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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2022 ONLY)

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REG.NO

NGM COLLEGE (AUTONOMOUS) POLLACHI

END-OF-SEMESTER EXAMINATIONS: MAY 2023

B. Sc Computer Science with AI & ML **MAXIMUM MARKS: 50**

II SEMESTER **TIME: 3 HOURS**

PART - III

ALLIED II-OPTIMIZATION TECHNIQUES

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

1. In LPP the decision variables are _____
   a. same b. zero c. non – negative d. negative
2. A basic feasible solution involving exactly _____ variables is known as non-degenerate basic feasible solution.
   (a) $m+n$ (b) $m+n-1$ (c) $m+n+1$ (d) mn
3. An activity is critical if its total float is.....
   (a) 1 (b) 2 (c) 0 (d) infinity
4. _____ factor affecting inventory control.
   (a) Demand (b) lead time and order cycle
   (c) time horizon and re-order level (d) all
5. Sequencing problems involving processing of two jobs on n machines_____
   (a) Can be solved graphically
   (b) Cannot be solved graphically
   (c) Have a condition that the processing of two jobs must be in the order
   (d) Can be solved simplex method

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES (K2)

6. Define Surplus variables.
7. What is called balanced transportation problem?
8. Define Project.
9. What is called cycle inventories?
10. Write any one situation when the replacement of certain item needs to be done?

SECTION – B (5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(Qn. No. 11 to 15 Questions for Short Answers with internal choices) (K3)

11. a) Explain the basic concept of Graphical solution method.

(OR)

b) Use Penalties method to solve the following LPP:
Maximize $z = 6x_1+4x_2$
Subject to the constraints: $2x_1+3x_2 \leq 30$; $3x_1+2x_2 \leq 24$; $x_1+x_2 \geq 3$;
Where $x_1, x_2 \geq 0$

(CONTD….2)

12. a) Obtain an initial basic feasible solution to the following transportation problem using North-West corner method:

	E	F	G	H	Availability
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	950

(OR)

b) Obtain an initial basic feasible solution to the following transportation problem using the Least-cost method.

	D	E	F	G	Capacity
A	1	2	3	4	6
B	4	3	2	0	8
C	0	2	2	1	10
Demand	4	6	8	6	

13. a) Write the rules of network construction.

(OR)

b) Write the distinction between PERT and CPM.

14. a) Neon lights on the U of A campus are replaced at the rate of100 units per day. The physical plant orders the neon lights periodically. It costs $100 to initiate a purchase order. A neon light kept in storage is estimated to cost about $.02 per day. The lead time between placing and receiving an order is 12 days. Determining the inventory policy of neon lights, EOQ is 1000 units. If the daily demand is normal with mean D = 100 lights and standard deviation U = 10 lights-that is, $N(100,10)$.Determine the buffer size so that the probability of running out of stock is below $\alpha = .05$.

(OR)

b) Explain the characteristics of a queuing system.

15. a) Solve the following sequencing problem

Job	J_1	J_2	J_3	J_4	J_5	J_6
Machine A	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

(OR)

b) The data collected in running a machine, the cost of which is Rs 60, 000 are given below

Year	1	2	3	4	5
Resale	42,000	30,000	20,400	14,400	9,650
Cost of spares	4,000	4,270	4,880	5,700	6,800
Cost of labour	14,000	16,000	18,000	21,000	25,000

(CONTD….3)

SECTION – C (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(Qn. No. 16 to 20 Questions for Long Answers with internal choices (K4 (Or) K5)

16. a) Use simplex method to solve the following LPP

Maximize $z= 4x_1+10x_2$

Subject to

$2x_1+x_2\leq 50$; $2x_1+5x_2\leq 100$; $2x_1+3x_2\leq 90$ where $x_1,x_2\geq 0$

(OR)

b) Solve graphically

Maximize $z = 4x_1 + 3x_2$

Subject to the constraints: $2x_1 + x_2 \leq 1000$;

$x_1 + x_2 \leq 800$;

$x_1 \leq 400$; $x_2 \leq 700$;

Where $x_1, x_2 \geq 0$

17. a) A departmental head has four subordinates and four tasks to be performed. The subordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to perform each task is given in the matrix below:

Tasks	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated one to a man so as to minimize the total man-hours?

(OR)

b) Find the starting solution in the following transportation problem by Vogel's approximation method. Also obtain the optimum solution:

	D1	D2	D3	D4	Supply
S1	3	7	6	4	5
S2	2	4	3	2	2
S3	4	3	8	5	3
Demand	3	3	2	2	

18. a) A small project consists of seven activities for which the relevant data are given below:

Activity	Preceding activities	Activity duration(days)
A	-	4
B	-	7
C	-	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

(i) Draw the network and find the project competition time.

(ii) Calculate total float for each of the activities and highlight the critical path

(iii) Draw the time scaled diagram.

(CONTD….4)

(OR)

b) A project consists of eight activities with the following relevant information:

Activity	Immediate predecessor	estimated duration (days)		
		Optimistic	Most likely	Pessimistic
A	---	1	1	7
B	---	1	4	7
C	---	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D,E	3	6	15
H	F,G	1	2	3

(i) Draw the PERT network and find out the expected project completion time.
(ii) Draw duration will have 95% confidence for project completion?
(iii) If the average duration for activity F increase to 14 days, what will be its effect on the excepted project completion time which will have 95% confidence?

19. a) In a railway marshaling yard, goods train arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the following (i) the mean queue size (ii) the probability that the queue size exceeds 10 if the input of trains increases to an average 33 per day , what will be the change in (i) & (ii).

(OR)

b) Lube Car specializes in fast automobile oil change. The garage buys car oil in bulk at $3 per gallon. A discount price of $2.50 per gallon is available if Lube Car purchases more than 1000 gallons. The garage services approximately 150 cars per day, and each oil change takes 1.25 gallons. Lube Car stores bulk oil at the cost of$.02 per gallon per day. Also, the cost of placing an order for bulk oil is $20. There is a 2-day lead time for delivery. Determine the optimal inventory policy. The consumption of oil per day is D = 150 cars per day X 1.25 gallons per car = 187.5 gallons per day

20. a) Solve the following sequencing problem.

Book	1	2	3	4	5	6
Machine A	30	120	50	20	90	100
Machine B	80	100	90	60	30	10

(OR)

b) A firm is considering replacement of a machine whose cost price is Rs 12,200 and the scarp value Rs 200. The running cost in rupees is found from experience to be as follows:

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1,200	1,800	2,500	3,200	4,000

When should the machine be replaced?

ETHICAL PAPER

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