



SNS College of Technology

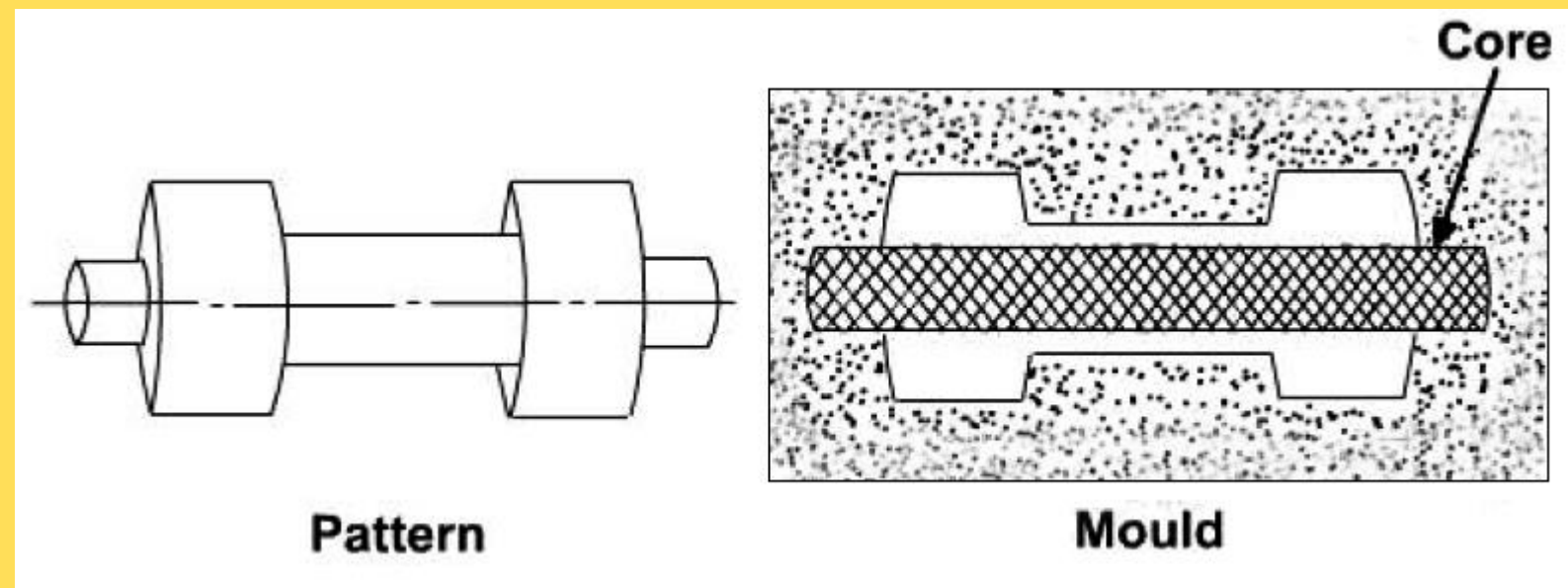
Department of Mechanical Engineering



MANUFACTURING TECHNOLOGY

Unit - I

Topic : Core Making – Patterns: Types, Materials, allowances



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AP/Mech



CORE



A **core** is a device used in **casting** and **moulding** processes to produce internal cavities and reentrant angles (an interior angle that is greater than 180°). ... They are most commonly used in sand **casting**, but are also used in die **casting** and injection **moulding**.

Materials required to make cores

- ✓ Core sand
- ✓ Bentonite clay
- ✓ Pulverized coal
- ✓ Resin oil



Requirements of Core

There are **seven requirements** for cores:

- **Green strength**: In the green condition, there must be adequate strength for handling
- In the hardened state, it must be strong enough to handle the forces of casting; therefore, the **compression strength** should be 100 to 300 psi (0.69 to 2.07 MPa).
- **Permeability** must be very high to allow for the escape of gases.
- **Friability**: As the casting or molding cools, the core must be weak enough to break down as the material shrinks. Moreover, they must be easy to remove during shakeout.
- Good **refractoriness** is required as the core is usually surrounded by hot metal during casting or molding.
- A smooth **surface finish**.
- Minimum **generation of gases** during metal pouring.



Types of Core

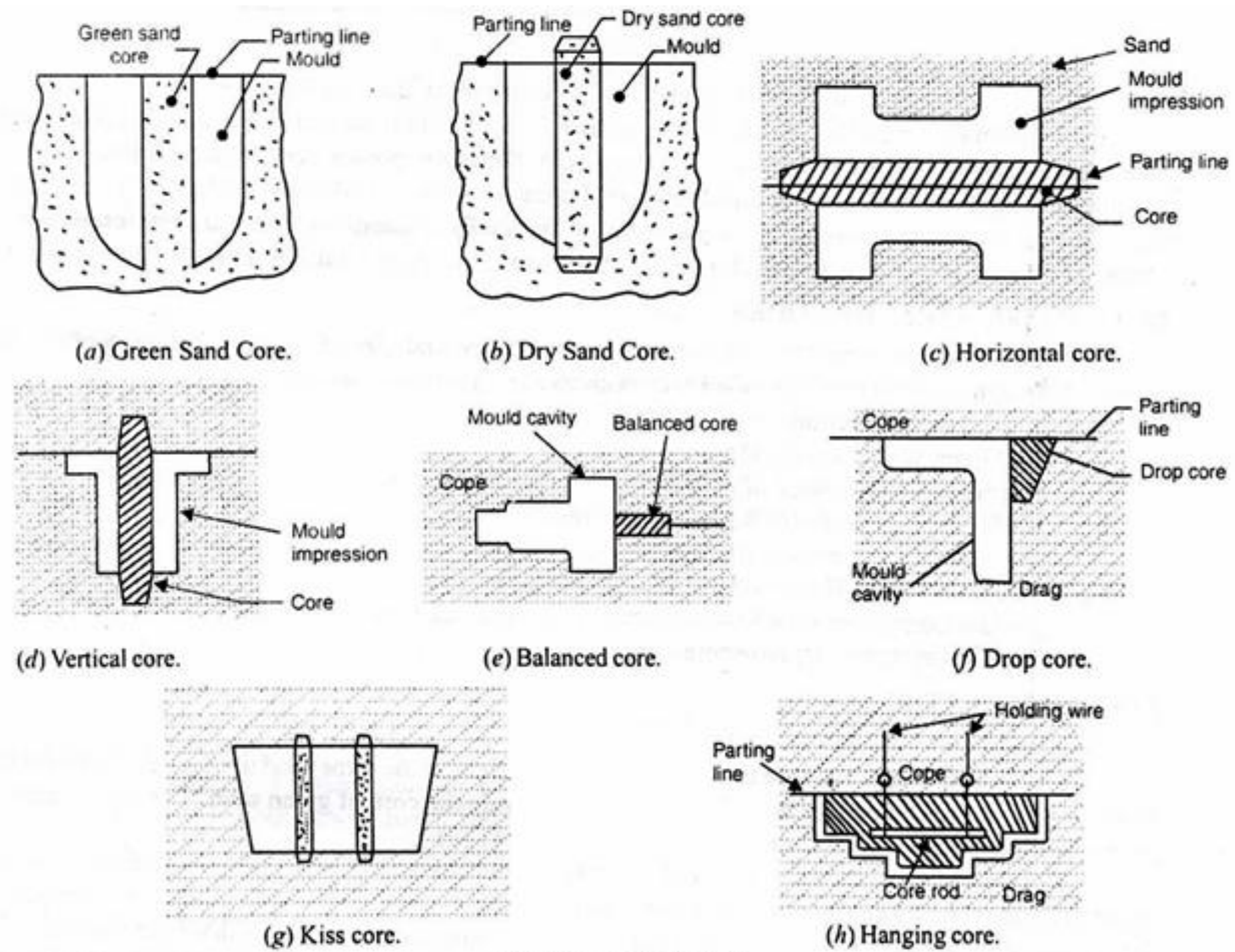


Fig. 3.11. Type of cores.

Source :
www.yourarticlelibrary.com



Pattern



- In casting, a pattern is a replica of the object to be cast, used to prepare the cavity into which molten material will be poured during the casting process.
- Patterns used in sand casting may be made of wood, metal, plastics or other materials. Patterns are made to exacting standards of construction, so that they can last for a reasonable length of time, according to the quality grade of the pattern being built, and so that they will repeatably provide a dimensionally acceptable casting



Wooden pattern for a cast-iron gear with curved spokes

Source :
[https://en.wikipedia.org/wiki/Pattern_\(casting\)](https://en.wikipedia.org/wiki/Pattern_(casting))



Types of Pattern

- Single piece pattern,
- Split Pattern
- Follow-board
- Match Plate
- Loose-piece
- Sweep
- Skeleton pattern

<p>Fig. 6.1</p>		
Single Piece Pattern	Loose Piece Pattern	Split Pattern
	<h2 style="color: red;">Types of Pattern</h2>	
Match Plate Pattern		Skeleton Pattern
Multi Piece (Cope Drag) Pattern	Sweep Pattern	Follow Board Pattern

Source : www.mech4study.com



Requirements of Good Pattern



The **pattern material should be**

1. Easily worked, shaped and joined
2. Light in weight
3. Strong, hard and durable, so that it may be resistant to wear and abrasion
4. Easily available at low cost
5. Repairable and reused
6. Able to take good surface finish
7. Dimensionally stable in all situation



Pattern Materials



Wood – readily available, affected by moisture & moisture dries out and wears out quickly

Metal – Cast iron, brass, aluminum, white metal – it does not change shape

Plastics – do not absorb moisture, resistant to wear

Rubber – Silicone rubber

Plaster & Waxes – Gypsum cement known as plaster of paris. It has high compressive strength upto 300 kg/cm²



Pattern Allowances



A pattern is always made larger than the required size of the casting considering the various allowances. These are the allowances which are usually provided in a pattern.

1: shrinkage or contraction allowance:

The various metals used for casting contract after solidification in the mould. Since the contraction is different for different materials, therefore it will also differ with the form or type of metal.

2: Draft allowance

It is a taper which is given to all the vertical walls of the pattern for easy and clean withdraw of the pattern from the sand without damaging the mould cavity. It may be expressed in millimeters on a side or in degrees. The amount of taper varies with the type of patterns. The wooden patterns require more taper than metal patterns because of the greater frictional resistance of the wooden surfaces.



Pattern Allowances



3: Finish or machining allowance

The allowance is provided on the pattern if the casting is to be machined. This allowance is given in addition to shrinkage allowance. The amount of this allowance varies from 1.6 to 12.5 mm which depends upon the type of the casting metal, size and the shape of the casting. The ferrous metals require more machining allowance than non ferrous metals.

4: Distortion or camber allowance

This allowance is provided on patterns used for casting of such design in which the contraction is not uniform throughout.

5: Rapping or shaking allowance

This allowance is provided in the pattern to compensate for the rapping of mould because the pattern is to be rapped before removing it from the mould.



Pattern Allowances

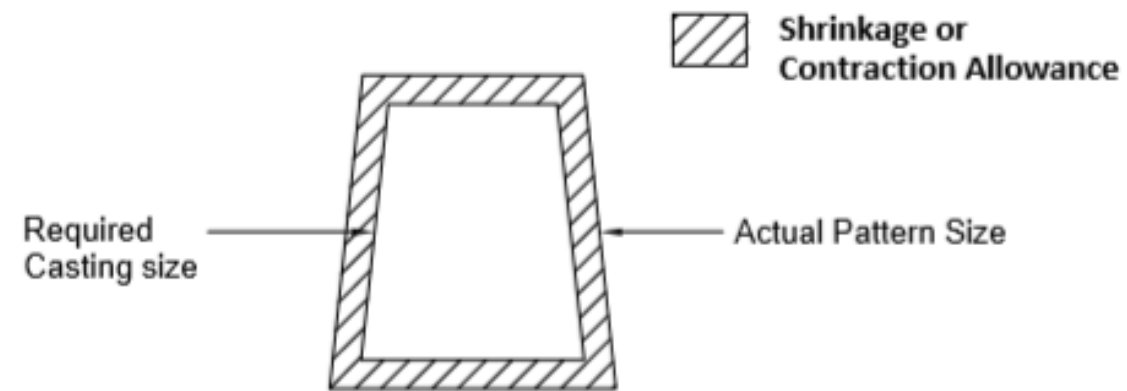
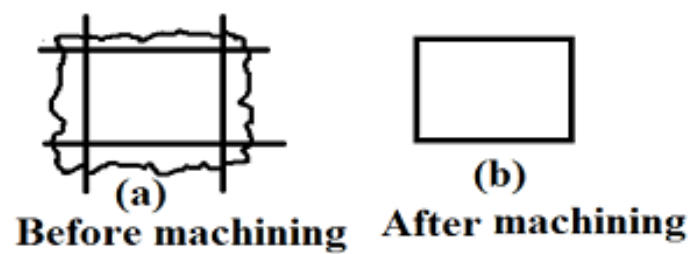
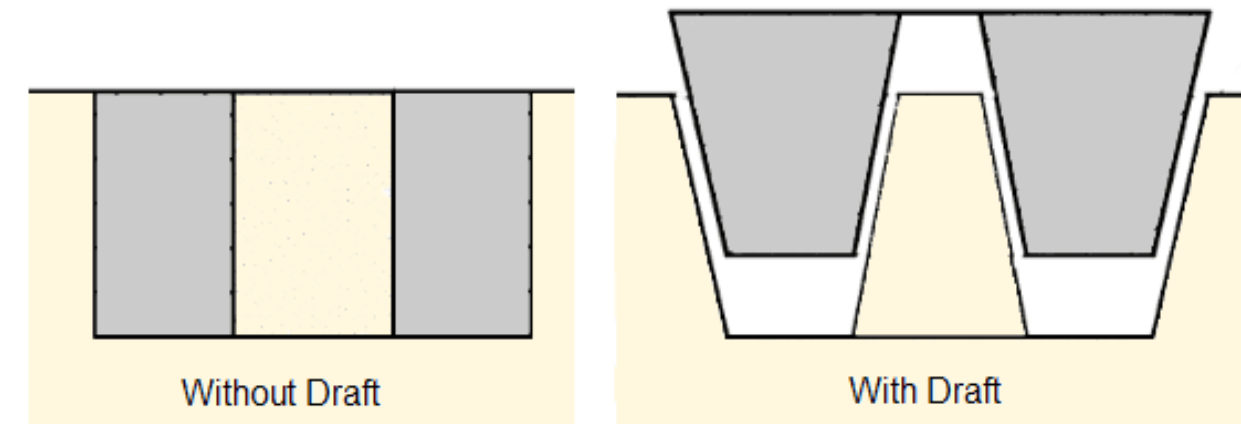


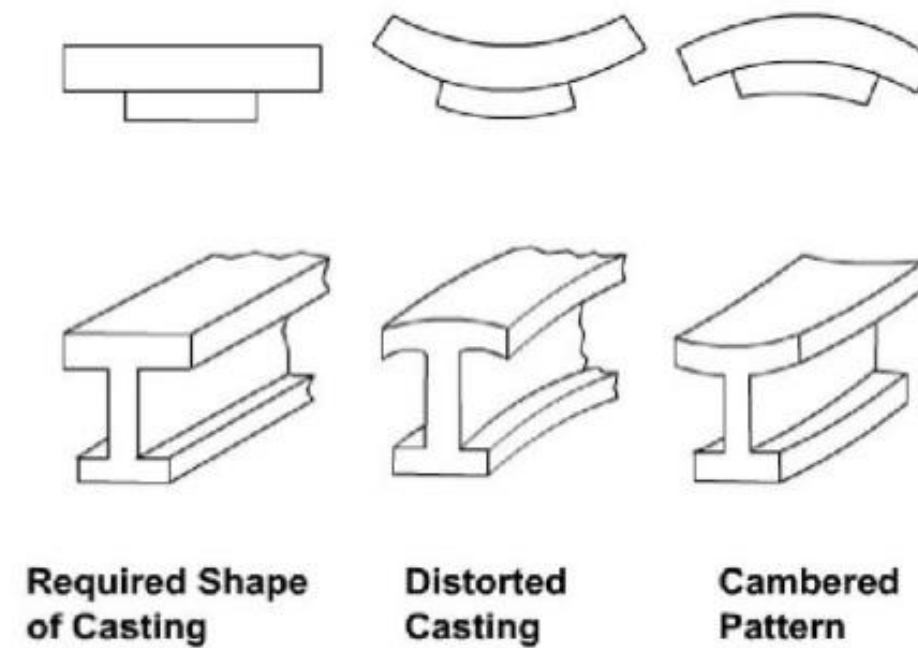
Figure. Shrinkage or contraction Allowance



Machining Allowance



Draft Allowance



Distortion Allowance

Source : www.mechanicalwalkins.com



Assessment



Workbook Questions

1. A taper provided on the pattern for its easy and clean withdrawal from the mould is known as _____

- a) Draft Allowance
- b) Shrinkage Allowance
- c) Machining Allowance
- d) Distortion Allowance

2. When a pattern is made in three parts, the bottom part is known as a cope.

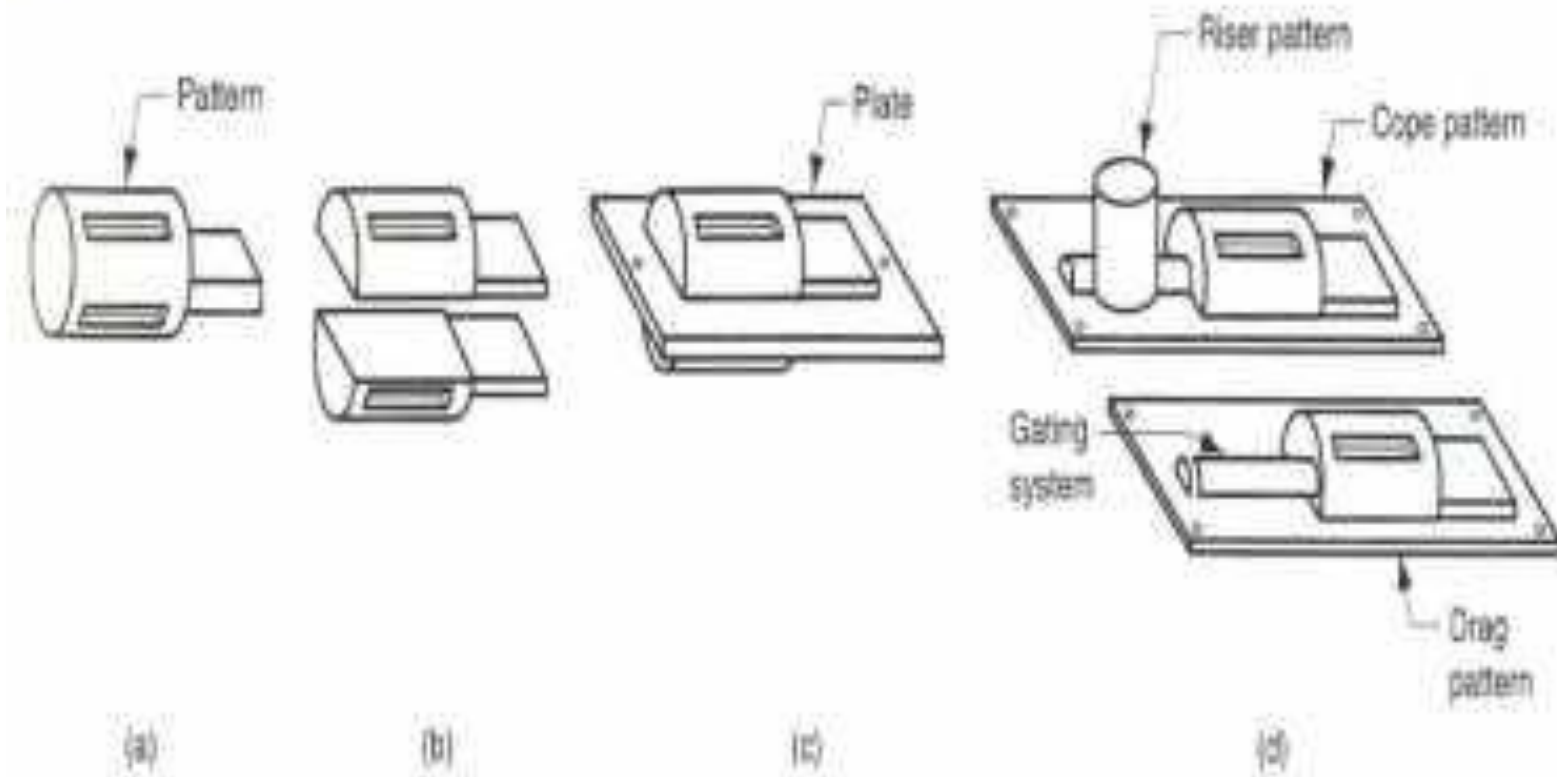
True / False



Assessment



3. Choose the match plate pattern in the given diagram



4. _____ is used for making a hole in a casting

5. If three moulding boxes are used for preparing sand mould, the middle box is called as



THANK YOU