

Code No: 153BR

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, September/October - 2023

PRODUCTION TECHNOLOGY

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A**

**(25 Marks)**

- 1.a) Describe the repair methods used in casting. [2]
- b) Explain briefly about the sweep pattern and match plate pattern. [3]
- c) What are the advantages and limitations of resistance welding? [2]
- d) What are the safety precautions required in welding? Discuss the tools used for this. [3]
- e) What is the soldering process? Where it can be used? [2]
- f) What does each term in E-3-2-2-5-411-P in electrode designation represent? [3]
- g) What is strain hardening? What is its influence in hot working and cold working? [2]
- h) Discuss the functions of die angle in wire drawing. [3]
- i) Define the extrusion process. Sketch and explain different types of extrusion processes. [2]
- j) What properties of metals contribute to good forgeability? [3]

**PART – B**

**(50 Marks)**

- 2.a) What are the materials used for making patterns? Discuss each material with applications, advantages and limitations.
- b) What are the different allowances provided on patterns? Sketch and explain each one of them. [5+5]

**OR**

- 3.a) Explain the working principle of the shell mould process with neat sketch. Also discuss the applications, advantages and limitations of the process.
- b) Give the steps in the sand-casting process and explain each briefly. [7+3]
- 4.a) Explain oxy-acetylene welding process with a neat sketch. Also discuss the combustion equations and temperature ranges along with reaction details.
- b) Discuss the principle of thermit welding process along with its applications. [6+4]

**OR**

- 5.a) In a given arc-welding operation, the power source is at 20V and the 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 the melting efficiency is 0.30. The heat required to melt the steel is 10 J/mm<sup>2</sup>.
- b) Write the principle of operation of forge welding. [6+4]

6.a) Explain destructive and non-destructive testing of welds.  
b) Sketch and explain the principle of friction welding along with its applications, advantages and limitations. [5+5]

OR

7.a) Explain the principle of laser welding process. Also discuss the limitations of it.  
b) Sketch and explain the principle of induction welding along with its applications, advantages and limitations. [4+6]

8.a) Sketch and explain different rolling mills.  
b) Why recovery, recrystallization, and grain growth are required after the plastic deformation of the metal? Explain these processes. [5+5]

OR

9.a) Differentiate hot working and cold working processes.  
b) What are the different types of drawing? Explain each with a help of a neat sketch. [4+6]

10. A cylindrical specimen made of annealed 1112 steel (strength coefficient  $K=750$  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 the upsetting force required at the end of the stroke. Use the average pressure formula. [10]

OR

11.a) Explain different forging operations and their principles.  
b) Explain briefly the terms backing and lapping related to forging practice. [5+5]

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