

Program Name : Diploma in Production Engineering / Production Technology
Program Code : PG/ PT
Semester : Fifth
Course Title : Total Quality Management
Course Code : 22567

1. RATIONALE

The success of any organization not only depends on quality of its products and services but also depends on the people working in it. Total quality management (TQM) is a philosophy, methodology aimed to create and maintain mechanism of organization's continuous improvement to achieve total quality. This course deals with the methods through which the needs and expectations of the customer and the objectives of the organization are satisfied in most efficient and cost-effective manner. After studying this course, the diploma technicians shall be able to improve and maintain the quality of products and services through ongoing refinements in the organization he/she serving.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Apply total quality management principles for assuring quality of products and services.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

- Apply the quality concepts in the organization.
- Measure the system performance to achieve total quality in the organization.
- Develop quality circle for TQM through employee involvement.
- Identify quality tools for continuous process improvement.
- Identify strategic techniques for TQM.
- Implement TQM models to achieve total quality.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
L	T	P		Theory						Practical						
				Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
			Max		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	-	3	3	70	28	30*	00	100	40	--	--	--	--	--	--

(*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain UOs required for the attainment of the COs.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit
 ESE - End Semester Examination; PA - Progressive Assessment



5. COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.

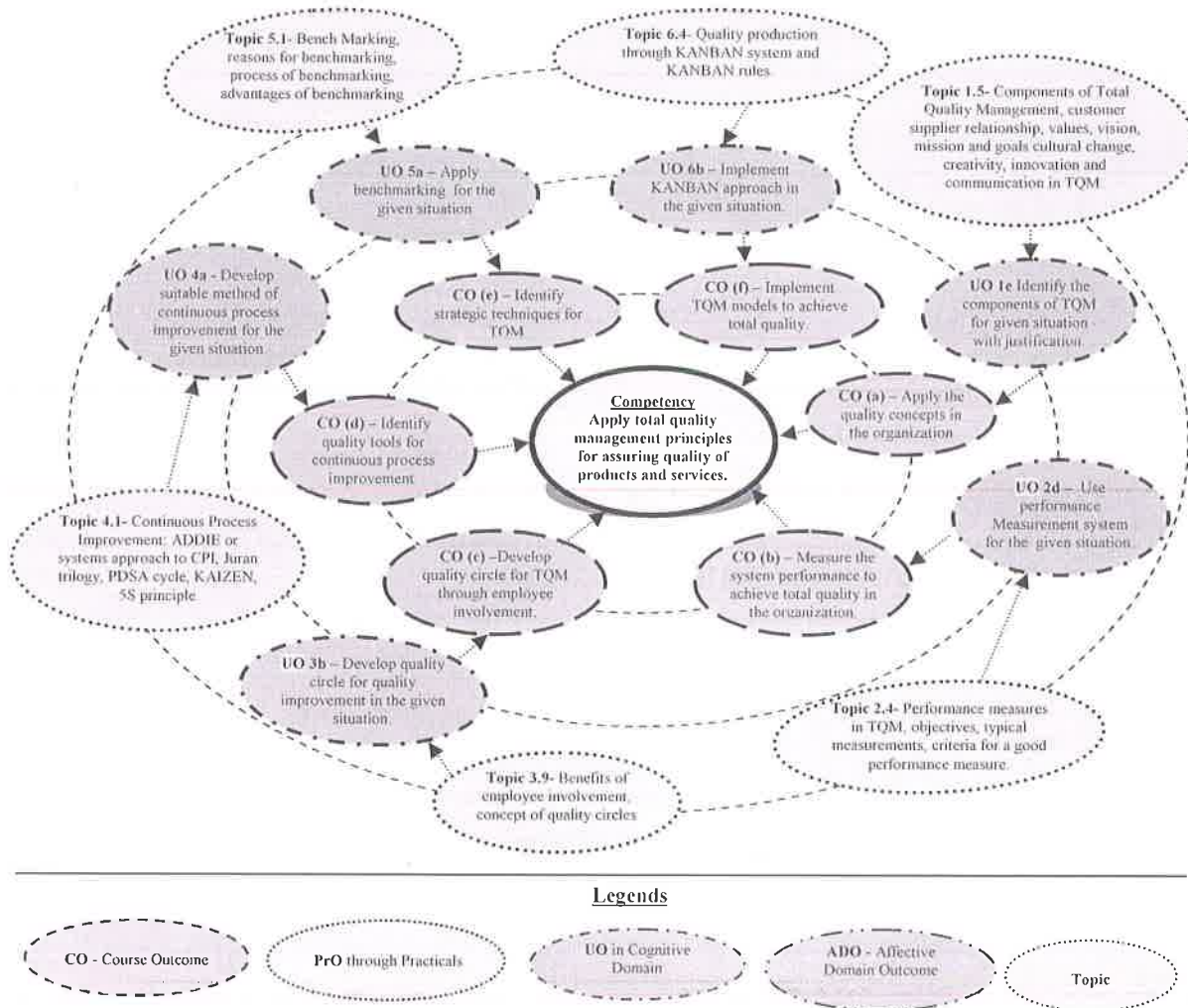


Figure 1 - Course Map

**6. SUGGESTED PRACTICALS/ EXERCISES
NOT APPLICABLE**

**7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED
NOT APPLICABLE**

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit – I Basics of Of TQM	1a. Apply TQM philosophies for the given condition. 1b. Apply TQM strategies to the	1.1 Basic concept of quality, and Total Quality Management, various definitions of quality, benefits of



Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	given situation/organization 1c. Identify given cost for the given specified condition with justification. 1d. Compare quality costs for the given condition. 1e. Identify the components of TQM for given situation with justification.	TQM. 1.2 TQM philosophies (approach to quality): Deming, Juran and Crosby. 1.3 Garvin's five approaches and nine dimensions of quality. 1.4 Quality planning and quality costs, prevention costs, appraisal cost, internal failure costs and external failure costs. 1.5 Components of Total Quality Management, customer supplier relationship, values, vision, mission and goals cultural change, creativity, innovation and communication in TQM.
Unit- II Leadership Role and Performance Measures in TQM	2a. Identify the role of leader in the given situation with justification. 2b. Identify the role of senior management in TQM in the given situation with justification 2c. Use Deming's "14 point" philosophy in the given situation. 2d. Use performance Measurement system for the given situation. 2e. Develop measuring and improvement processes for quality assurance and control.	2.1 Leadership role in TQM, leadership defined and leadership concepts. Characteristics of quality leader. 2.2 Role of senior management in TQM, Dr. Stephen Covey's seven habits of highly effective people. 2.3 Deming's "14 points" philosophy. 2.4 Performance measures in TQM, objectives, typical measurements, criteria for a good performance measure.
Unit- III Customer Satisfaction and Employee Involvement	3a. Identify external customers and internal customers in the given situation with justification 3b. Use customer complaints to improve the quality of the service of the given organization. 3c. Apply strategies for customer retention in the given situation, 3d. Select the strategy for achieving motivated workforce in the given situation with justification. 3e. Identify the need for employee empowerment in the given situation. 3f. Identify teams for TQM implementation in the given situation with justification. 3g. Develop quality circle for quality improvement in the given situation.	Customer Satisfaction: 3.1 External customers and internal customers. 3.2 Customer perception of Quality, customer complaints. 3.3 Customer feedback, service quality and customer retention. 3.4 Supplier relationship principles. Employee Involvement: 3.5 Maslow's need hierarchy. 3.6 Strategies for achieving a motivated workforce. 3.7 Employee empowerment, recognition and reward. 3.8 Teams, types of teams, characteristics of successful teams. 3.9 Benefits of employee involvement, concept of quality circles.

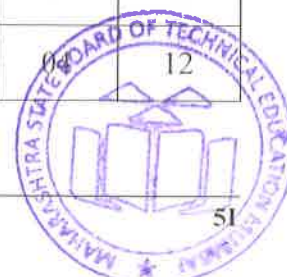


Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit– IV Continuous process improvement	4a. Develop suitable method of continuous process improvement for the given situation. 4b. Identify quality improvement techniques for the given condition with justification. 4c. Apply quality management methods for analyzing and solving given problems of the organization.	4.1 Continuous Process Improvement: ADDIE or systems approach to CPI, Juran trilogy, PDSA cycle, KAIZEN, 5S principle. 4.2 Six Sigma, Methodology of Six Sigma DMAIC and DMADV, its importance and overview of master black belt and green belt.
Unit–V Strategic techniques for TQM	5a. Apply benchmarking for the given situation. 5b. Use Failure Mode and Effect Analysis for the given situation. 5c. Propose a quality auditing system in the given situation with justification.	5.1 Bench Marking, reasons for benchmarking, process of benchmarking, advantages of benchmarking. 5.2 Concept of Failure Mode and Effect Analysis (FMEA), its types and stages in FMEA. 5.3 Quality Auditing: QS 9000 series of standards, ISO 14000, concepts, requirements and benefits of ISO certification.
Unit – VI Implementa tion of TQM	6a Develop the road map for TQM implementation in the given situation. 6b Implement KANBAN approach in the given situation. 6c Use given model of TQM in the given situation. 6d Identify the barriers to TQM implementation in the given situation with justification.	6.1 Approach for Total Quality implementation. 6.2 Road map for TQM, Malcolm Baldrige National Quality Award Model (MBNQA). 6.3 Single unit production, “YO-I-DON” and standardization, need of multi-skilled worker. 6.4 Quality production through KANBAN system and KANBAN rules. 6.5 Barriers to TQM implementation.

Note: To attain the COs and competency, above listed UOs need to be undertaken to achieve the ‘Application Level’ of Bloom’s ‘Cognitive Domain Taxonomy’.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER (INTERNAL) DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basics of Total Quality Management	08	06	04	-	10
II	Leadership Role and Performance measures in TQM	08	04	04	04	12
III	Customer Satisfaction and Employee Involvement	08	04	04	04	12



IV	Continuous Process Improvement	08	04	04	04	12
V	Strategic techniques for TQM	08	04	04	04	12
VI	Implementation of TQM	08	04	04	04	12
	Total	48	26	24	20	70

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

Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

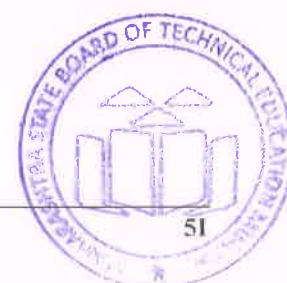
Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Prepare/Download information on:
 - i. Six Sigma Quality Strategies.
 - ii. ISO 9000/14000.
 - iii. Malcolm Baldrige National Quality Award Model
 - iv. Failure Mode and Effect Analysis (FMEA)
- b. Undertake a manufacturing survey on internet and list the name of manufacturing industries engaged in implementation of TQM.
- c. Visit to any Manufacturing industry and prepare a report consisting
 - i. Different advanced TQM tools implemented.
 - ii. Different strategic TQM techniques implemented.
- d. Visit to nearby industry and prepare a report consisting of strategies implemented for continuous improvement (any 02 industry).
- e. Give seminar on relevant topic.
- f. Undertake micro-projects.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- b. '*L*' in item No. 4 does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
- c. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- e. Guide student(s) in undertaking micro-projects.
- f. Arrange visit to nearby industries for understanding TQM.
- g. Show video/animation films to explain functioning of various TQM techniques and quality tools.
- h. Give Micro projects.
- i. Use different instructional strategies in classroom teaching.



12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

Suggestive lists of micro-projects are given here. Similar micro-projects could be added by the concerned faculty:

- Comparative study of TQM philosophies of Deming, Juran, Crosby, Kaizen, Shigeo Shingo, Ishikawa and Taguchi in a particular situation.
- Comparative Study of internal and external customers.
- Collect information of Six sigma black belt and yellow belt.
- List out the manufacturing organizations which are certified as Six Sigma, ISO 9001-2008, ISO-14000 or implementing any of the method of quality improvement with justification.
- Form a quality circle among the students and assign any case study for given problem solving.
- Case study on Quality circle / Failure Mode and Effect Analysis (FMEA).

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	TQM-Total Quality Management	Arasu Senthil B Paul Praveen J	Scitech Publications (India) Pvt. Ltd., Chennai, 2015. ISBN: 978-81-8371-578-2
2.	Quality Assurance and Total Quality Management (ISO-9000, QS-9000, ISO-14000)	Jain K C Chitale A K	Khanna Publishers, New Delhi, 2005, ISBN: 9788174091741
4.	TQM and ISO 14000	Arora K C	S.K. Kataria & Sons, New Delhi ,2014, ISBN: 9788185749990
6	Total Quality Management	Naidu N V R, Babu K M, Rajendra G	New Age International (P) Ltd, New Delhi, 2006. ISBN- 978-81-224-1799-9
7	Total Quality Management	Naagarazan R S Arivalagar A A	New Age International (P) Ltd, New Delhi, 2016. ISBN- 978-81-224-3968-7
8	Total Quality Management	Dale H. Besterfield, Carol Besterfield- Michna, Glen Besterfield	Prentice Hall; ISBN- 978-0136394037



14. SOFTWARE/LEARNING WEBSITES

- i. <https://www.versesolutions.com/>
- ii. <https://www.asq.org/learn-about-quality/total-qualitymanagement/overview/>
- iii. <https://www.hgint.com/tqm-total-quality-management-software/>
- iv. <https://www.books.google.co.in/books?isbn=817758412X>
- v. [https://www.www.educba.com › Courses › Business › Management](https://www.www.educba.com/Courses/Business/Management)
- vi. <https://www.managementhelp.org/quality/total-quality-management.htm>



