Internal Assesment-II

(1) **Powder metallurgy**:- Science of producing metal powders and making finished/semifinished objects from mixed @ allayed powdered with @ without the addition of nonmetallic constituents

Steps in powder metallurgy:- powder, production, compaction, sintering & secondary operation.

Powder production

Raw materials ⇒ powder, powders can be pure elements, pre-allayed powders

Methods of making powder - Atomization: produces powders of both ferrous and non-ferrous powders like Stainless Steel, Superallays, Ti allays powders; Reduction of Compounds: production of iron, Cu, tungsten, malybdenum, electrolysis for making Cu, iron, Silver powders

Compaction:- Compaction is performed using dies machined to close tolerance dies are made of Cemented Carbide, die/tool Steel; pressed using hydraulic @ mechnical process

The basic purpose of compaction is to obtain a green compact with sufficient Strength to withstand further handling operations

Sintering :- performed at controlled atmosphere to bond atomes metallurgically Bonding occurs by diffusion of atoms, done at 70% of abs. melting point of materials

* It serves to consolidate the mechanically bonded powders into a coherent body having desired on service behaviour.

* Densification occurs during the process an improvement in physical and mechanical system.

* Furnaces - mesh belt furnaces (upto 1200c) walking beam, pusher type furnace batch type furnaces are also used in the system.

Secondary operation

operation include reprewing, grinding, plating can be done they are used to ensure close dimensional talurances, good surface finish, increase density, corrosion resistance etc

(a)

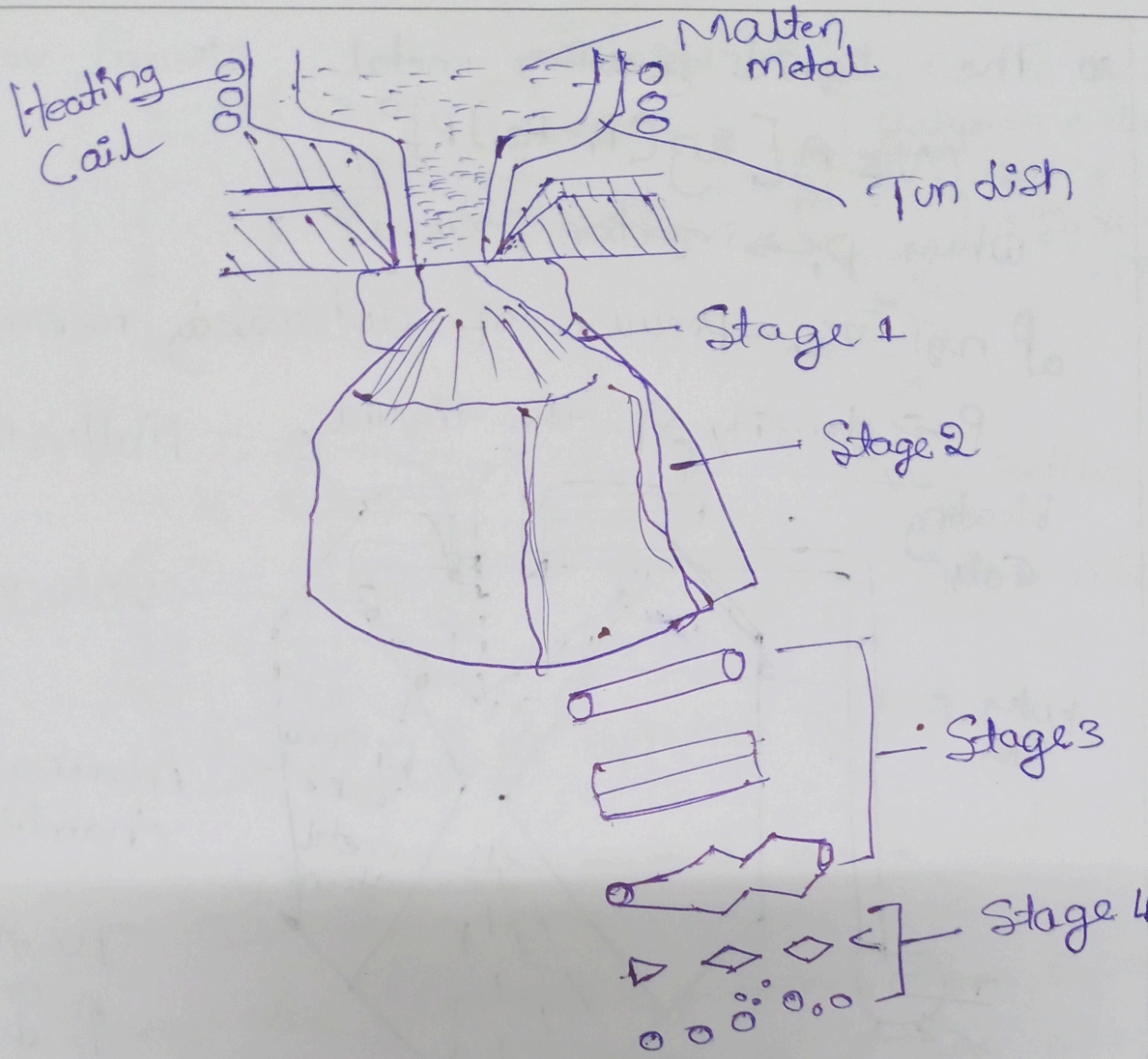

Fig (a) Atomization

(*) The interaction b/w jets and liquid metal Stream begins with the creation Small disturbances and at liquid surface which grow into shearing forces that fragment the liquid into ligaments.

(**) Lower Surface tension of molten metal, high Cooling rate => Formation of irregular Surface => like in water atomization.

(***) High Surface tension, low cooling rates => Spherical shape formation => like in inert gas atomization.

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* The liquid ~~gasifier~~ metal stream velocity

$$V = A[2g(P_i - P_g)P]^{0.5}$$

where P_i → injection pressure

P_g → pressure of atomizing medium

P → density of the liquid

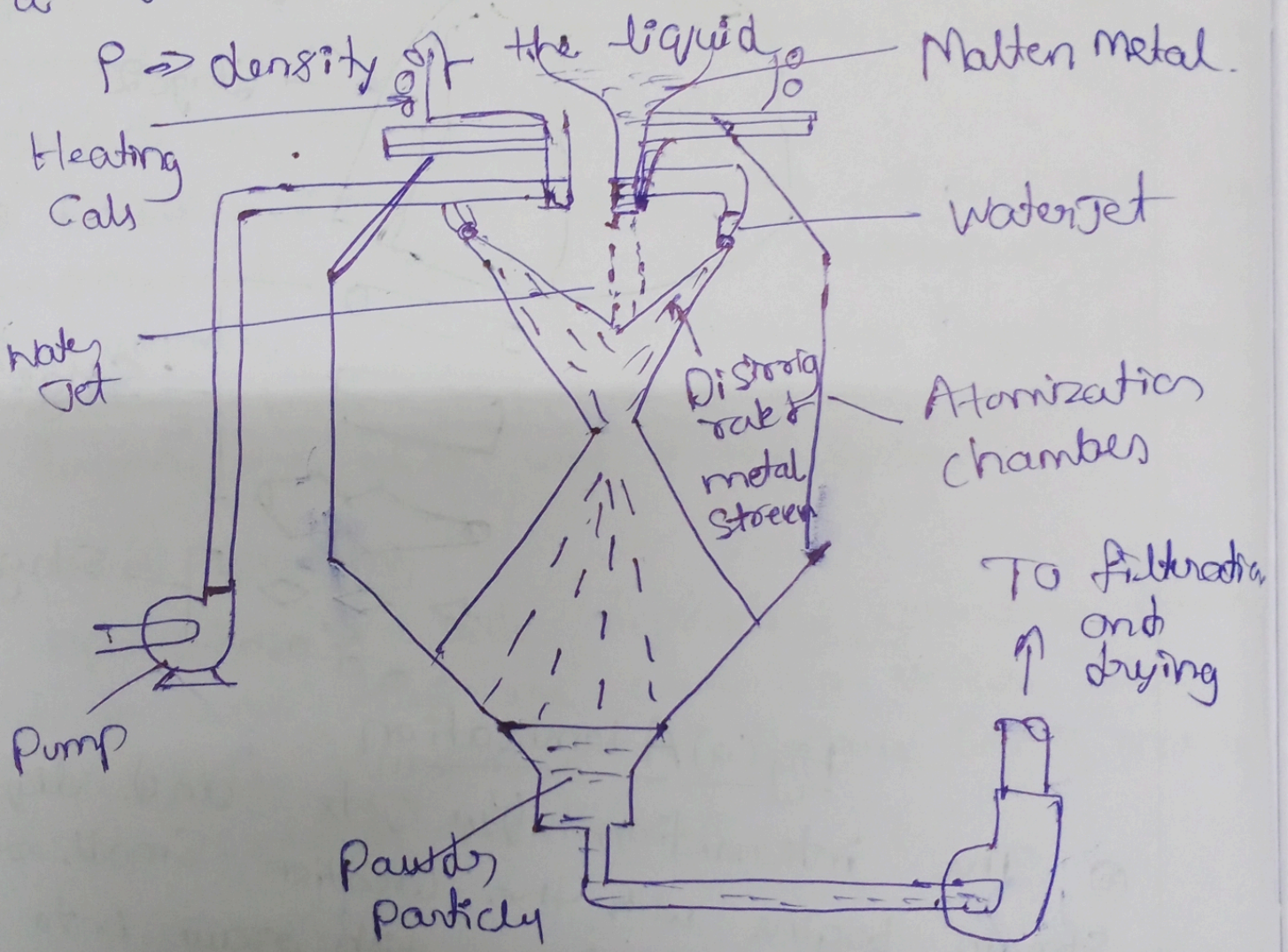

Fig:b Schematic of water atomization

(3)

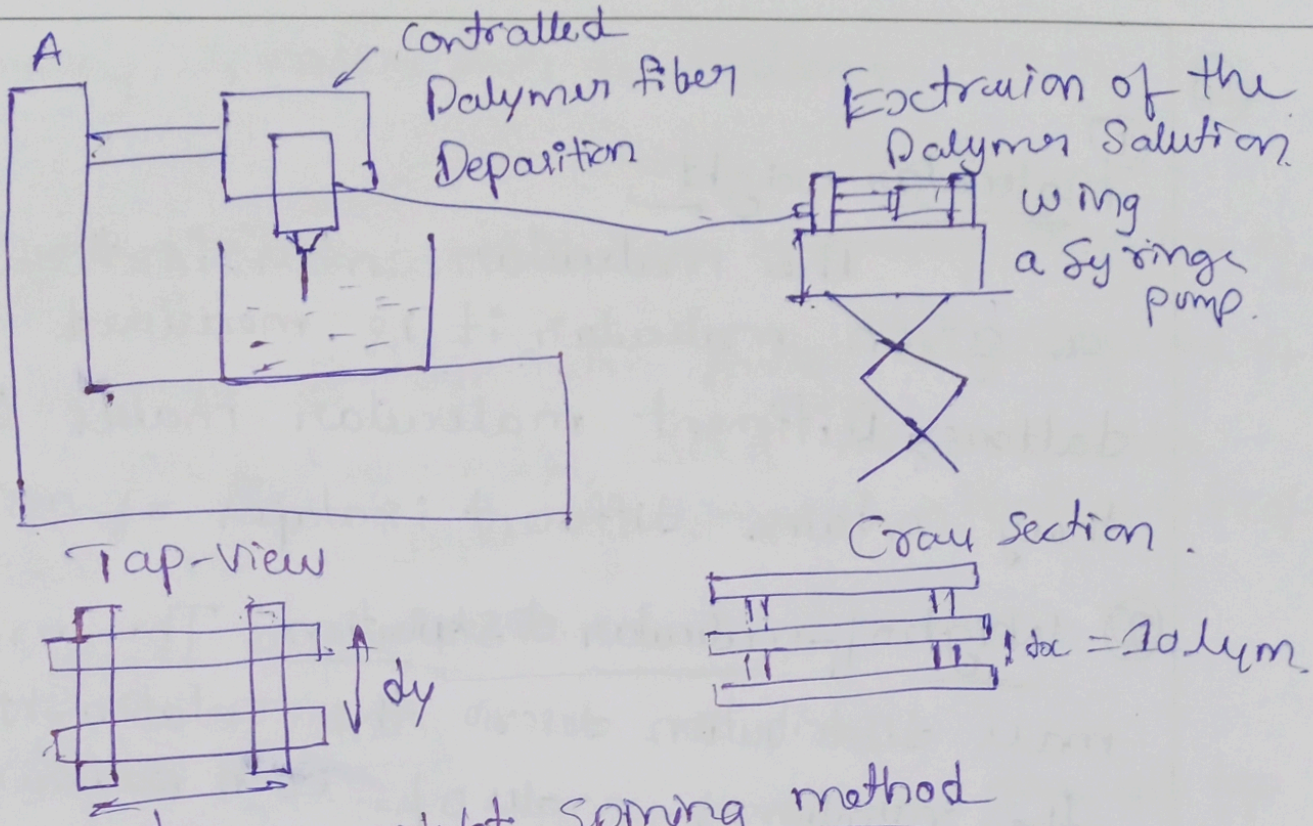

Fig (a) Wet Spining method

Wet Spinning method as shown above figure the controlled polymer fiber Deposition are used in this process as shown above figure Extrusion of the polymer by using the wet spinning method as shown above figure as shown also Top view & Side / and Cross Section view of the the wet spining method it used to controlled polymer fiber Deposition of dx = 10 µm. dy dx dy of shown above figure is called a wet spining method & wet spining process of extrusion of the Polymer as shown above fig

(10)

④

① Molecular weight

The molecular mass is the mass of a given molecular it is measured in daltons. Different molecular masses because they contains different isotopes of an element

② Weight of molecular distribution :- The molar mass distribution describe the relationship b/w the number of moles of each polymer species (N_i) and molar mass (M_i) of that species.

③ particle size :- particle size is a notation ~~diff~~ introduced for comparing dimensions of solid particles, liquid particles & gaseous particles.

④ particle shape :- is a defined by the relative dimensions of the long, intermediate, and short axes of the particle.

⑤ powder structure :- powder structure is a powder bed fusion is a additive manufacturing processes and works on the same basic principle in that parts are formed through adding material rather than subtracting it through conventional

forming operation such as milling

(6) Polymer :- A polymer is any of a class of a natural or synthetic substances composed of very large molecules, called macromolecules, which are multiples of simpler chemical units called monomers.

Types of polymers

- Natural polymers, Natural polymers are all those that found in nature & natural
- Synthetic polymer. Synthetic or artificial polymers are manufactured in the laboratory and generally have petroleum-derived ingredients
- Additive polymers
- Condensing polymer
- Rearrangement polymer
- Biodegradable polymers
- Semi-Synthetic polymer
- Linear polymer.
- branched-chain polymer
- cross-linked polymer
- Based on polymerization
- Based on monomers.

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Additive manufacture :- is a process of manufacturing additive adding the metals of metal is called additive manufacture