GUJARAT TECHNOLOGICAL UNIVERSITY

SUBJECT: MAINTENANCE AND SAFETY ENGINEERING

SUBJECT CODE: 2184102

B.E. 8th Semester

Type of course: Department Elective

Prerequisite: NA

Rationale: - Students will develop skills for evaluating, articulating, refining, and pitching a new product or service offering, either as a start-up business or a new initiative within an existing firm. This course is appropriate for all students interested in innovation and design as necessary components of new businesses today. The aims to acquaint the students with challenges of starting new ventures and enable then to investigate, understand and internalize the process of setting up a business.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	2	0	5	70	20	10	30	0	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**MAINTENANCE:-** Types – breakdown, preventive, predictive, TPM; elements of preventive maintenance – checklist, schedule, procedure.	07	15%
2	**TOTAL PRODUCTIVE MAINTENANCE: -** Principles; preparatory stages of implementation – TPM organisation structure, creation; basic TP policies and aids, master plan. TPM IMPLEMENTATION: Small group activities, autonomous maintenance, establishing planned maintenance, training, developing equipment management program.	09	25%
3	**SAFETY SYSTEMS ANALYSIS:-** Definitions, safety systems; safety information system: basic concept, safety cost / benefit analysis.	07	24%

4	**HAZARD ANALYSIS: -** General hazard analysis: electrical, physical and chemical hazard, detailed hazard analysis. Cost effectiveness in hazard elimination. Logical analysis: map method, tabular method, fault tree analysis and hazop studies. FIRE PROTECTION SYSTEM: Chemistry of fire, water sprinkler, fire hydrant, alarm and detection system. Suppression system: CO2 system, foam system, Dry Chemical Powder (DCP) system, halon system, portable extinguisher.	09	20%
5	**SAFETY IN MACHINE OPERATION**: - Design for safety, lock out system, work permit system, safety in use of power press, cranes. Safety in foundry, forging, welding, hot working and cold working, electroplating and boiler operation. SAFETY AND LAW: Provisions in factory act for safety, explosive act, workmen compensation act compensation calculation. Boiler act and pollution control act.	09	16%

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30%	**30%**	**30%**	**10%**	**0**	**0**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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

Reference Books:

1. John Ridley, "Safety at Work", Butter Worth Publisher, Oxford, 1997
2. Robinson C J and Ginder A P, "Implementing TPM", Productivity Press, USA, 1995
3. Joh Dhillon B S, "Maintainability, Maintenance and Reliability for Engineers", CRC Press, 2006.
4. National Safety Council, "Personal Protective Equipment", Bombay, 1998.

Course Outcomes:

After successful completion of the course the students shall be able to:

- Maintain the industry without any risk in its operation.
- Improve the production.
- Analyse the hazards in maintenance and to solve it.
- Identify and prevent chemical, environmental mechanical, fire hazard through analysis.

List of tutorials:
As per the topics of theory class.

Active Learning Assignments: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.