

Workshop Technology – Sessional Exam (Solved Paper)

Baba Mastnath University
Faculty of Engineering & Technology
Mechanical Engineering Department

Subject: Workshop Technology

Paper Code: ESC-202-H

Max. Marks: 75

Time: 3 Hours

Part-A (15 × 1 = 15 marks)

Answer all questions briefly.

Q.1(a) Manufacturing process is the method of converting raw materials into finished products through operations like machining, casting, welding, etc.

Q.1(b) Cupola Furnace is used for melting cast iron in foundries. It is a vertical shaft furnace where coke is the main fuel and air blast supports combustion.

Q.1(c) Two manufacturing processes: (i) Casting (ii) Welding

Q.1(d) Conventional lathes are manually operated, whereas CNC lathes use computer programming for automatic operation.

Q.1(e) Full form of NC machine: Numerical Control Machine.

Q.1(f) Five tools used in casting: Moulding box, Pattern, Riser, Runner, Trowel.

Q.1(g) Four lathe operations: Turning, Facing, Drilling, Thread cutting.

Q.1(h) Plant Layout is the physical arrangement of industrial facilities for smooth workflow and productivity.

Q.1(i) Five pattern materials: Wood, Metal, Plastic, Wax, Plaster.

Q.1(j) Welding is a fabrication process joining materials by melting the workpieces and adding filler metal.

Q.1(k) Five casting defects: Blow holes, Shrinkage, Cold shut, Misrun, Hot tear.

Q.1(l) Five welding defects: Porosity, Incomplete fusion, Cracks, Undercut, Slag inclusion.

Q.1(m) Material used for glass cutting: Diamond or tungsten carbide tools.

Q.1(n) Rolling process reduces thickness of metal by passing it through rollers.

Q.1(o) Wire drawing pulls metal through a die to reduce diameter and increase length.

Part-B (5 × 5 = 25 marks)

Attempt any five questions. Each question carries equal marks.

Q.2. Plant layout is the physical arrangement of machines and equipment in a factory. Advantages include improved workflow, reduced material handling, better safety, and higher efficiency. Applications: automobile plants, electronics assembly, textile industries.

Q.3. Carpentry tools:

1. Hammer – Driving nails.
2. Saw – Cutting wood.
3. Chisel – Cutting joints.
4. Jack Plane – Smoothing wood.
5. Try Square – Measuring right angles.

Q.4. Classification of metals:

Ferrous – Steel, Cast Iron

Non-ferrous – Aluminum, Copper

Fitting tools – Hack saw, File, Caliper, Chisel, Surface plate.

Q.5. Electric arc welding principle: An electric arc is struck between electrode and base metal. The intense heat (~6000°C) melts the base and filler metal, forming a weld upon cooling.

Q.6. Welding defects:

1. Porosity – Gas pockets
2. Cracks – Due to stress
3. Undercut – Groove at weld toe
4. Slag inclusion – Non-metallic materials trapped
5. Incomplete fusion – Poor melting.

Q.7. Machine tools in manufacturing:

1. Lathe – Turning
2. Milling – Slot cutting
3. Drilling – Hole making
4. Grinding – Surface finishing
5. Shaper – Straight cuts.

Q.8. Oxy-acetylene welding uses oxygen-acetylene gas mixture to create a high-temperature flame. It's suitable for welding thin sections, brazing, and cutting.

Q.9. Hot working (above recrystallization temperature) vs. Cold working (below recrystallization):

- Hot working: Soft metal, no hardening.
- Cold working: Harder metal, better finish.

Part-C (15 × 2 = 30 marks)

Attempt any two questions. Each question carries 15 marks.

Q.10. Cupola Furnace:

It is a vertical shaft furnace used to melt cast iron using coke as fuel. It includes components like shell, tuyeres, slag hole, tap hole, and charging door.

Working: Layers of coke and metal are charged. Air is blown from tuyeres. Coke burns, generating heat. Metal melts and is collected at the bottom. Slag is removed through the slag hole.

Uses: Foundries, casting industries.

Q.11. Sheet Metal Operations:

1. Shearing – Cutting without chips.
 2. Blanking – Cutting desired shape.
 3. Piercing – Making holes.
 4. Bending – Angled deformation.
 5. Drawing – Making cups from blanks.
- Sketches include basic operations showing punch, die, and sheet.

Q.12. Lathe Machine:

A lathe rotates the workpiece while a cutting tool removes material. Main parts: Bed, Headstock, Tailstock, Chuck, Carriage.

Working: Workpiece is held in chuck, rotated, and tool moves along to cut.

Uses: Turning, facing, threading, drilling.

Lathe is a versatile machine in workshops.

Q.13. Arc and MIG Welding:

Arc welding uses electric arc between electrode and base metal. MIG welding uses a consumable wire electrode and shielding gas (CO₂/Argon).

MIG Advantages: Continuous wire feed, clean welds, suitable for mass production.

Applications: Automotive, structural fabrication, metal furniture.