

STUDY MATERIAL

SUBJECT : BASIC MANUFACTURING PROCESSES (BMP)

(MODULE - I)

SEMESTER : 5TH

BRANCH : MECHANICAL ENGINEERING

CONTENTS :

- OBJECTIVE TYPE QUESTIONS AND ANSWERS
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DEPARTMENT OF MECHANICAL ENGINEERING

SRINIX COLLEGE OF ENGINEERING, BALASORE

(www.srinix.org)

Basic Manufacturing Processes

Objective Type

01. The most preferred process for casting gas turbine blades is : (ESE-92)
- (a) die moulding
 - (b) shell moulding
 - (c) investment moulding
 - (d) sand casting

02. Which of the following metal shrinks most from molten state to solid state? (ESE-92)
- (a) Cast iron
 - (b) Cast steel
 - (c) Brass
 - (d) Admiralty metal

03. **Assertion (A):** In a mould, a riser is designed and placed so that the riser will solidify after the casting has solidified.
Reasons(R): A riser can act as reservoir of molten metal which will supply molten metal where a shrinkage cavity would have occurred. (ESE-94)

04. Which of the following materials can be used for making patterns? (ESE-94)
- 1. Aluminium
 - 2. Wax
 - 3. Mercury
 - 4. Lead

Select the correct answer using the codes below:

- (a) 1,3 and 4
- (b) 2,3 and 4
- (c) 1,2 and 4
- (d) 1,2 and 3

05. **Assertion(A):** Aluminium alloys are cast in hot chamber die casting machine.
Reason(R) : Aluminium alloys require high melting when compared to zinc alloys. (ESE-95)

06. **Assertion(A):** An aluminium alloy with 11% silicon is used for making engine pistons by die casting technique.

Reason(R): Aluminium has low density and addition of silicon improves its fluidity and therefore its cast ability. (ESE-95)

07. Match List-I with List-II and select the correct answering the codes given below the lists: (ESE-95)

List - I

- A. Automobile piston in aluminum alloy
- B. Engine crankshaft in spheroidal graphite iron
- C. Carburetor housing in aluminium alloy
- D. Cast titanium blades

List - II

- 1. Pressure die-casting
- 2. Gravity die-casting
- 3. Sand casting
- 4. Precision investment casting
- 5. Shell moulding

Codes:

	A	B	C	D		A	B	C	D
(a)	2	3	1	5	(b)	3	2	1	5
(c)	2	1	3	4	(d)	4	1	2	3

08. Addition of magnesium to cast iron increases its (ESE-95)
- (a) hardness
 - (b) ductility and strength in tension
 - (c) corrosion resistance
 - (d) creep strength.

09. Which one of the following materials will require the largest size of riser for the same casting? (ESE-95)
- (a) Aluminium
 - (b) Cast iron
 - (c) Steel
 - (d) Copper

10. Directional solidification in castings can be improved by using (ESE-95)
- chills and chaplets
 - chills and padding
 - chaplets and padding
 - chills, chaplets and padding.

11. Consider the following ingredients used in moulding: (ESE-96)
- Dry silica sand
 - Clay
 - Phenol formaldehyde
 - Sodium silicate

Those used for shell mould casting include

- 1,2 and 4
- 2,3 and 4
- 1 and 3
- 1,2,3 and 4

12. Which of the following methods are used for obtaining directional solidification for casting design? (ESE-96)

- Suitable placement of chills
- Suitable placement of chaplets
- Employing padding

Select the correct answer.

- 1 and 2
- 1 and 3
- 2 and 3
- 1,2 and 3

13. Misrun is a casting defect which occurs due to (ESE-96)

- very high pouring temperature of the metal
- Insufficient fluidity of the molten metal
- Absorption of gases by the liquid metal
- Improper alignment of the mould flasks

14. Which of the following pairs are correctly matched? (ESE-96)

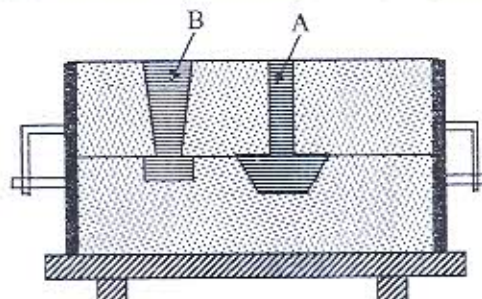
- Pit moulding..... For large Jobs
- Investment moulding...Lost wax process
- Plaster moulding....Mould prepared with gypsum

- 1,2 and 3
- 1 and 2
- 1 and 3
- 2 and 3

15. Which one of the following pairs is not correctly matched? (ESE-97)

- Aluminium alloy piston...Pressure die casting
- Jewellery Lost wax process
- Large pipes ... Centrifugal casting
- Large bells Loam moulding

16. A sand casting mould assembly is shown in the given figure. The elements marked 'A' and 'B' are respectively. (ESE-98)



- Sprue and Riser
- Ingate and Riser
- Drag and Runner
- Riser and Sprue

17. Which of the following are the requirements of an ideal gating system?

- The molten metal should enter the mould cavity with as high a velocity as possible.
- It should facilitate complete filling of the mould cavity.
- It should be able to prevent the absorption of air or gases from the surroundings on the molten metal while flowing through it.

Select the correct answer using the codes given below: (ESE-98)

- 1,2 and 3
- 1 and 2
- 2 and 3
- 1 and 3

18. A Spherical drop of molten metal of radius 2 mm was found to solidify in 19 seconds. A similar drop of radius 4 mm would solidify in (ESE-98)

- (a) 14.14 second (b) 20 second
(c) 18.30 second (d) 40 second.

19. In solidification of metal during casting, compensation for solid contraction is (ESE-99)

- (a) Provided by the oversize pattern.
(b) Achieved by properly placed risers
(c) Obtained by promoting direction solidification
(d) Made by provided chills

20. Match List I (Process) with List II (Products/materials) and select the correct answer using the codes given below the lists: (ESE-00)

List - I

- A. Die casting
B. Shell molding
C. CO₂ molding
D. Centrifugal casting

List - II

1. Phenol formaldehyde
2. C.I. pipes
3. Non-ferrous alloys
4. Sodium silicate

Codes :

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

21. The main purpose of chaplets is (ESE-01)

- (a) To ensure directional solidification
(b) To provide efficient venting
(c) For aligning the mould boxes
(d) To support the cores

22. **Assertion (A):** In CO₂ casting process, the mould or core attains maximum strength.

Reason (R): The optimum gassing time of CO₂ through the mould or core forms Silica gel which imparts sufficient strength to the mould or core. (ESE-02)

23. A gating ratio of 1:2:4 is used to design the gating system for magnesium alloy casting. This gating ratio refers to the cross-section areas of the various gating elements as given below: (ESE-03)

1. Down sprue
2. Runner
3. Ingate

The correct sequence of the above elements in the ratio 1:2:4 is

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

24. Match List-I (Products) with List-II (Casting process) and select the correct answer using the codes given below the lists: (ESE-03)

List-I(Products)

- A. Hollow statues
B. Dentures
C. Aluminium alloy pistons
D. Rocker arms

List-II (Casting Process)

1. Centrifugal Casting
2. Investment Casting
3. Slush Casting
4. Shell Moulding
5. Gravity Die Casting

Codes:

	A	B	C	D		A	B	C	D
(a)	3	2	4	5	(b)	1	3	4	5
(c)	1	2	3	4	(d)	3	2	5	4

25. 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? (ESE-03)

- (a) Choke area – Pouring time – Pouring basin – Sprue
- (b) Pouring basin – Sprue – Choke area – Pouring time
- (c) Choke area – Sprue – Pouring basin – Pouring time
- (d) Pouring basin – Pouring time – Choke area – Sprue

26. In shell moulding, how can the shell thickness be accurately maintained? (ESE-05)

- (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 $175^{\circ}\text{C} - 380^{\circ}\text{C}$
- (d) By the type of binder used

27. The gating ratio 2:8:1 for copper in gating system design refers to the ratio of areas of (ESE-05)

- (a) Sprue : Runner : Ingate
- (b) Runner : Ingate : Sprue
- (c) Runner : Sprue : Ingate
- (d) Ingate : Runner : Sprue

28. Which one of the following processes produces a casting when pressure forces the molten metal into the mould cavity? (ESE-05)

- (a) Shell moulding
- (b) Investment casting
- (c) Die casting
- (d) Continuous casting

29. According to Chvorinov's equation, the solidification time of a casting is proportional to (ESE-06)

- (a) V^2
- (b) V
- (c) $1/V$
- (d) $1/V^2$

[Where, V = volume of casting]

30. Shell moulding can be used for (ESE-06)

- (a) producing milling cutters
- (b) making gold ornaments
- (c) producing heavy and thick walled casting
- (d) producing thin casting

31. Which of the following materials are used for making patterns in investment casting method?

- 1. Wax
- 2. Rubber
- 3. Wood
- 4. Plastic

Select the correct answer using the code given below: (ESE-06)

- (a) Only 1 and 3
- (b) Only 2 and 3
- (c) Only 1, 2 and 4
- (d) Only 2, 3 and 4

32. In which of the following are metal moulds used? (ESE-06)

- (a) Greensand mould
- (b) Dry sand mould
- (c) Die casting process
- (d) Loam moulding

33. Match list I with List II and select the correct answer using the code given below the Lists: (ESE-07)

List – I (Casting Process)

- A. Die casting
- B. Investment casting
- C. Shell moulding
- D. Centrifugal casting

List – II (Principle)

- 1. The metal solidifies in a rotating mould
- 2. The pattern cluster is repeatedly dipped into a ceramic slurry and dusted with refractory
- 3. Molten metal is forced by pressure into a metallic mould

4. After cooling, the invest is removed from the casting by pressure jetting or vibratory cleaning

Codes :

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

34. Consider the following statements in respect of investment castings: (ESE-07)

1. The pattern or patterns is/are not joined to a stack or sprue also of wax to form a tree of patterns.
2. The prepared moulds are placed in an oven and heated gently to dry off the invest and melt out the bulk of wax.
3. The moulds are usually poured by placing the moulds in a vacuum chamber.

Which of the statements given above are correct?

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

35. Which of the following are employed in shell moulding? (ESE-07)

1. Resin binder
2. Metal pattern
3. Heating coils

Select the correct answer using the code given below :

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

36. Which one of the following is the correct statement? In a centrifugal casting method (ESE-07)

- (a) no core is used
(b) core may be made of any metal
(c) core is made of sand
(d) core is made of ferrous metal

37. Which one of the following is the correct statement? (ESE-07)

Gate is provided in moulds to

- (a) feed the casting at a constant rate
(b) give passage to gasses
(c) compensate for shrinkage
(d) avoid cavities

38. Small amount of carbonaceous material sprinkled on the inner surface of mould cavity is called (ESE-08)

- (a) Backing sand (b) Facing sand
(c) Green sand (d) Dry sand

39. Which of the following casting processes does not/do not require central core for production pipe? (ESE-08)

1. Sand casting process
2. Die casting process
3. Centrifugal casting process

Select the correct answer using the code given below:

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

40. Bottom gating system is sometimes preferred in casting because (ESE-08)

- (a) It enables rapid filling of mould cavity
(b) It is easier to provide in the mould
(c) It provides cleaner metal
(d) It reduces splashing and turbulence

41. Which of the following are the most suitable materials for die casting? (ESE-09)

- (a) Zinc and its alloys
(b) Copper and its alloys
(c) Aluminium and its alloys
(d) Lead and its alloys

42. Which one of the following casting processes is best suited to make bigger size hollow symmetrical pipes? (ESE-09)

- (a) Die casting (b) Investment casting
(c) Shell moulding (d) Centrifugal casting

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

(ESE-09)

- (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

44. Consider the following statements:

1. The actual entry point through which the molten metal enters the mould cavity is called in-gate.
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 the above statements is/are correct?

(ESE-09)

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

45. **Assertion (A)** : The investment casting is used for precision parts such as turbine plates, sewing machines etc.

Reason (R): The investment castings have a good surface finish and are exact reproductions of the master pattern.

(ESE-10)

46. Consider the following advantages of shell mould casting :

1. Close dimensional tolerance
2. Good surface finish
3. Low cost
4. Easier

Which of these are correct ?

(ESE-10)

- (a) 1,2 and 3 only
- (b) 2,3 and 4 only
- (c) 1, 2 and 4 only
- (d) 1,2,3 and 4

47. Rigid metal pieces to support cores are called.

(ESE-10)

- (a) Chaplets
- (b) Sprue
- (c) Riser
- (d) Ribs

48. Which one of the following moulding processes does not require use of core?

(ESE-10)

- (a) Sand moulding
- (b) Shell moulding
- (c) Centrifugal casting
- (d) Plaster moulding

49. Which of the following casting method utilizes wax pattern?

(ESE-10)

- (a) Die casting
- (b) Centrifugal casting
- (c) Investment casting
- (d) Semi-centrifugal casting

50. Consider the following advantages of die casting over sand casting :

(ESE-11)

1. Rapidity of the process
2. Smooth surface
3. Strong dense metal structure

Which of these advantages are correct?

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

51. The proper sequence of investment casting steps is :

(ESE-11)

- (a) Slurry coating – pattern melt out – Shake out – Stucco coating
- (b) Stucco coating – Slurry coating – Shake out – Pattern melt out
- (c) Slurry coating – Stucco coating – Pattern melt out – Shake out
- (d) Stucco coating – Shakeout – Slurry coating – Pattern melt out

52. The method of casting for producing ornamental pieces are:

(ESE-11)

- (a) Slush and gravity casting
- (b) Pressed and slush casting
- (c) Gravity and semi permanent mould casting
- (d) Semi permanent mould and pressed casting

53. In light metal casting, runner should be so designed that: (ESE-11)

1. It avoids aspiration
2. It avoids turbulence
3. The path of runner is reduced in area so that unequal volume of flow through each gate takes place

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

54. The relationship between total freezing time t_f , volume of the casting V and its surface area A , according to Chvorinov's rule is: (ESE-11)

- (a) $t = K \left(\frac{V}{A} \right)$ (b) $t = K \left(\frac{A}{V} \right)$
(c) $t = K \left(\frac{A}{V} \right)^2$ (d) $t = K \left(\frac{V}{A} \right)^2$

Where K is a constant

55. Match List -I with List -II and select the correct answer using the code given below the lists: (ESE-11)

List -I

- A. Top gate B. Bottom gate
C. Parting gate D. Step gate

List -II

1. Heavy and large castings
2. Most widely used and economical
3. Turbulence
4. Unfavourable temperature gradient

Codes:

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

56. The process of making hollow castings of non circular shape and desired thickness by permanent mould without the use of cores is known as (ESE-12)

- (a) Die casting
(b) Slush casting

- (c) Pressed casting
(d) Centrifugal casting

57. The ratio of surface area of volume for a unit volume of riser is minimum in case of (ESE-12)

- (a) Cylindrical riser
(b) Spherical riser
(c) Hemispherical riser
(d) Cuboid riser

58. **Statement (I):** Mould walls of a permanent mould are kept thick.

Statement (II): The thicker mould walls retain maximum heat increasing flow of molten metal. (ESE-13)

- (a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)
(b) Both Statement (I) and Statement (II) are individually true but Statement (II) is NOT the correct explanation of Statement (I)
(c) Statement (I) is true but Statement (II) is false
(d) Statement (I) is false but Statement (II) is true

59. **Statement (I):** In semi centrifugal casting a particular shape of the casting is produced by mould, core and the centrifugal force of molten metal.

Statement (II): The centrifugal force aids to proper feeding to produce casting free from porosity. (ESE-13)

60. **Statement (I):** In die casting process, molten metal is injected at high pressure into a metallic die.

Statement (II): In this die casting process, some excess metal as required than filling the mold is also forced into the parting plane. (ESE-14)

