Adda247

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"There is nothing impossible to they who will try."

ISRO | BHEL | DRDO & OTHER PSUs

PRODUCTION

CASTING

MOST EXPECTED QUESTIONS

PART-1

Live@ 11:30Am

Gaurav sir

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GATE 2023 RESULT

GATE

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AIR 403 EC MOHAN KUMAR SINGH

AIR 567 EE SHANKAR JHA

AIR 571 ME VIJENDER MEENA

YouTube Classes Schedule

ENGINEERS

MECHANICAL ENGINEERING

EXAM TARGET	SUBJECT	TIME	FACULTY
ALL PSUs	ENGINEERING MATHS	10:00 AM	ANANT SIR
ALL PSUs	PRODUCTION	11:30 AM	GAURAV SIR
ALL PSUs	THERMODYNAMICS	3:00 PM	KANISTH SIR
GATE 2024-25	HMT	4:30 PM	YOGESH SIR
GATE 2024-25	SOM	9:00 PM	MUKESH SIR

FREE APP
CLASS SCHEDULE

MECHANICAL ENGINEERING

HMT	MONDAY Live @11AM	YOGESH SIR
PRODUCTION	TUESDAY Live @11AM	GAURAV SIR
SOM	WEDNESDAY Live @8PM	MUKESH SIR
THERMODYNAMICS	THURSDAY Live @11AM	KANISTH SIR
ENGINEERING MATHEMATICS	FRIDAY Live @11AM	ANANT SIR

* Die casting → Gravity
* Die casting → Pressure

Pressure Die casting
↓
* Hot chamber
* Cold chamber

Consider the following characteristics:

1. High pressure are required.
2. Used for making castings in aluminium.
3. Melting unit as an integral part.

Which of these characteristics of cold chamber die casting process are correct?

(a) 1, 2 and 3
(b) 1 and 2 only
(c) 1 and 3 only
(d) 2 and 3 only

Which of the following casting methods utilizes wax pattern?

(a) Die casting

(b) Centrifugal casting

(c) Investment casting → wax → Smooth Surface ⇓ Excellent casting

(d) Semi-centrifugal casting

Given Data :→

* $d = 10cm$
* $L = 200cm$
* $\rho_{metal} = 0.077\ N/cm^3$
* $\rho_{core} = 0.0165\ N/cm^3$
* Upward Force (P) = ?

A big casting is to have a hole, to be produced by using a core of 10 cm diameter and 200 cm long. The density ρ_{metal} is 0.077 N/cm^3 and density ρ_{core} is 0.0165 N/cm^3. What is the upward force acting on the core prints?

(a) 200.5 N
(b) 1100.62 N
(c) 950.32 N
(d) 350.32 N

Solution :→

$$* P = V \times g \times (\rho_{metal} - \rho_{core})$$

$$* P = \left(\frac{\pi}{4} d^2\right) \times L \times g \left(\rho_{metal} - \rho_{core}\right)$$

$$* P = \frac{\pi}{4} (10)^2 \times 200 \times (0.077 - 0.0165) \times 981$$

$$* P = 950.32\ N$$

$g = 9.81\ m/s^2$

$g = 981\ cm/s^2$

centrifugal casting

⇓

Symmetrical cylindrical object

⇓

Symmetrical About vertical Axis

⇓

Hollow object

⇓

Fast Rate of cooling at outer periphery

⇓

Fine Grain developed With High Density

Which of the following are the most likely characteristics in centrifugal casting?

(a) Fine grain size and high porosity

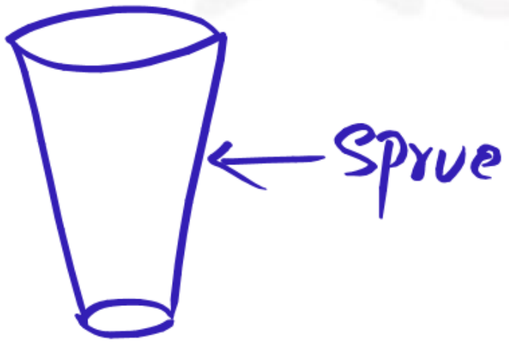
(b) Coarse grain size and high porosity

(c) Fine grain size and high density

(d) Coarse grain size and high density

Top Gate
⇓
favourable temp Gradient

Bottom Gate
⇓
unfavourable temp Gradient



Consider the following statements:

1. The actual entry point through which the molten metal enters the mould cavity is called ingate.
2. Bottom gate in case of a mould creates unfavourable temperature gradient.
3. Sprue in case of a mould is made tapered to avoid air inclusion

Which of these statements is/are correct?

(a) 1 only
(b) 1 and 2
(c) 2 and 3
(d) 1 and 3

$$* \; cA = \frac{m}{\rho \times t_f \times C_d \times \sqrt{2gh_t}}$$

$\downarrow$

$(A)_{min}$

$$* \; t_p = \frac{V_m \rightarrow mm^3}{A_g \times \text{Velocity of} \rightarrow mm^3/s}$$

Molten liquid Metal

In gating system design, which one of the following is the correct sequence in which choke area, pouring time, pouring basin and sprue sizes are calculated?

(a) Choke area - Pouring time - Pouring basin - Sprue ✓ Sprue $\rightarrow$ Runner $\rightarrow$ Gate $\rightarrow$ Cavity

(b) Pouring basin - Sprue - Choke area - Pouring time

(c) Choke area - Sprue - Pouring basin - Pouring time

(d) Pouring basin - Pouring time - Choke area - Sprue

The centrifugal casting method is used for casting articles of

(a) Symmetrical shape about vertical axis

(b) Symmetrical shape about horizontal axis

(c) Irregular shape

(d) Non-ferrous metal only

In solidification of metal during casting, compensation for solid contraction is

(a) Provided by the overisze pattern → +ve Allowance

(b) Achieved by properly placed risers

(c) Obtained by promoting direction solidification

(d) Made by providing chills

Given Data :→

* $V_m = 100 \times 90 \times 20$ mm
* $h, A \Rightarrow t_1$
* $4h, \frac{A}{2} \Rightarrow t_2$
* $\frac{t_2}{t_1} = ?$

A mold having dimensions 100mm × 90mm × 20mm is filled with molten metal through a gate with height h' and C.S area A, the mould filling time is t. The height is now quadrupled and the cross sectional area is halved. The corresponding filling time is t2. The ratio t2/t is

(a) $1/\sqrt{2}$
(b) 1
(c) $\sqrt{2}$
(d) 2

Solution :→

$$* \; t_f = \frac{V_m}{A_g \times V_g} \longrightarrow mm^3 \longrightarrow sec$$

mm^2 , mm/s

$$* \; t_f = \frac{V_m}{A \times \sqrt{2gh}}$$

$$* \; t_2 = \frac{V_m}{\frac{A}{2} \times \sqrt{2 \times g \times 4h}} \Rightarrow \frac{V_m}{\frac{A}{2} \times 2\sqrt{2gh}}$$

$$* \; t_2 = \frac{V_m}{A \times \sqrt{2gh}} \quad -(1)$$

$$* \; t_1 = \frac{V_m}{A \times \sqrt{2gh}} \quad -(2)$$

$$* \; \frac{t_2}{t_1} = \frac{\left(\frac{V_m}{A \times \sqrt{2gh}}\right)}{\left(\frac{V_m}{A \times \sqrt{2gh}}\right)} = 1$$

In shell moulding, how can the shell thickness be accurately maintained?

Dwell Time ⟸

(a) By controlling the time during which the pattern is in contact with mould

(b) By controlling the time during which the pattern is heated

(c) By maintaining the temperature of the pattern in the range of 175°C - 380°C

(d) By the type of binder used

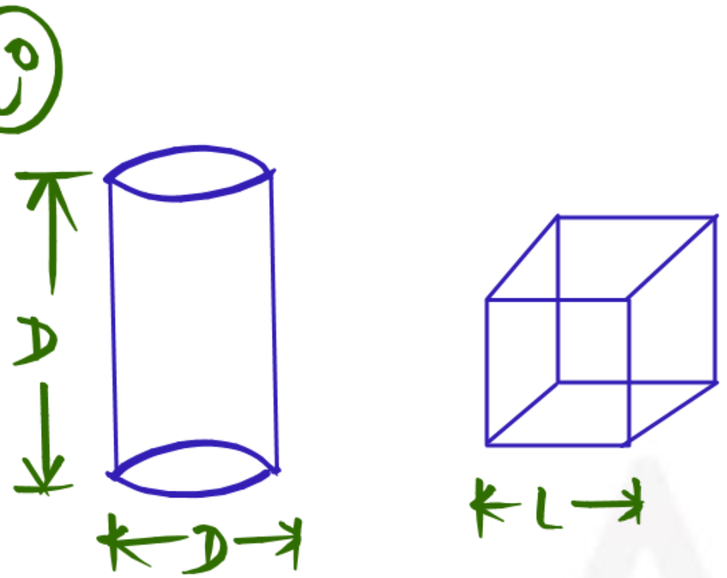
Which one of the following casting processes is best suited to make bigger size hollow symmetrical pipes?

(a) Die casting

(b) Investment casting

(c) Shell moulding

(d) Centrifugal casting



A solid cylinder of diameter D and height equal to D, and a solid cube of side L are being sand cast by using the same material. Assuming there is no superheat in both the cases, the ratio of solidification times of the cylinder to the solidification time of the cube is

(a) (L/D)2
(b) (2L/D)2
(c) (2D/L)2
(d) (D/L)2

$$\text{☺} * \frac{t_{cyl}}{t_{cube}} = ?$$

Solution :→

$$* \quad \frac{t_{cyl}}{t_{cu}} = \frac{K_{cyl}\left(\frac{V}{SA}\right)^2_{cyl}}{K_{cu}\left(\frac{V}{SA}\right)^2_{cu}}$$

$$* \quad \frac{t_{cyl}}{t_{cu}} = \frac{\left(\frac{V}{SA}\right)^2_{cy}}{\left(\frac{V}{SA}\right)^2_{cu}} = \frac{(D/6)^2}{\left(\frac{L}{6}\right)^2}$$

$$* \quad \frac{t_{cyl}}{t_{cu}} = \left(\frac{D}{L}\right)^2$$

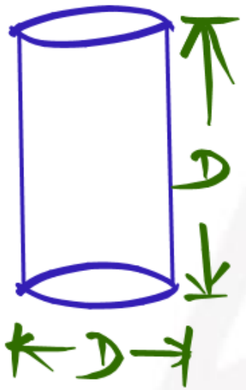
$$* \left(\frac{V}{SA}\right)_{cy} = \frac{D}{6}$$

$$* \left(\frac{V}{SA}\right)_{cu} = \frac{L^3}{6L^2} = \frac{L}{6}$$

Given Data :→

* $V_m = 30 \times 20 \times 5$ mm

* Riser ⇒



* F.R = ?

A cast steel slab of dimension 30 × 20 × 5 mm is poured horizontally using a side riser. The riser is cylindrical in shape with diameter and height, both equal to D. The freezing ratio of the mould is

(a) 8D/75 min
(b) 4D / 75 min
(c) 75/8D min
(d) 75 / 4D min

$$* \left(\frac{V}{SA}\right)_R = \frac{D}{6}$$

Solution :→ $*V_c = 30\times20\times5\ mm$

$$* F.R = \frac{\left(\frac{SA}{V}\right)_c}{\left(\frac{SA}{V}\right)_s} = \frac{\left(\frac{V}{SA}\right)_s}{\left(\frac{V}{SA}\right)_c}$$

$$* F.R = \frac{\left(\frac{V}{SA}\right)_s}{\left(\frac{V}{SA}\right)_c} = \frac{\frac{D}{6}}{\left(\frac{30}{17}\right)}$$

$$* F.R = \frac{D}{6}\times\frac{17}{30} = 0.095D = \frac{8D}{75}$$

$$* \left(\frac{V}{SA}\right)_c = \frac{30\times20\times5}{2(30\times20+20\times5+5\times30)}$$

$$* \left(\frac{V}{SA}\right)_c = \frac{3000}{1700} = \frac{30}{17}$$

Green Sand

⇓

Sand having Moisture

Which one of the following statements is correct?

In green sand moulding process, uniform ramming leads to

(a) less sand expansion type of casting defect

(b) greater dimensional stability of the casting

(c) uniform flow of molten metal into the mould cavity less change of gas porosity

(d) less chance of gas porosity

The mould in shell moulding process is made up of which of the following ?

(a) Gypsum + setting agents

(b) Green sand + clay

(c) Sodium silicate + dried sand

(d) Dried silica + phenolic resin

Phenol/formaldehyde

Directional solidification can be achieved by providing

(a) chills and chaplets

(b) chaplets and padding

(c) chills and padding

(d) chills, chaplets and padding

It Support the core

To create cavity

H.W

A casting of size 400 mm × 200 m × 140 mm solidifies in 20 min. the solidification time for a casting 400mm × 200 m × 35 mm under similar conditions is

(a) 2 min
(b) 3 min
(c) 4 min
(d) 8 min

Match List-I (Casting Process) with List II (Applications) and select the correct answer:

List-I	List-II
A. Centrifugal casting	1. Carburettors
B. Squeeze casting	2. Pipes
C. Die casting	3. Wheels for automobiles
	4. Gear housings

Codes:

	A	B	C
(a)	2	3	1
(b)	4	1	3
(c)	2	1	3
(d)	4	3	1

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