

# GUJARAT TECHNOLOGICAL UNIVERSITY



Program Name: Bachelor of Engineering

Level: UG

Branch: ALL

Subject Code : BE02R00061

Subject Name: Industrial Safety and Standards

WEF Academic Year :	2024-25
Semester :	2
Category of the Course :	MOPEC

<b>Prerequisite :</b>	High School Physics, Chemistry, Mathematics
<b>Rationale :</b>	The course is intended to give knowledge of various safety management principles, various safety systems, hazards, types, causes and preventive steps in an industrial environment. It will prepare the students to understand the importance of periodic and preventive maintenance in an industrial environment and to find faults in various machine tools.

## Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Understand the concept of industrial safety and industrial hazards	UN
02	Understand the importance of Periodic and Preventive maintenance	UN
03	Apply the fault finding methods in machine tools	AP

\*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

## Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
L	T	P	PBL*	TH		Theory		Tutorial / Practical			
						ESE (E)	PA (M)	PA/ (I)	PBL (I)	ESE (V)	
30	0	0	30	60	02	70	30	0	30	0	130

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, PA = Progressive Assessment, ESE = End-Semester Examination

\* *Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.*

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## Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	<b>Unit-I: Industrial safety:</b> Need for safety. Safety and productivity, Accident: causes, types, results and control. Injury, Unsafe act, Unsafe Condition, Dangerous Occurrence, Reportable accidents. Theories of accident causation. Mechanical and electrical hazards: types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Monitoring Safety Performance: Frequency rate, severity rate, incidence rate, activity rate. Safety policy and safety standards for Industry and organization.	8	20
2	<b>Unit-II: Hazard identification and analysis:</b> Hazard and risk, Types of hazards –Classification of Fire, Types of Fire extinguishers, fire explosion and toxic gas release, Structure of hazard identification and risk assessment. Identification of hazards: Inventory analysis, Fire and explosion hazard rating of process plants - The Dow Fire and Explosion Hazard Index, Preliminary hazard analysis, Hazard and Operability study (HAZOP) – methodology, criticality analysis, corrective action and follow-up. Control of Chemical Hazards, Hazardous properties of chemicals, Material Safety Data Sheets (MSDS)	4	10
3	<b>Unit-III: Fundamentals of maintenance engineering:</b> Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.	4	10
4	<b>Unit-IV: Wear and Corrosion and their prevention:</b> Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.	4	20
5	<b>Unit-V: Fault tracing:</b> Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, Types of faults in machine tools and their general causes.	4	20

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6	<b>Unit-VI: Periodic and preventive maintenance:</b> Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.	6	20
<b>Total</b>		<b>30</b>	<b>100</b>

## Reference Book :

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. R.K Jain (2000) Industrial Safety, Health and Environment management systems, Khanna Publications.
4. Paul S V (2000), Safety management System and Documentation training Programme handbook, CBS Publication.
5. Krishnan, N.V. (1997). Safety management in Industry. Jaico Publishing House, New Delhi.
6. John V. Grimaldi and Rollin H.Simonds. (1989) Safety management. All India Traveller Book Seller, Delhi.

## • List of suggested activities for Problem Based Learning:

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1.	Technical Video based learning related to the subject	Duration of video = 5hrs. Report preparation = 5hrs. Total = 10hrs.	Report /presentation based on the video learning outcomes.
2.	Assignment writing. Numericals based assignment is preferable.	5 assignments of 4hrs. each. Total = 20hrs.	Based on the correctness of submitted assignment.
3.	Self-learning online course	Minimum duration of the course should be 10hrs.	Examination based assessment at the end of course. Based on the certificate produced.
4	Videos on Industrial safety/Disaster Management aspects based on subject	Duration of video = 5hrs. Report preparation = 5hrs. Total = 10hrs.	Based on quiz/report submitted
5	Technical paper reading and	5 research papers = 20	Summarize research paper and

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	summarization of research papers based on relevant subject	hrs.	evaluation critical parameters
6	Poster/chart/power point preparation on technical topics	Duration = 6 hrs.	Based on poster/chart preparation and presentation skills
7	Industrial exposure for 2-3 day observe and provide tentative solutions on society/environment health/sustainability/any other	Duration = 15 hrs. for industrial exposure Problem identification and tentative solution = 10 hrs. Total = 20 hrs.	Based on evaluation of critical problems and solutions
6	Group Discussion on emerging/trending technical topics based on subject	Duration = Min. 1 hr.per subject. Max. 3 hrs. per subject	Based on performance in group discussion, technical depth, knowledge etc.
7	Real world case studies-based learning	Duration of data collection/study = 5hrs. Report preparation = 5hrs. Total = 10hrs.	Based on in-depth study, technical depth, data collected, fact finding, etc.
8.	Expert lecture/session	Duration 3 hrs. For attending the lecture/session– 2 hrs. and for report writing 1 hr.	Based on the proof of attendance and report submitted
9.	Annotated Video Explanation of Concept/Problem	10h (Preparation + Recording + Submission)	Based on accuracy of explanation, clarity, and presentation style.
10	Patent Search and Innovation Gap Identification	10h (Search + Report)	Based on number of relevant patents analyzed and identification of innovation scope.

Note:

1. All the suggested activity should be related to the subject.
2. The number of hours are suggestive. Faculty can sub-divide the number of hours based on the activity. However, total number of hours is fixed.
3. Rubrics for the evaluation can be prepared by the faculty.
4. Subject teacher can add the relevant activities other than those listed above, with the consent of head of the department and DQAC.

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