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Question Paper Code : 60903

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Elective

Manufacturing Engineering

MF 5013 – PROCESS PLANNING AND COST ESTIMATION

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

List the objectives of process planning.

Summarize importance of drawings interpretation in process selection.

State the main reasons for the use of jigs and fixtures.

List the factors considered for selecting process parameters in milling.

Distinguish between cost estimating and cost accounting.

Brief about depreciation cost.

What do you mean by "overhead cost" in cost estimation procedure?

Write the cost elements of a forged component.

Brief the elements of "Set-up Time" in machining time calculation?

How will you calculate the time required for drilling a hole in an object?

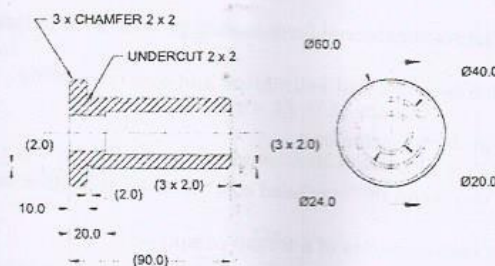
PART B — (5 × 13 = 65 marks)

- (a) Describe the steps or procedures involved in Process Planning with steps in process selection with suitable example.

Or

- [illegible]

12. (a) The "Sleeve" part shown in Fig.2 needs to be machined from typical aluminum round bar stock of diameter 62 mm. Discuss the production equipment, tooling selections and prepare a process flow diagram for producing the component.



Or

- (b) Consider the component shown in Fig.3. mention the machining operations involved and give the recommended machining parameters for each operations and prepare a simple process plan for manufacturing the part.

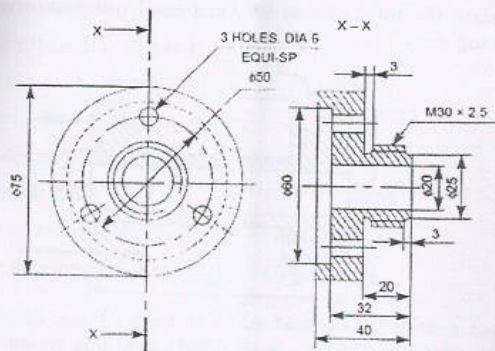


Fig. 3

- (a) Explain the terms prime cost, factory cost, total cost and selling price. Show the relationship between various components of cost with the help of a block diagram.

Or

- (b) From the following particulars of yearly expenditure of a sewing machine manufacturer, calculate the production cost and selling price per sewing machine:

- (i) Raw material used — Rs. 1,50,000
- (ii) Wages to manufacturing labour — Rs. 50,000
- (iii) Direct expenses — Rs. 4,000
- (iv) Wages of works supervisory staff — Rs. 60,000
- (v) Cost of electric power, fuel, oil etc — Rs. 2,000
- (vi) Repair and depreciation of building — Rs. 30,000
- (vii) Repair and depreciation of plant — Rs. 10,000
- (viii) Storage expenses — Rs. 10,000
- (ix) Office stationery — Rs. 5,000
- (x) Office telephone, postage, insurance and legal expenses — Rs. 6,000
- (xi) Cost of electricity for office, factory and sales department — Rs. 2,000
- (xii) Wages and salaries of office staff — Rs. 40,000
- (xiii) Salary of sales and packing department — Rs. 5,000
- (xiv) Cost of packing material — Rs. 16,000

Profit 20% on selling cost

Number of machines produced 2,000

80 Percent of the building space is occupied by the factory and office and remaining 20 percent space is occupied by sales and packing department.

14. (a) Calculate the total cost of CI (Cast iron) roller shown in Fig.4, from the following data:

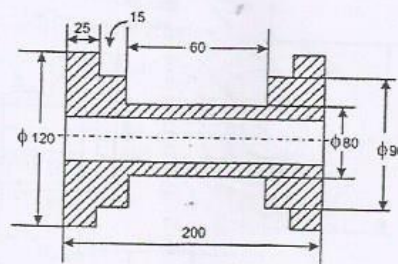


Fig.4

(All Dimensions are in mm)

Cost of molten iron at cupola spout = Rs. 30 per kg

Process scrap = 17 percent of net wt. of casting

Process scrap return value = Rs. 5 per kg

Administrative overhead charges = Rs. 2 per kg of metal poured.

Density of material used 7.2 gms/cc

Process	Time per piece (mm)	Labour charges per hour in Rupees	Shop overheads per hour in Rupees
Moulding and pouring	10	150	150
Casting removal, gate cutting etc.	6	100	150
Fettling and inspection	4	100	150

Or

- (b) A lap welded joint is to be made as shown in Fig. 5

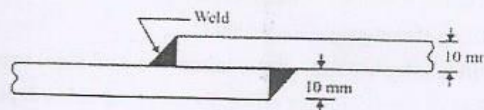


Fig.5

Estimate the cost of weld from the following data:

Thickness of plate = 10mm

Electrode diameter = 6 mm

Minimum arc voltage = 30 Volts

Current used 250 Amperes

Welding speed = 10 meters/hour

Electrode used per meter of weld = 0.350 kgs

Labour rate = Rs. 40 per hour

Power rate = Rs. 3 per kWh

Electrode rate = Rs. 8.00 per kg

Efficiency of welding m/c = 50 percent

Connecting ratio = 0.4

Overhead charges = 80 percent of direct charges

Labour accomplishment factor = 60 percent

A 300 × 50 mm C1 piece is to be face milled with a carbide cutter. The cutting speed and feed are 50 m/min and 50 mm/min. If the cutter dia is 80mm and it has 12 cutting teeth, determine

- (i) Cutter rpm
- (ii) Feed/tooth
- (iii) Milling time.

Or

Calculate the drilling time for drilling screw holes (3 holes) × ϕ 6mm thru and ϕ 20mm through hole in the flanges shown in Fig. 6.

Details of flanges

Cutting of speed for drilling = 22 m/min

Feed of drill = 0.2 mm/rev

Setting time = 8 mm

Auxiliary time per hole 1 min

Delay time 12% of machining and auxiliary time.

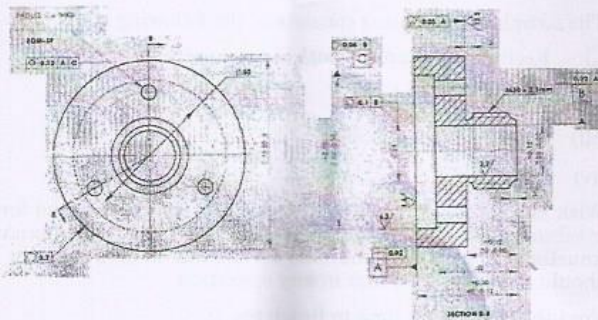


Fig.6

PART C — (1 × 15 = 15 marks)

16. (a) Two hundred components as in Fig.7. are to be made by upsetting a 20 mm diameter bar.

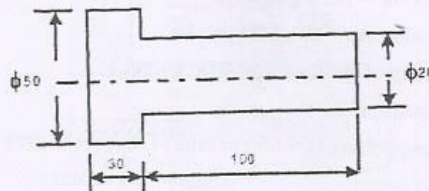


Fig.7

- (i) Find the net weight, gross weight and length of bar required if density of material = 7.88 gms/cc.
- (ii) Cost of forging/piece if:
Material cost = Rs. 80 per kg
Labour cost = Rs. 5 per piece
Overheads = 150 percent of labour cost.

Or

- (b) A mild steel shaft, shown in Fig. 8 is to be turned from a 24 mm dia bar.

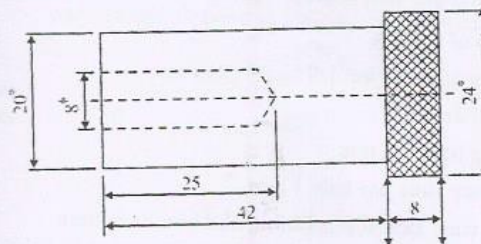


Fig.8

The complete machining consists of the following steps:

- (i) Facing ϕ 24 mm on both sides
- (ii) Turning to ϕ 20 mm.
- (iii) Drilling ϕ 8 mm hole
- (iv) Knurling

With H.S.S tool the cutting speed is 60 m/min. The feed for longitudinal machining is 0.3 mm/rev. The feed for facing, 0.2 mm/rev., feed for knurling 0.3 mm/rev., and feed for drilling is 0.08 mm/rev. Depth of cut should not exceed 2.5 mm in any operation.

Find the machining time to finish the job.