2017

[OBE DESIGN- MANAGEMENT SCIENCE DEPARTMENT]

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY AURANGABAD-431 001

PREFACE

Outcome Based Education (OBE) is the educational approach which focuses on student centric education in the context of development of personal, social, professional and knowledge (KSA) requirements in one's career and life. It is the decade ago curriculum development methodology. The educational triangle of *LEARNING-ASSESSMENT-TEACHING* is the unique nature of the OBE approach. The curriculum practices such as Competency Based Curriculum, Taylor's Model of Curriculum Development, Spadys' Curriculum principles, Blooms taxonomy and further use of assessment methodologies like, Norm-reference testing and Criterion reference testing, etc is being practiced since decades. It is also interesting to know that, globally, different countries and universities adopts the curriculum development models/approaches such as, CDIO (Conceive-Design-Implement-Operate), Evidenced Based Education, Systems' Approach, etc as the scientific and systematic approaches in curriculum design.

The authorities of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.) in-lieu of accreditation standards of National Assessment and Accreditation Council, decided to opt for Outcomes Based Education (OBE). As the part of the decision, different meetings, workshops and presentations were held at the campus of university.

This document is the outcome of different meetings and workshops held at university level and department level. The detailed document is designed and the existing curriculum of the department is transformed in to the framework of OBE. This is the first step towards the implementation of OBE in the department. The document will serve all stakeholders in the effective implementation of the curriculum. The OBE is continuous process for quality enhancement and it will go a long way in order to enhance the competencies and employability of the graduates/Post-graduates of the university department.

Head of Department

INDEX

OUTCOME BASED EDUCATION

Faculty of Commerce& Management

Department of Management Science

1. Mission:

Mission Statement

To make dedicated efforts to forge a holistic growth by introducing innovative teaching and learning models. With a strong base of scientific methods at all levels through organization of research festival, as well as strong and mature balance between modernization and traditional values by sensitizing teachers and students towards a more human approach through the inculcation of ethical and moral values and offering a robust support system, to inspire the youth for strengthening democracy.

2. Vision:

Vision Statement

- Department aims to enhance the numerical graph of higher education for the youth of the region.
- Enrich the quality and standard of teaching and learning through Modern Technology and scientific Innovative Ideas.
- Establishment of business research laboratory.
- Develop globally competent human resources by international accreditation.
- Stimulate pro-poor community activities and in doing so strengthen all round regional progress and development.

The mission and vision of the organization help in preparation of strategic plan.

3. Title of the Program (s):

a. **Master of Business Administration**
b. **Master of Computer Application**

4. Program Educational Objectives:

The program educational objectives (PEO) are the statement that describes the career and professional achievement after the program of studies (graduation/ post-graduation). The PEO s are driven form question no. (ii) of the Mission statement (What is the purpose of organization). The PEOs can be minimum three and maximum five.

PEO1: The advance knowledge of Management Science/Computer application in the management and administration of organization.

PEO2: To work as professional in private and public sector through respective competitive examination/interviews.

PEO3: To establish own professional activity in the domain of Management science such as Human Resources Development, Marketing, etc.

PEO4: To be a researcher and a life-long learner.

PEO5: To be a values based and ethical leader in the professional and social life.

5. Program Outcomes:

The program outcomes (PO) are the statement of competencies/ abilities. POs are the statement that describes the knowledge and the abilities the graduate/ post-graduate will have by the end of program studies.

PROGRAM OUTCOMES

MBA

1. Apply knowledge of management theories and practices to solve business problems.
2. Foster Analytical and critical thinking abilities for data-based decision making.
3. Ability to develop Value based Leadership ability.
4. Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business.
5. Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.
6. Innovation and Entrepreneurship
   Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
7. Quality Management: to pursue for application of quality management systems at work place.

MCA

1. Computational Knowledge:
   Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements.
2. Problem Analysis:

Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

3. Design /Development of Solutions:
   Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. Conduct Investigations of Complex C o m p u t i n g Problems:
   Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of t h e information to provide valid conclusions.
5. Modern Tool Usage:
   Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
6. Professional Ethics:
   Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
7. Life-long Learning:
   Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.
8. Project Management and finance:
   Demonstrate knowledge and understanding of the computing and managementprinciples and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
9. Communication Efficacy:
   Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
10. Societal and Environmental Concern:
    Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
11. Individual and Team Work:
    Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
12. Innovation and Entrepreneurship
    Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

6. Course- Program outcome Matrix:

The Program Outcomes are developed through the curriculum (curricular/co-curricular-extra-curricular activities). The program outcomes are attained through the course implementation. As an educator, one must know, ***"to which POs his/her course in contributing?"***. So that one can design the learning experiences, select teaching method and design the tool for assessment. Hence, establishing the Corse-PO matrix is essential step in the OBE. The course-program outcomes matrix indicates the co-relation between the courses and program outcomes. The CO-PO matrix is the map of list of courses contributing to the development of respective POs.

The **CO-PO Matrix**is provided in the below table.

MASTER OF BUSINESS MANAGMENT

COURSE-PO MATRIX

HUMAN RESOURCES MANAGEMENT

COURSE TITLE		P0O1	PO2	PO3	PO4	PO5	PSO1	PSO2
Management Practices & Organizational Behavior	3	*	*				*	*
Statistical Methods	1.8	*	*		*			
Managerial Economics	1.4	*	*				*	*
Research Methodology	1	*	*		*			
Accounting for Managers	2	*	*					
Environment Management	1.4	*	*					
Computer Applications	2	*	*					
MANB-408	3	*	*					
MANB-451	2	*	*			*	*	*
Mini Project	2	*	*			*	*	*
Optimization Techniques	2.2	*	*		*			
Human Resource Management	1.4	*	*					
Financial Management	1.2	*	*					
Marketing Management	3	*	*					
Production and Operation Management	1.2	*	*					
Business Legislation	2.2	*	*					
Creativity and Innovations	2.2	*	*					

International Business Environment	2.2	*	*		*	*	*	*
Soft Skill Development	2		*	*	*	*	*	*
Employability Skills	1		*	*	*			
Community Services	3		*	*	*	*	*	*
Mini Project	3		*	*	*	*	*	*
Business Policies and Strategic Analysis	2		*	*	*			
DSS and MIS	1.4		*	*	*			
Management of Industrial Relations	3		*	*	*			
Human Resource Planning and Development	3		*	*	*			
Training and Development	3		*	*	*			
Performance Management Systems	2		*	*	*			
HRD – Strategies and Systems	2		*	*	*			
MANB-508H	3		*	*	*			
Entrepreneurship Development	1.4		*	*	*		*	*
Quality Management	3		*	*	*		*	*
Indian Economy	2.2		*	*	*			
Project	1		*	*	*		*	*

COURSE-PO MATRIX

FINANCE

COURSE TITLE		P0O1	PO2	PO3	PO4	PO5	PSO1	PSO2
Management Practices & Organizational Behavior	3	*	*				*	*
Statistical Methods	1.8	*	*		*			
Managerial Economics	1.4	*	*				*	*
Research Methodology	1	*	*		*			
Accounting for Managers	2	*	*					
Environment Management	1.4	*	*					
Computer Applications	2	*	*					
MANB-408	3	*	*					
MANB-451	2	*	*			*	*	*

Mini Project	2	*	*			*	*	*
Optimization Techniques	2.2	*	*		*			
Human Resource Management	1.4	*	*					
Financial Management	1.2	*	*					
Marketing Management	3	*	*					
Production and Operation Management	1.2	*	*					
Business Legislation	2.2	*	*					
Creativity and Innovations	2.2	*	*					
International Business Environment	2.2	*	*		*	*	*	*
Soft Skill Development	2		*	*	*	*	*	*
Employability Skills	1		*	*	*			
Community Services	3		*	*	*	*	*	*
Mini Project	3		*	*	*	*	*	*
Business Policies and Strategic Analysis	1.8		*	*	*			
DSS and MIS	2.2		*	*	*			
Money, Banking & Finance	2.2		*	*	*			
Working Capital Management	2.2		*	*	*			
Corporate Taxation	1.4		*	*	*			
Investment Management	2.2		*	*	*			
Financial Decision Analysis	2.2		*	*	*			
Management of Financial Institutions	2		*	*	*			
Entrepreneurship Development	1.4		*	*	*		*	*
Quality Management	3		*	*	*		*	*
Indian Economy	2.2		*	*	*			
Project	1		*	*	*		*	*

COURSE-PO MATRIX

MARKETING

COURSE TITLE		P0O1	PO2	PO3	PO4	PO5	PSO1	PSO2
Management Practices & Organizational Behavior	3	*	*				*	*
Statistical Methods	1.8	*	*		*			

Managerial Economics	1.4	*	*				*	*
Research Methodology	1	*	*		*			
Accounting for Managers	2	*	*					
Environment Management	1.4	*	*					
Computer Applications	2	*	*					
MANB-408	3	*	*					
MANB-451	2	*	*			*	*	*
Mini Project	2	*	*			*	*	*
Optimization Techniques	2.2	*	*		*			
Human Resource Management	1.4	*	*					
Financial Management	1.2	*	*					
Marketing Management	3	*	*					
Production and Operation Management	1.2	*	*					
Business Legislation	2.2	*	*					
Creativity and Innovations	2.2	*	*					
International Business Environment	2.2	*	*		*	*	*	*
Soft Skill Development	2		*	*	*	*	*	*
Employability Skills	1		*	*	*			
Community Services	3		*	*	*	*	*	*
Mini Project	3		*	*	*	*	*	*
Business Policies and Strategic Analysis	1.8		*	*	*			
DSS and MIS	2.2		*	*	*			
Consumer Behavior	3		*	*	*			
Advertising Management	2.2		*	*	*			
Industrial Marketing	2.2		*	*	*			
Brand Management	1		*	*	*			
Sales & Distribution Management	1.4		*	*	*			
Digital Marketing	3		*	*	*			
Entrepreneurship Development	1.4		*	*	*		*	*
Quality Management	3		*	*	*		*	*
Indian Economy	2.2		*	*	*			
Project	1		*	*	*		*	*

MASTER OF COMPUTER APPLICATION

Title of Course	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Computer Organization and Architecture	*	*	*	*	*							
C programming	*	*	*	*	*							
Discrete Mathematics	*	*	*	*	*							
Information System Analysis and Design Methods	*	*	*	*	*							
DSS and MIS	*	*	*	*	*							
Basic of Web technology	*	*	*	*	*							
Practical Based on MANC401					*	*	*	*	*			
Practical Based on MANC402					*	*	*	*	*			
Practical Based on MANC406					*	*	*	*	*			
Operating System	*	*	*	*	*							
Database Management System	*	*	*	*	*							
Data Structure using C	*	*	*	*	*							
Software engineering	*	*	*	*	*							
Probability and Combinatory	*	*	*	*	*							

Visual Programming	*	*	*	*	*							
Practical Based on MANC408					*	*	*	*	*	*		
Practical Based on MANC409					*	*	*	*	*	*		
Practical Based on MANC412					*	*	*	*	*	*		
Data Communication and Networks		*	*	*	*	*						
OOPs using C++		*	*	*	*	*						
Soft Skill		*	*	*	*	*						
JAVA		*	*	*	*	*						
Introduction to Linux OS		*	*	*	*	*						
Advanced Web technology Using ASP.net		*	*	*	*	*						
Artificial Intelligence		*	*	*	*	*						
Practical Based on MANC502					*	*	*	*	*			
Practical Based on MANC504					*	*	*	*	*			
Practical Based on MANC522					*	*	*	*	*			
Practical Based on MANC523					*	*	*	*	*			
Design and Analysis of Algorithms		*	*	*	*	*	*					
Object Oriented Analysis and Design		*	*	*	*	*	*					
Research Methodology								*	*	*	*	*

Software Testing and Quality Assurance		*	*	*	*	*	*					
Advanced JAVA		*	*	*	*	*	*					
C Sharp		*	*	*	*	*	*					
Multimedia Technology		*	*	*	*	*	*					
Advances in Linux Administration		*	*	*	*	*	*					
Practical Based on MANC508					*	*	*	*	*			
Practical Based on MANC527					*	*	*	*	*			
Practical Based on MANC528					*	*	*	*	*			
Practical Based on MANC530					*	*	*	*	*			
Practical Based on MANC531					*	*	*	*	*			
Human Computer Interface		*	*	*	*	*	*					
Advanced Internet technology		*	*	*	*	*	*					
Advances in Algorithms		*	*	*	*	*	*					
Software Project Management		*	*	*	*	*	*					
Linux Bash Scripting		*	*	*	*	*	*					
JSP		*	*	*	*	*	*					
Mobile Computing		*	*	*	*	*	*					
Practical Based on MANC722			*	*	*	*	*	*	*			

Practical Based on MANC723			*	*	*	*	*	*	*			
Major Project			*	*	*	*	*	*	*	*	*	*

7. Course Outcomes (for all courses):

The course outcomes are the statement that describes the knowledge & abilities developed in the student by the end of course (subject) teaching. The focus is on development of abilities rather than mere content. There can be 5 to 7 course outcomes of any course. These are to be written in the specific terms and not in general. The list of Course Outcomes is the part of ***Annexure-C*** attached herewith.

8. Set Target levels for Attainment of Course Outcomes:

The course outcome attainment is assessed in order to track the graduates' performance w.r.t target level of performance. The CO-PO attainment is the tool used for continuous improvement in the graduates' abilities through appropriate learning & teaching strategies. In order to assess students' performance with respect to abilities (at the end of course teaching/by the end of program) the course outcome attainment are measured/calculated. In order to calculate the program outcome attainment, the course outcome attainment is calculated. Prior to that, the course-program outcome mapping is done.

9. Set Target level for Attainment of Program Outcomes:

The program outcome attainment is assessed in order to track the graduates' performance w.r.t target level of performance. The CO-PO attainment is the tool used for continuous improvement in the graduates' abilities through appropriate learning & teaching strategies. In order to assess students' performance with respect to abilities (at the end of course teaching/by the end of program) the course outcome attainment and program outcome attainment is measured/calculated. The program outcome attainment is governed by curricular, co-curricular and extra-curricular activities including the stakeholders' participation. The direct method and indirect method is adopted to calculate the PO attainment. The direct method implies the attainment by course outcomes contributing to respective program outcomes. And indirect method is the satisfaction/feed-back survey of stakeholders. In order to calculate the program outcome attainment, the course outcome attainment is calculated. Prior to that, the course-program outcome mapping is done.

The set target level is the set benchmark to ensure the continuous improvements in the learners/ graduates' performance.

10. Course Attainment Levels:

a. CO attainment is defined/set at three levels;
b. The CO attainment is based on end term examination assessment and internal assessment;
c. The Co attainment is defined at three levels for MBA programme in ascending order-

e.g. For end term and internal examination;

Level-1: 40% students scored more than class average

Level-2: 50% students score more than class average;

Level-3: 60% students score more than class average.

d. The Co attainment is defined at three levels for MCA programme in ascending order-

e.g. For end term and internal examination;

Level-1: 30% students scored more than class average

Level-2: 40% students score more than class average;

Level-3: 50% students score more than class average.

e. The target level is set (e.g. Level-2). It indicates that, the current target is level-2; 50% for MBA & 40% for MCA ,students score more than class average. The CO attainment is measured and the results are obtained. Based on the results of attainment, the corrective measures/remedial action are taken.
f. CO Attainment= 80% (Attainment level in end term examination) + 20% (Attainment level in internal examination).
g. <u>The example of calculating CO attainment is provided in Point No. 12. The CO attainment is calculated for one course from Master of Application.</u>

11.Program attainment Level:

a. PO attainment is defined at five levels in ascending order;
b. The PO attainment is based on the average attainment level of corresponding courses (Direct Method) and feed-back survey (Indirect method);
c. The PO attainment levels are defined / set as stated below;
    i. Level-1: Greater than 0.5 and less than 1.0 (0.5>1)- Poor
    ii. Level-2: 1.0>1.5-Average
    iii. Level-3: 1.5>2.0-Good
    iv. Level-4: 2.0>2.5-Very Good
    v. Level-5: 2.5>3.0 -Excellent

d. The PO attainment target level is set/defined (say, Level-3 for MCA and Level-4 for MBA). It implies that, the department is aiming at minimum level-3 (good) in the performance of abilities by the graduates. Based upon the results of attainment, the remedial measures are taken;
e. PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).
f. <u>The example of calculating CO attainment is provided in Point No. 12. The CO attainment is calculated for one course from Master of Application.</u>

12. The Results of CO Attainment:

The Results of CO attainment are provided in Annexure-B

<u>FOR EXAMPLE:</u>

<u>COURSE CODE/TITLE: MANC-402</u>

e.g. For end term and internal examination;

i. Level-1: 30% students scored more than class average
ii. Level-2: 40% students score more than class average;
iii. Level-3: 50% students score more than class average

Average Marks in External examination 15.00

% Students score more than 15 is 47% i.e. Levl-2

Average Marks in Internal examination IS 13.10 = i.e.13.00

% Students score more than 13 is 40%, i.e. Level-2

A (CO) MANC-402= 80% (2) +20(2)

=1.6+0.4

= 2.0

Hence, the attainment level is Level-2 and the set target level is Level-2 and therefore the CO is fully attained.

TABLE NO. 1(A)

COURSE-PO MATRIX

HUMAN RESOURCES MANAGEMENT

COURSE TITLE	CO Attainment Value	Attainment Target level	Attained/ Not Attained	Remedial Measures
Management Practices & Organizational Behavior	3	2	Attained	
Statistical Methods	1.8	2	Not Attained	Tutorial, Assignments
Managerial Economics	1.4	2	Not Attained	Tutorial, Assignments
Research Methodology	1	2	Not Attained	Tutorial, Assignments
Accounting for Managers	2	2	Attained	
Environment Management	1.4	2	Not Attained	Tutorial, Assignments
Computer Applications	2	2	Attained	
MANB-408	3	2	Attained	
MANB-451	2	2	Attained	
Mini Project	2	2	Attained	
Optimization Techniques	2.2	2	Attained	
Human Resource Management	1.4	2	Not Attained	Tutorial, Assignments
Financial Management	1.2	2	Not Attained	Tutorial, Assignments
Marketing Management	3	2	Attained	
Production and Operation Management	1.2	2	Not Attained	Tutorial, Assignments
Business Legislation	2.2	2	Attained	
Creativity and Innovations	2.2	2	Attained	
International Business Environment	2.2	2	Attained	
Soft Skill Development	2	2	Attained	
Employability Skills	1	2	Not Attained	Tutorial, Assignments
Community Services	3	2	Attained	
Mini Project	3	2	Attained	
Business Policies and Strategic Analysis	2	2	Attained	

DSS and MIS	1.4	2	Not Attained	Tutorial, Assignments
Management of Industrial Relations	3	2	Attained	
Human Resource Planning and Development	3	2	Attained	
Training and Development	3	2	Attained	
Performance Management Systems	2	2	Attained	
HRD – Strategies and Systems	2	2	Attained	
MANB-508H	3	2	Attained	
Entrepreneurship Development	1.4	2	Not Attained	Tutorial, Assignments
Quality Management	3	2	Attained	
Indian Economy	2.2	2	Attained	
Project	1	2	Not Attained	Tutorial, Assignments

COURSE-PO MATRIX

FINANCE

COURSE TITLE	CO Attainment Value	Attainment Target level	Attained/ Not Attained	Remedial Measures
Management Practices & Organizational Behavior	3	2	Attained	
Statistical Methods	1.8	2	Not Attained	Tutorial, Assignments
Managerial Economics	1.4	2	Not Attained	Tutorial, Assignments
Research Methodology	1	2	Attained	
Accounting for Managers	2	2	Attained	
Environment Management	1.4	2	Not Attained	Tutorial, Assignments
Computer Applications	2	2	Attained	
MANB-408	3	2	Attained	
MANB-451	2	2	Attained	
Mini Project	2	2	Attained	
Optimization Techniques	2.2	2	Attained	
Human Resource Management	1.4	2	Not Attained	Tutorial, Assignments
Financial Management	1.2	2	Not Attained	Tutorial,

				Assignments
Marketing Management	3	2	Attained	
Production and Operation Management	1.2	2	Not Attained	Tutorial, Assignments
Business Legislation	2.2	2	Attained	
Creativity and Innovations	2.2	2	Attained	
International Business Environment	2.2	2	Attained	
Soft Skill Development	2	2	Attained	
Employability Skills	1	2	Not Attained	Tutorial, Assignments
Community Services	3	2	Attained	
Mini Project	3	2	Attained	
Business Policies and Strategic Analysis	1.8	2	Not Attained	Tutorial, Assignments
DSS and MIS	2.2	2	Attained	
Money, Banking & Finance	2.2	2	Attained	
Working Capital Management	2.2	2	Attained	
Corporate Taxation	1.4	2	Not Attained	Tutorial, Assignments
Investment Management	2.2	2	Attained	
Financial Decision Analysis	2.2	2	Attained	
Management of Financial Institutions	2	2	Attained	
Entrepreneurship Development	1.4	2	Not Attained	Tutorial, Assignments
Quality Management	3	2	Attained	
Indian Economy	2.2	2	Attained	
Project	1	2	Not Attained	Tutorial, Assignments

COURSE-PO MATRIX

MARKETING

COURSE TITLE	CO Attainment Value	Attainment Target level	Attained/ Not Attained	Remedial Measures
Management Practices & Organizational Behavior	3	2	Attained	
Statistical Methods	1.8	2	Not Attained	Tutorial, Assignments
Managerial Economics	1.4	2	Not Attained	Tutorial, Assignments

Research Methodology	1	2	Not Attained	Tutorial, Assignments
Accounting for Managers	2	2	Attained	
Environment Management	1.4	2	Not Attained	Tutorial, Assignments
Computer Applications	2	2	Attained	
MANB-408	3	2	Attained	
MANB-451	2	2	Attained	
Mini Project	2	2	Attained	
Optimization Techniques	2.2	2	Attained	
Human Resource Management	1.4	2	Not Attained	Tutorial, Assignments
Financial Management	1.2	2	Not Attained	Tutorial, Assignments
Marketing Management	3	2	Attained	
Production and Operation Management	1.2	2	Not Attained	Tutorial, Assignments
Business Legislation	2.2	2	Attained	
Creativity and Innovations	2.2	2	Attained	
International Business Environment	2.2	2	Attained	
Soft Skill Development	2	2	Attained	
Employability Skills	1	2	Not Attained	Tutorial, Assignments
Community Services	3	2	Attained	
Mini Project	3	2	Attained	
Business Policies and Strategic Analysis	1.8	2	Not Attained	Tutorial, Assignments
DSS and MIS	2.2	2	Attained	
Consumer Behavior	3	2	Attained	
Advertising Management	2.2	2	Attained	
Industrial Marketing	2.2	2	Attained	
Brand Management	1	2	Not Attained	Tutorial, Assignments
Sales & Distribution Management	1.4	2	Not Attained	Tutorial, Assignments
Digital Marketing	3	2	Attained	
Entrepreneurship Development	1.4	2	Not Attained	Tutorial, Assignments
Quality Management	3	2	Attained	
Indian Economy	2.2	2	Attained	
Project	1	2	Not Attained	Tutorial,

				Assignments

Table No. 1.0 (B) : CO Attainment Level

MASTER OF COMPUTER APPLICATION

Title of Course	CO Attainment Value	Target Attainment Level	Fully Attained/ Not Attained	Remedial Measures
Computer Organization and Architecture	2.2	2	**Fully Attained**	
C programming	2	2	**Fully Attained**	
Discrete Mathematics	1.2	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
Information System Analysis and Design Methods	3	2	**Fully Attained**	
DSS and MIS	2.2	2	**Fully Attained**	
Basic of Web technology	2	2	**Fully Attained**	
Practical Based on MANC401	3	2	**Fully Attained**	
Practical Based on MANC402	2	2	**Fully Attained**	
Practical Based on MANC406	3	2	**Fully Attained**	
Operating System	3	2	**Fully Attained**	
Database Management System	3	2	**Fully Attained**	
Data Structure using C	1.8	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.

Software engineering	3	2	**Fully Attained**	
Probability and Combinatory	2	2	**Fully Attained**	
Visual Programming	2.6	2	**Fully Attained**	
Practical Based on MANC408	3	2	**Fully Attained**	
Practical Based on MANC409	2	2	**Fully Attained**	
Practical Based on MANC412	2	2	**Fully Attained**	
Data Communication and Networks	3	2	**Fully Attained**	
OOPs using C++	2	2	**Fully Attained**	
Soft Skill	2.8	2	**Fully Attained**	
JAVA	1.8	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
Introduction to Linux OS	0	2	**Not Attained**	
Advanced Web technology Using ASP.net	1	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
Artificial Intelligence	3	2	**Fully Attained**	
Practical Based on MANC502	1	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
Practical Based on MANC504	1	2	**Not Attained**	
Practical Based on MANC522	0	2	**Not Attained**	
Practical Based on MANC523	0	2	**Not Attained**	

Design and Analysis of Algorithms	2	2	**Fully Attained**	
Object Oriented Analysis and Design	2.8	2	**Fully Attained**	
Research Methodology	2	2	**Fully Attained**	
Software Testing and Quality Assurance	3	2	**Fully Attained**	3
Advanced JAVA	0	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
C Sharp	0	2	**Not Attained**	
Multimedia Technology	0	2	**Not Attained**	
Advances in Linux Administration	0	2	**Not Attained**	
Practical Based on MANC508	2	2	**Fully Attained**	
Practical Based on MANC527	2	2	**Fully Attained**	
Practical Based on MANC528	2	2	**Fully Attained**	
Practical Based on MANC530	2	2	**Fully Attained**	
Practical Based on MANC531	2	2	**Fully Attained**	
Human Computer Interface	1	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
Advanced Internet technology	3	2	**Fully Attained**	3
Advances in Algorithms	2	2	**Fully Attained**	2

Software Project Management	1	2	**Not Attained**	Assignments, Exercise, Tutorials and remedial coaching.
Linux Bash Scripting	1	2	**Not Attained**	
JSP	1	2	**Not Attained**	
Mobile Computing	1	2	**Not Attained**	
Practical Based on MANC722	1	2	**Not Attained**	
Practical Based on MANC723	2	2	**Fully Attained**	2
Major Project	3	2	**Fully Attained**	3

13.The Results of PO Attainment:

The Results of PO attainment are provided in Annexure-B

FOR EXAMPLE:

PO NO.: PO9

(Note: Refer point No. 11 above which describes the attainment level and set target attainment level)

PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).

A (PO) 9 = 80% (3+2+ 3+3+2+2+1+1+0+0+2+2+2+2+2+2+1+2+3)/19 +20% (1.84)

=80% (1.84) + 20% (1.84)

= 1.84 i.e. Level-3. The Target Level is Level-3.

Hence, PO is attained.

MASTER OF BUSINESS ADMINISTARTION (HRM)

Table No. 2.0 PO Attainment Level

PO/PSO number	PO Attainment Value	Target Attainment level	Fully attained/ Not Attained	Remedial Measures
a	2.00	4	Fully attained	Not Applicable
b	2.09	4	Fully attained	
c	2.25	4	Fully attained	
d	2.16	4	Fully attained	
e	2.37	4	Fully attained	
f	2.18	4	Fully attained	
g	2.18	4	Fully attained	

MASTER OF BUSINESS ADMINISTARTION (FINANCE)

Table No. 2.0 PO Attainment Level

PO/PSO number	PO Attainment Value	Target Attainment level	Fully attained/ Not Attained	Remedial Measures
a	2.00	4	Fully attained	Not Applicable
b	2.00	4	Fully attained	
c	2.05	4	Fully attained	
d	2.00	4	Fully attained	
e	2.37	4	Fully attained	
f	2.18	4	Fully attained	
g	2.18	4	Fully attained	

MASTER OF BUSINESS ADMINISTARTION (MARKETING)

Table No. 2.0 PO Attainment Level

PO/PSO number	PO Attainment Value	Target Attainment level	Fully attained/ Not Attained	Remedial Measures
a	2.00	4	Fully attained	Not Applicable
b	2.02	4	Fully attained	
c	2.09	4	Fully attained	
d	2.03	4	Fully attained	
e	2.37	4	Fully attained	
f	2.18	4	Fully attained	
g	2.18	4	Fully attained	

MASTER OF COMPUTER APPLICATION

Table No. 2.0 PO Attainment Level

PO/PSO number	PO Attainment Value	Target Attainment level	Fully attained/ Not Attained	Remedial Measures
a	2.33	3	Fully attained	Not Applicable
b	1.8	3	Fully attained	
c	1.82	3	Fully attained	
d	1.82	3	Fully attained	
e	1.81	3	Fully attained	
f	1.65	3	Fully attained	
g	1.59	3	Fully attained	
h	1.84	3	Fully attained	
i	1.84	3	Fully attained	
j	2.4	3	Fully attained	
k	2.5	3	Fully attained	
l	2.5	3	Fully attained	

14. Planned Actions for Course Attainment:

The courses having CO attainment level less than Level-2 shall be addressed by remedial measures such as assignments, tutorials, exercise and remedial coaching.

15. Planned Actions for Program Outcome Attainment:

Not Applicable.

ANNEXURE-B

SUMMARY OF RESULTS OF CO-PO ATTAINMENT

MASTER OF BUSINESS ADMINISTRATION

PO ATTAINMENT: MBA (HUMAN RESOURCES MANAGEMENT)

COURSE TILTLE	P0O1	PO2	PO3	PO4	PO5	PSO1	PSO2
Management Practices & Organizational Behavior	3	3				3	3
Statistical Methods	1.8	1.8		1.8			
Managerial Economics	1.4	1.4				1.4	1.4
Research Methodology	1	1		1			
Accounting for Managers	2	2					
Environment Management	1.4	1.4					
Computer Applications	2	2					
MANB-408	3	3					
MANB-451	2	2			2	2	2
Mini Project	2	2			2	2	2
Optimization Techniques	2.2	2.2		2.2			
Human Resource Management	1.4	1.4					
Financial Management	1.2	1.2					
Marketing Management	3	3					
Production and Operation Management	1.2	1.2					
Business Legislation	2.2	2.2					
Creativity and Innovations	2.2	2.2					
International Business Environment	2.2	2.2		2.2	2.2	2.2	2.2
Soft Skill Development		2	2	2	2	2	2
Employability Skills		1	1	1			
Community Services		3	3	3	3	3	3
Mini Project		3	3	3	3	3	3
Business Policies and Strategic Analysis		2	2	2			
DSS and MIS		1.4	1.4	1.4			
Management of Industrial Relations		3	3	3			
Human Resource Planning and Development		3	3	3			
Training and Development		3	3	3			
Performance Management Systems		2	2	2			

HRD – Strategies and Systems		2	2	2			
MANB-508H		3	3	3			
Entrepreneurship Development		1.4	1.4	1.4		1.4	1.4
Quality Management		3	3	3		3	3
Indian Economy		2.2	2.2	2.2			
Project		1	1	1		1	1
PO ATTAINMENT	**2**	**2.09**	**2.25**	**2.16**	**2.37**	**2.18**	**2.18**

PO ATTAINMENT – MBA (FINANCE)

COURSE TILTLE	**P0O1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**
Management Practices & Organizational Behavior	3	3				3	3
Statistical Methods	1.8	1.8		1.8			
Managerial Economics	1.4	1.4				1.4	1.4
Research Methodology	1	1		1			
Accounting for Managers	2	2					
Environment Management	1.4	1.4					
Computer Applications	2	2					
MANB-408	3	3					
MANB-451	2	2			2	2	2
Mini Project	2	2			2	2	2
Optimization Techniques	2.2	2.2		2.2			
Human Resource Management	1.4	1.4					
Financial Management	1.2	1.2					
Marketing Management	3	3					
Production and Operation Management	1.2	1.2					
Business Legislation	2.2	2.2					
Creativity and Innovations	2.2	2.2					
International Business Environment	2.2	2.2		2.2	2.2	2.2	2.2
Soft Skill Development		2	2	2	2	2	2
Employability Skills		1	1	1			
Community Services		3	3	3	3	3	3
Mini Project		3	3	3	3	3	3
Business Policies and Strategic Analysis		1.8	1.8	1.8			
DSS and MIS		2.2	2.2	2.2			

Money, Banking & Finance		2.2	2.2	2.2			
Working Capital Management		2.2	2.2	2.2			
Corporate Taxation		1.4	1.4	1.4			
Investment Management		2.2	2.2	2.2			
Financial Decision Analysis		2.2	2.2	2.2			
Management of Financial Institutions		2	2	2			
Entrepreneurship Development		1.4	1.4	1.4		1.4	1.4
Quality Management		3	3	3		3	3
Indian Economy		2.2	2.2	2.2			
Project		1	1	1		1	1
PO ATTAINMENT	**2.00**	**2**	**2.05**	**2**	**2.37**	**2.18**	**2.18**

PO ATTAINMENT: MBA (MARKETING)

COURSE TITLE	P0O1	PO2	PO3	PO4	PO5	PSO1	PSO2
Management Practices & Organizational Behavior	3	3				3	3
Statistical Methods	1.8	1.8		1.8			
Managerial Economics	1.4	1.4				1.4	1.4
Research Methodology	1	1		1			
Accounting for Managers	2	2					
Environment Management	1.4	1.4					
Computer Applications	2	2					
MANB-408	3	3					
MANB-451	2	2			2	2	2
Mini Project	2	2			2	2	2
Optimization Techniques	2.2	2.2		2.2			
Human Resource Management	1.4	1.4					
Financial Management	1.2	1.2					
Marketing Management	3	3					
Production and Operation Management	1.2	1.2					
Business Legislation	2.2	2.2					
Creativity and Innovations	2.2	2.2					
International Business Environment	2.2	2.2		2.2	2.2	2.2	2.2
Soft Skill Development		2	2	2	2	2	2
Employability Skills		1	1	1			
Community Services		3	3	3	3	3	3

Mini Project		3	3	3	3	3	3
Business Policies and Strategic Analysis		1.8	1.8	1.8			
DSS and MIS		2.2	2.2	2.2			
Consumer Behavior		3	3	3			
Advertising Management		2.2	2.2	2.2			
Industrial Marketing		2.2	2.2	2.2			
Brand Management		1	1	1			
Sales & Distribution Management		1.4	1.4	1.4			
Digital Marketing		3	3	3			
Entrepreneurship Development		1.4	1.4	1.4		1.4	1.4
Quality Management		3	3	3		3	3
Indian Economy		2.2	2.2	2.2			
Project		1	1	1		1	1
PO ATTAINMENT	**2**	**2.02**	**2.09**	**2.03**	**2.37**	**2.18**	**2.18**

MASTER OF COMPUTER APPLICATIONS

RESULTS OF CO-PO ATTAINMNENT

Title of Course	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Computer Organization and Architecture	2.2	2.2	2.2	2.2	2.2							
C programming	2	2	2	2	2							
Discrete Mathematics	1.2	1.2	1.2	1.2	1.2							
Information System Analysis and Design Methods	3	3	3	3	3							
DSS and MIS	2.2	2.2	2.2	2.2	2.2							
Basic of Web technology	2	2	2	2	2							
Practical Based on MANC401					3	3	3	3	3			
Practical Based on MANC402					2	2	2	2	2			

Practical Based on MANC406					3	3	3	3	3			
Operating System	3	3	3	3	3							
Database Management System	3	3	3	3	3							
Data Structure using C	1.8	1.8	1.8	1.8	1.8							
Software engineering	3	3	3	3	3							
Probability and Combinatory	2	2	2	2	2							
Visual Programming	2.6	2.6	2.6	2.6	2.6							
Practical Based on MANC408					3	3	3	3	3	3		
Practical Based on MANC409					2	2	2	2	2	2		
Practical Based on MANC412					2	2	2	2	2	2		
Data Communication and Networks		3	3	3	3	3						
OOPs using C++		2	2	2	2	2						
Soft Skill		2.8	2.8	2.8	2.8	2.8						
JAVA		1.8	1.8	1.8	1.8	1.8						
Introduction to Linux OS		0	0	0	0	0						
Advanced Web technology Using ASP.net		1	1	1	1	1						
Artificial Intelligence		3	3	3	3	3						
Practical Based on MANC502					1	1	1	1	1			

Practical Based on MANC504					1	1	1	1	1			
Practical Based on MANC522					0	0	0	0	0			
Practical Based on MANC523					0	0	0	0	0			
Design and Analysis of Algorithms		2	2	2	2	2	2					
Object Oriented Analysis and Design		2.8	2.8	2.8	2.8	2.8	2.8					
Research Methodology								2	2	2	2	2
Software Testing and Quality Assurance		3	3	3	3	3	3					
Advanced JAVA		0	0	0	0	0	0					
C Sharp		0	0	0	0	0	0					
Multimedia Technology		0	0	0	0	0	0					
Advances in Linux Administration		0	0	0	0	0	0					
Practical Based on MANC508					2	2	2	2	2			
Practical Based on MANC527					2	2	2	2	2			
Practical Based on MANC528					2	2	2	2	2			
Practical Based on MANC530					2	2	2	2	2			
Practical Based on MANC531					2	2	2	2	2			
Human Computer Interface		1	1	1	1	1	1					

Advanced Internet technology		3	3	3	3	3	3					
Advances in Algorithms		2	2	2	2	2	2					
Software Project Management		1	1	1	1	1	1					
Linux Bash Scripting		1	1	1	1	1	1					
JSP		1	1	1	1	1	1					
Mobile Computing		1	1	1	1	1	1					
Practical Based on MANC722			1	1	1	1	1	1	1			
Practical Based on MANC723			2	2	2	2	2	2	2			
Major Project			3	3	3	3	3	3	3	3	3	3
	2.33	1.8	1.82	1.82	1.81	1.65	1.59	1.84	1.84	2.4	2.5	2.5

ANNEXURE-C
COURSE OUTCOMES

Management Practice and Organization Behaviour

- Analyze individual and group behaviour, and understand the implications of organizational behaviour on the process of management.
- Identify different motivational theories and evaluate motivational strategies used in a variety of organizational settings.
- Evaluate the appropriateness of various leadership styles and conflict management strategies used in organizations.
- Describe and assess the basic design elements of organizational structure and evaluate their impact on employees.
- Explain how organizational change and culture affect working relationships within organizations.

Managerial Economics

- Apply economic principles to management decisions.
- Explain the basic forces governing the operation of competitive markets.
- Analyze the implications of various elasticities of consumer demand for pricing and location decisions.
- Characterize consumer and worker preferences and constraints. Analyze implications for employee compensation packages.
- Quantify the determinants of consumer demand.
- Distinguish relevant from irrelevant costs for economic decision-making.
- Determine how a firm with pricing power should exercise it.
- Determine if and how a firm can engage in price discrimination or implement two-part pricing.
- Analyze the factors that determine the supply and demand for productive inputs.

Accounting for Managers

- Describe and develop the nature and role of the four principal financial statements (i.e., the Income Statement, the Statement of Financial Position, the Statement of Cash Flows, and the Statement of Changes in fundamental accounting principles)
- Ability to read, interpret and analyse financial statements; combine financial analysis with other information to assess the financial performance and position of a company;
- Apply course concepts to analyse common business management Equity) ;
- Develop the accounting process and decisions such as pricing and outsourcing decisions from a financial perspective;

- Describe the role of budgets in organisations, their limitations and the behavioural issues to consider when developing and using budgets for planning and control;

Environment Management

- To analyze environmental management in relation to the major principles of sustainable development, defined broadly as: Biodiversity conservation; The Precautionary Principle; Economic sustainability; Intergenerational equity; and Intergenerational equity.
- To translate generic concepts and methods into critical reviews of contemporary, real-world environmental management practices.
- To critically assess theoretical and conceptual issues relating to environmental management.

Computer Applications

- Applying the fundamentals of information systems used in business,
- Demonstrates appropriate use of computers (hardware) and software applications (e.g. Microsoft Office Suite , Word processing, Cloud services, etc.) in a professional business environment.
- To organizes and communicates computer technology and technical concepts, processes, thoughts, ideas, and information effectively.
- The student is able to identify, repair, and upgrade computer technology systems.
- Apply problem solving skills using experience gained from research assignments, individual and group projects, and troubleshooting processes and practices.

Optimization Techniques

- Describe clearly a problem, identify its parts and analyze the individual functions.
- Feasibility study for solving an optimization problem
- Apply mathematical translation of the verbal formulation of an optimization problem.
- Design algorithms, the repetitive use of which will lead reliably to finding an approximate solution
- Evaluate and measure the performance of an algorithm.
- Discovery, study and solve optimization problems.

Human Resource Management

- Explain the importance of human resources and their effective management in organizations
- Demonstrate a basic understanding of different tools used in forecasting and planning human resource needs
- Describe the meanings of terminology and tools used in managing employees effectively
- Describe rules and regulations affecting employees and employers
- Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training

Financial Management

- Apply the theoretical and practical role of financial management in business corporations.
- Analyse the finances of individual corporations both in terms of their performance and capital requirements
- Evaluate the role and importance of shareholders within modern corporations
- Explain the importance of risk within the context of financial decision making
- Access financial information from a wide variety of sources and use this information to research and assess corporations

Marketing Management

- State the role and functions of marketing within a range of organisations.
- Describe key marketing concepts, theories and techniques for analysing a variety of marketing situations.
- Identify and demonstrate the dynamic nature of the environment in which marketing decisions are taken and appreciate the implications for marketing strategy determination and implementation.
- Analyse the relevance of marketing concepts and theories in evaluating the impacts of environmental changes on marketing planning, strategies and practices.
- Demonstrate the ability to justify marketing strategies and advocate a strategically informed position when considering marketing plan implementation.

Production and Operation Management

- Explain the importance of quality control.
- Apply techniques to measure quality control.
- Demonstrate a basic understanding of the problems of waiting lines.
- Apply the quality tools such as the principles of just-in-time systems.

- Explain the importance of forecasting.
- Demonstrate the ability to apply some mathematical forecasting techniques.
- Solve the problems involved in inventory management.
- Apply the principles underlying materials requirements planning.
- Develop basic materials requirement schedules.
- Develop the concepts of operations scheduling.

Business Legislation

- Describe the national and international legal system and the legal environment of business.
- Describe the relationship of ethics and law in business.
- Define relevant legal terms in business.
- Explain basic principles of law that apply to business and business transactions.
- Describe business law in the global context.
- Describe current law, rules, and regulations related to settling business disputes

Corporate Governance

- Compare and analyse the corporate governance issues involved in business and the workplace.
- Compare and analyse the role of stakeholders and corporate managers' moral obligations in business decision making
- Apply regulatory requirements to develop appropriate board and committee functions and structures
- Analyse and explain economic, social and environmental sustainability issues relating to business practice

International Business Management

- Identify and evaluate the complexities of international business and globalization from home versus host-country, and regional, cultural perspectives.
- Analyze the relationships between international business and the political, economic, legal and social policies of countries, regions and international institutions.
- Analyze current conditions in developing emerging markets, and evaluate present and future opportunities and risks for international business activities.
- Develop a framework to support successful decision-making in all relevant functions and activities of any international business or international operations of a domestic business within the competitively international environment.

Ethics in Management

- Use contemporary and classical frameworks to analyze and suggest resolutions to ethical dilemmas.
- Identify and address common ethical issues that arise for individuals, managers, and organizations.
- Recognize individual differences and cognitive barriers that influence ethical judgment.
- Identify key organizational tools, policies, systems, and laws that apply to managing ethical conduct specifically in the business environment.
- Identify and prioritize personal values and apply those to making ethical decisions.
- Explain organizational and cultural variables that influence ethical conduct.

Creativity & Innovation

- To analyze and understand the conditions for developing creativity and innovation in various settings
- To explain different perspectives on creativity and innovation and discuss analytical implications
- To analyze activities and processes which lead to the development of creativity in others

COURSE OUTCOMES
MASTER OF COMPUTER APPLICATION
COURSE OUTCOMES (SAMPLE)

Course Name	Course Outcomes
Object Oriented Programming Using C++	**CO1.** Perform well in class tests/ class assignments/ theory and practical examination. **CO2.** Apply object oriented features using C++. **CO3.** Implement features of object oriented programming to solve real world problems **CO4.**Update their knowledge about rapidly evolving programming languages by going through books and Internet.
Operating System	**CO1.** Understand the importance of operating system. **CO2** Analyze the performance of various CPU scheduling algorithms. **CO3.** Develop mechanisms for handling process synchronization and deadlock problems. **CO4.** Understand the various structures of file directories. **CO5.** Become familiar with the working of various operating system.
Computer Organization	**CO1.** Understand the design and organization of CPU and integration of the CPU into the computer system itself. **CO2.** Know binary numbers and their arithmetic. **CO3.** Familiar with the concept computer configuration. Configuration can refer to either hardware or software, or the combination of both. For instance, a typical configuration for a PC consists of main memory, a floppy drive, a hard disk, a modem, a CD-ROM drive, a VGA monitor, and the operating system. **CO4.** Have the capability of decision making. Suppose student enters the industry and is asked to select the most cost effective computer for the use throughout a large organization. An understanding of the implication of spending more for various alternatives, such as a larger cache or higher processor clock rate, is essential to making decision.

Numerical Methods and Statistical Techniques	**CO1.** Identify and classify the numerical problem to be solved choose the most appropriate numerical method for its solution based on characteristics of the problem understand the characteristics of the method to correctly interpret the results. **CO2.** Find numerical approximations to the roots of an equation by Newton method, Bisection Method, Regula falsi etc. **CO3.** Find numerical solution to a system of linear equations by Gaussian Elimination and Gauss- Seidel Iterative **CO4.** Find the Lagrange Interpolation Polynomial for any given set of points. **CO5.** Find numerical solution of a differential equation by Euler's, Modified Euler's, Predictor Corrector and Runge Kutta Methods. **CO6.** Use finite differences for interpolation, differentiation, etc. **CO7.** Find Measures of location. Use Probability theory and probability distribution. Also use regression and correlation analysis.
Lab I Object Oriented Programming Using C++	**CO1.** utilize Object Oriented features to design and implement using C++ programs **CO2.** solve implementation issues related to object-oriented techniques, **CO3.** Build good quality software using object-oriented techniques, and **CO4.** Develop software solutions to a variety of problems using OO methods, implemented in C++.
Lab II Operating System	**CO1.** Apply their knowledge to improve system performance by using memory management technique. **CO2.** Do program based on disk scheduling algorithm like SCAN, LOOK etc. **CO3.** Do program based on process scheduling algorithm like FCFS, SJF and priority scheduling. **CO4.** Do case study of different operating system so that they able to build or modify real operating system.
Lab III Computer Organization	**CO1.** Master the binary and hexadecimal number system including computer arithmetic's **CO2.** Be familiar with the functional units of the processor such as the register file and arithmetic-logical unit. **CO3.** Be familiar with assembly language programming. **CO4.** Be familiar with representation of data, addressing modes, instructions sets.
Lab IV Linux	**CO1.** Perform Successful Linux Installation. **CO2.** Work confidently in Unix/Linux environment **CO3.** Write shell scripts to automate various tasks. **CO4.** Manage user accounts.

Core Java	1) Students will write Core Java Programs which incorporate writing, testing, and debugging advanced-level Object-Oriented programs using Java. This results in improving their technical skills and fundamental concepts of Java. 2) Students will create GUI applications based on applet and swings so they feel the richness , superior and advance graphics of Java language 3) Students will develop and test event and exception handling programs that contains mouse and keyboard events on graphics component and the use of exceptions , try, catch with users own exception 4) Students will develop thread based programs that has multiple flows, they create the programs that contains JDBC connectivity and I/O package for storing and managing data
Data Structure Using C++	**CO1.** Apply basic search and sort algorithms to solve the time and space complexity problems in the programming. **CO2.**Synthesise a variety of advanced abstract data type (ADT) and data structures and their implementations. **CO3.** Distinguish between different algorithm designs technique and there importance. Apply the learned algorithm design techniques and data structures to solve the memory management and programming optimization problem.
Professional Communication Skill	1. Understand the nature of communication for effective handling of communication situations. 2. Demonstrate understanding of ethical values central to the communication discipline.3. Use the appropriate communication techniques including an appreciation of non-verbal communication / body language4. Effectively express and exchange ideas through listening, speaking, reading, writing, and other modes of interpersonal communication

Discrete Mathematical Structures	**CO1.** Demonstrate a working knowledge of set notation and elementary set theory, recognize the connection between set operations and logic, and prove elementary results involving sets. **CO2.** Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositional and predicate logic and truth tables. Analyze its application in the field of computer science. **CO3.** Construct elementary proofs using ordinary and strong induction in the context of studying the properties of recursion, relations, and graph theory **CO4.** Reformulate statements from common language to formal logic using the rules of propositional and predicate calculus, and assess the validity of arguments. **CO5.** Synthesize induction hypothesis and simple induction proofs. **CO6.** Students who studied this course are found to be better equipped in a relative sense as far as preparation for entrance examinations involving placement Opportunities.
Lab V Core java	**CO1.** Implement classes and objects, interfaces and packages. **CO2.** Update and retrieve data from MS-Access database using JDBC. **CO3.** Create high-performing multi-threaded applications that avoid deadlock. Develop GUI based applications using applet and swing.
Lab VI Data Structures Using C++	**CO1.** Analyze the different aspect to data structure and their usability during the programming task. **CO2.** Apply the knowledge from theoretical course on the practical labs to implement the different data structures using C++. **CO3.** Identify the best suitable data structure and algorithm to solve the real life problem during the application development. **CO4.** Determine the importance of the algorithm in working constraint to define the time and space complexity during the programming
Lab VIII HTML and PHP Lab	**CO1.** Create Dynamic Web application with validation. **CO2.** Synthesize all the knowledge to create web applications. **CO3.** Analyze the importance of team work. **CO4.** Apply the knowledge of HTML, PHP, MySql for creating Web Application.

Advance Java Programming (J2EE)	**CO1.** Students will write Core Java Programs which incorporate writing, testing, and debugging advanced-level Object-Oriented programs using Java. This results in improving their technical skills and fundamental concepts of Java. **CO2.** Students will create network based java applications that use Java Database Connectivity API, which supports both two-tier and three-tier processing models for database access. **CO3.** Students will develop and test server side applications that use Servlets and Java Server Pages (JSP) technology for the control and flow of e -business applications, and the use of JavaBeans to represent the business logic. Students will develop real time projects by using open source frameworks.
Computer Networks	**CO1**. Independently understand basic computer network technology. **CO2.** Understand and explain Data Communications System and its components. **CO3.** Identify the different types of network topologies and protocols. **CO4.** Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. **CO5.** Identify the different types of network devices and their functions within a network **CO6.** Understand and building the skills of sub netting and routing mechanisms. **CO7.** Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
Relational Database Management System	**CO1.** Develop and understand the essence of DBMS concepts such as: database security, integrity, normalization, transaction, concurrency and Client/Server. **CO2.** Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. **CO3.** Analyze business requirements and produce a viable model and implementation of a database to meet such requirements. **CO4.** Select appropriate storage structure as per the applications requirement.

Software Engineering I	**CO1.** On successful completion of the course, student will be able to know the concepts, principles and techniques associated with designing and evaluating user interfaces, relational databases and the process of database development implementation approaches for internet-based software. **CO2.** On successful completion of the course, student will be able to understand a systematic understanding of knowledge and a critical awareness of current problems in your field of study or area of professional practice. **CO3.** On successful completion of the course, student will be able to solve specific problems alone or in teams, manage a project from beginning to end, work independently as well as in teams, define, formulate and analyse a problem , define, formulate and analyse a problem. **CO4.** develop your problem solving skills and apply them independently to professional or equivalent level tasks/projects/functions **CO5.** Work with others to refine ideas leading to an improved understanding of key concepts
Lab I Advance Java Programming (J2EE)	**CO1.** To develop dynamic web application using jsp and servlet **CO2.** Update and retrieve data from database using postgresql. **CO3.** Develop server side program in the form of servlet. **CO4.** Develop component based java software using java beans. **CO5.** To take the content learned and immediately apply it to the problems encountered on job.
Lab II System Programming and Advance Operating System	**CO1.** Analyze need of evolution of several operating system categories. **CO2.** Synthesize appropriate operating system according to working constraint. **CO3.** Identify various ways of handling resources in different types of operating systems. work in different operating system as they thoroughly know the key concepts of every operating system
Lab III Relational Database Management System	**CO1.** Implement the languages such as DDL,DML and TCL on Relational Databases.**CO2.** Implement the concept of relationship in Relational Databases **CO3.** Administer database by applying indexes and triggers.
Lab IV Web Development Using Open Source Technology	**CO1.** To develop the mini project using PostgreSQL 9.2 database, Java servlets for the back end , and any standard Web browser for front end. **CO2.** To work on real life project implementation. **CO3.** To develop web applications.

Design and Analysis of Algorithm	**CO1:** Understand asymptotic notations to analyze the performance of algorithms **CO2:** Identify the differences in design techniques and apply to solve optimization problems. **CO3:** Apply algorithms for performing operations on graphs and trees. **CO4:** Solve novel problems, by choosing the appropriate algorithm design technique for their solution and justify their selection **CO5:** Analyze deterministic and nondeterministic algorithms to solve complex problems
Operation Research	**CO1:** Understand the usage Linear programming for the optimal allocation of limited resources such as men, machine, material and money **CO2:** Solve transportation problems to minimize cost and understand the principles of assignment of jobs **CO3:** Solve problems of Scheduling and sequencing of production runs. **CO4:** Use Game theory to identify the optimal strategies for the players **CO5:** Use Queuing theory to solve problems of traffic congestion, counters in banks, railway bookings etc **CO6:** Use PERT/CPM: (Project scheduling and allocation of resources) to schedule and control construction of dams, bridges, roads etc. in an optimal way.
Data Warehousing and Data Mining	**CO1.** To analyze the data and explain the need and implementation of the Data Warehousing concepts. **CO2.** Define OLTP, OLAP, ROLAP, MOLAP and HOLAP concepts and functions, along with the difference and schema concepts involved between them. **CO3.** Explain the concepts and techniques involved in Data Mining.
Software Engineering II	**CO1.** Ability to develop future software solutions such as new ways to use your smart phone, alternatives to Google, or intelligent energy saving houses.**CO2.** Ability to counsel CEOs and political decision makers on investments in new software solutions based on your ability to assess user needs and technological possibilities.**CO3.** Ability to head the development and implementation of IT based on a thorough knowledge of software and its strengths and weaknesses in relation to a specific company.
Lab V Design and Analysis of Algorithm	**CO1.**Identify the complexity of problems **CO2.**Describe the methodologies of how to analyze an algorithm
Lab VI Cryptography	**CO1.**apply modular arithmetic mathematic and basic group theoretic/finite field operations related to cryptographic techniques; **CO2.**describe basic concepts and algorithms of cryptography, including encryption/decryption, hash functions, pseudo random number generation; **CO3.**explain the impact of potential future development of cryptography such as quantum cryptography.

Lab VII Data Warehousing and Data Mining	**CO1.** Synthesize the data mining fundamental concepts and techniques from multiple perspectives. **CO2.** Develop skills and apply data mining tools for solving practical problems **CO3.** Advance relevant programming skills. **CO4.** Gain experience and develop research skills by reading the data mining literature.
Lab VIII - ASP.NET	**CO1.** Create a Web form with server controls. **CO2.**Separate page code from content by using code-behind pages, page controls, and components. **CO3.** Display dynamic data from a data source by using Microsoft ADO.NET and data binding. **CO4.** Debug ASP.NET pages by using trace.
Software Testing	**CO1.** To have an ability to be an effective member of a software testing team with an awareness of Individual professional and ethical responsibilities; **CO2.**Analyze requirements, extract test cases and write test scripts **CO3.** Extract test conditions from assigned requirements and apply basic test techniques to write executable test cases. **CO4.** Identifying defects and report them in a professional manner **CO5.** Apply basic risk analysis techniques ensuring effective test coverage **CO6.** An ability to define, assess, and adapt software quality practices, and software testing processes and methodologies for appropriate application on software testing projects in a variety of omain areas.
Professional Ethics and Cyber Security	**CO1.**Identify their personal values and can analyze the way their value systems inform and influence their professional practices. **CO2.**Encourages students to explore the legal, ethical, and global impact of cybercrime on private, public, and personal computing infrastructures. **CO3.**Apply critical thinking skills to risk analysis of computer systems. Identify, analyze, and mitigate threats to internal computer systems & Collect, process, analyze, and present computer forensic evidence.

Elective - I Mobile Computing II Multimedia Systems	**CO1.** Connect with real life applications of wireless communication or mobile computing. **CO2.** Identify the need of specific architecture depending upon the usage. **CO3.** Synthesize between communication bearers available in network market. **CO4.** Analyze the underlying structure and common gateways used for wireless protocols. **CO1.**describe different realisations of multimedia tools and the way in which they are used **CO2.**analyse the structure of the tools in the light of low-level constraints imposed by the adoption of various QoS schemes (ie bottom up approach) **CO3.**analyse the effects of scale and use on both presentation and lowerlevel requirements (ie top down approach) **CO4.**plan experiments to test user perception of multimedia tools
Open Source Software Development Lab	**CO1.** Perform successful Linux installation **CO2.** Use Linux system for command line requirement. **CO3.** Apply the basics of Linux administration using GUI and command line. **CO4.** Install and configure Servers for website development and hosting. Develop a small website.
Seminar	**CO1.**Students will demonstrate the ability to take a piece of writing through the process of revision in order to advance their ideas and communicate more effectively with their readers. **CO2.**Students will demonstrate the ability to identify the disciplinary context for different kinds of writing, including both informal writing (like scientific note taking) and formal writing (like a research paper in Government).
Dissertation	**CO1:** Identification of real world problems **CO2:** Awareness of design methodologies & its implementation **CO3:** Advanced programming techniques **CO4:** Technical report writing