## BRANCH-AUTOMATION & ROBOTICS

### Specialization: Automation & Robotics

#### 2nd Semester

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<th>Course Name</th>
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AUTOMATION & MANUFACTURING


3. **Evaluation of automatic production**: product manufacturability, orientation devices - active and passive devices, parts orientation and escapement. **Pneumatic and hydraulic components and circuits**: Boolean algebra, pneumatic sensors and amplifiers, jet destruction devices, logic devices, schimit triggering devices, developing pneumatic circuits for automatic die casting machine.


**REFERENCE BOOKS**:

4. Computer Based Industrial Control, Krishna Kant, EEE-PHI
5. An Introduction to Automated Process Planning Systems,Tiess Chiu Chang & Richard A. Wysk
6. Manufacturing assembly Handbook:- BrunoLotter
MECHANICAL MEASUREMENT & CONTROL SYSTEM

Module I

Module II

Module III
Description of open and closed loop control systems and their block diagrams. Use of block diagram and signal flow graph to find overall transfer function. 1st and 2nd order systems and their response to step and sinusoidal input, error analysis, static and dynamic error coefficients. Routh's stability criterion. The Root-Locus method, Bode Plot and Nyquist plot, Gain margin and phase margin.

Textbooks
1. Instrumentation Measurement and Analysis, B.C.Nakra and KK.Chaudhry, TMH, 3rd Ed.
Reference :
2. Modern Control Engineering, K.K. Ogata, prentice Hall India
ADVANCED COMPUTER CONCEPT FOR AUTOMATION

Module-I


Module-II
OOP’s features for Automation: Templates and Exceptions, C++ Input and output concepts, OOPS for Automation. Introduction to JAVA Features of JAVA, OOPS through JAVA.


Module-III

Operating System Structures: Operating System Components and Services & brief discussion about protocols-FTP, TCP/IP & HTTP.

Text Books / References:
5. Object Oriented Programming with C++ - E. Balaguruswamy, TMH.
6. Object Oriented Programming with C++ - Robert Lafore, PHI
7. Operating Systems-A concept based approach”, D M Dhamdhere, TMH
8. Internet Working with TCP/IP – Douglas, PHI
9. Introduction to DBMS – Date C.J. Addison Wesley
MECHATRONICS

Module 1
Evolution of Mechatronics, components of mechatronic system, types of mechatronic products, Signal theory, signal analysis and processing, Laplace transformation, Z-transformation modulation and de-modulation. Electrical components and Electronic device – Resister, inductor and capacitor, reactance and impedance. Basic electronics devices junction diodes, Bipolar transistors

Module II
Basic Digital Technology : Digital number system, Binary number system, Hexadecimal number system, Binary addition, Boolean Algebra, Logic function, Universal GATES, FLIP-FLOP, Registers counters. System modeling : Frequency response, Mechanical system, electrical system, Thermal system, Fluid system.

Module III

Text Books
1. A Text Books of Mechatronics, R.K.Rajput, S.Chand & company

Reference Books :
1. Mechatronics, A.Smaili & F Mrad, Oxford University Press
3. Mechatronics An Intigrated approach, Clarence W de Sliva, CRC Press
MODELLING, SIMULATION & ANALYSIS OF MANUFACTURING SYSTEM

Module I
Basic simulation modeling, Discrete event simulation, Simulation of queuing and the Carlo simulations, inventory systems, Continuous, Discrete-continuous and Mon statistical models in simulation, Discrete and continuous distributions, Poisson process, Empirical distribution, Generation of pseudo random numbers, Analysis of simulation data, Parameter estimation, Goodness-of-fit tests, Multivariable time series models.

Module II

Modules III
Simulation of manufacturing and material handling systems, Goals and performance measures, Modeling downtime and failures, Trace driven models, Case studies.

Text Books:
TOTAL QUALITY MANAGEMENT

Fundamentals of TQM; Some important philosophies and their impact on quality (Deming, Juran, Crossby), Features of Malcom Balridge quality award; Identification and measurement of quality costs; Issues related to products, processes, organization, leadership and commitment for total quality achievement; Tools and techniques used in TQM, seven tools, new seven, essential features of QCC, ZD, Kaizen, and JIT programmes; Fundamental concepts about Quality Function Deployment (QFD); Components of Total Quality System (TQS) in organizations, Quality Auditing: Introduction to ISO 9000 and 14000 standards, Case studies.

Books
1. Managing Total Quality, Rampersad, Hubert and Narasimhan, TMH
2. Quality Planning and Analysis, Juran J M and Gryna F M, TMH
EMBEDDED SYSTEM DESIGN

MODULE – I (13 hours)

MODULE – II (13 hours)

MODULE – III (14 hours)

Textbooks:

Recommended Reading:
2. G. De Micheli, Rolf Ernst and Wayne Wolf, eds, Readings in Hardware/Software Co-Design, Morgan Kaufmann, Systems-on-Silicon Series Embedded
MECHANICAL VIBRATION

Module – I


Module – II

FORCED VIBRATION OF SINGLE DEGREE FREEDOM SYSTEMS: Steady state solution with viscous damping due to harmonic force, reciprocating and rotating unbalance mass, vibration isolation and transmissibility due to harmonic force excitation and support motion. Vibration measuring instruments – vibrometer and accelerometer. Whirling of shaft with single disc and without damping, Concept of critical speed and its effect on the rotating shaft. UNDAMPED VIBRATION OF TWO DEGREE FREEDOM SYSTEMS: Free vibration of spring coupled and mass coupled systems, Longitudinal, Torsional and transverse vibration of two degree freedom systems, influence coefficient technique, Un-damped vibration Absorber.

Module – III


Text Books:

Reference Books:
COMPUTER AIDED PRODUCTION OPERATION MANAGEMENT

MODULE 1:
INTRODUCTION: Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership - Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

MODULE 2:

MODULE 3:
STATISTICAL PROCESS CONTROL (SPC):The seven tools of quality, Statistical Fundamentals - Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

MODULE 4:

MODULE 5:

TEXT BOOKS

REFERENCES
FINITE ELEMENT METHODS IN ENGINEERING

MODULE 1:

Basic Concepts: The standard discrete system, Finite Elements of an elastic continuum displacement approach, Generalization of the finite element concepts-weighted residual and variational approaches,

MODULE 2:

Element types: triangular, quadrilateral, sector, curved, isoparametric elements and numerical integration. Automatic mesh generation schemes.

MODULE 3:

Application to structural mechanics problems: plane stress and plane strains, Axisymmetric stress analysis, three dimensional stress analysis, bending of plates.

MODULE 4:

Introduction to the use of FEM in steady state field problems – heat conduction, fluid flow and nonlinear material problems, plasticity, creep etc. Computer procedures for Finite element analysis.

Text Books:


PROJECT MANAGEMENT

MODULE 1:
Project Feasibility Analysis: Technical feasibility, commercial and financial viability, Environment Analysis.

MODULE 2:

MODULE 3:

MODULE 4:
Product and service pricing: Availability and quality based pricing for services. Capacity planning and expansion, capacity decision considering and models.

Books:
1. Prasanna Chandra: Project Engineering and Management, Prentice Hall
2. Levy and Weist: Management guide to PERT / CPM, Prentice Hall