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.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

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

   (i) What are the various tools of productivity? How productivity can be increased?

   (ii) List down the different types of production system in industry and give practical example of each type of production system.

   (iii) State the benefits of productivity to management and workers.

   (iv) Explain the factors affecting process planning.
b) **Attempt any **ONE** of the following:**

(i) Give the considerations for designing a plant layout.

(ii) Define scheduling. What are various steps taken to control the production schedule?

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

a) Explain the different types of Automated Guided Vehicle (AGV) system and also state its functions and applications.

b) Prepare operation process sheet and sequence of operation for the Ring Nut shown in Figure No. 1. Assume suitable cutting parameters and raw material $\phi 50 \times 10$ mm blank of carbon steel. Ref. Fig. No. 1.

c) Explain various steps for planning a process for a product from raw material to finished product in an industry.
3. **Attempt any FOUR of the following:**

   a) What are the salient features of Industrial Policy as regards to backward areas?

   b) Explain the need and importance of material handling devices in an Industry.

   c) State the various stages at which inspection should be planned?

   d) Explain the following terms in context of work study.

      (i) Therblings

      (ii) MTM (Method time measurement)

   e) List down various types of clamping devices used in design of jigs. Explain any one with sketch.

   f) Explain the principle of working of Hydraulic Actuator and state it’s advantages.

4. **a) Attempt any THREE of the following:**

   (i) What are the different types of fixtures? Explain any one with sketch.

   (ii) Explain the importance of ‘5S’ (“Five S”) concept.

   (iii) Explain the concept of JIT and how does it help the manufacturing system to improve productivity?

   (iv) Give classification of robot sensor.

   **b) Attempt any ONE of the following:**

   (i) If a worker takes 15 minutes as a standard time for a job in which total allowance is 20% of normal time. If the rating of worker is 100% find the actual time required by the worker.

   (ii) Explain with suitable sketch 3-2-1 principle of location used in jigs and fixtures.
5. Attempt any FOUR of the following: 16
   a) State the functions of production planning.
   b) What is ejector? Explain role and necessity of ejector in the design of jigs and fixtures.
   c) State advantages and disadvantages of ERP system.
   d) Explain pull type manufacturing system.
   e) Explain degree of freedom in Robots.
   f) Explain the basic components of Robots.

6. Attempt any TWO of the following: 16
   a) Explain the GANTT CHART used in production planning and control. State its advantages and disadvantages.
   b) Explain in brief the allowances to be considered while estimating the standard time.
   c) Explain various Robot configurations with neat sketch.