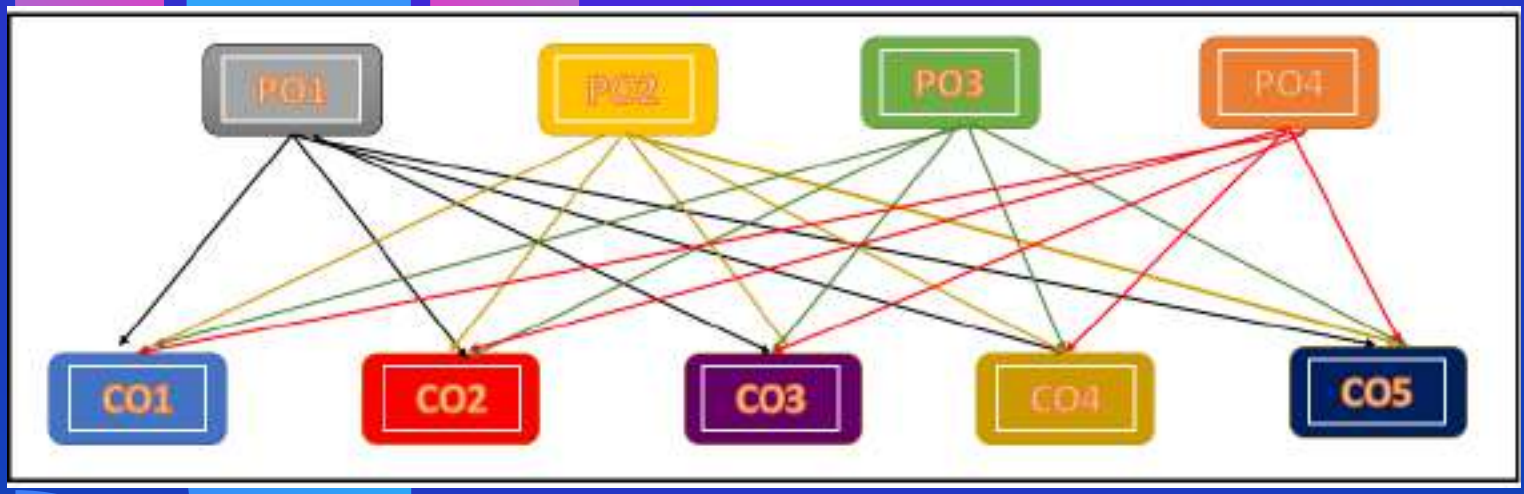
GOVT. HOLKAR (MODEL, AUTONOMOUS)
SCIENCE COLLEGE, INDORE

Outcome Based Education Manual

SURESH T SILAWAT

Digitally signed by SURESH T SILAWAT
Date: 2023.07.28 14:54:11 +05'30'



Prepared by:
Internal Quality Assurance Cell

Quality Manual

Outcome Based Education

Content

PREFACE

A type of instruction that places a strong emphasis on the student and measures student success by results is called outcome-based education. Knowledge, skills, and attitudes are examples of outcomes. The program's results are still being evaluated, with an emphasis on knowledge, ability, and conduct. OBE, or outcome-based education, offers a potent and alluring method of regulating and improving education. The educational objectives are clearly stated in OBE. It establishes the structure and substance of the curriculum, the courses that are given, the teaching techniques and tactics, and the evaluation procedures.

Outcome based education should have a broader perspective of grooming students as good citizens and strengthening democracy. And this would come only with the cooperation of all teachers when they played an active role. OBE is moving from teacher centric learning to learner centric learning. The teacher and learner both need to be engaged. The teacher has to be an active agency of teaching, which has to deeply engage the learner by allowing space for questions, arguments and making the teaching-learning process lively. Our graduates should have a combination of different kinds of knowledge, skills, and attitudes. In OBE, the emphasis is shifting from teacher-centered learning to learner-centered learning. Both the instructor and the student must be actively involved.

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.

Vision and Mission of the Institute

Vision:

To make our youth the torch-bearer of knowledge, and to continue the rich legacy of imparting scientific education and groom them on an intellectual, social and humane platform.

Mission:

- To create an innovative ecosystem for the promotion of scientific temperament.
- To enrich the academics with state-of-art technology and innovation at par with the global standards.
- To impart Skill-based training relevant to local and global needs.
- To develop a well-groomed and empowered youth.
- To nurture a socially responsible and value-driven generation.

OBE PROCESS AND FRAMEWORK

There are two levels of outcomes are considered in OBE Processes such as Course Outcomes (CO), Programme Specific Outcomes &, Program Outcomes (PO).

Course Outcomes (COs):

Course Outcome is a statement that describes what students are expected to know and be able to perform or attain upon completion of a course. Each CO contributes to the achievement of PO via curriculum design, course delivery, and assessment tasks that are most appropriate to attain that CO.

Programme Specific Outcomes (PSOs):

Programme specific outcomes are what the students of a specific programme should be able to do at the time of studying in the programme.

Programme Outcomes (POs):

Programme outcomes are one step broader statements that describe what students are expected to know and be able to do upon the completion of a specific program. These relate to the skills, knowledge and behavior that students acquire.

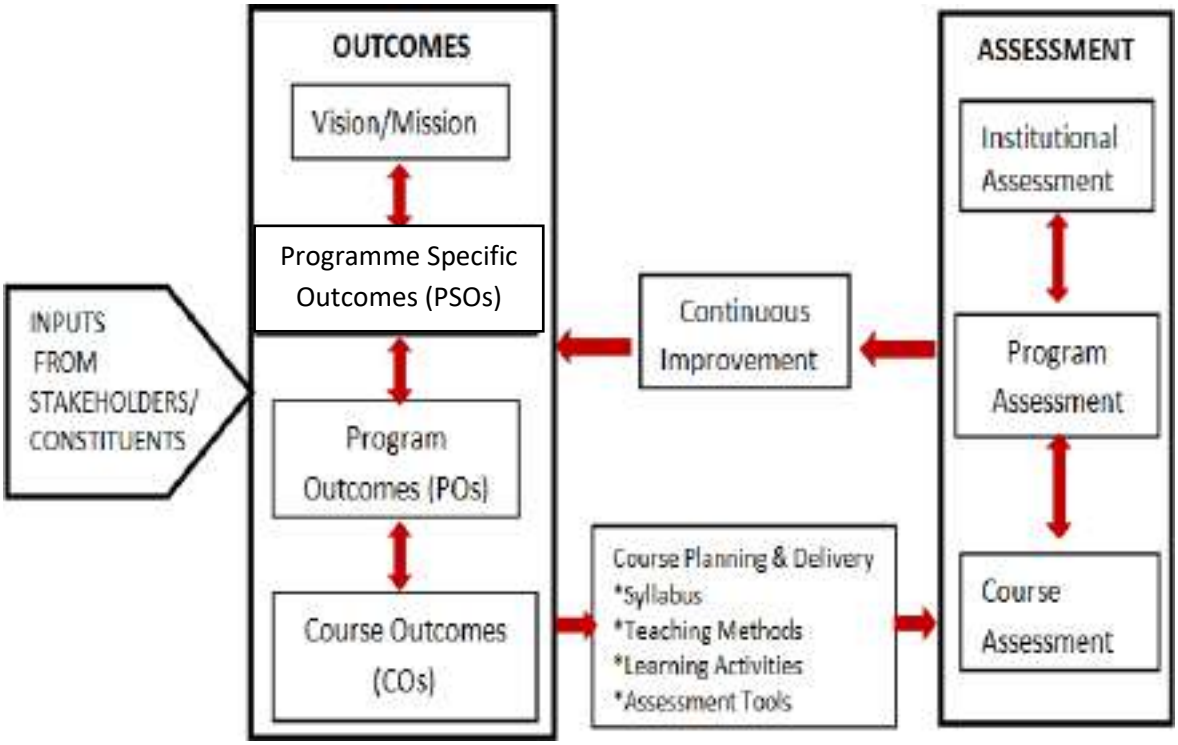


Figure 1: OBE Framework

OBE Addresses the Following:

- How to align outcomes with the syllabus? – **OBC(Curriculum)**
- How to make the students to achieve the outcomes? – **OBLT (Learning and Teaching)**
- How to measure the students' success? – **OBA (Assessment**)

❖ Outcome Based Curriculum:

Outcome-based education approaches the curriculum decision-making based on the competencies students should demonstrate at the end of their educational program, thus the outcomes or skills dictate the curriculum content and organization, the teaching methods and strategies, the course offered, the educational environment and the assessment strategies. All curriculum and teaching decisions are made based on how best to facilitate the desired final outcome.

Steps for planning and implementing outcome-based curriculum:

- **Deciding on the outcomes:** The educational outcomes are clearly identified and unambiguously specified regardingthe content, context and competence.
- **Demonstrating outcomes:** The expected outcome should be defined by setting benchmarks for each level of the program. Each benchmark is a skill that must be demonstrated by the student. Benchmarks should tackle and define specifically the goals of the curriculum and verifyways to assess whether students have reached these goals at that level of study.
- **Deciding on content and teaching strategies:** OBE can be implemented as whole class models which aim to bring all learners in aclassroom up to high levels of learning before proceeding further or by the Flexible models which use flexible grouping, continuous progress, technological approaches and instructional management.
- **Assessments in OBE:** OBE is driven by assessments that focus on well-defined learning outcomes and not by other factors such as what is taught, the duration taken by the 10 students to achievethe outcomes, or which path the students take to achieve their targets.

The outcome-based curriculum is based on the following levels:

1. **Institution Level**
   - Vision and Mission of the Institution
   - Framework of Curriculum
2. **Programme Level**
   - POs, PSOs
   - Course Outcome (COs)
   - Content Delivery (Theory, Practical, Project, Assignment, Tutorial etc.)

➢ OUTCOME BASED LEARNING AND TEACHING

Outcome-based Teaching and Learning (OBTL) is a student-centered education approachwhere the programmes intended learning outcomes are explicitly defined for students to achieve. Teaching and learning activities are then carefully designed to facilitate students to achieve these outcomes. The success of OBTL is based on pieces of evidence from the assessment results and student learning experience. Periodic reviews of this evidence will lead to continuous improvement of program quality.

The Outcome-based Teaching and learning approach focus on:

- The alignment of the desired graduate attributes, program-intended learning outcomes, and module-intended learning outcomes.
- The development of teaching and learning activities in enhancing studentlearning experiences.
- The design of assessment processes to monitor students' learning progress andthe achievement of the desired outcomes and attributes.
- The collection of stakeholders' feedback for continuous improvement.

Delivery of an Outcome Based Curriculum to the students by providing the:

- Syllabus
- Course Plan
- Lecture Notes
- Learning Styles

➢ OUTCOME BASED ASSESSMENT

Assessment is one or more processes which is carried out by the institution, that identify, collectand prepare data to evaluate the achievement of course outcomes and program outcomes.

Attainment is the action of achieving a standard result towards accomplishment of desired goals. Primarily attainment is the standard of academic attainment as observed by test and examination result.

Two types of CO assessment methods are employed in Outcome Based Assessment:

- **Direct Assessment**
- **Indirect Assessment**

The direct methods **(Mark based Assessments)** display the student's knowledge and skills from their performance in the continuous internal assessment tests, semester examinations and supporting activities such as seminars, assignments, case studies, group discussions, online quizzes, mini project etc. These methods provide a sampling of what students know and can do and provide strong evidence of student learning.

The indirect method **(Survey based Assessments)** done through surveys. it asks the stakeholders to reflect on their views students's learning. The institute assesses opinions on thoughts about graduate's knowledge or skills by different stakeholders.

GRADUATE ATTRIBUTES (GAs)

On the successful completion of the programme, the following are the Graduate Attributes.

- **Domain Knowledge**: Apply the knowledge in the relevant areas of arts, science and Management fields.
- **Problem Analysis:** Identify and analyze the complex problems using the knowledge acquired in various domains.
- **Design/Development of solutions:** Define solutions for complex problems with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Conduct investigations of complex problems:** Develop competency to carry out the research with their ability to design and execute the experiment.
- **Society and ethics:** Apply contextual knowledge for societal welfare and commit to professional ethics.
- **Environment and sustainability:** Understand the Environmental factors and focus towards sustainable development.
- **Project management and team work:** Demonstrate knowledge and understanding the principles of Project management in various domains to lead effectively and work as team
- **Communication:** Demonstrate the effective communication skills for interaction with personnel as well as presentation in appropriate forums.
- **Inculcate innovative thinking:** To identify the sources of business opportunity and develop entrepreneurial skills for entrepreneurship development.
- **Lifelong learning:** Recognize the needs to engage in lifelong learning with moral values.

PROCESS TO DEPICT, POs AND COs OF THE DEPARTMENT

The process steps followed for establishing the Vision, Mission, PEOs, POs and Cos for Programme are illustrated in the flow chart:

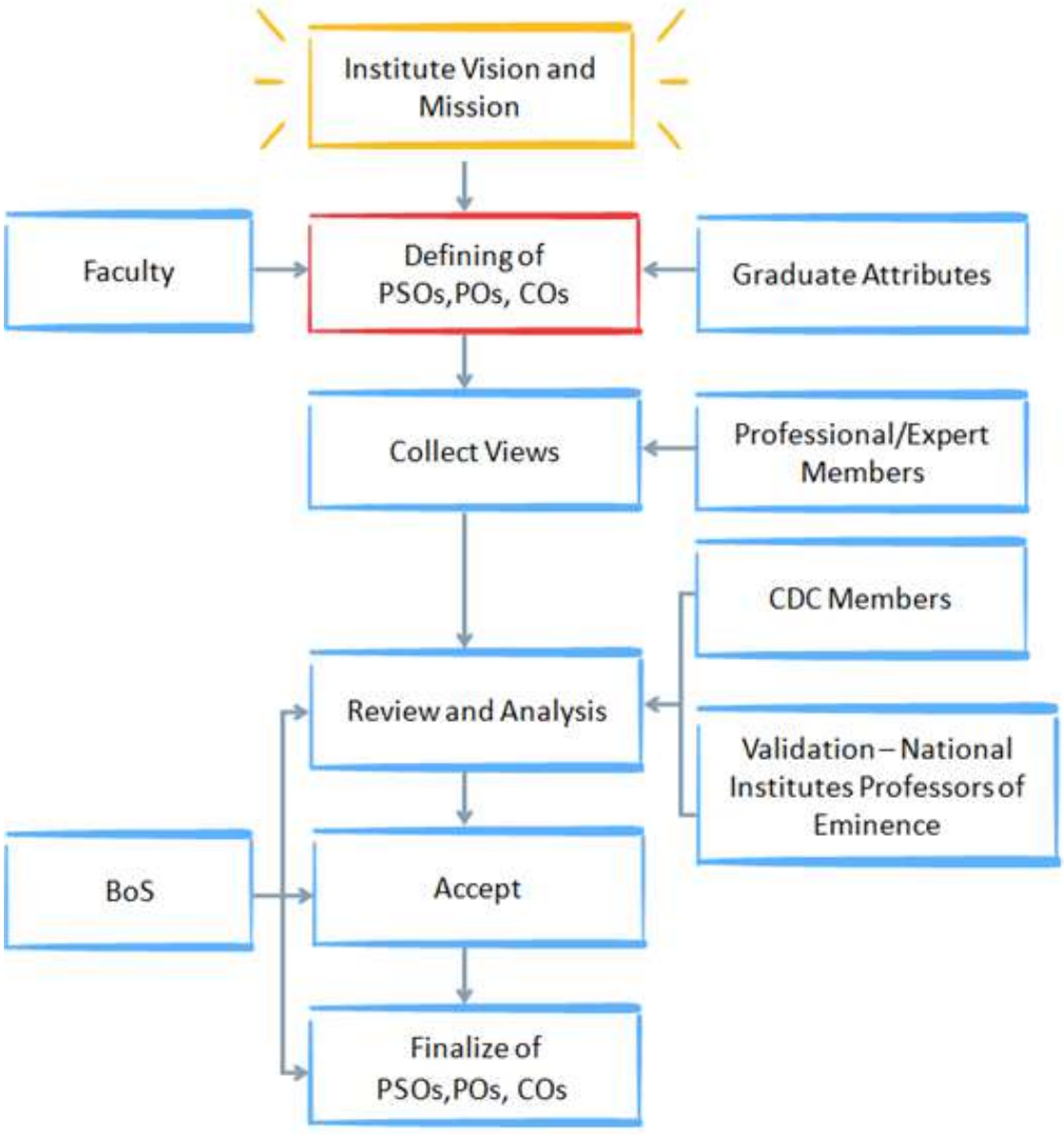


Figure 2

BLOOM'S KNOWLEDGE LEVELS & ACTION VERBS

Action Verbs to be used for different knowledge level while framing the question paper:

Knowledge level		Action Verbs
K1	**Remembering**	Choose • Define • Find • How • Label • List • Match • Name •Omit • Recall • Relate • Select• Show • Tell • What • When •Where • Which • Who • Why
K2	**Understanding**	Classify • Compare • Contrast • Demonstrate • Explain Extend • Illustrate • Infer •Interpret • Outline • Relate Rephrase • Show • Summarize • Translate • Journalize
K3	**Applying**	Apply • Build • Choose • Construct • Develop Experiment with • Identify • Make use of • Model Organize • Plan • Select • Solve • Utilize •Prepare
K4	**Analyzing**	Analyze • Assume • Categorize • Classify • Compare Conclusion • Contrast • Discover •Dissect • Distinguish Divide • Examine • Function • Inference • Inspect • List • Motive •Relationships • Simplify • Survey • Take part in • Test for • Theme •Journalize
K5	**Evaluating**	Agree • Appraise • Assess • Award • Choose • Compare Conclude • Criteria • Criticize •Decide • Deduct • Defend Determine • Disprove • Estimate • Evaluate • Explain Importance • Influence • Interpret • Judge • Justify • Mark Measure • Opinion • Perceive • Prioritize • Prove • Rate Recommend • Rule on • Select • Support • Solve •Value Journalize •Prepare • Solve
K6	**Creating**	Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create •Delete • Design • Develop Discuss • Elaborate • Estimate • Formulate • Happen Imagine •Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan •Predict • Propose • Solution • Solve • Suppose • Test • Theory

LEVELS IN QUESTION PAPER

Question paper pattern for UG Courses:

Section	Knowledge level
Section A	K1 level only
Section B	K 1 & K2 level
Section C	K 2 & K3 level

Mark Allotted 60	Pattern
05*01=05 marks	Section A: 05 MCQ Questions each Question carry one mark
05*05=25 marks	Section B: 05 Short Question each question carries 05 marks
02*15= 30 Marks	Section C: 02 Long question each question carries 15 marks

Question paper pattern for PG Courses End Semester Pattern

Section	Knowledge Level
No section internal choice	**K1 to k6**

ASSESSMENT OF PROGRAMME OUTCOMES

Assessment of POs is done in two different methods as given in table.

Assessment Type	Weightage (%)	Tool
Direct	80%	Assignment, Seminar, Unit Test, CCE, ESE, Written Exam
Indirect	20%	Course End Survey, Stakeholder feedback, Program Exit Survey, Alumni Survey

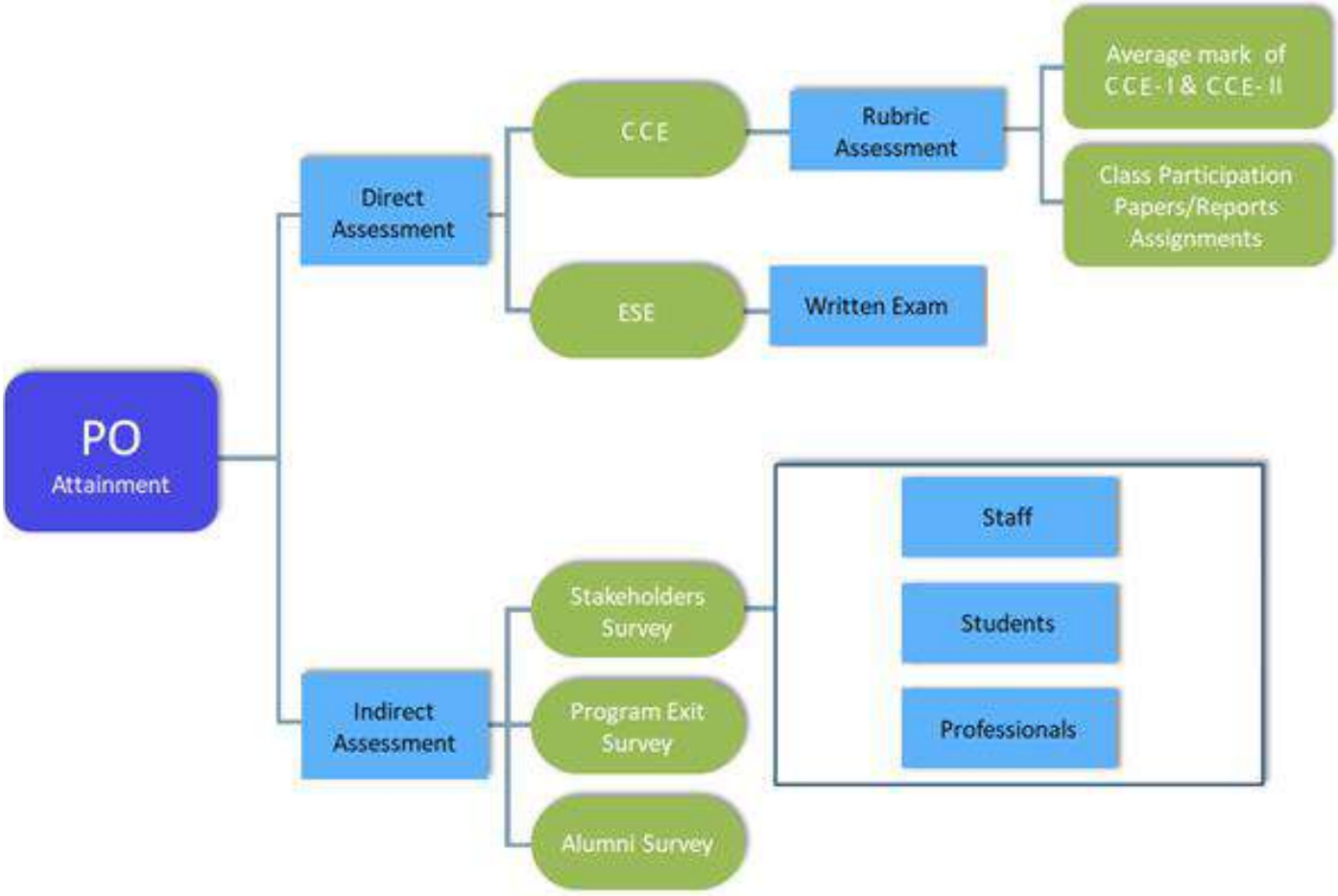


Figure 3: Assessment Process

CO - PO ASSESSMENT TOOLS

The various direct and indirect assessment tools used to evaluate COs & POs and thefrequency with which the assessment processes are carried out are detailed in Table.

Direct Assessment Tools Used for the Evaluation of CO and PO Assessment:

<table>
<tr><th colspan="6">CO and PO ASSESSMENT TOOLS</th></tr>
<tr><td rowspan="12">Direct (80% Weightage)</td><td rowspan="12">CO Assessment</td><td>Course Type</td><td colspan="2">Assessment Tools</td><td>Minimum Frequency</td></tr>
<tr><td rowspan="4">Theory</td><td>Regular Class Evaluation</td><td>Class Test,Group Discussion, MCQ</td><td>Minimum of four</td></tr>
<tr><td rowspan="2">Internal Evaluation</td><td>Best of Two Mark of CCE-I, CCE - II, & CCE-III</td><td>CCE Three per course</td></tr>
<tr><td>Seminar/ Assignments</td><td>One per course</td></tr>
<tr><td colspan="2">End Semester Exam</td><td>One per course</td></tr>
<tr><td rowspan="3">Practical</td><td rowspan="2">Internal Evaluation</td><td>During Practical Days</td><td>Every practical Class</td></tr>
<tr><td>Model PracticalExam</td><td>One per course</td></tr>
<tr><td colspan="2">End Semester Exam</td><td>One per course</td></tr>
<tr><td rowspan="2">Project</td><td colspan="2">Internal Evaluation - Reviews</td><td>Twice per program</td></tr>
<tr><td colspan="2">End Semester Viva- Voce</td><td>One per program</td></tr>
<tr><td>Internship Program/ Industrial Training</td><td colspan="2">End Semester Viva</td><td>One per program</td></tr>
<tr><td>Lab on Project</td><td colspan="2">Group Project</td><td>One per program</td></tr>
</table>

RECOMMENDATIONS BY PO CO COMMITTEE

The attainment of the Programme Outcome is a combined with the outcome of two components, the direct and indirect method of assessment. In most cases, the direct method is given more weightage (about 80%) and the indirect methods (about 20%) are given less weightage. The indirect method involves the 'Exit Survey' filled by the students. The survey may contain questions that are directly related to the Programme Outcomes. In direct method the attainment of the course outcomes, which are already mapped with the Programme Outcomes are cumulated and the average is calculated which in turn contributes to the calculation of the attainment of the Programme Outcome. This may alternatively be simplifiedby earmarking a few courses as culminating courses and the others as enabling courses.

The attainment of the course outcome of the culminating courses alone can be considered as direct component for the calculation of the Programme Outcome. But this requires a detailed mapping of the questions to the course outcomes. Only with a detailed mapping of the questions to the course outcomes and knowledge level, it may not be possible to calculate the attainment of the Programme Outcome effectively using the direct method. Since the implementation of Outcome-based Education is in a rudimentary stage, it is recommended to consider both direct and the indirect methods (Exit Survey) to calculate the attainment of the Programme Outcome. Further, it is recommended that the process of micro- level mapping of the questions with the course outcomes, calculation of attainment of the course outcomes and classification of culminating courses shall be done in the forthcoming academic year i.e. 2022 – 2023.

CO – PO ATTAINMENT METHODOLOGY

Attainment of course outcomes for each course was calculated based on the following assessment process:

STEP 1:

The course outcomes for each course are mentioned in the syllabi of the program. Whichever Course Outcomes are formed, it is necessary that they follow below-given guidelines

1. Follows Bloom's taxonomy.
2. Reflects on the whole syllabus prescribed by the Institute for each course.
3. There should be four to five COs in each course. As rule of thumb, a 4-credit course for 90 days should have around 5-course outcomes

Step 2:

Considering the percentage of marks (related to each COs) asked in the external exam and internal exam, the average weightage percent of each CO was calculated as an average of external/internal exams for further calculation of direct attainment.

Step 3:

The weightage of external and internal examination marks was distributed based on total marks as per the curriculum. The class average in respective (External and Internal) examinations was used for further calculation of CO attainment

Step 4:

The criteria to determine the final attainment level for each COs were considered as follow:

The formula for calculating the course attainment level:

Course attainment level = 80% of attainment level is the end exam +20 % of the attainment level in the internal assessment:

Level 1: 50% of the student scored more than the class average
Level 2: 60% of the student scored more than the class average
Level 3: 70% of the student scored more than the class average

Programme Outcome Attainment (Direct method)

The direct method means the odd semester and even semester examination and internal assessment together.

PO attainment is measured as the average percentage of marks obtained by all the students across all the courses of the programme that are mapped to a particular PO.

Steps to calculate programme outcomes:

Step 1:

Construction of COs POs Matrix The mapping of Course Outcomes with POs gives us information about how many COs are linked with a particular PO.

Step 2:

Setting of targets level, it is required to define the target attainment level for each POs.

Target level set by the institute based on last three-year data are as follows:
Level-1: Greater than 0.5 and less than or equal to 1.0
Level-2: Greater than 1.0 and less than or equal to 1.5
Level-3: Greater than 1.5 and less than or equal to 2.0
Level-4: Greater than 2.0 and less than or equal to 2.5
Level-5: Greater than 2.5 and less than or equal to 3.0

After calculating the actual attainment level, it is compared with the target level, which means the programme attainment is fully attained, and if not, it requires the corrective measure match to the target level.

Continuous Improvement

Action Taken Report (ATR)

Actions taken based on the results of evaluation of each of the POs

Faculty		**Department**	
Batch		**Academic Year**	

POs	Target Level	ainmentLevel	Observations
PO1	**3**	**2.9**	**PO Attained**
PO1: Actions/Suggestions:			
PO2	**3**	**2.8**	**PO Attained**
PO2: Actions/Suggestions:			
PO3	**3**	**2.5**	**PO Attained**
PO3: Actions/Suggestions:			
PO4	**3**	**2.7**	**PO Attained**
PO4: Actions/Suggestions:			
PO5	**3**	**2.7**	**PO Attained**
PO5: Actions/Suggestions:			

COURSE END SURVEY

SAMPLE:

Degree & Branch		**Regulation**	
Course Name		**Course Code**	
Course Instructor		**Semester &Class**	
Designation		**Academic Year**	

Course Outcome:

CO1: Understand basics of PHP

CO2: Learn functions and objects in PHP.

CO3: Understand working with MySQL database using PHP.

CO4: Learn fundamental concepts of Python language

CO5: Remember the core functions and techniques used in Python

Rate the understanding level of the following (Tick the appropriate box)

S. No	CO	Questions	Excellent(4)	Good(3)	Moderate(2)	Fair(1)
1	CO1.1					
2	CO1.2					
3	CO2.1					
4	CO2.2					
5	CO3.1					
6	CO3.2					
7	CO4.1					
8	CO4.2					
9	CO5.1					
10	CO5.2					
Any other feedback/Suggestions						

CO1.1	CO1.2	CO2.1	CO2.2	CO3.1	CO3.2	CO4.1	CO4.2	CO5.1	CO5.2
CO1Average:		**CO2Average:**		**CO3Average:**		**CO4 Average:**		**CO5Average:**	

Date: **Name of Student** **Signature of the Student**

COURSE END SURVEY (INDIRECT ANALYSIS):

Degree & Branch		**Regulation**	
Course Name		**Course Code**	
Course Instructor		**Semester &Class**	
Designation		**Academic Year**	

S. No.	Register No	Name	CO1	CO2	CO3	CO4	CO5
SUM							
AVERAGE							
PERCENTAGE OF COURSE OUTCOME							

Course Instructor Signature **HOD**

Note:

- **SUM = Total marks given by all students for CO1**
- **Average = SUM / Total No. Of students**
- **Percentage of CO = (SUM/ (Total No. of students*4)) *100**

PO ATTAINMENT THROUGH PROGRAMME EXIT SURVEY

Sample:

PROGRAMME EXIT SURVEY FORM
(To assess POs)

Student Name		**Roll/Reg. No**	
Programme	**M.SC Physics**	**Batch**	**2020-2022**

Please tick (√) Appropriately

SI. No.	To what extent do you feel have learnt and will be able to do the following (which are the POs and PSO of the Program)	Very Good (4)	Good(3)	Average(2)	Poor(1)
1	Question related to PO 1				
2	Question related to PO 2				
3	Question related to PO 3				
4	Question related to PO 4				
5	Question related to PO 5				
Any other feedback/Suggestions					

Date: **Signature of the Student**

Program Exit Survey – (Indirect Analysis):

Faculty		**AcademicYear**	
Degree & Branch		**Batch**	

Roll No.	**Name of the Student**	**POs**				
		PO1	**PO2**	**PO3**	**PO4**	**PO5**
1		4	3	3	3	3
2		3	4	3	3	4
3		4	3	2	2	3
.		3	3	4	3	4
.		3	3	3	3	3
.		4	2	3	2	2
.		1	1	1	1	1
62		2	3	3	4	3
Count of Survey Scale Values	**2**	**11**	**15**	**7**	**16**	**9**
	3	**17**	**27**	**19**	**25**	**31**
	4	**27**	**10**	**23**	**4**	**7**
(a) Target Values of PO		*** Target Attainment level is 2 and above *Only Survey Scale values of 2, 3 and 4will be considered.**				
(b) No. of Survey scale values 2,3		**55**	**52**	**49**	**45**	**47**
PO Attainment value in %=(b)/Total Students		**93**	**88**	**83**	**76**	**80**
PO Attainment through Program		**3**	**3**	**3**	**3**	**3**

Govt. Holkar (Model Autonomous) Science College, Indore

वसुधैव कुटुम्बकम्
[Vasudhaiva Kutumbakam]

Our SDG-2030 Goals Tree

कल्पवृक्षः

Published by IQAC, Govt. Holkar (Model Autonomous) Science College, Indore