Register Number:……..

B.E/B.TECH DEGREE EXAMINATIONS: NOV/ DEC 2024

(Regulation 2018)

Sixth Semester

MECHATRONICS ENGINEERING

U18MCE0002: Condition Monitoring

COURSE OUTCOMES

CO1: Recognize the types of failures and maintenance strategies.
CO2: Illustrate the fundamental principles of machinery vibration.
CO3: Explain signal analysis, fundamentals of FFT and signal conditioning.
CO4: Explain the vibration and noise-based condition monitoring techniques.
CO5: Explain the thermography and wear analysis for condition monitoring.
CO6: Identify and explain the appropriate condition monitoring technique for a given application.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Distinguish System and component failure.	CO1	[K_2]
2.	List the human factors in failures.	CO1	[K_2]
3.	Differentiate free vibration and forced vibration with example	CO2	[K_2]
4.	List different vibration absorbers	CO2	[K_2]
5.	Classify signals	CO3	[K_2]
6.	List different noise fields.	CO4	[K_2]
7.	If you wanted to identify the noise source, which measurement technique do you use and justify your selection.	CO4	[K_3]
8.	State the use of elemental analysis	CO5	[K_2]
9.	Being a mechatronics engineer, which maintenance strategy do you prefer for steam turbines of thermal power plants.	CO6	[K_3]
10.	You are asked to work in a slaughter house as a QC engineer, which NDE technique will you propose to maintain the quality of meat.	CO6	[K_3]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Why scheduled maintenance is required and develop a schedule for maintaining a motor used in Electric bus	8	CO1	[K_2]
	b)	Explain various failure analysis techniques.	8	CO1	[K_2]
12.	a)	Why mode shapes are important in vibration analysis and draw the 1st three modes shapes of cantilever beam also explain the principle of vibration transmissibility.	8	CO2	[K_2]
	b)	Explain Single degree freedom vibratory system with Mass, spring and dashpot equivalence.	8	CO2	[K_2]
13.	a)	Why signal analysis is very essential in condition monitoring. List various signal analysis techniques and of which technique is widely used for signal analysis and justify.	8	CO3	[K_2]
	b)	With a neat sketch, explain the implementation of condition monitoring system for a diesel engine generator.	8	CO3	[K_2]
14.	a)	Explain the process of identifying the bent shaft using the vibration signature.	8	CO4	[K_3]
	b)	Explain the various techniques used for noise measurements.	8	CO4	[K_2]
15.	a)	Explain Severity and Residual Life based on oil analysis.	8	CO5	[K_2]
	b)	Distinguish Active and passive thermography? And justify which is cost effective?	8	CO5	[K_2]
16.	a)	Justify why X-ray fluorescence is gaining popularity in oil analysis justify?	8	CO6	[K_3]
	b)	List the bearing defects and explain how they are identified with Vibration signature?	8	CO6	[K_3]

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