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Question Paper Code : 11018

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Fifth/Sixth/Seventh Semester

Mechanical Engineering

CME396 — PROCESS PLANNING AND COST ESTIMATION

(Common to : Manufacturing Engineering)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the factors influencing process selection?
2. Write the approaches of process planning.
3. What are the main process parameters than can influence the success of the machining?
4. What are the basic elements of jigs?
5. What is meant by depreciation due to accident?
6. Specify the elements involved in the allocation of overhead charges in cost estimation.
7. Identify the key factors to be considered when estimating the production costs in a welding shop.
8. What is meant by distortion allowance in a pattern?
9. What is meant by machining time?
10. List the factors to be considered for the selection of feed and depth of cut for a particular operation.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the various machine selections and tooling selection method in detail.

Or

- (b) List out the information that the process planner can obtain from the engineering drawing of a component. Explain any five of them in detail.
12. (a) Discuss about the principles of jigs and fixtures design and their factors for selecting them.

Or

- (b) List and explain features and uses of set of documents used for process planning.
13. (a) The direct material used is Rs. 1,000 and direct wages of Rs. 443 for the manufacture of certain items. Calculate factory cost, when the on-cost is to be 60% of prime cost, and when the on cost is to be 90% of direct productive labour cost.

Or

- (b) (i) Discuss data requirements and sources for cost estimation. (7)
(ii) Distinguish between estimating and costing. (6)
14. (a) What is the material cost of welding two plates of size 300 mm length and 150 mm width and 8 mm thickness to make a piece 300 mm × 300 mm approximately Fig. 14 (a). Use rightward technique with no edge preparation cost. Take overall cost of oxygen as Rs. 15 per cu.metre, cost of acetylene as Rs.60 per cu.metre, cost of filler metal as Rs. 50 per kg and 1 cu.cm of filler metal weighs 11.28 gms. Assume dia of filler rod = 4 mm.

Filler rod used per metre of weld = 3.4 metre.

Rate of welding = 2.1 metre/hour.

Consumption of oxygen = Consumption of acetylene = 7.1 cu.metre/hr.

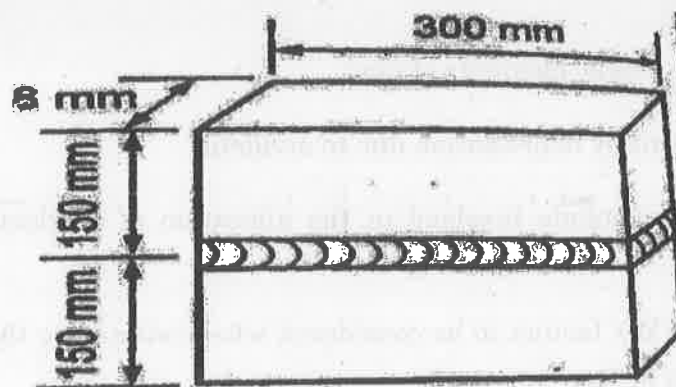
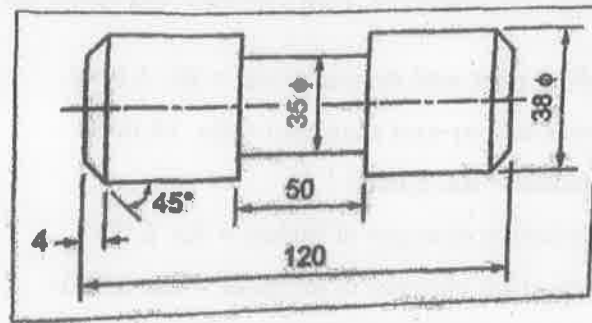


Fig. 14 (a)

Or

- (b) Discuss the specific challenges and considerations involved in estimating production costs for different types of jobs in forging, welding and foundry shop.

15. (a) A mild steel bar 120 mm long and 40 mm in diameter is turned to 38 mm diameter and was again turned to a diameter of 35 mm over a length of 50 mm as shown in the Fig. 15 (a).



All dimensions are in mm

Fig. 15 (a).

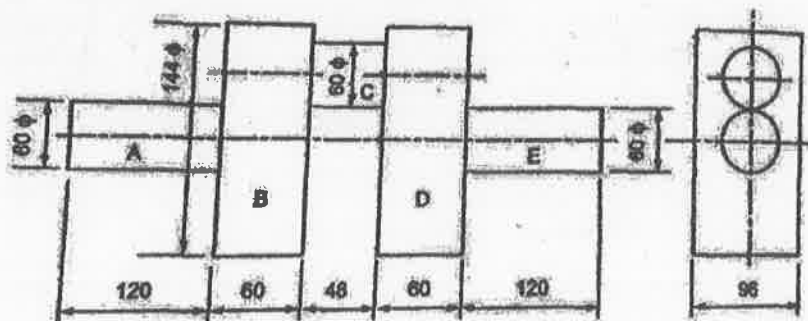
The bar was chamfered at both the ends to give a chamfer of $45^\circ \times 4$ mm after facing. Calculate the machining time. Assume cutting speed of 50 m/min and feed 0.3 mm/rev. The depth of cut is not to exceed 3 mm in any operation.

Or

- (b) Determine the time required to shape a block 400 mm $\times$ 150 mm on a shaper working with a cutting speed of 12 m/min and cross feed of 0.85 mm/stroke. Ratio of return stroke to cutting stroke speed is 3:2. Take allowances as 25 mm on each side on length and 5 mm on each side on width.

PART C — (1 $\times$ 15 = 15 marks)

16. (a) Calculate the cost of forging a crank shaft shown in Fig. 16 (a). The forging is to be made out of a bar stock of 60 mm ϕ and the following data are available.
- Material cost = Rs. 80 per kg.
 - Direct labour charges = Rs. 40 per piece
 - Overheads = 130% of material cost
 - Losses = 25% of net weight
 - Density of material = 7.8 gms/cc.



All dimensions are in mm

Fig. 16 (a)

Or

- (b) A factory has 15 lathes of same make and capacity and 5 shapers of same make and capacity. Lathes occupy 30 m² area while shapers occupy 15 m² area. During the calendar year, factory expenses for this section are as follows :

- (i) Building rent and depreciation = Rs. 5,000/-
- (ii) Indirect labour and material = Rs. 15,000/-
- (iii) Insurance = Rs. 2,000/-
- (iv) Depreciation charges of lathes = Rs. 5,000/-
- (v) Depreciation charges of shapers = Rs. 3,000/-
- (vi) Power consumption for lathes = Rs. 2,000/-
- (vii) Power consumption for shapers = Rs. 1,000/-

Find out the machine hour rate for lathe and shapers, if all the lathes and shapers work for 25,000 hours and 8,000 hours respectively.

