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कोनी, बिलासपुर – 495009 (छ.ग.)

Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

Department	: *Mechanical Engineering*
Programme Name	: *B.Tech.*

Academic Year : 2017-18

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	ME5TPE22	Technology and Management
02.	ME5TPE23	Simulation Modeling and Analysis
03.	ME5TPE24	Material Management
04.	ME5TOE11	Innovation and Technology Management
05.	ME5TOE12	Innovative & Entrepreneurial Skills
06.	ME5TPE23	Simulation Modeling and Analysis
07.	ME5TOE13	Financial Management
08.	ME5TOE14	Management Information System
09.	ME6TPE32	Mechatronics
10.	ME6TPE33	Industrial Automation
11.	ME6TPE34	Advanced Manufacturing System
12.	ME6TOE21	Enterprise Resource Planning
13.	ME6TOE22	Decision support and Executive Information system
14.	ME6TOE23	Soft Computing
16.	ME6TOE24	Safety Engineering

विभागाध्यक्ष/Head
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Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2017-18	
School	: *School of Studies of Engineering and Technology*
Department	: *Mechanical Engineering*
Date and Time	: *May 29, 2017 – 11:00 AM*
Venue	: *G-25, New IT Building*

2016-17

DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY GGV, BILASPUR CG

MINUTES OF MEETING OF BOARD OF STUDIES

A meeting of board of studies of Department of Mechanical Engineering was held on 29/05/2017 at 11:00 AM at Room no.G-25 of New-IT building. Following members were present:-

1. Prof. N.D. Mittal,
   Professor (Mechanical Engineering Department)
   Maulana Azad National Institute of Technology, Bhopal (M.P.)
   (External Expert Member)

2. Mr. Vivek Singh,
   Executive Engineer, (Mech). Damodar Valley Corporation,
   Koderma Thermal Power Station, Jharkhand
   (Member of B.O.S. as an Industry Expert)

3. Dr. Rajesh Kumar Bhushan,
   H.O.D. Department Mechanical Engineering
   (Chairman Board of Studies)

4. Mr. Prashant Kumar Jangde
   Assistant Prof. Department of Mechanical Engineering
   (Member Board of Studies)

In the meeting syllabus and scheme of B.Tech (Mechanical Engineering) from V Semester to VI Semester have been discussed in detail as per Choice Based Credit System (CBCS). The syllabus and scheme of B.Tech (Mechanical Engineering) Vth Semester and VIth Semester have been approved by the B.O.S. members, Revised syllabus is attached with the minutes. Syllabus from VII semester to VIII semester will be put in forthcoming B.O.S. meeting for approval after required correction. The seminar subject (EIPHDS01) is already approved in the scheme for pre-Ph D course work, this may be read as qualified/not qualified. Corrected scheme is attached with minutes.
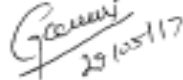
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प्रौद्योगिकी संस्थान/Institute of Technology
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- The B.O.S. meeting was concluded with vote of thanks.

Prof. N.D. Mittal,
Professor (Mechanical
Engineering Department)
Maulana Azad National
Institute of Technology,
Bhopal (M.P.)
(External Member))

Mr. Vivek Singh, Executive
Engineer, (Mech), Damodar
Valley Corporation,
Koderma Thermal Power
Station, Jharkhand
(Member of B.O.S. as an
Industry Expert)

Dr. Rajesh Kuamr Bhushan,
H.O.D. Department of
Mechanical Engineering
(Chairman Board of Studies)

Mr. Prashant Kumar Jangde
Assistant Prof. Department of
Mechanical Engineering
(Member Board of Studies)

विभागाध्यक्ष / Head
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प्रौद्योगिकी संस्थान / Institute of Technology
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3RD YEAR 2017

Department of Mechanical Engineering, School of Engineering & Technology, GGV, Bilaspur (C.G.)

Changes in syllabus of B. Tech. 3rd year (V & VI Sem) Mechanical Engineering BoS 29-05-17)

The following changes have been incorporated in the course syllabus of B. Tech. 3rd Year Mechanical Engineering as per the discussion in BoS meeting held in the department. The complete V and VI semester syllabus along with the evaluation scheme is appended for your reference. Salient aspects of the revisions made are listed below.

1. **Industrial Engineering** subjects remove from compulsory subject and added as professional Elective in 5th semester.
2. 1 subject added from open elective in 5th semester (**Innovative & Entrepreneurial Skills**).
3. **Measurement Metrology & Control** subject removed from compulsory subject to professional elective subject in 6th semester.
4. 1 subject added as an open elective in 6th semester (**Safety Engineering**).
5. **Seminar** is added in 6th semester as a lab.
6. Total subject credits in 6th semester have been increased from 20 to 21 credits.

Objectives of the Program

I. To produce competent, creative and imaginative engineers.
II. To create an intellectual reservoir to meet the growing engineer demands of the nation.
III. To inculcate in the student concepts and intellectual skills, courage and integrity.
IV. To help the graduates to make their way in the society with proper scientific and technical knowledge in mechanical engineering.
V. To help the graduates in design and analysis of mechanical systems with strong fundamentals and methods of synthesis.

Learning Outcomes

i. Ability to apply knowledge of mechanical engineering fundamentals for solving problems.
ii. Ability to design and develop mechanical components and processes to meet desired needs considering various aspects.
iii. Ability to understand and investigate complex mechanical engineering problems experimentally.
iv. Ability to develop sustainable solutions and understand their impact on society and environment.
v. Ability to function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
vi. Ability to comprehend, design documentation, write effective reports, make effective presentations to the engineering community and society at large.
vii. Ability to apply knowledge of engineering to lead teams and manage projects in multidisciplinary environments.
viii. Ability to engage in independent and life-long learning in the broad context of technological changes and advancements.

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GURU GHASIDAS VISHWAVIDHALAYA, (A CENTRAL UNIVERSITY)
DEPARTMENT OF MECHANICAL ENGINEERING,
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2017-2018

Year: B.Tech, III year
SEMESTER-V

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME5TPC07	Machine Design-I	3	1	0	40	60	100	4
2.	ME5TPC08	Mechanics of Solid-II	3	1	0	40	60	100	4
3.	ME5TPC09	Fluid Machinery	3	0	0	40	60	100	3
4.	ME5TPC10	Internal Combustion Engine	3	0	0	40	60	100	3
5.	ME5TPE02	Professional Elective-PE2	3	0	0	40	60	100	3
6.	ME5TOE01	Open Elective-OE1	3	0	0	40	60	100	3
	Total		18	02	0	240	360	600	20
PRACTICALS									
1.	ME5LPC09	Fluid Machinery lab	-	-	3	30	20	50	2
2.	ME5LPC10	Internal Combustion Engine Lab	-	-	3	30	20	50	2
	Total				6	60	40	100	04

Total Credits: 24
Total Contact Hour: 26
Total Marks: 700
*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL, CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

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Professional Elective-PE2	Open Elective-OE1
ME5TPE02	ME5TOE01
ME5TPE21 Industrial Engineering	ME5TOE11 Innovation and Technology Management
ME5TPE22 Technology and Management	ME5TOE12 Innovative & Entrepreneurial Skills
ME5TPE23 Simulation Modeling and Analysis	ME5TOE13 Financial Management
ME5TPE24 Material Management	ME5TOE14 Management Information System

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DEPARTMENT OF MECHANICAL ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2017-2018

at: B.Tech III year
MESTER-VI

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	ME6TPC11	Dynamics of Machine	3	1	0	40	60	100	4
2.	ME6TPC12	Machine Design-II	3	1	0	40	60	100	4
3.	ME6TPC13	Heat & Mass Transfer	3	1	0	40	60	100	4
4.	ME6TPC14	Manufacturing Science-II	3	0	0	40	60	100	3
5.	ME6TPE03	Professional Elective-PE3	3	0	0	40	60	100	3
6.	ME6TOE02	Open Elective-OE02	3	0	0	40	60	100	3
		Total	18	3		240	360	600	21
PRACTICALS									
7.	ME6LPC11	Dynamics of Machine Lab	-	-	3	45	30	75	2
8.	ME6LPC13	Heat & Mass Transfer Lab	-	-	3	45	30	75	2
9.	ME6LPS01	Seminar			3	50	-	50	2
		Total			9	140	60	200	6

Total Credits: 27
Total Contact Hour: 30
Total Marks: 800
*INTERNAL ASSESSMENT-[MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL, CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

Professional Elective –PE3	Open Elective-OE2

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Department of Mechanical Engineering

ME5TPE21 INDUSTRIAL ENGINEERING (Professional Elective)

Unit-I
Introduction History & Development of industrial engineering: Productivity definition; means of increasing productivity; work study definition; productivity and work study; work of F.W. Taylor; Frank and Lillian Gilberth and their contribution, Productivity measures and its models, productivity index & productivity cycle.

Unit-II
Method Study: Definition & basic procedure, selection of jobs, recording technique; micro motion, study; Therbligs; cyclograph and Chronocyclo-graph; principle of motion economy; design of work place layout; analysis in the form of chart; operation chart; flow process chart; flow diagram; string diagram; man machine chart; two hand chart; Simo chart.

Unit-III
Work Measurement: Definition, objectives, application, number of cycle to be timed, time study equipment, performance rating, allowances; number of cycle to be studied; determination of standard time; predetermined motion time systems. Conducting work sampling study and establishing standard time.

Unit-IV
Wages & Incentives: Characteristics of a good wage or incentive system, method of wage payment. Concept of wage incentive schemes; financial and non-financial; Taylor differential piece rate, Halsey premium plane; Merric's multiple piece rate system. Ergonomics, work space dimension, design of work place, environmental stresses & impacts on human work.

Unit-V
Value Engineering: Concept of VA, VE, VE team, job plan value test, P.L.C. of product, FOST Techniques.
Factory legislation: Various Act related to factory, minimum wage out, ESI Act, health provision Act, Safety act.

Text Books:
1. ILO, Bobbay, Introduction to work study, Universal publishing corporation
2. Mundel, Motion and time study, Prentices Hall India
3. Ralph M. Barnes, Motion and Time Study, John Wiley and sons
4. M.I Khan, Industrial Engineering, New Age Publication
5. M. Telsang, Industrial Engineering and Production Management, S.Chand

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Department of Mechanical Engineering

ME5TPE22 TECHNOLOGY MANAGEMENT (Professional Elective)

Unit I
Technology: Definitions, Types and characteristics, Management of Technology (MOT). Technological Environment, Parameters of Technological Environment; Science & Technology in India.

Unit II
Innovation Management: Invention v/s Innovation, Definition and components of innovation. Types of innovations: Product, Process and system innovations. Understanding Innovation Process.

Unit III
Technology life cycle: Technology evolution and S-curves of Technology Evolution, Technology Diffusion, Dynamics of Diffusion, Mechanism of Diffusion.

Unit IV
Technology strategies & Intelligence: Technology strategy & types, Models for technology strategy formulation, Definition of Technology Intelligence, Technology Audit, Process of Technology Intelligence: Scanning, monitoring, Forecasting and Assessment.

Unit V
Acquisition and technology transfer: Over view of GATT. Intellectual property rights IPR)

Texts Books:
1. V. K Narayanan, Managing Technology and Innovation for competitive advantage, Pearson Education
2. Tarek Khalil, Management of Technology, McGraw Hill

Reference Books:
1. Lovell Steele, Managing Technology, McGraw Hill.
2. R. A. Burgelman & M. A. Maldique, Strategic Management of Technology and Innovation Irwin
3. Pisek, Innovation and Quality, PHI

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ME5TPE23 SIMULATION MODELING & ANALYSIS
(Professional Elective)

Unit – I

Introduction to Simulation: Simulation, Advantages, Disadvantages, Areas of application, System environment, components of a system, Model of a system, types of models, steps in a simulation study.

Simulation Examples: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples.

Unit – II

General Principles: Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling.

Random Numbers: Properties, Generations methods, Tests for Random number-Frequency test, Runs test, Autocorrelation test.

Unit – III

Random Variate Generation: Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and log normal Distributions, convolution methods- Erlang distribution, Acceptance Rejection Technique

Optimization Via Simulation: Meaning, difficulty, Robust Heuristics, Random Search.

Unit – IV

Analysis of Simulation Data Input Modeling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis. Verification and Validation of Model – Model Building, Verification, Calibration and Validation of Models.

Unit – V

Output Analysis: Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations.

Simulation Softwares: Selection of Simulation Software, Simulation packages, Trend in Simulation Software.

Text Books:

1. Averill M. Law and Associates, Simulation modeling and Analysis, TMH Publications
2. Handbook of Simulation, Principles Methodology Advances Applications and Practice, John Wiley and Sons, New York
3. Manjit Kaur Bedi & Prof. Vikram Singh , Simulation and Modelling, Laxmi publications
4. Amit Kumar Vats & Ranjit Kaur, Basic of System Modelling and Simulation and Its Application, Vayu Education of India

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ME5TPE24 MATERIAL MANAGEMENT (Professional Elective)

Unit-I

Forecasting & Purchasing: Forecasting in purchase and sales, methods of purchasing, Functions, organization of purchase department, mass production purchasing and its procedure, Functions and organization of purchase department source selection, negotiation, make or buy decision how much to buy.

Unit-II

Inventory planning (MRP) and Spare parts Management: Types of Inventory, Computer control in materials planning, factors affecting ordering quantity, in process inventories, raw materials supplies, the problem of spare parts, pattern of failure, Reliability and variety, reduction, classification of spares replenishment, service level, work-in-process.

Unit-III

Inventory Controls and its Various Models: Ordering procedures, re-ordering, reorder point and quantity, economic lot size, economic ordering quantity, quantity discount, influence of uncertainty, continuous supply. Selection Control, ABC, XYZ, HML, VED, FSN, SDE, and SOS analysis. Spare parts management of spares Reliability and Quality of spares. Spare parts procurement , spare parts marketing and pricing. Management of absolute spares.

Unit-IV

Store keeping and Management Codification: Objectives of storekeeping, function of store organization, store organization, location of storekeeping department, factor affecting location, centralized and decentralized storing.

Unit-V

Store Planning: Methods of store-keeping, moving materials into and out of stock, protection of stores, codification, materials requisition. Preservation of stores, disposal of surplus & scrap.

Text Books:

1. S.C. Sharma, Materials Management , Khanna Publications.
2. N.M. Shah, An Integrated Concept of Materials Management, TMH Publisher.
3. P. GopalKrishnan, K. Bannergee, Maintenance & Spare parts Management, PHI Learning Pvt. Ltd.

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ME5TOE11 INNOVATION AND TECHNOLOGY MANAGEMENT (Open Elective)

UNIT I
Technology: Definitions and Characteristics; Management of Technology (MOT); Technological Environment; Parameters of Technological Environment; Technology life-cycle

Technological change: Dynamics of Technological change; innovation dynamics at firm level.

UNIT-II
Innovation Management: Invention v/s Innovation; Definition and components of innovation; Types of innovations (Product, Process and system innovations); Understanding Innovation Process.

Innovation strategies: Creative thinking and problem solving, models; Concurrent engineering; Economics of innovation. Assessment of Innovation: Measuring Innovativeness of the firm; Commercialization requisites; Innovation inspired by nature.

UNIT-III
Technology evolution and diffusion: S-curves of Technology Evolution; Technology Diffusion, Dynamics of Diffusion, Mechanism of Diffusion.

Competitive consequence of Technological change: Creation of new products/change in value chain.

UNIT-IV
Technology Intelligence: Definition of Technology Intelligence, Technology Audit, Mapping technological environment, Process of Technology intelligence: Technology Scanning, Monitoring, Forecasting and Assessment, Analytical tools for forecasting and assessment.

UNIT-V
Technology-Business Connection: Technology Strategy & types; Models for technology strategy formulation.

Acquisition and technology transfer: Collaborative arrangements in domain of Technology Strategy, Intellectual Property Rights.

Technology Support Systems: Funding Mechanism and venture capital.

Text Books:
1. V. K. Narayanan, Managing Technology and Innovation for competitive advantage, Pearson Education
2. Tarek Khalil, Management of Technology, McGraw Hill
3. Afuah, Innovation Management, 2nd Edition, Oxford University Press

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Department of Mechanical Engineering

MESTOE12 INNOVATIVE & ENTREPRENEURIAL SKILLS (Open Elective)

Unit I

Innovation: innovation- an abstract concept; creativity, innovation and imagination; types of innovation - classified according to products, processes or business organizations.

Unit II

Entrepreneurship: who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors, Impact of Entrepreneurship for sustainable development.

Unit III

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and intrapreneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

Unit IV

Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

UNIT-V

Techno-Economic Feasibility of the project: Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Performa of Feasibility Report, Role of Institutions and entrepreneurship.

Text Books:
1. Bellon & Whittington, Competing through Innovation, Prentice Hall of India
2. David Oates, A Guide to Entrepreneurship, JAICO Publishing House
3. Rober D Hisrich, Peters and Shepherd, Entrepreneurship, TMH
4. Coulter, Entrepreneurship in Action , Prentice Hall of India
5. Ajith Kumar , Entrepreneurship Management and Development , HPH
6. Mohanty, Fundamentals of entrepreneurship, PHI
7. Jack M Kaplan, Patterns of Entrepreneurship, Wiley, student Edition

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ME5TOE13 FINANCIAL MANAGEMENT (Open Elective)

UNIT –I
Introduction: Scope and objective, organisation of finance function, Time value risk and return and valuation of money, valuation of long term securities various model of pricing.

UNIT –II
Statement of changes in financial position: Sources and uses of working capital ,cash flow statement, balance sheet, profit loss account and its process
Financial ratio analysis: Meaning, types, importance and limitations, calculation of various ratios.

UNIT –III
Capital budgeting: Principals, techniques, various methods of capital budgeting. Concept and measurement of cost and capital, and various approaches for measurement of cost of capital and computation.
Analysis of risk and uncertainty: various approaches for risk evaluation.

UNIT –IV
Theory of working capital management: Concept and definition of gross, working capital and net working capital, trade-off between profitability and risk.

UNIT –V
Operating financial and combined leverage: Introduction, definition and concept and various approaches.

Text Books:
1. Khan and Jain, Financial Management, TMGH
2. Kuchhal, Financial Management, Vikas Publication
3. Paresh Shah, Financial Management, Willey India Pvt. Ltd.

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ME5TOE14 MANAGEMENT INFORMATION SYSTEM (Open Elective)

Unit-I
Information for Decision Making: Decision Making, Conceptual Foundations of Information Systems, Information Resources Management

Unit-II
System Development: Overview of Systems Analysis & Design, System Development Life Cycle, Designing On Line & Distributed Environments-Design Consideration, Implementation and Control of Projects

Unit-III
Computer Networks & Data Communications: Trends in Information Technology-Hardware, Software, Data Communication Concepts, Computer Networks

Unit-IV
Managing Corporate Data Resources: Organizing Data, Relational Data Base Management Systems, Query Languages Including DSS, Applications and Illustrations

Unit-V
Socio-Legal Aspects Of Computerization: Social Dimensions of Computerization, Computer Viruses, Legal Dimensions of Computerization

Text Books :
1. Kenneth C. Laudon , Management information systems: managing the digital firm.
2. Effy Oz, Management information systems, Course Technology India.
3. S. Sadagopan, Management information systems , PHI Learning Pvt. Ltd.

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Department of Mechanical Engineering

ME6TPE31 MEASUREMENT, METROLOGY AND CONTROL (Professional Elective)

UNIT-I

Introduction to Measurement and Measuring Instruments: Generalized Measuring Systems and Functional Element, Static & Dynamic Performance Characteristic of Measurement Devices, Calibration, Concept of Error, Sources of Error, Analysis of Error.
Transducers: Types of Transducers and Their Characteristics, Measurement of Strain, Strain Gauges and Their Working, Gauge Factor, Strain Gauge Circuits, Strain Rosettes.

UNIT-II

Measurement of Pressure: Pressure Measuring Transducers, Elastic Diaphragms, Measurement of Vacuum and Low Pressure, Various Low Pressure Gauges.
Measurement of Fluid Flow: Various Methods of Flow Measurement and Devices
Temperature Measurement: Bi-Metallic Thermometers, Thermocouples, Thermistors and Pyrometers.

UNIT-III

Metrology : Standards of Linear Measurement ,Line and End Standards System of Limit and Fits, Limit Gauges and Their Design, Measurement of Geometric Forms Like Straightness, Flatness, Roundness and Circularity ,Measurement of Surface Textures, Quantitative Evaluation of Surface Roughness and Its Measurement, Introduction of CMM, Its Working and Application.

UNIT-IV

Interferometry: Principle and Uses of Interferometry, Types of Interferometers
Comparators: Classification, Working Principle and Magnification Range of Mechanical, Electrical, Optical, Electronic, Pneumatic Comparators, Measurement of Screw Threads & Gears, Two Wire and Three Wire Method

UNIT-V

Fundamentals of Control System
Control system concepts, classification of control systems, mathematical representation of system equations, hydraulic, pneumatic, thermal and mechanical system and their mathematical modeling, response characteristics of components and systems through classical solution.

Text books:
1. Beckwith & Buch, Mechanical Measurement, Pearson Education.
2. Raven H, Automatic Control Engineering, McGraw Hill.
3. Donald P Eckman, Automatic Process Control, John Wiley and sons.
4. Nakra & Choudhary, Instrumentation Measurement & Analysis, TMH Education
5. Nakra B C, theory & Application of Automatic Controls, New age Publishers.

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ME6TPE32 MECHATRONICS (Professional Elective)

Unit –I
Introduction: Introduction to Mechatronics, need and applications, elements of mechatronic systems, role of mechatronics in automation, manufacturing and product development;

Unit –II
Sensors and Feedback Devices : Importance of sensors in Mechatronics, Static and Dynamic characteristics of sensors, errors and output impedance of sensors, transducers for measurement of displacement, strain, position, velocity, noise, flow, pressure, temperature, humidity, vibration, liquid level, vision sensors;

Unit –III
Control Elements and Actuators: On/off push buttons, control relays, thermal over load relays, contactors, selector switches, solid state switches. Mechanical actuators – types of motion, gear trains, belt and chain drives, screw rods. Electrical actuators, solenoids, DC drives and AC variable frequency drives, AC and DC motors, servomotors, stepper motors, linear motors. Hydraulic and Pneumatic controls, functional diagram- control valves, cylinders and hydro motors;

Unit –IV
Computational Elements and Controllers: Basic concepts of control systems – open loop, closed loop, semi closed loop control system, block and functional diagrams controllers for
robotics and CNC, linear and rotary encoders, timers, counters, microprocessors and microcontrollers: introduction, programming and applications, introduction to PLC, simple programs for process control application based on relay ladder logic-Supervisory Control and Data Acquisition Systems (SCADA) and Human Machine Interface (HMI);

Unit –V
Interfacing Systems: Introduction to interfacing of different hard wares in industry, need for networks in industrial plants, hierarchy and structure of networking, RS 232 based network, Ethernet, TCP/IP, MAP/TOP;

Text Books:
1. S Cetinkunt, Mechatronics, John Wiley
2. J Stenersons, Fundamentals of Programmable Logic Controllers Sensors and Communications, Prentice Hall, 2004.

Reference Books:
1. A. Kuttan K K, Introduction to Mechatronics, Oxford University Press
2. D. G. Alciatore and M. B. Histand, Introduction to Mechatronics and Measurement systems, McGraw Hill, NY

3. Bolton W, Mechatronics, Pearson Education Asia, New Delhi
4. HMT, Mechatronics, Tata McGraw Hill Publishers, New Delhi
5. S. Soloman, Computer Control of Manufacturing Systems, McGraw Hill, New York
6. K. J Ayala, 8051 Microcontroller, Architecture, Programming and Applications, Penram International, India

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ME6TPE33 INDUSTRIAL AUTOMATION (Professional Elective)

UNIT-I
Automation: Definition; Automation in production systems; Automation principles and strategies; Basic elements of an automated system; Advanced automation functions; Levels of automation; Types of automation; Benefits and Impact of Automation in Manufacturing and Process Industries. Architecture of Industrial Automation Systems.

UNIT –II
Pneumatic Control Systems: Overview of different types of valves and Actuators in Pneumatics, their applications and their ISO symbols. Design of Pneumatic circuits using Cascade method and Shift register method (up to 3 cylinders). Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves with and without grouping. Design of Pneumatic circuits using PLC Control (ladder programming only and up to 3 cylinders) with applications of Timers and Counters and concept of Flag and latching.

UNIT –III
Hydraulic Control Systems: Overview of different types of valves, Actuators and Accumulators used in Oil hydraulic circuits, their applications and their ISO symbols. Basic hydraulic circuits involving linear and rotary actuators (No sequential circuits). Fundamental concepts of digital and servo hydraulic controls. Comparison between proportional, digital and servo hydraulic control systems. **Digital logic:** Number systems; Logic Gates; Boolean Algebra, Simplification of Boolean equations using Karnaugh Maps.

UNIT –IV
Microprocessors and Microcontrollers (Only basic understanding and applications) : Concept of Microprocessor based control and its application; Parts of a Microprocessor system with block diagram of the general form of a microprocessor system; Data bus, Address bus and Control Bus; General internal Architecture of a Microprocessor; Functions of constituent parts such as ALU, Various Registers and the Control unit. Difference between a Microprocessor and a Microcontroller. General Block diagram of Microcontroller.

UNIT-V
Sensors and Transducers: Fundamentals of displacement, position and Proximity Sensors; Velocity and Motion Sensors; Force and Fluid Pressure Sensors; Liquid level and Flow sensors; Temperature and light Sensors; Control of stepper motors.

Text Books:

1. Industrial Production & Automation- Mikel P. Grover, PHI
2. Automation Production System and CIM- Mikel P. Grover, PHI

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ME6TPE34 ADVANCED MANUFACTURING SYSTEMS (Professional Elective)

Unit-I

Definition and broad characteristics of Flexible Manufacturing Cells, Systems, Islands and Flexible transfer lines – Place of flexible manufacturing systems in CIM .The FMS relational: Economics and technological justification for FMS .

Unit-II

Design and Planning: the role of associated technologies such as GT, JIT and simulation - Installation, Operation and evaluation - Scheduling problems.

Unit-III

FMS hardware CNC machines tools, robots, AGVs, ASRs, Inspection and Cleaning stations - Control aspects of FMS-DNC of machine tools, cutting tools, robots, quality control and inventories.

Unit-IV

Personnel and infrastructural aspects - Flexible machining cells and islands - Flexible assembly Systems; structure, control and applications.

Unit-V

FMS in action: Understanding Flexibility, Types of Flexibility in FMS, Flexible and Dynamic Manufacturing Systems, IT facilitated flexibility, integration and automation, Role of Integrated and automated material handling systems, Typical FMS operation, IT based Tools: Computer simulation and AI for FMS.

Text Books:
1. M. P. Groove, Automation, Production systems & Computer Integrated Manufacturing, PHI
2. P. Radhakrishna and V. Raju, CAD, CAM & CIM, New Age, International Publisher

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ME6TOE21 ENTERPRISE RESOURCE PLANNING (Open Elective)

UNIT–I
Introduction to Enterprise resource planning: Evolution of ERP, MRP, MRP-II, e-ERP, Generic business model with reference to ERP, Structure of ERP Two tier architecture client, server, Three tier architecture, repository, RDBMS, Operating systems, Generic model of ERP system - Design tree node structure, Design of, Role/Activity Diagrams, Benchmarking, Types of Benchmarking, Process of Benchmarking.

UNIT–II
Introduction to Business Process Re-engineering: Procedure of BPR, Principle of BPR, Process improvement Process redesign

UNIT-III
Introduction: Supply chain Management and ERP, understanding the supply chain with case examples, Supply chain performance with measures, Achieving strategic fit and scope, Supply chain drivers, Supply chain obstacles, ERP vs SCM, Benefits of supply chain improvement, Introduction of Logistics Types of Logistics, Types of Logistics, Benefits of Logistics.

UNIT-IV
Integrated SAP model, Integrated Data, Master Data, Transactional Data, Integrated processes, Evolution Electronic Data Interchange (EDI), Use of EDI, and Benefits of EDI, Selection of ERP: Introduction Opportunities and problems in ERP selection, Approach to ERP selection of ERP.

UNIT-V
Origins of SAP, SAP's Markets, SAP architecture and integration, SAP Business structure, Customization of SAP, SAP R/3 material Management, Sales and Distribution, Production, Plant Maintenance, Quality Management, Methodology for ERP implementation, Implementation phases, Implementation of Life cycle.

Text Books:
1. Rahul V, Enterprise Resource Planning: Theory and practice, PHI Publication
2. V.K. Garg, Enterprise Resource Planning: Concepts and practice, TMH Publication.
3. Alexis Leon, Enterprise Resource Planning, McGraw-Hill Publication

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ME6TOE22 DECISION SUPPORT AND EXECUTIVE INFORMATION SYSTEM
(Open Elective)

UNIT-I

Decision Support System: What is a DSS, Decision Making Rational Decisions, Definitions of Rationality, Bounded Rationality and Muddling Through, The Nature of Managers, Appropriate Data Support, Information Processing Models, Group Decision Making?

UNIT-II

Component OF DSS: Data Component : Information and its Usefulness, Characteristics of Information, Databases to Support Decision Making, Database Management Systems, Data Warehouses, Data Mining and Intelligent Agents Model Component-:Models Representation Methodology, Time Model Based Management Systems, Access to Models Understandability of Results, Integrating Models Sensitivity of a Decision, Brainstorming and Alternative Generation, Evaluating Alternatives, Running External Models. Mail Component: Integration of Mail Management Examples of Use implications for DSS.

Unit-III

Intelligence and Decision Support Systems: Programming Reasoning, Backward Chaining Reasoning, Forward Chaining Reasoning, Comparison, Certainty Factors, User-Interface Component: User Interface Components, The Action Language, Menus, Command Language, I/O Structured Formats, Free Form Natural Language, The Display or Presentation Language, Windowing Representations, Perceived Ownership of Analyses, Graphs and Bias Support for All Phases of Decision Making, The Knowledge Base Modes of Communication

Unit-IV

Designing A DSS: Planning for DSS, Designing a Specific DSS, Interviewing Techniques, Other Techniques, Situational Analysis Design Approaches, Systems Built from Scratch,
Using Technology to Form the Basis of the DSS, Evaluating a DSS Generator, Using a DSS Generator, The Design Team, DSS Design and Re-engineering Discussion .

Unit-V

Implementation and Evaluation of DSS : Implementation Strategy , Prototypes, Interviewing , User Involvement , Commitment to Change, Managing Change, Institutionalize System, Implementation and System Evaluation, Technical Appropriateness, Measurement Challenges , Organizational Appropriateness.

Text Books:

1. Vicki l Sauter, Decision Support System
2. Gerald V. Post & David L. Anderson, Management Information system

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