

316362

25226

3 Hours / 70 Marks

Seat No. 

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- Instructions* – (1) All Questions are *Compulsory*.  
(2) Answer each next main Question on a new page.  
(3) Illustrate your answers with neat sketches wherever necessary.  
(4) Figures to the right indicate full marks.  
(5) Assume suitable data, if necessary.  
(6) Use of Non-programmable Electronic Pocket Calculator is permissible.  
(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. Attempt any FIVE of the following : 10
- a) List four key factors that influence site selection.
  - b) State the role of industrial engineering in optimizing business processes and resource utilization.
  - c) Define work study.
  - d) Define Quality of design.
  - e) State the difference between variable measurement and attribute measurement. (Two points)
  - f) Define cost of Quality and Value of Quality.
  - g) State two ways in which Computer - Aided Quality Control (CAQC) software improves the reliability of an inspection process.

P.T.O.

- 2. Attempt any THREE of the following : 12**
- a) Explain the objectives of Computer-Aided Quality Control.
  - b) Explain any two types of plant layout with neat sketch.
  - c) Sketch the symbols of the following therbligs :
    - i) Search
    - ii) Assemble
    - iii) Transport Loaded
    - iv) Rest
  - d) Explain the cause-and-effect diagram with a sketch.
- 3. Attempt any THREE of the following : 12**
- a) Explain Operating Characteristic (OC) curve with neat sketch.
  - b) Explain the steps to calculate process capability of machines.
  - c) Compare traditional quality control with computer-aided quality control based on the following points :
    - i) Inspection
    - ii) Method
    - iii) Consistency
    - iv) Feedback loop
  - d) State the types of CAPP systems. Explain any one in detail.
- 4. Attempt any THREE of the following : 12**
- a) Explain the meaning of Quality of performance.
  - b) Differentiate between mass production and continuous production system based on the criteria :
    - i) Unit cost
    - ii) System Flexibility
    - iii) Capital Investment
    - iv) Product example

- c) Identify which layout is most suitable for an Automobile assembly line and Justify.
- d) Draw an outline process chart to change the SIM card of a mobile phone.
- e) Explain the concept of 'Line Balancing' with example.

**5. Attempt any TWO of the following :**

**12**

- a) Differentiate between inspection and Quality control on the basis of following points :
  - i) Scope
  - ii) Function
  - iii) Objective
  - iv) Time
  - v) Techniques used
  - vi) Responsibility
- b) List the different sampling plans and explain the double sampling plan with suitable example.
- c) In a manufacturing process, the number of defectives found in the inspection of 10 lots of 400 items are given below.

|                      |   |   |    |   |   |    |   |   |   |    |
|----------------------|---|---|----|---|---|----|---|---|---|----|
| Lot number           | 1 | 2 | 3  | 4 | 5 | 6  | 7 | 8 | 9 | 10 |
| Number of Defectives | 2 | 0 | 14 | 3 | 1 | 18 | 6 | 0 | 3 | 6  |

Table No. 1

Determine the trial control limits for np chart and state whether the process is in control or not.

**6. Attempt any TWO of the following :****12**

- a) A shop floor activity consists of three elements. Find the standard time for the activity. The allowances are given as percentage of basic time.

| Element No. | Observed time (min.) | Performance Rating % | Total % Allowance |
|-------------|----------------------|----------------------|-------------------|
| 1           | 1.5                  | 100                  | 20                |
| 2           | 2.5                  | 110                  | 15                |
| 3           | 3.5                  | 120                  | 10                |

Table No. 2

- b) 10 samples of size 5 have been collected with following observations.

| Sr. No. | $\bar{X}$ | R     |
|---------|-----------|-------|
| 1       | 2.011     | 0.011 |
| 2       | 2.008     | 0.017 |
| 3       | 2.001     | 0.009 |
| 4       | 2.003     | 0.026 |
| 5       | 1.998     | 0.27  |
| 6       | 1.995     | 0.21  |
| 7       | 1.997     | 0.014 |
| 8       | 1.997     | 0.017 |
| 9       | 2.002     | 0.023 |
| 10      | 2.003     | 0.015 |

Table No. 3

Given:  $A_2 = 0.577$ ,  $D_3 = 0$ ,  $D_4 = 2.114$ , Draw the appropriate control chart and state whether the process is in statistical control or not.

- c) Construct a two-handed process chart for a task of sharpening pencil with appropriate process chart with symbols and a summary.

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