SET C

QUESTION 1

a) Define **bulk metal** and list **two (2)** process that used bulk metal.

(CO1: PO1)

(2 marks)

Bulk metal : A mass of unprocessed or semi-processed metal. Bulk metal shapes are the starting forms for many continuous metal shaping processes. The workpart also has low area to volume ratio.

2 processes

- Rolling processes
- Forging processes

b) Explain **three (3)** types of **forging** process.

(CO1:PO1)

(3 marks)

Open die forging

- where a solid workpiece is placed between two flat dies and reduced in height by compressing it.
- Also called upsetting or flat die forging.
- Workpiece is deformed uniformly under frictionless comditions

Closed die forging

- Cropping from an extruded or drawn bar stock
- Preforming from operations such as powder metallurgy
- Casting
- Using a preformed blank from a prior forging operation

True closed die forging

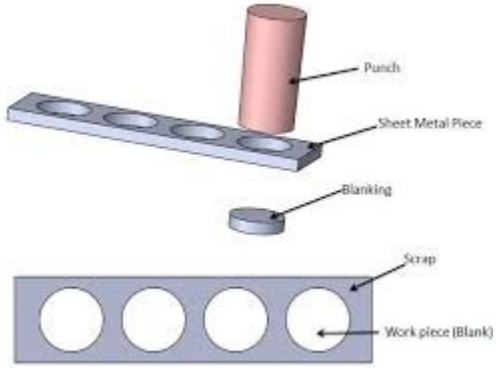
- In true closed-die forging, flash does not form and the workpiece completely fills the die cavity.
- Undersized blanks prevent the complete filling of the die cavity.
- It is applied to impression die forging with flash generation

c) Briefly explain **punching and blanking** process with an aid of diagram. Give **one (1)** example of product for each processes.

(CO1:PO1)

(5 marks)

Both blanking and punching are material forming processes that involve the precise removal of material from a workpiece. The main difference between the two processes lies in the end product produced.



In blanking operations, the final part or product is removed or “punched-out” out of the larger sheet material, with the remaining material being discarded as scrap. On the other hand, in punching operations, the material removed is discarded, and the final product is the remaining material which then undergoes further processing.

QUESTION 2

a) List and define **three (3)** types of flame that used in **oxy-fuel gas welding**.

(CO2:PO1)

(3 marks)

Neutral flame : oxygen : acytelene
Oxidizing flame : oxygen > acytelene
Carburizing flame : oxygen < acytelene

b) Explain **two (2)** purposes of electrode coatings used in arc welding process.

(CO1:PO1) (2 marks)

- stabilize the arc
- generate gases to act as a shield
- control the rate at which the electrode melt
- act as a flux to protect the weld
- add alloying elements to the weld zone to enhance the properties of the joint

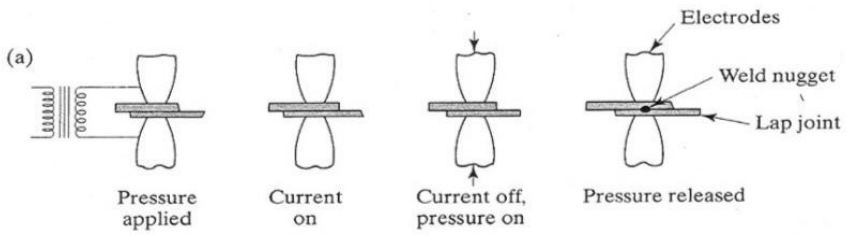
c) With and aid of diagram, briefly explain step by step joining process using **Resistance Spot Welding** and give **two (2)** limitations of the process. (CO2, PO1) (5 marks)

Step

1.The electrodes being brought to the surface of the metal and applying a slight amount of pressure.
2.The current from the electrodes is then applied briefly after which the current is removed but the electrodes remain in place for the material to cool. Weld times range is 0.01 sec to 0.63 sec depending on the thickness of the metal, the electrode force and the diameter of the electrodes themselves.
3.The current is removed from the workpiece and it is cooled using the coolant holes in the center of the electrodes

Limitations :

1. Equipments use are complex
2. Limited to only lap joint

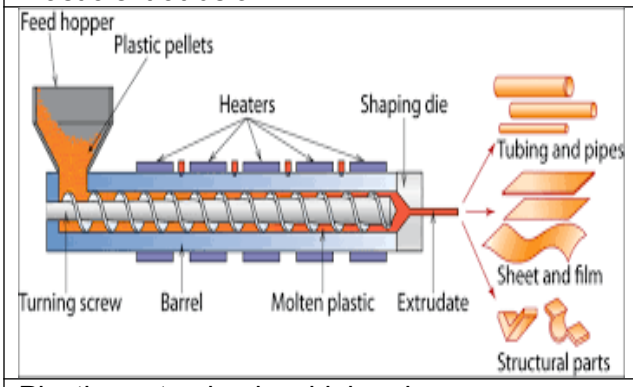
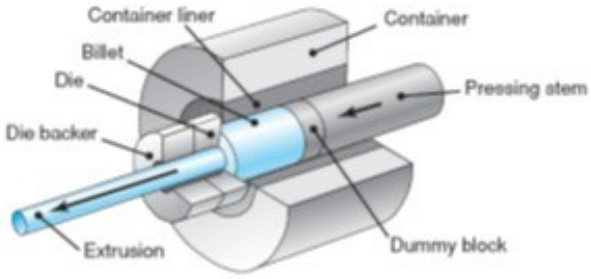


QUESTION 3

a) How are **plastic extrusion** different from **metal extrusion**? Explain at least **two (2)** differences with an aid of diagram.

(CO2; PO1)

(5 marks)

Plastic extratrusion	Metal extrusion
	
Plastics extrusion is a high-volume manufacturing process in which raw plastic is melted and formed into a continuous profile. Extrusion produces items such as pipe/tubing, weatherstripping, fencing, deck railings, window frames, plastic films and sheeting, thermoplastic coatings, and wire insulation	Extrusion is a process used to create objects of a fixed cross-sectional profile. A material is pushed through a die of the desired cross-section. The two main advantages of this process over other manufacturing processes are its ability to create very complex cross-sections, and to work materials that are brittle, because the material only encounters compressive and shear stresses. It also forms parts with an excellent surface finish

b) Distinguish **sheet metal deep drawing** process and **polymer compression molding** process. Support your answer with an aid of sketches for both process.

(CO3; PO1) (5 marks)

Sheet metal deep drawing	Polymer compression molding
1. Sheet metal drawing becomes deep drawing when the workpiece is drawing longer than its diameter 2. It is common that the workpiece is also processed using other forming processes, such as piercing, ironing, necking, rolling, and beading 3. In shallow drawing, the depth of drawing is less than the smallest dimension of the hole	Compression molding is a forming process in which a plastic material is placed directly into a heated metal mold then is softened by the heat and therefore forced to conform to the shape of the mold, as the mold closes. Once molding is completed excess Flash may be removed