Bachelor of Technology – Mechanical & Automation Engineering

FLEXILEARN
-Freedom to design your degree

Programme Structure
Curriculum & Scheme of Examination

2014

AMITY UNIVERSITY CHHATTISGARH
RAIPUR
### SIXTH SEMESTER

<table>
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<th>Course Code</th>
<th>Course Title</th>
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**SUMMER INTERNSHIP – II**
* Compulsory
MANAGEMENT OF MANUFACTURING SYSTEMS

Course Code: MAE2601
Credit Units: 03

Course Objective:
The overall objective of this course is to provide high caliber engineering students with an in-depth understanding of strategic, tactical and operational issues relating to manufacturing industries worldwide. On completion of the course the students will be equipped with the state-of-the-art concepts, methods, techniques and tools to allow them to contribute towards the competitiveness of manufacturing organizations.

Course Contents:

Module I: Introduction
Production functions, Plant Organization: Principles of organization, Organization structure-line and staff Organization

Module II: Production Planning & Control
Types of products, demand, demand forecasting, marketing strategies, scheduling and control of scheduling, production control.

Module III: Work and method study
Definition and concepts, method study procedures, symbols, advantages, Flow process charts, Motion study, micro motion, SIMO charts, system concepts, classification, analysis techniques.

Module IV: Industrial maintenance
Types, organization for maintenance department, Breakdown and preventive maintenance.

Module V: Inventory control and replacement analysis
Introduction replacement policy and method adopted, EOQ.

Module VI: Management concepts
Development of management principles, scientific management, human relation aspects. Project Management – CPM and PERT.

Examination Scheme:

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CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- J Moore, Manufacturing Management, Prentice Hall
- Buffa, Modern production and operations management, E.S. Wiley eastern.

References:
MACHINE DESIGN - II

Course Code: MAE2602  Credit Units: 03

Course Objective:
The course aims at developing concepts as to how to analyze mechanical systems and select proper machine elements (bearing, gears, belts, chains). It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical systems.

Course Contents:

Module I: Mechanical Drives
Selection of transmission, helical, bevel and worm gears, belt and chain drives.

Module II: Friction Clutches & Brakes
Common friction materials, shoe, band, cone and disc brake their characteristics and design, friction clutches.

Module III: Bearings and Lubrication
Types of sliding bearing, materials, type of lubrication, design of sliding bearing, selection and application of rolling bearing, seals.

Module IV
Design of spring, helical spring, Leaf spring

Module V: Engine parts
Piston, connecting rod and crankshaft.

Examination Scheme:

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Text & References:

Text:

References:
- Mahadevan, “Design Data Book”, CBS Publication & Publisher
FLUID POWER SYSTEMS

Course Code: MAE2651 Credit Units: 03

Course Objective:
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

Course Contents:

Module I: Introduction
Euler’s equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

Module II: Water Turbines
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines for hydroelectric plants.

Module V: Hydraulic Power Transmission
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.

Module VI: Power Hydraulics

Examination Scheme:

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Text & References:

Text:

References:
IC ENGINE AND GAS TURBINE

Course Code: MAE2603  
Credit Units: 03

Course Objective:
This course provides an in-depth knowledge of the functioning of IC Engine & Gas Turbine, and also deals with the combustion techniques used for various fuels. This course finds immense application in automobile industry and gas-operated power plants.

Course Contents:

Module I: Fundamentals
Development of IC engine, Classification, Working Cycles, Indicator diagram, comparison of SI Engine and CI Engine, two stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

Module II: Air Standard Cycle
Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

Module III: Fuel and Combustion
Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals of combustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

Module IV: Performance & Testing
Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

Module V: Gas Turbine

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Text & References:

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References:
- Wallace Ludwig Lind. Internal-combustion Engines; Their Principles and Applications to Automobile, Aircraft, Ginn.
- Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
- Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited
- Rolla Clinton Carpenter, Herman Diedrichs. Internal Combustion Engines, Their Theory Construction and Operation. Van Nostrand companies
MACHINE DESIGN LAB - II

Course Code: MAE2604 Credit Units: 01

Course Contents:
Design and drawing based upon the course Machine Design II such as automotive transmission, brakes, clutches connecting rod, I.C. engine piston, connecting rod, hydraulic rivet, mechanical hoist etc.

Examination Scheme:

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Note: IA – Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
FLUID POWER SYSTEMS LAB

Course Code: MAE2605 Credit Units: 01

Course Contents:

Name of Experiments:

1. To conduct a test on Centrifugal Pump and plot its characteristics
2. To Plot the characteristics of Pelton turbine.
3. To conducts an experiment on Francis turbine.
4. To study the effect of a draft tube on reaction turbines.
5. To find the friction factor for flow through pipes
6. To study the hydraulic controls rig.
7. To conduct an experiment for verifying model laws.
8. To study the cavitations phenomenon in turbines.
9. Study of hydraulic couplings and torque converters.

Examination Scheme:

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COMPUTER AIDED DRAFTING AND DESIGN LAB

Course Code: MAE2606  Credit Units: 01

Course Contents:

1. Basics of Auto CAD
2. Modeling of machine Components such as Connecting Rod, Piston etc.
3. 2D modeling for different Geometrics such as Hexagon, Pentagon etc.
4. 3D modeling for Nuts and Bolts.
5. Modeling of Gear.
6. Modeling of Compound Geometrics such as Hollow Cylinder containing Sphere, Triangle etc.

Examination Scheme:

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MODULE - 1

Project Management Concepts: Concept and characteristics of a project, importance of project management, types of project, project organizational structure, project life cycle, Statement of Work, Work Breakdown Structure.

MODULE - 2

Project Planning: Project Planning and Scheduling techniques: developing the project network USING CPM/PERT, constructing network diagram, AON basics, Forward Pass and backward pass, Limitations of CPM/PERT, Precedence Diagramming Method, constructing diagram and computations using precedence diagramming method, PERT/CPM simulation, reducing project duration.

MODULE - 3

Critical Chain Scheduling: Concept of critical chain scheduling; critical chain scheduling method, application of Critical chain scheduling and limitations. Project Quality Management: Concept of project quality, responsibility for quality in projects, quality management at different stages of project, tools and techniques, Quality Management Systems, TQM in projects.

MODULE - 4


Book Recommended


3. John M Nicholas “Project Management For Business And Technology” Prentice Hall Of India Pvt Ltd

COMPUTER INTEGRATED MANUFACTURING SYSTEM

Course Code: MAE2608  Credit Units: 04

Module 1
Evolving manufacturing environment, New competitive challenges, Evolving Role of Information Technology

Module 2
CIM Systems: Flexibility, Integration and Automation Opportunities, Automation of information and manufacturing systems, Automation strategies, Towards Flexible Automation,

Module 3
Islands of automation, Evolution Towards CIM systems, Computer based integration between various functions- manufacturing, sales, design, materials etc

Module 4
Flexible Manufacturing Systems (FMS) as mini CIM, Computer Integrated Production Management, ERP, Group technology,

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METAL CUTTING AND TOOL DESIGN

Course Code: MAE2609  Credit Units: 03

Course Objective:
Metal cutting involves removing metal through machining operations. Machining traditionally takes place on lathes, drill presses, and milling machines with the use of various cutting tools. Successful machining also requires knowledge about the material being cut. This course is designed in such way that it explains all aspects (process and tools) of metal cutting. The course also covers the common tooling setups and operations as well as specialized applications for the more experienced users.

Course Contents:
Module I: Introduction
Basic shape of cutting tools, Function of different angles of cutting tools, tool geometry and Nomenclatures- ASA, ORS systems, Conversion of angles, Tool Materials.

Module II: Mechanism of chip formation
Fracture & yielding mechanism, Types of chips, Factors involved in chip formation analysis, shear plane in flat chips, chip formation in drilling and milling.

Module III: Mechanism of metal cutting
Force system during turning, merchant circle diagram, velocity relationship, stress in conventional shear plane, Energy of cutting process, Ernst& merchant angle relationship, Lee-Shafer relationship, measurement of forces, Heat generation and temperature distribution in metal cutting.

Module IV: Theory of Tool wears
Criteria of wear, mach inability and tool life, Flank wear, Crater wear, Taylor”s tool life equation, causes and mechanism of tool failure, cutting fluid, Economics of metal machining.

Module V: Design for sheet metal works
Press working Terminology, press operation, types of dies, clearance, cutting forces, methods of reducing cutting forces, minimum diameter of piercing, center of pressure, Drawing dies-blank diameter, drawing force.

Module VI: Jigs and Fixture design
Important considerations in jig and fixture design, Locating and clamping, principles for location purposes, principles for clamping purposes, design principles for jigs and fixtures.

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Text & References:

Text:
- A Bhattacharya , “Metal cutting theory& practice”, C.B. Publication

References:
- Dr. B.J. Ranganath, “Metal Cutting & Tool Design” Vikas Publishing House Pvt. Ltd.
METAL CUTTING AND TOOL DESIGN LAB

Course Code: MAE2610  Credit Units: 01

Course Contents:

Name of Experiments:

1. Step and taper turning on lathe machine
2. To make a hexagonal headed bolt on a milling machine.
3. To make a job on a shaper.
4. To study the Kinematics design of workshop machines.
5. To make a job on drilling machine as per given specifications.
6. To measure cutting forces on a single point cutting tool
7. To measure cutting parameters for multipoint cutting tool.
8. Study of a punch and die set.
9. Study of a jig and fixture.
10. Fixture fabrication with case study.
11. Study of formation of chips during turning and shaping operations on samples of C.I., M.S., Brass, Cu & aluminum.
12. Determination of the life of the cutting tool used on lathe for various cutting speeds, feeds and different work piece materials.

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