

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR
Dept. of Mechanical Engineering

Course Description

TITLE OF COURSE: WORKSHOP/ MANUFACTURING PRACTICES

COURSE CODE: MEC002

L-T-P: 1-0-4

CREDITS: 3

Pre-requisite: The basic need is to provide theoretical and practical knowledge of manufacturing processes and workshop technology to all the engineering students.

Introduction:

Manufacturing and workshop practices have become important in the industrial environment to produce products for the service of mankind. The knowledge of manufacturing practices is highly essential for all engineers and technocrats for familiarizing themselves with modern concepts of manufacturing technologies. Manufacturing is the backbone of any industrialized nation. Manufacturing and technical staff in industry must know the various manufacturing processes, materials being processed, tools and equipments for manufacturing different components or products with optimal process plan using proper precautions and specified safety rules to avoid accidents. Beside above, all kinds of the future engineers must know the basic requirements of workshop activities in terms of man, machine, material, methods, money and other infrastructure facilities needed to be positioned properly for optimal shop layouts or plant layout and other support services effectively adjusted or located in the industry or plant within a well planned manufacturing organization.

Course Outcomes (CO):

1. Upon completion of this course, students will acquire knowledge about:
2. To acquire skills in basic engineering practice.
3. To identify the hand tools and instruments.
4. To acquire measuring skills.
5. To acquire practical skills in the trades.
6. To provide the knowledge of job materials in various shops.
7. To provide the knowledge of core technical subjects for making and working of any type of project.
8. Students will be able to analyze the material on the basis of their properties and thus assigning different weightage to their use for technical purposes.
9. Understand modern manufacturing operations, including their capabilities, limitations, and how to design economically.
10. Gain insight into how designers influence manufacturing schedule and cost, and cost of different components.
11. Learn how to analyze products and be able to improve their manufacturability and make the cost effectively.
12. The students will be able to assess the working conditions of any machining process and thus calculating the actual forces involved.

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13. Students are expected to learn the physical recognition of different electrical & Electronics components like Resistances, Inductances, Capacitances, diodes, transistors and their ratings

Course Contents:

Module-1:

Manufacturing Methods-Introduction, classification of manufacturing methods, casting, forming, Machining: Machining principle, single point cutting tool, lathe machine, shaper machine, drilling machine; joining, advanced manufacturing

Module-2:

CNC machining, Additive manufacturing:

What is NC, Components of traditional NC systems, Advantages of NC systems over manual methods of production, Computer Numerical Control (CNC), Components of modern CNC systems, Advantages & Disadvantages of CNC systems, Direct Numerical Control (DNC), Application of CNC Machine Tools, Classification of CNC Machines, G-code, M-code. Additive Manufacturing, Basic structure of additive manufacturing and its subcategories, Pros and Cons of AM, AM Benefits, Classification of Additive Manufacturing Systems, Important Technologies of AM: Stereo lithography Apparatus (SLA), Fused deposition modeling (FDM), Selective Laser Sintering (SLS)

Module-3:

Fitting operations & power tools: introduction, tools used in fitting shop, operations performed in fitting work, power tools.

Module-4:

Electrical & Electronics: Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems, Transformers, Rotating Electrical Machines, Basic Electronics.

Module-5:

Carpentry: introduction, hard and soft wood, types of common timbers, their qualities and uses, felling, conversion and seasoning of wood, defects in timber, characteristics of a good timber, plywood and applications, common tools used in carpentry shop, common wood joints, common safety in carpentry shop.

Module-6:

Plastic moulding, glass cutting: introduction, Classification of Plastic processing methods, Fundamentals of Processing, Primary Processing Technology Types; Injection Moulding, Blow Moulding, Extrusion Process, Compression Moulding, Secondary Processing Technology Types: Rotation Moulding, Thermoforming Moulding, Calendering, Coating; glass cutting.

Module-7:

Metal casting: introduction, fluidity, pattern, common pattern materials, types of pattern, pattern allowances, core and core box, hand tools used in foundry shop, molding sand, constituents of molding sand, kinds of moulding sand, properties of moulding sand, moulding methods, casting, permanent mold or gravity die casting, slush casting, pressure die, shell mold casting, casting, centrifugal casting, casting Defects, causes and remedies.

Module-8:

Welding (arc welding & gas welding), brazing : introduction, terminology of welding process: edge preparations, welding joints, welding positions, classification of welding and allied processes, gas welding processes: oxy-acetylene welding, types of welding flames, gas welding equipment's, safety

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recommendations for gas welding, arc welding processes: principle of arc welding, arc welding equipment, safety recommendations for arc welding, welding defects, brazing, soldering

Text Books

1. Elements of Workshop Technology Hajra & Choudhary, Media Promoters & Publisher.
2. Introduction to Basic Manufacturing Processes and Workshop Technology, Rajendersingh, New age international publishers.

References

1. Workshop Practice HS Bawa, Tata McGraw Hill 2nd ed. India.
2. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
3. Workshop Technology, W.A.J. Chapman, CBS Publisher & Distributor New Delhi.