## Bachelor of Instrumentation & Electronics Engineering Examination, 2023
### (4th Year, 2nd Semester)
### Industrial Management

Time: Three Hours                                                                      Full Marks:  100

### Different parts of the same question should be answered together

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**1.   Answer any two from (a), (b) and (c) in this block**                      **2 x 10 = 20**

**(a)** Summarise functions of management.                                                      **10**

**(b)** Describe scope of management. Enumerate Fayol's 14 principles of management..              **5 + 5**

**(c)** Describe MAPE. During the last 8 quarters, Kolkata port has unloaded large quantities of grain from ships. The ports operations manager wants to compute MAPE from the data furnished in the following table for $\alpha$ = 0.1.  Compute MAPE on behalf of the operations manager of Kolkata  port.              **5 + 5**

| Quarter | Actual tonnage unloaded | Forecast for $\alpha$ = 0.1 |
|---|---|---|
| 1 | 180 | 175 |
| 2 | 168 | 175.5 |
| 3 | 159 | 174.75 |
| 4 | 175 | 173.18 |
| 5 | 190 | 173.36 |
| 6 | 205 | 175.02 |
| 7 | 180 | 178.02 |
| 8 | 180 | 178.22 |

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**2.   Answer any two from (a), (b) and (c) in this block**                      **2 x 15  = 30**

**(a)**

| Activity | Immediate Predecessor(s) | Duration (Weeks) |
|---|---|---|
| A | ----- | 6 |
| B | ----- | 5 |
| C | A | 4 |
| D | B, C | 9 |
| E | B, C | 11 |
| F | D | 10 |
| G | E | 8 |
| H | E | 12 |

(i) Draw a network diagram.                                                                      **8**
(ii) Find project completion time and the critical path by activity on arrow method.              **2 + 2**
(iii) How much are the floats of 'B' & 'G'?                                                      **3**

**(b)** A dairy firm has three plants located in a state. The daily milk production at each plant is as follows:

Plant 1 : 6 million litres,   Plant 2 : 1 million litre, and Plant 3 : 10 million litres

[ Turn over

Each day, the firm must fulfil the need of its four distribution centres. The minimum requirement of each centre is as follows:

Distribution centre 1 : 7 million litres,    Distribution centre 2:  5 million litres,
Distribution centre 3 : 3 million litres,    Distribution centre 4:  2 million litres

Cost ( in hundreds of rupees) of shipping one million litres from each plant to each distribution centre is given below:

Distribution Centre

| Plant | D1 | D2 | D3 | D4 |
|---|---|---|---|---|
| P1 | 4 | 6 | 22 | 14 |
| P2 | 2 | 0 | 12 | 2 |
| P3 | 10 | 16 | 30 | 18 |

Find the initial basic solution for the given problem by using the following methods:

(i) NCWR method,   (ii) Vogel's approximation method                     **6 + 9**

(c) Solve the following game by subgamel method:

Player B

                    -5   2   -3   5
    Player A         8   7    5  -4

                                                                         **15**

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3.    **Answer any two from (a), (b) and (c) in this block**                    **2 x 10 = 20**

(a) Explain cost of quality. Describe causes of variable in a statistical quality control chart.    **6 + 4**

(b) Describe Predictive maintenance.                                          **10**

(c) Enumerate steps in preparing a control chart. Provide a brief discussion on 'cost of unreliability.    **5 + 5**

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4.    **Answer any one from (a) and (b) in this block.**                       **1 x 15 = 15**

(a) What do you understand by JIT? Enumerate various types of wastes that JIT reduces. State advantages and disadvantages of JIT.                                       **2 + 5 + 8**

(b) Saraswati Publishing Company produces books for the retail market. Demand for a current book is expected to occur at a constant rate of 7,000 copies. The cost of one copy of book is Rs. 1,450. The carrying cost is based on an 18% annual rate of the product cost per unit. Annual setup cost is Rs. 15,000 per setup. Annual

production volume is 25,000 copies. There are 250 working days per year. Set time for production run is 15 working days. Use the production lot size model to determine the following:

**5 x 3**

I. Minimum cost production lot size.
II. Number of production runs per year.
III. Total annual cost.

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5. **Answer any one from (a) and (b) in this block** **1 x 15 = 15**

(a) Explain Herzberg's two factor theory of motivation. Present your understanding on Maslow's need hierarchy theory. **6 + 9**

(b) Why is work study needed? State objectives of method study. Present process chart symbols with explanations. **5 + 4 + 6**