CODE: 3385505)

Diploma Programme in which this course is offered	Semester in which offered
Fabrication Technology	8th Semester

1. RATIONALE

This course provides the basic knowledge of productivity, factors affecting productivity and methods of improvement of productivity. The students will learn the better management of work force. The students will able to learn importance and meaning of inspections and quality control. The students will learn importance of safety management and safety measures which need to be followed in fabrication industry.

2. LIST OFCOMPETENCY

The course content leading to the achievement of the following competencies:

- Able to implement and understand appropriate tools and techniques to improve quality and productivity.
- Able to establish safe environment through safety management in industry.

3. COURSE OUTCOMES

The theory should be taught and practicals should be carried out in such a manner that students are able to required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes

i. Describe importance of production, productivity and quality in the fabrication industry.
ii. Describe importance of safety management and create safe environment while working in the fabrication industry.
iii. Describe quality, quality control and quality assurance.
iv. Apply tools and techniques to improve productivity and quality.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
4	-	2	6	70	30	20	30	

Legends:L-Lecture;**T**–Tutorial/TeacherGuidedStudentActivity;**P**-Practical;**C**–Credit;;**ESE**-End Semester Examination; **PA**- Progressive Assessment.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **INTRODUCTION TO QUALITY, PRODUCTIVITY & SAFETY MANAGEMENT**	1a. Describe types of production 1b. Describe quality, productivity and need of safety. 1c. Describe dimensions of quality.	**INTRODUCTION TO QUALITY, PRODUCTIVITY & SAFETY MANAGEMENT:** 1.1 History, Concept and definition of Quality, Productivity & Safety Management. 1.2 Introduction to Quality, Quality management and Safety management Quality Management, A conceptual frame work. 1.3 Various dimensions of quality. 1.4 Know the (5P) Purpose, Planning, Procedure, and Problem solving Performance of learning this Subject. 1.5 Need of attitude, Knowledge & skill required for engineer for application of Quality, Productivity & Safety Management in industry. 1.6 Prepare CV of Quality, Productivity & Safety management engineer.
Unit– II **INTRODUCTION TO PRODUCTION AND PRODUCTIVITY**	2a. Classify production and productivity. 2b. Describe types of production. 2c. Differentiate production and productivity.	**INTRODUCTION TO PRODUCTION AND PRODUCTIVITY:** 2.1 Production concepts and factors. 2.2 Production function. 2.3 Production system and types of Production. 2.4 Input output model. 2.5 Difference between production and productivity. 2.6 External & Internal factors of productivity.
Unit– III **PRODUCTIVITY**	3a. Describe causes of low productivity. 3b. Describe factors affecting productivity. 3c. Explain advantage from increased productivity.	**PRODUCTIVITY:** 3.1 Definition & Concept of Productivity. 3.2 Importance of Productivity. 3.3 External & Internal Factors of Productivity. 3.4 Reasons for low productivity. 3.5 Factors that help to increase productivity. 3.6 Productivity Index. 3.7 Kinds of Productivity measurement. 3.8 Causes of Low Productivity and techniques of their Elimination. 3.8.1 Due To Defects In Design Or Specimen Of Product 3.8.2 Due to Inefficient Methods of Manufacture.

Unit	Major Learning Outcomes	Topics and Sub-topics
		3.8.3 Mismanagement Of Time On Account Of Management 3.8.4 Mismanagement On Account Of Workers 3.9 Factors affecting Productivity. 3.9.1 Man power 3.9.2 Equipment and machines 3.9.3 Input materials 3.9.4 Time 3.9.5 Floor area or space 3.9.6 Power of Energy 3.9.7 Finance 3.9.8 Movement of Man and Material 3.10 Technical Methods to Improve Productivity. 3.10.1 Task based productivity 3.10.2 Product based technique 3.10.3 Technology based methods 3.10.4 Materials based technologies 3.10.5 Employee based methods 3.11 Improving productivity by reducing work content. 3.12 Management tools for productivity improvement. 3.13 Main Contributors to Productivity Improvement. 3.13.1 Human relations 3.13.2 Improvement in Existing 3.13.3 Methods of production and adoption of latest technology 3.13.4 Proper design of the product 3.13.5 Cost control 3.13.6 Product simplification and standardization 3.13.7 Proper planning loading and scheduling 3.13.8 Good supervision and management 3.13.9 Awareness and training about productivity 3.13.10 Inceptive to workers 3.14 Advantages from increased productivity.
Unit– IV QUALITY MANAGEMENT	4a. Describe quality management. 4b. Describe cost of quality.	**QUALITY MANAGEMENT:** 4.1 Introduction to Quality. 4.2 Introduction to Quality Management. 4.3 Dimensions of Quality. 4.4 Costs of Quality.

Unit	Major Learning Outcomes	Topics and Sub-topics
	4c. Explain importance of standardization. 4d. List various standards used for quality management.	4.5 Impact of Poor quality. 4.6 Quality Characteristics. 4.7 Quality assurance process meaning and Importance. 4.8 Steps to be taken for Quality Assurance. 4.9 Quality, Reliability and Safety. 4.10 Bureau of Indian Standards. (BIS) 4.11 International Organization for Standardization. 4.12 ISO 9000. 4.13 Conformance to Specifications. 4.14 ISO 14000.
Unit– V **INSPECTION AND QUALITY CONTROLS**	5a. Define inspection and quality controls. 5b. Describe role of inspection engineer in industrial field. 5c. Define TQM.	**INSPECTION AND QUALITY CONTROLS:** 5.1 Introduction. 5.2 Definitions Of Inspection. 5.3 Objectives of Inspection. 5.4 Functions of Inspection. 5.5 Types of Inspection. 5.6 Methods of Inspection. 5.7 Drawback of Inspection. 5.8 Quality Control. - Types of Quality Control. - Steps in Quality Control. - Objectives of Quality Control. - Benefits of Quality Control. - Seven tools for Quality Control. 5.9 Quality Circles.
Unit VI **TOTAL QUALITY MANAGEMENT**	6a. Explain Total Quality Management. 6b. Describe Elements of TQM 6c. Describe Benefits of TQM 6d. Define KAIZEN. 6e. Define "5S"	**TOTAL QUALITY MANAGEMENT:** 6.1 Total Quality Control. 6.2 Need for management of product quality. 6.3 Concept of Total Quality Management. 6.4 Elements of TQM. 6.5 Implementation of TQM. 6.6 Benefits of TQM. 6.7 Benchmarking. 6.8 KAIZEN. 6.9 "5S" Introduction and Concept.
Unit VII **SAFETY MANAGEMENT**	7a.Describe the safety and accident definition and terminology.	**SAFETY MANAGEMENT :** 7.1 Definition, introduction and need of safety. 7.2 Safety terminology.

Unit	Major Learning Outcomes	Topics and Sub-topics
	7b.Describe safety for workshop machines and equipments. 7c. Create a safe environment in industry by studying safety in various areas (electrical, gas cutting, material handling, fire.) 7d.Importance of safety management report. 7e. Describe role of safety engineer. 7f. Create safe environment in industry.	7.3 Define the term "Accident" - Introduction to unsafe condition - Introduction to unsafe Act. 7.4 Safety for machines & equipments. - Safety for grinding machines, drilling machines & power tools. 7.5 Electrical safety. -Primary hazards -Secondary hazards 7.6 Safety for gas cutting cylinders. 7.7 Safety for arc welding. 7.8 Safety for material handling. 7.9 Safety for use of ladder and scaffoldings. 7.10 "5S" Safety concepts. 7.11 Safety for pressure test. 7.12 Safety for fire. 7.13 Safety management and reports. 7.14 Personnel Protective Equipment & first aid.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	**Introduction to quality, productivity & safety management**	4	7	0	0	7
II	**Introduction to quality, productivity & safety management**	4	0	7	0	7
III	**Productivity**	14	0	7	7	14
IV	**Quality management**	8	0	7	0	7
V	**Inspection and quality controls**	8	0	0	7	7
VI	**Total quality management**	4	7	0	0	7
VI	**Safety management**	14	7	7	7	21
	TOTAL	**56**	**21**	**28**	**21**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's Revised taxonomy)

NOTE:-Suggested specification table shall be treated as a general guidance for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OFEXERCISE/PRACTICAL/EXPERIMENTS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes mainly in psychomotor domain are listed as practical/exercises. However, If these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus overall development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomesinaffectivedomainwhicharerequiredforoverallachievementofProgramme Outcomes/Course Outcomes

Sr. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx hours required
1	2	Compare job production and mass production.	2
2	3	Calculate productivity from the given data & describe purpose to Increase productivity.	2
3	2	Calculate production and productivity from the given data.	2
4	4	Write Case study on ISO 14000 with its benefits.	2
5	5	Draw cause and effect diagram (fish bone diagram) from the given technical problems. E.g. Porosity in low carbon steel plate welding.	2
6	6	Write case study on KAIZEN implementation with its concept and benefits.	2
7	6	Write case study on “5S” with its history, concept and benefits.	2
8	7	Demonstration of grinding and drilling machine safety (do and don’t do’s)	2
9	7	Demonstration of electrical primary and secondary hazards.	2
10	7	Demonstration of safety of fuel gas cutting system.	2
11	7	Demonstration of arc welding safety.	2
12	7	Demonstration of material handling system.	2
13	7	Fill the typical safety management report format.	2
14	7	Prepare a typical accident report for industrial accident in recycling yard/heavy fabrication engineering.	2
		Total Hrs.	28

8. SUGGESTED LIST OF PROPOSED STUDENTACTIVITIES

Following is the list of proposed student activities:

8.1 Prepare a question bank.
8.2 10 min PPT presentation on the given topic from the syllabus or beyond the syllabus
8.3 Report writing on various topics from syllabus and beyond syllabus.
8.4 Download the videos of related to safety in industry and prepare a report on it.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Arrange industrial visit.
ii. Arrange expert lecture.
iii. Show video films/animation films/photographs of different automated manufacturing process and discuss their features.

10. SUGGESTED LEARNINGRESOURCES

A. List of Books

Sr.No	Title of Books	Author	Publication
1	INDUSTRIAL ENGINEERING & OPERATIONS MANAGEMENT.	S.K.SHARMA & SAVITA SHARMA	S.K. KATARIA & SONS
2	QUALITY MANAGEMENT	KANISHKA BEDI	OXFORD UNIVERSITY PRESS
3	INDUSTRIAL ENGINEERING & PRODUCTION MANAGEMENT	M. MAHAJAN	DHANPATRAI & CO.
4	INDUSTRIAL ENGINEERING & MANAGEMENT.	O.P.KHANNA	DHANPATRAI PUBLICATIONS
5	PRODUCTION & OPERATION MANAGEMENT	S. ANIL KUMAR	NET

B. List of Major Equipment/Instrument

i. LCD Projector
ii. Laptop

C. List of Software/Learning Websites

i. Microsoft Excel
ii. https://en.wikipedia.org/wiki/5S_(methodology
iii. http://leanmanufacturingtools.org
iv. www.slideshare.net
v. http://in.kaizen.com/knowledge-center/what-is-5s.html
vi. https://archive.org

11. COURSE CURRICULUM DEVELOPMENTCOMMITTEE

Faculty Members from Polytechnics

- **Prof. P. B. Pathak,** I/C HOD**,** Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. B. K. Gandhi,** Sr. Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. S. Y. Merchant**, Sr. Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. A. M. Gohil**, Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. N. M. Bhangale**, Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar

Co-coordinator and Faculty Members from NITTTR Bhopal