

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

**CLASS: BE  
BRANCH: PRODUCTION**

**SEMESTER : V  
SESSION : MO/18**

**SUBJECT: PE5007-WORK STUDY AND ERGONOMICS**

**TIME: 03:00 HRS.**

**FULL MARKS: 60**

**INSTRUCTIONS:**

1. The question paper contains 7 questions each of 12 marks and total 84 marks.
  2. Candidates may attempt any 5 questions maximum of 60 marks.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) Discuss the contributions of F.W. Taylor in the field of work study. [2]  
(b) Discuss the roles of following disciplines in the development ergonomics: [4]  
(i) Work physiology (ii) Engineering psychology  
(iii) Engineering anthropometry (iv) Environmental physiology  
(c) Define work study and ergonomics. Discuss its roles in enhancing industrial productivity. [6]
- Q.2(a) Enumerate various recording techniques used in method analysis. [2]  
(b) Draw a suitable chart to establish a number of machines to be assigned to one operator. Also discuss the advantages of the chart. [4]  
(c) State and explain the principles of a good plant layout. Also state the characteristics of process type layout. [6]
- Q.3(a) Explain the use of therbligs with the help of suitable example. [2]  
(b) State the principles of motion economy related to: [4]  
(i) The design of tools and equipments  
(ii) Design of work place  
(c) What is SIMO chart? Explain SIMO chart with the help of a suitable example. What are advantages and limitations of this chart? [6]
- Q.4(a) Define work measurement. What are the application possibilities of time study? [2]  
(b) What do you mean by performance rating? What are different methods of performance rating? Explain any one stating its advantages and limitations. [4]  
(c) What is work sampling? Explain the procedure of work sampling for establishing schedule of visits. What are its advantages and limitations? [6]
- Q.5(a) What is merit rating? Enumerate various types of errors involved in merit rating. [2]  
(b) Define job evaluation. With the help of suitable example, explain the factor comparison method of job evaluation. [4]  
(c) What do you mean by wage incentives? Explain following plans of wage incentives stating their advantages and limitations: [6]  
(i) Straight wage incentive plan  
(ii) Taylors' wage incentive plan
- Q.6(a) What are the conditions under which you will recommend a work to be performed in: [2]  
(i) Seated posture (ii) Standing posture  
(b) What do you mean by control - display compatibility ratio? Explain its conceptual frame work with the help of suitable example. [4]  
(c) What do you mean by man - machine communication system? Enumerate various factors required for selecting a particular type of man - machine communication system with a suitable example. [6]
- Q.7(a) Define material handling. Explain the principle of unit load for handling the materials. [2]  
(b) Explain the principle of material handling with respect to design of good plant layout. [4]  
(c) What are different material handling equipments? Mention characteristic features and conditions for usefulness of any three types of equipments. [6]