Q. Code: 934785

B.E./B.TECH. Degree Examination, December 2020

Fifth Semester

ME18025- Process Planning and Cost Estimation

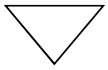
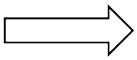
(Regulation 2018)

Time: Three hours Maximum: 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Match List-I (symbols in Flow Chart) with List-II (Actions) and select the correct answer using the codes given below the lists:

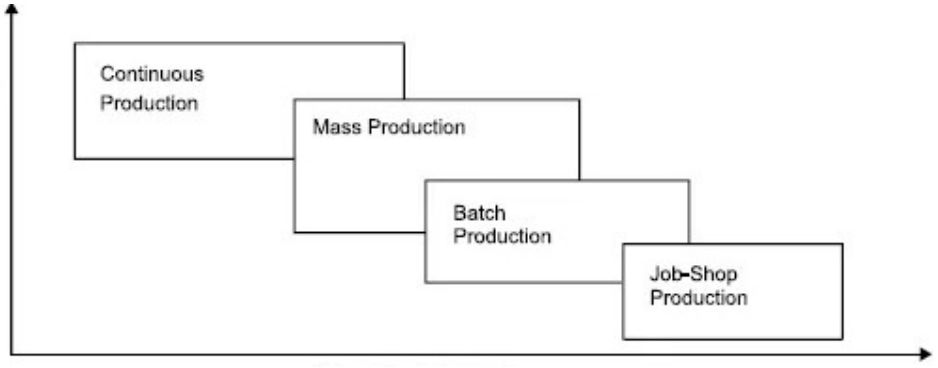
List – I		List – II	
A		1	Shipping of raw material from go down to workplace.
B		2	Drilling 10mm dia hole in a plate
C		3	Quality inspector measures the dimension to confirm.
D		4	Finished goods are available in rack at store.

Codes:

	A	B	C	D
a	1	2	3	4
b	2	3	4	1
c	3	4	1	2
d	4	1	2	3

2. Which *one* of the following indicates an increase in productivity?
    a. Increased output as a result of waste reduction.
    b. Increased output as a result of working for an additional shift.
    c. Increased production owing to addition of machines and equipment.
    d. Increased production with respect to increase in raw material consumption
3. Prime cost of a product, manufactured in a factory, is determined by the sum of
    a. Direct Material, direct expenses and indirect labour
    b. Indirect material, indirect expenses and indirect labour
    c. Direct material, direct expenses and direct labour
    d. Indirect material, direct expenses and direct labour
4. Shear loss, tonghold loss scale loss, flash loss and sprue loss will be considered in
    a. Cost estimation of forging
    b. Cost estimation of casting
    c. Cost estimation of welding
    d. Cost estimation of fabrication

5. Give an example for each type of production process, mentioned in the following graph:



6. Differentiate interchangeability and standardization.
7. What is the significance of breakeven point?
8. Estimate the machining time to face both ends of a workpiece of 30mm steel rod in one cut, if the cutting speed is 30 m/min and cross feed is 0.2 mm/rev.

PART B - (4 X16 = 64 marks)

09. (a) (i) Estimate the standard time for the following data refers to the time study conducted for an operation: **(8)**

Cycle-Element	1	2	3	4	5
1	2.5	2.1	2.2	5.4	2.5
2	6.2	6.0	6.1	5.9	5.9
3	2.3	2.0	2.1	2.1	2.2
4	2.4	2.1	2.8	3.0	2.3

Element 2 is a machine element

Consider the observation as abnormal and delete the same if they are more than 2% of the average time of the element.

Take performance rating as 120%

Take following allowances: personal allowance is 30 minutes in a shift of 8 hours; fatigue allowance as 15%; contingency allowance as 2%.

09. (a) (ii) Design a table and a chair on which a PCB board is to be soldered by on operator. Obtain the appropriate limb dimensions for all the class, and hence arrive at the most suitable height and working areas. **(8)**

(OR)

09 (b) (i) An induction hardening machine is being run by an operator to harden the surface of an automobile component. Details are given below: **(8)**

Time for Loading	1 minute
Time for unloading	1.5 minute
Hardening Time	3.5 minute
Cost for induction	Rs.100 per hour
Hardening machine operator cost	Rs.10 per hour

(ii) Draw a Two-handed chart for the situation, you might be come across to prepare specimen for gear manufacturing in the machine shop during your laboratory classes. **(8)**

10. (a) For the component drawing below (Fig. Q5.7), identify: **(16)**

i. suitable processes for its manufacture;

ii. a suitable sequence of operations using the datum provided and using the points designated P1-P10;

iii. suitable types of equipment for its manufacture;

iv. suitable tooling for its manufacture.

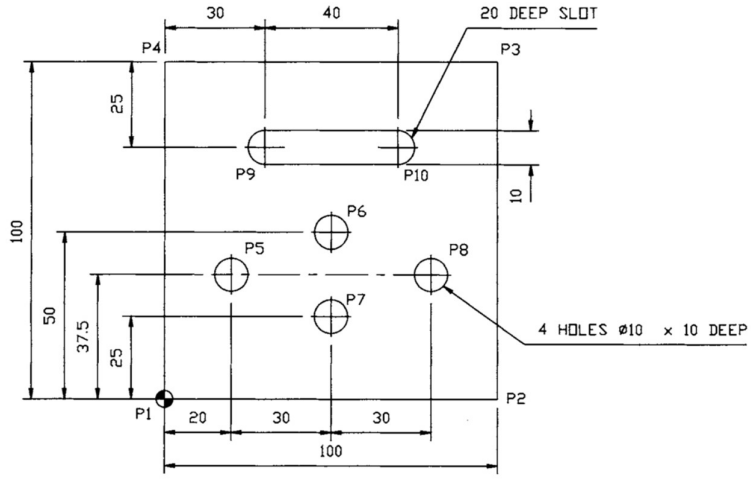


Figure Q5.7 *Mild steel component*

Drg. notes:

Workpiece:	20 mm thick
Material:	Mild steel
General tolerance:	±0.5
Surface finish:	N9 (general), N7 (slot/holes)

(OR)

10 (b) Consider the cast iron component shown in Fig. Q7.5. Given the sequence of operations in following Table, determine the work holding requirements for the part in terms of jigs/fixtures. **(16)**

Sequence of operations	
Operation No	Description
1	Case initial geometry
2	Bore Ø50mm hole
3	Drill 4 x Ø10mm holes

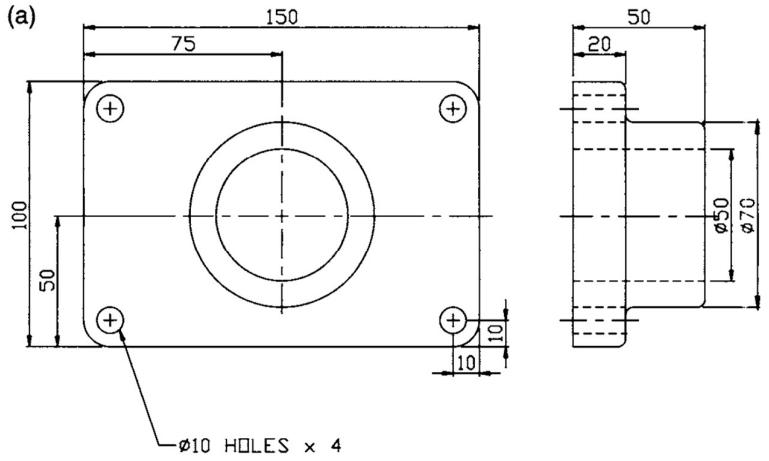


Figure Q7.5

11. (a) (i) Find the weight and material cost of the brass component as shown in fig. 6.18. Assume density of brass as 8.5 gm/cc^3 and the cost of brass as Rs.90/kg. **(8)**

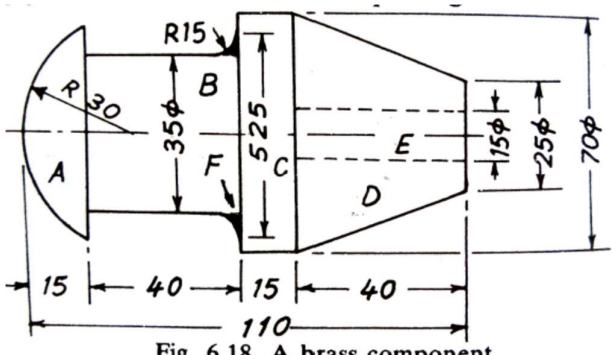


Fig. 6.18. A brass component.
(All dimensions are in mm)

(ii) Two machines are purchased, each for Rs.12,000. The estimated useful life of the machines is 5 years. The estimated scrap value is Rs.2,000. For machine A, the straight-line method and for B, the reducing balance method with p = 30% is used to calculate the depreciation every year. Compare the depreciation charges in each case and then suggest which method is preferred. **(8)**

(OR)

11 (b) (i) From the following data, find material cost, prime cost, factory overhead, administrative overhead, selling overhead, total cost and profit. Following data refer to a factory for the financial year ending, 31st March, 1981: **(8)**

1	Stock of material as on 1st April 1980 = Rs.50,000	11	Works Manager's salary = Rs.15,000
2	Material purchased = Rs.3,40,000	12	Salary of office staff = Rs.60,000
3	Drawing office salaries = Rs.5,000	13	Depreciation of the plant = Rs.8,000
4	Rent, tax and insurance of factory = Rs.10,000	14	Material transportation = Rs.2,000
5	Pay and commission to salesmen = Rs.10,000	15	Water and lighting for office = Rs.3,000
6	Depreciation equipment = Rs.200	16	Rent taxes and insurance of office = Rs.5,000
7	Wages to direct labour = Rs.2,50,000	17	Repairs and maintenance of plant = Rs.5,000
8	General administrative expenses = Rs.3,400	18	Direct Expenses = Rs.500
9	Water and power for factory = Rs.9,000	19	Stock of material on 31st March 1981 = Rs.45,000
10	Sale of products = Rs.9,00,000		

(ii) The TAFE tractor company has extra capacity that can be used to produce gears that the company is now buying for Rs.100 each. If TAFE makes the gears, it will incur materials costs of Rs.30 per unit, labour costs of Rs.40 per unit, and variable overhead costs of Rs.10 per unit. The annual fixed cost associated with the unused capacity is Rs.80,000. Demand over the next year is estimated at 4,000 units. Would it be profitable for the company to make the gears? Assume that the unused capacity has no alternative use. **(8)**

12. (a) (i) 150 pieces of shafts as shown in Fig.4.10 are to be drop forged from the raw stock of 2 cm diameter. Estimate the cost incurred assuming that material cost = Rs.300 per metre. Cost of forging = Rs. 1,000 per sq.metre of surface area to be forged. Overhead expenses to be 100% of the cost of the forging. Consider all losses. **(8)**

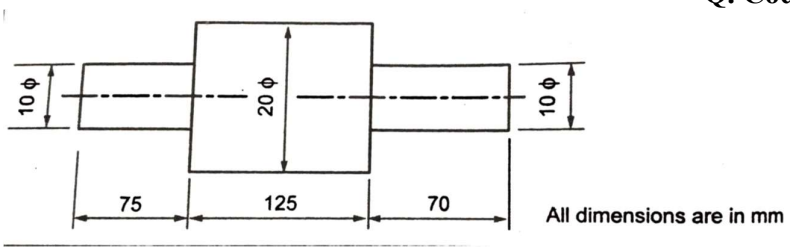


Fig. 4.10

(ii) Calculate the direct material cost for butt welding two mild steel plates each 300mm x 150mm x 4mm. Assume that the followings: **(8)**

Filler rod diameter	3 mm
Filler metal lost during welding	15%
Oxygen consumption	0.55 m^3/hour
Acetylene consumption	0.27 m^3/hour
Filler rod length consumed	3.4 m/m of weld
Welding time / metre of weld	20 min
Density of filler metal	7.2 g/cc
Cost of filler metal	Rs. 15/kg
Cost of oxygen	Rs. 5/m^3
Cost of acetylene	Rs. 40/m^3

(OR)

12 (b) (i) A cast iron component is to be manufactured as per Fig. 5.2. Estimate the selling price per piece from the following data: **(8)**

Density of material	= 7.2 gms/cc
Cost of molten metal at cupola	= Rs. 20 per kg
spout	= 20 percent of net weight
Process scrap	= Rs. 6 per kg
Scrap return value	= Rs. 30 per hour
Administrative overheads	= 20 percent of factory cost
Sales overheads	= 20 percent of factory cost
Profit	

Other expenditures are:

Operation	Time (in min)	Labour Cost / hour (in Rs.)	Shop overhead / hour (in Rs.)
Moulding and Pouring	15	20	60
Shot blasting	5	10	40
Fettling	6	10	40

The component shown is obtained after machining the casting. The pattern which costs Rs. 5,000 can produce 1,000 pieces before being scrapped. The machining allowance is to be taken as 2 mm on each side.

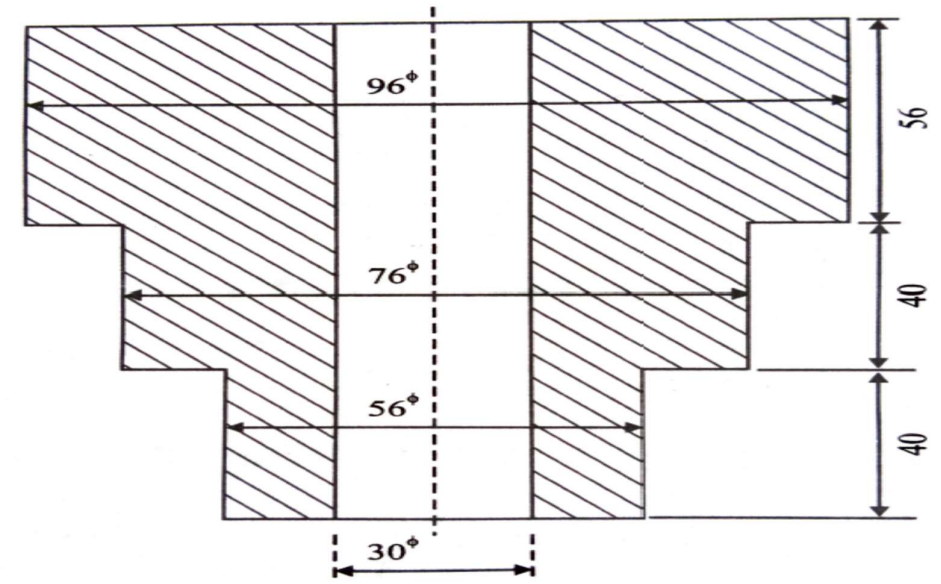


Fig 5.2

(ii) Estimate the cost of metal sheet for preparing a funnel as shown in Fig. 12.14. Assume the wastage of metal as 15% and cost of the sheet as Rs.45/m^2. **(8)**

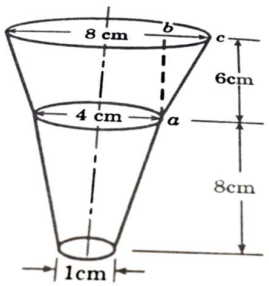


Fig. 12.14