Ex/Che/HS/B/Mech/T/423/2025

B.E CHEMICAL ENGINEERING

4TH Yr. (2nd Semester) Examination, 2025

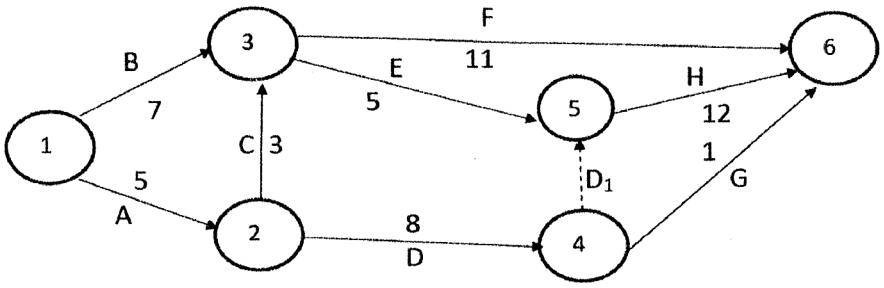
Industrial Management

Time: Three hours **Full marks: 100**

Answer any *five*questions

(All Parts of One Question must be Answered Together)

1. a) In the following network diagram, all the durations are in days. Find the critical path.



(10)

1. b) A project consists of activities A,B,C,D,E,F,G and H. These activities along with their precedence relationship are given in the following table: Draw the network diagram.

Activity	Predecessor activity	Activity	Predecessor activity
A	-	E	B, C
B	A	F	E
C	A	G	D,F
D	B	H	G

(10)

2. a) The supply of a component has the following price schedule:

0 to 99 items: Rs. 1000/- per piece

100 and above items: Rs. 950/- per piece

The inventory holding costs are estimated to be 25% of the value of inventory. The procurement costs are estimated to be Rs. 2000/- per order. If the annual requirement of the component is 300, compute the Economic Order Quantity (EOQ). (15)

2. b) A equipment is to operate for 5000 hours. Failure rate estimated as one in 50000 hrs. What is the probability of survival? (05)

3. a) What do you mean by Economic Manufacturing Batch Size? Explain clearly with at least two real life examples. (08)

3.b) Derive an expression for Economic Batch Quantity stating clearly the types of inventory related costs and the assumptions. (08)

3. c) Explain the JIT manufacturing philosophy. (04)

4.a)Summarize F.W. Taylor's contributions to Scientific Management. (06)

b) What is meant by Product layout? Discuss the same with a suitable diagram. (08)

c) How do you define an organization? Give examples of organizations. What do you mean by Span of Management? What factors govern this span of management? (06)

5 a)For the following transportation problem, obtain initial feasible solution by Vogel's Approximation method(VAM). The entries in the matrix indicate the cost in rupees for transporting a unit from a particular source to a particular destination.

Origin	Destination				Availability
	1	2	3	4	
1	10	8	11	7	20
2	9	12	14	6	40
3	8	9	12	10	35
Requirement	16	18	31	30	95

(10)

5b) A computer centre has got three expert programmers. The centre needs three application programs to be developed. The head of the computer center, after studying carefully the

programs to be developed, estimates the computer time, in minutes, required by the experts to develop the application programs, as follows:

Programmer	Programs		
	A	B	C
1	120	100	80
2	80	90	110
3	110	140	120

Assign the programmers to the programs in such a way that the total computer time is least. (06)

5. c) What is the necessity of selective inventory control? Give suitable examples. (04)

6. Write short notes (any four): (20)

a) Statistical Quality Control (SQC)

b) Method Study

c) Acceptance Sampling

d) Standard Time

e) Reliability and Bath Tub Curve

f) Break even analysis

7. a) Use Johnson's rule to find the optimum sequence for processing the jobs shown through two work Centers in flow shop scheduling. Times at each centre are in hours.

Job	A	B	C	D	E	F	G
Work Centre 1	6	8	18	15	16	6	10
Work Centre 2	12	7	9	10	8	8	5

Compute the throughput time for the optimum sequence of jobs obtained in part (a) and the corresponding idle time at the two work centres. (07)

7. b) What are the factors (both qualitative & quantitative) are to be taken into account while setting up a greenfield Petroleum Refinery? (07)

7. c) Godavari Electric Ltd. wanted to set up a new plant for manufacturing industrial heaters. The management of Godavari Electricals identified Kakinada, Vijayavada, and Hyderabad as the potential areas to set up the plant. The fixed cost per year and the variable cost per heater at each of the three locations are given below:

Location	Fixed Cost/Yr	Variable Cost/Unit
Kakinada	Rs 2,00,000	325
Vijayavada	Rs 2,50,000	285
Hyderabad	Rs 3,00,000	265

The product is expected to be sold at Rs 1050 and company hopes to sell 600 heaters per year. Calculate the likely profit each location and determine the most profitable location for the company. (06)

8. (a) We are inspecting 25 successive wafers. Here, the wafer is the inspection unit. The observed number of defects are:

Wafer Number	Number of Defects	Wafer Number	Number of Defects
1	16	14	16
2	14	15	15
3	28	16	13
4	16	17	14
5	12	18	16
6	20	19	11
7	10	20	20
8	12	21	11
9	10	22	19
10	17	23	16
11	19	24	31
12	17	25	13
13	14		

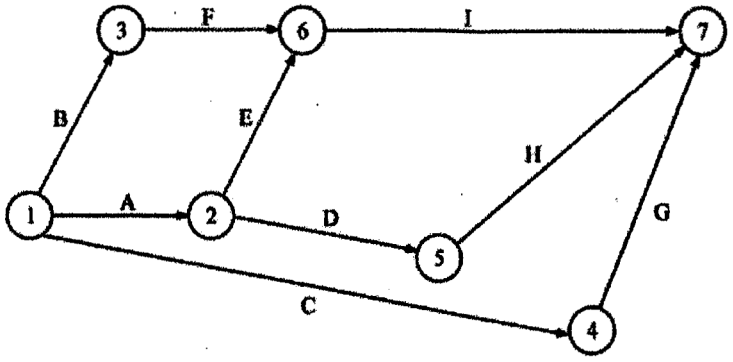
Draw the suitable control chart. Comment on whether the process is under control. (12)

8. (b) What is the importance of a control chart? (08)

9. (a) Difference between PERT and CPM (5)

9. (b) The following network diagram represents activities associated with a project:

Activities	:	A	B	C	D	E	F	G	H	I
Optimistic time, t_0	:	5	18	26	16	15	6	7	7	3
Pessimistic time, t_p	:	10	22	40	20	25	12	12	9	5
Most likely time, t_m	:	8	20	33	18	20	9	10	8	4



Determine the following: (a) Expected completion time and variance of each activity (b) The earliest and latest expected completion times of each event. (c) The critical path. (d) The probability of expected completion time of the project if the original scheduled time of completing the project is 41.5 weeks. (e) The duration of the project that will have 95 per cent chance of being completed. (15)

10. (a) What are the objectives of job evaluation and merit rating? (10)

10. (b) Explain two different wages incentive plan (i) Hasley plan (ii) Rowan plan. (10)