

R15

Code No: 124DM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2017

PRODUCTION TECHNOLOGY

(Common to ME, MCT, AME, MSNT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

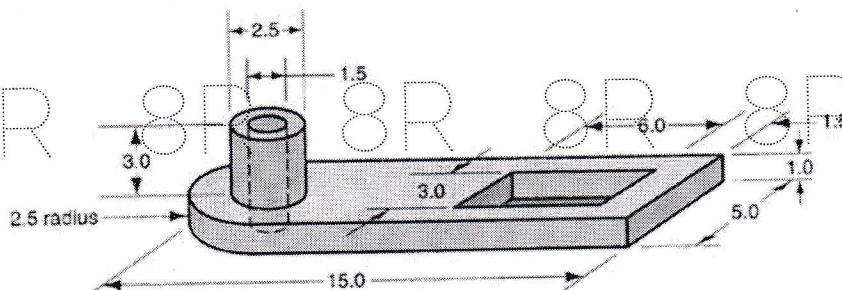
(25 Marks)

- 1.a) Explain briefly about sweep pattern and match plate pattern. [2]
- b) A rectangular block of dimensions  $80 \times 50 \times 20$  mm is to be made from cast iron by the casting process. The mould for this job is made using a wooden pattern. Determine the dimensions of wooden pattern if machining allowance is 2mm on each side, shrinkage allowance of 2% and taper allowance of  $1^\circ$ . [3]
- c) In a resistance welding process if the current of 10000 A supplied for 0.1 sec through a  $100 \mu\Omega$  resistance joint, what is the heat input required at weld joint? [2]
- d) A rail track was broken at a remote location, which welding technique do you suggest? Given the reason. [3]
- e) Name any two non-destructive tests used for finding welding defects. [2]
- f) What does each term in E-3-2-2-5-411-P in electrode designation represent? [3]
- g) What is strain hardening? [2]
- h) Write three differences between cold working and hot working. [3]
- i) What is fullering and edging in forging operation? [2]
- j) Write any three differences between forward and backward hot extrusion process. [3]

PART-B

(50 Marks)

2. A cylindrical riser with diameter-to-length ratio = 1 is to be designed for a sand casting mold. The casting geometry is shown in figure, in which the units are in inches. If the mold constant is Chvorinov's rule (proportionality constant) =  $19.5 \text{ min/in}^2$ ,  $n=2$ , determine the dimensions of the riser so that the riser will take 0.5 min longer to freeze than casting itself. [10]



OR

3. Explain the working principle of shell mould casting, hot chamber and cold chamber die casting process. [10]

- 4.a) Why do we do the edge preparation before welding? What are the different ways of edge preparation techniques?
- b) Write primary and secondary combustion equations in oxy-acetylene gas welding process. Is it an endothermic process or exothermic process? [6+4]

OR

- 5.a) In a given arc-welding operation, the power source is at 20V and current is at 300 A. If the electrode travel speed is 6 mm/s, calculate the cross-sectional area of the joint. The heat transfer efficiency is 0.8 and melting efficiency is 0.30. Heat required to melt the steel is  $10 \text{ J/mm}^2$ .
- b) Assume that two 1.5 mm thick steel sheets are being spot welded at a current of 5500 A and current flow time  $t=0.15 \text{ s}$ . Using electrodes 6mm in diameter, estimate the amount of heat generated and its distribution in the weld zone. Use an effective resistance of  $250 \mu\Omega$ . [5+5]

- 6.a) List any five welding defects and describe the consequences of those defects and remedies.
- b) Can we join dissimilar materials? If so give those process names and describe the basic principle of working. [5+5]

OR

- 7.a) Which welding technology out of TIG/MIG welding uses non consumable electrode? Explain that process with neat diagram.
- b) Why DC arc welding is more used than AC arc welding in specialized applications? [5+5]

- 8.a) Estimate the force required in punching  $25 \text{ mm}^2$  area square hole with 2 mm thickness and UTS of the material is 1000 MPa.
- b) Draw the neat sketches of two high, three high, four high, tandem, planetary rolling mills. [5+5]

OR

- 9.a) A 10 mm deep cylindrical cup with diameter of 15 mm is drawn from a circular blank. Neglect the variation in the sheet thickness, what is the diameter of the blank in mm?
- b) Why recovery, recrystallization and grain growth are required after plastic deformation of a metal. Explain these process. [7+3]

10. A cylindrical specimen made of annealed 1112 steel (strength coefficient  $K=750 \text{ MPa}$ , strain hardening coefficient  $n=0.15$ ) has a diameter of 225 mm and 125 mm high. It is upset at room temperature, by open die forging with flat dies to a height of 50 mm. Assuming that the coefficient of friction is 0.2, calculate upsetting force required at the end of the stroke. Use average pressure formula. [10]

OR

11. A copper billet 150 mm in diameter and 325 mm long is extruded at 1123 K at a speed of 300 m/s. Using square dies and assuming poor lubrication, estimate the force required in this operation if the extruded diameter is 75 mm, where strength coefficient  $C=240 \text{ MPa}$  and strain rate sensitivity coefficient  $m=0.06$ . [10]

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