

Hall Ticket Number:

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Code No. : 14144 G

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD*Accredited by NAAC with A++ Grade***B.E. IV-Semester Main & Backlog Examinations; June-2022****Optimization Methods (OE-II)**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and any FIVE from Part-B***Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO																
1.	State an LP problem in standard form.	2	1	1	1																
2.	What is optimization?	2	1	1	1																
3.	Compare dual and primal problem?	2	2	2	1																
4.	List special cases in simplex method.	2	1	2	1																
5.	What do you mean feasible solution and basic feasible solution of transportation problem?	2	2	3	1																
6.	What are the applications of CPM?	2	2	3	1																
7.	List methods used to solve non-linear programming problems.	2	1	4	1																
8.	Compare Newton and quasi-Newton methods.	2	1	4	1																
9.	Find the extreme points of $Y = X^3 - 12X$	2	2	5	1																
10.	What is Hooke and Jeeves method?	2	1	5	1																
Part-B (5×8 = 40 Marks)																					
11. a)	Solve the following problem graphically Maximize $Z = 30X_1 + 40X_2$ Subject to: $3X_1 + 2X_2 \leq 600$ $3X_1 + 5X_2 \leq 800$ $5X_1 + 6X_2 \leq 1100$ $X_1 \geq 0, X_2 \geq 0$	5	3	1	4																
b)	Define (a) Feasible solution (b) degeneracy	3	2	1	4																
12. a)	Discuss the relationship between the regular simplex method and the revised simplex method.	2	2	2	2																
b)	Solve the following LP problem by the dual simplex method Minimize $Z = 30X_1 + 40X_2$ Subject to $2X_1 + 5X_2 \geq 6$ $3X_1 + 5X_2 \geq 8$ where $X_1, X_2 \geq 0$	6	3	2	4																
13. a)	The time estimate (in weeks) for the activities of a CPM network are given below. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Activity</td> <td>1-2</td> <td>1-3</td> <td>1-4</td> <td>2-5</td> <td>3-5</td> <td>4-6</td> <td>5-6</td> </tr> <tr> <td>T_c(Duration)</td> <td>1</td> <td>1</td> <td>2</td> <td>6</td> <td>2</td> <td>2</td> <td>3</td> </tr> </table>	Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6	T_c (Duration)	1	1	2	6	2	2	3	5	3	3	4
Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6														
T_c (Duration)	1	1	2	6	2	2	3														
	i. Construct the project network																				
	ii. Find the project duration using Total float.																				

D-208

13. b)	Explain rules to draw network diagram.	3	2	3	4																						
14. a)	Solve $f(X) = X^2 + (54/X)$ using Fibonacci method, assume missed data.	6	3	4	4																						
b)	Explain unimodal function.	2	2	4	2																						
15. a)	Solve three iterations using Univariate method for following problem. $f(X_1, X_2) = X_1^2 - 6X_1^2 X_2 - 4X_1 X_2^2 + X_2^2$	6	4	5	4																						
b)	List nonlinear programming constrained methods.	2	2	5	4																						
16. a)	A company uses lathes, milling and grinding machines to produce two machine parts. Following table represents the machining times required for each part, the machining times available on different machines and the profit on each machine part. Find the number of parts I and II to be manufacture per week to maximize the profit.	4	3	1	4																						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Type of machine</th> <th colspan="2">Machining time required for the machine part (minutes)</th> <th rowspan="2">Maximum time available per week (minutes)</th> </tr> <tr> <th>I</th> <th>II</th> </tr> </thead> <tbody> <tr> <td>Lathes Machines</td> <td style="text-align: center;">12</td> <td style="text-align: center;">6</td> <td style="text-align: center;">3000</td> </tr> <tr> <td>Milling Machines</td> <td style="text-align: center;">4</td> <td style="text-align: center;">10</td> <td style="text-align: center;">2000</td> </tr> <tr> <td>Grinding Machines</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">900</td> </tr> <tr> <td>Profit per unit</td> <td style="text-align: center;">Rs 40</td> <td style="text-align: center;">Rs 100</td> <td></td> </tr> </tbody> </table>	Type of machine	Machining time required for the machine part (minutes)		Maximum time available per week (minutes)	I	II	Lathes Machines	12	6	3000	Milling Machines	4	10	2000	Grinding Machines	2	3	900	Profit per unit	Rs 40	Rs 100					
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b)	Construct the dual to the primal problem <div style="text-align: center;"> $\text{Max. } Z = 3X_1 + 5X_2$ $\text{Sub to } 2X_1 + 6X_2 \leq 50$ $3X_1 + 2X_2 \leq 35$ $5X_1 - 3X_2 \leq 10$ $X_2 \leq 20$ $X_1, X_2 \geq 0$ </div>	4	2	2	4																						
17.	Answer any <i>two</i> of the following:																										
a)	How do you solve an unbalanced transportation problem?	4	2	3	4																						
b)	What is one dimensional minimization problem?	4	2	4	4																						
c)	What is the difference between constrained and unconstrained optimization?	4	1	5	4																						

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

$f(x) = 27$
 $4 + 74$
 31
 $53, 27$