

**MANUFACTURING PROCESSES
(MECH 2204)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

***Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.***

Candidates are required to give answer in their own words as far as practicable.

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Green sand mould indicates that
 - (a) polymeric mould has been cured
 - (b) mould has been totally dried
 - (c) mould is green in color
 - (d) mould contains moisture.
 - (ii) Swage is a tool used in,
 - (a) drop forging
 - (b) smith forging
 - (c) press forging
 - (d) upset forging.
 - (iii) The cooling characteristics of casting can be represented by the
 - (a) volume to surface area ratio
 - (b) product of volume and surface area
 - (c) surface area to volume ratio
 - (d) surface area to perimeter ratio.
 - (iv) Non-consumable electrode is used in
 - (a) gas metal arc welding
 - (b) plasma arc welding
 - (c) flux cored arc welding
 - (d) manual metal arc welding.
 - (v) The strength of the welded joint reduces due to
 - (a) undercut
 - (b) lack of fusion
 - (c) lack of penetration
 - (d) all of these.
 - (vi) In a rolling process, roll separating force can be decreased by
 - (a) reducing the roll diameter
 - (b) increasing the roll diameter
 - (c) providing back up rolls
 - (d) increasing the friction between the rolls and the metal.
 - (vii) In press working operation with a progressive die complete product is made in,
 - (a) single station operation
 - (b) multiple station operation
 - (c) one punch and one die
 - (d) none of these.

- (viii) The process of infiltration in sintered products is to improve
(a) porosity (b) dimensional accuracy
(c) surface finish (d) coherent property.
- (ix) Select the following component which withstand the high temperature in casting process
(a) clay (b) moisture (c) silica (d) water.
- (x) When a metal is deformed above recrystallization temperature, the metal possesses
(a) thermal stresses (b) residual stresses
(c) fatigue stresses (d) none of the above.

Group – B

2. (a) Two cubical castings of the same metal and sizes of 20 mm side and 40 mm side are moulded in green sand. If the smaller casting solidifies in 2 mins, then find the expected time of solidifications of large casting. State the applications of the Die casting process. [(C04)(Remember/LOCQ)]
(b) Discuss the following casting defects with reference to the causes and methods of prevention: (i) Blowhole, (ii) Air Inclusion, (iii) Cold Shuts. [(C02)(Understand/LOCQ)]
(4 + 2) + (2 + 2 + 2) = 12
3. (a) In a sand casting operation, the total liquid head is maintained constant such that it is equal to the mould height. The time taken to fill the mould with a top gate is t_A . If the same mould is filled with a bottom gate, then the time taken is t_B . Ignore the time required to fill the running and frictional effects. Assume atmospheric pressure at the top molten metal surfaces. Find the relation between t_A and t_B . [(C02)(Remember/LOCQ)]
(b) Briefly describe the Centrifugal Casting process with a sketch. [(C03)(Understand/LOCQ)]
6 + 6 = 12

Group – C

4. (a) Why shielding of weld area during welding is necessary and also evaluate why spot welding is commonly used in automotive bodies? [(C03)(Evaluate/HOCQ)]
(b) Discuss various types of oxy-acetylene flames developed during gas welding with sketches. [(C01)(Remember/LOCQ)]
6 + 6 = 12
5. (a) Classify and explain the various welding defects with causes of occurrences and describe a method of detecting cracks on a weld surface. [(C03)(Apply/HOCQ)]
(b) Explain the advantages, disadvantages and applications of Resistance welding process. [(C03)(Remember/LOCQ)]
6 + 6 = 12

Group – D

6. (a) Define rolling process. Analyze why surface finish of rolled products is better in cold rolling than in hot rolling. [(C04)(Analyze/IOCQ)]
 (b) Evaluate the angle of bite when rolling plates are of 12 mm thick using work rolls of 600 mm diameter and reducing the thickness by 3mm. [(C04)(Evaluate/HOCQ)]
6 + 6 = 12
7. (a) Explain how hollow sections can be produced in forward extrusion process with neat diagram. [(C05)(Evaluate/HOCQ)]
 (b) Explain in detail about the defects occurred in forging operations. [(C01)(Remember/LOCQ)]
6 + 6 = 12

Group – E

8. (a) Describe the shearing operation done using punch and die in a mechanical press showing the sequence of deformation followed by fracture with the help of necessary sketches. [(C06)(Remember/LOCQ)]
 (b) Giving necessary sketches explain the process of making a metal washer using a progressive punch and die system. [(C06)(Understand/LOCQ)]
6 + 6 = 12
9. (a) Describe any one of the atomization processes used for preparing the metallic powder. Differentiate between Hot Isostatic Pressing and Cold Isostatic Pressing. [(C05)(Analyze/LOCQ)]
 (b) Differentiate between Thermoplastic and Thermosetting materials. Describe Injection blow moulding process with schematic diagram. [(C05)(Analyze/LOCQ)]
(4 + 2) + (2 + 4) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	68.75	6.25	25

Course Outcome (CO):

After the completion of the course students will be able to

CO 1	Explain the basic idea of different non-machining manufacturing processes.
CO 2	Investigate different sand casting processes.
CO 3	Compare different welding processes
CO 4	Differentiate different forming processes & their specific applications.
CO 5	Explain powder metallurgy process & different plastic moulding processes.

CO 6	Describe press working process.
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*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question;
HOCQ: Higher Order Cognitive Question