PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2022
(Fourth Semester)

Branch - COMPUTER SCIENCE WITH DATA ANALYTICS

OPTIMIZATION TECHNIQUES

Time: Three Hours   Maximum: 75 Marks

SECTION-A
Answer ALL questions
ALL questions carry EQUAL marks   (10 x 1 = 10)

1. Constraints inequalities (≤) are to be equalities (=) by introducing
   (i) Slack variables
   (ii) Surplus variables
   (ii) Artificial variables
   (iv All the above

2. The standard form of LPP if the objective function is of minimization then all the constraints _____.
   (i) Inequalities
   (ii) Greater than are equal to type
   (iii) Less than are equal to type
   (iv) Equation type

3. In Transportation problem the preferred method of obtaining either optimal or very close to the optimal solution is _____.
   (i) Northwest corner rule
   (ii) Vogel's approximation
   (iii) Least cost method
   (iv) None of these

4. Purpose of MODI method is to get_____.
   (i) Degenerate solution
   (ii) Non – degenerate solution
   (iii) Basic feasible solution
   (iv) Optimal solution

5. Replacement Model is a _____ model
   (i) Static Models
   (ii) Dynamic Models
   (iii) Both (i) and (ii)
   (iv) None of the above

6. A machine is replaced with an average running cost
   (i) Is not equal to the current running cost
   (ii) till the current period is greater than that of next period
   (iii) of the current period is greater than that of the next period,
   (iv) of the current period is less than that of next period

7. A game wherein the gain of one player equals the loss of other is called ....game
   (i) Payoff
   (ii) Zero sum
   (iii) Two person zero sum game
   (iv) Mixed strategy

8. Zero sum game with two players are called
   (i) Zero sum game
   (ii) Two person game
   (iii) Two person zero sum game
   (iv) Value of the game

9. An ....represent the start or completion of some activity
   (i) Network
   (ii) task
   (iii) CPM
   (iv) Event

10. Total float of an activity is the defined as the difference between the ....and ....
    (i) LFT, EFT
    (ii) EFT+LFT
    (iii) LIP, EFP
    (iv) IP+FF

SECTION - B
Answer ALL Questions
ALL Questions Carry EQUAL Marks   (5 x 7 = 35)

11. (a) A firm manufactures headache pills in two sizes A and B. Size A contains 2 grains of aspirin, 5 grains of bicarbonate and 1 grain of codeine. Size B contains 1 grain of aspirin, 8 grains of bicarbonate and 6 grains of codeine. It is found by users that it requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codeine for providing immediate effect. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the problem as a standard LPP.

(OR)

(b) Solve the following LPP using graphical method:

Minimize $Z = 400 X_1 + 360 X_2$ subject to the constraints:

$5X_1 + 3X_2 \geq 45,$

$X_1 \leq 8, X_2 \leq 10$

$X_1 , X_2 \geq 0.$

12. (a) Obtain an initial basic feasible solution to the following transportation problem using north west corner rule method:

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	950

(OR)

(b) Solve the following assignment problem.

		Men		
		A	B	C
	I	9	26	15
Task :	II	13	27	6
	III	35	20	15
	IV	18	30	20

13. (a) Describe the basic terms used in sequencing.

(OR)

(b) A pipeline is due for repairs. It will cost Rs.10,000 and last for 3 years. Alternatively, a new pipeline can be laid at a cost of Rs. 30,000 and lasts for 10 years. Assuming cost of capital to be 10% and ignoring salvage value, which alternative should be chosen?

14. (a) Solve the following 2 x 2 game graphically :

$$\begin{pmatrix} 2 & 10 & -2 \\ 1 & 03 & 2 \end{pmatrix}$$

(OR)

(b))A T.V. repairman finds that the time spent on his jobs an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in and if the arrival of sets is approximately poisson with an average rate of 10 per 8-hour day. What is repairman's expected idle time each day?

15. (a) Write the rules of network construction

(OR)

(b) Draw a network diagram for the following data.

Activity	A	B	C	D	E	F	G	H	I	J
Preceding activities	None	A	A	B	A	B,E	C	D,F	G	H,I

SECTION - C (30 Marks)
Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16. Solve the following LPP using simplex method.

$$Max\ Z = 4x_1 + 10x_2$$

$$subj$$

$$2x_1 + x_2 \le 50$$

$$2x_1 + 5x_2 \le 100$$

$$2x_1 + 3x_2 \le 90$$

$$\&\ x_1, x_2 \ge 0$$

17. Use Vogel's Approximation method to obtain an initial basic feasible solution of the transportation problem.

	D_1	D_2	D_3	D_4	Supply
S_1	20	25	28	31	200
S_2	32	28	32	41	180
S_3	18	35	24	32	110
Demand	150	40	180	170	

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

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

19. Explain the queueing model M/M/1 :∞/ FIFO.

20. Find the critical path and project duration for the following data:

Activity : A B C D E F G H I
Predecessor : - - A B C,D B E E F,G
Duration(days) : 4 7 2 9 6 5 2 10 4

Z-Z-Z   END