Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Seventh Semester - Regular) Examinations, November – 2025

22BCHOE47011-Industrial Engineering

(Chemical Engineering)

Time: 3 hrs Maximum: 70 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions

		CO #	Blooms Level
a.	Briefly discuss the difference between manufacturing and service sector with suitable examples.	CO1	K2
b.	Explain the concepts involved in new product design.	CO1	K2
c.	Describe the use of the Delphi method in forecasting uncertain or long-term events.	CO2	K2
d.	Explain the role of Master Production Scheduling (MPS) in production planning.	CO3	K2
e.	State different sequencing rules for single machine and n job problems.	CO4	K1

PART – B **(15 x 4 = 60 Marks)**

Answer ***all*** the questions

		Marks	CO #	Blooms Level
2. a.	What is time study? Explain the steps involved in time study for the calculation of standard time through stopwatch time study technique.	8	CO1	K2
b.	Discuss different type of production system with appropriate examples.	7	CO1	K2

(OR)

c. A job consisting of three work elements and all are performed by the same operator. An analyst conducted work sampling to determine the standard time for the job. The duration of the study is one shift with 400 min. of effective time. The details of observations are summarized in the following table. The total number of acceptable units produced during the study period is 150 units. Determine the standard time by assuming allowance of 10%. — 8, CO1, K3

Work element number	Frequency of performance	Performance rating
1	70	80%
2	80	120%
3	50	110%

		Marks	CO #	Blooms Level
d.	Pilot study showed percentage of occurrence of an activity as 50%.Determine the number of observation required for work sampling study for 95% confidence level and relative error of +-2%.	7	CO1	K3
3.a.	Discuss various types of layouts and also write merits and demerits of the layouts.	8	CO2	K2
b.	Explain any one quantitative method for selection of facility location.	7	CO2	K2

(OR)

c. The super Snow paint shop has recorded the demand for a particular colour during the past 6 weeks as shown below. — 8, CO2, K3

Week	1	2	3	4	5	6
Demand in Litre	19	17	22	27	29	33

(a) Calculate a 3-week moving average for the data to forecast demand for the next week.

(b) Calculate weighted average forecast for the data, using a weight of 0.6 for the most recent data and weights of 0.3 and 0.1 for successive older data.

d. Suppose that there are 5 existing plants, which have a material movement relationship with a new plant. Let the existing plants have locations of (400, 200), (800, 500), (1100, 800), (200, 900) and (1300, 300). Furthermore suppose that the numbers of tons transported per year from the new plant to various existing plants are 450, 1200, 300, 800, and 1500, respectively. Then determine optimum location for new plant such that the distance moved (cost) is minimized. 7 CO2 K3

4.a. Write Short notes on P-type and Q-type inventory system. 8 CO3 K1

b. Write a short notes on Capacity Requirements Planning (CRP). 7 CO3 K1

(OR)

c. Annual demand for an item is 4800 units. Ordering cost is Rs. 500 per order . Inventory cost is 24% of the purchase price per unit, per year. The price breaks are shown in table. Find the optimal order size. 8 CO3 K3

QUANTITY	PRICE
0-1200	10
1200-2000	9
2000-Q3	8

d. If a product is to be manufactured within the company, the details are as follows annual demand is 24000unit, No. of unit produced per year is 48000, cost per setup is Rs.200, carrying cost per unit is Rs. 20/year. Find the EBQ and cycle time. 7 CO3 K3

5.a. Consider the following 3 machines and 5 jobs flow shop problem. Find the optimal sequence, total completion time and the idle time for each machine. 10 CO4 K3

JOB:	1	2	3	4	5
M1:	8	10	6	7	8
M2:	5	6	2	3	4
M3:	4	9	8	6	5

b. What is sequencing? State the Johnson's rule. 5 CO4 K1

(OR)

c. A project is having in the following activities and their time estimates. 10 CO4 K3

Activity	Predecessor	Time days		
		Optimistic(t_0)	Most likely(t_m)	Pessimistic(t_p)
A		2	4	6
B	A	8	12	16
C	A	14	16	2
D	B	4	10	16
E	C,B	6	12	18
F	E	6	8	22
G	D	18	18	30
H	F,G	8	14	32

Draw the network diagram and find the critical path and duration. Find also the total float, free float and independent float for each activity.

d. Write short notes on JIT. 5 CO4 K1

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