



**C20-M-502**

**7656**

**BOARD DIPLOMA EXAMINATION, (C-20)**

**OCTOBER/NOVEMBER—2023**

**DME – FIFTH SEMESTER EXAMINATION**

**INDUSTRIAL ENGINEERING AND ESTIMATING AND COSTING**

*Time : 3 Hours ]*

*[ Total Marks : 80*

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**PART—A**

3×10=30

**Instructions :** (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Write any three objectives of work study.
2. Define time study.
3. List out the types of sampling plans.
4. What is six sigma? Briefly explain.
5. Write any three examples of selling and distribution overheads.
6. What are the various causes of depreciation?
7. Write the step-by-step procedure to calculate the weight of material for a given component.
8. Find the RPM for turning a steel shaft of 125 mm diameter at a cutting speed of 20 m/min.
9. List out the various forging operations.
10. How do you estimate the total cost of gas welding?

**PART—B**

8×5=40

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **eight** marks.  
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

**11.** (a) Describe the procedure for method study.

**(OR)**

(b) Explain the procedure for work measurement by stopwatch method.

**12.** (a) Find mean and standard deviation from the following data :

|   |   |    |    |    |    |    |    |
|---|---|----|----|----|----|----|----|
| X | 5 | 7  | 10 | 12 | 15 | 18 | 20 |
| f | 5 | 10 | 15 | 20 | 14 | 11 | 6  |

**(OR)**

(b) In a production process a lot of 250 products has been manufactured in a day. Five samples have been collected at random in a day as a SQC measure. Each sample size is 5. Five samples A, B, C, D, and E have been collected as shown in the table below for a particular dimension of the product.

Table Measurements per sample

| Sample | 1  | 2  | 3  | 4  | 5  |
|--------|----|----|----|----|----|
| A      | 43 | 42 | 42 | 44 | 43 |
| B      | 45 | 40 | 39 | 39 | 46 |
| C      | 40 | 40 | 41 | 42 | 43 |
| D      | 43 | 42 | 40 | 40 | 46 |
| E      | 40 | 41 | 43 | 46 | 43 |

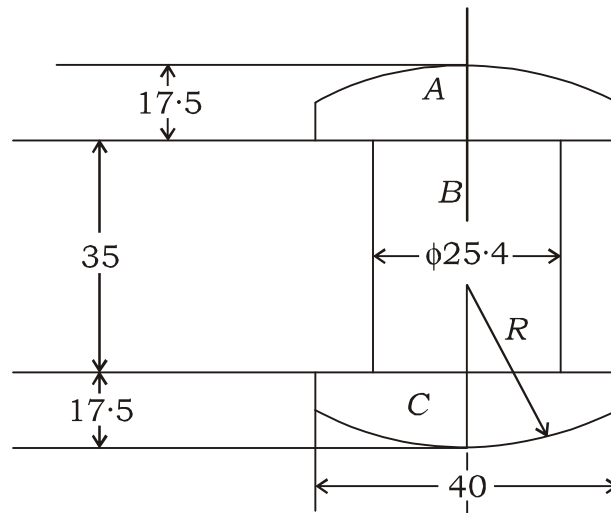
Calculate the control limits and plot X-bar and R-charts. Take  $A_2$  for control limits of X-bars as 0.577 and  $D_4$  and  $D_3$  for control limits of R-chart as 2.11 and zero respectively. Comment on the result.

13. (a) What are the constituents of estimating? Describe them in brief.

(OR)

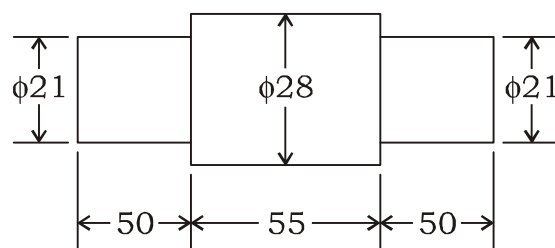
- (b) An NC machine was purchased for ₹ 15,00,000 and its life is estimated as 15 years. Its scrap value is ₹ 75,000. Calculate (i) rate of depreciation, (ii) total depreciation fund at the end of four years and (iii) value of the machine at the end of 12 years by using straight line depreciation method.

14. (a) Estimate the number of rivets made from 4.5 kg of mild steel as shown in the figure below. The density of the material is 7.87 grams/cc. All dimensions are in mm.



(OR)

- (b) Estimate the time required to turn 35 mm diameter bar to the dimensions shown in the figure below. Cutting speed is 15.4 m/min and feed is 1 mm/rev. All cuts are 3.5 mm deep. All dimensions are in mm.



15. (a) Two one-meter-long MS plates 10 mm thick are to be welded by a lap joint with 6 mm electrodes. Calculate the cost of welding if the electrical supply is 250 amps and 30 volts : welding speed : 10 m/hr, electrodes used : 0.5 kg/m of welding, labour charges : ₹ 15 per hour, power charges : ₹ 1/kWh, cost of electrodes : ₹ 15/kg, efficiency of welding machine : 60%.

**(OR)**

- (b) 1000 MS pins of 4 cm diameter and 10 cm length are to be drop forged from a bar stock of 5 cm diameter. Calculate the material cost, if the bar is available at ₹ 40/m length, assuming all the possible losses.

**PART—C**

10×1=10

- Instructions :** (1) Answer the following question.  
(2) The question carries **ten** marks.  
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. Discuss the importance of work sampling technique over stopwatch method for calculating the standard time for the given job.

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