



Alva's Institute of Engineering & Technology

Shobhavana Campus, Mijar, Moodbidri, D.K - 574225

Phone: 08258-262725, Fax: 08258-262726

VISION AND MISSION OF INSTITUTE

VISION STATEMENT

"Transformative education by pursuing excellence in Engineering and Management through enhancing skills to meet the evolving needs of the community"

MISSION STATEMENT

- To bestow quality technical education to imbibe knowledge, creativity and ethos to students community.
- To inculcate the best engineering practices through transformative education.
- To develop a knowledgeable individual for a dynamic industrial scenario
- To inculcate research, entrepreneurial skills and human values in order to cater the needs of the society.


Dr. Peter Fernandes
PRINCIPAL

Alva's Institute of Engineering & Technology,
Mijar, MOODBIDRI - 574 225, D.K.



Alva's Institute of Engineering & Technology

Shobhavana Campus, Mijar, Moodbidri, D.K - 574225

Phone: 08258-282627, Fax: 08258-262726

VISION STATEMENT and MISSION STATEMENTS

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

VISION STATEMENT -

"Engendering competent, excellent professionals by transforming the knowledge and computing skills to individuals through modern innovative tools and techniques"

MISSION STATEMENTS

- To produce skilled, creative software developers through rigorous training.
- To conduct specific technical courses to keep abreast to the latest technological developments and transformations in the domain.
- To establish Industry-Institute Interaction programs to enhance the skills of employability and entrepreneurship.
- To implement the ideas of research and innovations in interdisciplinary domains.


Dr. Manjunath Kotari
Head of the Department
Dept. Of Computer Science & Engineering
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225


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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PSOs and PEOs

PROGRAMME SPECIFIC OUTCOMES (PSOs)

A graduate of the Computer Science and Engineering Program will exhibit:

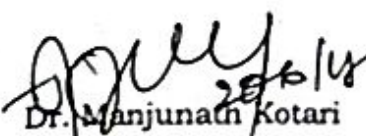
PSO1: Professional Skills: The ability to understand & implement the computer programs in the areas of Computer Architecture, System Software, Database Management Systems, Web Design, Multimedia and Computer Networking.

PSO2: Problem-Solving Skills: The ability to solve real-world problems by suitable mathematical model with strong technological concepts in rapidly growing arena of computer technology.

PSO3: Successful Career and Entrepreneurship: Knowledge in diverse areas of Software Engineering and Management & Entrepreneurship for IT Industry, conducive in cultivating skills for successful career development.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1:** To provide students with fundamental strength in core disciplines of computer engineering to solve the problems of computing world.
- **PEO2:** To ensure that graduates conquer the difficulties of emerging adaptive technological changes.
- **PEO3:** To prepare students for successful career in the industry of international standard.


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H. O. D.
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ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY, MIJAR, MOODBIDRI

INDIVIDUAL FACULTY TIME TABLE

FACULTY NAME:

Ms. Ankitha Shetty (AS)

Department	Computer Science and Engg.				Academic Year		2017-18 (EVEN SEMESTER)		
Period→	1	2		3	4	L U N C H B R E A K	5	6	7
Time →	9.00–9.55	09.55 – 10.50		11.10 – 12.05	12.05 – 01.00		02.00 – 03.00	03.00 – 04.00	04.00 – 05.00
MONDAY	INS						MP LAB		
TUESDAY		OR	T E A B R A K		INS		SS&CD LAB		
WEDNESDAY		INS			OR				
THURSDAY		INS			OR		SS&CD LAB		
FRIDAY	OR				INS		COMPUTER PROGRAMMING LAB		
SATURDAY	OR								

Other Special Activities: CULTURAL, CLASS COORDINATOR-8A

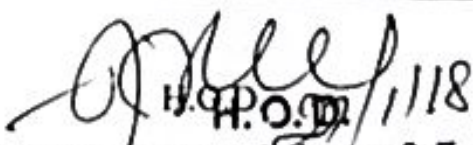
UNITS: Theory: 20 LAB: 12 Others: TOTAL UNITS:32

Time Table Coordinator

H.O.D.
Dept. Of Computer Science & Engineering
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY, MIJAR, MOODBIDRI										
INDIVIDUAL FACULTY TIME TABLE				FACULTY NAME:		Ms. Shruthi Shetty J.				
Department		Computer Science and Engg.			Academic Year		2017-18 (EVEN SEMESTER)			
Period→	1	2	T E A C H E R B R E A K	3	4	L U N C H B R E A K	5	6	7	
Time →	09.00 – 9.55	09.55 – 10.50		11.10 – 12.05	12.05 – 01.00		02.00 – 03.00	03.00 – 04.00	04.00 – 05.00	
MONDAY				PCD			COMPUTER PROGRAMMING LAB			
TUESDAY		OR					COMPUTER PROGRAMMING LAB			
WEDNESDAY	PCD				OR					
THURSDAY					OR				PCD	
FRIDAY	OR	COMPUTER PROGRAMMING LAB					SEMINAR/APTITUDE LAB		PCD	
SATURDAY	OR				PCD					
Other Special Activities: SHRISTI, MINI PROJECT, EMS-II SEM,NSS										
UNITS:		Theory: 20		LAB: 09		Others: 02		TOTAL UNITS:31		

Time Table Coordinator


 H.O.D. 11/18
 Dept. Of Computer Science & Engineering
 Alva's Institute of Engg. & Technology
 Mijar, MOODBIDRI - 574 225



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

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Time Table with effect from 29/01/2018 DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Academic Year		Scheme	Semester	Section		Room No		Class Coordinator	
2017-18		2015	VI	A		104		Mr. Tahir N.H.B.	
Time	9.00 To 9.55	9.55 To 10.50	10.50 To 11.10	11.10 To 12.05	12.05 To 1.00	1.00 To 2.00	2.00 To 3.00	3.00 To 4.00	4.00 To 5.00
Day									
MON	PAP	CGV	B R E A K	OS	CNSC	L U N C H	SS&CD	SEMINAR/ MINI PROJECT	
TUE	CGV	OR/ DM&DW		GATE/ APT	SS&CD		CGV LAB (A1) [TNHB+PSK] / SS&CD LAB (A2) [AS+HGM]		
WED	CGV	CNSC		PAP	OR/ DM&DW		OS	SS&CD	CC
THU	CGV	PAP		OS	OR/ DM&DW		CGV LAB (A2) [TNHB+PSK] / SS&CD LAB (A1) [AS+HGM]		
FRI	OR/ DM&DW	GATE/ APT		SS&CD	CGV		OS	CNSC	PAP
SAT	OR/ DM&DW	OS		CNSC	SS&CD				

Allocation of Subjects

Subjects			Staffs	Staff Code
15CS61	Cryptography, Network Security & Cyber Laws	CNSC	Dr. A. Manjunath Kotari	AMK
15CS62	Computer Graphics & Visualization	CGV	Mr. Tahir N.H.B.	TNHB
15CS63	System Software & Compiler Design	SS & CD	Mr. Venkatesh	VKT
15CS64	Operating Systems	OS	Mr. Chanchal Antony	CA
15CS651 15CS653	Data Mining & Data Warehousing Operations Research	DM&DW OR	Mrs. Sumith N. Ms. Shruthi Shetty J.	SN SSJ
15CS664	Python Application Programming	PAP	Dr. Mohideen Badhusha S.	MBS
15CSL67	Computer Graphics & Visualization Lab	CGV LAB	Mr. Tahir N.H.B. Mr. Parikshith Nayak S.K	TNHB PSK
15CSL68	System Software & Compiler Design Lab	SS & CD LAB	Ms. Ankitha Shetty Mrs. Harshitha G.M.	AS HGM

INDUSTRY ORIENTED COURSES (IOC)

Aptitude Training/GATE Coaching	APT	Mr. Tahir N.H.B. Mrs. Merlyn Melita M.	TNHB MM
Seminar/Mini Project	---	Mrs. Harshitha G.M. Mr. Tahir N.H.B.	HGM TNHB

H.O.D.
Dept. of Computer Science & Engineering
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Time Table with effect from 29/01/2018 DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Academic Year	Scheme		Semester		Section	Room No	Class Coordinator		
2017-18	2015		VI		B	304	Mrs. Harshitha G.M.		
Time	9.00 To 9.55	9.55 To 10.50	10.50 To 11.10	11.10 To 12.05	12.05 To 1.00	1.00 To 2.00	2.00 To 3.00	3.00 To 4.00	4.00 To 5.00
Day									
MON	CNSC	CGV	B R E A K	M-App	SS&CD	L U N C H	OS	SEMINAR/ MINI PROJECT	
TUE	GATE/ APT	OR/ DM&DW		CGV	OS		M-App	SS&CD	CNSC
WED	SS&CD	OS		CGV	OR/ DM&DW		CGV LAB (B1) [PSK+TNHB] / SS&CD LAB (B2) [RP+SM]		
THU	CNSC	GATE/ APT		OS	OR/ DM&DW		M-App	SS&CD	CC
FRI	OR/ DM&DW	OS		CGV	M-App		CGV LAB (B2) [PSK+TNHB] / SS&CD LAB (B1) [RP+SM]		
SAT	OR/ DM&DW	CGV		CNSC	SS&CD				

Allocation of Subjects

Subjects			Staffs	Staff Code
15CS61	Cryptography, Network Security & Cyber Laws	CNSC	Mr. Hemanth Kumar N.P.	HNP
15CS62	Computer Graphics & Visualization	CGV	Mr. Parikshith Nayak S.K.	PSK
15CS63	System Software & Compiler Design	SS & CD	Ms. Remul Pinto	RP
15CS64	Operating Systems	OS	Mrs. Harshitha G.M.	HGM
15CS651 15CS653	Data Mining & Data Warehousing Operations Research	DM&DW OR	Mrs. Sumith N. Ms. Ankitha Shetty	SN AS
15CS661	Mobile Application Development	M-App	Mr. Sayeesh	SS
15CSL67	Computer Graphics & Visualization Lab	CGV LAB	Mr. Parikshith Nayak S.K. Mr. Tahir N.H.B.	TNHB PSK
15CSL68	System Software & Compiler Design Lab	SS & CD LAB	Ms. Remul Pinto Mr. Sushant M.	RP SM

INDUSTRY ORIENTED COURSES (IOC)

Aptitude Training/GATE Coaching	APT	Mrs. Deeksha M. Mrs. Merlyn Melita M.	DM MM
Seminar/Mini Project	----	Ms. Remul Pinto Mr. Tahir N.H.B	RP TNHB

Dept. of Computer Science & Engineering
H.O.D.

Principal

OPERATION RESEARCH
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)

SEMESTER – VI

Subject Code	15CS653	IA Marks	20
Number of Lecture Hours/Week	3	Exam Marks	80
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03			
Course objectives: This course will enable students to			
• Formulate optimization problem as a linear programming problem. • Solve optimization problems using simplex method. • Formulate and solve transportation and assignment problems. • Apply game theory for decision making problems.			
Module – 1			Teaching Hours
Introduction, Linear Programming: Introduction: The origin, nature and impact of OR; Defining the problem and gathering data; Formulating a mathematical model; Deriving solutions from the model; Testing the model; Preparing to apply the model; Implementation . Introduction to Linear Programming Problem (LPP): Prototype example, Assumptions of LPP, Formulation of LPP and Graphical method various examples.			8 Hours
Module – 2			
Simplex Method – 1: The essence of the simplex method; Setting up the simplex method; Types of variables, Algebra of the simplex method; the simplex method in tabular form; Tie breaking in the simplex method, Big M method, Two phase method.			8 Hours
Module – 3			
Simplex Method – 2: Duality Theory - The essence of duality theory, Primal dual relationship, conversion of primal to dual problem and vice versa. The dual simplex method.			8 Hours
Module – 4			
Transportation and Assignment Problems: The transportation problem, Initial Basic Feasible Solution (IBFS) by North West Corner Rule method, Matrix Minima Method, Vogel's Approximation Method. Optimal solution by Modified Distribution Method (MODI). The Assignment problem; A Hungarian algorithm for the assignment problem. Minimization and Maximization varieties in transportation and assignment problems.			8 Hours
Module – 5			
Game Theory: Game Theory: The formulation of two persons, zero sum games; saddle point, maximin and minimax principle, Solving simple games- a prototype example; Games with mixed strategies; Graphical solution procedure. Metaheuristics: The nature of Metaheuristics, Tabu Search, Simulated Annealing, Genetic Algorithms.			8 Hours
Course outcomes: The students should be able to:			
• Select and apply optimization techniques for various problems. • Model the given problem as transportation and assignment problem and solve. • Apply game theory for decision support system.			

Question paper pattern:

The question paper will have TEN questions.

There will be TWO questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. D.S. Hira and P.K. Gupta, Operations Research, (Revised Edition), Published by S. Chand & Company Ltd, 2014

Reference Books:

1. S Kalavathy, Operation Research, Vikas Publishing House Pvt Limited, 01-Aug-2002
2. S D Sharma, Operation Research, Kedar Nath Ram Nath Publishers.

ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY, Moodbidri
Department of Computer Science & Engineering, Academic Year 2017-18 (Even Semester)

VI Semester A Section (Operation Research)

Sl.No.	USN	Name of the Student
1.	4AL15CS002	ADARSH M S
2.	4AL15CS003	ADARSH MOHAN PUJAR
3.	4AL15CS004	ADITHYA VISHWANATH SHETTY
4.	4AL15CS009	ANKITH
5.	4AL15CS017	ASHWINI P SHETTY
6.	4AL15CS018	BANGERA YATISH GOVINDA
7.	4AL15CS023	CHAITHRA GAJANDIMATH
8.	4AL15CS027	DEEKSHA
9.	4AL15CS028	DEEKSHA SHETTY
10.	4AL15CS030	DEVIKA SHETTY M
11.	4AL15CS032	DIVYA R
12.	4AL15CS034	GANESH SHRIKANT PALEKAR
13.	4AL15CS037	H AKSHAY KEDLAYA
14.	4AL15CS040	HEMA R
15.	4AL15CS043	JASMINE PRINCY LOBO
16.	4AL15CS051	KUMARASWAMY V S
17.	4AL15CS053	LALITH KUMAR MISHRA J
18.	4AL15CS054	MADHUKARA
19.	4AL15CS056	MEGHANA G R
20.	4AL15CS060	MUKESH H M
21.	4AL15CS063	NIDHI V ARADYA
22.	4AL15CS068	POORNA SHETTY
23.	4AL15CS069	PRAJWAL S
24.	4AL15CS071	PRIYANKA B.M.
25.	4AL15CS072	PRIYANKA S P
26.	4AL15CS075	RAJARAJESHWARI B B
27.	4AL15CS076	RAKESH H M
28.	4AL15CS083	SANJAY M N
29.	4AL15CS084	SHETTY MAYUR KISHOR
30.	4AL15CS087	SHRADDHA B SHETTY
31.	4AL15CS092	SRIDEVI
32.	4AL15CS095	SUMITH KUMAR S K
33.	4AL15CS097	SUREKHA SRIHARI REDDY
34.	4AL15CS099	T S KUSUMASRI
35.	4AL15CS100	TEJASWINI M B
36.	4AL15CS102	VAIBHAVI VITTHAL KULKARNI

37.	4AL15CS104	VARSHA S
38.	4AL15CS106	VINAY S
39.	4AL15CS107	VISHNU P S
40.	4AL15CS108	VISHRUTH K
41.	4AL15CS112	PRAMOD K S
42.	4AL16CS401	NALINI
43.	4AL16CS403	YOGESH

[Signature]
H. O. D.

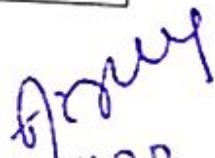
Dept. Of Computer Science & Engineering
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

VI Semester B Section (Operation Research)

Sl.No.	USN	Name of the Student
1.	4AL14CS051	PAVITHRA G
2.	4AL15CS001	ACHARYA RAKSHITHA KESHAV
3.	4AL15CS007	ALGEENA CAROL DSOUZA
4.	4AL15CS010	ANUPRAKASH M P
5.	4AL15CS013	ARJUN V
6.	4AL15CS014	ARPITHA S
7.	4AL15CS015	ARSHRITHA M S
8.	4AL15CS016	ASHRITHA JAIN R
9.	4AL15CS022	CHAITHRA
10.	4AL15CS024	CHITHRA R G
11.	4AL15CS025	DSILVA AMITH JOSEPH
12.	4AL15CS029	DEEKSHITHA
13.	4AL15CS035	GEETHANJALI BISHTANNAVAR
14.	4AL15CS039	HEISNAM SURSITA DEVI
15.	4AL15CS045	JEFFIN BOBAN
16.	4AL15CS047	KAJARE TEJAS TUKARAM
17.	4AL15CS048	KALAVARA DEEKSHITH RAJ
18.	4AL15CS049	KAVYA RAI A
19.	4AL15CS115	ADITYA MARUTHI NAIK
20.	4AL15CS057	MISHRA HIMANSHU U.
21.	4AL15CS064	NISHMITHA
22.	4AL15CS065	POOJA K
23.	4AL15CS066	POOJARY PRAJWAL PRABHAKAR
24.	4AL15CS067	POOJARY TUSHAR VITTAL
25.	4AL15CS073	RAHUL NARAYANA NAYAK
26.	4AL15CS077	RAKSHITHA H B
27.	4AL15CS078	RAKSHITHA M
28.	4AL15CS079	RANJITH
29.	4AL15CS081	SACHIN PANDITH
30.	4AL15CS091	SNEHA K N
31.	4AL15CS093	SRUJANA G B
32.	4AL15CS094	SUDARSHAN G
33.	4AL15CS096	SURAKSHA R B
34.	4AL15CS098	SUSHANTH
35.	4AL15CS105	VILAS RAJ S
36.	4AL15CS111	SAFEEQ BIDORKUNDI
37.	4AL15CS113	SHETTY NIKETHA S
38.	4AL15CS114	SHETTY AISHWARYA S

Operations Research weak students list - VI Semester A and B Section

Sl. No.	USN	NAME
1	4AL14CS051	PAVITHRA G
2	4AL15CS001	ACHARYA RAKSHITHA
3	4AL15CS013	ARJUN V
4	4AL15CS073	RAHUL N NAYAK
5	4AL15CS083	SANJAY M N
6	4AL15CS091	SNEHA K N
7	4AL15CS102	VAIBHAVI KULKARNI
8	4AL15CS107	VISHNU P S
9	4AL15CS037	H AKSHAY KEDLAYA
10	4AL15CS047	KAJARE TEJAS
11	4AL15CS057	MISHRA HIMANSHU
12	4AL15CS013	ARJUN V


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ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY, MOODBIDRI
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
I - INTERNAL ASSESSMENT

Semester: 6

Subject: OPERATIONS RESEARCH(15CS653)

Max Marks: 30

Faculty: Ms Shruthi J Shetty / Ankittha Shetty

Date: 28 Mar 2018

Time: 03:00 PM - 04:00 PM

Instructions to students :

Answer any 2 full questions

Question#	Question	Marks	CO	BT/CL
1 a	What is Operations Research? Explain in detail the Operation Research modeling approach.	7	CO1	L2
1 b	List the applications of OR. A boat manufacturer builds two types: type A and type B boats. The boat built during the month of January-June go on sailing in the month July - December at a profit of Rs. 2000 per type A boat and Rs. 1500 per type B boat. The boat built during the month of July-December go on sailing in the month January - June at a profit of Rs.4000 per type A boat and Rs. 3300 per type B boat. Each type A boat requires 5 hours in carpentry shop and 3 hours in finishing shop. Each type B boat requires 6 hours in carpentry shop and 1 hour in finishing shop. During each half year period a maximum of 12000 hours and 15000 hours available in carpentry and finishing shop respectively. Sufficient materials are available to build not more than 3000 type A and Type B boats in a year. How many of each type of boat should be built during each half year in order to maximize the profit. Formulate as an LPP	8	CO1	L5
OR				
2 a	Old hens can be bought at Rs. 2 each and young ones at Rs. 5 each. The old hens lay 3 eggs per week and the young one lays 5 eggs per week, each egg being worth 30 paise. A hen (young or old) cost Rs. 1 per week to feed. You have only Rs.80 for buying hens. How many of each kind should you buy to give a profit of more than Rs. 6 per week assuming that you cannot house more than 20 hens? Formulate the problem as an LPP and solve using graphical	7	CO1	L5
2 b	Explain the features of Operations research, and Solve the following using graphical method.	8	CO1	L5

$$\text{Min } Z = 2x_1 + 1.7x_2$$

STC

$$0.15x_1 + 0.10x_2 \geq 1.0$$

$$0.7x_1 + 1.07x_2 \geq 7.5$$

$$1.30x_1 + 1.10x_2 \geq 10.0$$

where $x_1, x_2 \geq 0$

Question#	Question	Marks	CO	BT/CL
3 a	Explain assumptions of LPP. A milk distributor supplies milk in bottle to houses in three areas A, B and C in a city. His delivery charges per bottle is 30 paisa in area A, 40 paisa in area B and 50 paisa in area C. He has to spend on an average of 1 minute to supply one bottle in area A, 2 minutes/bottle in area B and 3 minutes / bottle in area C. He can spare 2.5 hours for milk distribution and not more than 1.5 hours for A and B together. The maximum number of bottles he can delivery is 120. Find the number of bottles that he has to supply on each area so as to earn maximum income. What is his maximum income. Solve using simplex method	8	CO1	L4
3 b	Solve the following LPP using Penalty method. Min $Z = 5x_1 + 3x_2$ STC $2x_1 + 4x_2 \leq 12$ $2x_1 + 9x_2 = 10$ $5x_1 + 2x_2 \geq 10$ where $x_1, x_2 \geq 0$ OR	7	CO1	L4
4 a	Discuss the various aspects of the concept tie breaking in simplex method. Obtain all the basic solution of the following system of linear equations and in each case identify basic and non-basic variables. $2x_1 + 3x_2 + 4x_3 = 10$ $3x_1 + 4x_2 + x_3 = 12$	8	CO1	L4
4 b	Solve using Two Phase method. Max $Z = -4x_1 - 3x_2 - 9x_3$ STC $2x_1 + 4x_2 + 6x_3 \geq 15$ $6x_1 + x_2 + 6x_3 \geq 12$ where $x_1, x_2, x_3 \geq 0$	7	CO1	L3

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY, MOODBIDRI
(A unit of Alva's Education Foundation)

Sixth Semester B.E. (CSE)

I. A Test Examinations-I

SCEHEME OF EVALUATION

28th May- 2017

OPERATION RESEARCH

Note: 1) Answer any Two full questions.

PART A

Operation Research is a scientific approach to decision making which seeks to determine how best to design and operate a system, under conditions requiring the allocation of resources.

01

Phases of operation research

- 1) Defining the problem and gathering data
- 2) Formulating a mathematical model.
- 3) Deriving solutions from the model
- 4) Testing the model.
- 5) Preparing to apply the model.
- 6) Implementation.

06

Applications of OR.

- 1) In Industry
- 2) In defense
- 3) Planning
- 4) Agriculture
- 5) Public Utilities.

- b) :-
- 1) OR is a holistic approach.
 - 2) The use of interdisciplinary teams.
 - 3) Application of Scientific method.
 - 4) Uncovering of New problems.
 - 5) Improvement in Quality of decisions.
 - 6) Use of Computers.
 - 7) Quantitative solution
 - 8) Human factors.

Graphical method. $\frac{2x_1 + 1.7x_2}{2}$

1. $0.15x_1 + 0.10x_2 \geq 1.0$
 $x_1 = 0 \quad x_2 = 10$
 $x_2 = 0 \quad x_1 = 6.7$ (6.7, 10)

2) $0.7x_1 + 1.07x_2 \geq 7.5$
 $x_1 = 0 \quad x_2 = 7.00$
 $x_2 = 0 \quad x_1 = 10.7$ (10.7, 7.00)

3) $1.30x_1 + 1.10x_2 \geq 10.0$
 $x_1 = 0 \quad x_2 = 9.1$
 $x_2 = 0 \quad x_1 = 7.7$ (7.7, 9.1)

A (0, 10) = 17

B (2.9, 5.8) = 15.66

C (4, 4.4) = 15.48 ✓

D (10.7, 0) = 21.4

graph → 2

3a) Assumptions of LPP

- 1) Proportionality
- 2) Additivity
- 3) Divisibility
- 4) Certainty
- 5) Optimality

∴ let x_1 be no of bottles for Area A
 x_2 be no of bottles for Area B
 x_3 be no of bottles for Area C

$$\text{Max } Z = 30x_1 + 40x_2 + 50x_3$$

$$\text{STC } x_1 + 2x_2 + 3x_3 \leq 150$$

$$x_1 + 2x_2 \leq 90$$

$$x_1 + x_2 + x_3 \leq 120$$

where $x_1, x_2, x_3 \geq 0$

Standard form

$$\text{Max } Z = 30x_1 + 40x_2 + 50x_3$$

$$\text{STC } x_1 + 2x_2 + 3x_3 + u_1 = 150$$

$$x_1 + 2x_2 + u_2 = 90$$

$$x_1 + x_2 + x_3 + u_3 = 120$$

Basis	C_B	X_B	x_1	x_2	x_3	u_1	u_2	u_3	Ratio
u_1	0	150	1	2	(3) ^{key}	1	0	0	$150/3 = 50 \rightarrow$
u_2	0	90	1	2	0	0	1	0	∞
u_3	0	120	1	1	1	0	0	1	120
	C_j		30	40	50	0	0	0	
	Z_j		0	0	0	0	0	0	
	$C_j - Z_j$		30	40	50	0	0	0	

↑ E.V

Basis	C_B	X_B	x_1	x_2	x_3	u_1	u_2	u_3	Ratio
x_3	50	50	$\frac{1}{3}$	$\frac{2}{3}$	1	$\frac{1}{3}$	0	0	$50/\frac{1}{3} = 150$
u_2	0	90	<u>1</u>	2	0	0	1	0	$90/1 = 90 \rightarrow$
u_3	0	70	$\frac{2}{3}$	$\frac{1}{3}$	0	$-\frac{1}{3}$	0	1	$70/\frac{2}{3} = 105$
C_j			30	40	50	0	0	0	
Z_j			$50/3$	$100/3$	50	$50/3$	0	0	
$C_j - Z_j$			<u>$40/3$</u>	$20/3$	0	$-50/3$	0	0	

$\uparrow$ E.V.

Basis	C_B	X_B	x_1	x_2	x_3	u_1	u_2	u_3	Ratio
x_3	50	20	0	0	1	$\frac{1}{3}$	$-\frac{1}{3}$	0	
x_1	30	90	1	2	0	0	1	0	
u_3	0	10	0	-1	0	$-\frac{1}{3}$	$-\frac{2}{3}$	1	
C_j			30	40	50	0	0	0	
Z_j			30	60	50	$50/3$	$-\frac{50}{3}$	1300	
$C_j - Z_j$			0	-20	0	$-50/3$	$-40/3$	0	

$\therefore x_1 = 30 \quad x_3 = 50 \quad x_2 = 0$

Max $Z = 3100$

$\therefore$ He earns 3TRs as max income.

3b) Penalty method

Min $Z = 5x_1 + 13x_2$

s.t.c $2x_1 + 4x_2 \leq 12$

$2x_1 + 2x_2 = 10$

$5x_1 + 2x_2 \geq 10$

where $x_1, x_2 \geq 0$.

Standard form

$$\text{Min } Z = 5x_1 + 3x_2$$

$$-5x_1 - 3x_2$$

$$\text{s.t. } 2x_1 + 4x_2 + u_1 = 12$$

$$2x_1 + 2x_2 + a_1 = 10$$

$$5x_1 + 2x_2 - s_1 + a_2 = 10$$

$$x_1, x_2, u_1, a_1, s_1, a_2 \geq 0$$

Basis	C _B	X _B	x_1	x_2	u_1	a_1	s_1	a_2	Ratio
u_1	0	12	2	4	1	0	0	0	$12/2 = 6$
a_1	-M	10	2	2	0	1	0	0	$10/2 = 5$
a_2	-M	10	5	2	0	0	-1	1	$10/5 = 2 \rightarrow$
C_j			-5	-3	0	-M	0	-M	
Z_j			-7M	-4M	0	-M	+M	-M	
$C_j - Z_j$			$5+7M$	$-3+4M$	0	0	-M	0	

Basis	C _B	X _B	x_1	x_2	u_1	a_1	s_1	Ratio
u_1	0	8	0	$16/5$	1	0	$2/5$	$8/(16/5) = 5/2 = 2.5$
a_1	-M	16	2	$6/5$	0	1	$4/5$	$-6/2 = -3$
x_1	-5	2	1	$2/5$	0	0	$-1/5$	$2/(2/5) = 5$
C_j			-5	-3	0	-M	0	
Z_j			-5	$-6M-10$	0	-M	$-2M+5/5$	
$C_j - Z_j$			0	$6M-5$	0	0	$4M-1$	

$$\min \left(\frac{1}{0}, -\frac{3}{2} \right)$$

$$\min (0, -1)$$

is	C_B	X_B	x_1	x_2	x_4	s_1	a_1	Ratio
x_2	-9	8/2	0	1/8	5/16	1/8	0	20
s_1	-M	13	0	-1/8	3/8	1/4	1	12
x_1	-5	5	1	0	-1/8	-1/4	0	-4
C_j			-5	-3	0	0	-M	
Z_j			-5	3	$-5/16 + \frac{3M}{8}$	$-1/8 - M/4$	-M	
$C_j - Z_j$			0	0	$5/16 - \frac{3M}{8}$	$-1/8 + M/4$	0	

Basis	C_B	X_B	x_1	x_2	x_4	s_1	Ratio
x_2	-3	1	0	1	1/2	0	
s_1	0	12	0	0	-3/2	1	
x_1	-5	4	1	0	-1/2	0	
C_j			-5	-3	0	0	
Z_j			-5	-3	1	0	
$C_j - Z_j$			0	0	-1	0	

$$\text{Min } Z = 15x_1 + 3x_2$$

$$x_1 = 4 \quad x_2 = 1$$

$$\text{Min } Z = 5(4) + 3(1)$$

$$\boxed{\text{Min } Z = 23}$$

4a) Tie breaking in simplex method

Degeneracy occurs at

- 1) initial stage.
- 2) any subsequent iteration.
- 3) any iteration of simplex method, where one or more than one variable is ready to leave the basis.

one variable is ready to leave the basis.

Procedure to Resolve

min $\left(\frac{\text{Element of the first column of the unit matrix}}{\text{corresponding key column elements}} \right)$

b) Basic solution

$$2x_1 + 3x_2 + 4x_3 = 10$$

$$3x_1 + 4x_2 + x_3 = 12$$

$$n=3 \quad m=2 \quad n-m=3-2=1$$

$$n_{cm} = 3 - 2 = 1$$

B.V	Non-B.V	Values of B.V	Is solution feasible.
x_1, x_2	$x_3 = 0$	$2x_1 + 3x_2 = 10$ $3x_1 + 4x_2 = 12$ $x_1 = -4x_2 + 6$	No.
x_1, x_3	$x_2 = 0$	$x_1 = 3.8, x_3 = 0.6$	Yes.
x_2, x_3	$x_1 = 0$	$x_2 = 2.92, x_3 = 0.30$	Yes.

(b) Max $Z = -4x_1 - 3x_2 - 9x_3$

STC

$$2x_1 + 4x_2 + 6x_3 \geq 15$$

$$6x_1 + x_2 + 6x_3 \geq 12$$

where $x_1, x_2, x_3 \geq 0$

Soln:- 1st Phase

Max $Z = 0x_1 + 0x_2 + 0x_3 + 0s_1 + 0s_2 - a_1 - a_2$

STC

$$2x_1 + 4x_2 + 6x_3 - s_1 + 0a_1 = 15$$

$$6x_1 + x_2 + 6x_3 - s_2 + 0a_2 = 12$$

Basis	C _B	X _B	E.V.			a_1	s_1	a_2	s_2	Ratio
a_1	-1	15	2	4	6	1	-1	0	0	$15/6 = 2.5$
a_2	-1	12	6 ^k	1	6 ^{key}	0	0	1	-1	$12/6 = 2 \rightarrow$
C_j			0	0	0	-1	0	-1	0	
Z_j			-8	-5	-12	-1	1	-1	1	
$C_j - Z_j$			8	5	12	0	-1	0	-1	
			E.V.							

Basis	C_B	X_B	E.V					Ratio	
a_1 ^{L.V}	-1	3	-4	<u>3</u> _{key}	0	1	-1	1	$3/3 = 1 \rightarrow$
x_3	0	2	1	$1/6$	1	0	0	$-1/6$	$2/(1/6) = 12$
C_j			0	0	0	-1	0	0	
Z_j			4	-3	0	-1	1	-1	
$C_j - Z_j$			-4	<u>3</u> _{E.V}	0	0	-1	1	

Basis	C_B	X_B	x_1	x_2	x_3	s_1	s_2	Ratio.
x_2	0	1	$-4/3$	1	0	$-1/3$	$1/3$	
x_3	0	$11/6$	$11/9$	0	1	$1/18$	$-2/9$	
		C_j	0	0	0	0	0	
		Z_j	0	0	0	0	0	
		$G-Z_j$	0	0	0	0	0	

Since $G-Z_j < 0$.

Phase 2

Basis	C_B	X_B	$E.V.$ (x_1)	x_2	x_3	s_1	s_2	Ratio
x_2	-3	1	$-4/3$	1	0	$-1/3$	$1/3$	$-3/4$
$L.V.$ (x_3)	-9	$11/6$	$(11/9)$	0	1	$1/18$	$-2/9$	$3/2 \rightarrow L.V.$
		C_j	-4	-3	-9	0	0	
		Z_j	-7	-3	-9	$1/2$	1	
		$G-Z_j$	(3)	0	0	$-1/2$	-1	

Basis	C_B	X_B	x_1	x_2	x_3	s_1	s_2	Ratio.
x_2	-3	3	0	1	$12/11$	$-2/11$	$-1/11$	
x_1	-4	$3/2$	1	0	$9/11$	$1/22$	$-2/11$	
		C_j	-4	-3	-9	0	0	
		Z_j	-4	-3	$-12/11$	$2/11$	$7/11$	
		$G-Z_j$	0	0	$-27/11$	$-2/11$	$-7/11$	

Max $Z = -15$

where $x_2 = 3$ $x_1 = 3/2$ $x_3 = 0$.

$A(0, 10)$
 $0.15x_1 + 0.10x_2 \geq 1.0$

$B(2.9, 5.8)$

$C(4, 4)$

$1.80x_1 + 1.10x_2 \geq 10.0$

$0.7x_1 + 1.07x_2 \geq 7.5$

$D(10.7, 0)$

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY, MOODBIDRI
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
II - INTERNAL ASSESSMENT

Semester: 6

Subject: OPERATIONS RESEARCH(15CS653)

Max Marks: 30

Faculty: Ms Ankitha Shetty / Ms Shrutbi Shetty J

Date: 26 Apr 2018

Time: 03:00 PM - 04:30 PM

Instructions to students :

Answer any 2 full question(s)

Question# Question

Marks CO BT/CL

1 a Find IBFS to the following transportation problem using VAM

5 CO2 L5

19	30	50	10	7
70	30	40	60	9
40	8	70	20	18
5	8	7	14	

1 b Explain Hungarian algorithm with example.

10 CO2 L4

OR

2 a Write the difference between Transportation problems and assignment problems

5 CO2 L1

2 b Transportation costs per truck load cement (in hundreds of rupees) from each plant to each project site are as follows.

10 CO2 L5

	Project sites				
	1	2	3	4	
Factories	2	3	11	7	6
	1	0	6	1	1
	5	8	15	9	10
Demand	7	5	3	2	

Supply

Determine the optimal distribution for the company so as to minimize the total transportation cost.

Question# Question

Marks CO BT/CL

3 a

A company has 5 tasks and 5 person to perform the same. The matrix shows the return (profit) in hundreds of rupees for assigning jobs to the person. Assign the 5 tasks to % persons to maximize the total return.

10

CO2 L5

5	11	10	12	4
2	4	6	3	5
3	12	5	14	6
6	11	4	11	7
7	9	8	12	5

3 b

Give note on outline of a basic Simulated Annealing Algorithm.

5

CO2 L2

OR

4 a

Solve the games for the following payoff matrix.

10

CO2 L5

a)

	B ₁	B ₂	B ₃	B ₄
A ₁	-5	2	0	1
A ₂	5	6	4	8
A ₃	4	0	2	-3

b)

	B ₁	B ₂
A ₁	4	-4
A ₂	-4	4

4 b

Give a note on genetic algorithm.

5

CO2 L2

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY, MOODBIDRI

(A unit of Alva's Education Foundation)

Sixth Semester B.E. (CSE)

I. A Test Examinations-II

SCEHEME OF EVALUATION

26th April- 2018

OPERATION RESEARCH

Note: 1) Answer any Two full questions.

PART A

Row Penalty

5

1	5	30	50	10	2	7	9	9	40	40	-
7	0	30	40	7	6	0	7	10	20	20	20
4	0	8	70	20	10	18	12	20	50	-	-

80	80	7	14	10
21	22	10	10	
21	-	10	10	
-	-	10	10	
-	-	10	50	
-	-	40	60	

$$TC = 779$$

b Hungarian algorithm:

1. Check Order of Matrix

2. Row Minima

3. Column Minima

4. Assignment

5. No. of assignment = order of matrix, then obtained solution is optimal

Else, follow below steps:

- i) Select unassigned rows
- ii) Select In the selected row, zero element- column should be selected
- iii) In the selected column, assigned row need to be selected.

6. Draw straight- lines for selected column and unselected rows.

7. Among uncovered element, select least element. ~~and~~ Add that quantity to the element which is covered by 2 lines, subtract the same with all uncovered element. Element covered by single line remain unchanged.

8. For the new table repeat from step 4.

2 a.

Transportation Problem

1. The matrix may or maynot be square to solve the problem
2. Supply & demand will be known
3. When supply $\neq$ demand the problem is unbalanced
4. The number of allocations in a row/column may exceed 1.
5. If all net cell evaluation is ≥ 0 then solution is optimal

Assignment Problem

1. Matrix must be square matrix to solve the problem
2. Supply & demand will be unity
3. When no. of rows $\neq$ no. of columns, the problem is unbalanced.
4. The no. of allocation in row/column is always 1.
5. If no. of assignment is equal to order of the matrix, then solution is optimal

2①	3⑤	11	7	8	1	1	5	-	-	-
1	0	6	1①	6	1	-	-	-	-	-
5⑥	8	15③	9①	18	3	3	4	4	4	5
7	8	6	2	7						
1	3	5	6							
3	5	4	2							
3	-	4	2							
5	-	15	9							
5	-	-	9							
5	-	-	-							

$$\underline{\underline{TC = 102 \times 100}}$$

1. Degeneracy check

$$6 = 3 + 4 - 1$$

$$\underline{\underline{6 = 6}}$$

∴ degeneracy does not exist

2. u 's & v 's calculation for all allocated cells.

$$u_3 = 0$$

$$u_1 = -3$$

$$v_1 = 5$$

$$2 = u_1 + v_1$$

$$u_2 = -8$$

$$v_2 = 6$$

$$3 = u_1 + v_2$$

$$u_3 = 0$$

$$v_3 = 15$$

$$1 = u_2 + v_4$$

$$v_4 = 9$$

$$5 = u_3 + v_1$$

$$15 = u_3 + v_3$$

$$9 = u_3 + v_4$$

3. $C_{ij} - u_i + v_j$ calculation for all unallocated cells

$$11 - (-3 + 15) = -1$$

$$7 - (-3 + 9) = 1$$

$$1 - (-8 + 5) = 4$$

$$0 - (-8 + 6) = 2$$

$$6 - (-8 + 15) = -1$$

$$8 - (0 + 6) = 2$$

2①	3⑤	11	7
1	0	6	1①
5②	8	15③	9①

2	3⑤	11①	7
1	0	6	1①
5②	8	15③	9①

6=6

u 's & v 's calculation for allocated cells

$$\begin{array}{lcl}
 3 & u_3 = 0 & \\
 \text{R} & u_1 = 0 & \\
 3 = u_1 + v_2 & u_2 = -4 & \\
 11 = u_1 + v_3 & u_3 = 4 & \\
 1 = u_2 + v_4 & & \\
 5 = u_3 + v_1 & & \\
 15 = u_3 + v_3 & & \\
 9 = u_3 + v_4 & &
 \end{array}$$

$C_{ij} - u_i + v_j$ for all unallocated cells

$$\begin{array}{lcl}
 2 - (0 + 3) = -1 & 2 - (-4 + 5) = 1 & \\
 7 - (0 + 11) = -4 & 7 - (-4 + 9) = 2 & \\
 1 - (-4 + 8) = 0 & 1 - (-8 + 5) = 4 & \\
 8 - (-4 + 3) = 1 & 0 - (-8 + 7) = 1 & \\
 6 - (-4 + 11) = -1 & 6 - (-8 + 15) = -1 & \checkmark \\
 8 - (4 + 3) = 1 & &
 \end{array}$$

optimal

2	3⑤	11①	7
1	0	6①	1①
5⑦	8	15②	9①

2	3⑤	11①	7
1	0	6①	1
5⑦	8	15②	9②

6 > 6

u_i & v_j 's calculation for all unallocated cells

$$3 = u_1 + v_2$$

$$u_3 = 0$$

$$v_1 = 5$$

$$11 = u_1 + v_3$$

$$u_1 = -4$$

$$v_2 = 7$$

$$6 = u_2 + v_3$$

$$u_2 = -9$$

$$v_3 = 15$$

$$5 = u_3 + v_1$$

$$v_4 = 9$$

$$15 = u_3 + v_3$$

$$9 = u_3 + v_4$$

$C_{ij} - (u_i + v_j)$ for unallocated cells

$$2 = (-4 + 5) = 1$$

$$7 = (-4 + 9) = 5$$

$$1 = (-9 + 5) = 5$$

$$0 = (-9 + 7) = 2$$

$$6 = (-9 + 9) = 0$$

$$8 = (0 + 7) = 7$$

$C_{ij} - u_i + v_j \geq 0$ $\therefore$ optimal solution is reached

$$TC = 15 + 11 + 6 + 35 + 15 + 18 = \underline{\underline{100 \times 1000}}$$

3 a

5	11	10	12	4
2	4	6	3	5
3	12	5	14	6
6	11	4	11	7
7	9	8	12	5

⇒

9	3	4	2	10
12	10	8	11	9
11	2	9	0	8
8	3	10	3	7
7	5	6	2	9

Cost
Matn

Row minima

7	2	1	2	0	8
4	2	0	3	1	
11	2	9	0	8	
5	0	7	0	4	
5	3	4	0	7	

Column Minima

3	1	2	<u>10</u>	7	✓
<u>0</u>	2	8	3	6	
7	2	9	0	7	✓
1	<u>0</u>	7	3	3	
1	3	4	6	6	✓

2	2	1	0	6	✓
4	2	<u>0</u>	4	6	
6	1	8	<u>0</u>	6	✓
1	<u>0</u>	7	1	3	✓
<u>0</u>	2	3	0	5	

1	2	<u>0</u>	6	5	
4	3	0	5	<u>0</u>	
5	1	7	<u>0</u>	5	
4	<u>0</u>	6	1	2	
<u>0</u>	3	3	1	4	

Cost = 10 + 5 + 14 + 11 + 7 = 47

b

-5	2	0	7	Row Minima -5
5	6	4	8	$\boxed{4}$ ← Maximin
4	0	2	-3	-3
5	6	$\boxed{4}$	8	↑ Minimax

Maximin = Minimax. $\therefore$ Saddle point exist.

Value of the game = 4

Optimal strategy of Player A $\rightarrow A_2$

Optimal strategy of player B $\rightarrow B_3$

Game type $\rightarrow$ Strictly Determinable

Winner $\rightarrow$ Player A

b)

4	-4	Row Minima -4
-4	4	-4 } Maximin

column
Maximin
4 4
Minimax

$\therefore$ No saddle point exist.

Mixed strategy Method

$P_1 =$

$$P_1 = \frac{d-c}{(a+d)-(b+c)} = \frac{4+4}{(4+4)-(-4-4)} = \frac{8}{16} = \frac{1}{2}$$

$$P_2 = 1 - P_1 = 1 - \frac{1}{2} = \frac{1}{2}$$

$$q_1 = \frac{d-b}{(a+d) - (b+c)} = \frac{4+4}{(4+4) - (-4-4)} = \frac{8}{16} = \underline{\underline{\frac{1}{2}}}$$

$$q_2 = 1 - \frac{1}{2} = \underline{\underline{\frac{1}{2}}}$$

$$\begin{aligned} \text{Value of the game } (V) &= \frac{ad - bc}{(a+d) - (b+c)} \\ &= \frac{16 - 16}{16} = \underline{\underline{0}} \end{aligned}$$

Fair game.
~~Value~~

b

Genetic algorithm explanation

5

Ankitha Shetty ~~Ashetty~~
Shruti Shetty ~~Shetty~~
Name & Signature of Staff


Signature of HOD

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY, MOODBIDRI,
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
III - INTERNAL ASSESSMENT

Semester: 6

Subject: OPERATIONS RESEARCH(15CS653)

Max Marks: 30

Faculty: Ms Ankitha Shetty

Shruthi Shetty

Date: 18 May 2018

Time: 03:00 PM - 04:30 PM

Instructions to students:

Answer any 2 full question(s)

Question# Question

Marks CO BT/CL

Write the key relationship between primal and dual problem. Write the dual of the following LPP.

1a

$$\begin{aligned} \text{Max } Z &= 2x_1 + x_2 + x_3 \\ x_1 + x_2 + x_3 &\geq 6 \\ 3x_1 + x_2 + x_3 &= 3 \\ -4x_1 + 3x_2 - 6x_3 &= 1 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

8 CO1 L4

Solve the following LPP by dual Simplex method

1b

$$\begin{aligned} \text{Min } Z &= 3x_1 + 2x_2 + x_3 + 4x_4 \\ \text{STC } 2x_1 + 4x_2 + 5x_3 + x_4 &\geq 10 \\ 3x_1 - x_2 + 7x_3 - 2x_4 &\geq 2 \\ 5x_1 + 2x_2 + x_3 + 6x_4 &\geq 15 \\ x_1, x_2, x_3 \text{ OR } x_4 &\geq 0 \end{aligned}$$

7 CO1 L5

Write the dual of the following LPP.

2a

$$\begin{aligned} \text{Min } Z &= 3x_1 - 2x_2 + x_3 \\ \text{STC } 2x_1 - 3x_2 + x_3 &\leq 5 \\ 4x_1 - 2x_2 &\geq 9 \\ -8x_1 + 4x_2 + 3x_3 &= 8 \quad \text{where } x_1, x_2, x_3 \geq 0 \end{aligned}$$

5 CO1 L4

Write the working procedure of dual simplex method problem. Solve the following LPP by dual Simplex method

2b

$$\begin{aligned} \text{Max } Z &= -3x_1 - 2x_2 \\ \text{STC } x_1 + x_2 &\geq 1 \\ x_1 + x_2 &\leq 7 \\ x_1 + 2x_2 &\geq 10 \\ x_2 &\leq 3 \end{aligned}$$

10 CO1 L5

where $x_1, x_2, x_3 \geq 0$

Question# Question

Marks CO BT/CL

Explain the following.

i) Maximin Principle ii) Minimax Principle

iii) Two person zero sum game.

Solve the game for the following Payoff matrix.

3a

	B ₁	B ₂	B ₃	B ₄	B ₅
A ₁	-4	-2	-2	3	1
A ₂	1	0	-1	0	0
A ₃	-6	-5	-2	-4	4
A ₄	3	1	-6	0	-8

7 CO3 L3

Solve the following game using graphical method.

3b

I	II	III
3	-1	2
2	2	6

8 CO3 L5

OR

Solve the following game using Dominance principle.

4a

	I	II	III	IV
I	3	2	1	0
II	3	4	2	4
III	4	2	4	0
IV	0	4	0	8

	B ₁	B ₂	B ₃	B ₄	B ₅
A ₁	1	2	3	4	5
A ₂	1	3	2	7	4
A ₃	3	4	1	5	6
A ₄	6	5	7	6	5
A ₅	2	0	6	3	1

10 CO3 L5

Solve the following game

4b

	B ₁	B ₂
A ₁	8	-3
A ₂	-3	1

5 CO3 L4

Note: 1) Answer Two Full questions each Part.

PART-A

1. a) Key relationship between primal and dual problem:

Primal

- 1) Maximization problem
- 2) n variables and m constraints
- 3) $\leq$ type constraints
- 4) Objective function coefficients
- 5) RHS constants of the constraints
- 6) $=$ type i th constraint
- 7) Variable x_j unrestricted

$$\text{Max } Z = 2x_1 + x_2 + x_3$$

$$-x_1 - x_2 - x_3 \leq -6$$

$$3x_1 + x_2 + x_3 \leq 3$$

$$-3x_1 - x_2 - x_3 \leq -3$$

$$-4x_1 + 3x_2 - 6x_3 \leq 1$$

$$4x_1 - 3x_2 + 6x_3 \leq -1$$

where $x_1, x_2, x_3 \geq 0$.

Dual

$$\text{Min } Z = -6w_1 + 3(w_2' - w_2'') + 1(w_3' - w_3'')$$

$$-w_1 + 3(w_2' - w_2'') - 4(w_3' - w_3'') \geq 2$$

$$-w_1 + (w_2' - w_2'') + 3(w_3' - w_3'') \geq 1$$

$$-w_1 + (w_2' - w_2'') - 6(w_3' - w_3'') \geq 1$$

where $w_1, w_2, w_3 \geq 0$ and are dual variables.

Dual

- 1) Minimization problem
- 2) m variables and n constraints
- 3) $\geq$ type constraints
- 4) RHS constants of the constraints
- 5) Objective function coefficients
- 6) Unrestricted i th variable
- 7) j th constraint $=$ type

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$$\text{Min } z = 3x_1 + 2x_2 + x_3 + 4x_4$$

$$2x_1 + 4x_2 + 5x_3 + x_4 \geq 10$$

$$3x_1 - x_2 + 7x_3 - 2x_4 \geq 2$$

$$5x_1 + 2x_2 + x_3 + 6x_4 \geq 15$$

$$x_1, x_2, x_3 \geq 0$$

Basis	CB	XB	x_1	x_2	x_3	x_4	u_1	u_2	u_3
u_1	0	10	-2	-4	-5	-1	1	0	0
u_2	0	2	-3	1	-7	2	0	1	0
u_3	0	15	-5	-2	-1	-6	0	0	1
$\rightarrow$ L.V									
C_j			-3	-2	-1	-4	0	0	0
Z_j			0	0	0	0	0	0	0
$C_j - Z_j$			-3	-2	1	4	0	0	0
Ratio			3/5	1	1	-4/6	0	0	0

Basis	CB	XB	x_1	x_2	x_3	x_4	u_1	u_2	u_3
u_1	0	-4	0	-16/5	-23/5	7/5	1	0	0
u_2	0	7	0	11/5	-32/5	28/5	0	1	-3/5
x_1	-3	3	1	2/5	1/5	6/5	0	0	-1/5
C_j			-3	-2	-1	-4	0	0	0
Z_j			-3	-6/5	-3/5	-18/5	0	0	3/5
$C_j - Z_j$			0	-4/5	-2/5	-2/5	0	0	-3/5

Basis	CB	XB	x_1	x_2	x_3	x_4	u_1	u_2	u_3
x_3	-1	20/23	0	16/23	1	-7/23	-5/23	0	2/23
u_2	0	289/23	0	153/23	0	84/23	-32/23	1	-1/23
x_1	-3	65/23	1	6/23	0	29/23	1/23	0	-5/23
C_j			-3	-2	-1	-4	0	0	0
Z_j			-3	-12/23	0	-12/23	-2/23	0	-13/23
$C_j - Z_j$			0	-12/23	0	-22/23	2/23	0	13/23

$$Z = 215$$

2a) Min $Z = 3x_1 - 2x_2 + x_3$

STC

$$2x_1 - 3x_2 + x_3 \leq 5$$

$$4x_1 - 2x_2 \geq 9$$

$$-8x_1 + 4x_2 + 3x_3 = 8$$

where $x_1, x_2, x_3 \geq 0$

Soln:- Standard Primal

$$\text{Min } Z = 3x_1 - 2x_2 + x_3$$

$$-2x_1 + 3x_2 - x_3 \geq -5$$

$$4x_1 - 2x_2 \geq 9$$

$$-8x_1 + 4x_2 + 3x_3 \geq 8$$

$$8x_1 - 4x_2 - 3x_3 \geq -8$$

Dual LPP

$$\text{Max } Z = -5w_1 + 9w_2 + 8w_3' - 8w_3''$$

STC

$$-2w_1 + 4w_2 - 8(w_3' - w_3'') \leq 3$$

$$3w_1 - 2w_2 + 4(w_3' - w_3'') \leq -2$$

$$-1w_1 + 3(w_3' - w_3'') \leq 1$$

where $w_1, w_2, w_3 \geq 0$ and are dual variables.

2b) working procedure of dual simplex method. [5 marks]

$$\text{2 Max } Z = -3x_1 - 2x_2$$

STC $x_1 + x_2 \geq 1$

$$x_1 + x_2 \leq 7$$

$$x_1 + 2x_2 \geq 10$$

$$x_2 \leq 3$$

$$x_1, x_2, x_3 \geq 0$$

Standard form

$$\text{Max } Z = -3x_1 - 2x_2$$

STC

$$-x_1 - x_2 \leq -1$$

$$+x_1 + x_2 \leq 7$$

$$-x_1 - 2x_2 \leq -10$$

$$x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

$$\text{Max } Z = -3x_1 - 2x_2$$

STC

$$-x_1 - x_2 + u_1 = -1$$

$$x_1 + x_2 + u_2 = 7$$

$$-x_1 - 2x_2 + u_3 = -10$$

$$x_2 + u_4 = 3$$

$$\text{where } x_1, x_2, u_1, u_2, u_3, u_4 \geq 0$$

Basis	B_B	X_B	x_1	x_2	u_1	u_2	u_3	u_4
u_1	0	-1	-1	-1	1	0	0	0
u_2	0	7	1	1	0	1	0	0
L.V. u_3	0	-10	-1	-2	0	0	1	0
u_4	0	3	0	1	0	0	0	1
C_j			-3	-2	0	0	0	0
Z_j			0	0	0	0	0	0
$C_j - Z_j$			-3	-2	0	0	0	0
Ratio			3	1	0	0	0	0

Basis	C_B	X_B	x_1	x_2	u_1	u_2	u_3	u_4
u_1	0	4	$\frac{1}{2}$	0	1	0	$-\frac{1}{2}$	0
u_2	0	2	$\frac{1}{2}$	0	0	1	$\frac{1}{2}$	0
x_2	-2	5	$\frac{1}{2}$	1	0	0	$-\frac{1}{2}$	0
u_4 L.V	0	-2	$-\frac{1}{2}$ ^{key}	0	0	0	$\frac{1}{2}$	1
	C_j		-3	-2	0	0	0	0
	Z_j		-1	-2	0	0	1	0
	$C_j - Z_j$		-2	0	0	0	-1	0
	Ratio		4	0	0	0	-2	0
			↑					

Basis	C_B	X_B	x_1	x_2	u_1	u_2	u_3	u_4
u_1	0	2	0	0	1	0	0	1
u_2	0	0	0	0	0	1	1	1
x_2	-2	3	0	1	0	0	0	1
x_1	-3	4	1	0	0	0	-1	-2
	C_j		-3	-2	0	0	0	0
	Z_j		-3	-2	0	0	0	4
	$C_j - Z_j$		0	4	0	0	-3	-4

$$x_1 = 4 \quad x_2 = 3$$

$$\text{Max } Z = -3(4) - 2(3)$$

$$= -12 - 6$$

$$\boxed{\text{Max } Z = -18}$$

3a) 1) Maximin Principle defⁿ

2) Minimax Principle. defⁿ

3X1 = 3 marks

3) Two-person zero sum game defⁿ

	B ₁	B ₂	B ₃	B ₄	B ₅	Row Minima
A ₁	-4	-2	-2	3	1	-4
A ₂	1	0	-1	0	0	-1 Maximin
A ₃	-6	-5	-2	-4	4	-6
A ₄	3	1	-6	0	-8	-8
column Maxima	3	1	-1 Minimax	3	4	

$$\text{Maximin} = \text{Minimax} = -1$$

∴ Value of the game = -1

Strictly deterministic game

strategy of Player A is → A₂

B is → B₃

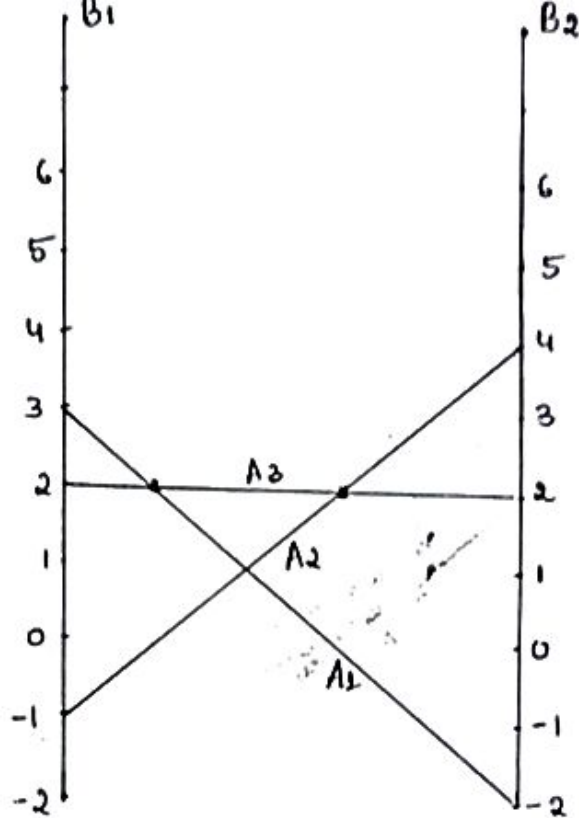
Player B is winner.

3b) Graphical method

$$\rightarrow \begin{bmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{bmatrix}$$

Reducing into 2x2

$$\begin{bmatrix} 3 & -2 \\ -1 & 4 \\ 2 & 2 \end{bmatrix}$$



$$\Rightarrow \begin{bmatrix} 3 & -2 \\ 2 & 2 \end{bmatrix} \quad \begin{bmatrix} -1 & 4 \\ 2 & 2 \end{bmatrix}$$

$$p_1 = \frac{d-c}{(a+d)-(b+c)}$$

$$q_1 = \frac{d-b}{(a+d)-(b+c)}$$

$$r = \frac{ad-bc}{(a+d)-(b+c)}$$

$$p_1 = \frac{2-2}{5-0} = 0$$

$$q_1 = \frac{2+2}{5} = \frac{4}{5}$$

$$r = \frac{6-(-4)}{5-0} = \frac{10}{5} = 2$$

$$p_2 = 1 - p_1$$

$$\boxed{p_2 = 1}$$

$$\boxed{q_1 = 4/5}$$

$$q_2 = 1 - 4/5$$

$$\boxed{q_2 = 1/5}$$

$$\boxed{r = 2}$$

$$p_1 = \frac{2-2}{1-6} = 0$$

$$q_1 = \frac{2-4}{1-6}$$

$$= \frac{-2}{-5} = \frac{2}{5}$$

$$p_2 = 1 - p_1$$

$$\underline{\underline{p_2 = 1}}$$

$$q_2 = 1 - 2/5$$

$$\boxed{q_2 = 3/5}$$

$$r = \frac{-2-8}{(1)-(6)} = \frac{-10}{-5}$$

$$\boxed{r = 2}$$

$$A) \begin{bmatrix} 3 & 2 & 4 & 0 \\ 3 & 4 & 2 & 4 \\ 4 & 2 & 4 & 0 \\ 0 & 4 & 0 & 8 \end{bmatrix}$$

$$\rightarrow \begin{array}{cccc} 3 & 2 & 4 & 0 \\ 3 & 4 & 2 & 4 \\ 4 & 2 & 4 & 0 \\ 0 & 4 & 0 & 8 \end{array}$$

Avg of 3rd & 4th Row

$$(2+4)/2 = 3$$

$$(4+0)/2 = 2$$

$$(0+8)/2 = 4$$

$$\begin{bmatrix} 4 & 2 & 4 \\ 2 & 4 & 0 \\ 4 & 0 & 8 \end{bmatrix} \quad \begin{bmatrix} 4 & 2 & 4 \\ 3 & 2 & 4 \end{bmatrix} \quad \text{Not possible to remove.}$$

$$\begin{bmatrix} 4 & 3 \\ 2 & 2 \\ 4 & 4 \end{bmatrix} \Rightarrow \begin{bmatrix} 2 & 4 \\ 4 & 0 \\ 0 & 8 \end{bmatrix} = \begin{bmatrix} 2 & 4 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 4 & 0 \\ 0 & 8 \end{bmatrix}$$

$$p_1 = \frac{d-c}{(a+d)-(b+c)} = \frac{8-0}{12-0} = \underline{\underline{2/3}} \quad p_2 = 1 - 2/3 = \underline{\underline{1/3}}$$

$$q_1 = \frac{d-b}{(a+d)-(b+c)} = \frac{8-0}{12-0} = 2/3 \quad q_2 = 1 - 2/3 = \underline{\underline{1/3}}$$

$$r = \frac{ad-bc}{(a+d)-(b+c)} = \frac{32}{12} = \underline{\underline{8/3}}$$

$$11) \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 3 & 2 & 4 & 5 \\ 3 & 4 & 1 & 5 & 6 \\ 6 & 5 & 7 & 1 & 5 \\ 2 & 0 & 6 & 3 & 1 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 3 & 4 & 1 \\ 6 & 5 & 7 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 2.5 \\ 3 & 6 \end{bmatrix}$$

$$\therefore \begin{bmatrix} 4 & 1 \\ 5 & 7 \end{bmatrix}$$

$$P_1 = \frac{7-5}{(7+4)-(5+1)} = \frac{2}{11-6} = \underline{\underline{\frac{2}{5}}} \quad P_2 = 1 - \frac{2}{5} = \underline{\underline{\frac{3}{5}}}$$

$$q_1 = \frac{7-1}{(7+4)-(5+1)} = \frac{6}{11-6} = \underline{\underline{\frac{6}{5}}} \quad q_2 = 1 - \frac{6}{5} = \underline{\underline{-\frac{1}{5}}}$$

$$v = \frac{28-5}{5} = \underline{\underline{\frac{23}{5}}}$$

Row minima

$$4b) \begin{bmatrix} 8 & -3 \\ -3 & 1 \end{bmatrix} \begin{matrix} -3 \\ -3 \end{matrix} \} \text{ maximin Principle}$$

col
max

$$8 \quad \boxed{1}$$

minimax
Principle

$$P_1 = \frac{1 - (-3)}{(8+1) - (-3-3)} = \frac{4}{9+6} = \underline{\underline{\frac{4}{15}}} \quad P_2 = 1 - \frac{4}{15} = \underline{\underline{\frac{11}{15}}}$$

$$q_1 = \frac{1 - (-3)}{9+6} = \underline{\underline{\frac{4}{15}}} \quad q_2 = \underline{\underline{\frac{11}{15}}}$$

$$v = \frac{8-9}{9+6} = \underline{\underline{-\frac{1}{15}}}$$

Value of the game = $-\frac{1}{15}$

Strategy of Player A ($\frac{4}{15}, \frac{11}{15}$)

Player B ($\frac{4}{15}, \frac{11}{15}$)

Winner of the game = Player B

Ankitha Shetty ~~Ashty~~

Shrutika Shetty ~~Shrutika~~

Signature of Faculty


Signature of ALOP



CBCS SCHEME

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15CS653

Sixth Semester B.E. Degree Examination, June/July 2018

Operations Research

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define operations research. List and explain the various phases of an operations research study. (06 Marks)
- b. An agriculturist has a farm with 126 acres. He produces Tomato, Mango and Potato. Whatever he raises is fully sold in the market. He gets Rs.5/- for Tomato/kg, Rs.4/- for Mango/kg and Rs.5/- for Potato/kg. The average yield is 1,500 kg of Tomato/acre, 1800 kg of Mango/acre and 1200kg of Potato/acre. To produce each 100kg of Tomato and Mango and to produce each 80kg of Potato a sum of Rs.12.50 has to be used for manure. Labour required for each acre to raise the crop is 6 man-days for Tomato and Potato each and 5 man-days for Mango. A total of 500 man-days of labour at a rate of Rs.40/- per man day are available. Formulate this as a LP model to maximize the agriculturist's total profit. (10 Marks)

OR

- 2 a. Define: i) Feasible region ii) Feasible solution iii) Optimal solution (06 Marks)
- b. Solve the following LPP by graphical method,
Minimize $Z = 20x_1 + 10x_2$
Subject to $x_1 + 2x_2 \leq 40$
 $3x_1 + x_2 \geq 30$
 $4x_1 + 3x_2 \geq 60$
 $x_1, x_2 \geq 0$. (10 Marks)

Module-2

- 3 a. Define slack variable, surplus variable and basic solution. (06 Marks)
- b. Solve the following LPP using simplex method,
 $Z_{max} = 2x_1 + 2x_2 + 4x_3$
Subject to the constraint
 $2x_1 + 3x_2 + x_3 \leq 240$
 $x_1 + x_2 + 3x_3 \leq 300$
 $x_1 + 3x_2 + x_3 \leq 300$
 $x_1, x_2, x_3 \geq 0$. (10 Marks)

OR

- 4 a. Solve the following LPP by two phase method
 $Z_{max} = 3x_1 - x_2$
Subject to the constraint
 $2x_1 + x_2 \geq 2$
 $x_1 + 3x_2 \leq 2$
 $x_2 \leq 4$
 $x_1, x_2 \geq 0$. (08 Marks)

- b. Solve the following LPP by Big-M method,
 Maximize $Z = 2x_1 + 3x_2 + 10x_3$
 Subject to $x_1 + 2x_3 = 0$
 $x_2 + x_3 = 1$
 $x_1, x_2, x_3 \geq 0$.

(08 Marks)

Module-3

- 5 a. Explain the following:
 i) The essence of duality theory.
 ii) Primal dual relationship.
 b. Write the duals for the following LPP:
 i) Maximize $Z = x_1 + 2x_2 + x_3$
 Subject to the constraint $2x_1 + x_2 + x_3 \leq 2$
 $-2x_1 + x_2 - 5x_3 \geq -6$
 $4x_1 + x_2 + x_3 \leq 6$
 and $x_1, x_2, x_3 \geq 0$.
 ii) Maximize $Z = 3x_1 + 5x_2 + 7x_3$
 Subject to the constraint $x_1 + x_2 + 3x_3 \leq 10$
 $4x_1 - x_2 + 2x_3 \geq 15$
 and $x_1, x_2 \geq 0$ and x_3 is unrestricted variable.

(06 Marks)

(10 Marks)

OR

- 6 a. Give the characteristics of dual problem.
 b. Solve the following LPP using dual simplex method
 Minimize $Z = 2x_1 + x_2 + 3x_3$
 Subject to $x_1 - 2x_2 + x_3 \geq 4$
 $2x_1 + x_2 + x_3 \leq 8$
 $x_1 - x_3 \geq 0$
 with all the variables non negative.

(06 Marks)

(10 Marks)

Module-4

- 7 a. Find initial basic feasible solution by North-West corner method.

	Destination					
	D ₁	D ₂	D ₃	D ₄	Requirement	
Factory	F ₁	3	3	4	1	100
	F ₂	4	2	4	2	125
	F ₃	1	5	3	2	75
Demand	120	80	75	25		

(06 Marks)

- b. Solve the following transportation problem and determine optimal distribution for the company so as to minimize the total transportation cost. Use VAM method to find the initial basic feasible solution.

(10 Marks)

Factories	Warehouses			Available
	W ₁	W ₂	W ₃	
F ₁	16	20	12	200
F ₂	14	8	18	160
F ₃	26	24	16	90
Required	180	120	170	

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10CS/IS661

Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Operations Research

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART - A

- 1 a. What is operations research? Briefly explain the various phases of operations research study. (08 Marks)
- b. A person requires minimum 10, 12 and 12 units of chemicals for A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C respectively per jar. A dry product contains 1, 2 and 4 units of A, B and C per jar. If the liquid product sells for Rs.3 per jar and dry product sells for Rs.2 per jar, how many of each should be purchased in order to minimize the cost and meet requirement. (06 Marks)
- c. Use graphical method to solve the following :

$$\text{Max } z = 100x_1 + 40x_2$$

$$\text{Subjected to } 5x_1 + 2x_2 \leq 1000$$

$$3x_1 + 2x_2 \leq 900$$

$$x_1 + 2x_2 \leq 500$$

$$x_1, x_2 \geq 0$$

Downloaded from A-ZShiksha.com

(06 Marks)

- 2 a. Solve the following LPP by using simplex method:

$$\text{Max } z = 3x_1 + 2x_2 + 5x_3$$

$$\text{Subjected to } x_1 + 2x_2 + x_3 \leq 430$$

$$3x_1 + 2x_2 \leq 460$$

$$x_1 + 4x_2 \leq 420$$

$$x_1, x_2, x_3 \geq 0$$

(10 Marks)

- b. Explain the steps involved in setting up of a simplex method. (10 Marks)

- 3 a. Solve the following LPP by using Big M method:

$$\text{Max } z = -2x_1 - x_2$$

$$\text{Subjected to } 3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

(10 Marks)

- b. Solve the following LPP by using two-phase method:

$$\text{Max } z = 5x_1 + 8x_2$$

$$\text{Subjected to } 3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

(10 Marks)

- 4 a. Explain the steps involved in revised simplex method.
b. Use revised simplex method to solve the following LPP:

$$\text{Min } z = x_1 + x_2$$

$$\text{Subjected to } x_1 + 2x_2 \geq 7$$

$$4x_1 + x_2 \geq 6$$

$$x_1, x_2 \geq 0$$

(10 Marks)

PART - B

- 5 a. Explain the role of duality theory in sensitivity analysis.
b. Write the dual of the following LPP:

$$\text{i) Max } z = 3x_1 - x_2 + x_3$$

$$\text{Subjected to } 4x_1 - x_2 \leq 8$$

$$8x_1 + x_2 + 3x_3 \geq 12$$

$$5x_1 - 6x_3 \leq 13$$

$$x_1, x_2, x_3 \geq 0$$

$$\text{ii) Min } z = 2x_1 + 8x_2$$

$$\text{Subjected to } 3x_1 + x_2 \geq 12$$

$$2x_1 + x_2 + 6x_3 \leq 6$$

$$5x_1 - x_2 + 3x_3 = 4$$

$$x_1, x_2, x_3 \geq 0$$

(10 Marks)

- 6 a. Find the initial solution to the following transportation problem using VAM:

		Destination				Supply
		D ₁	D ₂	D ₃	D ₄	
Factory	F ₁	3	3	4	1	100
	F ₂	4	2	4	2	125
	F ₃	1	5	3	2	75
	Demand	120	80	75	25	300

(10 Marks)

- b. Explain Hungarian algorithm with example.

(10 Marks)

- 7 a. Define the following with respect to games:

i) Pay off

ii) Strategy

iii) Saddle point.

- b. Solve the following game by graphical method:

(03 Marks)

Player B

$$\text{Player A } \begin{bmatrix} 3 & -3 & 4 \\ -1 & 1 & -3 \end{bmatrix}$$

(07 Marks)

- c. Solve the following game by dominance property:

Player B

$$\text{Player A } \begin{bmatrix} 2 & -2 & 4 & 1 \\ 6 & 1 & 12 & 3 \\ -3 & 2 & 0 & 6 \\ 2 & -3 & 7 & 7 \end{bmatrix}$$

(10 Marks)

- 8 Write short notes on:

- a. Genetic algorithm.
b. Metaheuristics.
c. Tabu search algorithm.
d. Simulated annealing algorithm.

(20 Marks)

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10CS/IS661

Sixth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Operations Research

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART - A

- 1 a. Explain the six phases of OR study. (12 Marks)
- b. A retailer deals in two items only, item A and item B. He has ₹ 50,000 to invest and a space to store at most 60 pieces. An item 'A' costs him ₹ 2,500 and 'B' costs ₹ 500. A net profit to him on item 'A' is ₹ 500, and item 'B' is ₹ 150. If he can sell all the items he purchases, how should he invest his amount to have maximum profit?
 (i) Give mathematical formulation to the LPP
 (ii) Use graphical method to solve the problem. (08 Marks)
- 2 a. Explain the concept of Tie breaking in simplex method. (10 Marks)
- b. Solve the following LPP by simplex method:
 Maximize $Z = 2x_1 + 2x_2$
 Subject to $5x_1 + 3x_2 \leq 8$
 Downloaded from www.4ZShiksha.com (10 Marks)
- 3 a. Explain the post optimality analysis of linear programming. (10 Marks)
- b. Solve the following LPP by Big-M method.
 Maximize $Z = 4x_1 + x_2$
 Subject to $3x_1 + x_2 = 3$
 $4x_1 + 3x_2 \geq 6$
 $x_1 + 2x_2 \leq 3$ and $x_1, x_2 \geq 0$ (10 Marks)
- 4 a. Apply revised simplex method to solve the following problem:
 Maximize $Z = 6x_1 - 2x_2 + 3x_3$
 Subject to $2x_1 - x_2 + 2x_3 \leq 2$
 $x_1 + 4x_3 \leq 4$ and $x_1, x_2, x_3 \geq 0$ (10 Marks)
- b. Explain the following:
 (i) The essence of duality theory (ii) Primal dual relationship (10 Marks)

PART - B

- 5 a. Solve the following LPP by using dual simplex method:
 Minimize $Z = 10x_1 + 6x_2 + 2x_3$
 Subject to $-x_1 + x_2 + x_3 \geq 1$
 $3x_1 + x_2 - x_3 \geq 2$ and $x_1, x_2, x_3 \geq 0$ (10 Marks)
- b. Explain general procedure for sensitivity analysis. (10 Marks)

- 6 a. Explain Hungarian algorithm with example. (10 Marks)
 b. The transportation costs per truck load of cement (in hundred of rupees) from each plant to each project site are as follows:

		Project Site				
		2	3	11	7	6
Factories	1	1	0	6	1	1
	5	5	8	15	9	10
	7	7	5	3	2	17
	Supply					

Determine the optimal distribution for the company so as to maximize the total transportation cost. (10 Marks)

- 7 a. Two players 'A' and 'B' throw 2 coins on a table 'A' wins '8' when both coins show heads and '1' when both are tail. 'B' wins '3' when coin does not match. Prepare the payoff matrix and determine optimal strategies for each player. (10 Marks)
 b. With reference to game theory define the following, with an example:
 (i) Pure strategy (ii) Mixed strategy (iii) Saddle point
 (iv) Payoff matrix (v) Two-person-zero-sum- game (10 Marks)

- 8 Explain briefly the following :

- a. Tabu search algorithm
 b. Genetic algorithm
 c. Metaheuristics
 d. Simulated Annealing algorithm

(20 Marks)

.....

Assignment - 1

- 1) A firm can produce 3 types of baby sweaters say A, B and C. Three kinds of wool are required for it say red wool, green wool and blue. One unit of type A sweater needs 2 yards of red wool and 3 yards of blue wool, one unit of Type B sweater needs 3 yards of red wool, 2 yards of green wool and 2 yards of blue wool, one unit of Type C needs 5 yards of green wool, and 4 yards of blue wool. The firm has only a stock of 80 yards of red wool, 100 yards of green wool and 150 yards of blue wool. It is assumed that the income obtained from each unit of Type A sweater is Rs 30, Type B sweater is Rs 50, and Type C sweater is Rs 40.
- Determine how the firm should use the available materials so as to maximize the total income from the finished sweaters.
- Formulate the above problem as L.P.P.

- 2) A farmer has to plant 2 kinds of trees P and Q in a land of 4000m^2 area. Each P tree requires at least 25m^2 and Q tree requires 40m^2 of land. The annual water requirement of P tree is 30 units and of Q trees is 15 units per tree, while at most 3000 units of water is available. It is also estimated that the ratio

of the number of Q trees to the number of P trees should not be less than $6/19$ and should not be more than $17/8$. The return per tree from P is expected to be one and half times as much as from Q tree. Formulate the problem as an LPP model.

3) A retailer deals in 2 items only item A and item B. He has 50,000 to invest and a space to store atmost 60 pieces. An item 'A' costs him ₹. 500 and B costs 500. A net profit of item, 'A' is 500 and item B is 150. If he can sell all the items he purchases, how should he invest his amount to have maximum profit?

1) Give mathematical formulation to the LPP.

2) Use graphical method to solve the problem.

4) Define

- 1) Feasible solution

- 2) Feasible region

- 3) Optimal solution.

- 4) Degeneracy.

- 5) Basic solution.

- 6) Basic feasible solution.

5) Nirmala Leather works produces 2 types of leather belts, A and B. A is of superior quality and B is of inferior quality. The respective profits are Rs 10 and Rs 5 per belt. The supply of raw material is sufficient for making 850 belts per day. For belt A, a special type of buckle is required and 500 are available per day. There are 700 buckles available for belt B per day. Belt A needs twice as much as time required for belt B and the company can produce 500 belts if all of them were of the type A. Formulate a L.P Model.

6) Egg contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and cost 12 paise per gram. Milk contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 paise per gram. The daily minimum requirement of vitamin A and vitamin B are 100 units and 120 units respectively. Find the optimal product mix.

7) A company produces 2 types of Hats. Each hat of the first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limits daily sales of the first and second type to 150 and 250 hats. Assuming that the profits per hat are Rs 8 for type A and Rs. 5 for type B, formulate the problem as a linear programming model in order to determine the number of hats to be produced of each type so as to maximize the profit.

A firm manufactures 3 products A, B and C. The profits are Rs 3, Rs 2 and Rs 4 respectively. The firm has 2 machines and below is the required processing time in minutes for each machine on each product.

Machine G and H have 9000 and 2500 machine-minutes respectively. The firm must manufacture 100 A's, 200 B's and 50 C's but no more than 150 A's. Setup the problem to maximize the profit.

Machine	Product		
	A	B	C
G	4	3	5
H	2	2	4

Ignore

9) A farmer has 100 acre farm. He can sell all tomatoes, lettuce or radishes he can raise. The price he can obtain is Rs. 1.00 per kg of tomatoes, Rs 0.75 for lettuce and Rs 2.00 per kg for radish. The average yield per acre is 2000 kg of tomatoes, 3000 heads of lettuce and 1000 kgs of radishes. Fertilizers is available at Rs 0.50 per kg and the amount required per acre is 100kgs for tomatoes and lettuce, and 50 kgs for radishes. Labour required for sowing, cultivating and harvesting per acre is 5 man days for tomatoes and radishes and 6-man days for lettuce. A total of 400 man-days of labour are available at Rs. 20 per man-day. Formulate the problem as LPP to maximize the farmer's total profit.

Graphical method. problems.

1) Using graphical method, solve the LPP,

$$\text{Maximize } Z = 5x_1 + 4x_2$$

$$\text{Subject to } 6x_1 + 4x_2 \leq 24$$

$$x_1 + 2x_2 \leq 6$$

$$-x_1 + x_2 \leq 1$$

$$\text{where } x_1, x_2 \geq 0$$

2) Minimize $Z = 1.5x_1 + 0.5x_2$

$$\text{Subject to } x_1 + 3x_2 \geq 3$$

$$x_1 + x_2 \geq 2$$

$$\text{and } x_1, x_2 \geq 0$$

3) Max $Z = 100x_1 + 40x_2$

$$\text{Subject to } 5x_1 + 2x_2 \leq 1000$$

$$3x_1 + 2x_2 \leq 900$$

$$x_1 + 2x_2 \leq 500$$

$$\text{where } x_1, x_2 \geq 0$$

4) Max $Z = 3x_1 + 5x_2$

$$\text{Subject to } -3x_1 + 4x_2 \geq 12$$

$$2x_1 - x_2 \geq -2$$

$$2x_1 + 3x_2 \geq 12$$

$$x_1 \leq 4, x_2 \geq 2$$

$$\text{and } x_1, x_2 \geq 0$$

$$5) \text{ Max } Z = 2x_1 + 3x_2$$

$$\text{Subject to } x_1 - x_2 \leq 2$$

$$x_1 + x_2 \geq 4$$

$$\text{and } x_1, x_2 \geq 0$$

$$6) \text{ Max } Z = 4x_1 + 3x_2$$

$$\text{Subject to } x + y \geq 10$$

$$2x + 5y \geq 35$$

$$x, y \geq 0$$

$$7) \text{ Max } Z = 3x_1 - 2x_2$$

$$\text{Subject to } x_1 + x_2 \leq 1$$

$$2x_1 + 2x_2 \geq 4$$

$$\text{and } x_1, x_2 \geq 0$$

$$8) \text{ Max } Z = 5x_1 + 3x_2$$

$$\text{Subject to } 3x_1 + 5x_2 = 15$$

$$5x_1 + 2x_2 = 10$$

$$\text{and } x_1, x_2 \geq 0$$

9) What is Operation Research? Explain the phases of OR.

Assignment - 2

1. $\text{Max } Z = 10x_1 + 15x_2 + 20x_3$

$$\text{STC } 2x_1 + 4x_2 + 6x_3 \leq 24$$

$$3x_1 + 9x_2 + 6x_3 \leq 30$$

$$x_1, x_2, x_3 \geq 0$$

Solve the above LPP using simplex method.

2. Use Big-M Method to solve LPP.

$$\text{Min } Z = 2x_1 + 3x_2$$

$$\text{STC } x_1 + x_2 \geq 6$$

$$7x_1 + x_2 \geq 14$$

$$x_1, x_2 \geq 0$$

3. Solve the following using II-Phase method.

$$\text{Max } Z = 2x_1 + 3x_2 + 5x_3$$

$$\text{STC } 3x_1 + 10x_2 + 5x_3 \leq 15$$

$$x_1 + 2x_2 + x_3 \geq 4$$

$$33x_1 - 10x_2 + 9x_3 \leq 33$$

$$x_1, x_2, x_3 \geq 0$$

Assignment - 3

1. Explain Nature of the metaheuristics.
2. Explain Simulated Annealing with example.
3. Explain Tabu search algorithm.
4. Explain genetic algorithm in detail.

PROGRAMME OUTCOME & PROGRAMME SPECIFIC OUTCOME ASSESSMENT MATRIX
Alva's Institute of Engineering and Technology, Moodbidri
Department of Computer Science and Engineering

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
15CS653.1		2	3	2		1			1		2	1	1	3	2
15CS653.2		2	3	2		1			1		2	1		3	1
15CS653.3		2	3	2		1			1		2	1		3	2
AVG	#DIV/0!	2	3	2	#DIV/0!	1	#DIV/0!	#DIV/0!	1	#DIV/0!	2	1	1	3	2

PO Attainment Calculation																
COs	CO Attainment Grade	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
15CS653.1	2.61	0	1.73684	2.60526	1.73684	0	0.86842	0	0	0.86842	0	1.73684	0.86842	0.86842	2.60526	1.73684
15CS653.2	2.73	0	1.81818	2.72727	1.81818	0	0.90909	0	0	0.90909	0	1.81818	0.90909	0	2.72727	0.90909
15CS653.3	3.00	0	2	3	2	0	1	0	0	1	0	2	1	0	3	2
	Weighted Sum →	0	5.55502	8.33254	5.55502	0	2.77751	0	0	2.77751	0	5.55502	2.77751	0.86842	8.33254	6.45909
	Max Weight →	0	6	9	6	0	3	0	0	3	0	6	3	1	9	5
PO Attainment in percentage	→	#DIV/0!	92.58	92.58	92.58	#DIV/0!	92.58	#DIV/0!	#DIV/0!	92.58	#DIV/0!	92.58	92.58	86.84	92.58	92.92
PO Attained Grade		#DIV/0!	1.86	2.78	1.86	#DIV/0!	0.93	#DIV/0!	#DIV/0!	0.93	#DIV/0!	1.86	0.93	0.87	2.73	1.86

Aditya
Chaitanya

23/8/14
H.O.D.
 Dept. Of Computer Science & Engineering
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COs, PEOs, PSOs and COs-POs/PSOs mapping matrix

SEMESTER 6

Sub Code: 15CS653	Sub Name: OPERATION RESEARCH	
Name of the Faculty: Ms. Ankitha Shetty and Ms. Shruthi Shetty J		IA Marks: 20
Total Numbers of Lecture Hours: 40	Number of Lecture Hours/Week: 3hrs	Exam Marks: 80
		Exam Hours: 3hrs

COURSE OUTCOMES:

After studying this course, students will be able to:

C305.1. Select and apply optimization techniques for various problems.

C305.2. Model the given problem as transportation and assignment problem and solve.

C305.3. Apply game theory for decision support system.

PROGRAMME EDUCATION OBJECTIVES (PEOs) :

PEO1: To provide students with fundamental strength in core disciplines of computer engineering to solve the problems of computing world.

PEO2: To ensure that graduates conquer the difficulties of emerging adaptive technological changes.

PEO3: To prepare students for successful career in the industry of international standard.

PROGRAMME SPECIFIC OUTCOMES (PSOs) :

A graduate of the Computer Science and Engineering Program will exhibit:

PSO1: Professional Skills: The ability to understand & implement the computer programs in the areas of Computer Architecture, System Software, Database Management Systems, Web Design, Multimedia and Computer Networking.

PSO2: Problem-Solving Skills: The ability to solve real-world problems by suitable mathematical model with strong technological concepts in rapidly growing arena of computer technology.

PSO3: Successful Career and Entrepreneurship: Knowledge in diverse areas of Software Engineering and Management & Entrepreneurship for IT Industry, conducive in cultivating skills for successful career development.

CO-PO/POS Mapping Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C305.1		2	3	2		1			1		2	1	1	3	2
C305.2		2	3	2		1			1		2	1	1	3	2
C305.3		2	3	2		1			1		2	1		3	1
SUM		6	9	6		3			1		2	1		3	2
AVG		2	3	2		1			3		6	3	1	9	5
									1		2	3	1	3	1.66

Signature of the faculty

Signature of HOD
HOD
Dept. Of Computer Science & Engineering
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

AIET	Lesson Plan & Execution			Format No.	ACD 08	
				Issue No.	01	
				Rev. No.	00	
Name of the faculty			Shruthi Shetty J			
Semester and Section			6 th SEM,			
Date of Commencement			05/02/2018			
Last Working Day of the Semester			26/05/2018			
Source Materials List						
1. D.S Hira and PK Gupta, Operation Research, (RE), Published by						
2.			Chand & Company Ltd, 2014			
3. S. Kalavathy, OR Vikas Publishing House Pvt Limited 01 Aug 2002						
4. SD Sharma, OR, Kedar Nath Ram Nam Publishers.						
5.						
Subject Name <u>OPERATIONS RESEARCH.</u>						
Period	Plan			Execution		
	Date	Topics to be covered	Source Material needed	Topics Covered	Date	Source Material Referred
<u>Module 1</u>						
1	6/2/18	Introduction, Linear Programming. Introduction, The Origin, nature and Impact.	1, 2	Introduction to operation research definitions.	6/2/18	1
2	7/2/18	Defining a problem and gathering data	1, 2	Impact, history advantages of operation research	7/2/18	1
3	8/2/18	Formulating a mathematical model. Deriving solutions from the model.	1, 2	Phase of operation research	8/2/18	1
4	9/2/18	Testing the model. Preparing to apply the model.	1, 2	Linear programming	9/2/18	1

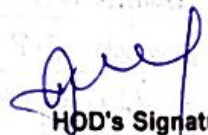
Period	Plan			Execution		
	Date	Topics to be covered	Source Material needed	Topics Covered	Date	Source Material needed
5	10/2/18	Implementation. Introduction to LPP.	1, 2	Problems on LPP.	10/2/18	1
6	11/2/18	Prototype example Assumptions of LPP	1, 2	Problems on LPP.	11/2/18	1
7	15/2/18	Formulation of LPP and graphical method various eg.	1, 2	Graphical method.	15/2/18	1
8	16/2/18	Graphical method problems.	1, 2	Graphical method problems.	16/2/18	1
Module 2 9	17/2/18	Simplex method-1 The essence of the simplex method.	1, 2	More problems on graphical method	17/2/18	1
10	20/2/18	Setting up the simplex method.	1, 2	Graphical method problems.	20/2/18	1
11	21/2/18	Types of variables.	1, 2	Simplex method	21-2-18	1
12	22/2/18	Algebra of the simplex method.	1, 2	Standard form on simplex method	22/2/18	1
13	23/2/18	The simplex method in tabular form	1, 2	slack, surplus variable	23/2/18	1
14	24/2/18	Tie breaking in the simplex method	1, 2	Simplex method problem	24-2-18	1
15	27/2/18	Big M-method.	1, 2	Tie breaking in Simplex method.	27-2-18	1
16	28/2/18	Two-phase method.	1, 2	Simplex method problems	28-2-18	1
Module 3 17	1/3/18	Simplex Method-2	1, 2	Problems-	1-3-18	1

Period	Plan			Execution		
	Date	Topics to be covered	Source Material needed	Topics Covered	Date	Source Material Referred
18	2/3/18	Duality theory	1,2	Big M method.	2-3-18	1
19	3/3/18	The essence of duality theory.	1,2	Problems on Big M method.	3-3-18	1
20	5/3/18	Primal dual relationship.	1,2	Problems.	6-3-18	1
21	7/3/18	Conversion of primal to dual problem.	1,2	2 phase method.	7-3-18	1
22	8/3/18	Conversion of dual to primal problem	1,2	Steps in 2 phase method	8-3-18	1
23	9/3/18	The dual simplex method.	1,2	Problems on 2-phase method.	9-3-18	1
24	10/3/18	Problems on duality.	1,2	Problems on 2 phase method.	10-3-18	1
<u>Module 4</u> 25	13/3/18	Transportation and Assignment Problems.	1,2	Class test	13-3-18	1
26	14/3/18	Initial Basic feasible solution by NWCR method.	1,2	Revision on Module 2	14-3-18	1
27	15/3/18	Matrix Minima method	1,2	Transportation problems.	15-3-18	1
28	16/3/18	Vogel's Approximation Method	1,2	Standard form of LP.	16-3-18	1
29	17/3/18	Modified distribution method	1,2	North-West corner method.	17-3-18	1
30	20/3/18	The Assignment problem	1,2	Least cost method	20-3-18	1

Period	Plan			Execution		
	Date	Topics to be covered	Source Material needed	Topics Covered	Date	Source Material Referred
31	21/3/18	A Hungarian algorithm for the assignment problem	1,2	Problems on NWCM	21/3/18	1
32	22/3/18	Minimization and Maximization varieties in TP and AP.	1,2	Problems on LCM	23/3/18	1
Module 5						
33	23/3/18	Game theory	1,2	Problems on VAM.	24/3/18	1
34	24/3/18	The formulation of 2 persons.	1,2	MODS method.	31/3/18	1
35	31/3/18	Zero sum games. Saddle point	1,2	Degeneracy in MODS method.	3/4/18	1
36	3/4/18	Maximin and Minimax principle	1,2	Problems on MODS.	4/4/18	1
37	5/4/18	Solving simple games Example. Games with mixed strategies.	1,2	Maximization type in TP.	6/4/18	1
38	6/4/18	Graphical solution procedure	1,2	Problems on Maximization type	10/4/18	1
39	8/4/18	Metaheuristics: The nature of Metaheuristics Tabu Search.	1,2	Unbalanced TP.	11/4/18	1
40	9/4/18	Simulated Annealing Genetic Algorithms	1,2	Problems on Unbalanced TP	12/4/18	1
				Transportation problems	13/4/18	1
				Introduction to Assignment problem	17/4/18	1
				Assignment problem	17/4/18	1

Period	Plan			Execution		
	Date	Topics to be covered	Source Material needed	Topics Covered	Date	Source Material Referred
				Assignment problem problems	18/4/18	1
				Maximization type in AP.	19/4/18	1
				Problems.	20/4/18	1
				Game theory Introduction.	21/4/18	1
				2 person zero sum game	23/4/18	1
				Maximin principle	23/4/18	1
				Min-max principle.	25/4/18	1
				Graphical method.	2/5/18	1
				Problems.	3/5/18	1
				Dominance principle	4/5/18	1
				Metaheuristics	8/5/18	1
				Tabu Search Genetic Algo.	9/5/18	1
				Simulated Annealing	10/5/18	1

Period	Plan			Execution		
	Date	Topics to be covered	Source Material needed	Topics Covered	Date	Source Material Referred
				Duality theory	11/5/18	1
				Intro. Examples.	15/5/18	1
				Conversion of primal to dual.	16/5/18	1
				Problems.	17/5/18	1
				Primal-dual relationship.	18/5/18	1
				problems.	22/5/18	1
				The dual simplex method.	23/5/18	1
				Problems.	24/5/18	1
				Problems.	25/5/18	1
				Problems	26/5/18	1

Others	Planned	Actual	Remarks :
Special Classes	10	10	
Tutorials	10	16	
Assignments	05	04	
Seminars	00	00	
IA Tests	03	03	
Portions Covered in the entire Semester	100%.		
Course Effectiveness			
Students Feedback	Good		
Students Response	Very Good		
Result	No. of Students AP	No. of Students Passed	% of Result
	43	42	100%
 Faculty In Charge  Signature of Principal (& Remarks If any)  HOD's Signature			

ALVA'S INSTITUTE OF ENGINEERING

MIJAR

ND TECHNOLOGY

OODBIDRI - 574 225

Class : Operation Research, A Sec

Subject : OR

No. of Classes held :

ATTENDANCE CUM INTERNAL

Subject

Date / Month																																	
Sl. No.	U.S.N.	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	4A15CS002	Adarsh M S	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	03	Adarsh Mohan Rijar	1	2	3	4	A	5	6	7	8	9	10	A	A	A	A	17	18	19	20	A	21	22	23	24	25	26	27	28	29	30	
3	04	Adithya V Shetty	1	2	3	A	A	4	5	6	7	8	A	A	9	10	A	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
4	09	Ankith	1	2	3	4	5	6	7	8	9	10	11	A	A	A	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
5	17	Ashwini P Shetty	1	2	3	4	5	6	7	8	9	10	A	A	11	12	A	13	14	15	16	17	18	19	20	A	21	22	23	24	25	26	
6	18	Bangura Yatish G	1	2	3	4	5	6	A	7	A	8	A	9	10	11	12	13	14	15	16	17	18	19	20	21	A	22	23	24	25	26	
7	23	Chaitra Gajendramath	1	2	3	4	5	6	7	8	9	10	11	A	12	13	14	15	16	17	18	19	20	21	A	22	23	24	25	26	27	28	
8	27	Deeksha	1	2	3	4	5	6	7	8	9	10	A	A	11	12	A	13	14	15	16	17	18	19	20	A	21	22	23	24	25	26	
9	28	Deeksha Shetty	1	2	3	4	5	6	7	8	9	10	A	A	11	12	A	13	14	15	16	17	18	19	20	A	21	22	23	24	25	26	
10	30	Devika Shetty M	1	2	3	4	5	6	7	8	9	10	A	A	11	12	A	13	14	15	16	17	18	19	20	A	21	22	23	24	25	26	
11	34	Dhruva S R	A	A	A	A	A	1	2	3	4	5	6	7	8	9	A	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
12	34	Ganesh S P	1	2	3	4	5	A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25	26	27	28	
13	49	H. Anushay Kedlaya	A	A	A	A	A	1	2	3	4	5	A	A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	A	20	21	22	23
14	40	Hemant P	A	A	A	A	A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	17	18	19	20	21	22	A	23	24
15	53	Jasmine Primij Loba	1	2	3	4	5	6	7	8	9	10	A	11	12	13	A	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
16	51	Kumaraswamy V S	1	2	3	4	5	6	7	8	9	10	A	A	11	12	A	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
17	53	Kalithi Kumar Mishra J	1	2	3	4	5	6	A	7	8	9	A	10	11	12	13	14	15	16	A	17	18	19	20	21	22	23	A	24	25	26	
18	54	Madhukara	1	2	3	4	5	6	7	8	9	10	11	A	12	A	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
19	56	Meghana G R	A	A	A	A	A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
20	60	Mukesh H M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
21	63	Nidhi V Ananya	A	A	A	A	A	1	2	3	4	5	6	7	8	A	9	10	11	12	13	14	15	16	17	18	19	A	20	21	22	23	
22	68	Poorva Shetty	A	A	A	A	1	2	3	4	5	6	7	8	9	10	A	11	12	13	14	15	16	17	18	19	20	A	21	22	23	24	
23	69	Prasanna S	A	A	A	A	A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	A	A	16	17	A	18	19	20	21	22	23
24	71	Priyanka B.M	1	2	3	4	5	6	7	8	9	10	A	11	12	13	A	14	15	16	17	18	19	20	21	22	A	23	24	25	26	27	
25	72	Priyanka S.P	A	A	A	A	A	1	2	3	4	5	6	7	8	9	A	10	11	A	12	13	14	15	16	17	18	19	20	21	22	23	24
26	75	Rajarajeshwari B B	1	2	3	A	4	5	6	7	8	9	A	A	10	11	12	13	14	15	16	17	A	A	18	A	19	20	21	22	23	24	
27	76	Rakesh H.M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	A	15	16	17	18	19	20	21	22	A	A	A	23	24	25	26	
28	83	Sanjay N N	A	1	2	3	A	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
29	84	Shetty Mayur K	1	2	3	4	5	6	7	8	9	10	11	A	12	13	14	15	16	17	18	19	A	20	21	22	23	24	25	26	27	28	
30	87	Shradha B Shetty	A	A	A	A	1	2	3	4	5	6	7	8	9	A	10	11	12	13	14	15	A	16	17	18	A	19	20	21	22	23	24
Staff Initials			55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85

ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

MOODBIDRI - 574 225

Class : Operation Research, A Sec

Subject : OR

No. of Classes held :

		Date / Month	6	2	7	2
Sl. No.	U.S.N.	Name	1	2		
1	4ALISCS002	Adarsh M S	1	2		
2	03	Adarsh Mohan Rajar	1	2		
3	04	Adithya V Shetty	1	2		
4	09	Ankith	1	2		
5	17	Ashwini P Shetty	1	2		
6	18	Bangara Yatish G	1	2		
7	23	Chaitra Gajendramath	1	2		
8	27	Deeksha	1	2		
9	28	Deeksha Shetty	1	2		
10	30	Dendra n Shetty M	1	2		
11	32	Dhruva ... R	(A)	(A)		
12	34	Ganesh S.P.	1	2		
13	40	H. Anurag Kedlaya	(A)	(A)		
14	40	Jeevika ... P.	(A)	(A)		
15	43	Jasmine Priyanka Loba	1	2		
16	51	Kumaraswamy V S	1	2		
17	53	Lalith Kumar Mishra	1	2		
18	54	Madhukara	1	2		
19	56	Meghana G R	(A)	(A)		
20	60	Mukesh H M	1	2		
21	63	Nidhi V Ananya	(A)	(A)		
22	68	Pooja Shetty	(A)	(A)		
23	69	Pragwal S	(A)	(A)		
24	71	Priyanka B.M	1	2		
25	72	Priyanka S.P	(A)	(A)		
26	75	Rajasekhari B B	1	2		
27	76	Rakesh H.M	1	2		
28	83	Sanjay M N	A	1		
29	84	Shetty Mayur K	1	2		
30	87	Shradha B Shetty	(A)	(A)		
Staff Initials			SS	SS		

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
29	30	31	A	32	33	34	35	36	37	A	A	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
21	22	23	A	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
22	23	24	25	26	27	28	29	30	31	32	33	A	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
28	29	30	31	32	33	34	35	36	37	A	A	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
(A)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
23	A	24	(A)	26	27	28	29	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
28	29	30	A	A	31	32	33	34	35	36	A	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
(A)	20	21	A	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
(A)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
(A)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
21	22	23	A	A	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
29	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
(A)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
(A)	(A)	(A)	A	A	23	24	25	26	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
25	A	26	27	A	28	29	30	31	32	33	A	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
24	25	26	A	27	28	29	30	31	32	A	A	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
25	(A)	26	A	27	28	29	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
29	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
25	26	27	A	A	28	29	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
31	32	33	34	35	36	37	38	39	40	41	A	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
24	25	26	A	27	28	29	A	(A)	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	A	45	46	A	47
(A)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
23	24	25	26	27	28	29	30	31	32	33	A	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
24	25	26	A	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	A	45	46	47	48	49	50	51
20	21	22	A	A	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	A	40	41	42	43	44	45	46
A	24	25	A	A	26	27	28	(A)	29	30	A	31	32	33	34	35	36	37	38	39	(A)	40	41	42	43	44	45	46	47
23	24	25	A	A	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
21	22	23	A	A	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
29	30	31	A	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	A	A	52	53	54
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
(A)	19	20	21	22	23	24	25	A	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	A	41	42	43	44	45
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Class : Operation Research . A Sec

Subject : OR

No. of Classes held :

Sl. No.	U.S.N.	Name	Date / Month	
			1	2
1	AA15C0002	Adarsh M S	1	2
2	03	Adarsh Mohan Rijar	1	2
3	04	Adithya V Shetty	1	2
4	09	Ankith	1	2
5	17	Ashwini P Shetty	1	2
6	18	Bangara Yatish G	1	2
7	23	Chakthra Gajananmath	1	2
8	27	Deeksha	1	2
9	28	Deeksha Shetty	1	2
10	30	Devita S Shetty M	1	2
11	34	Dhruva S R	(A)	(A)
12	34	Ganesh S P	1	2
13	44	H. Ashwary Kedlaya	(A)	(A)
14	48	Jasmin P	(A)	(A)
15	43	Jasmine Princy Loba	1	2
16	51	Kumaraswamy V S	1	2
17	53	Kalith Kumar Mishra	1	2
18	54	Madhukara	1	2
19	56	Meghana G R	(A)	(A)
20	60	Mukesh H M	1	2
21	63	Nidhi V Ananya	(A)	(A)
22	68	Poorva Shetty	(A)	(A)
23	69	Pragwal S	(A)	(A)
24	71	Priyanka B.M	1	2
25	72	Priyanka S.P	(A)	(A)
26	75	Rajasekharani B B	1	2
27	76	Rakesh H.M	1	2
28	83	Sanjay M N	A	1
29	84	Shetty Mayur K	1	2
30	87	Shradha B Shetty	(A)	(A)
Staff Initials			SS	SS

Signature of students Less than 75% attendance		Total Class Conducted		No. of Class Attended	% of Atten- dance	Internal Assessment (25)			Average Marks
12	24	36	48	60		I	II	III	
5					61	92	21	28	20
5					53	95	14	25	19
5					62	94	10	27	18
5					61	92	18	24	18
5					53	95	20	27	19
4					60	90	14	19	14
5					60	90	14	29	19
5					61	92	15	24	18
5					53	95	12	29	20
5					63	95	24	29	19
5					63	95	12	25	16
4					61	92	22	20	16
5					66	100	11	25	16
5					51	85	18	30	20
5					62	93	29	21	20
4					61	92	15	20	15
4					62	93	12	27	17
4					62	93	20	22	15
5					62	93	08	27	20
5					65	98	18	26	16
5					59	88	18	29	20
5					64	96	21	25	17
5					62	93	15	25	17
5					63	95	14	23	18
5					63	95	15	26	18
5					58	86	18	27	18
5					61	92	15	29	20
5					60	90	12	25	17
5					63	95	18	18	15
5					62	93	18	25	18
5					55	85	15	24	18

ATTENDANCE CUM INTERNAL

No. of Classes held :

[illegible]

AL

ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

DODDIBIDRI - 574 225

Class : 6th SEM A

Subject : Operation Research.

No. of Classes held :

		Date / Month		6/12/18	
Sl. No.	U.S.N.	Name	1	2	
1	4415CS092	Saidavi	1	2	
2	95	Sumith Kumar S.K	(A)	(A)	
3	97	Surekha S. Reddy	(A)	(A)	
4	99	T.S Kusumassi	(A)	(A)	
5	100	Tejaswini M B	(A)	(A)	
6	102	Vaibhavi V. K	(A)	(A)	
7	104	Varsha B	(A)	(A)	
8	106	Viray S	1	2	
9	107	Vishnu P.S	1	2	
10	108	Vishnu K	1	2	
11	112	Damod K.S	1	2	
12	✓ 401	Nalini	1	2	
13	403	Yogesh.	1	2	
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
Staff Initials					

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	
24	25	26	A	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	A	43	44	45	46	47	48	49	50	51	52
A	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	A	38	39	40	41	42	43	44	45	46	47
18	19	20	A	A	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	A	36	37	38	39	40	41	42	43	44	45
17	18	A	A	20	21	22	A	23	A	24	A	25	26	27	28	29	30	31	32	A	33	34	35	36	37	38	39	40	41	42
26	27	28	A	29	30	31	A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
A	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	A	40	41	42	43	44	45	46	47	48
95	96	27	A	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	A	44	45	46	47	48	49	50	51	52	53
A	25	26	A	A	27	28	29	30	A	31	32	33	34	35	36	37	38	39	40	A	41	42	43	44	45	46	47	48	49	50
24	25	26	A	27	28	29	A	30	31	A	32	33	34	35	36	37	38	39	40	A	41	42	43	44	45	46	47	48	49	50
25	26	27	A	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
26	27	28	A	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	A	45	46	47	48	49	50	51	52	53	54
26	27	28	A	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	A	45	46	47	48	49	50	51	52	53	54

AL

Class : 6th SEM A'

Subject : Operation Research.

No. of Classes held :

Sl. No.	U.S.N.	Name	Date / Month	
			1	2
1	4AL1SC5092	Sridevi	1	2
2	95	Sumith Kumar S.K	(A)	(A)
3	97	Surekha S. Reddy	(A)	(A)
4	99	T. S. Kusumarsi	(A)	(A)
5	100	Tejaswini M B	(A)	(A)
6	102	Vaibhavi V. K	(A)	(A)
7	104	Vaisha B	(A)	(A)
8	106	Vinay S	1	2
9	107	Vishnu P. S	1	2
10	108	Vishruth K	1	2
11	112	Pranod K. S	1	2
12	✓ 401	Nalini	1	2
13	403	Yogesh.	1	2
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				

ALVA'S INSTITUTE OF ENGINEERING

AND TECHNOLOGY

MOODBIDRI - 574 225

ASSESSMENT STATEMENT

Signature of students Less than 75% attendance												Total Class Conducted					No. of Class Attended	% of Atten- dance	Internal Assessment (25)			Average Marks
76	77	78	79	80	81	82	83	84	85	12	24	36	48	60	I	II			III			
									5						59	93	26	25	AB	18		
									5						59	93	12	19	24	16		
									5						58	86	11	19	27	17		
									5						59	90	18	21	24	19		
									5						59	95	17	21	15	15		
									5						56	100	09	25	24	18		
									5						59	95	12	29	29	20		
									5						59	90	09	22	19	16		
									5						58	88	13	23	AB	15		
									4						51	86	16	25	AB	14		
									5						55	98	23	29	AB	19		
									5						64	96	11	27	27	19		
									5						53	95	11	26	26	18		

[illegible]

AIET	INTERNAL EXAM RESULT ANALYSIS						Format No.	ACD 12
							Issue No.	01
							Rev. No.	00
Department	CSE						Semester	6 th .
							Subject Code	15CS653
Total No. of Students	43						Academic Year	2017-18.
Test	Date	Number of Students				Signature		Remarks
		Attended	0-10	11-20	21-30	Faculty	HOD	
T ₁	28/3/18	39	04	26	09			
T ₂	26/4/18	43	00	04	39			
T ₃	18/05/18	37	00	07	30			
T ₄								
T ₅								

Signature of Staff in - charge

HOD's Signature

ALVA'S INSTITUTE OF ENGINEERING

MLJAR

ND TECHNOLOGY

ATTENDANCE CUM INTERNAL

DODBIDRI - 574 225

Subject :

Class : VI B

Subject : Operation Research

No. of Classes held : 69

Date / Month			1/2	2/2	3/2	4/2	5/2	6/2	7/2	8/2	9/2	10/2	11/2	12/2	13/2	14/2	15/2	16/2	17/2	18/2	19/2	20/2	21/2	22/2	23/2	24/2	25/2	26/2	27/2	28/2	29/2	30/2					
Sl. No.	U.S.N.	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					
1	4AL14CS051	Pavithra G	1	2	3	4	5	6	A	7	8	9	A	10	A	11	A	12	A	13	14	15	16	17	18	19	20	A	21	22	23						
2	4AL15CS001	Acharya Rakshitha Kaho	1	2	3	4	5	6	7	8	9	10	11	12	A	13	A	14	A	15	A	16	17	18	19	20	A	A	22	23	24						
3	007	Algeena Carol D'souza	1	2	3	4	5	6	7	8	9	10	11	12	A	13	A	14	A	15	16	17	18	19	20	A	A	21	22	23	24	25					
4	010	Anuprakash M. P	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	15	16	17	A	18	19	20	21	22	23	24	25	26						
5	013	Arjun V	1	2	3	4	A	5	6	7	8	9	10	11	12	A	13	A	14	A	A	A	A	15	16	17	18	A	19	20	21						
6	014	Arpitha S	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29				
7	015	Arshritha M S	1	2	3	4	5	A	A	6	7	8	9	10	11	12	A	13	A	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
8	016	Ashritha Jain R	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29				
9	022	Chaitra	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	15	16	17	18	19	A	20	21	22	23	24	25	26	27	28				
10	084	Chithra R. G.	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	15	16	17	18	19	20	21	22	23	24	25	26	A	27	28	29			
11	025	Dsilva Amith Joseph	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	15	16	17	18	19	20	21	A	22	23	24	25	26	27	28	29			
12	029	Deekshitha	1	2	3	A	4	5	6	7	8	9	10	11	12	A	13	A	14	A	15	16	17	A	18	19	20	21	22	23	24	25	26	27	28		
13	035	Geethanjali B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1	2	3	4	5	6	7	8			
14	036	Heisnam Sursita Div	1	2	3	4	5	A	A	6	7	A	8	9	10	11	A	12	A	13	14	15	16	17	18	19	20	21	22	23	24	25	26				
15	045	Jeffin Boban	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	A	18	19	A	A	20	21	22	23	24	25	26				
16	047	Kajare Tejas Tukaram	1	2	3	4	5	6	A	7	8	9	10	11	12	A	13	A	A	A	A	A	13	14	15	16	17	18	19	20	21	22	A	23	24		
17	048	Kalavara Deekshitha Raj	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	A	13	14	15	16	17	18	19	20	21	22	A	23	24		
18	049	Kavya Rai A	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	A	13	14	15	16	17	18	19	20	21	22	A	23	24		
19	115	Adithya M Naik	1	2	3	4	5	6	7	8	9	10	11	12	A	13	A	A	A	A	A	13	14	15	16	17	18	19	20	21	22	A	23	24	25	26	
20	057	Mishra Himanshu U	1	2	3	4	5	6	A	7	8	9	10	11	12	A	13	A	A	A	A	13	14	15	16	17	18	19	20	21	22	A	23	24	25		
21	064	Nishmitha	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	13	14	15	16	17	18	19	20	21	22	23	24	25	A		
22	065	Pooja K	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	13	14	15	16	17	18	19	20	21	22	23	A	24	25	26	
23	066	Poojary Prajwal P.	1	2	3	4	5	6	7	8	9	10	11	12	A	13	A	A	A	A	A	13	14	15	16	17	18	19	20	A	21	22	23	24	A		
24	067	Poojary Tushar V.	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	13	14	15	16	17	18	19	20	A	21	22	23	24	25		
25	073	Rahul Narayana Nag	1	2	3	4	5	A	A	6	7	8	9	10	11	12	A	13	A	A	A	13	14	15	16	17	18	19	20	21	22	23	24	25	26	A	
26	077	Rakshitha H. B	1	2	A	A	3	4	5	6	7	8	9	10	11	12	A	13	A	A	A	13	14	15	16	17	18	19	20	21	22	23	24	25			
27	078	Rakshitha M	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	13	14	15	16	17	18	A	19	20	21	A	22	A	23	24	25
28	079	Ranjith	1	2	3	4	A	A	A	5	6	7	8	9	10	11	12	A	13	A	A	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
29	081	Sachin Pandith	1	2	3	4	5	6	7	8	9	10	11	12	A	13	A	A	A	A	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	A	
30	091	Sneha K.N	1	2	3	4	5	6	7	8	9	10	11	12	13	A	14	A	A	A	A	13	14	15	16	17	18	19	20	21	22	23	A	A	A	A	24
Staff Initials			Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya	Aditya		

Signature

AL

ALVA'S INSTITUTE OF ENGINEERING

TECHNOLOGY

MADRID - 574 225

Class : VI B

Subject : Operation Research

No. of Classes held : 69

Date / Month			1/2	2
Sl. No.	U.S.N.	Name	1	2
1	4AL14CS051	Pavithra G.	1	2
2	4AL15CS001	Acharya Rakshittha K.	1	2
3	007	Algeena Carol D'souza	1	2
4	010	Anuprakash M. P.	1	2
5	013	Arjun V	1	2
6	014	Arpitha S	1	2
7	015	Arshritha M S	1	2
8	016	Ashritha Jain R	1	2
9	022	Chaitra	1	2
10	024	Chithra R. G.	1	2
11	025	Dsilva Amith Joseph	1	2
12	029	Deekshitha	1	2
13	035	Geethanjali B	1	2
14	039	He'snam Sursita Devi	1	2
15	045	Jeffin Boban	1	2
16	047	Kajare Tejas Tukaram	1	2
17	048	Kalavara Deekshitha Raj	1	2
18	049	Kavya Rai A	1	2
19	115	Adithya M Naik	1	2
20	057	Mishra Himanshu U	1	2
21	064	Nishmitha	1	2
22	065	Pooja K	1	2
23	066	Poojary Prajwal P.	1	2
24	067	Poojary Tushar V.	1	2
25	073	Rahul Narayana Naye	1	2
26	077	Rakshittha H. B.	1	2
27	078	Rakshittha M	1	2
28	079	Ranjith	1	2
29	081	Sachin Pandith	1	2
30	091	Sneha K. N	1	2
Staff Initials				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80			
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80				
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80					
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80						
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80							
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80								
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80									
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80										
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80											
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80												
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80													
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80														
36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80															
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																	
39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																		
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																			
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																				
42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																					
43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																						
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																							
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																								
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																									
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																										
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																											
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																												
50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																													
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																														
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																															
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54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																	
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56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																			
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																				
58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																					
59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																						
60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																							
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																								
62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																									
63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																										
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																											
65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																												
66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																													
67	68	69	70	71	72	73	74	75	76	77	78	79	80																																														
68	69	70	71	72	73	74	75	76	77	78	79	80																																															
69	70	71	72	73	74	75	76	77	78	79	80																																																
70	71	72	73	74	75	76	77	78	79	80																																																	
71	72	73	74	75	76	77	78	79	80																																																		

Subject : Operation Research

No. of Classes held: 69

01	02	03	04	05	06	07	08	09	70	71	72	73
49	50	51	52	53	54	55	56	57				
54	55	56	57	58	59	60	61	62				
55	56	57	58	59	60	61	62	63				
50	51	52	53	54	55	56	57	58				
40	41	42	43	44	45	46	47	48				
48	49	60	61	62	63	64	65	66				
58	59	60	61	62	63	64	65	66				
59	60	61	62	63	64	65	66	67				
56	57	58	59	60	61	62	63	64				
57	58	59	60	61	62	63	64	65				
57	58	59	60	61	62	63	64	65				
55	56	57	58	59	60	61	62	63				
36	37	38	39	40	41	42	43	44				
53	56	57	58	59	60	61	62	63				
54	53	54	55	56	57	58	59	60				
50	51	52	53	54	55	56	57	58				
62	58	59	60	61	62	63	64	65				
53	57	58	59	60	61	62	63	64				
50	51	52	53	54	55	56	57	58				
55	56	57	58	59	60	61	62	63				
58	59	60	61	62	63	64	65	66				
57	53	54	55	56	57	58	59	60				
52	53	54	55	56	57	58	59	60				
50	51	52	53	54	55	56	57	58				
51	52	53	54	55	56	57	58	59				
55	56	57	58	59	60	61	62	63				
58	59	60	61	62	63	64	65	66				
59	59	60	61	62	63	64	65	66				
57	58	59	60	61	62	63	64	65				
46	47	48	49	50	51	52	53	54				

ASSESSMENT STATEMENT

Signature of students
less than 75% attendance

Attendances
Mr. J. J. Smith

Total Class Conducted										No. of Class Attempted	% of Attn.	Internal Assessment (25)				Average Marks				
												I	II	III	IV					
0	77	78	79	80	81	82	83	84	85	12	24	36	48	60						
					61	88	05								55	87	10	13	A.B.	17
					67	97	05								61	97	9	13	A.B.	16
					68	99	05								62	98	10	15	A.B.	18
					66	96	5								60	95	10	6	9	15
					56	81	5								50	80	6	A.B.	9	13
					66	96	5								60	95	13	15	A.B.	19
					66	96	5								60	95	11	15	14	20
					69	100	5								63	100	12	15	A.B.	19
					65	94	5								59	94	13	15	A.B.	19
					66	96	5								61	97	11	13	13	18
					66	96	5								60	95	6	9	14	17
					64	93	5								58	92	12	14	A.B.	18
					66	96	5								60	95	9	13	15	19
					63	91	5								57	90	9	12	A.B.	16
					65	94	5								59	94	7	9	10	15
					64	93	3								58	92	6	5	14	13
					68	99	3								60	95	9	6	13	14
					68	99	5								62	98	12	15	A.B.	19
					67	97	5								61	97	11	13	A.B.	17
					63	91	3								57	90	4	5	12	12
					63	91	5								57	90	7	14	A.B.	16
					68	99	5								62	98	11	15	14	20
					65	94	5								58	92	7	11	12	17
					61	88	5								55	87	13	9	A.B.	16
					61	88	5								55	87	7	14	4	16
					62	90	5								56	89	8	14	15	20
					68	99	5								62	98	13	15	A.B.	19
					66	96	5								60	95	9	11	14	18
					69	100	5								68	100	13	15	A.B.	19
					63	91	5								57	90	6	9	11	15
					65	94	5								59	94	7	9	10	15

DDBDRI - 574 225

No. of Classes held : 69

[illegible]

No. of Classes held : 69

[illegible][illegible]

Class : V B

Subject : Operation Research

No. of Classes held : 69

ASSESSMENT STATEMENT

Signature of students
Less than 75% attendance

Appendix
TII 3rd IA

Date / Month			$\frac{6}{2}$	$\frac{7}{1}$
Sl. No.	U.S.N.	Name	1	2
1	093	Srujana G. B	1	2
2	094	Sudarshan G	1	2
3	096	Suraksha R. B	1	2
4	098	Sushanth	1	2
5	105	Vilas Raj S	1	2
6	111	Safoeq Biderkundi	A	A
7	113	Shetty Niketha S	1	2
8	114	Shetty Aishwarya S	1	2
9				
10				
11				
12				
13				
14				
15				
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Staff Initials				

Less than 75% attendance										T10 3rd I A		Internal Assessment (25)			Average Marks
Total Class Conducted										No. of Class Attended	% of Attendance				
1	2	3	4	5	6	7	8	9	10			11	12	13	14
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68