Instructions –

(1) All Questions are Compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. a) Attempt any THREE of the following: 12

(i) Explain production system with block diagram. Also give two examples.

(ii) Compare production and productivity with suitable example.

(iii) Explain any four techniques to improve the productivity of manufacturing firm.

(iv) State the objectives of production planning and control.

b) Attempt any ONE of the following: 6

(i) Suggest and explain with neat sketch material handling device used in process production.

(ii) Explain Gantt chart used in scheduling with suitable example.
2. Attempt any TWO of the following: 16
   a) Prepare operation process sheet and sequence of operation by taking suitable example. Assume suitable cutting parameters.
   b) Sketch the following layout types.
      (i) Line layout
      (ii) Functional layout
      (iii) Fixed position layout
      (iv) Combined layout
   c) Write stepwise procedure of process planning from raw material to finished product.

3. Attempt any FOUR of the following: 16
   a) Classify material handling devices.
   b) How operations are combined? Explain with example.
   c) State the factors affecting site selection for manufacturing industry.
   d) Explain the concept of ERP.
   e) Define Jig and fixture. Give two examples of each.
   f) Why allowances are considered while calculating standard time? Explain.

4. a) Attempt any THREE of the following: 12
      (i) Sketch any two drill Jig bushes.
      (ii) How ‘5S’ can be used as inventory reduction technique.
      (iii) State the applications of robots.
      (iv) Give the classification of sensors used in robots.
b) **Attempt any ONE of the following:**

(i) Describe 3-2-1 principle of location with neat sketch.

(ii) A shop floor activity consists of three elements. Find the standard time for the activity. The allowances are given as % of basic time.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Observed time (min)</th>
<th>Rating</th>
<th>Allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>100 %</td>
<td>20 %</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
<td>110 %</td>
<td>15 %</td>
</tr>
<tr>
<td>III</td>
<td>3</td>
<td>120 %</td>
<td>10 %</td>
</tr>
</tbody>
</table>

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

a) Draw a neat sketch of open type jig and label it.

b) State the general principles of jigs and fixtures design.

c) State the benefits and limitations of JIT. (Four each)

d) Differentiate between hydraulic actuator and pneumatic actuator. (Any four points)

e) State four types of grippers used in robots with application of each.

f) Write down basic steps in method study.

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

a) Describe types of scheduling in detail.

b) Prepare a two handed process chart for a task of sharpening the pencil with appropriate process chart symbols.

c) Describe robot configurations with neat sketch. (Any two)