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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2025 - 2026)

Subject: Industrial Engineering

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- (1.1) Which of the following charts are used for plant layout design? 1
 1. Operation process chart 2. Man machine chart
 3. Correlation chart 4. Travel chart. Select the correct answer using the codes given below: [CO1,K1]
 (a) 1, 2, 3 and 4
 (b) 1, 2 and 4
 (c) 1, 3 and 4
 (d) 2 and 3
- (1.2) Which of the following explain the need for facility location selection? [CO1,K1] 1
 (a) When the existing business unit has outgrown its original facilities and expansion is not possible.
 (b) When a business is newly started.
 (c) When the lease expires and the landlord does not renew the lease.
 (d) All of these
- (1.3) The sales of cycles in a shop in four consecutive months are given as 70, 68, 82, and 95. Exponentially smoothing average method with a Smoothing factor of 0.4 is used in forecasting. The expected number of sales in the next month is: [CO2,K2] 1
 (a) 59
 (b) 72
 (c) 86
 (d) 136
- (1.4) A dummy activity is used in PERT network to describe [CO2,K1] 1

- (a) Precedence relationship
 - (b) Necessary time delay
 - (c) Resource restriction
 - (d) Resource idleness
- (1.5) If the arrivals are completely random, then what is the probability distribution of number of arrivals in a given time? [CO3,K2] 1
- (a) Negative exponential
 - (b) Binomial
 - (c) Normal
 - (d) Poission
- (1.6) In inventory control theory, the economic order quantity (E.O.Q.) is: [CO3,K1] 1
- (a) Average level of inventory
 - (b) Optimum lot size.
 - (c) Lot size corresponding to break-even analysis
 - (d) Capacity of a warehouse
- (1.7) Work study is also recognised as [CO4,K1] 1
- (a) Time study
 - (b) Motion study
 - (c) both 'a' and 'b'
 - (d) None of the above
- (1.8) Which one of the following is NOT a work measurement technique? [CO4,K1] 1
- (a) Time study
 - (b) Work sampling
 - (c) Motion time data
 - (d) Micromotion study
- (1.9) The assignment problem is always a _____ matrix. [CO5,K1] 1
- (a) circle
 - (b) square
 - (c) rectangle
 - (d) triangle
- (1.10) The slack variables indicate _____. [CO5,K1] 1
- (a) excess resource available.
 - (b) shortage of resource
 - (c) nil resource
 - (d) idle resource

2. Attempt all parts:-

- (2.1) Define the term production system.[CO1,K1] 2
- (2.2) What is shortest route problem? [CO2,K1] 2
- (2.3) Explain Kendall's notation. [CO3,K1] 2
- (2.4) State the limitation of time study. [CO4,K1] 2

- (2.5) List out the methods used to obtain initial basic feasible solution in Transportation Problem. [CO5,K1] 2

SECTION-B

30

Answer any one of the following:-

- (3.1) What are advantages and disadvantages of urban and suburban locations for a plant? Compare rural and urban sites for the location of the plan [CO1,K2] 6
- (3.2) Define process planning. Also differentiate between manual process planning and computer aided process planning [CO1, K2] 6

Answer any one of the following:-

- (3.3) Distinguish between PERT and CPM. [CO2,K2] 6
- (3.4) Explain the shortest route problem with an example [CO2,K2] 6

Answer any one of the following:-

- (3.5) With the help of neat diagram explain the following terms:
(i) Order Quantity (ii) Lead Time (iii) Safety Stock (iv) Re-Order Point. [CO3, K2] 6
- (3.6) Derive the formula for determining EOQ for several production runs or unequal lengths. [CO3, K3] 6

Answer any one of the following:-

- (3.7) Compare outline process chart and flow process chart. [CO4,K2] 6
- (3.8) Explain the purpose of string diagram and explain it with an example. [CO4,K2] 6

Answer any one of the following:-

- (3.9) Explain the optimality test in a transportation problem with help of suitable example? (CO5,K3] 6
- (3.10) Define the following terms, 6
(a) Shadow price, (b) Opportunity cost,
(c) Key column, (d) Key row
(e) Key number and (f) Limiting ratio. [CO5, K2]

SECTION-C

50

4. Answer any one of the following:-

- (4.1) Explain Group Technology. Explain in detail Production Flow Analysis method? Describe various benefits for Group Technology. [CO1, K2] 10
- (4.2) Explain Steps of generative type of process planning. Also write down the advantages and limitations of Generative process planning. [CO1, K2] 10

5. Answer any one of the following:-

- (5.1) What do you understand by forecasting. What are the different types of forecasting. explain exponential smoothing method of forecasting.[CO2, K2] 10
- (5.2) Listed in the table are the activities and sequencing requirements necessary for completing the research project. Draw the network and compute EST, EFT,LST,LFT, Total float and critical path. [CO2, K3] 10

Activity	A	B	B	D	E	F	G	H	I	J	K	L	M
Duration	4	2	1	12	14	2	3	2	4	3	4	2	2
Immediate Predecessor	E	A	B	K	-	E	F	F	F	I,L	C,G,H	D	I,L

6. Answer any one of the following:-

- (6.1) Consider a box office ticket window being manned by a single server. Customer arrives to purchase ticket according to Poisson input process with a mean rate of 30/hr. the time required to serve a customer has an ED with a mean of 90 seconds determine: 10
- (a) Mean queue length.
- (b) Mean waiting time in the system.
- (c) The probability of the customer waiting in the queue for more than 10min.
- (d) The fraction of the time for which the server is busy. [CO3,K3]
- (6.2) The ratio of variable costs to sales is 70 percent. The break even point occurs at 60 percent of the capacity. Find the break even point sales when fixed costs are Rs. 90,000. Also compute profit at 75% of the capacity sales. [CO3, K3] 10

7. Answer any one of the following:-

- (7.1) Define Work Study. State its objectives. Differentiate between Method Study and Work Measurement. [CO4,K2] 10
- (7.2) Explain the various steps in conducting a stop watch time study. [CO4,K2] 10

8. Answer any one of the following:-

- (8.1) Obtain an initial basic feasible solution to the following transportation problem using the Vogel Approximation Method [CO5,K4] 10

	1	2	3	4	Supplies
1	20	25	28	31	200
2	32	28	32	41	180
3	18	35	24	32	110
Demands	150	40	180	170	

- (8.2) There are 3 jobs A, B, and C and three machines X, Y, and Z. All the jobs can be processed on all machines. The time required for processing job on a machine is given below in the form of matrix. Make allocation to minimize the total processing time.[CO5, K3] 10

	Machines (time in hours)		
JOBS	X	Y	Z
A	11	16	21
B	20	13	17
C	13	15	12