

# 22657

**12526**

**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) Figures to the right indicate full marks.  
(4) Assume suitable data, if necessary.  
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.  
(6) 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) Define method study. State its objectives.
  - b) State the factors of production.
  - c) State the types of control.
  - d) Enlist various quality control tools. (Any four points)
  - e) State the advantages of quality circle.
  - f) State various types of control charts in SQL.
  - g) State the merits of acceptance sampling.
- 2. Attempt any THREE of the following: 12**
- a) Explain in brief different ‘Recording Techniques used in method study’.
  - b) Explain the various factors affecting on process planning.
  - c) Explain the types of display in details.
  - d) Describe any four principle elements of TQM.

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**3. Attempt any THREE of the following: 12**

- a) Draw the symbol and write the meaning of following therbligs :-
- Assemble
  - Find
  - Transport loaded
  - Transport empty.
- b) Draw an outline process chart to change the SIM CARD of a mobile phone.
- c) Explain in brief steps involved in process planning.
- d) Apply the principles of ergonomics for design of control member like push buttons and knobs.

**4. Attempt any THREE of the following: 12**

- a) From the activities given below :-
- Construct network diagram
  - Find out the critical path and calculate the project duration

Operation	Pre-operation	Duration (Days)
A	–	02
B	A	03
C	A	03
D	B	04
E	C	03
F	E, D	04

- Explain the concept of ergonomics.
- Explain man machine relationship in ergonomics.
- Explain cost of quality and value of quality with the help of graph.
- Differentiate between variables and attribute measurement.

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

- a) The workers in a company are expected to work for 410 min. in a shift and 08 hrs. The remaining time is allowed for personal needs etc. Determine the standard time per piece of a job whose normal time is 3 minutes.
- b) Explain six sigma statistical concept. Enlist its benefits.
- c) The following are the inspection results of 20 lots of magnets each lot having 750 magnets. No of defective magnet in each lot are 48, 83, 70, 85, 45, 56, 48, 67, 37, 52, 47, 50, 47, 57, 53, 34, 29 and 30. Calculate the average fraction defective and the control limits for P chart.

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

- a) Draw and explain :-
  - i) Scatter diagram
  - ii) Cause and effect diagram
  - iii) Bar charts.
- 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	0.027
6	1.995	0.021
7	1.997	0.014
8	1.997	0.017
9	2.002	0.023
10	2.003	0.015

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.

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**Marks**

- c) Number of defects found in an inspection of 10 assemblies are 7, 14, 14, 18, 8, 12, 8, 10, 11, 12 respectively. Draw C control chart and conclude.

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