

32032 MANUFACTURING PROCESSES

DETAILED SYLLABUS

Unit I Foundry Technology

Patterns: Definition – types of pattern – solid piece – split piece - loose piece – match plate - sweep - skeleton – segmental – shell – pattern materials – pattern allowances.

Moulding: Moulding sand – constituents – types – properties of moulding sand – moulding sand preparation – moulding tools - moulding boxes – types of moulds – green sand mould – dry sand mould – loam mould – methods of moulding – moulding machines – jolting – squeezing – sand slinger construction and working principle. Cores: Essential qualities of core – materials – core sand preparation – core binders – core boxes - CO₂ process core making – types of core. Metallurgy :- Introduction - Iron-carbon diagram. Melting furnaces: Blast furnace – Cupola furnace – crucible furnace – types – pit furnace – coke fired – oil fired – electric furnace – types – direct arc – indirect arc – induction furnace – working principles.

Casting: Shell mould casting – investment casting – pressure die casting – hot chamber die casting – cold chamber die casting – gravity die casting – centrifugal casting – continuous casting - defects in casting – causes and remedies.

Unit II Welding Technology

Arc Welding: Definition – arc welding equipment – electrode types – filler and flux materials - arc welding methods – metal arc - Metal Inert gas (MIG) - Tungsten inert gas (TIG) - Submerged arc - Electro slag welding – resistance welding – spot welding – butt welding – seam welding – Plasma arc welding – Thermit welding – Electron beam welding – Laser beam welding – friction welding – ultrasonic welding – Induction welding - working principle – applications – advantages and disadvantages.

Gas welding: Oxy-acetylene welding – advantages - limitations - gas welding equipment - Three types of flames – welding techniques – filler rods. – Flame cutting – soldering – brazing – difference between soldering and brazing. Types of welded joints – merits and demerits of welded joints – inspection and testing of welded joints – destructive and non-destructive types of tests – magnetic particle test – radiographic and ultrasonic test - defects in welding – causes and remedies.

Unit III Forming Technology Forging:

For Notes, Syllabus, Question Papers and Many more

Hot working, cold working – advantages of hot working and cold working– hot working operations – rolling, forging, smith forging, drop forging, upset forging, press forging – roll forging.

Press Working: Types of presses - mechanical and hydraulic presses - press tools and accessories - press working operations - bending operations - angle bending - channel bending – curling – drawing - shearing operations - blanking, piercing, trimming – notching – lancing.

Powder Metallurgy: Methods of manufacturing metal powders – atomization, reduction and electrolysis deposition – compacting – sintering – sizing – infiltration – mechanical properties of parts made by powder metallurgy – design rules for the powder metallurgy process.

Unit IV Theory of metal cutting:

Introduction – orthogonal cutting – oblique cutting - single point cutting tool – nomenclature – types of chips – chip breakers – cutting tool materials – properties – tool wears – factors affecting tool life – cutting fluids – functions – properties of cutting fluid.

Centre Lathe: Introduction - specifications – simple sketch – principal parts – head stock – back geared type – all geared type – feed mechanism - tumbler gear mechanism – quick change gear box – apron mechanism – work holding device – three jaw chuck – four jaw chuck – centres - faceplate – mandrel – steady rest – follower rest – machining operations done on lathe - straight turning – step turning - taper turning methods: form tool – tailstock set over method – compound rest method – taper turning attachment – knurling - Thread cutting – Facing – Boring – chamfering –grooving – parting-off – eccentric turning - cutting speed – feed - depth of cut - metal removal rate.

Semi-Automatic Lathes: Types of semi-automatic lathes – capstan and turret lathes – Geneva indexing mechanism – bar feeding mechanism - difference between turret and capstan – work holding devices – tool holders.

Unit V Drilling and Metrology

Drilling Machines: Drills - flat drills - twist drills – nomenclature of twist drill - types of drilling machines - bench type - floor type - radial type - gang drill – multi spindle type -principle of operation in drilling - methods of holding drill bit - drill chucks - socket and sleeve –drilling operation – reaming - counter sinking - counter boring - spot facing – tapping - deep hole drilling.

Metrology: Definition – need of inspection – precision – accuracy – sensitivity - magnification – repeatability – calibration – comparator – Advantages – requirements – mechanical comparator – optical comparator – electrical comparator – pneumatic comparator – Principles – advantages and disadvantages.

For Notes, Syllabus, Question Papers and Many more

Measuring instruments: Construction and principles only - Steel rule – Callipers: outside calliper – inside calliper – jenny calliper – Combination set – Feeler gauge – Pitch screw gauge – Vernier calliper – Digital calliper – Vernier height gauge – Micrometer – Inside micrometer – Thread micrometer – Slip gauges – requirement – Indian standard – care and use - Sine bar – types – uses – limitations – Working principle of clinometers, autocollimator, angle dekkor.

Text Books:

1) Elements of workshop Technology Volume I & II – Hajra Chowdry & Bhattacharya - 11th Edition - Media Promoters & Publishers Pvt. Ltd., Seewai Building 'B', 20-G, Noshir Bharucha Marg, Mumbai 400 007 – 2007.

2) Introduction of basic manufacturing processes and workshop technology – Rajendersingh – New age International (P) Ltd. Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi – 110002

Reference Books:

1) Manufacturing process – Begeman - 5th Edition -McGraw Hill, New Delhi 1981.

2) Workshop Technology- WAJ Chapman - Volume I, II, & III – Vima Books Pvt. Ltd., 4262/3, Ansari Road, Daryaganj, New Delhi 110 002.

3) Workshop Technology – Raghuwanshi - Khanna Publishers. Jain & Gupta,

4) Production Technology, Edn. XII, Khanna Publishers, 2-B, North Market, NAI Sarak, New Delhi 110 006 - 2006

5) Production Technology - P. C. SHARMA - Edn. X - S.Chand & Co. Ltd., Ram Nagar, New Delhi 110 055 - 2006 6) Production Technology – HMT - Edn. 18 - published by Tata McGraw Hill publishing Co. Ltd., 7 West Patel nagar, New Delhi 110 008. – 2001