A10:WORKSHOPTECHNOLOGY

Materials : Composition, physical and mechanical properties.

Engineering uses of common metals and their alloys such as cast iron and varieties of cast iron, wrought iron, mild steel, medium carbon steel. Tool steels, highspeed steels. Effect of alloying elements. Alloys of aluminium, tin, copper, zinc and magnesium, bearing materials.

Heat treatment of steels : Relation between heat treatment and physical properties of steels, critical temperatures, annealing, normalizing hardening, tempering, case carburising and hardening, nitriding and other surface hardening methods, quenching, Hardness number. Hardness Testing Machines.

Fitting Work : Files, their specifications and uses, marking scheme for a fitting job, surface plates, vee blocks, marking block, steel scale, punch, vernier caliper, micrometer, hammers, scrapers, chisels, angle plates, bench vice, spanners - their specifications and uses, Pipe and chain wrenches, hacksaws. Drilling, lapping and die cutting.

Sheet metal working : shearing, bending, cup drawing, operations, presses and press working operations, classification of presses, press tools.

Shaping Machines : Principles of operation - types of driving mechanisms, feed and speed control, hydraulic shapers.

Slotting Machines : Principle of operation - driving mechanisms, feed control

Planing Machines : Methods of driving planners - clamping of work, cutting speeds, etc.

Drilling Machines : Vertical, radial, speed and feed control mechanism

Lathes: Types of Lathes : Description of lathe, headstock, tailstock, gear box, carriage, apron, feed controls - longitudinal and transverse, compound tool resets, cutting speeds and feeds, leadscrew, change gears, Lathe accessories, Lathe Operations: surfacing, sliding and screw cutting, taper turning.

Chucks : 3-jaw, 2-jaw, use of soft jaws, faceplate - carriers

Milling Machine : Plane milling machine, universal milling machines, universal dividing head, rotory table, cutting tools used in milling.

Numerical Control Manufacturing :

Nomenclature of NC Machines, Axis, types of NC Machines, Features of NC Machine Tools, Machine Control Unit, Computer programme for computer aided part programming.

Text Books:

1. W A J Chapman, Workshop Technology, Parts I, II & III, CBS Publication
2. S K Hajra Choudhury and S C Bhattacharya, Elements of Workshop Technology, Vol. I & II, Media Promoters & Publishers.
3. T K Kundra, P N Rao, N K Tiwari, Numerical Control and Computer Aided Manufacturing

Reference Books :

1. V. Austin, Workshop Theory, Macmillan and Co. Ltd.
2. F.H. Hallet, machine Shop Theory and Practice, Macmillan & Co. Ltd.
3. C.H. Sumans, Engineering Metals and their Alloys, Macmillan & Co. Ltd.
4. E. Pull, Workshop Practice

Syllabus for six week Training Capsule on Workshop Technology

Training Module

1. Fitting shop	:	Use of drilling m/c. Files. Hacksaw
2. Welding shop	:	Gas Welding & Electric Arc Welding, Spot Welding, Joints
3. Carpentry shop	:	Planer, Marking tools, Joints, Pattern making
4. Sheet Metal shop	:	Development of surfaces, Joints, Soldiering, Brazing
5. Machine shop	:	Introduction to lathe, Milling m/c. shapers, if possible, NC and CNC m/cs.
6. Foundry shop	:	sand, Binders, Moulding Boxes, Moulds, Casting
7. Forging shop	:	Anvil. Swage block, tools. Forging Manual. Steam Hammers.

IMPORTANT POINTS:

1. Candidate to inform the HQ 4 weeks in advance about the place where he intends to undergo Workshop Training.
2. The training should be under the supervision of a "Qualified Engineer" in a Workshop/ Company/ Organisation/ Engineering College*/ Polytechnic*/ ITI/ Institution recognized by DGCA for conduction 3 years AME course (*Approved by AICTE).
3. The certificate for completion of 6 wek Workshop Training must b e signed by the Principal or Head of Organisation/ Head of Department/ In-charge Workshop.
4. The training will be for a period of 6 weeks with 2 weeks each in any three shops from the above mentioned seven shops.

EXEMPTIONS:

The candidates with following qualifications are exempted from 6weeks Workshop Training capsule

a) Graduate Degree in Engineering
b) Diploma in Engineering (3years)
c) AME course (3 years duration)