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**Question Paper Code : 80902**

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

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)

1. Write any two objectives of process planning.
2. Mention any four material selection parameters.
3. List any four important points required to do the process planning effectively.

4. The following data is given for turret lathe and automatic lathe.

	Turret lathe	Automatic lathe
Number of pieces / hour	10	30
Setup time	2	4
Labor rate	Rs 4/hour	Rs 4/hour
Hourly depreciation rate (Rs)	1.50/machine hour	4.50/machine hour

Find the break even quantity which can be produced on either the turret lathe or the automatic lathe

5. Differentiate between estimating and costing.
6. Factory overheads of a certain concern for the year 1990-1991 were Rs. 8 lakhs and total direct wages paid to the labor during the above period were Rs. 32 lakhs. Find the percentage on-cost by percentage on direct labor cost method.
7. Which method of costing would you recommend for the following industries? Give reasons: (a) Toy making (b) Ship building.
8. Mention the commonly encountered losses in forging process and mention one reason for each loss.

9. Estimate the time required for doing rough grinding of a 16 cm long steel shaft to reduce its diameter from 4.2 to 4 cm in a grinding wheel of 2 cm face width. Assume cutting speed as 16.5 m/min and depth of cut as 0.25 mm.
10. Estimate the time required for cutting 3 mm pitch threads on a mild steel bar of 28 mm diameter and 80 mm long. Let the cutting speed as 15 m/min.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the process planning classification in detail.  
Or  
(b) Define process planning and discuss the different factors affecting process planning.
12. (a) Discuss the production equipment and tool selection for the component shown in Figure 1. (Undercut diameter = 12 mm).

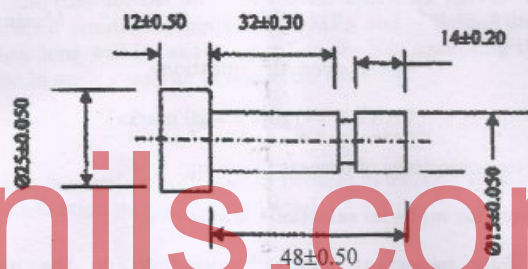


Figure. 1

Or

- (b) In the Figure 2, interpret the meaning of any two: 1. Dimensional tolerance symbols 2. Form tolerance feature control frames 3. Surface finish symbols (if any). Also, specify the interpretation of all the geometric tolerances.

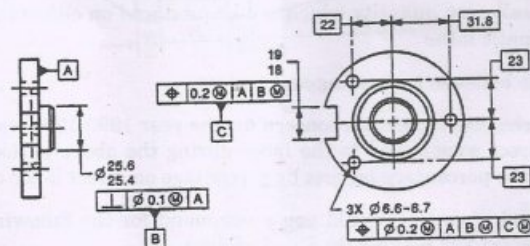


Figure. 2



13. (a) A small firm is producing 100 pens per day. The direct material cost is found to be Rs. 160, direct labor cost is Rs. 200 and factory overheads chargeable to it are Rs. 250. If the selling on-cost is 40% of the factory cost, what must be the selling price of each pen to realize a profit of 14.6% of the selling price?

Or

- (b) A boiler was purchased for Rs. 45000 on 1st January 1996, the erection and installation cost was Rs. 7000. The boiler was to be replaced by a new one on 31st December 2015. If the scrap value was estimated as Rs. 15000, (i) What should be the rate of depreciation and depreciation fund on 15th June 2005. (ii) if after 12 years of running, some boiler tubes are replaced and the replacement cost is Rs. 1500, what will be the new rate of depreciation?
14. (a) A cylindrical boiler drum 2.5 m  $\times$  1 m diameter is to be made from 15 mm thick plates. Both the ends are closed by welding circular plates to the drum. Cylindrical portion is welded along the longitudinal seam. Welding is done both on inner and outer sides. Calculate the electric arc welding cost using the following data: (i) rate of welding = 2 m/hr on inner side and 2.5 m/hr on outer side (ii) length of electrode required = 1.5 m/m of welding (iii) cost of electrode = Rs. 12/m (iv) power consumption = 4 units/m of welding (v) power charges = Rs 6/unit (vi) labor charges = Rs 40/hr (vii) overhead = 100% of prime cost (viii) discarded electrodes = 5% (ix) fatigue and setting-up time = 5% of welding time.

Or

- (b) Calculate the gross weight of the mild steel bolt shown in Figure 3, if it is produced in a lot of 5000, if steel weighs 7.9 g/cm<sup>3</sup> and the method used is upsetting. Also calculate the length of the bar required.

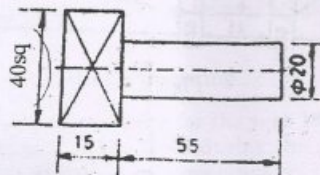


Figure. 3

15. (a) The top surface of a rectangular work part is machined using a peripheral milling operation. The work part is 735 mm long by 50 mm wide by 95 mm thick. The milling cutter, which is 60 mm in diameter and has five teeth, overhangs the width of the part equally on both sides. Cutting speed = 80 m/min, chip load = 0.30 mm/tooth, and depth of cut = 7.5 mm. Determine the time required to make one pass across the surface, given that the setup and machine settings provide an approach distance of 5 mm before actual cutting begins and an over travel distance of 25 mm after actual cutting has finished.

Or

- (b) An open side planer is to be used to plane the top surface of a rectangular work part, 50cm by 112.5cm. The cutting speed is 9 m/min, the feed is 0.0375 cm/pass, and the depth of cut is 0.625 cm. The length of the stroke across the work must be set up so that 25 cm are allowed at both the beginning and end of the stroke for approach and over travel. The return stroke, including an allowance for acceleration and deceleration, takes 60% of the time for the forward stroke. The work part is made of carbon steel with a tensile strength of 345 MPa and a Brinell hardness of 110 HB. How long will it take to complete the job, assuming that the part is oriented in such a way as to minimize the time?

PART C — (1 × 15 = 15 marks)

16. (a) What are the factors influencing process selection? And write down the process selection parameters in detail.

Or

- (b) Estimate the weight and cost of the lathe centre shown in Figure 4 (All dimensions are in mm). Let the density as 7.787 g/cm<sup>3</sup> and the cost of material as Rs. 90 per kg.

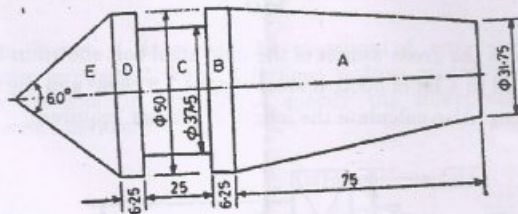


Figure. 4