GURUGRAM UNIVERSITY
SCHEME OF STUDIES AND EXAMINATION
M.TECH 2ND YEAR (MECHANICAL ENGINEERING)
SEMESTER 3RD

Sl.No	Course No.	Subject	Teaching Schedule				Examination Schedule(Marks)				Duration of Exam (Hours)	No of hours/ week
			L	T	P	Total credits	Marks of Class works	Theory	Practicall	Total		
1	17MME23C1	Tribology & Maintenance Engineering	4	0	-	4	50	100	-	150	3	4
2	17MME23C2	Robotics and Automation	4	0	-	4	50	100	-	150	3	4
3	17MME23C3	Major Project (DissertationStage 1)	-	-	4	4	100	-	-	100		4
4	17MME23CL1	Tribology & Maintenance	-	-	2	2	50	-	50	100		2
		Engineering Lab										
5		Open Elective				3						
		TOTAL	19									

NOTE:

Examiner will set nine questions in total. Question One will be compulsory and will comprises of all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

OPEN ELECTIVE

 A candidate has to select this paper from the pool of open electives provided by the University.

GURUGRAM UNIVERSITY
SCHEME OF STUDIES AND EXAMINATION
M.TECH 2ND YEAR (MECHANICAL ENGINEERING)
SEMESTER 4TH

Sl. No	Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				No of Credits
			L	T	P	Total	Marks of Class works	Theory	Practical	Total	
1.	17MME24C1	Major Project (Dissertation Stage 2)	-	-	-	-	250	-	500	750	**20**
		TOTAL	-	-	-	-	**250**	**-**	**500**	**750**	

NOTE:

1. **Students have to publish a research paper in a journal / conference of the research work done in the semester.**

17MME23C1   TRIBOLOGY & MAINTENANCE ENGINEERING

L   T   P   CREDIT   **SESSIONAL:50 Marks**
4   0   0   4   **THEORY :100 Marks**
                                                                               TOTAL :150 Marks
                                                                               DURATION OF EXAM. :3 Hrs.

Course Outcomes (CO): The students will be able to:

CO1. identify the properties of lubricants used in different bearings.

 CO2. predict the different wears and causes of friction in different bearings.

CO3. analyze hydrodynamic lubrication for short and long bearing.

CO4. Management of maintenance activities.

CO5. monitor different conditions like leakage and vibration

UNIT-1

Engineering Tribology

Tribological system, Tribology in industries, friction and wear, lubricants and lubrication, fundamental of bearings, nano Tribology ,Introduction part of friction, theories of friction, adhesion theory of friction and its drawbacks, stick-slip theory of friction, friction measurement methods.

Unit-2

Wear, lubricants and bearings

Cause, effect, classification and mechanism of wear, quantitative laws of wear, wear and wear rate, objective and properties of   lubricants, synthetic lubricants, reasons of degradation of lubricating oils ,lubricant additives, boundary lubrication, hydrodynamic lubrication, mechanism of elastohydrodynamic lubrication, classification of bearings, hydrostatic bearings, hydrodynamic bearings

UNIT-3

Maintenance Management

Relevance of maintenance, maintenance: an over view, maintenance services, problems of the plant manager, automation and maintenance, maintenance objectives and costs, quality and quality circle in maintenance, Engineering reliability, maintainability Maintenance Types/sytems

Planned and unplanned maintenance, breakdown, corrective, opportunistic, routine, preventive, predictive, CBM, Design out maintenance

Unit -4

Condition monitoring

NDT concepts, visual and temperarture monitoring, leakage monitoring, vibration monitoring, lubricant monitoring-methods, equipments, ferrography, spectroscopy, cracks monitoring, thickness monitoring, corrosion monitoing.

Books:

Engineering Tribology by Choudhary

Maintenance planning and control- Kelly, A. Buttersworth & Co. 1984

Maintenance and spare parts Management – Krishanan G, Prentice Hall – 1991

17MME23CL1 TRIBOLOGY & MAINTENANCE ENGINEERING LAB

L   T   P   CREDIT   **Sessional:50 Marks**

0   0   3   1.5   **Practical :100 Marks**
                                                          Total :100 Marks
                                                          Duration of Exam. :3 Hrs.

Course Outcomes (CO): The students will be able to:

CO1. Study and perform non destructive testing techniques

CO2. Study and perform current testing and ultrasonic testing.

CO3. Study and perform pin and wear disc apparatus.

CO4. Study wear, lubricants and bearings.

List of Experiments.

1. To study the introduction to maintenance techniques. preventive and predictive Maintenance
2. To study and perform Non-Destructive Testing techniques , liquid dye penetrant and leak testing.
3. To study and perform Eddy current testing & Ultrasonic testing .
4. To study and perform Magnetic particle detection and Particle counter.

5. To study wear Analysis through thermography and Ferrography.

6. To study and perform Pin on wear disc apparatus

7. To study wear, lubricants and bearings

8. to study and perform on Journal bearing apparatus,hudrodynamic and hydrostatic bearing apparatus.

17MME23C2   ROBOTICS AND AUTOMATION

L   T   P

4   0   0

Course Outcomes (CO's): At the end of the course, the student shall be able to:

CO1 Understand the robotic automation strategies.

CO2 Analyze dynamics of robot manipulator.

CO3 Task programming of robots.

CO4 Understand vision and sensing characteristics of robots.

CO5 General design consideration on trajectories motion of robots

UNIT-1

Introduction to Robot Technology: Robot Physical configuration, basic Robot motions.

Types of Manipulators: Constructional features, advantages and disadvantages of various kinematic structures, servo and Non- servo manipulator. Actuators and Transmission System: Pneumatic, Hydraulic and Electrical actuators and their characteristics and control systems. Feed Back Systems and Sensors: Encoders and other feed back systems, vision, ranging systems, textile sensors.

UNIT-2

Programming Languages: Description of VAN, RAII and other Languages. Artificial Intelligence: Logged Locomotion, Export system.Concept of spatial description and transformations, manipulator Kinematics; Inverse manipulator, Kinematics Jacobians; velocities and static forces; manipulator dynamics, position control of manipulators, force control of manipulators, robot programming languages and systems. Concept of automation in Industry, mechanisation and automation classification of automation systems.

UNIT-3

Air Cylinders- their design and mountings, pneumatic and hydraulic valves, flow control valves metering valves, direction control valves, hydraulic servo systems, pneumatic safety and remote control circuits.

UNIT-4

Basis of Automated work piece handling: Working principles and techniques, job orienting and feeding devices. Transfer mechanisms automated feed out of components, performance analysis.

Assembly automation, automatic packaging and automatic Inspection.

Books:

CAD/CAM by Groover and Elimmers (Jr.) CAD/CAM Handbook, Bed ford Masschusettes.

Automation Production Systems & Computer Aided Manufacturing. Robotics for Engineers by Royen MIT Press.

Robot Manipulators by Paul MIT Press. Robotics by Hall & Hall.

Robot Motion by Brady MIT Press.

Numerical Controlled Computer Aided manufacturing by Press man and Elimmers, John Wiley & sons. New York.

17MME23C3   **MAJOR PROJECT**

                        (DISSERTATION STAGE-1)

                        Marks   Credits -4

L   T   P

  -                4   Sessional Exam :   100

A candidate has to prepare a report covering identification of research topic, literature review, planning of research scheme and systematic documentation. The marks will be given on the basis of a report prepared and presentation given by the candidate covering the above said contents, contents of the presentation, communication and presentation skills.

COURSE OUTCOMES:

By the end of this course every student is expected to be able to

CO1 understand the process of research.

CO2 do literature survey to identify a research problem.

CO3 communicate and discuss research ideas.

CO4 plan and write dissertation synopsis.

17MME24C1 DISSERTATION-II (IV sem)

COURSE OUTCOMES:

By the end of this course every student is expected to be able to

CO1 handle research problems and use modern research tools/methods.

CO2 analyse and review the existing literature on a research problem.

CO3 design and conduct experiments.

CO4 write dissertation and technical reports.

CO5 publish research papers.