## COURSE STRUCTURE AND SYLLABUS

### I Semester

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<th>Category</th>
<th>Course Title</th>
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**III Semester**

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*Open Elective subjects must be chosen from the list of open electives offered by OTHER departments.*

# For Project review I, please refer 7.10 in R17 Academic Regulations.
UNIT – I:
Oil hydraulic systems Hydraulic pumps, types and construction details, sizing and selection. Direction control valves, flow and pressure control valves.

UNIT – II:
Linear actuators types Piston rod design sizing and selection, Rotary actuators, hydraulic reservoir accumulators.

UNIT – III:
Design of hydraulic circuits, seals and packings, hydraulic servo techniques, cylinders and air motors.

UNIT – IV:
Sequencing and synchronizing circuits, accumulator, low cost automation Hydro circuits, accumulators, Hydro pneumatic circuits principles of pneumatic circuit design.

UNIT – V:
Maintenance and trouble shooting of hydraulic and pneumatic circuits, components, PLC Automation and uses of Microprocessors.

REFERENCES:
1. Oil Hydraulic Systems/ S.R. Majumdar/ Tata Mcgraw Hill
2. Pneumatic systems, principles and maintenance/ S.R. Majumdar/Tata Mcgraw Hill
4. Fluid power with applications/ Antony Esponssito/ Prentice Hall
UNIT - I:
Concepts of Accuracy:

Geometric Dimensioning and Tolerancing: Tolerance Zone Conversions – Surfaces, Features, Features of Size, Datum Features – Datum Oddly Configured and Curved Surfaces as Datum Features, Equalizing Datums – Datum Feature of Representation – Form controls, Orientation Controls – Logical Approach to Tolerancing.

UNIT - II:
Datum Systems:
Design of freedom, Grouped Datum Systems – different types, two and three mutually perpendicular grouped datum planes; Grouped datum system with spigot and recess, pin and hole; Grouped Datum system with spigot and recess pair and tongue – slot pair – Computation of Transnational and rotational accuracy, Geometric analysis and application.

UNIT - III:
Tolerance Analysis:

UNIT - IV:
Tolerance Charting Techniques:
Operation Sequence for typical shaft type of components, Preparation of Process drawings for different operations, Tolerance worksheets and centrally analysis, Examples, Design features to facilitate machining; Datum Features – functional and manufacturing Components design – Machining Considerations, Redesign for manufactured, Examples.

UNIT - V:

Measuring Systems Processing: In processing or in-situ measurement of position of processing point-Post process and on-machine measurement of dimensional features and surface-mechanical and optical measuring systems.

REFERENCES:
5. Precision Engineering/VC Venkatesh & S Izman/TMH
UNIT – I:
Tool Materials:
Prosperities of materials: Tools steels, Cast Iron, Mild or low carbon steels, Non metallic and nonferrous materials, Heat treating

UNIT – II:
Design of Cutting Tools:
Single Point cutting tools: Milling cutters, Drills, Selection of carbide steels – Determination of shank size for single point carbide tools, Determining the insert thickness for carbide tools

UNIT – III:
Design of Jigs and Fixtures:
Basic principles of location and clamping: Locating methods and devices, Jigs-Definition Types, General considerations in the design of Drill jigs, Drill bushing, Methods of Construction. Fixtures-Vice fixtures, Milling, Boring Lathe Grinding fixtures.

UNIT – IV:
Design of Sheet Metal Blanking and Piercing Dies:

UNIT – V:
Design of Sheet Metal Bending, Forming and Drawing Dies:
Bending dies, Drawing dies, Forming dies, Drawing operations, Variables that effect metal flow during drawing. Determination of blank size, Drawing force, Single and double action draw dies.

REFERENCES:
2. Production Technology/HMT/Tata McGraw Hill/
INTELLIGENT MANUFACTURING SYSTEMS (Professional Elective – 3)

UNIT - I:

UNIT - II:
Components of Knowledge Based Systems - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT - III:
Machine Learning - Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks - Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT - IV:

UNIT - V:

REFERENCES:
1. Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.
2. Artificial Neural Networks/ Yagna Narayana/PHI/2006
4. Neural networks: A comprehensive foundation/ Simon Haykin/ PHI.
5. Artificial neural networks/ B. Vegnanarayana/PHI
6. Neural networks in Computer intelligence/ Li Min Fu/ TMH/2003
UNIT - I:

UNIT - II:
Concept Generation and Selection:

UNIT - III:
Product Development Management:

UNIT - IV:

UNIT - V:
Design for Manufacturing and Product Development:

REFERENCES:
5. Production and Operations Management/Chase/TMH
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I year II Sem. (Design for Manufacturing)

FUZZY LOGIC AND NEURAL NETWORKS (Professional Elective – 3)

UNIT-I
Fuzzy Set Theory and Fuzzy Logic Control:
Basic concepts of fuzzy sets- Operations on fuzzy sets- Fuzzy relation equations- Fuzzy logic control-
Fuzzification –Defuzzification- Knowledge base- Decision making logic- Membership functions – Rule
base.

UNIT-II
Adaptive Fuzzy Systems:
Performance index- Modification of rule base- Modification of membership functions- Simultaneous
modification of rule base and membership functions- Genetic algorithms- Adaptive fuzzy system- Neuro
fuzzy systems.

UNIT-III
Artificial Neural Networks:
Introduction- History of neural networks- multilayer perceptions- Back propagation algorithm and its
Variants- Different types of learning, examples.

UNIT-IV
Mapping and Recurrent Networks:
Counter propagation –Selforganization Map- Congnitrone and Neocogniton- Hopfield Net- Kohonnen
Nets - Grossberg Nets - Art-I, Art-II reinforcement learning

UNIT-V
Case Studies:
Application of fuzzy logic and neural networks to Measurement- Control- Adaptive Neural Controllers –
Signal Processing and Image Processing

TEXT BOOK:
Delhi, 1996

REFERENCE BOOKS:
1. Fuzzy logic & Neural Networks/ Chennakesava R. Alavala/ New Age International, 2008
5. Introduction to Fuzzy control, Dirankov D. Hellendoorn H, Reinfrank M., Narosa Publications
House, New Delhi 1996
UNIT- I

UNIT- II

UNIT- III
Linear Programming: Formulation – Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints.
Simulation – Introduction – Types- steps – application – inventory – queuing – thermal system

UNIT - IV
Integer Programming: Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method
Stochastic programming: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, covariance, joint probability distribution- stochastic linear, dynamic programming.

UNIT - V
Non-traditional optimization Techniques: Genetic Algorithms-Steps-Solving simple problems- Comparisions of similarities and dissimilarities between traditional and non-traditional techniques-Particle Swarm Optimization (PSO)- Steps(Just understanding)-Simulated Annealing-Steps-Simple problems.

REFERENCES:
2. Engineering Optimization-Kalyan Deb/ PHI
3. Introductory to operation Research / Kasan & Kumar / Springar
5. Operation Research / H. A. Taha /TMH
6. Optimization in operations research / R. L Rardin
7. Optimization Techniques /Benugundu & Chandraputla / Pearson Asia
UNIT - I
Overview of Smart Materials, Structures and Products Technologies.

UNIT - II

UNIT - III
Smart Sensor, Actuator and Transducer Technologies: Smart Sensors: Accelerometers; Force Sensors; Load Cells; Torque Sensors; Pressure Sensors; Microphones; Impact Hammers; MEMS Sensors; Sensor Arrays Smart Actuators: Displacement Actuators; Force Actuators; Power Actuators: Vibration Dampers; Shakers; Fluidic Pumps; Motors ; smart Transducers: Ultrasonic Transducers; Sonic Transducers.

UNIT - IV
Measurement, Signal Processing, Drive and Control Techniques: Quasi-static and Dynamic Measurement Methods; Signal conditioning devices; Constant voltage, Constant-current and Pulse drive methods; Calibration methods; Structural dynamics and Identification techniques; Passive, Semi-active and Active control; Feedback and feed forward/control strategies

UNIT - V
Design, Analysis, Manufacturing and Applications of Engineering Smart Structures and Products: Case studies incorporating design, analysis, manufacturing and application issues involved in integrating smart materials and devices with signal processing and control capabilities to engineering smart structures and products; Emphasis on structures, automation and precision manufacturing equipment, automotives, consumer products, sporting products, computer and telecommunications products, as well as medical and dental tools and equipment.

REFERENCES:
VIBRATION ANALYSIS AND CONDITION MONITORING (Professional Elective – 4)

UNIT - I
Causes and effects of vibration, Vibration of single Degree and Multi Degree of freedom systems. Steady state and transient characteristics of Vibration.

UNIT - II
Introduction to Condition Monitoring, Failures types, investigation and occurrences. Causes of failure, Characteristics of vibration ~SHM, Periodic motion, Displacement, Velocity and acceleration. Peak to peak & RMS, Linear and logarithmic scales and phase angle.

UNIT - III

UNIT - IV
Condition monitoring through vibration analysis. Frequency analysis, Filters, Vibration signature of active systems, vibration limits and standards. Contaminant analysis, SOAP and other contaminant monitoring techniques,

UNIT - V
Special vibration measuring techniques Change in sound method, Ultrasonic measurement method, Shock pulse measurement, Kurtosis, Acoustic emission monitoring, Cepstrum analysis, Modal analysis, critical speed analysis, shaft -orbit & position analysis.

REFERENCES:
MANUFACTURING SIMULATION & PRECISION ENGINEERING LAB

A. MANUFACTURING SIMULATION

The students will be given training on the use and application of the following software to manufacturing problems:
1. Auto MOD Software.
2. PROMODEL
3. SLAM-II
4. CAFIMS
5. Flexsim

They also learn how to write sub routines in C-language and interlinking with the above packages.

Problems for modelling and simulation experiments:
1. AGV planning
2. ASRS simulation and performance evaluation
3. Machines, AGVs and AS/RS integrated problems
4. JIT system
5. Kanban flow
6. Material handling systems
7. M.R.P. Problems
8. Shop floor scheduling etc.

B. PRECISION ENGINEERING

1. Hydraulic and Pneumatic circuits
2. Closed loop control systems
3. Study of the chip formation in turning process
4. Study of operation of tool and cutter grinder, twist drill grinder, Centreless grinder
5. Determination of cutting forces in turning
6. Experiments in unconventional manufacturing processes-AJM and study of USM, EDM, Laser Machining and Plasma spraying
7. Inspection of parts using tool makers microscope, roughness and form tester
8. Study of micro-controllers, programming on various CNC machine tools and also controllers
9. Studies on PLC programming
10. Study and programming of robots