Total No. of printed pages = 7

END SEMESTER (REGULAR/RETEST) EXAMINATION, DECEMBER–2023

Semester : 5th (New)

Subject Code : Me-502

INDUSTRIAL ENGINEERING

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) Question Nos. 1 and 2 are compulsory.

(ii) Answer any *five* questions from the rest.

1. Choose the correct answers from the following : 1×10=10

(a) Work study is concerned with

(i) improving present method and finding standard time

(ii) motivation of workers

(iii) improving production capability

(iv) improving production planning and control

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(b) Basis of Job Evaluation is

(i) Job design

(ii) Job ranking

(iii) Job analysis

(iv) Any of the above

(c) Which of the following wage incentive plan guarantees minimum wage to a worker and bonus is paid for the fixed percentage of time saved ?

(i) Halsey plan

(ii) Gantt plan

(iii) Rowan plan

(iv) Emerson's efficiency plan

(d) The quality of the product means

(i) Degree of brightness

(ii) Fitness for use

(iii) Degree of perfection at any cost

(iv) Fitness for use at minimum cost

(e) PERT requires

(i) Single time estimate

(ii) Double time estimate

(iii) Triple time estimate

(iv) None of these

(f) In process charts, the symbol used for storage is

(i) Circle (ii) Square

(iii) Arrow (iv) Triangle

(g) Which of the following is a written statement of the skills, knowledge, abilities, and other characteristics needed to perform a job effectively ?

(i) Job analysis (ii) Design.

(iii) Job description (iv) Job specification

(h) When the same rate of incentives is paid to the employees for each unit of goods produced by them, it is called

(i) Straight piece rate

(ii) Differential piece rate

(iii) Task and time bonuses

(iv) None of the above

(i) $\bar{X}$ and R charts are used to find out

(i) Production control (ii) Cost control

(iii) Process control (iv) Material control

(j) Earliest finish time can be regarded as

(i) Earliest start time + duration of activity

(ii) Earliest start time – duration of activity

(iii) Latest finish time + duration of activity

(iv) Latest finish time – duration of activity.

2. Fill in the blanks with appropriate word(s) : $1 \times 5 = 5$

(a) In process charts, the symbol used for inspection is _____.

(b) Evaluating the relative worth of the employees in the organization and then deciding the awards for them are called _____.

(c) When more than one piece rate is offered to the individuals for goods produced by them, it is called _____.

(d) Control charts based upon measured quality characteristics are called as _____.

(e) The performance of a specific task in CPM is known _____.

3 (a) Differentiate between "Method Study" and "Work measurement". 4

(b) Give the various symbols utilized as recording techniques with their meaning. 7

4 (a) Define work measurement and state its objectives. 1+4=5

(b) In a time study for a job done by a worker whose rating is 90, the data are as follows : Observed time = 20 minutes, Personal needs allowances = 4% of Basic time, Fatigue allowance = 2.5% of Basic time , Contingency work allowance = 2% of Basic time, Contingency delay allowance = 1% of Basic time. Find :

(i) Basic time

(ii) Work content and

(iii) Standard time. 6

5 (a) Define 'Job Evaluation' and explain its objectives. 1+4=5

(b) What are the four basic methods of job evaluation ? Describe any one of them. 1+5=6

6 (a) Define the following : 3

(i) Minimum wages

(ii) Fare wages and

(iii) Living wage.

(b) There are three workers X, Y, and Z manufacturing steel pins. They are paid at a standard rate of Rs. 40 per day and are supposed to produce 50 pins a day. If they are producing 30, 50 and 60 pins respectively, calculate their earnings on the basis of Emersion's efficiency plan. 8

7 (a) State different types of control charts used for controlling variables and attributes type of characteristics. 2

(b) Plot the control charts for $\bar{X}$ and R using the following sample data and a sample size of 5. From the chart find out whether the process is in control. 9

Subgroup No.	1	2	3	4	5
$\bar{X}$	5,004	5,204	5,014	5,008	5,009
R	0.02	0.08	0.03	0.05	0.04

Subgroup No.	6	7	8	9	10
$\bar{X}$	5,016	5,030	5,010	5,016	5,010
R	0.09	0.04	0.04	0.05	0.07

8 (a) Explain Critical Path Method. 2

(b) The activities involved in a small project are given below along with relevant information. Construct the network and find the critical path and project duration. Also find the floats for each activity. 9

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration (days)	20	25	10	12	6	10