RollNo. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

MINING ENGINEERING
VII Semester
MI5007 System Engineering in Mining
(Regulation 2019)

Time: 3hrs   Max. Marks: 100

CO1	The students will learn the concept of system engineering and applicability in mining field.
CO2	The students will learn the concept of operational research and applicability in mining field.
CO3	The students will learn about simulation techniques.
CO4	The students will have knowledge about CPM, PERT, etc.
CO5	They will also know about basic models, statistical theory, etc.

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

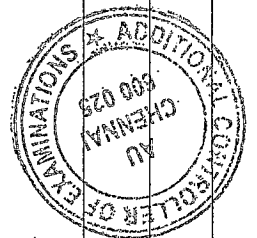## PART- A (10x2=20Marks)
(Answer all Questions)

Q. No.	Questions	Marks	CO	BL
1	Define System Engineering.	2	1	1
2	State the tools available for system engineering.	2	1	2
3	What is linear Programming?	2	2	1
4	Differentiate operation research and system engineering.	2	2	2
5	State different techniques of transportation model.	2	3	1
6	Differentiate model with simulation	2	3	2
7	Define Critical Path in network Analysis.	2	4	1
8	Differentiate the PERT with CPM	2	4	2
9	Define Optimization.	2	5	1
10	What is statistical decision theory?	2	5	1

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

Q.No.	Questions	Marks	CO	BL
11 (a)	Discuss in detail the common sense is essential even though scientifically applied operation research with a few examples	13	1	3
	OR			
11 (b)	Explain in detail system engineering concept applied in mining industry	13	1	3
12 (a)	A patient visits the doctor to get treatment for ill-health. The doctor examine and advise to take at least 40 units of vitamin A and 50 units of vitamin B. He has to take tonic X & Y that have both vitamin A & B. one unit of tonic X contain 2 unit of vitamin A and 3 units of vitamin B and tonic Y consist of 4 units of vitamin A and 2 units of vitamin B. The cost of tonic Rs. 3 and Rs. 2.50 per unit X and Y respectively. Minimize the total cost, at the time he get the required amount of vitamin.	13	2	4
	OR			
12	Solve the following	13	2	4

(b)	Max Z= $x_1 + x_2$ Subject to $x_2 <= 2$ $3x_1 + 2x_2 <= 5$ $x_1, x_2 >= 0$ and integer							

13 (a)	Solve the transportation problem and find the lease cost					13	3	4

Source/ Destination	A	B	C	Supply
1	2	7	4	5
2	3	3	1	8
3	5	4	7	7
4	1	6	2	14
Demand	7	9	18	

OR

13 (b)	Solve the assignment problem						13	3	4

	1	2	3	4	5
I	20	15	18	20	25
II	18	20	12	14	15
III	21	23	25	27	25
iV	17	18	21	23	20
V	18	18	16	19	20

14 (a)	Find the Critical Path using CPM.					13	4	4

Activity	Predecessors	Duration (days)
A	–	3
B	A	4
C	A	5
D	A	4
E	B	2
F	D	9
G	C, E	6
H	F, G	2

OR

14 (b)	Find the Critical Path using PERT.					13	4	4

Activity	Immediate Predecessor	Optimistic Time	Most Likely Time	Pessimistic Time
a	–	10	22	22
b	–	20	20	20
c	–	4	10	16
d	a	2	14	32
e	b,c	8	8	20
f	b,c	8	14	20
g	b,c	4	4	4
h	c	2	12	16
I	g,h	6	16	38
j	d,e	2	8	14

Q. No.	Questions	Marks	CO	BL
15 (a)	Discuss in detail inventory of machinery spare parts and explosives is mainlined in mining industry	**13**	5	3
OR				
15 (b)	Explain in detail statistical decision theory and optimization is used mining operations like drilling, loading and transportation.	**13**	5	3

PART- C (1x 15=15Marks)
(Q.No.16 is compulsory)

Q. No.	Questions	Marks	CO	BL
16.	A mining Company owns two different mines (A and B) for producing Iron ore. The two mines are located in different areas and produce different qualities of uranium ore. After the ore is mined, it is separated into three grades— high-, medium-, and low-grade. Mine A produces 0.75 tons of high-grade ore, 0.25 tons of medium grade ore, and 0.50 tons of low-grade ore per hour. Likewise, Mine B produces 0.25, 0.25, and 1.50 tons of high, medium, and low-grade ore per hour, respectively. The firm has contracts with iron-processing plants to supply a minimum of 36 tons of high-grade ore, 24 tons of medium-grade ore, and 72 tons of low-grade ore per week. It costs the company 50,000 per hour to operate Mine A and 40,000 per hour to operate Mine B. The company wishes to determine the number of hours per week it should operate each mine to minimize the total cost of fulfilling its supply contracts.	15	1,2,3	4