OPEN ELECTIVES
PGOP 12 Industrial Safety

Lecture: - 3 h/week

Unit-I:

Industrial safety: Accident, causes, types, results and control, mechanical and electricalhazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit-II:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-III:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-IV:

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-V:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition,need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

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PEPE 31 AUTOMATION IN MANUFACTURING

M.Tech II Semester
Production Engineering

Lectures / Week: 3 periods

Course Objectives:

1. To study the types and strategies and various components in Automated Systems.
2. To understand the automated flow lines, line balancing, material storage and retrieval and inspection
3. To learn the adaptive control systems.

Course Content:

UNIT-I

Introduction: Types and strategies of automation, pneumatic and hydraulic components, circuits, automation in machine tools, mechanical feeding and tool changing and machine tool control.

UNIT-II

Automated Flow Lines: Methods of part transport, transfer mechanism, buffer storage, control function, design and fabrication considerations.
Analysis of automated flow lines - General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT-III

Assembly System And Line Balancing: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

Automated Material Handling And Storage Systems: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems. Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT-IV

Adaptive Control Systems: Introduction, adaptive control with optimization, adaptive control with constraints, application of adaptive control in machining operations. Consideration of various parameters such as cutting force, temperatures, vibration and acoustic emission in the adaptive controls systems.

UNIT-V

Automated Inspection: Fundamentals, types of inspection methods and equipment, Coordinate Measuring Machines, Machine Vision.

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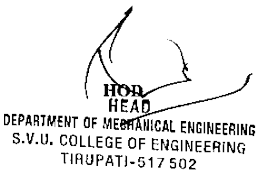
Course Outcomes:

At the end of the course student will be able to learn the-

1. Solve the line balancing problems in the various flow line systems with and without use buffer storage
2. Understand the different automated material handling, storage and retrieval systems and automated inspection systems.
3. Use of Adaptive Control principles and implement the same online inspection and control

REFERENCES:

1. Automation, Production Systems and Computer Integrated Manufacturing/ M.P. Groover./ Prentice Hall
2. Computer Control of Manufacturing Systems / Yoram Coren/Tata McGraw-Hill edition
3. CAD / CAM/ CIM /P. Radhakrishnan, S.Subrahmanyam,V.Raju/New Age international Publishers
4. Automation / W. Buekinsham, 3rd Edition/PHI Publications



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MEOE 06 ENGINEERING SYSTEM ANALYSIS AND DESIGN

Lectures/Week : 3 periods

Credits: 3
Sessionals: 20 +20
End Examination Marks: 60

UNIT – I

Introduction – Systems, Elements of a system, Types of systems, Subsystems, Super systems, Need for system analysis and design, CASE tools for analysis and its limitations.

UNIT – II

System analysis – Methods of system analysis, system development life cycle, structured approach, development tools, database and networking techniques.

UNIT – III

System design – Design technologies, design principles. Design tools and methodologies, feasibility survey conversion and testing tools, design management and maintenance tools.

UNIT – IV

Object oriented analysis and design – Introduction, Object modeling, Dynamic modeling, functional modeling,, UML diagrams and tools.

UNIT – V

Case studies – Developing prototypes for systems like online exam management, computer gaming and online website management.

Text Books

1. Perry Edwards, System analysis and design, McGrawHill Intrl. Edition, 1993.
2. Len Fertuck , System analysis and design with CASE tools , Wm C Brown Publishers, 1992.

Reference Text Books

1.Er.V.K. Jain, System analysis and Design , Dreamtech press
2. Kenneth E Kendall and Julie E Kendall , System analysis and design, PHI, 2007.

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MEOE 02 GREEN ENERGY SYSTEMS

Lectures/Week : 3 periods

Credits: 03
Sessionals: 20 +20
End Examination Marks: 60

UNIT-I

Solar Radiation: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships.

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT – II

Solar Energy Storage And Applications: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT – III

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking,

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles.

UNIT –IV

Energy efficient systems

Electrical Systems: Energy efficient motors, energy efficient lighting and control, selection of luminaire,.

Mechanical Systems: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps**.**

Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

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UNIT–V

Green Buildings: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, alternate roofing systems, paints to reduce heat gain of the buildings.

TEXT BOOKS:

1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/ TMH
2. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006
3. Green Manufacturing Processes and Systems, Edited / J. Paulo Davim/Springer 2013
4. Non-Conventional Energy / Ashok V Desai /New Age International (P) Ltd
5. Renewable Energy Technologies /Ramesh & Kumar /Narosa
6. Non-conventional Energy Source/ G.D Roy/Standard Publishers

REFERENCES:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao/New age international
2. Principles of Solar Engineering / D.Yogi Goswami, Frank Krieth & John F Kreider / Taylor & Francis
3. Renewable Energy Resources-2nd Edition/ J.Twidell and T. Weir/ BSP Books Pvt.Ltd
4. Fuel Cell Technology –Hand Book / Gregor Hoogers / BSP Books Pvt. Ltd.

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MEPET03 Mechatronic Systems
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

COURSE OBJECTIVE:

(i) To understand the structure of microprocessors and their applications in mechanical devices
(ii) To understand the principle of automatic control and real time motion control systems, with the help of electrical drives and actuators
(iii) To understand the use of micro-sensors and their applications in various fields

Course Contents:

UNIT-I

Introduction: Definition of Mechanical Systems, Philosophy and approach; Systems and Design: Mechatronic approach, Integrated Product Design, Modeling, Analysis and Simulation, Man-Machine Interface.

UNIT-II

Sensors and transducers: classification, Development in Transducer technology, Opto- electronics-Shaft encoders, CD Sensors, Vision System, etc.;

UNIT-III

Drives and Actuators: Hydraulic and Pneumatic drives, Electrical Actuators such as servo motor and Stepper motor, Drive circuits, open and closed loop control; Embedded Systems: Hardware Structure, Software Design and Communication, Programmable Logic Devices, Automatic Control and Real Time Control Systems;

UNIT-IV

Smart materials: Shape Memory Alloy, Piezoelectric and Magneto-strictive Actuators: Materials, Static and dynamic characteristics, illustrative examples for positioning, vibration isolation, etc.;

UNIT-V

Micro mechatronic systems: Microsensors, Microactuators; Micro-fabrication techniques LIGA Process: Lithography, etching, Micro-joining etc. Application examples; Case studies Examples of Mechatronic Systems from Robotics Manufacturing, Machine Diagnostics, Road vehicles and Medical Technology.

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Course Outcomes:

Upon completion of this course, students will get an overview of mechatronics applications and the use of micro-sensors and microprocessors.

Text Books:

1) Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.)
2) Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education
3) A Textbook of Mechatronics ,R.K.Rajput, S. Chand & Company Private Limited
4) Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, William Bolton, Prentice Hall.

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MEPET01 ADVANCED MANUFACTURING PROCESS

B.Tech V Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Course Objectives: To make the student

- Acquire knowledge about nontraditional machining process
- Understand theory involved material removal mechanism
- Study the different process parameters
- Know the material addition processes

UNIT-I

MATERIAL REMOVAL PROCESSES: Introduction, history of machining, traditional machining processes, nontraditional machining processes, hybrid machining processes. need for non-traditional machining processes.

MECHANICAL PROCESSES: Ultrasonic machining - Introduction, the machining system, material removal process, factors affecting material removal rate, dimensional accuracy and surface quality, applications.

Water jet machining - Introduction, The machining system, Process parameters, Applications, Advantages and disadvantages of Abrasive jet machining - Introduction, Machining system, Material removal rate, Applications, Advantages and limitations of AJM.

UNIT-II

CHEMICAL PROCESSES: Chemical Milling - Introduction, Tooling for CHM, Process parameters, Material removal rate, Accuracy and surface finish, Advantages, Limitations, Applications Photochemical Milling - Introduction, Process description Applications, Advantages Electro Polishing - Introduction, Process parameters, Applications, Process limitations.

ELECTROCHEMICAL PROCESSES: Electro Chemical Machining: Introduction, Principles of electrolysis, Theory of ECM, ECM equipment, Basic working principles, Process characteristics, Process control, Applications Basics of Electrochemical Drilling, Electro-Chemical Deburring, and Electro stream drilling

UNIT-III

HYBRID ELECTROCHEMICAL PROCESSES: Electro Chemical Grinding - Introduction, Material removal rate, Accuracy and surface quality, Applications, Advantages and disadvantages Electrochemical Honing - Introduction, Process characteristics, Applications Electrochemical Super Finishing - Introduction, Material removal process, Process accuracy Electrochemical Buffing - Introduction, Material removal process

UNIT-IV

THERMAL PROCESSES: Introduction, Mechanism of material removal, The machining system, Material removal rates, Heat-affected zone, Applications. Wire EDM principle, Process parameters, surface finish and machining accuracy, applications.

Laser beam machining - Introduction, material removal mechanism, applications, advantages and limitations. electron beam machining - introduction, basic equipment and removal mechanism, applications, advantages and disadvantages. Plasma beam machining - introduction, machining systems, material removal rate, accuracy and surface quality, applications, advantages and disadvantages. Ion beam machining - introduction, material removal rate, accuracy and surface effects, applications

UNIT-V MATERIAL ADDITION PROCESSES: INTRODUCTION, CLASSIFICATION : Liquid-Based Techniques – stereo-lithography, holographic interference solidification, beam interference solidification, solid ground curing-liquid thermal polymerization, fused deposition, modeling, multi jet modeling, ballistic particles manufacturing, shape deposition manufacturing. Powder based processes - selective laser sintering, laser engineered net shaping, three-dimensional printing. Solid-Based techniques -solid foil polymerization, laminated object modeling.

Course Outcomes: The student will be able to

- Differentiate between various nontraditional machining process
- Identify suitable nontraditional machining process
- Be familiar with various material removal mechanisms
- Explain the phenomena of material addition processes

TEXT BOOKS:

El-Hofy, Hassan Abdel-Gawad, “Advanced Machining Processes: Nontraditional And Hybrid Machining Processes”, McGraw-Hill, 2005.

REFERENCES:

1. Pandey P.C. and Shah H.S, “Modern Machining Processes”, 1st Edition, TMH, 2010.

2. Bhattacharya A, “New Technology, the Institution of Engineers”, India 1984.

3. V. K. Jain, “Advanced machining processes”, 1st Edition, Allied publishers, 2010.

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