Reg. No. :

Question Paper Code : 41351

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Sixth/Seventh/Eighth/Nineth Semester
Mechanical Engineering
ME 6005 – PROCESS PLANNING AND COST ESTIMATION
(Common to Mechanical Engineering (Sandwich)/Manufacturing Engineering/
Mechanical and Automation Engineering/Production Engineering/Robotics and
Automation Engineering)
(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions.

PART – A   (10×2=20 Marks)

1. What are the details required for process planning ?

2. Study the drawing shown in fig. 1 and interpret any one geometric tolerance symbol.
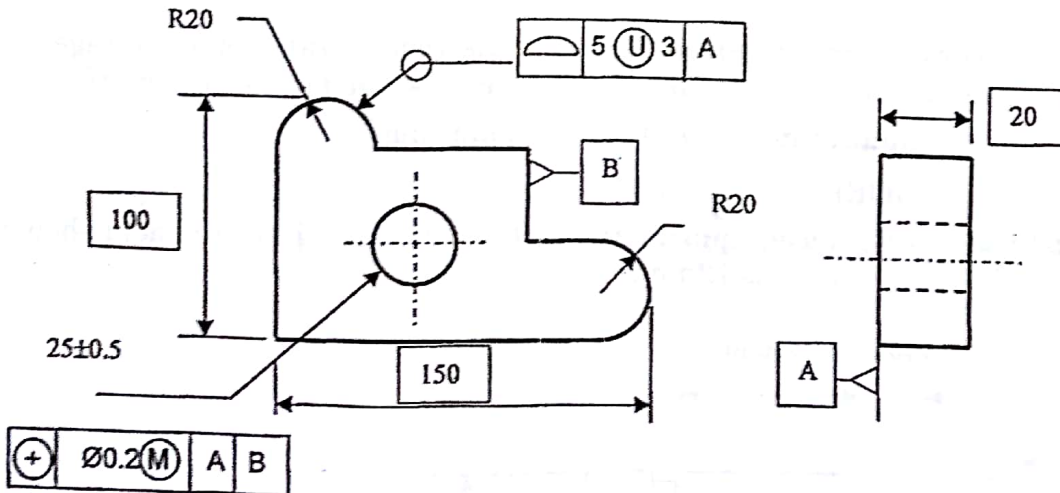

Figure –1

3. What is activity based costing ?

4. What are the elements of costing ?

5. Estimate the power cost for melting Aluminium of 150kg at 650°C from room temperature of 35°C. Specific and latent heats of Aluminium are 0.91kJ/kg and 398kJ/kg respectively. Unit cost of power is Rs. 7.

6. What are the causes of depreciation?

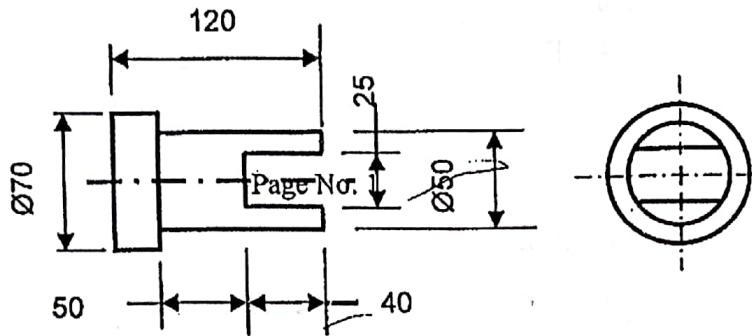7. Estimate the weight of the component shown in fig.2. The material is CI.

Figure – 2

8. What is right hand (RH) and left hand (LH) welding?

9. What are the typical data required for cutting time calculation in shaping.

10. Write steps involved in cutting time calculation.

PART – B   (5×13=65 Marks)

11. a) i) Why is process planning required to estimate cost? State its advantages. Discuss in detail the methods how computer can be used in cost estimations.

   ii) Write note on different methods of process planning.

(OR)

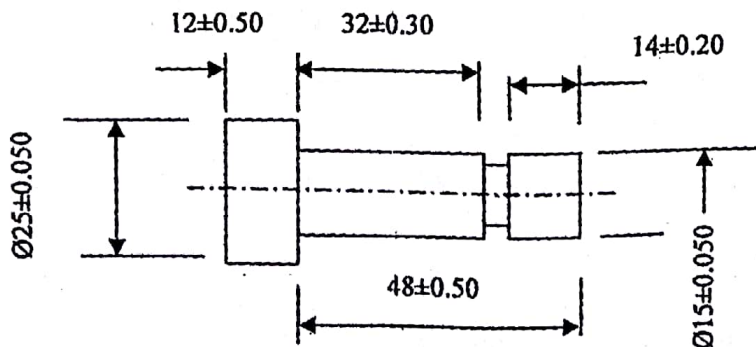   b) Discuss the production equipment and tool selection for the component shown in fig.3. Undercut diameter is 12mm.

Figure – 3

12. a) Explain the importance of selection of the right quality assurance method during manufacturing.

(OR)

b) Explain the factors to be considered in selection of process parameters.

13. a) A factory has 25 lathes of same make and capacity and 10 CNC machining centers of same make and capacity. Lathe occupies $70m^2$ and CNC machining centre occupies $40m^2$. The factory expenses are given below :

Description	Period	Amount is Rs.
Building rent and depreciation	annual	70,000
Direct labour	month	60,000
Indirect labour and indirect material	month	50,000
Depreciation charges for lathes	annum	2,00,000
Depreciation charges for CNC m/c center	annum	10,00,000
Power consumption for lathe	month	3,50,000
Power consumption for CNC m/c center	month	8,50,000
Insurance for lathes	annum	25,000
Insurance for CNC m/c center	annum	20,000

Find out the machine hour rate for lathe and CNC m/c center if they work for 5000 hrs and 3000 hrs respectively.

(OR)

b) An apparel factory has a fork lift truck which is used by receiving and shipping departments. In receiving section large rolls of fabric are handled while in shipping sections cartons of finished parts are handled. Fork lift costs are shown in table. Fork lift spends 70% of time in shipping and 30% in receiving.

Operator salary	Rs. 75,000
Maintenance	Rs. 15,000
Depreciation	Rs. 20,000
Others	Rs. 5,000

The factory operates two production lines. One line is for jeans and the other for T shirts. Operational data per month is given below

	Jeans	T shirts	Total
Units produced	5,50,000	3,20,000	8,70,000
Direct labor hrs	90,000	50,000	1,40,000
Rolls of fabric	2250	850	3100
Cartons shipped	60000	25000	85,000

If the total over head of the factory is Rs.18,50,000, find fork lift expenses per unit of jeans and T shirts.

14. a) Find the rate per kg for melting CI in an induction furnace. Furnace operates on 3 shift basis for 300 working days. Assume depreciation period is 10 years and that the furnace investment is done 100% through bank for an interest rate 12% and the repayment period is 10 years.

Furnace cost Rs. 60 lakhs.

Power 750 kVA with 0.95 power factor. Power cost is Rs.6/unit

Labour Rs. 20000/month

Material cost Rs.38/kg

Miscellaneous and consumable expenses Rs. 70,000 per annum.

Maintenance charge Rs 2 lakhs/annum

Specific heat of CI = 0.46 kJ/kg and latent heat 272 kJ/kg

Furnace capacity=1ton.

(OR)

b) A cylindrical boiler drum 3m × 1m diameter is to be made from 18mm MS plates. Both the ends are closed by welding circular plates to the drum. Cylindrical portion is welded along the longitudinal seam both inside and outside. Calculate the electric welding cost using the following data.

Rate of welding is 3m/hr inside and 4m/hr outside. Length of electrode required is 1.8m/m. Cost of electrode Rs.12/m. Labour charges Rs 100/hr. Discarded electrodes 6% and the setup time is 7% of welding time. Welding Voltage used is 40V and the Current is 325A. Assume the efficiency of welding transformer as 85%. Power cost is Rs. 7/unit. Over head charge is 100% of prime cost.

15. a) Find the machining time of the component shown in fig 4. If the material cost is Rs. 55/kg and the machine hour rate is Rs.425/hr without OH, find the cost of the component. Assume over head as 50% of machine hour rate and the set up time is 3 min. Material is AISI 1040.
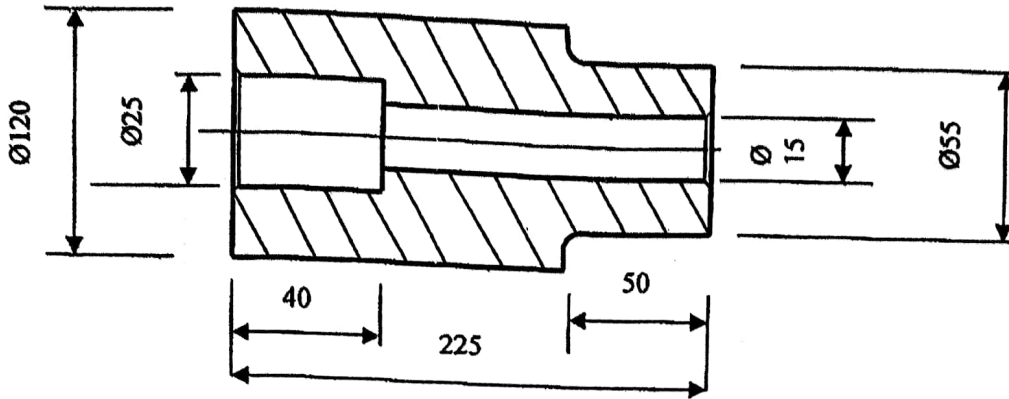

Figure – 4

(OR)

b) Calculate the machining time to mill a plate of thickness 24mm and drill four 10mm diameter holes and 50mm diameter hole in the plate shown in fig.5. Assume cutting speed and feed in the case of milling to be 75m/min and 0.2m/min respectively. Cutting speed for drilling is 30m/min and feed 0.15mm/rev for 10mm drill, 0.18mm/rev for 25 mm drill and 0.3mm/rev for 50mm drill.
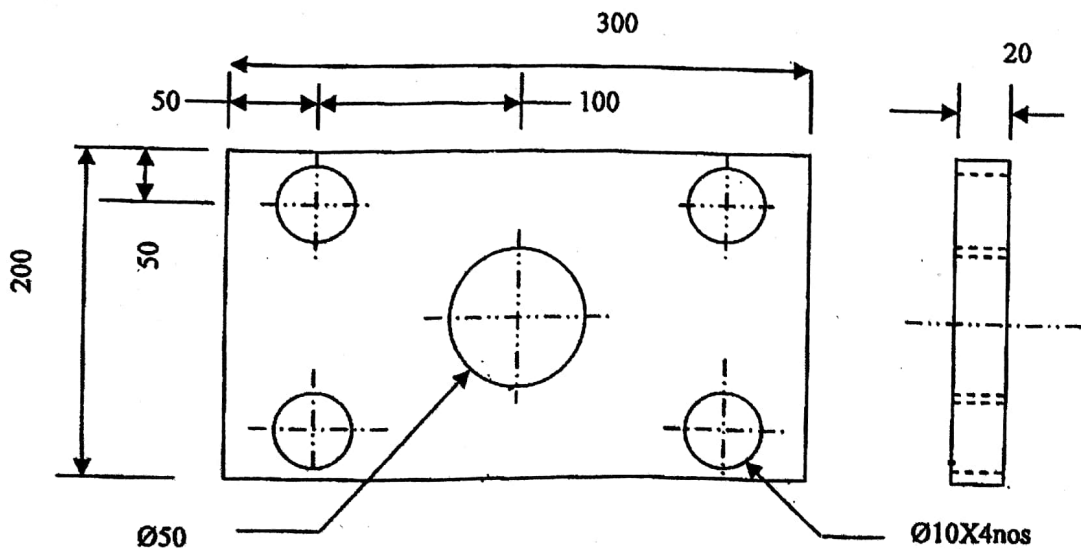

Figure – 5

PART – C (1×15=15 Marks)

16. a) i) Discuss about factors to be considered in the selection of jigs and fixtures for cost reduction. (8)

    ii) Write note on economics of process planning. (7)

(OR)

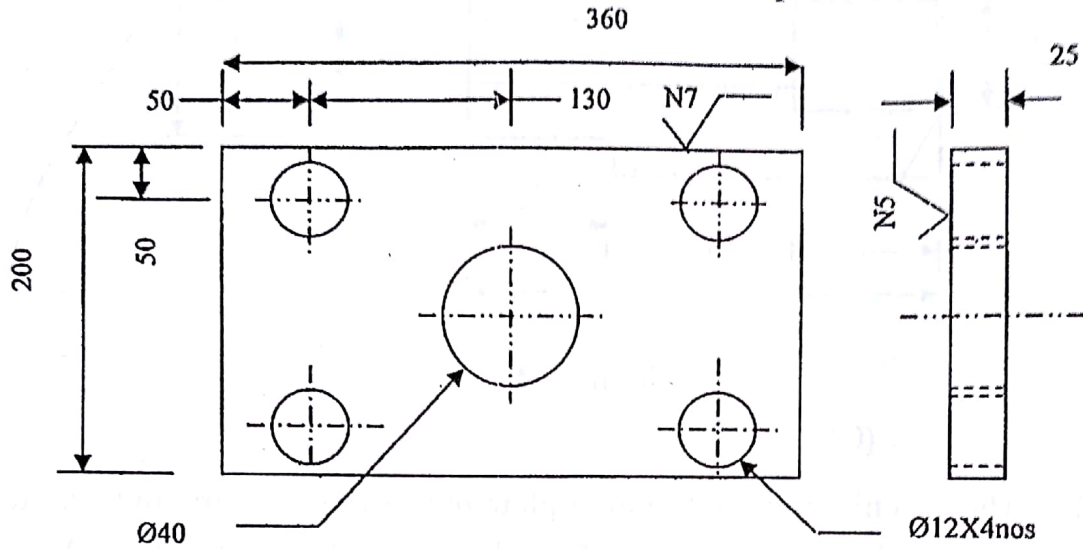b) Prepare and operation and route sheet for the component shown in fig.6.

Figure – 6

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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Sixth/Seventh/Eighth Semester

Mechanical Engineering

ME 6005 – PROCESS PLANNING AND COST ESTIMATION

(Regulations 2013)

(Common to : Manufacturing Engineering /Mechanical and Automation Engineering / Production Engineering / Robotics and Automation Engineering)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions.

PART – A   (10×2=20 Marks)

1. List the objectives of process planning.

2. What is bilateral tolerance ? Give examples.

3. What are the most influential factors in terms of tool performance ?

4. What are the main reasons for using jigs and fixtures ?

5. Distinguish between cost estimation and cost accounting.

6. Classify the allowances considered in cost estimation.

7. Define roll forging.

8. Give the formula for calculating the cost of power consumed in arc welding.

9. Write short notes on tear down time.

10. Give the formula for estimation of machining time for drilling.

PART – B   (5×16=80 Marks)

(Question No. 11 is Compulsory)

11. a) Describe the set of documents required for Process Planning.   (16)

    (OR)

    b) Explain the steps in process selection with suitable example.   (16)

12. a) Describe the steps or procedures involved in process planning.   (16)

    (OR)

    b) Describe the basic method employed for the selection of cutting tools.   (16)

13. a) Calculate the selling price per unit from the following data : Direct material cost = Rs. 8,000, Direct labour cost = 60 percent of direct material cost. Direct expenses = 5 percent of direct labour cost, Factory expenses = 120 percent of direct labour cost, Administrative expenses = 80 percent direct labour cost, Sales and distribution expenses = 10 percent of direct labour cost, Profit = 8 percent of total cost, No. of pieces produced = 200.   (16)

    (OR)

    b) Describe the various components of job estimate.   (16)

14. a) Calculate the welding cost for a cylindrical boiler drum 2½m × 1m diameter which is to be made from 15 mm thick mild steel plates. Both the ends are closed by arc welding of circular plates to the drum. The cylindrical portion is welded along the longitudinal seam and welding is done both inner and outer sides. Assume the following data : (i) Rate of welding = 2 meters per hour on inner side and 2.5 meters per hour on outer side (ii) Length of electrodes required = 1.5 m/ meter of weld length (iii) cost of electrode = Rs. 0.60 per meter (iv) Power consumption = 4 kWh/meter of weld (v) Power charges = Rs. 3/kWh (vi) Labour charges = Rs. 40/hour (vii) Other overheads = 200 percent of prime cost (viii) Discarded electrodes = 5 percent (ix) Fatigue and setting up time = 6 percent of welding time.   (16)

    (OR)

    b) i) What are the various losses considered while calculating the material cost for a forged component ? Explain.   (12)

    ii) List the various sections that will be normally found in a foundry shop.   (4)

15. a) Consider the component as shown in the figure. The component is to be made from mild steel with carbide tooling at a constant surface speed of 100 m/min. on a lathe with a maximum spindle speed of 1500 rev/min. The machining allowance is 2 mm. Determine : (i) if the lathe is capable of turning the component at the required surface speed (ii) the total machining time for the component if the lathe is capable. (16)
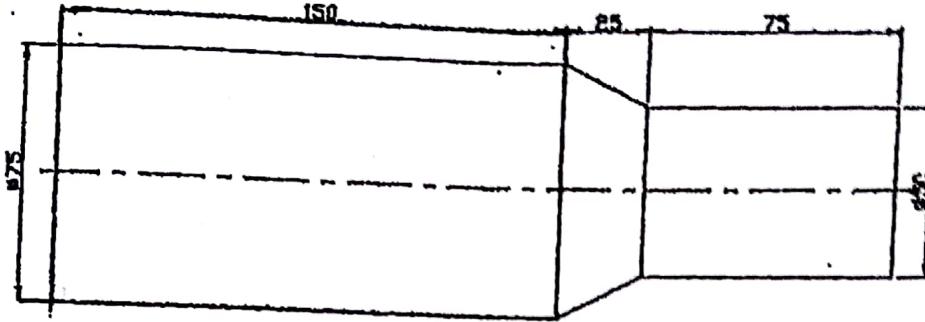
(OR)

b) i) 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. (8)

ii) A T-slot is to be cut in a Cast Iron slab as shown in figure. 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. (8)