

# GUJARAT TECHNOLOGICAL UNIVERSITY

## MECHATRONICS (47)

DIAGNOSTIC MAINTENANCE AND MONITORING

SUBJECT CODE: 2724704

M.E. 2<sup>ND</sup> SEMESTER

**Type of course:** Engineering Science

**Prerequisite:** NA

**Rationale:** This subject deals with fundamentals of Condition Monitoring and its applications, which are useful for Mechatronics engineers.

### Teaching and Examination Scheme:

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

### Content:

Sr. No	Contents	Teaching Hrs	Weightage (%)
1	<b>Introduction</b> Introduction to Condition Based Maintenance (CBM), Application and economic benefits, Signature analysis - online and off-line techniques	05	12.5
2	<b>Various Condition Monitoring (CM) techniques</b> Vibration monitoring and analysis, Time and Frequency domain analysis, Shock Pulse Method, Thermal monitoring, Noise monitoring, Envelope detection technique, Oil analysis including wear debris and contaminant monitoring, Performance monitoring, Acoustic emission and other techniques, Nondestructive techniques	20	50
3	<b>Knowledge-based systems for Condition Monitoring</b> Future developments in condition monitoring techniques and systems	05	12.5
4	<b>Practical applications of diagnostic maintenance</b> Condition monitoring of mechanical and electrical machines, Condition monitoring of Bearings and gears, Electro pneumatic systems	10	25
	<b>TOTAL</b>	<b>40</b>	<b>100</b>

### Reference Books:

1. Handbook of Condition Monitoring: Techniques and Methodology By A. Davies, Springer
2. Handbook of Condition Monitoring By B. K. N. Rao, Elsevier
3. Condition-based Maintenance and Machine Diagnostics By J.H. Williams, A. Davies, P.R. Drake, Springer

### Course Outcomes:

After learning the course the students should be able to

- Perform practical analysis on actual machines and systems
- Develop a maintenance strategy based on system response.
- Understand the advantages and limitations of a variety of techniques for condition monitoring.
- Understand the practical aspects of sensor use and type

- Understand the environmental benefits of condition monitoring techniques

### **List of Practicals**

Experiments will be based on

1. Vibration Monitoring of machine component
2. Oil monitoring of machine component
3. Non Destructive testing of machine components.
4. Condition monitoring of Electrical machines.

### **Design based/open ended problem**

Student may be given a task to exhibit the knowledge of the course studied during the academic year.

### **Major Equipment:**

Condition Monitoring setup with Labview software.

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.