

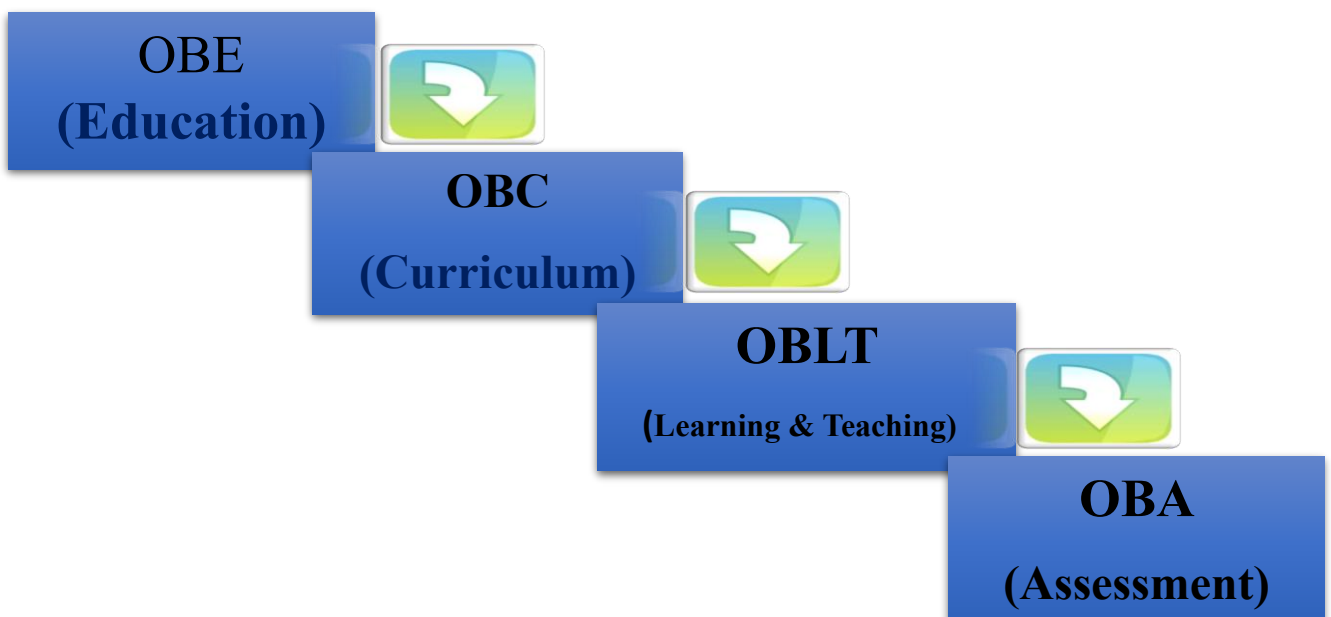
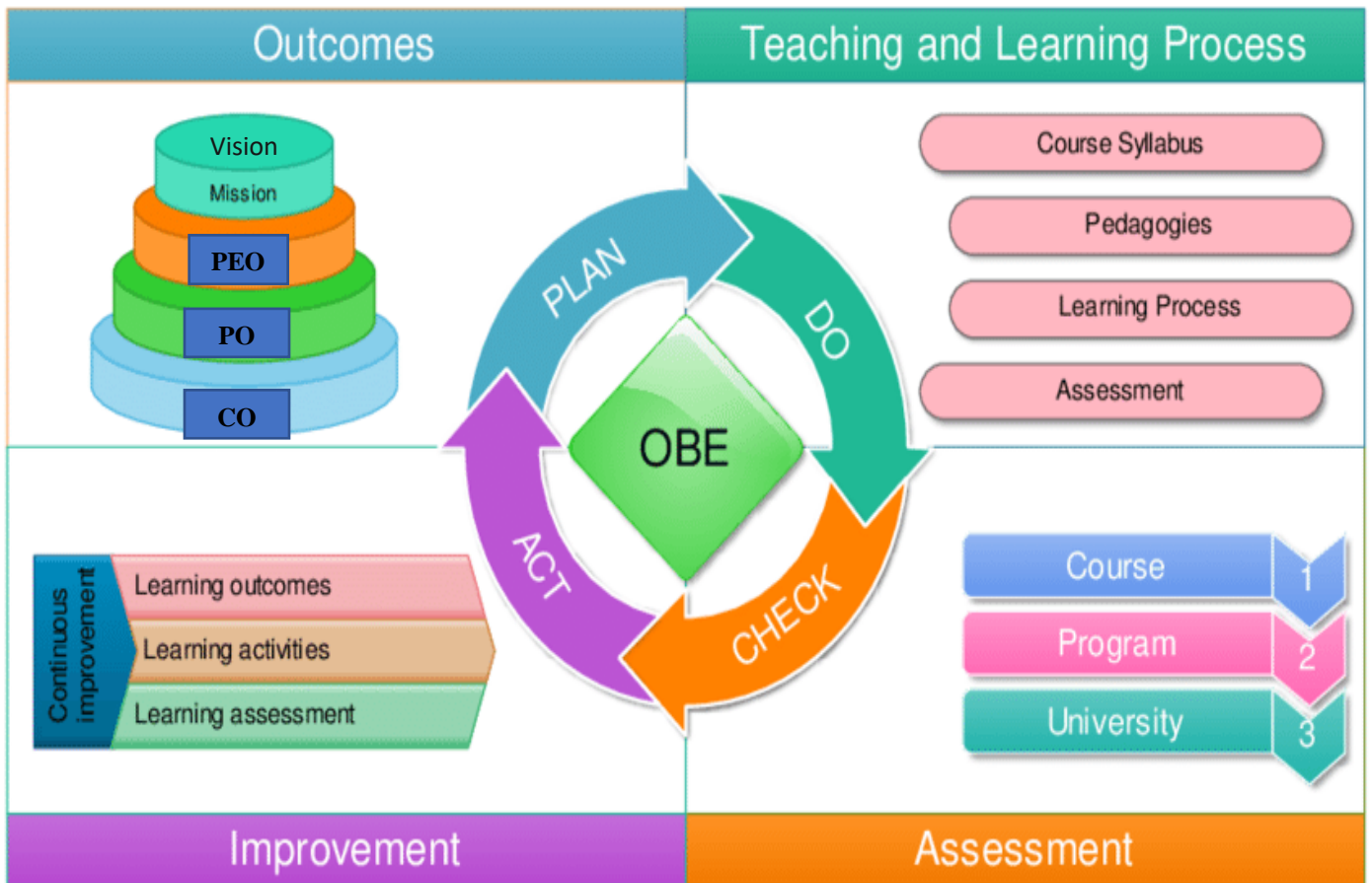
# **Manual of Outcome Based Education (OBE)**



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### Abbreviations:

<b>OBE</b>	Outcome Based Education	<b>BTL</b>	Bloom's Taxonomy Level
<b>LOT</b>	Lower Order Thinking	<b>HOT</b>	Higher Order Thinking
<b>PEO</b>	Program Educational Objectives	<b>PO</b>	Program Outcome
<b>CO</b>	Course Outcome	<b>PSO</b>	Program Specific Outcome
<b>ESE</b>	End Semester Examination	<b>CIA</b>	Continuous Internal Assessment

### **Definition of Abbreviations**

**Lower order Thinking:** The lower-order thinking skills include Remembering, Understanding and Applying.

**Higher order Thinking:** refer to skills that go beyond memorizing information.

**Programme Educational Objective:** PEOs are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. Knowledge, Skill and Attitude are the three behavioral elements based on which PEOs are constructed.

**Course Outcomes :** It is a detailed description of what a student must be able to do at the conclusion of a course.

**Programme Outcome:** Program outcomes are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude and behavior that students acquire through the program.

**Programme Specific Outcomes:** Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.

**Semester End Examination:** SEE means the examinations to be held at the end of each semester separately for theory & practical part by the University

**Continuous Internal Assessment:** Continuous Internal assessment is a form of educational examination that evaluates a student's progress throughout a prescribed course.

**Bloom's Taxonomy Level:** There are six levels of cognitive learning according to the revised version of Bloom's Taxonomy. Each level is conceptually different. The six levels are remembering, understanding, applying, analyzing, evaluating, and creating.

**Course Objective:** A course objective describes what a faculty member will cover in a course. They are generally less broad than goals and broader than student learning outcomes. Objectives focus on content and skills within the classroom or program.

## **Preamble**

**Outcome Based Education (OBE)** is an educational model that forms the base of a quality education system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should help the students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor, based on the outcomes targeted. OBE enhances the traditional methods and focuses on what the Institute provides to students. It shows the success by making or demonstrating outcomes using statements “able to do” in favor of students. OBE provides clear standards for observable and measurable outcomes.

### **Benefits of OBE**

**Clarity:** The focus on outcome creates a clear expectation of what needs to be accomplished by the end of the course.

**Flexibility:** With a clear sense of what needs to be accomplished, instructors will be able to structure their lessons around the students’ needs.

**Comparison:** OBE can be compared across the individual, class, batch, program and institute levels.

**Involvement:** Students are expected to do their own learning. Increased student involvement allows them to feel responsible for their own learning, and they should learn more through this individual learning.

### **India, OBE and Accreditation**

From 13<sup>th</sup> June 2014, India has become the permanent signatory member of the Washington Accord. Implementation of OBE in higher technical education also started in India. The National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) are the autonomous bodies for promoting global quality standards for technical education in India. NBA has started accrediting only the programs running with OBE from 2013.

The National Board of Accreditation mandates establishing a culture of outcome-based education in institutions that offer Engineering, Pharmacy, Management program. Reports

of outcome analysis help to find gaps and carryout continuous improvements in the education system of an Institute, which is very essential.

### **Features of OBE:**

OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.

OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of higher order learning and mastery rather than accumulation of course credits.

- Both structures and curricula are designed to achieve those capabilities or qualities.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content.

### **Deficiencies in Traditional education**

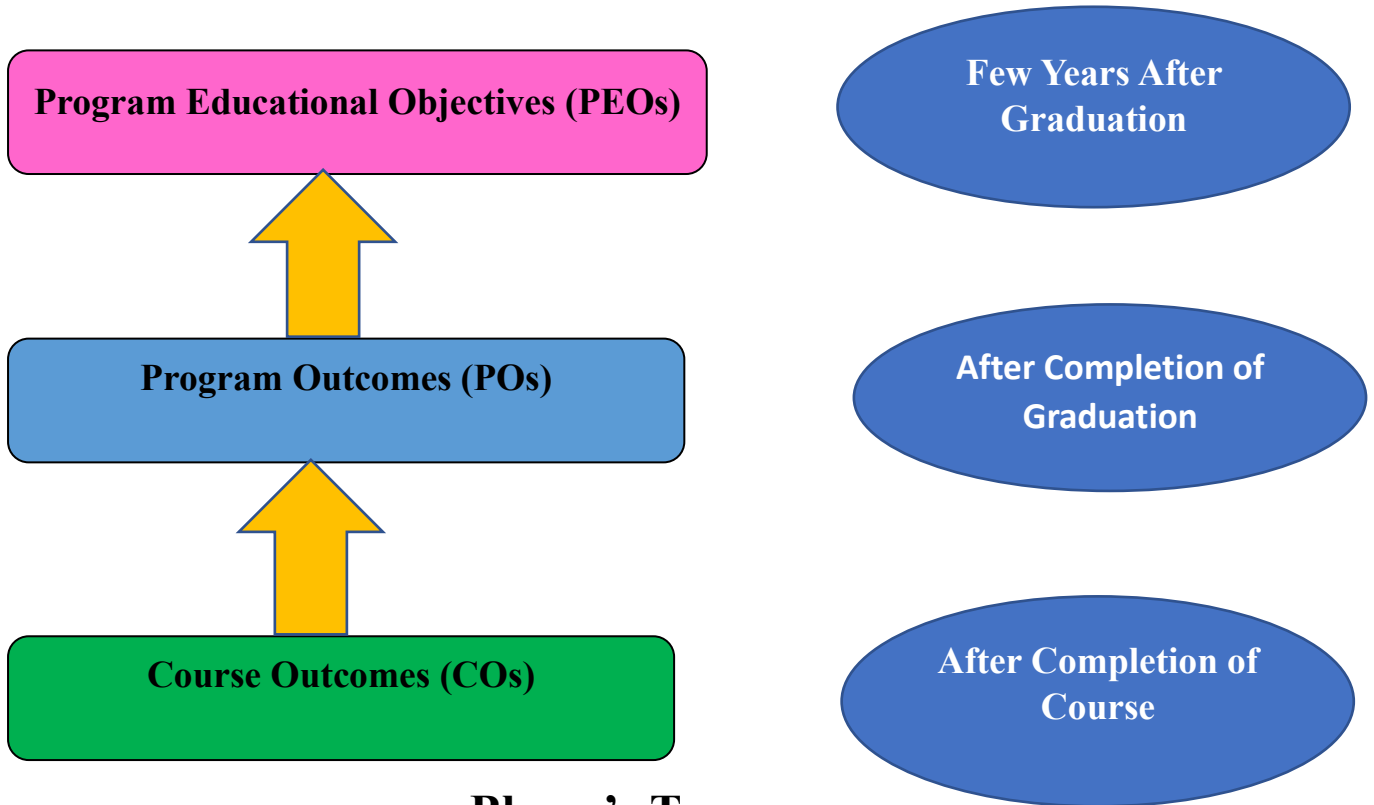
- Provides students with a learning environment with little attention to whether or not students ever learn the material.
- Students are given grades and rankings compared to each other – students become exam oriented or CGPA driven. Graduates are not completely prepared for the workforce.
- Lack of emphasis on soft skills needed in jobs e.g. communication skills, interpersonal skills, analytical skills, working attitude etc.

### **Expectations of students under OBE – the outcome**

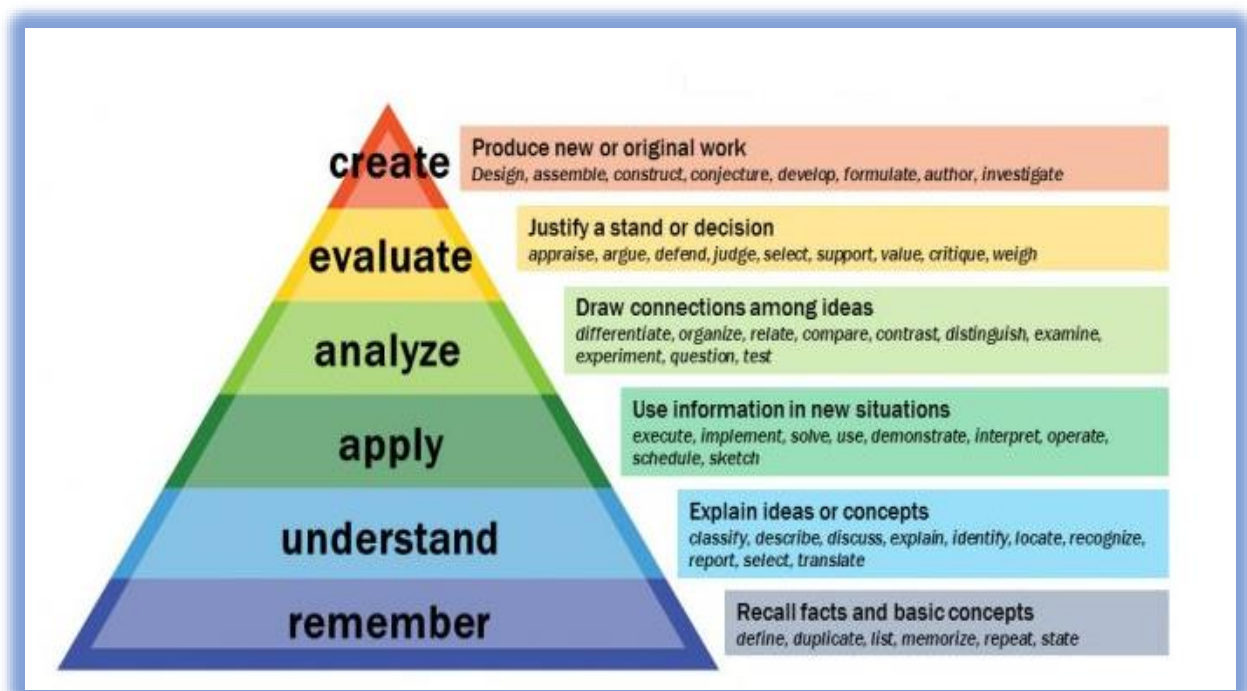
- Students are expected to be able to do more challenging tasks other than memorize and reproduce what was taught.
- Students should be able to: write project proposals, complete projects, analyze case studies, give case presentations, show their abilities to think, question, research, and make decisions based on the findings.
- Be more creative, able to analyze and synthesize information.
- Able to plan and organize tasks, able to work in a team as a community or in entrepreneurial service teams to propose solutions to problems and market their solutions.
- Students should be enriched on three dimensional scales of knowledge, skill and attitude throughout the course.

**The OBE model measures the progress of the graduate in three parameters**

- Program Educational Objectives (PEO)
- Program Outcomes (PO)
- Course Outcomes (CO)



### **Bloom's Taxonomy**



# Vision & Mission of the University

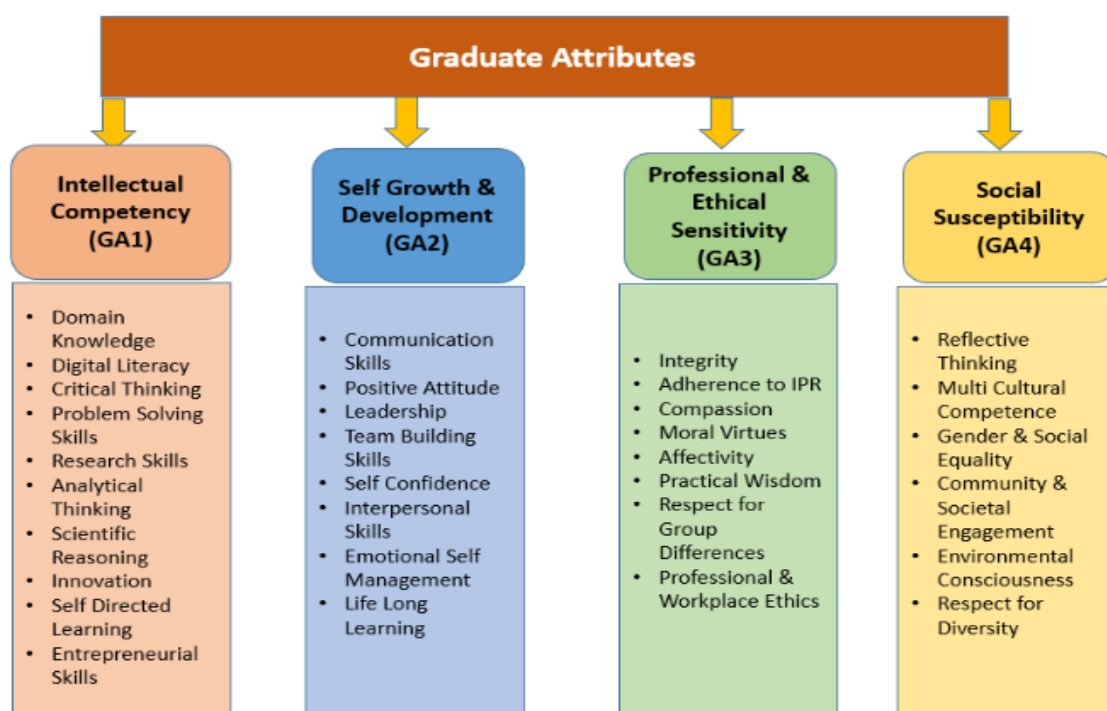
## **Vision of the University**

The vision envisages augmenting the cause of education at all levels. As a catalyst for developing engaged and employable workforce, JRU envisions making a compelling transformation to the world through education, research and innovation that will make difference to the society and mankind.

## **Mission of the University**

We endeavor to create the best possible learning environment for our students through dynamic research, rigorous training and efficient mentorship and are committed to the cause of making higher education accessible to all irrespective of caste, colour or creed. To create an atmosphere of rigor and discipline through innovative education that helps students to understand all aspects of societal challenges and enable them to work in team to tackle multifarious problems that directly benefit society.

## **Graduate Attributes**



## **Program Educational Objective & Outcomes (PEO & PO)**

### **Bachelor of Business Administration (BBA)**

#### **Programme Educational Objective**

**PEO 1** – To provide a practical exposure & comprehensive knowledge of Business concept, theories & practices.

**PEO 2** – Develop an ability to identify and analyze problems and make effective decisions.

**PEO 3** – To develop essential skills & decision-making ability to pursue higher education/ undertake entrepreneurial ventures

**PEO 4**– To develop required communication, interpersonal and leadership skills.

**PEO-5**- Creating Professional with Social Sensitivity and enable them to practice profession with ethics.

**PEO 6**- Develop a strong base to facilitate the students to pursue professional career or take up higher learning courses.

#### **Program Outcomes**

**PO1:** Develop competency & Conceptual clarity of Business Concepts theories & practices and across business disciplines.

**PO2:** Ability to understand and analyze problems and make effective decision to solve the business problems.

**PO3:** Demonstrate an ability to identify business opportunities, create Business plan & undertake entrepreneurial ventures.

**PO4:** Ability to effectively communicate in business environment and perform effectively as a leader as well as a member of a team

**PO5:** Exhibit an understanding and application of ethical principles at both the professional and societal levels

**PO6:** Decision making ability & strong foundation to pursue professional career or take up higher learning courses.

### **Programme Educational Objective**

**PEO 1** – To develop conceptual and practical knowledge, skills and competency related to the various aspects of logistics and their integration with other business functions.

**PEO 2-** To provide on-job training with practical exposure during the program enabling them solve complex business problems in real life.

**PEO 3-** To develop required communication, interpersonal and leadership skills.

**PEO 4-** Creating Professional with Social Sensitivity and enable them to practice profession with ethics.

**PEO 5** – To recognize the need for adopting to change & engage themselves in independent life-long learning.

### **Programme Outcomes**

**PO1:** Students will develop good knowledge and skills related to all the issues & aspects of logistics management and their integration with other business functions.

**PO2:** Students will get well trained & prepared to work in existing industry scenario.

**PO3:** Ability to effectively communicate in business environment and perform effectively as a leader as well as a member of a team.

**PO4:** Exhibit an understanding and application of ethical principles at both the professional and societal levels

**PO5:** Self-driven grit for continuous learning facilitating the student's ongoing professional development.

## **Master of Business Administration (MBA)**

### **Programme Educational Objective**

**PEO 1:** To facilitate students in gaining the conceptual understanding of management theories and its application in resolving complex managerial problems in a rational way.

**PEO 2:** To inculcate the aptitude for research, continuous learning and innovative thinking

**PEO 3:** To develop essential entrepreneurial skills to undertake entrepreneurial ventures.

**PEO 4:** To equip with the required communication skills, teamwork and leadership skills.

**PEO 5:** To inculcate a spirit of Ethics and Social Commitment to add value to the society.

### **Programme Outcomes**

**PO1:** Understand Business Management holistically and application of the knowledge of management science to solve complex corporate problems.

**PO2:** Self-motivated persistence in acquiring knowledge and competencies in order to expand skillset and develop future opportunities.

**PO3:** Identify business opportunities, design and implement innovations in work space.

**PO4:** Ability to communicate effectively and function effectively as an individual, and as a member or leader in diverse teams.

**PO5:** Exhibit an understanding and application of ethical principles at both the professional and societal levels

## **B.Sc(Honours) Agriculture**

### **Programme Educational Objective**

**PEO1:** Graduates will be able to develop the conceptual and practical knowledge, skills and competency related to the various aspects of agriculture and allied sciences

**PEO2:** Graduates will be agricultural professionals or experts who will help to solve technological as well as production problems in the agriculture and allied fields.

**PEO3:** Graduates will be able to develop entrepreneurial skills, creativity and innovation in the field of agricultural science and related sectors.

**PEO4:** Graduates will be able to develop professional skills with ethical and moral responsibilities in the workplace/society and contribute to the country's economic growth & development.

**PEO5:** Graduates will have the opportunity to pursue higher education in agriculture or allied sectors.

**PEO6:** Graduates will be engaged in independent and life-long learning in the ever-changing agricultural production system or enterprise.

### **Programme Outcomes:**

**PO1:** Understand in-depth knowledge of agriculture and its allied fields.

**PO2:** Apply the professional agricultural solutions and demonstrate the knowledge and need for sustainable development.

**PO3:** Deliver relevant extension services effectively by providing quality services and assistance to agriculture sectors.

**PO4:** Identify various business opportunities and demonstrate scientific knowledge and skills of a prospective entrepreneur.

**PO5:** Demonstrate legal & ethical practices impacting agriculture enterprises and exhibit an understanding of the ethical implications of decisions.

**PO6:** Engage in critical thinking by analyzing the situations and communicate & work effectively in a team

**PO7:** Develop the decision-making ability for selection of higher studies in agriculture or allied fields.

**PO8:** Practice lifelong learning using various skills to analyse, interpret and present relevant data and reports in the field of agriculture.

## **Master of Computer Application (MCA)**

### **Programme Educational Objective**

**PEO1:** To develop the conceptual and technical skills to provide solutions to problems across the broad range of application domain through analysis and design.

**PEO2:** To develop good professional skills with a positive attitude for design, development of software and its computation.

**PEO3:** To develop the leadership and managerial skills along with ethical practices, social concern and will be able to communicate technical information effectively.

**PEO4:** To create scientific and societal advancement through technological innovation and entrepreneurship.

**PEO5:** To inculcate the aptitude for self-development, continuous learning to be applied in industries.

### **Programme Outcomes:**

**PO1:** Understand computational knowledge with problem analytical skills to provide IT enabled solutions.

**PO2:** Ability to analyze the computing problems and develop computer programs/ application software by using algorithms and mathematical concepts.

**PO3:** Apply moral, ethical and societal principles for professional computing practices.

**PO4:** To be prepared to adopt new technology with unprecedented ideas to be a successful entrepreneur who can be a job creator.

**PO5:** Recognize the need for and be prepared with the ability to engage in independent and life-long learning attitude in the broadest context of technological change.

## **B.Tech in Computer Science & Engineering**

### **Programme Educational Objective**

**PEO1:** Develop foundational knowledge, technical skills and competency related to the various core and related areas of IT and Ites in order to demonstrate good analytical, design and implementation skills.

**PEO2:** Establish their career in Creativity & Design of Computer Support Systems and impart knowledge and skills with proficiency in analysis, design, coding, testing, deployment, maintenance of the system and application software.

**PEO3:** Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors, and practice their profession with high regard to ethical responsibilities.

**PEO4:** Drive scientific and societal advancement through technological innovation and entrepreneurship.

**PEO5:** Recognize the need for adapting to change & engage themselves in independent life-long learning.

### **Programme Outcomes**

**PO 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and 15modelling to complex engineering activities with an understanding of the limitations.

**PO 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcome (PSOs)**

- 1. PSO1: Professional Skills:** Ability to understand, analyze and develop computer programs/ application software in the areas related to Software Engineering, Web and Mobile Application, Artificial Intelligence, Cyber Security & Networking and Data Analysis.
- 2. PSO2: Problem Solving Skills:** Ability to apply and implement standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

- 3. PSO3: Successful Career:** Ability to become employable in a variety of IT companies and government sectors and for the betterment of an individual and society at large.
- 4. PSO4: Entrepreneurship:** Preparedness to adopt new technology with unprecedented ideas to be a successful entrepreneur or zest for higher studies.

## **Bachelor of Computer Application (BCA)**

### **Programme Educational Objective**

**PEO1:** To develop comprehensive understanding in the areas of Programming, Databases, Software Engineering, Web Designing, Networking and other Computer application areas.

**PEO2:** To build up the ability among the students to identify the problem, analyze the requirements, understand the technical specification, design and provide innovative IT solutions to resolve the industrial problems and address the societal issues.

**PEO3:** To inculcate professionalism, ethical attitude, strong communication skills and teamwork spirit among the students with the aim to make them a successful professional.

**PEO4:** To enable students for pursuing respectable career through Self- Employment or Entrepreneurship.

**PEO5:** To empower the students to employ their skill with a strong base to prepare themselves for higher education.

### **Programme Outcomes**

**PO1:** Apply the concept of Programming, databases, software engineering, web designing, networking and other computer application area to design solution for complex IT problems.

**PO2:** Apply necessary skill-set for designing of hardware/software system, components, and/or processes to meet desired needs, within realistic constraints.

**PO3:** Ability to understand, analyze and communicate national, global, economic, legal and ethical aspects of IT and Ites and apply ethical principles and commit to professional ethics and responsibilities.

**PO4:** Contribute to the ecosystem of entrepreneurship by formulating sustainable innovative solutions in the larger interest of the society and community

**PO5:** Pursue higher education to specialize in his/her study stream & become more employable

**PO6:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in context of technological changes.

### **Bachelor of Pharmacy(B.Pharm)**

#### **Programme Educational Objective**

**PEO 1:** To develop conceptual and practical knowledge in the various fields of pharmaceutical sciences in order to build technical skill for analytical aspects in research and design of pharmaceutical products.

**PEO 2:** To prepare the students to enter careers in the pharmaceutical industries, clinical research companies, government sectors, community and hospital Pharmacy in the field of pharmaceutical sciences, pharmaceuticals, pharmaceutical chemistry, pharmacology, pharmacovigilance & pharmacognosy.

**PEO 3:** To develop professional ethics and moral values amongst the students in context to social pharmacy and health sciences.

**PEO 4:** To inculcate high order thinking to realise the market potential and explore entrepreneurship skills to grab the opportunities.

**PEO 5:** To create enthusiasm among graduates to upgrade themselves in the context of technological advancement in the field of pharmaceutical sciences seeking higher studies.

**PEO 6:** To develop communication, team spirit, leadership skills, analytical skills and shall be self-motivated for lifelong learning to achieve excellence in all spheres of pharmacy.

#### **Programme Outcomes**

**PO 1: Pharmacy knowledge:** Apply the knowledge of basic molecular biology, drug mechanism, science of various systems of human body, fundamental principles of analytical chemistry, preparation of different dosage forms, natural drugs and monographs of inorganic drugs in pharmacy.

**PO 2: Planning abilities:** Demonstrate effective planning abilities in pharmaceutical industry through resource & time management, delegation skills and organizational skills to achieve goal.

**PO 3: Problem analysis:** Develop ability for in-depth analytical and critical thinking in order to identify, formulate, solve the issues related to Pharmaceutical Industry, Regulatory Agencies, Hospital and Community Pharmacy.

**PO 4: Modern tool usage:** Apply the foundation of pharmaceutical science in formulation technology, synthetic knowledge of modern pharmacy computing tools uses as per the requirement of pharmaceutical sectors within the constraints.

**PO 5: Leadership skills:** Exhibit leadership quality, team spirit with motivational capability when planning for fulfilment of professional and social responsibilities to facilitate improvement in health and wellbeing.

**PO 6: Professional identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, educators, managers, employers, employees).

**PO 7: Pharmaceutical ethics:** Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Honour personal values and apply ethical principles in professional and social contexts. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**PO 8: Communication:** Demonstrate effective communication with the pharmacy community and with society at large such as being able to comprehend and write effective reports, make effective presentations and documentation to give and receive clear instructions.

**PO 9: The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**PO 10: Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 11: Entrepreneurial skill:** Exhibit effective entrepreneurial skills in the field of pharmacy to analyse the market potential and grab opportunities.

**PO 12: Lifelong learning:** Develop an aptitude for lifelong learning in the broadest context of technological change. Develop the decision-making ability for selection of higher studies in pharmaceutical sciences and allied fields.

## **B.Tech in Mining Engineering**

## **Programme Educational Objective**

**PEO 1-** To develop graduates with technical knowledge, skill & competency in core mining fundamentals with special emphasis on blasting, mine planning, designing, execution and monitoring of various mining processes and systems.

**PEO 2-** To prepare the graduates to enter careers in PSUs or employed in leading companies in mining or related fields to achieve professional growth.

**PEO 3-** To exhibit the professional skills such as effective communication, leadership and team spirit in their chosen career and recognize the ethical & moral responsibilities to make informed judgment considering the impact of engineering solutions in economic, environmental & societal contexts.

**PEO 4-** To demonstrate an understanding of the critical role mining engineers plays in society with respect to health, safety, and the environment in tangible ways such as achieving professional licensure.

**PEO 5** -To pursue lifelong learning or acquire advanced degree in mining related field to assimilate new information and exposure to cutting edge technology.

## **Programme Outcomes**

**PO 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Programme Specific Outcomes**

**PSO 1-**Apply principles of mine engineering for designing and developing solutions to problems in the field of minerals extraction, processing, exploration, excavation, geology, metallurgy & geotechnical engineering.

**PSO 2-** Demonstrate their technical abilities, insights and skills creatively and productively in field of Mining Engineering and practice effectively as professional engineers, managers, and leaders in the mining Industries and/or a wide variety of other fields as engineers.

**PSO 3-** Engage in independent and lifelong learning the technological advancements in the field of mine engineering and use the technology to analyze and provide sustainable solutions to the challenges in mining sector.

## OBE Framework of the University

### **Before Start of Semester**

Competency Matrix

Course Allotment by HoD  
(Based on Competency)

Subject confirmation by Faculty

Develop curriculum & course  
file

### **During Semester**

Refine Course file/Plan

Updation & Tracking of course  
File

Identifying student competency  
& Action taken

Execution of all other Activities

### **End of Semester**

Implementation & Verification of Course  
file in Lectures/Practical's

Assessment & evaluation of CO -PO  
Attainment

Submit Attainment analysis to Process  
owner/HoD

The Cognitive Process Dimensions-Categories					
Lower Order Thinking(LOT)			Higher Order Thinking(HOT)		
Remember	Understand	Apply	Analyse	Evaluate	Create
Recognizing (identifying)  Recalling (retrieving)	Interpreting  Illustrating  Classifying  Summarizing  Inferring (concluding)  Comparing  Explaining	Executing  Implementing	Differentiating  Organizing  Attributing	Checking (coordinating, detecting, testing, monitoring)  Critiquing (judging)	Planning  Generating  Producing (constructing)

## Action Verbs for Course Outcomes

Lower Order Thinking( LOT)			Higher Order Thinking (HOT)		
Remember	Understand	Apply	Analyse	Evaluate	Create
Define	Explain	Solve	Analyse	Reframe	Design
Describe	Describe	Apply	Compare	Criticize	Create
List	Interpret	Illustrate	Classify	Judge	Plan
State	Summarise	Calculate	Distinguish	Recommend	Formulate
Match	Compare	Sketch	Explain	Grade	Invent
Tabulate	Discuss	Prepare	Differentiate	Measure	Develop
Record	Estimate	Chart	Appraise	Test	Organize
Label	Express	Choose	Conclude	Evaluate	Produce

## Guidelines for writing Course Outcome Statements

**Well-written course outcomes involve the following parts:**

1. Action verb
2. Subject content
3. Level of achievement as per BTL
4. Modes of performing task (if applicable)

**For Example:**

Students are able to

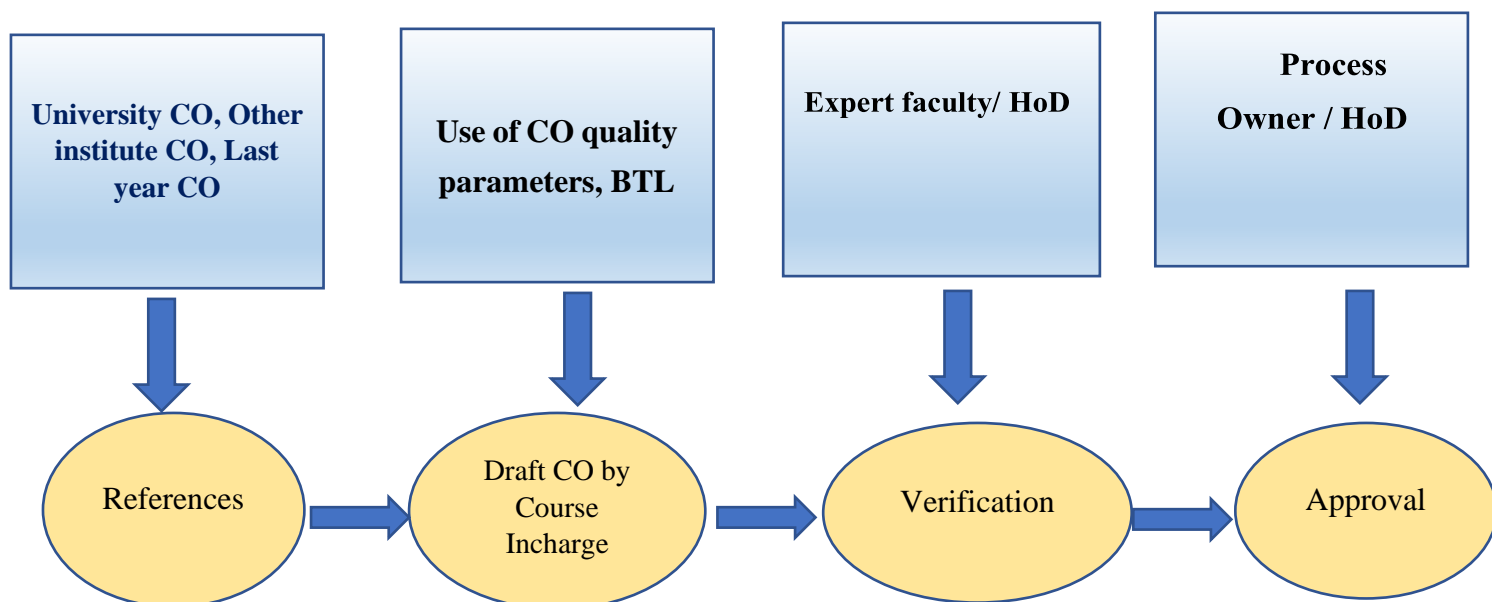
- 1) Design Derivative controller for the Plant. —→ Action verb (underlined)
- 2) Determine Gain of an operational Amplifier. —→ Subject content
- 3) Use structural analysis software to a competent Level. —→ Level of achievement.
- 4) Present seminar on real life problems. —→ Modes of performing task with action verb (underlined)

**While writing Cos the following questions/points must be addressed properly.**

<b>Specific</b>	Is there a description of precise behavior and the situation it will be performed in ? Is it concrete, detailed, focused and defined?
<b>Measurable</b>	Can the performance of the outcome be observed and measured ?
<b>Achievable</b>	With a reasonable amount of efforts and application can the outcome be achieved? Are you attempting too much ?
<b>Relevant</b>	Is the outcome important or worthwhile to the learner or stakeholder ? Is it possible to achieve this outcome ?
<b>Time-Bound</b>	Is there a time limit, rate, number, percentage or frequency clearly stated ? When will this outcome be accomplished ?

**Note:** If Laboratory is given as separate course (with course code) then there should be separate course outcomes for Laboratory.

## Quality of Course Outcome:



## Guidelines/Checklist for Cos:

<b>Number of COs</b>	Two to Six
<b>CO essentials</b>	Action Verb, Subject Content, Level of Achievement, Modes of Performing task (If Applicable)
<b>Based on BTL</b>	Understand, Remember, Apply, Analyse, Evaluate, Create
<b>Number of BTL Considered in one course</b>	Minimum 3
<b>Technical Content/ point of curriculum</b>	All curriculum contents are covered
<b>Curriculum gap</b>	Additional CO for gap identified/filling. Adds more weightage

## Consider two minimum criteria for CO-PO Mapping Justification

Course Outcome statement may be broken down into two main components:

- I. **An action word** that identifies the performance to be demonstrated
- II. **Learning statement** that specifies what learning will be demonstrated in the performance

## CO – PO Mapping Criteria

Following two criteria should be used for CO PO Mapping justifications

1. Contact Hours: Lecture, Tutorial and Practical

2. Assessment Tools

### 1. CO – PO Mapping by Contact Hours

S.NO	Level of Correlation	Contact hours in Percentage (Lecture, tutorial & Practical)
1	No Mapping	Less than 5% of total Hours
2	Low	(05 – 15) % of total Hours
3	Medium	(15 – 25) % of total Hours
4	High	Greater than 25 % of total Hours

### Description

Assume Number of Lectures = 3Hr /week x 12 weeks = 36 Hours

Tutorial = 1Hr/Week x 12 Weeks = 12 Hours

Practical = 2Hr/Week x 12 Week = 24 Hours

Total Hours = 36+12+24 = 72 Hours

Example: Let, CO1 related points are engaged in 10 lectures + 1 Tutorial and 2 practical Hours

Then contact hours = 10+1+2x2 = 15 Hours

Therefore, contact hours in percentage =  $(15/72) \times 100 = 20.8 \%$ . Medium mapping (2)

## 2. CO – PO Mapping by Assessment Tools

S.NO	Level of Correlation	Assessment tools used to assess the CO
1	No Mapping	Zero Assessment tools used
2	Low	1 or 2 Assessment tools used
3	Medium	3 Assessment tools used
4	High	4 or More Assessment tools used

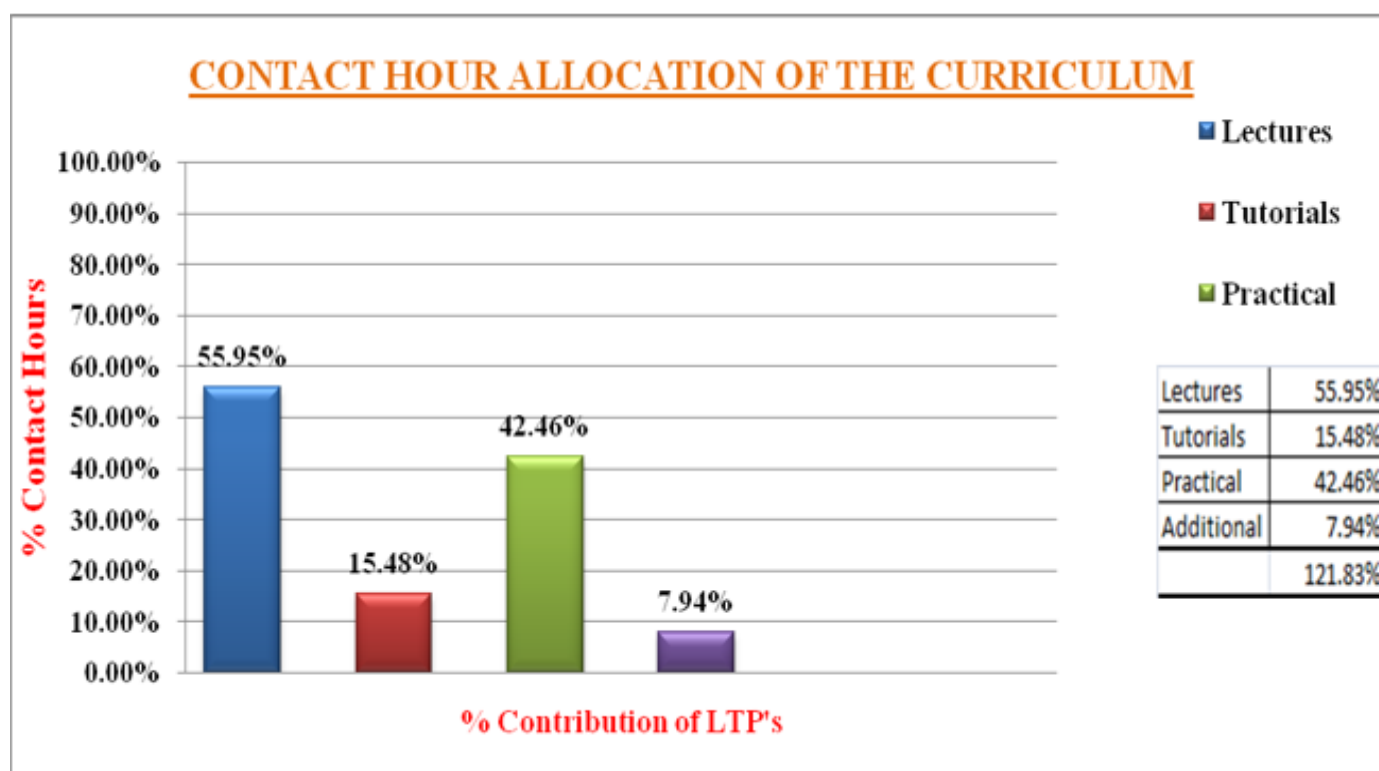
Sample Assessment Tools for CO – PO Mapping		
End Semester Exam	End Semester Exam	Q1, Q2A
Assignment & Quiz	Assignment 1	Q1, Q2, Q3, Q4
	Assignment 2	Nil
	Quiz	Q1, Q2, Q3, Q4
Mid Semester &	Mid Test 1	Q1
Teacher Assessment	GD	Nil
	Seminar	Nil
	Brainstorming	Nil
	Project	Q2

## Correlation of course components with POs & PEOs

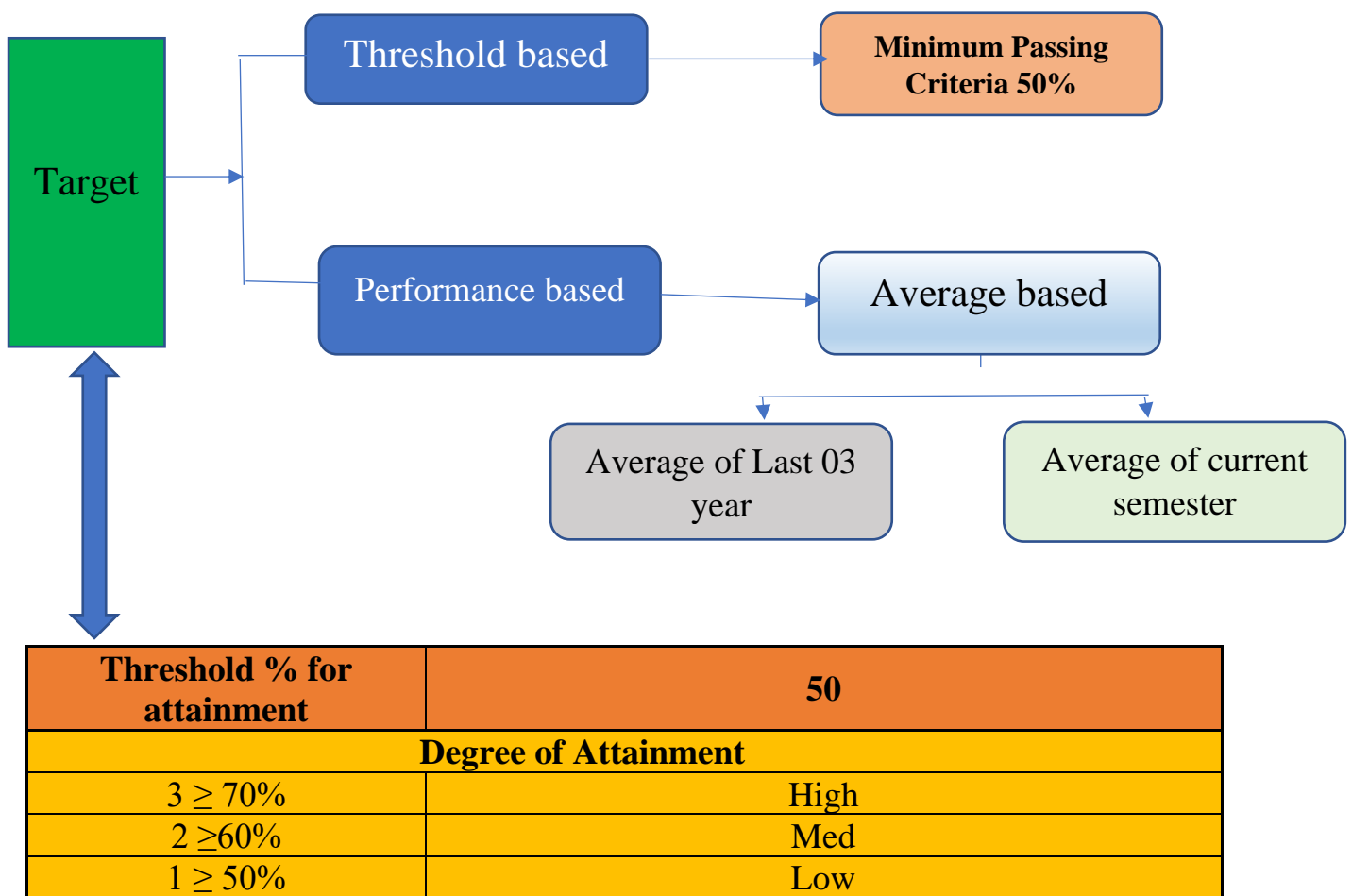
### Sample Correlation

Course Component	Curriculum Content (% of total no. of credits of the programme)	Total No. of Contact Hour	Total No. of Credits	PEO'S	PO's
Mathematics & Basic Science	9.52%	336	24	PEO 1 & PEO 2	PO 1
Humanities & Social Sciences	6.35%	224	16	PEO 1 , PEO 2 & PEO 3	PO 7, PO 8, PO 9, PO 11
Basic Engineering Science Core Courses	12.70%	448	32	PEO 1 & PEO 2	PO 1, PO 2
Professional Core	65.08%	2296	164	PEO 1 & PEO 2	PO 2, PO 3, PO 4, PO 5, PO 9, PO 10, PO 11
Electives	6.35%	224	16	PEO 1 & PEO 2	PO 2, PO 6, PO 7, PO 8, PO 9

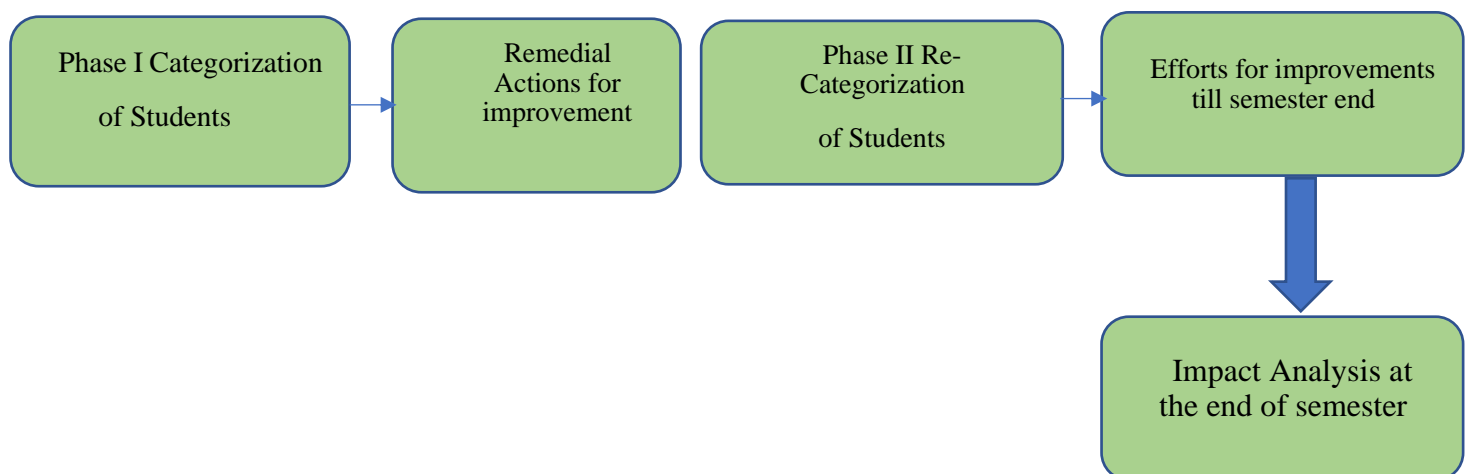
### Sample Allocation of Course Curriculum



## Target/Attainment



## Student competency



### Guidelines for First semester

<b>Phase I- Categorization (Commencement of Semester)</b>	<b>Phase II- Re-categorization (After 30 Days)</b>
Last Qualifying Exam	Assignment/Mid Term Result
Roots Exam	Timely Completion/Submission of work
Attendance & Soft Skills	Attendance & Soft Skills
Technical Knowledge	Lab Performance

### Guidelines for Intermediate semester

<b>Phase I- Categorization (Commencement of Semester)</b>	<b>Phase II- Re-categorization (After 30 Days )</b>
Last End Semester Examination	Assignment/Mid Term Result
Attendance & Soft skills	Attendance & Soft skills
Assessment	Assessment
Technical Knowledge	Lab Performance

### Strategies for Slow, Average and Advanced Learners

#### For Slow learners

- ▶ Document/record of remedial classes with timetable & attendance
- ▶ Specially designed assignment/ task
- ▶ Student study group for peer-to-peer learning
- ▶ Individual Mentoring (Tutor Guardian)

### **For Average Learners**

- ▶ Additional assignment/ task
- ▶ Encouraging for timely and effective completion of work
- ▶ Conduction of quiz, orals etc.
- ▶ Solving previous year University question papers and test papers
- ▶ Presentation on technical topics/ case studies/mini projects

### **For Advanced Learners**

- ▶ Encouraging to present & publish papers in journals/conferences/competitions
- ▶ Guidance for CAT/GATE/competitive Examination
- ▶ Encouraging to participate in professional activities.
- ▶ Specially designed activities to improve the portfolio of students.
- ▶ Individual guidance for career building

## Rubrics for Assessment:

A scoring guide with criteria for evaluating students' work in direct relation to one or more of the PO's and a rating scale indicating differing levels of performance. Used to examine how well students have met CO or PO rather than how well they perform compared to their peers. Typically include measurable descriptors that define expectations at each level of performance for each criterion.

## Rubrics for CO assessment in Project (MBA)

Rubrics for Internal Evaluation				Total Marks for Project
SI No	Rubrics	Marks	Weightage	
1	Project Synopsis	15	30%	100
2	Regularity	5	10%	
3	Mid Project Review	10	20%	
4	Final Report Assessment	20	40%	
	Total Marks for Internal Evaluation	50	100%	
Rubrics for External Evaluation				
SI No	Rubrics	Marks	Weightage	
1	Content & Layout of the Project	10	20%	
2	Quality of work	10	20%	
3	Future Scope of Study	10	20%	
4	Viva Voce	20	40%	
	Total Marks for External Evaluation	50	100%	

## Rubrics for Internal Evaluation

Rubric 1- Project Synopsis						
SI No	Subcomponents	Excellent	Good	Satisfactory	Not Satisfactory	Maximum Marks (15)
		5	4	3	= or < 2	
1	Feasibility of the Project Proposal	Detailed and extensive analysis to determine the viability of the proposed project	Detailed analysis to determine the viability of the proposed project	Moderate Study to determine the viability of the proposed project	Minimal Study to determine the viability of the project	5
2	Objective of the study & Research Methodology	Clearly defined objectives of the proposed Study	Good Justification of the objectives of the	Incomplete Justification of the objectives of	Objectives of the study are not relevant with the proposed title of the Study	5

			proposed study	the proposed Study		
		Specific Procedure or techniques to collect and analyze the information is clearly defined	Specific Procedure or techniques to collect and analyze the information are defined but more specification is required	Specific Procedure or techniques to collect and analyze the information are mentioned but are not very clear	Improper specification of the Procedure or techniques to collect and analyze the information	
3	Work Schedule	All the steps of the project and time required to complete each step is clearly defined	Time line has been defined but require more precision	Steps of the project has been identified but the time required to complete each step is unclear	The steps of the project and time required to complete each step is unclear	5

Rubric 2- Regularity						
SI No	Subcomponents	Excellent	Good	Satisfactory	Not Satisfactory	Maximum Marks (10)
		5	4	3	= or < 2	
1	Reporting to Faculty Guide (Fortnightly)	Reports to the Guide Regularly (every week) and updates regarding the progress of the project work	Regular in the interaction classes for project work but reports on fortnightly basis regarding the progress of Project work	Not very regular in the interaction classes (Once in a month) regarding the progress of Research Work	Very irregular (once in a while) in the interaction classes regarding the progress of Research work	5

### Rubric 3- Mid Project Review

SI No	Subcomponents	Excellent	Good	Satisfactory	Not Satisfactory	Maximum Marks (10)
		5	4	3	= or < 2	
1	Review of Literature & Research Methodology adopted	Required no.of research papers relevant to the study have been thoroughly studied and analysed	Few Research papers relevant to the study have been thoroughly studied & analysed	Read few Research Papers relevant to the study but thorough analysis is required	Referred to very few Research papers or haven't referred to any Research paper	5
		Clear definition of the Research design, Sample size, Sample method, data collection method & technique of analysis	Research design, Sample size, Sample method, data collection method and technique of analysis have been defined but requires further detailing	Research design, Sample size, Sample method, data collection method and technique of analysis have not been defined properly	Not defined either of the components or some of the components of Research Methodology	
2	Adherence to work schedule	Strict adherence to the work schedule and appropriate distribution of project work	Tries to follow the defined work schedule and appropriate distribution of project work	Irregular in adherence to the defined work schedule	Defined work schedule is not followed	5

Rubric 4- Final Report Assessment						
SI No	Subcomponents	Excellent	Good	Satisfactory	Not Satisfactory	Maximum Marks (15)
		5	4	3	= or < 2	
1	Data Analysis, Findings of the Study & Recommendations	1. Precise & well thought out data analysis 2. Findings of the study are clearly defined and suitable recommendations are given	1. Good analysis of data answering all reasonable questions. 2. Findings of the study are defined but has to be more relevant with the analysis. Recommendations of the study are given	1. Reasonable analysis of data 2. Findings have been mentioned but require more precision as per the project work. Recommendations have not been mentioned	1. Data analysis is not clear 2. Findings are not relevant and recommendations have not been mentioned	5
2	Adherence to the Project Format defined by the University	Strict adherence to the defined format	Tries to follow the defined format	Incomplete adherence to the defined format	Lacks adherence to the defined format	5
3	Presentation of the Project work	1. Contents of the presentation are appropriate and well delivered. 2. Student is confident in answering the queries of the panel and justification given for the queries are appropriate.	1. Contents of the presentation are appropriate and well delivered. 2. Student is less confident in answering the queries of the panel but justification given for the queries are acceptable.	1. Contents of the presentation are appropriate but not well delivered. 2. Student is less confident in answering the queries of the panel but justification given for the queries are somewhat okay.	1. Contents of the presentation are not appropriate and not well delivered 2. Student is less confident in answering the queries of the panel but justification given for the queries are not appropriate.	5
4	Student Learning Outcome	Extensive & Detailed knowledge related to the area of project work	Fair knowledge related to the area of project work	Moderate knowledge related to the area of project work	Lacks knowledge related to the area of project work	5

## Rubrics for External Evaluation

SI No	Rubrics	Excellent	Good	Satisfactory	Not Satisfactory	Maximum Marks (50)
		(9-10)	(7-8)	(4-6)	(0-3)	
1	Content & Layout of the Project	1. Project Report is concise & focussed on the objectives of the Study 2. Objective of the study, scope & limitations have been clearly defined 3. Contents are relevant with the project title & are arranged properly 4. Description of the work has been divided properly in Chapters 5. Proper referencing	1. Project Report is concise & focussed on the objectives of the Study 2. Objective of the study, scope & limitations have been clearly defined 3. Contents are relevant with the project title & are arranged properly 4. Description of the work has not been divided properly in Chapters 5. Proper referencing is required	1. Objective of the study, scope & limitations have been defined 2. Contents are more or less relevant with the project title & are arranged properly 3. Description of the work has to be defined in a better manner 4. referencing is okay	1. Objective of the study, scope & limitations need to be defined properly 2. Contents are not relevant with the project title 3. Description of the work has to be defined in a better manner 4. Referencing is okay	10
2	Quality of work	1. Precised analysis of data using analytical techniques 2. Originality of Project work 3. Innovative	1. Precised analysis of data using statistical techniques 2. Originality of Project work	1. Fair analysis of data using Graphs/diagrams 2. Originality of Project work	1. Inappropriate analysis of data using Graphs/diagrams 2. Lack of Originality in Project work	10
3	Future Scope of Study	Future Research suggestions and critical estimation are provided from which topics for further research can be explored	Future scope of the study has been identified and well defined	Future scope of the study has been just mentioned	Future scope of the study has not been properly identified and mentioned	10

4	Viva Voce [ Aptitude & Life Skills]	In-depth understanding of all the aspects of the project and awareness about the work in the related area	Knowledge and understanding of major aspects and awareness about the work in the related area	Moderate knowledge & understanding of most aspects with some awareness about the work in the related area	Exhibits little knowledge & understanding with minimal awareness about the work in the related area	10
		1. Logical & to the point answers communicated effectively 2. Confident 3. Adherence to the formal Dress code	1. To the point answers communicated effectively 2. More or less Confident 3. Adherence to the formal Dress code	1. Logical answers but unable to communicate effectively 2. Not very Confident 3. Adherence to the formal Dress code	1. Vague answers 2. Not very Confident 3. Formal dress code not followed	10

## MCA PROJECT WORK RUBRICS

### Total Marks = 800 Marks

- **Viva Voce Marks= 200**

The marks will be awarded on the basis of viva conducted in presence of External members & guides related to the project.

- **Internal Marks =600**

The marks will be awarded on the basis of four reviews conducted for the work done related to the project.

### RUBRICS FOR INTERNAL MARKS

The marks will be given on the basis of four reviews conducted for the work done related to the project.

Review	Agenda	Rubrics	Review Assessment (Maximum Marks)	Weightage
Review 1	Project Synopsis/Project Evaluation	Rubric R1	120	20%
Review 2	Project Evaluation I	Rubric R2	150	25%
Review 3	Project Evaluation II	Rubric R3	150	25%

<b>Review 4</b>	Project Evaluation III	Rubric R4,R5,R6	180	30%
External Evaluation			200	100 %
Total			800	

### Rubric #R1: Project Synopsis/ Proposal Evaluation

Total Marks (120)						
Level of achievement						
		<b>Excellent 35-40</b>	<b>Good 25-34</b>	<b>Average 15-24</b>	<b>Poor &lt;15</b>	<b>Score</b>
<b>a</b>	Identification of Problem Domain and Detailed analysis  (40 marks)	Detailed and extensive explanation of the specifications and the limitations of the existing systems	Good explanation of the purpose and need of the project	Average explanation of the purpose and need of the project;	Moderate explanation of the purpose and need of the project	
<b>b</b>	<b>Study Of the existing system and feasibility of project proposal</b>  (40 marks)	All objectives of the proposed work are well defined; Steps to be followed to solve the defined problem are clearly specified	Collects a great deal of information and good study of the existing systems;	Moderate study of the existing systems; collects some basic information	explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information	
<b>c</b>	<b>Objective and Methodology of the proposed work</b>  (40 marks)	Detailed and extensive explanation of the specifications and the limitations of the existing systems	Good justification to the objectives; Methodology to be followed is specified but detailing is not done	Incomplete justification to the objectives proposed; Steps are mentioned but unclear; without justification to objectives	Only Some objectives of the proposed work are well defined; Steps to be followed to solve the defined problem are not specified properly	

## Rubric #R2: Project Evaluation I

Total Marks (150)						
Level of achievement						
		Excellent 41-50	Good 31-40	Average 21-30	Poor <20	Score
a	Design Methodology  (50 marks)	Division of problem into modules and good selection of computing framework	Division of problem into modules and good selection of computing framework  Design methodology not properly justified	Division of problem into modules but inappropriate selection of computing Framework  Design methodology not defined properly	Partial division of problem into modules and inappropriate selection of computing framework  Design methodology not defined properly	
b	Planning of Project Work  (50 marks)	Time frame properly specified and being followed	Time frame properly specified but being followed partly	Time frame properly specified, but not being Followed	Time frame not properly specified	
c	Demonstration and Presentation  (50 marks)	Objectives achieved as per time frame  Contents of presentations are appropriate and well arranged  Proper eye contact with audience and clear voice with good spoken language	Objectives achieved as per time frame  Contents of presentations are appropriate but not well arranged  Satisfactory demonstration, clear voice with good spoken language but eye contact not proper	Objectives achieved as per time frame  Contents of presentations are appropriate but not well arranged  Eye contact with few people and unclear Voice	Objectives not achieved as per time frame  Contents of presentations are not appropriate  Demonstration not satisfactory	

## Rubric #R3: Project Evaluation II

Total Marks (150)						
Level of achievement						
		<b>Excellent</b> <b>41-50</b>	<b>Good</b> <b>31-40</b>	<b>Average</b> <b>21-30</b>	<b>Poor</b> <b>&lt;20</b>	<b>Score</b>
<b>a</b>	<b>Incorporation of Suggestions</b>  (50 marks)	Changes are made as per modifications suggested during Project evaluation I and new innovations added	Changes are made as per modifications suggested during Project evaluation I and new and good justification	Changes are made as per modifications suggested during Project evaluation I	Suggestions during Project evaluation I and new are not incorporated	
<b>b</b>	<b>Project Demonstration</b>  (50 marks)	<p>All defined objectives are achieved</p> <p>Each module working well and properly demonstrated</p> <p>All modules of project are well integrated and system working is accurate</p>	<p>All defined objectives are achieved</p> <p>Each module working well and properly demonstrated</p> <p>Integration of all modules not done properly and system working is not accurate</p>	<p>All defined objectives are achieved</p> <p>Modules are working well in isolation and properly demonstrated</p> <p>Modules of project are not properly integrated</p>	<p>Only some of the defined objectives are achieved</p> <p>Modules are not in proper working form that further leads to failure of integrated system</p>	
<b>c</b>	<b>Presentation</b>  (50 marks)	<p>Contents of presentations are appropriate and well delivered</p> <p>Proper eye contact with audience and clear voice with good spoken language</p>	<p>Contents of presentations are appropriate and well delivered</p> <p>Clear voice with good spoken language but less eye contact with audience</p>	<p>Contents of presentations are appropriate but not well delivered</p> <p>Eye contact with only few people and unclear voice</p>	<p>Contents of presentations are not appropriate and not well delivered</p> <p>Poor eye contact with audience and unclear voice</p>	

### Rubric #R4: Project Evaluation III

Total Marks (60)						
Level of achievement						
		Excellent 16-20	Good 12-15	Average 8-11	Poor <8	Score
a	<b>Incorporation of Suggestions</b> (20 marks)	Changes are made as per modifications suggested during Project evaluation I and new innovations added	Changes are made as per modifications suggested during Project evaluation I and new and good justification	Changes are made as per modifications suggested during Project evaluation I	Suggestions during Project evaluation I and new are not incorporated	
b	<b>Project Demonstration</b> (20 marks)	<p>All defined objectives are achieved</p> <p>Each module working well and properly demonstrated</p> <p>All modules of project are well integrated and system working is accurate</p>	<p>All defined objectives are achieved</p> <p>Each module working well and properly demonstrated</p> <p>Integration of all modules not done properly and system working is not accurate</p>	<p>All defined objectives are achieved</p> <p>Modules are working well in isolation and properly demonstrated</p> <p>Modules of project are not properly integrated</p>	<p>Only some of the defined objectives are achieved</p> <p>Modules are not in proper working form that further leads to failure of integrated system</p>	
c	<b>Presentation</b> (20 marks)	<p>Contents of presentations are appropriate and well delivered</p> <p>Proper eye contact with audience and clear voice with good spoken language</p>	<p>Contents of presentations are appropriate and well delivered</p> <p>Clear voice with good spoken language but less eye contact with audience</p>	<p>Contents of presentations are appropriate but not well delivered</p> <p>Eye contact with only few people and unclear voice</p>	<p>Contents of presentations are not appropriate and not well delivered</p> <p>Poor eye contact with audience and unclear voice</p>	

### Rubric #R5: Project Evaluation III (Project Report Evaluation)

Total Marks (60)						
Level of achievement						
		Excellent 16-20	Good 12-15	Average 8-11	Poor <8	Score
a	<b>Project Report</b>  (20 marks)	Project report is according to the specified format  References and citations are appropriate and well mentioned	Project report is according to the specified format  References and citations are appropriate but not mentioned well	Project report is according to the specified format but some mistakes  In-sufficient references and citations	Project report not prepared according to the specified format  References and citations are not appropriate	
b	<b>Description of Concepts and Technical Details</b>  (20 marks)	Complete explanation of the key concepts and strong description of the technical requirements of the project	Complete explanation of the key concepts but in-sufficient description of the technical requirements of the project	Incomplete explanation of the key concepts and in-sufficient description of the technical requirements of the project	Inappropriate explanation of the key concepts and poor description of the technical requirements of the project	
c	<b>Conclusion and Discussion</b>  (20 marks)	Results are presented in very appropriate manner  Project work is well summarized and concluded  Future extensions in the project are well specified	Results are presented in good manner  Project work summary and conclusion not very appropriate  Future extensions in the project are specified	Results presented are not much satisfactory  Project work summary and conclusion not very appropriate  Future extensions in the project are not specified	Results are not presented properly  Project work is not summarized and concluded  Future extensions in the project are not specified	

## Rubric #R6: Project Evaluation III (Evaluation by Guide)

Total Marks (60)						
Level of achievement						
		<b>Excellent</b> <b>26-30</b>	<b>Good</b> <b>21-25</b>	<b>Average</b> <b>15-20</b>	<b>Poor</b> <b>&lt;15</b>	<b>Score</b>
<b>a</b>	<b>Technical Knowledge and Awareness related to the Project</b>  (30 marks)	Extensive knowledge and awareness related to the project	Fair knowledge and awareness related to the project	Reports to the guide very often but not very consistent	Poor knowledge and no awareness related to project	
<b>b</b>	<b>Regularity and Attendance</b>  (30 marks)	Reports to the guide regularly and consistent in work	Reports to the guide very often but not very consistent	Reports to the guide but lacks Consistency	Irregular and inconsistent in work	

## RUBRICS FOR VIVA VOCE

The viva voce marks of the project will be given on the basis of viva conducted in presence of external member & guide.

Total Marks (200)						
Level of achievement						
		<b>Excellent</b> <b>66-80 or 31-40</b>	<b>Good</b> <b>41-65 or 21-30</b>	<b>Average</b> <b>16-40 or 11-20</b>	<b>Poor</b> <b>&lt;15 or &lt;10</b>	<b>Score</b>
<b>a</b>	<b>Project Report</b>  (80 marks)	Project report is according to the specified format  References and citations are appropriate and well mentioned	Project report is according to the specified format  References and citations are appropriate but not mentioned well	Project report is according to the specified format but some mistakes  In-sufficient references and citations	Project report not prepared according to the specified format  References and citations are not appropriate	
<b>b</b>	<b>Project Demonstration</b>  (80 marks)	All defined objectives are achieved  Each module working well	All defined objectives are achieved system working	All defined objectives are achieved  Modules are working well	Only some of the defined objectives are achieved	

		and properly demonstrated  All modules of project are well integrated and system working is accurate	is not very satisfactory  Each module working well and properly demonstrated  Integration of all modules not done and system working is not accurate	in isolation and properly demonstrated  Modules of project are not properly integrated	Modules are not in proper working form that further leads to failure of integrated system	
c	Viva Voce (40 marks)	Good understanding of the relevance of the project  Extensive knowledge of not only the project but domain around  Technically correct and confident answers  Crisp to-the-point answers	Fair understanding of the relevance of the project  Extensive knowledge of the project but not of the domain around  Most of the answers are technically correct but confidence not very good  Crisp to-the-point answers	Fair understanding of the relevance of the project  Fair knowledge of the project and the domain around  Few of the answers are technically correct but confidence is not good  Answers not to-the-point	Poor understanding of the relevance of the project  Lacks sufficient knowledge of project  Poor technically knowledge of the subject and low on confidence  Vague answers	

## Rubrics for CO assessment in Mining Engineering Laboratory: (30 Marks)

Parameters	Criteria	Assessment
<b>Objective (5 marks)</b>	Objective accurately describes the purpose for doing the lab.	<b>5-4 marks</b>
	Objectives address the procedural aspects of the lab , but don't accurately summarize theoretical concept of the experiment.	<b>3-2 marks</b>
	Objectives are missing & not connected with lab performed.	<b>1-0 mark</b>
<b>Theory, Procedure &amp; diagram/ sketch (5 marks)</b>	Theory illustrated in the record book with proper diagram & procedure is included in the report.	<b>5-4 marks</b>
	Theory illustrated but not accurately summarized & procedure is incomplete in the report. Diagram is not neat & proper way.	<b>3-2 marks</b>
	Theory is incorrect & procedure is missing completely. Diagram/Sketch missing.	<b>1-0 mark</b>
<b>Experimental Data &amp; analysis (5 marks)</b>	All the data of experiment is included with complete analysis.	<b>5-4 marks</b>
	The data of experiment is not properly mentioned & incomplete analysis.	<b>3-2 marks</b>
	Data of experiment & analysis is missing.	<b>1-0 mark</b>
<b>Conclusion (5 marks)</b>	Appropriate & summarized conclusion.	<b>5-4 marks</b>
	Conclusion is mentioned but not in proper order.	<b>3-2 marks</b>
	Conclusion missing.	<b>1-0 mark</b>
<b>Lab performed / Attendance (10 marks)</b>	Regular attended lab & performed properly.	<b>10-7 marks</b>
	Irregular attendance in lab conducted.	<b>6-4 marks</b>
	Poor attendance.	<b>3-0 mark</b>

### RUBRICS FOR EXTERNAL MARKS

The viva voce marks of the project will be given on the basis of viva conducted.

1. **Demonstration & performing of Experiment (10 Marks)**
2. **Viva-voce (10 Marks)**

Parameters	Criteria	Assessment
<b>Demonstration &amp; performing of Experiment (10 Marks)</b>	Full demonstrated & performed the experiment with knowledge of theory, objectives, application and also suggest new ideas.	<b>10 - 7 marks</b>
	Fair understanding and demonstration of experiment with partial knowledge of concept & objective.	<b>6 - 4 marks</b>
	Demonstrates to some extent, not performed the experiment properly and little understanding of objective.	<b>0 - 3 marks</b>
<b>Viva-voce (10 Marks)</b>	Give complete and logical reply to the questions asked by examiner & Attire is appropriate.	<b>10 - 7 marks</b>
	Give logical reply to the questions asked by examiner with few errors & attire is appropriate.	<b>6 - 4 marks</b>
	Give very few and vague answers to the questions asked by examiner & not proper attire.	<b>0 - 3 marks</b>

## Vocational Training Rubrics: B.Tech

**Total Marks = 100 Marks**

- **Internal Marks =50**

The marks will be given on the basis of review conducted for the work done to prepare training report.

- **External Marks= 50**

The marks will be given on the basis of viva conducted in presence of external member & guide related to training report prepared.

### INTERNAL MARKS

The marks will be given on the basis contents in the training report.

1. **Front Pages of Report (10 Marks)**
2. **Introductory Data of Mine (10 Marks)**
3. **Technical Data of Mine (20 Marks)**
4. **Conclusion (10 Marks)**

PARAMETERS	Contents	Review Assessment (Maximum Marks)	Weightage
Front Pages of Report	• Title page, Certificate page, acknowledgment page & experience certificate	10	20%
Introductory Data of Mine	• Introduction of mine, Geology, Access method, Location of Mines & Mining Method	10	20%
Technical Data of Mine	• Transportation method, Machinery used, Explosive, Blasting method, Safety Equipment, Pumping system, Support system & power system.	20	40%
Conclusion	• Manpower, Productivity & Conclusion	10	20%
TOTAL REVIEW MARKS		50	

## RUBRIC OF INTERNAL MARKS

S.No	Parameter	Level of Achievement	Marks
1	Front Pages of Report (10 marks)	Title page, certificate page & acknowledgment of training report are properly aligned and extensive explanation of the purpose and need of the project.	10-6
		Title page, certificate page & acknowledgment of training report are aligned but not exactly.	5-3
		Not appropriate pattern of title page, certificate page & acknowledgment of training report.	2-0
2	Introductory Data of Mine (10 marks)	All introduction data of mine including location, method, geology were clearly specified in the report.	10-6
		The introduction data of mine including location, method, geology were mentioned but to some extent.	5-3
		Insufficient introductory data of mine in the report.	2-0
3	Technical Data of Mine (20 marks)	All the technical data from machinery to transportation system is detailed in the training report with suitable figure.	10-6
		The technical data of mine is specified in the training report but not in details & figure missing.	5-3
		Some technical data of mine is not specified in the training report & figure missing.	2-0
4	Conclusion (10 marks)	Production, Productivity & conclusion are clearly detailed in appropriate format.	10-6
		Production, Productivity & conclusion are mentioned in the report but not in proper format.	5-3
		All details are not mentioned in conclusion.	2-0

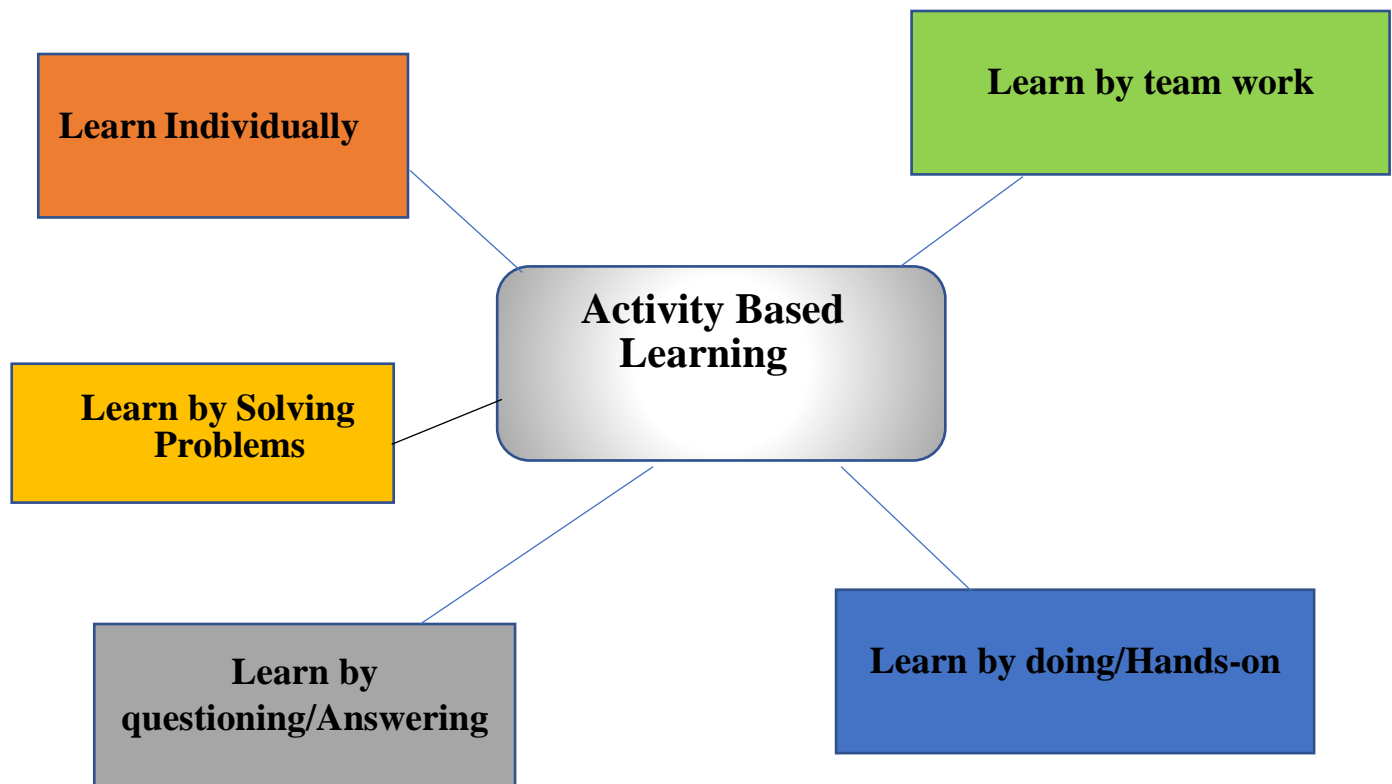
## RUBRICS FOR EXTERNAL MARKS

The viva voce marks of the training report of mine will be given on the basis of viva conducted in presence of external member & guide.

1. Knowledge of Mine (20 Marks)
2. Training Report (20 Marks)
3. Viva-voce (10 Marks)

Parameters	Criteria	Assessment
<b>Knowledge of Mine (20 Marks)</b>	Complete technical knowledge of mine with appropriate demonstration of mining method & equipments used.	<b>20 - 14 marks</b>
	Fair understanding of mine with some demonstration of mining method & equipments used.	<b>8 - 14 marks</b>
	Partial or incomplete understanding and demonstration of mining method & equipments used in mine.	<b>0 - 8 marks</b>
<b>Training Report (20 Marks)</b>	Information in training report is in prescribed sequence with figures, conclusion title page & certificate page. The report is complete and in proper format.	<b>20 - 14 marks</b>
	Information in report is in sequence with figures, conclusion title page & certificate page. The report is partially complete and in proper format.	<b>8 - 14 marks</b>
	Less technical information of mine is provided in the report. The report is incomplete and not in proper format.	<b>0 - 8 marks</b>
<b>Viva-voce (10 Marks)</b>	Give complete and proper technical reply to the questions asked by examiner & crisp to-the-point answers & Attire is appropriate.	<b>20 - 14 marks</b>
	Give incomplete reply to the questions asked by examiner & attire is proper.	<b>8 - 14 marks</b>
	Give very few and vague answers to the questions asked by examiner & not proper attire.	<b>0 - 8 marks</b>

## Activity Based Learning



## List of Assessment Tools

All (Direct + Indirect) CO Assessment Tools = PO Direct Assessment Tools

### Sample CO Assessment Tools

- Mid Term Test/Sessional
  - End Term Test
  - Quiz
  - Assignment
  - Practical/ Lab work
  - Industrial Visit, Workshop
  - Other Task/Activity
  - End Semester Exam
  - Oral
  - Course Exit Survey
- 
- External Feedback (External Examiner/Trainer, Campus Placement Technical Expert)

**Direct Tools:** (Measurable in terms of marks and w.r.t. CO) Assessment done by faculty at Institute level

**Indirect Tools:** (Non measurable in terms of marks and w.r.t. CO) Assessment done at University level.

### Assessment Pattern

#### CIA- Continuous Internal Assessment (30 Marks)

Assessment Parameters	Assessment Tools	Marks	Percentage (%)	Bloom's Taxonomy Category	Bloom's Taxonomy Level LOT/HOT
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Assignment 1	Assignment consisting of minimum 5 Questions	10	20	Remember, Understand, Apply	LOT
Assignment 2	Assignment consisting of minimum 2 Questions	10	20	Analyze, Evaluate, Create	HOT
<b>Teacher Assessment/ Class Participation</b>					
Teacher Assessment 1	Quiz, Case Studies, Presentations, Group Discussion, Lab work, Project or any other activity	10	20	Remember, Understand, Apply	LOT
Teacher Assessment 2	Quiz, Case Studies, Presentations, Group Discussion, Lab work, Project or any other activity	10	20	Analyze, Evaluate, Create	HOT
Class Participation	Brainstorming, Discussion, Attendance, Extempore or any other activity	10	20		

**ESE- End Semester Examination (70 Marks)**

<b>Bloom's Taxonomy Category</b>	<b>ESE Question Paper Section</b>	<b>Percentage (%)</b>	<b>Bloom's Taxonomy Level LOT/HOT</b>
Remember	A	30	LOT
Understand	A		
Apply	B	40	LOT/ HOT
Analyze	B		
Evaluate & Create	C	30	HOT

## **CO & PO Attainment Calculation:**

### **I. Marks Distribution for both CIA & ESE**

Sample academic regulations

Semester End Exam	Assignment I/Mid Sem	Assignment II	Teacher Assessment
70	10	10	10

### **II. Mapping of Course Outcomes and Program Outcomes:**

Sample CO-PO Mapping

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
CO 1	1				3							
CO 2			2		3							
CO 3		2	2									
CO 4					3							1

(Level of Correlation: 3-High, 2-Medium, 1-Low)

### Sample correlation of Blooms Taxonomy level with Assessment Tools

Course Outcome (CO)	Program Outcome (PO)	Bloom's Taxonomy Level	Assessing Tools can be used to measure CO	Contact Hour Total 36 Hours	Level of Correlation
CO1	PO 1	Understand	Assignment 1, ESE	08 hours	Low [1]
	PO 5	Understand, Analyze	Assignment 1, Assessment 1, Brainstorming		Medium [2]
CO2	PO 3	Understand	Assignment 2 ESE, Assessment 3	11 Hours	Medium [2]
	PO 5	Understand, Analyze	Assignment 2 Assessment 1, Assessment 3, ESE		High [3]
CO3	PO 2	Understand, Apply	Assessment 2, Assignment 2, ESE	08 Hours	Medium [2]
	PO3	Understand	Assessment 2, ESE, Assignment 2		Medium [2]
CO4	PO5	Understand, Analyze	Assignment 2, Assessment 4, ESE, QUIZ	09 Hours	High (3)
	PO12	Analyze	Assessment 4, ESE		Low [1]

### III. Develop list of Assessment Tools for each course outcomes

#### Sample Mapping of Assessment Tools & Course Outcomes

Course Outcome	Assessment Tool
CO1	Final exam, Assignment, quiz, midterm, test, Lab assignment, Lab quiz, lab performance
CO2	Final exam, Assignment, quiz, midterm, test, brainstorming, Lab assignment, Lab quiz, lab performance
CO3	Final exam, Assignment, test, quiz, midterm, Lab assignment, lab end exam, Lab quiz, lab performance, end sem practical
CO4	Final exam, Assignment, quiz, midterm, test, Lab assignment, Lab quiz, lab performance

## Distribution of questions of Continuous Internal Assessment & Semester End Examination as per CO

Course outcome	Assignment					Test			Mid term		End sem exam	quiz	GD/ Seminar/ Brainstorming/ class performance/ Project	end sessional	Lab quiz	lab assignment	Lab performance
	A1	A2	A3	A4	A5	T1	T2	T3	MT1	MT2							
CO1	q1, q2, q3, q4					q1, q2				q8	q1, q2(a)	q6, q7, q10, q11			V1, v2	PA1, PA2	P1, P2
CO2		q1, q2		q2, q3					q3, q7		q3	q13	1		V3	PA3	P3
CO3			q1, q2, q3, q4	q3, q4			q1, q2		q1, q2, q4, q5, q6		q4, q5	q1, q2, q3, q4, q5		1	V3, V5, V6	PA4, PA5, PA6	P4, P5, P6
CO4				q1, q4						q1, q2	q6	q7, q8, q9			V7, V8	PA7, PA8	P7, P8
CO5					q1, q2, q3, q4			q1, q2		q3, q4, q5, q6	q7, q8	q15, q16, q17, q18, q19, q20			V9, V10	PA9, PA10	P9, P10

### IV. Define threshold value for Attainment:

Threshold % for attainment	50
Degree of Attainment	
$3 \geq 70\%$	High
$2 \geq 60\%$	Med
$1 \geq 50\%$	Low

## Sample calculation of OBE Attainment

### Part: A Continuous Internal Assessment (CIA)

Assignment 1 is from CO 1

SL.NO.	ROLL NO	Status (Present/Absent)	Marks Obtained in Assignment 1	Marks in Percentage	Degree of Correlation
1	1001	PRESENT	8.00	80.00	3.00
2	1002	PRESENT	9.00	90.00	3.00
3	1003	PRESENT	9.00	90.00	3.00
4	1004	PRESENT	9.00	90.00	3.00
5	1005	PRESENT	9.00	90.00	3.00
6	1006	PRESENT	8.50	85.00	3.00
7	1007	PRESENT	9.00	90.00	3.00
8	1008	PRESENT	8.50	85.00	3.00
9	1009	PRESENT	8.00	80.00	3.00
10	1010	PRESENT	7.50	75.00	3.00
AVERAGE OF DEGREE					3.00

#### Student Wise Continuous Internal Assessment (CIA) - CO ATTAINMENT

SL.NO.	ROLL NO	Status (Present/Absent)	CO1	CO2	CO3	CO4	AVG
1	1001	PRESENT	3.00	3.00	3.00	3.00	3.00
2	1002	PRESENT	3.00	3.00	3.00	3.00	3.00
3	1003	PRESENT	3.00	3.00	3.00	3.00	3.00
4	1004	PRESENT	3.00	3.00	3.00	3.00	3.00
5	1005	PRESENT	3.00	3.00	3.00	3.00	3.00
6	1006	PRESENT	3.00	3.00	3.00	3.00	3.00
7	1007	PRESENT	3.00	3.00	3.00	3.00	3.00
8	1008	PRESENT	3.00	3.00	3.00	3.00	3.00
9	1009	PRESENT	3.00	3.00	3.00	3.00	3.00
10	1010	PRESENT	3.00	3.00	3.00	3.00	3.00
			3.00	3.00	3.00	3.00	3.00

#### CO INTERNAL ATTAINMENT

##### CO AVERAGE CORRELATION

CO1	3.00
CO2	3.00
CO3	3.00
CO4	3.00

**PO attainment Formula** = [Deg of Correlation of mapped PO -CO \* Avg. Deg of Correlation of mapped CO] / [Deg of Correlation of mapped PO -CO]

PO Attainment: Continuous Internal Assessment	
PO1	3.00
PO2	3.00
PO3	3.00
PO5	3.00
PO12	3.00

**Part: B End Semester Examination (ESE)**  
**Question No. 2 & Question No. 4 is from CO 1**

SL.NO.	ROLL NO	Status (Present/Absent)	Marks Obtained in Question No 2	Marks in Percentage	Degree of Correlation	Marks Obtained in Question No 4	Marks in Percentage	Degree of Correlation	AVG
1	1001	PRESENT	8	80.00	3.00				3.00
2	1002	PRESENT	8	80.00	3.00				3.00
3	1003	PRESENT							
4	1004	PRESENT							
5	1005	PRESENT							
6	1006	PRESENT							
7	1007	PRESENT							
8	1008	PRESENT				7	70.00	3.00	3.00
9	1009	PRESENT	6	60.00	2.00				2.00
10	1010	PRESENT	7	70.00	3.00	6	60.00	2.00	2.50
Average Degree for Q.No 02					2.75	Average Degree for Q.No 04		2.50	2.70

Student Wise End Semester Examination (ESE) CO Attainment							
SL.NO.	ROLL NO	Status (Present/Absent)	CO1	CO2	CO3	CO4	Average
1	1001	PRESENT	3.00	2.50		3.00	2.83
2	1002	PRESENT	3.00	3.00	3.00	3.00	3.00
3	1003	PRESENT		3.00	3.00	3.00	3.00
4	1004	PRESENT		3.00	3.00	3.00	3.00
5	1005	PRESENT		3.00	3.00	3.00	3.00
6	1006	PRESENT		3.00	3.00	3.00	3.00
7	1007	PRESENT		3.00	3.00	3.00	3.00
8	1008	PRESENT	3.00	3.00	2.50	3.00	2.88
9	1009	PRESENT	2.00	1.50	0.00	1.00	1.13
10	1010	PRESENT	2.50	2.50	0.00		1.67
			2.70	2.75	2.28	2.78	2.65

Attainment CO: End Semester Examination (ESE)	
COURSE OUTCOME AVERAGE CORRELATION	
CO1	2.70
CO2	2.75
CO3	2.28
CO4	2.78

Attainment PO: End Semester Examination (ESE)	
PO1	2.70
PO2	2.28
PO3	2.51
PO5	2.74
PO12	2.78

### Part: C CO-PO Attainment

CO - PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3							
CO2			2		3							
CO3		2	2									
CO4					3							1
Wt Avg	1	2	2		3							1
Overall Mapping of Subject											1.8	

	Overall CO Attainment			
	CO1	CO2	CO3	CO4
CIA	3.00	3.00	3.00	3.00
Weightage (50%)	1.50	1.50	1.50	1.50
End Sem	2.70	2.75	2.28	2.78
Weightage (50%)	1.35	1.37	1.14	1.39
Final Attainment	2.85	2.87	2.64	2.89

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Attn (CO/3)
CO1	0.95				2.85								0.95
CO2			1.89		2.83								0.94
CO3		1.74	1.74										0.87
CO4					2.69							0.90	0.90
Wt Avg	0.95	1.74	1.81		2.79							0.90	
Overall Attainment of Course												1.64	

### PO Attainment

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
2.85	2.64	2.75		2.87							2.89

### Overall Attainment (ESE & CIA) of course

Total % attainment of course	90.87
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## Continuous Improvement

### I. Contribution of CO in PO attainment and Continuous Improvement (Faculty Level)

Outcome	Action to be taken by faculty
High attainment of all CO-PO (>2.5 out of 3)	Set new higher targets or attainment levels for next Academic Year (A.Y.).
Moderate attainment of all CO-PO (1.8 to 2.49 out of 3)	Record observations, Continue action plan of last A.Y. with plan for improvements.
Low attainment of all CO-PO (0.9 to 1.79 out of 3)	Record observations, assess the target set, revise/improve action plan of last A.Y. to achieve the attainment with plan for improvements.
CO-PO not attained, poor performance (<0.9 out of 3)	Record observations, Critical assessment of target with Program Assessment Committee (PAC), Revise action plan of last A.Y. at faculty/department level.

### II. PO attainment and Continuous Improvement (PC and HoD Level)

Category	Outcome	Action by PO and HoD
Course Related	PO attained highly	Include activities with HOT.
	PO not attained highly	Identify concerned courses, plan for immediate improvements, guide, support and monitor its execution.
Activity Related	Activities Conducted	Critical assessment, impact analysis to be done and revise as per the need for improvements.