



Dhanalakshmi Srinivasan College of Engineering and Technology
Chennai - 603104

DEPARTMENT OF MECHANICAL ENGINEERING
ME6005 PROCESS PLANNING AND COST ESTIMATION
QUESTION BANK

UNIT I - INTRODUCTION TO PROCESS PLANNING

PART -A

1. Briefly explain how process planning interfaces design and manufacturing
2. How is surface finish indicated on an engineering drawing?
3. What are the main activities undertaken during process planning?
4. What is meant by interpretation of drawing?
5. List the objectives of method study
6. Name the various methods of process planning?
7. State the Material Evaluation Procedure.
8. Define process planning.
9. Enumerate the documents required for process planning.
10. Write the objective of method study.
11. Write the approaches to process planning.
12. List the information requires for process planning?
13. State the significance of Process Planning
14. What is meant by operation lists?
15. What is meant by Standardization?
16. What is meant by DFM/A?
17. Name the various Material Selection Methods?
18. What are the three analyses carried out during the drawing interpretation?
19. List the seven wastes of production?
20. List the functions of Quality Assurance?
21. State the main components of Generative System?



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PART –B

1. Explain the basic steps of the design and development of a new product approach for material selection process.
2. Explain the basic steps to the material selection process and stages of material evaluation procedure in detail?
3. Explain process planning activities in detail and documentation involved in preparation of process plan.
4. What do you understand by CAPP? Explain in detail about the types CAPP and mention the benefits of CAPP.
5. What are the benefits of simplification and standardization?
6. What are the set of documents required for process planning?
7. Explain the various machine selections and Tooling selection method in detail.
8. Explain the various Process Selection Methods and general guide lines for process sequencing.
9. Describe various approaches to process planning.
10. Explain the use of computers in process planning and cost estimation and list out the advantages of CAPP.
11. Explain the main functions of Product design and manufacture and its interface in detail?
12. Explain the basic factors affecting process design.
13. Explain the steps involved in the process planning.
14. Explain how to develop manufacturing logic and knowledge.
15. Discuss the tools and techniques for work measurement.
16. What are the factors influencing process selection and write down the process selection parameter.



UNIT II PROCESS PLANNING ACTIVITIES

PART -A

1. Define breakeven point.
2. How does the fixture differ from jig?
3. Identify and describe the four basic elements of a workholder.
4. What is standard time?
5. State the two objectives of QMS?
6. What is meant by cutting speed?
7. What is meant by the cutting time ratio when considering shaping and planing machines?
8. State the parameters involved in material selection
9. What is meant by a feed rate?
10. What is the function of work holding device?
11. What are the main reasons for the use of jigs and fixtures?
12. How jigs are classified ?
13. A planer is capable of 15 strokes per minute over a stroke length of 2m. It has been refurbished and upgraded and it is now claimed that speeds of up to 80m/min are possible with a cutting time ratio of 3:2. How many strokes per minute is the machine capable of?
14. Name the various process parameters to be considered in machining?
15. A small driveshaft is produced using a CNC lathe. The machine operator's hourly rate is Rs.8.30 per hour The time taken to machine the driveshaft is 15 min. The order is for 1500 units. Calculate the direct labour cost for producing the drive shafis.
16. Define Quality Assurance
17. List out the selection of machinery.
18. What is meant by overhead absorption rate?
19. What are the general recommendations for cutting depths for turning and boring?
20. For shaping and planing, what is the significance of the number of strokes with regard to the cutting speed?
21. What general advice can be followed when determining suitable cutting speeds for specific types of operations such as finishing and roughing?
22. Why is the feed rate for drills related to the drill size?
23. What are the main reasons for the use of jigs and fixtures?



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PART –B

1. The fixed costs for a factory for the year 2009-2010 are Rs.1,50,000 and the variable cost is Rs. 10 per unit produced. The selling price per unit is Rs.25. calculate the break –even quantity.
2. (1) Explain the Break Even analysis in detail with derivation

(2) A component can be produced with equal ease on either a capstan lathe or on a single spindle cam operated automatic lathe. Find the break even quantity QE if the following information is known.

Capstan lathe

automatic lathe

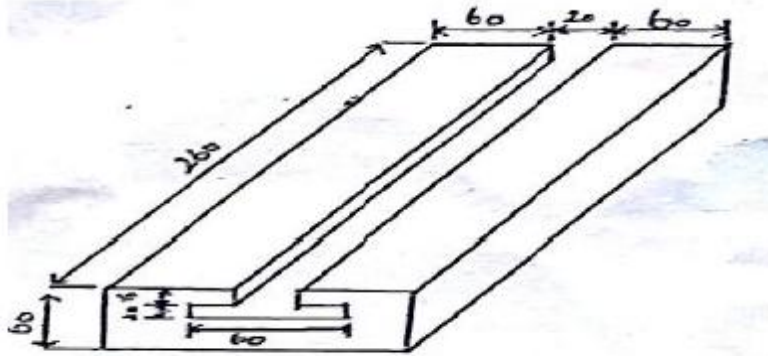
1 Tooling cost	Rs. 40.00	Rs. 40.00
2 Cost of cams	-----	Rs. 150.00
3 Material cost/components	Rs. 0.32	Rs. 0.32
4 Operating labour cost	Rs. 2.50 /hour	Rs. 1.36 /hours
5 Cycle time/component	6 minutes	2 minutes
7 Setting up labour cost	Rs. 4.00/hours	Rs. 4.00/hours
8 Setting up time	1.5 hours	8 hours
9 Machine overheads (Setting and operating)	300 % of (d)	950 % of (d)

3. A 25 cm× 10 cm C.I surface is to be faced on a milling machine with a cutter of diameter of 15 cm and 16 teeth. If the cutting speed and feed are 55 m/min and 6 cm/min. respectively, determine the rpm of the cutter, feed/tooth and the milling time.
4. Calculate the machining time required to produce one piece of the component shown in fig starting from 25 mm bar. The following data is available.
 - a. For turning:
 - b. Cutting speed =40 m/min
 - c. Feed -0.4 mm/rev
 - d. Depth of cut =2.5 mm/per pass
 - e. For thread cutting:
 - f. Cutting speed =8 m/min



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5. A T-slot is to be cut in C.I slab as shown in fig. given below. Estimate the machining time. Take cutting speed 25 m/min, feed is 0.25 mm/rev. Dia of cutter for channel milling is 80 mm.



6. What are all the process planning parameter of production processes. Explain in detail about the principles and practice of location and clamping in jigs and fixtures
7. An inserted tooth face milling cutter has 8 teeth. It is to be used to mill a surface using a spindle speed of 1250 rpm and a feed rate of 0.3mm/tooth. Calculate the feed rate in m/min
8. A planer is capable of 15 strokes per minute over a stroke length of 2m. The cutting time ratio for the machine is 4:3. Determine cutting speed. The feed per stroke f_s is quoted as 2 mm/stroke. What is the feed rate f_m in mm/min ?
9. Explain the marginal costing in detail.
10. Calculate the maximum surface speeds for facing, turning all surfaces and parting off. The maximum spindle speed of the lathe being used is 600rpm for the part diagram that shown in figure



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UNIT 3- INTRODUCTION TO COST ESTIMATION

PART -A

1. Define Cost estimation.
2. Define Costing.
3. What meant by target cost?
4. List a few objectives of the cost estimation?
5. What are the functions of cost estimation?
6. What is meant by conceptual cost estimating?
7. What do you mean by a realistic estimate
8. Define parametric estimating.
9. Define Batch costing?
10. What do you mean by multiple cost method?
11. What is meant by direct material cost?
12. Write the formula to find out material cost.
13. What is meant by overhead expenses.
14. Brief the importance of the cost estimating.
15. What are the methods of estimation?
16. What is the process of conference method?
17. What is meant by the comparison method?
18. What method is used for estimation when time is a constraint?
19. What is detailed analysis method in cost estimation?
20. What is departmental costing?
21. Define job costing?
22. Write some examples for operating cost method.
23. What is preliminary estimate?
24. What is final estimate?
25. What is Labour Cost?
26. What is meant by indirect material cost?
27. Who are called direct labour?
28. Who are called Indirect labour?
29. The lengths of one edge of C.I. cube is 25cm. Calculate its weight, if the density of the material is 7.2 g/cc.
30. What are Establishment on-cost expenses?
31. What are the methods available for allocation of overhead expenses?
32. Write the formula for allocation by percentage of prime cost for overhead
33. Write the formula for allocation by machine hour rate for overhead.

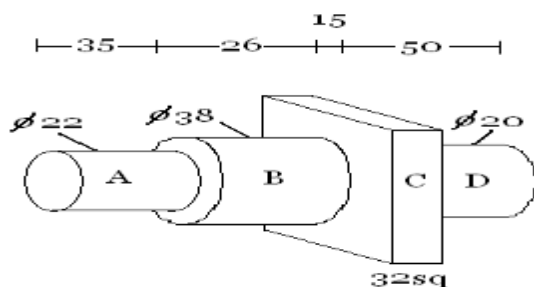


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34. A Production shop had its production overheads of Rs.12000/- and the production for the period in terms of direct labour was 24,000 hrs. find the overhead for a job requiring 20 labour hrs.
35. Define depreciation.
36. What are the various methods of calculating depreciation.
37. A machine is purchased for Rs 40,000. The estimated life of machine is 15 years and scrap value Rs 15000. If the rate of interest on the depreciation fund is charged at 5%, calculate the rate of depreciation by sinking fund method.
38. A machine costing Rs 2,00,000 has a residual value of Rs 1,00,000 after 10 years of service. The estimated rate of production is 8 units per hour. Using the production unit method calculate the rate of depreciation. Assume a 50 week year and 46 hours week.

PART –B

1. Explain in detail about the types of estimates and how it is done?
2. List and explain in detail about the components of a job estimate?
3. Explain the step by step cost estimation procedure in detail
4. List and explain in detail about the objectives of cost accounting?
5. What are the methods of costing? Explain in detail.
6. Write down the step by step procedure for estimating the direct material cost.
7. Name the various elements of cost. Explain each element in detail with examples.
8. An isometric view of the work piece is shown in figure. What will be the weight of the material required to produce it. The density of material is 2.681gm/cc. Find also the material cost, if its rate is 13.60 per kg.

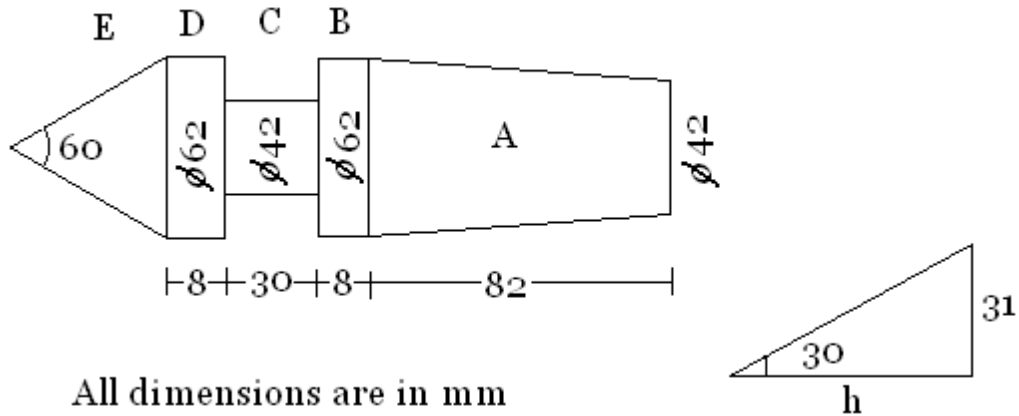


All dimensions in mm



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9. The dimensioned figure shows a lathe centre. Estimate the weight and cost of material for the same, if the material weighs 7.868 gm/cc density and the material cost is Rs11.45 per kg.



10. What is meant by analytical estimating? Write its procedure, advantages, limitations and applications.
11. Explain about allowances in cost estimation.
12. A certain piece of work is produced by a firm in batches of 100. The direct material cost for that 100 workpiece is Rs. 160 and the direct labor cost is Rs. 200. Factory on cost is 35% of the total material and labour cost. Overhead charges are 20% of the factory cost. Calculate the prime cost and factory cost. If the management wants to make a profit of 10% on gross cost, determine the selling price of each article.
13. Describe the various methods of allocation of overhead expenses?
14. (i) What are the types of estimates. (ii) Differentiate between estimating and costing.
15. What are the three methods used in conceptual cost estimation? Explain any two methods briefly.
16. Explain the various time allowances which should be considered for calculating labour cost.
17. Explain the procedure followed for estimating the cost of an industrial product.
18. A C.I factory employs 25 persons. It consumes material worth Rs.35,000 pays workers at the rate of Rs.5 per hour and incurs total overheads of Rs. 20,000. In a particular month (25 days) workers had an overtime of 150 hrs and were paid double than the normal rate. Find (i) the total cost and (ii) the man hour rate of overheads. Assume an 8 hrs working days.



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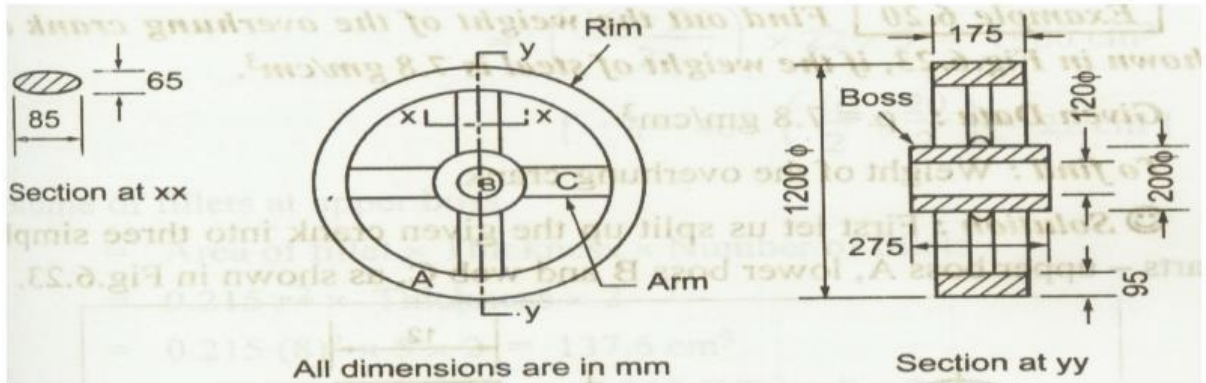
- 19.(i) A manufacturer is making 100 units of an item per hr and incurs the following expenses:
Direct Material cost Rs 35
Direct labour cost Rs 200
Direct Expenses Rs 75
Factory on cost 150% of labour cost
Office on cost 30% of factory cost
Find out the selling price for a profit of 15% on the selling price.
- 20.The direct material used is Rs.1000 and direct wages of Rs.443 for the manufacture of certain items.
Calculate factory cost (i) when the on-cost is to be 60% of prime cost, and
(ii)When the on-cost is to be 90% of direct productive labour cost.

UNIT IV-PRODUCTION COST ESTIMATION
PART -A

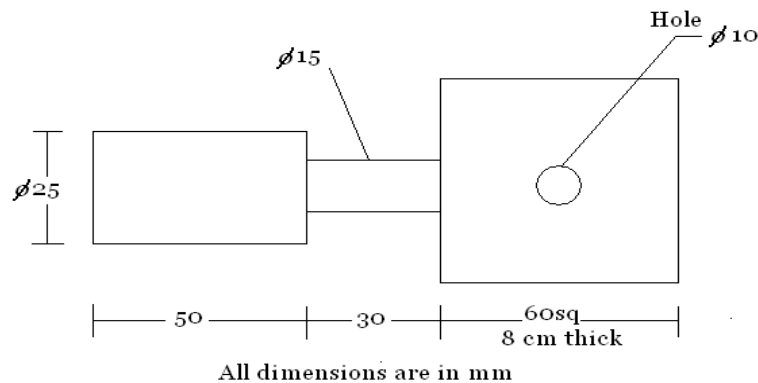
1. Write the formula for flash loss.
2. What are the various types of forging?
3. What are the various losses associated with forging?
4. Write the formula for volume of flash.
5. Write the formula for direct material cost for manufacturing pattern.
6. What is Smith forging?
7. What is Drop forging?
8. What is upset forging?
9. What is scale loss?
- 10.What is tong hold loss?
- 11.List out the names of gas welding techniques.
- 12.A butt joint between two square metal plates of 250 x 250 cm is made using electric arc welding. If the rate of welding is 5metre/hr, calculate the time required to complete ten such welding operations.
- 13.What is Leftward or forward welding
- 14.What is Rightward or backward welding
- 15.What is forging and give its classification?
- 16.What is Press forging?
- 17.What is Flash loss?
- 18.What is sprue loss?

PART –B

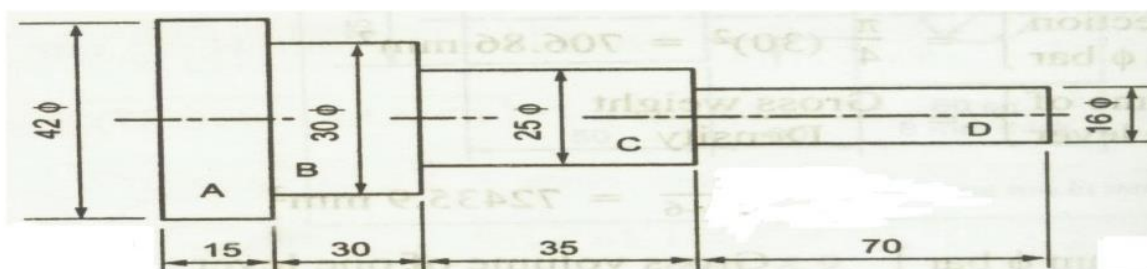
1. A gas engine flywheel is shown in figure. Determine the weight of the flywheel if the material weighs 7.2 g/cc.



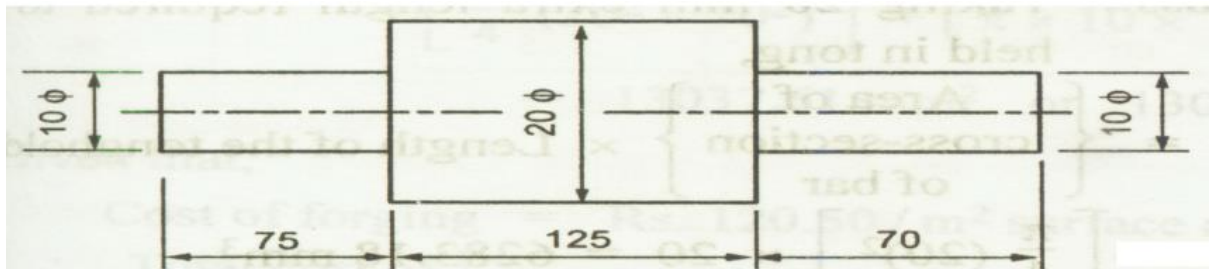
2. Calculate the net weight and gross weight for the manufacture of 500 levers shown in figure. The material weighs 7.8 g/cc and the total losses account for 25% of net weight of the lever. Also calculate (i) length of 3 cm diameter required per component (ii) the cost of forging 500 pieces if material cost Rs. 8 per kg, labor costs Rs. 1.20 per piece and overheads are 25% of material cost.



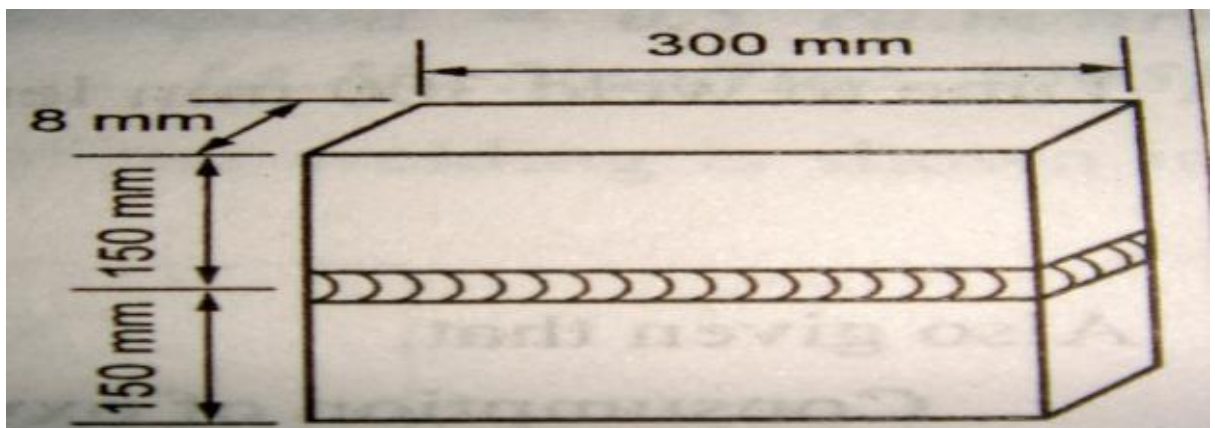
3. 750 stepped spindles are to be made by machine forging. Estimate the net weight, gross weight and number of bars required if mild steel are available in 4 m length and 25 mm diameter. Take the density of M.S bar 7.6 gm/cc. consider all the possible forging losses.



4. A square bar of 3 cm side and 25 cm length is to be hand forged into a hexagonal bar of side of 1.5 cm. Find length of the hexagonal bar ignoring metal losses. Density remains same. ?(Nov/Dec 2015)
5. 150 pieces of shafts as shown in figure are to be forged from the raw stock of tcm dia .Estimate the cost incurred assuming that material cost =Rs5.20 per metre. Cost of forging = Rs120.50 per sq.m of surface area to be forged. Overhead expenses to be 100% of the cost of forging .Consider all losses.



6. 6. What is the material cost of welding two plates of size 300mm length and 150mm width and 8mm thickness to make a piece 300 x300 mm approximately. Use rightward technique with no edge preparation cost .Take overall cost of oxygen as Rs.0.70 per cu m, cost of acetylene at Rs 7 per cum ,Cost of filler metal Rs 2.50 per kg and 1Cu.Cm of filler metal weighs 11.28 gms .Assume dia of filler rod = 4mm . Filler rod used per metre of weld = 3.4 m .Rate of welding = 2.1 m/hr. Consumption of oxygen = Consumption of acetylene = 7.1 Cu.m/hr

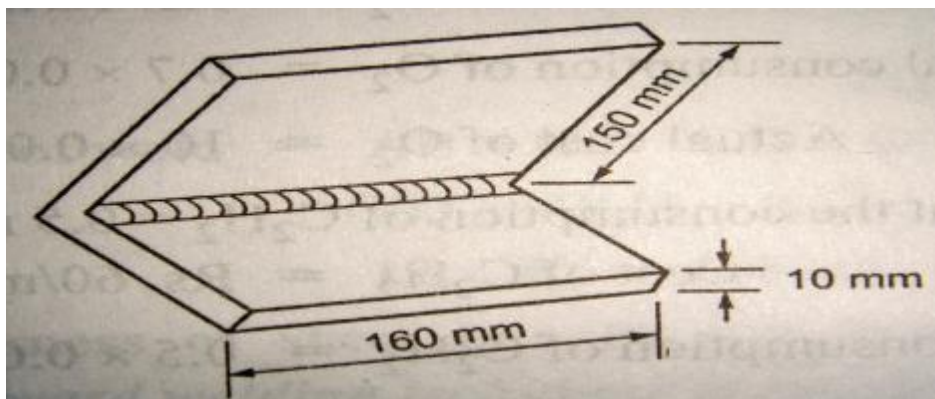


7. A foundry unit produces tractor components as cast. Calculate the selling price of producing a component weighing 50 kgs from the following data(i)Material of the component is cast iron with density = 7.2gm/cc(ii)Cost of molten iron at cupola=Rs2.5 per kg(iii)Process scrap = 17% of net weight(iv) Scrap return value = Rs 1.1per kg (v)

Administrative and sales overheads = Rs 5 per piece(vi) Profit 10% of total cost(vii) other expenditure is given in table below

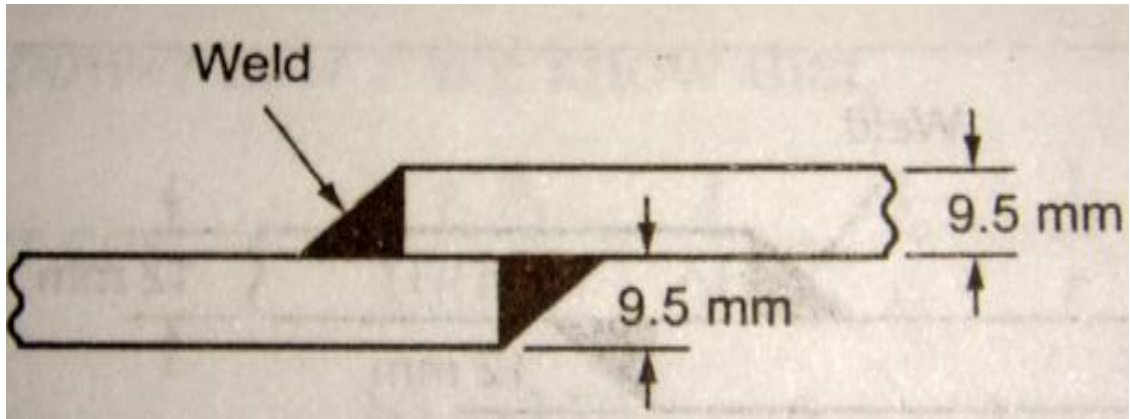
Operation	Time per component (min)	Labour cost per component(Rs)	Shop overheads per hour(Rs)
Moulding and pattern making	6	2.6	4.25
Core making	8	2.4	3.5
Fettling and cleaning	10	2.75	3

8. Estimate the material cost for welding 2 flat pieces of M.S 15x16x1 cm size at an angle of 90 by gas welding .Neglect edge preparation cost and assume Cost of O₂ = Rs 10/cu.m, cost of C₂H₂= Rs60/cu.m, density of filler metal = 7 gm/cc; Cost of filler metal = Rs12/kg; Filler rod dia = 5 mm , filler rod required 4.5 mm / m of weld, welding time = 30 min /m of welding, consumption of O₂ = 0.7cu.m/hr and consumption of C₂H₂ = 0.5 cu.m/hr.

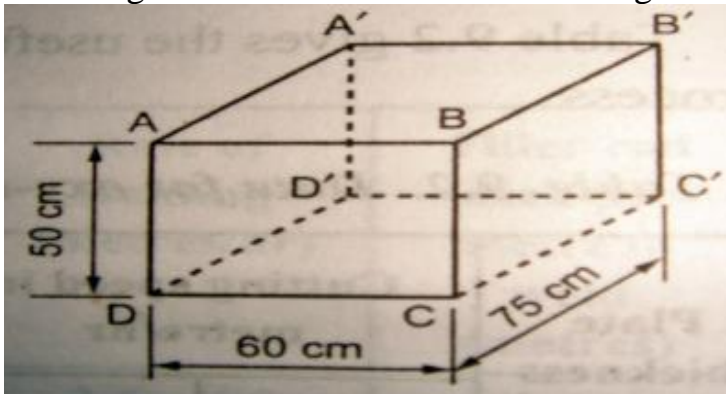


9. A lap joint is to be prepared in 9.5 mm M.S. sheet using flat welding position and 6 mm electrode .Current used is 250 A and voltage is 30 V. Welding speed is 12 m/Hr and 0.3 Kg of metal is deposited per metre length of joint. Labour cost Rs 1.5 per hour , power Rs 0.20 per KW hr and electrode Rs 4 per Kg Efficiency of machine is 50% and operating factor

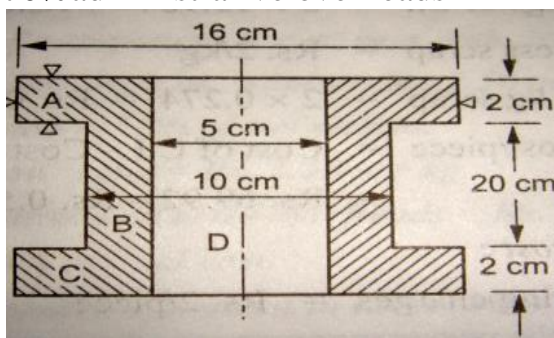
is 60 % Calculate the cost of labour , power and electrode per metre of weld.



10. An open water tank of size 75cm x 60cm x 50cm is made by gas welding from a 4 mm thick metallic sheet .Estimate the time require for welding a tank .Neglect other factors. Rate of welding = 5m/hr



11. Estimate the total cost of 20 CI flanged pipe casting shown in figure, assuming the following data, Cost of CI=Rs.5/kg, cost of process scrap Rs.2/kg, process scrap 2% of net weight of casting , moulding and pouring charges = Rs.2/piece , casting removal and cleaning = Rs0.5/piece , administrative overheads = 5% factory cost , selling overheads = 70% administrative overheads





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12. A small fuse box 300mm long, 20 mm wide and 60 mm deep with a 30 mm deep is to be manufactured in grey iron. The average thickness is 4.5 mm. The pattern supplied by the customer is of loose type, hence bench moulding is to be followed. Estimate the selling price per piece, assume the following data: (i) Cost of iron at the cupola sprout = Rs 1.2 per kg (ii) Cost of process scrap return = Rs 55 paise per kg (iii) Administrative on cost = Rs 3.2 per hour (iv) Profit margin = 16% (v) Density = 7.3 gm/cc, (vi) Process scrap = 20% of net weight. Other expenditure details are

Operation	Time per piece	Labour charges per minute	Works on cost per hour
Moulding and pouring	16 min	Rs. 1.50	Rs. 4.50
Shot blasting	6 min	Rs. 0.25	Rs. 4.00
Fettling	4 min	Rs. 0.10	Rs. 3.25

To find selling price per piece.

13. A small fuse box 25 cm long, 17.5cm wide and 5 cm deep with a lid 2.5cm deep is to be manufactured in grey iron. It has the usual legs and ears with an average thickness of 3.9 mm. The pattern supplied by the customer is of loose type, hence bench moulding is to be followed. Estimate the selling price per piece, given the following data: (i) Cost of iron at the cupola spout = 660 paise / kg (ii) Cost of process scrap return = 30 paise / kg (iii) Administrative on cost = Rs 2.00/hr (iv) Profit margin = 15 % Assume: Gate is 18.5mm in diameter and 5cm long. Runner is 1.85cm wide, 22.5cm long and 1.25 cm deep. 4 gates and 4 runners. (i.e two on the box and lid each)

Operation	Time per piece	Labour charges per minute	Works on cost per hour
Moulding and pouring	20 min	Rs. 2.00	Rs. 3
Shot blasting	2 min	Rs. 0.20	Rs. 5
Fettling	1 min	Rs. 0.05	Rs. 3



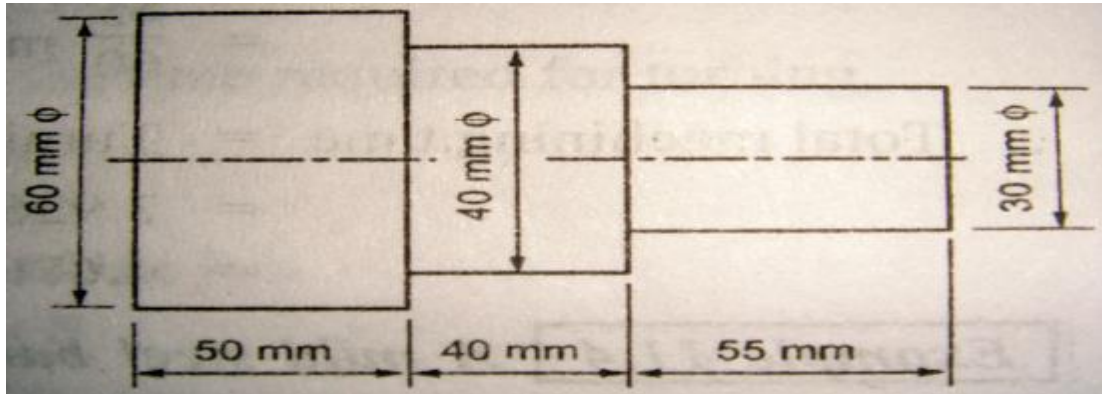
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UNIT V-MACHINING TIME CALCULATION
PART -A

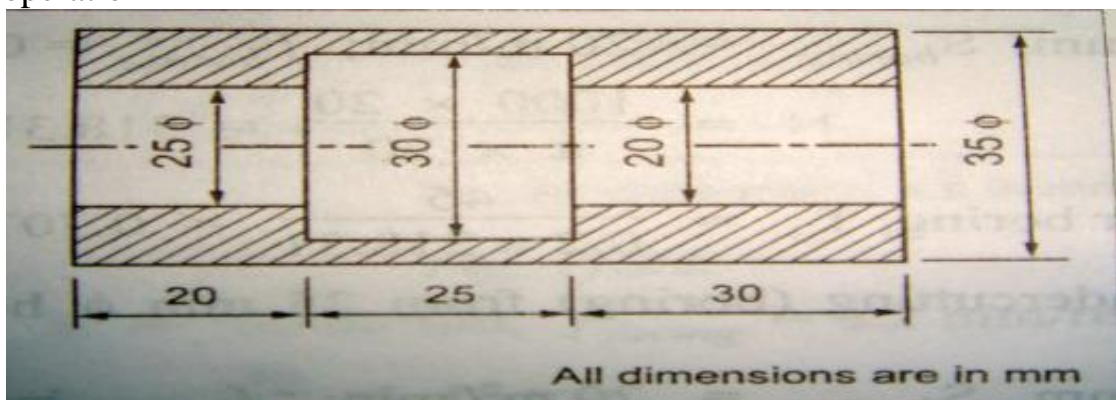
1. What is cutting speed?
2. What are the factors to be considered by the estimator while calculating the time required for a particular job?
3. What are the terms used in study of machining time?
4. What is Length of cut?
5. A machinist manufactures 25 jobs in 7 hours. If this time includes the time for setting his machine, calculate the machinist's efficiency. Take the allowed standard setting time and standard production time per piece as 45 min and 10 min respectively.
6. What is reaming?
7. What is undercutting?
8. What is external relief?
9. Write the formulae to find out time taken for tapping operation.
10. Write the formulae to find time taken per cut in milling.
11. Write the formula for selling price and market price.
12. What is manufacturing cost of a product?
13. What are miscellaneous allowances?
14. What is feed?
15. What is boring?
16. What is set up time?
17. What is tear down time?

PART -B

1. Describe the procedure of estimating the machining time required during the shaping operation on a shaper.
2. 10.(i) A 25 cm x 10 cm C.I surface to be faced on a milling machine with a cutter of diameter of 15 cm and 16 teeth. If the cutting speed and feed are 55 m/min and 6 cm/min respectively, determine the rpm of the cutter, feed/tooth and the milling time. (ii) find the time required for finish grinding a 20 cm long steel shaft to reduce its diameter from 4.5 cm to 4.3 cm with a grinding wheel of 2.5 cm face width. Cutting speed is 16 m/min and depth of cut is 0.2 mm. (iii) Calculate the cutting speed on a job of 50mm diameter rotating at 200 rpm.
3. What is the machining time to turn the dimensions given in figure. The material is brass, the cutting speed with H.S.S tool being 60 m/min and the feed is 7.5mm/rev, depth of cut is 3 mm per pass.



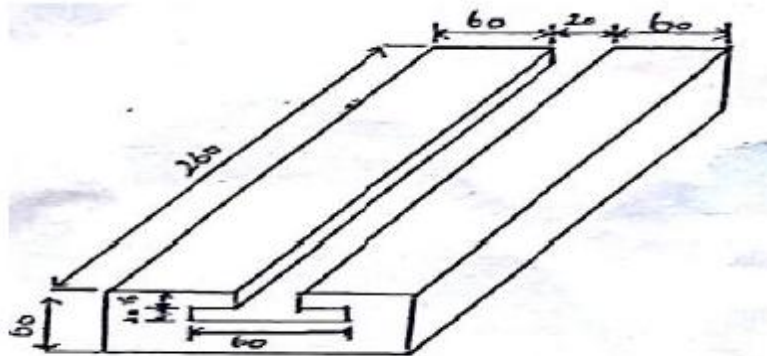
4. A 150 mm thick laminated plate consists of 90 mm thick steel plate and 60 mm thick brass plate .A 20 mm dia hole is to be drilled through this plate .Estimate the total time taken for drilling if , cutting speed for steel = 25 m/min , cutting speed for brass = 50 m/min ,feed of 20 mm drill for steel = 0.2 mm/rev , feed of 20 mm drill for brass = 0.25 mm/rev.
5. Calculate the drilling and tapping time for producing threads in a mild steel of 25 mm thickness. The size of H.S.S drill to be used is 20 mm and the number of threads to be cut is 3 per cm. Taking cutting speed and feed for drill as 20 m/min and 0.25 mm/rev respectively, tapping speed as 5m/min.Neglect the time taken for setting up and approaching and over travelling of tools
6. Estimate the time taken to prepare a job from M.S.stock bar 4 cm in dia and 7.5 cm long.Assume the following data , Cutting speed for turning and boring = 20 m/min . Cutting speed for drilling operation = 30m/min.Feed for turning and boring operation = 0.2 mm/rev .Feed for 20 mm drill = 0.23 mm/rev .Depth of cut not to exceed 3 mm in any operation



7. Find the time required on a shaper to machine a plate 1100*500mm , if the cutting speed is 16 m/min.The ratio of return stroke time to cutting stroke time is 2 : 3 .The clearance at each end is 20 mm along the length and 15 mm on width .Two cuts are required , one roughing cut with cross

feed of 2 mm per stroke and one finishing cut with feed of 1.25 mm per stroke

8. Find the time required for doing rough grinding of a 15cm long steel shaft to reduce its dia from 4 to 3.8 cm with the grinding wheel of 2cm face width .Assume cutting speed as 15 m/min and the depth of cut as 0.25 mm.
9. A T-Slot is to be cut in a C.I slab in fig. given below. Estimate the machining time. Take cutting speed 25 m/min, feed is 0.25 mm/rev. Dia of cutter for channel milling is 80 mm. Nov/Dec 2014



10. Calculate the machining time required to produce one piece of the component shown in fig. Starting from a 25mm bar. The following data is available. Nov/Dec 2014 For turning: Cutting Speed = 40 m/ min; Feed = 0.4 mm/rev; Depth of cut = 2.5 mm/per pass; For thread cutting: Cutting speed = 8 m/ min;
11. i) In a manual operation, observed time for a cycle of operation is 0.5 minute and the rating factor as observed by the time study engineer is 125%. All allowances put together is 15% of normal time. Estimate the standard time. ii. In a manufacturing process the observed time for one cycle of operation is 0.75 minute. The rating factor is 110%. The following are the various allowances as the percentage of normal time. Personal allowance = 3% ; Relaxation allowance= 10%; Delay allowance= 2%; Estimate the standard time.
12. It is required to produce a hole 15 mm in dia and 10 cm deep through the mild steel piece. Estimate the time taken for completing the hole in the following two cases (i) The hole is drilled by a 15 mm drill . Assume the cutting speed for the mild steel to be 30 m/min and the feed for 15 mm drill to be 0.2 mm/rev. (ii) First, a 10 mm hole is drilled which is then brought to accurate size by boring . Assume the cutting speed for boring and drilling to be 30m/min. The feed for 10mm drill to be 0.15 mm/rev and the feed for the boring operation to be 0.13mm/rev.