



Name :
Roll No. :
Invigilator's Signature :

CS/M.Tech (ME)/SEM-1/MME-102/2012-13

2012

ADVANCED PRODUCTION METHODS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any ten of the following :
10 × 1 = 10

- i) Critical radius of nucleation and its crystal growth during solidification of casting requires that
- a) the net free energy of the liquid continues to reduce.
 - b) rate of increase in surface tension energy is greater than bulk free energy.
 - c) all of these
 - d) none of these.



- ii) In rapidly cooling alloy metal micro-segregation in grain leads to
- a) richer solute at the core
 - b) richer solvent at the core
 - c) random variation of constituent elements
 - d) uniform distribution of the constituents
 - e) none of these.
- iii) 'Mass feeding' in solidification of casting is
- a) a type of rapid pouring of liquid metal in the mould
 - b) related to multiple in-gating system of mould
 - c) observed when alloy metal is cooled with extreme rapidity
 - d) none of these.
- iv) If a die-cast aluminium pump casing freezes in 26 seconds, then the freezing time of a die-cast aluminium impeller which is 5 times heavier and 6.5 times greater in surface area than the casing is approximately
- a) 33.8 second
 - b) 20 second
 - c) 13 second
 - d) 130 second
 - e) none of these.



- v) ' h/d ' ratios of compact top and side risers are respectively
- a) 2 and 1 b) 1 and 2
 c) $\frac{1}{2}$ and 1 d) none of these.
- vi) The co-ordinate point (freezing ratio, volume ratio) which lies on the left, or below the Caine's risering curve indicates
- a) improper location zone of riser placement
 b) unsound casting zone
 c) sound casting zone
 d) none of these.
- vii) S.S. plate can be cut efficiently by
- a) $O_2 - C_2H_2$ gas cutting torch
 b) Hacksaw cutting machine
 c) Plasma cutting
 d) None of these.
- viii) For c-steel welding by MIG process the gas used is
- a) N_2
 b) H_2
 c) O_2
 d) CO_2
 e) none of these.



- ix) V-I characterization of power source for TIG welding is
- a) flat
 - b) gradual drooping
 - c) drooping
 - d) rising
 - e) none of these.
- x) Maximum thick metal plate can be welded by
- a) TIG
 - b) MIG
 - c) SAW
 - d) ESW
 - e) MMA method.
- xi) In plasma arc welding the electrode is
- a) Copper
 - b) Titanium
 - c) Alloy steel
 - d) Tungsten.
- xii) Non-consumable electrode is used for
- a) ESW
 - b) MMA
 - c) SAW
 - d) MIG
 - e) TIG.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. How is the air aspiration effect in downsprue of a mould avoided ? Explain clearly.
3. Compare the solidification times of spherical, cubical and cylindrical shapes of casting if their volumes are same.
4. Clearly explain why greater amount of shrinkage metal is needed to be considered for estimating the riser-size in case of bar appendages to plate casting, when compared to the shrinkage metal for plate appendage to bar casting, for the same thickness ratios of appendage to parent casting in each case.
5. How shear and clearance are provided in case of punching & blanking operation ?
6. Explain working principle of constant feed welding head.
7. What are the different types of welding defect ? Show with the help of neat sketches.

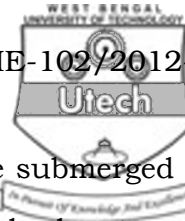


GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) Distinguish between a pure metal and an alloy in respect of their nucleation and growth during solidification from liquid in mould, highlighting the range of temperature, composition of solid formed. 8
- b) Explain what is 'Constitutional supercooling'. What are its effects on solidification of casting and, what are the factors on which it depends ? 7
9. a) Compare design procedures of an optimum size riser using (i) Caine's risering curve and (ii) NRL riser curve for steel castings. 8
- b) How can the NRL design method be modified for (i) hollow cylindrical castings and (ii) the castings with plate or bar type appendages i.e, bar type casting having either plate or bar appendages, and vice-versa ? 7
10. a) Explain how the feeding distances in bar and plate type cast sections are estimated, taking into consideration the effect of riser contribution and the effect of edge contribution. Cite illustrative examples. 7
- b) What are the different types of metal transfer in MIG welding ? Discuss in detail with figures, graphs etc. 8



11. a) With the help of neat sketch explain the submerged arc welding process. Give disadvantages and advantages of the process. 8
- b) With the help of neat sketch explain the mechanism of electrode feed system, i.e., variable feed method for above process. 7
12. a) Explain TIG process with neat sketch. 6
- b) Give detail sketch of high frequency unit and explain the function of it. 7
- c) Give advantages and disadvantages of TIG process. 2
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