

HIGHER NATIONAL DIPLOMA

MECHANICAL ENGINEERING (PRODUCTION OPTION)

1. (a). Explain the following type of plastics:
 - i. Thermosetting
 - ii. Thermoplastics(b) With the aid of sketches, explain the production of the following plastic products:
 - i. A tube by extrusion moulding
 - ii. A bottle by blow moulding.
2. (a) Explain the following inspection methods for casting:
 - i. Fluorescent penetrant
 - ii. Radiographic inspection(b) Describe the three major steps for fettling as applied to casting
(c) With the aid of sketches, explain shell-moulding process.
3. (a) Explain the following metal forming processes.
 - i. Hot working
 - ii. Cold working(b) With the aid of sketches, explain the following metal forming processes:
 - i. Wire drawing
 - ii. Cold bending
 - iii. Stretch forming.
4. (a) Explain three physical treatment of metals prior to finishing process.
(b) Explain the following metal coating processes.
 - i. Electroplating
 - ii. Anodising
 - iii. Cladding
 - iv. Hot dipping
5. (a) State any two effects of the following alloying elements in steel:
 - i. Tungsten
 - ii. Chromium
 - iii. Cobalt(b) Explain three types of stainless steel.
(c) List five reasons for alloying of steels.
6. (a) Explain why copper cadmium is used in making electrodes for resistance welding.
(b) With aid of a sketch, describe the spot welding process.
(c) Describe the thermit welding process
7. (a) State two disadvantages and two disadvantages of powder metallurgy.
(b) Explain four problem areas associated with powder metallurgy and how they can be rectified.
8. (a) Explain the following quenching methods:
 - i. Stepped quenching (martempering)
 - ii. thermal quenching (austempering)

(b) Explain the causes and remedies for each of the following defects of heat treatment of steel.

- i. Warping
- ii. Cracks
- iii. Decarburization
- iv. Carbides
- v. Soft spots.