Roll No. | | | | | | | | | | |

**ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)**

**B.E. (Full Time) – ARREAR END SEMESTER EXAMINATIONS, NOV/DEC 2024**

INDUSTRIAL ENGINEERING
IV Semester
**IE5401 & WORK SYSTEM DESIGN**

(Regulation 2019)

Time: 3hrs | Max.Marks: 100

| | |
|---|---|
| CO 1 | To Estimate Rating factors, allowances and standard times to assess the work condition and environment. |
| CO 2 | To record and analyse the task using Method study and apply principle to improve performance |
| CO 3 | To Conduct a time study to improve the efficiency of the system |
| CO 4 | To Estimate Rating factors, allowances and standard times to assess the work condition and environment |
| CO 5 | Appraise the standard times to assess the office work condition. |

**BL – Bloom's Taxonomy Levels**
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

## PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

| Q. No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 1 | Define Work-study | 2 | 1 | L1 |
| 2 | List down the steps involved in work study? | 2 | 1 | L2 |
| 3 | Discuss the symbols used in two handed process charts. | 2 | 2 | L2 |
| 4 | Differentiate between cycle graph and chrono cycle graph. | 2 | 2 | L2 |
| 5 | What is synthetic rating? What is its principal strength? | 2 | 3 | L1 |
| 6 | Define governing and foreign element | 2 | 3 | L1 |
| 7 | Briefly define the Taylor's Differential Piece Rate System | 2 | 4 | L2 |
| 8 | Expand and define PMTS. | 2 | 4 | L1 |
| 9 | What is the importance of method study in office | 2 | 5 | L1 |
| 10 | Differentiate between MICR and OCR forms | 2 | 5 | L2 |

## PART- B (5 x 13 = 65 Marks)
(Restrict to a maximum of 2 subdivisions)

| Q. No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 11 (a) | How the total work content of manufacturing a component is made up? Explain the Excess time & ineffective time due to shortcomings on the part of the management and workers and how management techniques can reduce the Excess time & ineffective time due to shortcomings on the part of the management. | 13 | 1 | L3 |
| | **OR** | | | |
| 11 (b) | Explain the Total productivity model, Productivity Index model and APC model | 13 | 1 | L3 |
| 12 (a) | Explain any four Effective and ineffective THERBLIG with proper justification as why they are effective Ineffective | 13 | 2 | L3 |

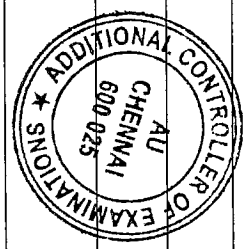
**OR**

| | | | | |
|---|---|---|---|---|
| 12 (b) | Discuss the principle of motion economy with examples. | 13 | 2 | L3 |
| 13 (a) | The Minnesota Coach company has just been given the following production schedule for ski lift gondola cars. This product is considerably different from any others the company has produced. Historically, the company's learning rate has been 80% on large projects. The first unit took 1000 hours to produce. | 13 | 3 | L4 |

| Month | Units | Cumulative Units |
|---|---|---|
| 1 | 3 | 3 |
| 2 | 7 | 10 |
| 3 | 10 | 20 |
| 4 | 12 | 32 |
| 5 | 4 | 36 |
| 6 | 2 | 38 |

a. Estimate how many hours would be required to complete the thirty-eight unit.

b. If the budget only provides for a maximum of 30 direct labour employees in any month and a total of 15,000 direct labour hours for the entire schedule, will the budget be adequate? Assume that each direct labour employee is productive for 150 work hours each month.




**OR**

| | | | | |
|---|---|---|---|---|
| 13 (b) | b) Continuous stop watch time study figures for a job are given in Table 13b.Calculate the standard time for the job assuming that the sample size is adequate, and total allowances are 15%. | 13 | 3 | L4 |

**Table 13b: Data recording for all the four manual-elements**

| Element No | Cycle Time (min) (observations | | | | | | | | | | Performance rating |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 1 | 9 | 41 | 71 | 107 | 38 | 67 | 98 | 28 | 57 | 87 | 115% |
| 2 | 15 | 46 | 79 | 13 | 43 | 72 | 103 | 33 | 62 | 93 | 105% |
| 3 | 28 | 59 | 94 | 27 | 56 | 85 | 18 | 46 | 76 | 100 | 97% |
| 4 | 32 | 62 | 98 | 30 | 59 | 88 | 21 | 49 | 79 | 09 | 120% |

| | | | | |
|---|---|---|---|---|
| 14 (a) | Furtado Engineering works wants to introduce Rowan Scheme and Halsey plan with the intention of enhancing production. The standard time for to production of an item is 16 minutes per piece. The eight-hour day has 400 working minutes. What would be to earnings of the operator given the present wage rate of Rs 11.40 per hour, if he produced 30,40,45,60, 70 units in a day. Find the earnings using Rowan Scheme and Halsey plan | 13 | 4 | L3 |

**OR**

| | | | | |
|---|---|---|---|---|
| 14 (b) | Find out time in minutes using MOST Technique?<br>i) Pick up a screwdriver from the table within reach and place it on the head of a screw, turn down the screw 9 wrist turns and set aside the tool.<br>ii) A punch press operator pushes two buttons simultaneously within reach to actuate the press. Press cycles for 2.5 seconds.<br>iii) A worker collects scrap wires rom the table within reach and tosses them into a garbage can.<br>iv) After the team's 4th loss, the coach, with whistle in hand, walks 6 steps and tosses the whistle into the garbage can- | 13 | | L3 |
| 15 (a) | a) Explain the steps in designing a forms control Programme? | 13 | 5 | L2 |

**OR**

| | | | | |
|---|---|---|---|---|
| 15 (b) | Illustrate the principles and aspects of organisations and methods. | 13 | 5 | L2 |

## PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

| Q. No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 16. (i) | A Multi-Specialty hospital in Mumbai follows certain systematic way of serving Lunch in a hospital ward. The hospitals ward containing 15 beds. When dinners were served by the nurse in charge of the ward fetched a large tray bearing the first course, together with the plates for the patients, from the kitchen. The food was usually contained in three dishes two of which held vegetables and the third the main dish. The nurse placed the tray on the table marked serving table. She set the large dishes out on the table, served one plate with meat and vegetables and carried it to bed. She returned to the serving table and repeated the operation for the remaining 14 beds. When she served all the patients with the first course, she returned to the kitchen with the tray and the empty dishes, collected the dishes and plates for the second course and returned to the ward. She then repeated the complete operation, replacing the plates -emptied by the patients with plates containing their second course and returning the used plates to the serving table, where she stacked them. Finally, she made a tour of the ward, collecting up the empty plates from the second course, and carried everything on the tray back to the kitchen. Identify which type of chart can be used for the current method and propose the new method for the identified chart? Summarize the findings by showing the present and proposed chart. | 15 | 2 | L5 |