B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024
Fifth Semester
Mechanical Engineering
20MEEL514 - PROCESS PLANNING AND COST ESTIMATION
Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)
Answer ALL Questions

		Marks	K–Level	CO

1. What is the primary objective of process planning in manufacturing? — 1, K1, CO1
   (a) Reduce material cost
   (b) Minimize workforce
   (c) Develop a systematic production process
   (d) Ensure higher inventory levels

2. What is the focus of production equipment selection? — 1, K1, CO1
   (a) Optimizing raw material usage
   (b) Ensuring compatibility with tooling
   (c) Selecting machines for manufacturing
   (d) Evaluating design specifications

3. Tell the process that bridges design interpretation and material selection. — 1, K1, CO1
   (a) Production equipment selection
   (b) Tooling selection
   (c) Material evaluation
   (d) Process selection

4. Recall the feed rate during machining process is measured in: — 1, K1, CO2
   a) Revolutions per minute (RPM)
   b) Millimetres per minute (mm/min)
   c) Degrees per second (°/s)
   d) Kilograms per square meter (kg/m²)

5. What is the main purpose of selecting jigs and fixtures? — 1, K1, CO2
   (a) To reduce manufacturing costs
   (b) To assist in quality assurance
   (c) To hold and guide workpieces
   (d) To analyze case studies

6. The breakeven analysis in process planning helps to determine: — 1, K1, CO2
   (a) The best supplier
   (b) The point where total cost equals total revenue
   (c) The number of tools required
   (d) The best operator

7. What is the primary purpose of costing and estimation? — 1, K1, CO3
   (a) To increase production
   (b) To analyze expenses and forecast costs
   (c) To reduce overhead costs
   (d) To evaluate depreciation

8. How Labour cost is estimated based on: — 1, K1, CO3
   (a) Material weight
   (b) Standard time and wage rate
   (c) Market trends
   (d) Machine size

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13114**

9. Depreciation cost is typically calculated using: 1 K1 CO3
   (a) Material price and market demand
   (b) Original cost, salvage value, and asset life
   (c) Labour hours and unit costs
   (d) Overhead allocation methods

10. What is the primary objective of job estimation? 1 K1 CO4
    (a) To increase material usage
    (b) To determine the time and cost of job completion
    (c) To allocate fixed overhead charges
    (d) To reduce waste

11. Where is the material wastage highest among the given processes? 1 K1 CO4
    (a) Forging jobs
    (b) Welding jobs
    (c) Foundry jobs
    (d) Machining jobs

12. Recall the Shrinkage allowance in foundry job estimation accounts for: 1 K1 CO4
    (a) Tool wear
    (b) Material contraction during solidification
    (c) Increase in labour time
    (d) Reduced cooling rates

13. Why is machine time calculation important in manufacturing? 1 K1 CO5
    (a) To improve marketing strategies
    (b) To ensure accurate cost estimation and process planning
    (c) To increase raw material wastage
    (d) To reduce operator wages

14. Select the formula used to calculate the machining time in turning. 1 K1 CO5
    (a) Time = Feed rate × Depth of cut
    (b) Time = Cutting speed × Diameter
    (c) Time = (Length of cut / Feed rate) × RPM
    (d) Time = Diameter × Tool material cost

15. How Boring differs from drilling because: 1 K1 CO5
    (a) It enlarges an existing hole
    (b) It starts with a solid work piece
    (c) It uses a faster spindle speed
    (d) It does not require cutting fluid

16. What is the drilling time for a 50 mm deep hole using a drill feed rate of 0.1 mm/rev and 1 K1 CO5
    spindle speed of 600r.p.m.
    (a) 0.833 min
    (b) 8.33 min
    (c) 0.96min.
    (d) 0.625min

17. If a work piece requires a cut length of 200 mm, the cutter has 4 teeth, spindle speed 1 K1 CO6
    NNN is 300 RPM, and feed per tooth is 0.1 mm/tooth, what is the machining time for
    milling?
    (a) 1 minute
    (b) 2 minutes
    (c) 5 minutes
    (d) 10 minutes

18. Relate the Surface grinding is typically used for: 1 K1 CO6
    (a) Producing cylindrical parts
    (b) Producing flat and smooth surfaces
    (c) Rough cutting operations
    (d) Drilling holes

19. What affects the cutting time in milling operations?   *1 K1 CO6*
    (a) Spindle speed
    (b) Workpiece size
    (c) Feed rate
    (d) Cutting tool material
20. In planning, the time per stroke depends on: *1 K1 CO6*
    (a) Stroke length and return time
    (b) Tool material
    (c) Machine weight
   (d) Operator's experience

PART - B (10 × 2 = 20 Marks)
Answer ALL Questions

21. Define Process Planning.	2	K1	CO1
22. List the Advantages and disadvantages of manual process planning	2	K1	CO1
23. Name the various process parameters to be considered in machining?	2	K1	CO2
24. What is the use of quality assurance?	2	K1	CO2
25. Define overhead cost.	2	K1	CO3
26. Contrast between cost estimation and cost accounting.	2	K2	CO3
27. List the losses occur during forging.	2	K1	CO4
28. Name the various sections in foundry shop.	2	K1	CO4
29. Define machining time.	2	K1	CO5
30. State the formula to calculate the machining time for a shaping and planning.	2	K2	CO6

PART - C (6 × 10 = 60 Marks)
Answer ALL Questions

31. a) Explain the basic steps of the design and development of a new product approach for material selection process   *10 K2 CO1*

    OR

    b) Explain the various machine selections and Tooling selection method in detail.   *10 K2 CO1*

32. a) Illustrate the elements of Jigs and fixtures in detail.   *10 K2 CO2*

    OR

    b) Explain the economics of Process planning.   *10 K2 CO2*

33. a) Compare estimating with costing. Also, explain the various methods of costing.   *10 K2 CO3*

    OR

    b) Explain various allowances to be considered in estimation of direct labour cost.   *10 K2 CO3*

34. a) Explain the various methods used in an industry for allocation of overheads with an example.   *10 K2 CO4*

    OR

    b) A lap welded joint is to be made as shown in Fig.   *10 K2 CO4*
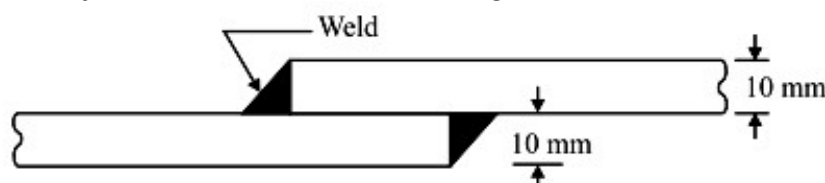
Calculate the cost of weld from the following data :
Thickness of plate = 10 mm
Electrode diameter = 6 mm
Minimum arc voltage = 30 Volts
Current used = 250 Amperes
Welding speed = 10 meters/hour
Electrode used per meter of weld = 0.350 kgs
Labour rate = Rs. 40 per hour
Power rate = Rs. 3 per kWh
Electrode 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

35. a) Elucidate the time elements considered to arrive at total time required to perform a machining operation   *10   K2   CO5*

<center>OR</center>

   b) Calculate the machining time required to produce one piece of the component shown in Fig. starting from ϕ 25 mm bar. The following data is available.   *10   K2   CO5*
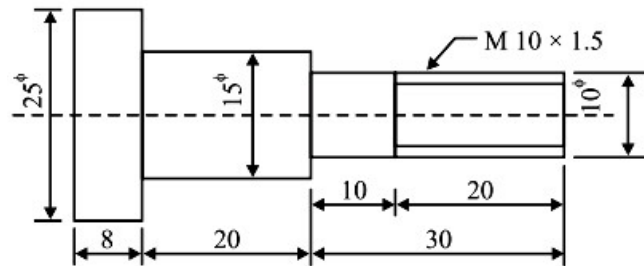
36. a) A T-slot is to be cut in a C.I. slab as shown in Fig. 5.27. Estimate the machining time. Take cutting speed 25 m/min, feed is 0.25 mm/rev. Diameter of cutter for channel milling is 80 mm.   *10   K2   CO6*
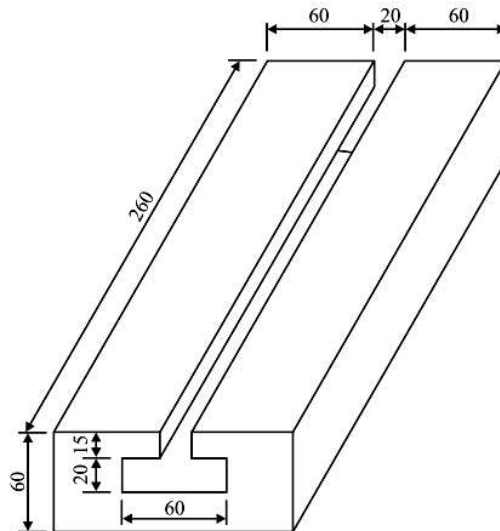

Fig. 5.27

<center>OR</center>

   b) Explain the following terms with respect to machining operations giving examples: *10   K2   CO6*
   (a) Set-up time. (b) Handling time. (c) Unit operation time. (d) Total time.