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Question Paper Code : 50890

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

Seventh/Eighth/Nineth Semester

Mechanical Engineering

ME 8793 — PROCESS PLANNING AND COST ESTIMATION

(Common to Manufacturing Engineering/Material Science and
Engineering/Mechanical Engineering (Sandwich)/Mechanical and Automation
Engineering/Mechatronics Engineering/Production Engineering/Robotics and
Automation)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define process planning.
2. List the objectives of process planning.
3. What are the factors to be considered during the selection of a process?
4. What is the purpose of a work holding device? List the types of work holding devices.
5. Classify the allowances considered in cost estimation.
6. Brief about the procedure to calculate material cost.
7. Differentiate leftward and rightward welding.
8. What are the causes of depreciation?
9. Write the steps involved in cutting time calculation.
10. What do you mean by machining time?

PART B — (5 × 13 = 65 marks)

11. (a) Explain with neat sketch various methods of process planning. (13)
Or
(b) Write down the procedure to be followed during material selection. Discuss the factors that are taken into account in process selection and equipment selection. (13)

12. (a) What are the Set of documents required for process planning? (13)

Or

(b) A factory has three sections in a machine shop. During one calendar year the following details are available. (13)

- (i) Depreciation and rent of building Rs. 8,000
- (ii) Supervisory charge Rs. 20,000
- (iii) Indirect labour and indirect materials Rs. 7,000
- (iv) Insurance charge Rs. 5,000
- (v) Other charges are (given below)

Items of expenditure	Section I	Section II	Section III
1. Depreciation of machines	Rs. 5,000	Rs. 7,000	Rs. 4,000
2. Cost of power consumed	Rs. 3,000	Rs. 5,000	Rs. 2,000
3. Area occupied as percentage of total area	40%	20%	40%
4. M/C hours worked	Rs. 8,000	Rs. 25,000	Rs. 10,000
5. Maintenance charges	Rs. 2,000	Rs. 3,000	Rs. 1,000

Find out the machine hour rate for each section if the common fixed expenses are to be apportioned on the basis of floor space occupied by each section.

13. (a) From the following data for a sewing machine manufacturer prepare a statement showing prime cost, Works/factory cost, production cost, total cost and profit. (13)

Description	Rs.
Value of stock of material as on 1-04-2003	26,000
Material purchased	2,74,000
Wages to labour	1,20,000
Depreciation of plant and machinery	8,000
Depreciation of office equipment	2,000
Rent, taxes and insurance of factory	16,000
General administrative expenses	3,400
Water, power and telephone bills of factory	9,600
Water, lighting and telephone bills of office	2,500
Material transportation in factory	2,000
Insurance and rent of office building	2,000
Direct expenses	5,000
Commission and pay of salesman	10,500
Repair and maintenance of plant	1,000
Works Manager salary	30,000
Salary of office staff	60,000
Value of stock of material as on 31-03-2004	36,000
Sale of products	6,36,000

Or

(b) Discuss various methods of costing in detail. (13)

14. (a) (i) List the various sections that will be normally found in a foundry shop. (6)
- (ii) Explain the different items involved in the estimation of arc welding cost of job. (7)

Or

- (b) Evaluate the welding cost for a cylindrical boiler drum 2.5 m × 1 m diameter which is to be made from 15 mm thick M.S. plates. Both the ends are closed by arc welding of circular plates to the drum. Cylindrical portion is welded along the longitudinal seam and welding is done both in inner and outer sides. Assume the following data:
- Rate of welding = 2 meters / hour on inner side and 2.5 meters per hour on outer side
 - Length of electrodes required = 1.5 m/meter of weld length
 - Cost of electrode = Rs. 0.60 per meter
 - Power consumption = 4 kWh/meter of weld
 - Power charges = Rs. 3/kWh
 - Labour charges = Rs. 40/hour
 - Other overheads = 200 percent of prime cost
 - Discarded electrodes = 5 percent
 - Fatigue and setting up time = 6 percent of welding time. (13)
15. (a) A mild steel bar 100 mm long and 38 mm in diameter is turned to 35 mm dia. And was again turned to a diameter of 32 mm over a length of 40 mm as shown in the Fig.15. a. The bar was machined at both the ends to give a chamfer of $45^\circ \times 5$ mm after facing. Calculate the machining time. Assume cutting speed of 60 m/min and feed 0.4 mm/rev. The depth of cut is not to exceed 3 mm in any operation.

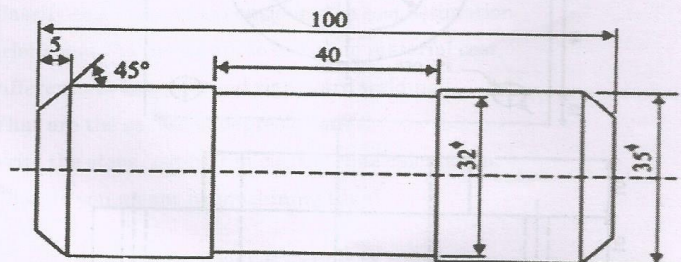


Fig. 15.a

Or

- (b) Find the time required on a shaper to machine a plate 600 mm × 1,200 mm, if the cutting speed is 15 meters/min. The ratio of return stroke time to cutting time is 2 : 3. The clearance at each end is 25 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 mm per stroke. (13)

PART C — (1 × 15 = 15 marks)

16. (a) 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. During one 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 the lathes	Rs. 2,000
(vii) Power consumption for the shapers	Rs. 1,000

Find out the machine hour rate for lathes and shapers work for 25000 hours and 8000 hours respectively. (15)

Or

- (b) Estimate the machining time to drill four 8 mm dia holes and One 40 mm dia central hole in the flange shown in Fig.16 b. A 20 mm dia hole is drilled first and then enlarged to 40 mm dia hole. Take cutting speed 10 m/min, feed for 8 mm drill 0.1 mm/rev, for 20 mm drill feed is 0.2 mm/rev, and for 40 mm drill feed is 0.4 mm/rev.

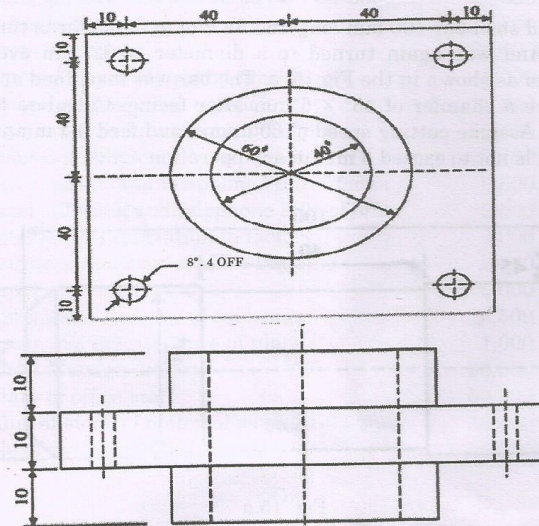


Fig. 16.b