SHRI VENKATESHWARA UNIVERSITY

Syllabus

M.TECH
Mechanical Engineering
IInd SEMESTER

(Two Years Post Graduation Programme)

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

Mechanical Engineering

SEMESTER-II

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	MME-201	Numerical Control of Machine Tools	3	0	0	20	10	30		70		100	3
2	MME-202	Non- Traditional & Modern Machining	3	0	0	20	10	30		70		100	3
3	MME-031	Reverse Engineering And Rapid Prototyping	3	0	0	20	10	30		70		100	3
4	MME-041	Reliabilty	3	0	0	20	10	30		70		100	3
5	MME-211	Robotics & Mechatronics Lab	0	0	4				25		25	50	2
6	MME-212	Design Practice Lab	0	0	4				25		25	50	2
7	MME-221	Mini Project	0	0	4				50		50	100	2
8	AUD-102	Disaster Management	2	0	0								0
		Total										600	18

Course:- M.Tech
Subject:- Numerical Control of Machine Tools
Max. Marks: a) Internal/Practical- 30
b) External- 70

Year/Semester:- I/II
Subject Code:- MME-201

Credit Hours		
L	T	P
3	0	0

Course Outcomes: At the end of the course, students will be able to

1. Use Finite Element Method for structural analysis.
2. Execute the Finite Element Program/ Software.
3. Solve continuum problems using finite element analysis.

Syllabus Contents:

Fundamentals of Numerical Control: Introduction to numerical control, Classification of NC/CNC machines and axis nomenclature, PTP and Continuous Contouring, Absolute and Incremental Programming, Difference between NC and CNC, Different types of software's in CNC. **Control system fundamentals:** feedback, transfer function, system stability. Open Loop and Closed Loop control: Servo Mechanism, Position and Velocity feedback.

Engineering Analysis of NC/CNC systems: Computations of total number of pulses and pulse frequency in Open Loop and Closed Loop control, Precision in NC/CNC: Resolution, Accuracy and Repeatability. Interpolation in NC and CNC: Linear and Circular, Tolerance Analysis: Inward, Outward and Secantial.

System components: Machine Control Unit (MCU), Transducers, Actuators.

Design considerations of NC/CNC machine tools: Re-circulating ball screw, lost motions in NC systems, Turning Centers and Machining Centers.

Part Programming: Manual programming: Different G codes and M codes, Stock Removal Cycle, Canned Cycles. Computer assisted Part Programming. Tool path generation from CAD models, CNC Toolings.

Process optimization: Online condition monitoring in CNC, Adaptive control: ACC, ACO & GA.

DNC: Direct and Distributed Numerical Control, Merits of DNC, Concept of BTR, Data Multiplexing.

Economic analysis of NC/CNC: Various cost elements of CNC, Break-Even analysis, ROI andother techniques.

Reference Books:

1. Computer Control of Manufacturing Systems by Y. Koren, McGraw-Hill
2. Numerical Control and Computer Aided manufacturing by R. S. Pressman & J. E. Williams, John Wiley & Sons
3. Computational Geometry for Design and Manufacture, by I. D. Faux and M. J. Pratt, Ellis Horwood, Chichester, 1979.
4. Numerical Control in Manufacturing by F. W. Wilson, McGraw-Hill Book Company New York.

Course:- M.Tech **Year/Semester:-** I/II
Subject:- Non-Traditional & Modern Machining **Subject Code:-** MME-202
Max. Marks: a) Internal/Practical- 30
b) External- 70

Credit Hours		
L	T	P
3	0	0

Course Outcomes: At the end of the course, students will be able to

1. Analyze and study dynamics response of single degree freedom system using fundamental theory and equation of motion.
2. Analyze and study dynamics response of Multi degree freedom system using fundamental theory and equation of motion.
3. Use the available software for dynamic analysis.

Syllabus Contents:

Non Traditional Machining Processes: Importance and need, Classifications.
Mechanical Processes: Abrasive Jet Machining (AJM), Water Jet Machining (WJM)
Abrasive Water Jet Machining (AWJM): Principles of material removal, Computation of MRR, Salient process variables, equipments, applications.Ultrasonic Machining (USM): Mechanism of material removal, factors affecting material removal,equipment, transducers, different types of horn,Dimensional accuracy.
Electrochemical Processes: Electrochemical Machining (ECM): Basic mechanics of ECM, Electrochemistry & process characterization, Computation of MRR for single metal and alloys, Dynamics of ECM, ECM hydrodynamics, Operating variables, equipments and applications.
Electro-Thermal Processes: Electro-discharge machining (EDM): Principles of EDM, Process variables and characteristics, Modeling of material removal, Equipments: Types of power supply, Analysis of RC Relaxation EDM Generator, Determination of Surface roughness and over cut, Applications. Laser Beam Machining (LBM): Laser generation and types, Laser construction, Mechanism of material removal, Process characteristics of different lasers, Applications. Electron Beam Machining (EBM): Principle, Mechanism of material removal, Effect of process variables onprocess criteria, Applications. Plasma Arc Machining (PAM): Principle, Mechanism of material removal, Effect of process variables on process criteria, Applications. Ion Beam Machining (IBM) **Computer Integrated Manufacturing:** Batch Production and Mass Customization, Concept of Integrated automation, Concurrent Engineering.
CAD & CAE: Feature based Design, parametric design, Fundamentals of FEA, Role of CAD in CIM environment.
Group Technology: Need & Utility, Different types of coding, Clustering Techniques & Benefits. CAPP: Variant & Generative, Feature Recognition, Feature-Process co-relation, Application Programs in CAPP.
Computer aided quality control: Quality control, Inspection, Contact and Non-contact Inspection,Computer aided data acquisition, CMM.
FMS: Types of flexibility, FMM, FMC, Modules of FMS, Materials handling in FMS, Quantitativeanalysis in FMS, Tool Management, Automatic Tool wear monitoring, Performance evaluation.
CIM: Definition & Concept, CIM wheel, External and Internal challenges, World-class order winning criteria, Product Development Cycle. Concurrent Engineering, Design for Manufacturing& Assembly, Data base requirements in CIM, Computer Networking, CIM Implementation & Barriers.
Emerging trends in manufacturing: High speed machining, micro, meso and nano manufacturing.

Reference Books:

1. Non-Conventional Machining by P.K.Mishra, Narosa Publishers.
2. Modern machining processes by P. C. Pandey, H. S. Shan, Tata McGraw Hill.
3. Fundamentals of Machining Processes, H. El-Hofy (2007), CRC Press, Taylor and Francis Group
4. Automation, Production Systems and Computer Integrated Manufacturing by Groover, PrenticeHall.
5. Computer-Integrated Manufacturing by Rehg Kraebber, 2nd Edition, Pearson Education.
6. The Design and Operation of FMS by P. G. Ranky, IFS Ltd., U.K., North Holland.
7. Computer Integrated Manufacturing by Joseph Harrington, Industrial Press

Course:- M.Tech
Subject:- Reverse Engineering And Rapid Prototyping
Max. Marks: a) Internal/Practical- 30
b) External- 70

Year/Semester:- I/II
Subject Code:- MME-031

Credit Hours		
L	T	P
3	0	0

Course Outcomes: At the end of the course, students will be able to

1. Design steel structures/ components by different design processes.
2. Analyze and design beams and columns for stability and strength, and drift.
3. Design welded and bolted connections.

Syllabus Contents:

Prerequisite: Classification of manufacturing processes, Different Manufacturing Systems, Introduction to Rapid Prototyping (RP), Need of RP in context of batch production, FMS and CIM and its application; Basic Principles of Generative Manufacturing Processes.

Reverse Engineering: Need & Techniques, Data collection, Point-Cloud of data.

Steps in RP: Process chain in RP in integrated CAD-CAM environment, Advantages of RP; Utility of Rapid Prototyping in Reverse Engineering. Classifications of different RP techniques – based on raw material, layering technique (2D or 3D) and energy sources; Comparative study of: - Stereo-lithography(SL) with photo-polymerization, SL with liquid thermal polymerization,

Process Technology: Solid foil polymerization, Selective laser sintering, Selective powder binding, Ballastic particle manufacturing – both 2D and 3D, Fused Deposition Modelling, Shape Melting, Laminated Object Manufacturing, Solid Ground Curing, Repetitive Masking and deposition.

Reference Books:

1. Reverse Engineering 101 Speaker Presentation
2. Reverse Engineering 101 - NYU: Poly 2010: Intro to Reverse Engineering given at NYU:Poly on October 4th, 2010 by Aaron Portnoy and Peter Silberman.
3. Reverse Engineering 102 - NYU: Poly 2010: Intro to Reverse Engineering (Day 2) given at NYU:Poly on October 11th, 2010 by Aaron Portnoy and Peter Silberman.
4. CTF Field Guide

Course:- M.Tech **Year/Semester:-** I/II
Subject:- Robotics & Mechatronics Lab **Subject Code:-** MME-211
Max. Marks: a) Internal/Practical- 25
b) External- 25

Credit Hours		
L	T	P
0	0	4

Course Outcomes: At the end of the course, students will be able to

1. To synergies the combination of mechanical, electronics, control engineering and computer.
2. Providing a focused laboratory environment to the engineering students to apply and absorb Mechatronics concepts.
3. To provide a common ground where students could perform experimental study regarding fundamental sequence control by utilizing various sensors and actuators.
4. The laboratory is designed to assist the students in the development of "handson" skills with an emphasis on hardware architecture and multidisciplinary systems.
5. To introduce basic concepts in electrical measurements.
6. To introduce the principles of signal conditioning and displaying.

Syllabus Content:

1. Identification and familiarization of the following components: resistors, inductors, capacitors, diodes, transistors, LED's.
2. Familiarization with the following components: CRO, transformer, function generator, multimeter , power supply.
3. Familiarization with the following electrical machines: Induction motors, DC motors, synchronous motors, single phase motors.
4. Familiarization with the following mechanical components: gears, gear train, bearings, couplings, tachometer
5. To study and design the PN junction diode and its use as half wave and full wave rectifier.
6. To design a voltage regulator using zener diode. Discuss the behavior of the regulator for various loads.
7. To verify truth tables of various logic gates and flip flops.
8. To study various sensors and transducers and compare with ideal characteristics.
9. To measure the characteristics of LVDT using linear displacement trainer kit.

Course:- M.Tech **Year/Semester:-** I/II
Subject:- Design Practice Lab **Subject Code:-** MME-212
Max. Marks: a) Internal/Practical- 25
b) External- 25

Credit Hours		
L	T	P
0	0	4

Course Outcomes: At the end of the course, students will be able to

1. To demonstrate the concepts discussed in Design of Machine Elements, Mechanical Vibrations & Dynamics of Machines courses.
2. To visualize and understand the development of stresses in structural members and experimental determination of stresses in members utilizing the optical method of reflected photo-elasticity.

Syllabus Contents:

1. Determination of natural frequency of a spring mass system.
2. Determination of natural frequency logarithmic decrement, damping ratio and damping Co-efficient in a single degree of freedom vibrating systems (longitudinal and torsional)
3. Determination of critical speed of rotating shaft.
4. Balancing of rotating masses.
5. Determination of fringe constant of Photo-elastic material using Circular disk subjected diametric compression, Pure bending specimen (four point bending)
6. Determination of equilibrium speed, sensitiveness, power and effort of Porter/Hartnell Governor.
7. Determination of pressure distribution in Journal bearing
8. 8. Experiments on Gyroscope (Demonstration only)

Course:- M.Tech **Year/Semester:-** I/II
Subject:- Mini Project **Subject Code:-**
Max. Marks: a) Internal/Practical- 50
b) External- 50

Credit Hours		
L	T	P
0	0	4

Course Outcomes: At the end of the course, the student will be able to:

1. Identify structural engineering problems reviewing available literature.
2. Study different techniques used to analyze complex structural systems.
3. work on the solutions given and present solution by using his/her technique applying engineering principles.

Syllabus Contents:

Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.

End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution.

Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the departmental committee.

Course:- M.Tech
Subject:- Disaster Management
Max. Marks: a) Internal/Practical- 30
b) External- 70

Year/Semester:- I/II
Subject Code:- AUD-102

Credit Hours		
L	T	P
3	0	0

Course Outcomes: Students will be able to:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countriesthey work in

Syllabus Contents:

Unit 1: Introduction

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

Unit 2: Repercussions Of Disasters And Hazards:

Economic Damage, Loss Of Human AndAnimal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit 3: Disaster Prone Areas In India

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference ToTsunami; Post-Disaster Diseases And Epidemics

Unit 4: Disaster Preparedness And Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit 5: Risk Assessment

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Unit 6: Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

SUGGESTED READINGS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.