

2013

Total Pages--5

B.Tech-3
MST-I

2013

Set-1

MANUFACTURING SCIENCE AND
TECHNOLOGY-I

Full Marks : 70

Time : 3 hours

Attempt Q. No. 1 and any other five questions

The figures in the right-hand margin indicate marks

I. Answer all questions : 2 x 10

- (a) What are the components of the gating system in sand mould?
- (b) Explain the use of sweep pattern in sand casting.
- (c) What do you mean by directional solidification in casting?
- (d) How liquid, solidification and solid shrinkages are taken care in sand casting process?

(Turn Over)

(2)

- (e) What are the functions of tundish in continuous casting process?
- (f) Mention the significance of "polarity" in arc welding.
- (g) Explain how arc shielding is achieved in submerged arc welding.
- (h) Mention an application of thermit welding process.
- (i) Define the term "weldability" of a metal.
- (j) A steel bar of 200 mm diameter is being turned at 93 m/min at a feed of 0.2 mm/rev and depth of cut of 2 mm. Determine the feed rate in mm/min.

2. (a) Mention the various factors considered while designing pattern in sand casting process? 5

(b) What are the functions of riser in sand casting? A spherical casting of diameter 10 cm has a cylindrical riser 5 cm in diameter and 10 cm height. Will the riser prevent macroporosity? 5

(3)

3. (a) Show the different types of centrifugal casting process with schematic drawing. What is the disadvantage of this process for Al-alloy casting? 5
- (b) What is continuous casting process, and mention the basic features of this process with a neat sketch. 5

4. (a) Electron beam welding and laser-beam welding are considered as high energy density welding processes. Explain the salient features of these processes. 5

(b) With neat sketches explain the following welding defects (i) undercut (ii) porosity (iii) cracks. Explain the causes and preventive measures, if any. 5

5. (a) Explain the functions of electrode coating in manual metal arc welding. 5

(b) With simple sketches, explain metal inert gas (MIG) welding process. 5

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(4)

6. (a) Flame in oxy-acetylene welding is produced by the chemical reaction of acetylene (C_2H_2) and oxygen (O_2) in two stages. Describe the reactions. How the 2-stage reaction affects the flame structure? 5
- (b) Explain the principle of formation of an electric arc when potential field is applied between the electrode and the work. 5

7. (a) How many top risers will be needed in sand casting a bar of dimensions 4 inches x 4 inches x 100 inches (thickness x width x length)? 5

(b) A centre lathe is driven by a 3 phase induction motor having a rotational speed of 1440 rpm. The motor is connected to the headstock via belt-pulley mechanism. The diameter of the pulley on the motor spindle is 200 mm and that on the input shaft of the headstock is 300 mm. For a particular combination of gears in the headstock, the main spindle rotates at 144 rpm. (i) What is the rotational

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(5)

speed of the input shaft of the headstock?
(ii) What would be the rotational speed of the main spindle if the pulleys are interchanged? 5

8. (a) A grinding wheel is specified as C60K8V. Explain the grinding wheel specification. 5

(b) A spur gear with 48 teeth is required to be machined in milling machine. Explain indexing procedure with a neat diagram of the indexing mechanism. 5

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