

Instructions:

- Q. 1 is compulsory.
- Attempt any **THREE** questions from the remaining questions
- Assume suitable data wherever necessary
- Figures to the right indicate full marks.

Q.1 Write short notes on. (**Any Four**).

- Assembly line balancing
- Computerized Relative Allocation of Facilities Technique (CRAFT)
- Measures of productivity
- Financial Statements
- Group Technology
- Job evaluation

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Q.2 a. Define Industrial Engineering. State objectives of industrial engineering. Explain system approach to industrial engineering with suitable example. 10

- Define productivity. Discuss the role of government, employers, and employees in productivity improvement. 10

Q.3 a. What is value analysis? What are its objectives? How does it differ from value engineering? 10

- Define micro motion study. What are therbligs? When it is used? List therbligs symbols, colour description, name and code. 10

Q.4 a. What is job evaluation? What objectives are achieved from scientific job evaluation? 10

- Explain the following in connection with time study. 10
 - Selecting the job
 - Selection of worker
 - Breaking the job into elements
 - Number of cycles to be timed

Q.5 a. Define Ergonomics. Explain the importance of anatomy, physiology and psychology, with respect to ergonomics discipline. 10

- b. A work sampling study was conducted for 100 hours in the machine shop in order to estimate the standard time. The total number of observations recorded was 2500. No working activity could be noticed for 400 observations. The ratio between manual and machine elements was 2:1. Average rating factor was estimated as 1.15 and the total number of articles produced during the study period was 6000. Rest and personal allowances are 12% of the normal time. Estimate standard time to perform the operation. 10

- Q.6 a. What is materials handling systems? Explain the important principles of material handling. 10
- b. What is time value of money? Compare the main features of payback, net present value, and internal rate of return methods of evaluation. 10
