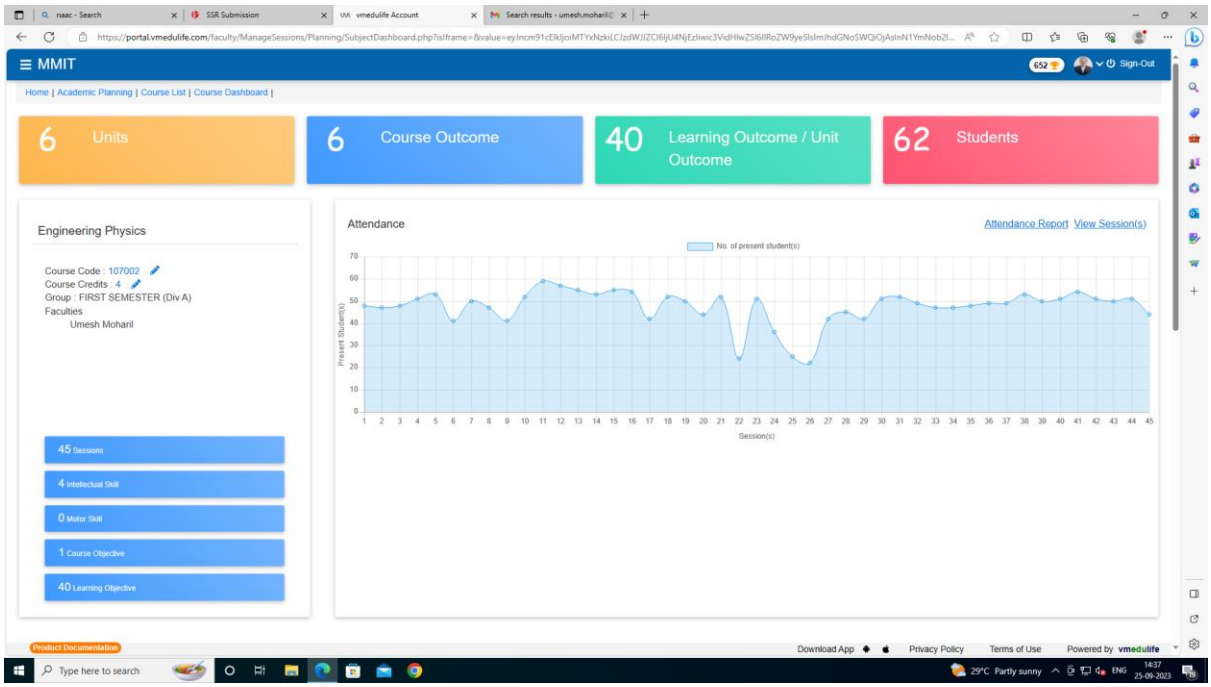
INDEX

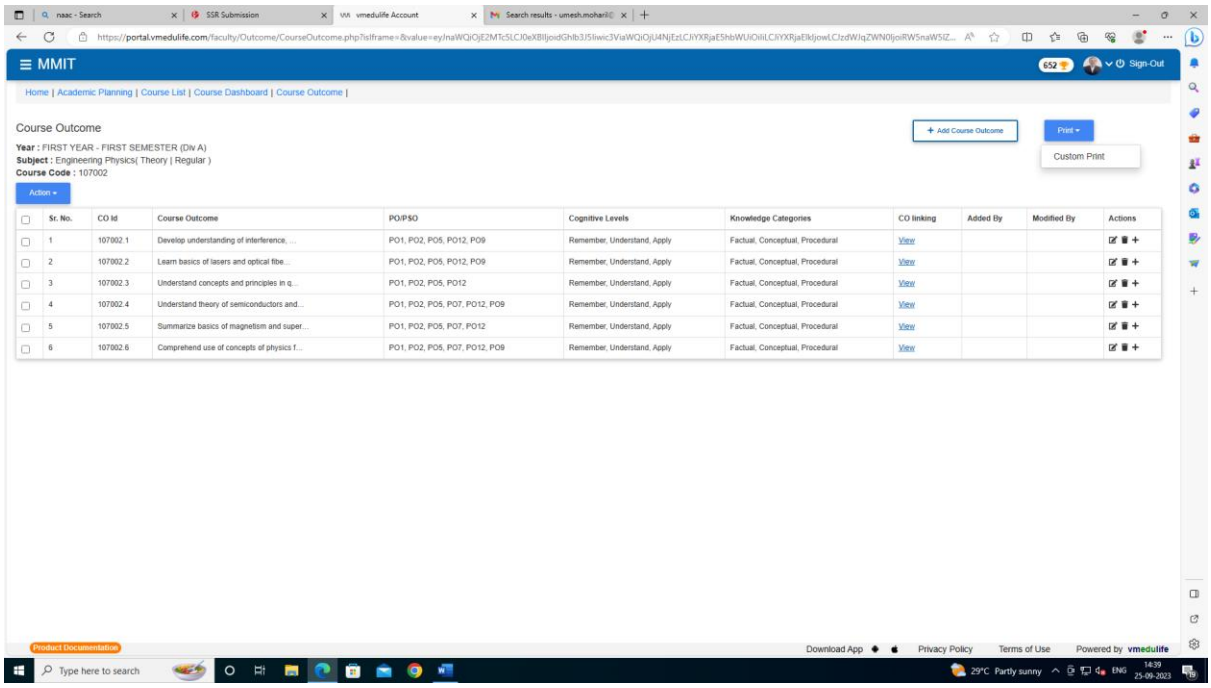
2.6.2: *Attainment of POs and COs are evaluated.*

Marathwada Mitramandal's Institute of Technology, Lohgaon, Pune - 411047

Sample File CO-PO Evaluation and Attainment

Academic Year: 2022-23, Semester-1 |Subject: Engineering Physics | Faculty: Dr. Umesh Moharil





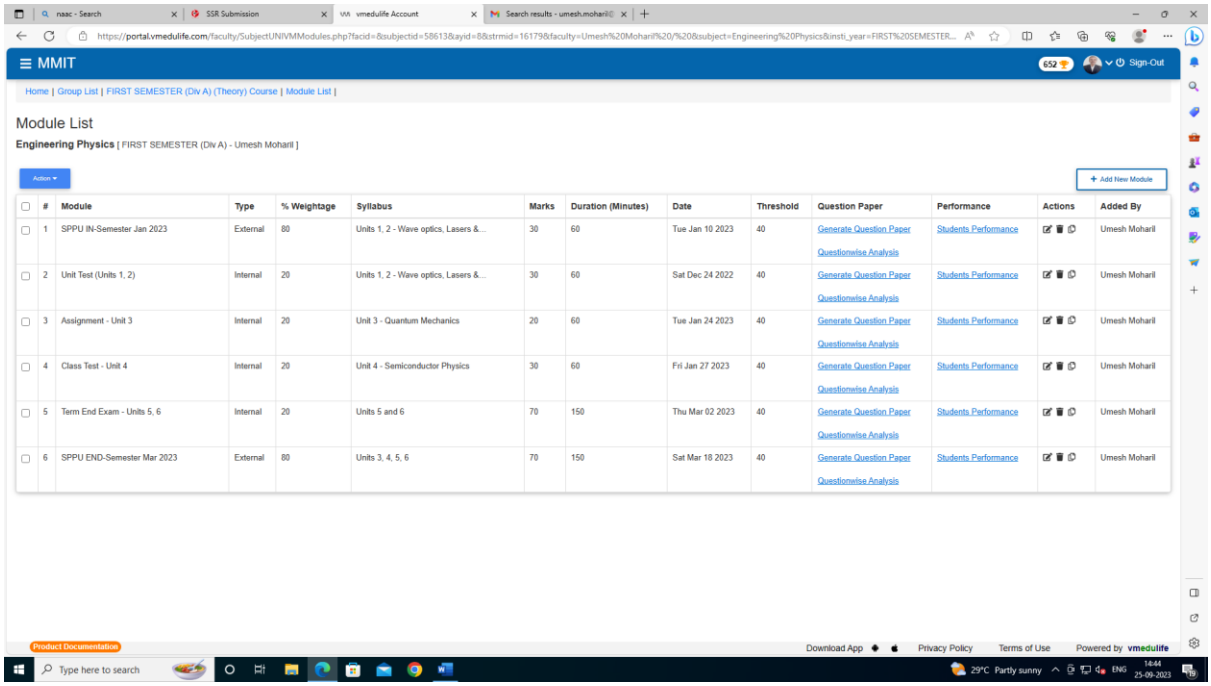
Marathwada Mitramandal's Institute of Technology PUNE 411047

CO PO Desired Mapping Report with Justification

Justification

Course Outcome	Program Outcome	Level	Justification
107002.1	PO1	2	The knowledge of interference, diffraction and polarization is extended to engineering applications such as thin film, ARC, LCD.
107002.1	PO2	1	Student should be able to solve a few problems (numerical) based on a few applications.
107002.1	PO5	1	Student should be able to solve a few problems (numerical) based on a few applications.
107002.1	PO12	1	Students would perform the laboratory expertiments individually or in team.
107002.1	PO9	2	This will motivate students for life-long learning of optics and their applications.
107002.2	PO1	2	The knowledge of lasers and optical fibers would be extended to engineering applications such as fiber optic communication, industrial and holography.
107002.2	PO2	1	Student should be able to solve a few problems (numerical) based on basics of optical fibers
107002.2	PO5	1	students would be utilizing some tools of measurements while performing experiments individually or in team.
107002.2	PO12	2	students would be utilizing some tools of measurements while performing experiments
107002.2	PO9	1	Students would perform the laboratory expertiments individually or in team.
107002.3	PO1	2	The theoretical understanding of quantum mechanics would be extended to engineering applications STM, principles of quantum computing.
107002.3	PO2	1	Student should be able to a few problems (numerical) based on duality and energy of particle
107002.3	PO5	1	Students would be able to predict potential applications in the emerging field of quantum computing
107002.3	PO12	1	This will motivate students for life-long learning of STM, that is one of tools of nanotechnology. The basics of quantum computing would help them to prepare base for future learning.
107002.4	PO1	2	The theoretical understanding of KP model, band formation, Fermi energy would be extended for understanding semiconductors and would be extended to explain diode, Solar cell, Hall effect
107002.4	PO2	1	Student should be able to solve a few problems (numerical) based on doping concentration, Hall effect

Course Outcome	Program Outcome	Level	Justification
107002.4	PO5	1	Students would be utilizing some tools for performing experiments such as bandgap energy, solar cell, Hall effect
107002.4	PO7	1	students would be utilizing some tools of measurements while performing experiments
107002.4	PO12	2	Understand the need of renewable energy source for the environment, sustainability and environmental issues.
107002.4	PO9	1	This will motivate students for life-long learning such as use of Hall effect sensors in modern day gadjets such as mobiles
107002.5	PO1	2	Extend the understanding of magnetic material with engineering applications such as magnetic storage, magneto-optical devices. Extend the knowledge of superconductors for undertanding applications such as SQUID, MagLev Trains, Spintronic devices
107002.5	PO2	1	Students would be able to understand problems in traditional systems and how superconductors could be used as modern tools as transmission lines, SQUID, MEG, MRI, Spintronic devices, etc
107002.5	PO5	1	Students would be utilizing some tools for performing numerical on critical magnetic field
107002.5	PO7	1	At very basic level, students would be able to understand applications of superconductors if used in transmission lines to reduce the conventional losses and minimizing loss of energy and useful for environment and sustainability
107002.5	PO12	2	Students would be understand life long learning of magnetic materials and superconductors in memory storage & magneto optical devices, spintronic devices, MagLev trains, SQUID, Josephson effect, etc.
107002.6	PO1	2	Students would understand a few NDT techniques, basics of nanotechnology and its few current and potential applications.
107002.6	PO2	1	They would be able to understand problem analysis and solve a few problmes (numerical) such as flaw detection.
107002.6	PO5	1	At the basic level students would be able to understand modern day applications of nanotechnology in the field of targeted drug delivery, automobiles, space and defense
107002.6	PO7	1	At the basic level, students would be able to understand role of nanotechnology in few applications related with environment (removing pollutants)
107002.6	PO12	2	Students would be utilizing some tools of measurements while performing experiments individually or in team.
107002.6	PO9	1	Will understand and discuss the applications of non-destructive testing and nanomaterials for further life-long learning.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Home | Group List | FIRST SEMESTER (Div A) (Theory) Course | Module List |
Module List
Engineering Physics [FIRST SEMESTER (Div A) - Umesh Moharil]
Action
+ Add New Module
# Module Type % Weightage Syllabus Marks Duration (Minutes) Date Threshold Question Paper Performance Actions Added By
1 SPPU IN-Semester Jan 2023 External 80 Units 1, 2 - Wave optics, Lasers &... 30 60 Tue Jan 10 2023 40 Generate Question Paper Questionwise Analysis Students Performance Umesh Moharil
2 Unit Test (Units 1, 2) Internal 20 Units 1, 2 - Wave optics, Lasers &... 30 60 Sat Dec 24 2022 40 Generate Question Paper Questionwise Analysis Students Performance Umesh Moharil
3 Assignment - Unit 3 Internal 20 Unit 3 - Quantum Mechanics 20 60 Tue Jan 24 2023 40 Generate Question Paper Questionwise Analysis Students Performance Umesh Moharil
4 Class Test - Unit 4 Internal 20 Unit 4 - Semiconductor Physics 30 60 Fri Jan 27 2023 40 Generate Question Paper Questionwise Analysis Students Performance Umesh Moharil
5 Term End Exam - Units 5, 6 Internal 20 Units 5 and 6 70 150 Thu Mar 02 2023 40 Generate Question Paper Questionwise Analysis Students Performance Umesh Moharil
6 SPPU END-Semester Mar 2023 External 80 Units 3, 4, 5, 6 70 150 Sat Mar 18 2023 40 Generate Question Paper Questionwise Analysis Students Performance Umesh Moharil
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Marathwada Mitra Mandal's Institute of Technology

Engineering Science [2022-23]

SPPU IN-Semester Jan 2023

Subject : [107002] Engineering Physics - Theory **Faculty :** Umesh Moharil

Year : FIRST YEAR - FIRST SEMESTER (Div A) **Marks :** 30 **Date :** 10 January, 2023 **Duration :** 60 Minutes

1. Solve Q1 or Q2, Q3 or Q4
2. Neat diagrams to be drawn wehrever necessary
3. Figures to the right indicate full marks
4. Use of electronic pocket calculator is allowed
5. Assume suitable data, if necessary

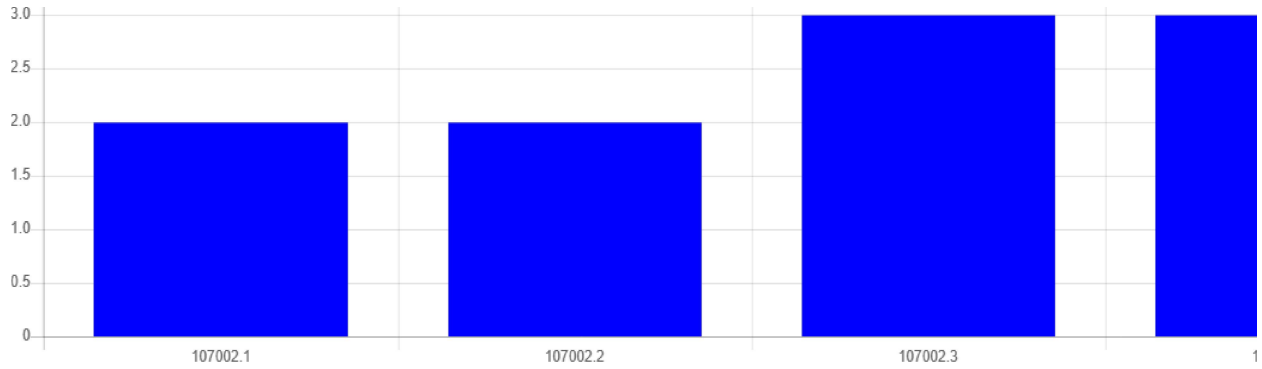
Sr.No.	Question			Marks	Course Outcome
1	**Unit 1 - Wave Optics**				
1.1	**Question 1**			15.00	107002.1
	Q1(a)	What is Fraunhoffer diffraction? State the conditions for resultant amplitude and resultant intensity between the diffracted waves in a Franhoffer diffraction due to a single slit. State the conditions for maximum and minimum intensity.	6		
	Q1(b)	State and explain Malu's law with proof.	5		
	Q1(c)	White light falls at an angle 45^0 on a thin film of soap bubble having refractive index 1.33. At what minimum thickness of the film it will appear bright yellow for the wavelength 5896 A^0 in the reflected light.	4		
1.2	**Question 2**			15.00	107002.1
	Q2(a)	What is double refraction? Explain Huygen's theory of double refraction.	6		
	Q2(b)	What is interference of light? Explain the use of thin film as antireflection coating.	5		
	Q2(c)	What is the highest order spectrum that is visible with a light of wavelength 6000 A0 by means of a grating having 5000 lines per centimeter.	4		
2	**Unit 2 - Question 3**				
2.1	**Question 3**			15.00	107002.2
	Q3(a)	Explain the construction and working of a CO2 laser.	6		
	Q3(b)	What are optical fibers? Distinguish between step index and graded index optical fibers (any 4 points.)	5		
	Q3(c)	Calculate numerical aperture and acceptance angle of an optical fiber having core and cladding refractive index 1.49 and 1.44 respectively.	4		
2.2	**Question 4**			15.00	107002.2
	Q4(a)	What is optical fiber? Draw a neat and labelled diagram of cross section of an optical fiber showing total internal reflection. State the advantages of optical fiber communication over conventional communication system (any 4).	6		
	Q4(b)	What is holography? Explain process of hologram recording using laser.	5		
	Q4(c)	What is laser? State important characteristics of laser.	4		

Marathwada Mitra Mandal's Institute of Technology

Engineering Physics - Theory (2022-23) [Umesh Moharil]

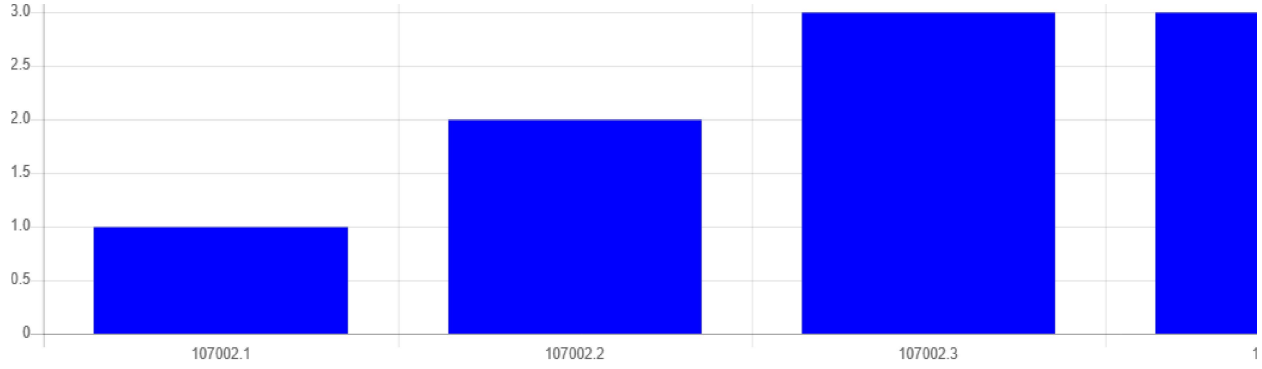
Internal Assessment

Title	Type	% Weightage	107002.1	107002.2	107002.3	107002.4	107002.5	107002.6
Unit Test (Units 1, 2)	Internal	20	0.40	0.40				
Assignment - Unit 3	Internal	20			0.60			
Class Test - Unit 4	Internal	20				0.60		
Term End Exam - Units 5, 6	Internal	20					0.40	0.40
Percent course outcome weightage			20.00	20.00	20.00	20.00	20.00	20.00
Attainment as per percent weightage			0.40	0.40	0.60	0.60	0.40	0.40
Final attainment			2	2	3	3	2	2



External Assessment

Title	Type	% Weightage	107002.1	107002.2	107002.3	107002.4	107002.5	107002.6
SPPU IN-Semester Jan 2023	External	80	0.80	1.60				
SPPU END-Semester Mar 2023	External	80			2.40	2.40	2.40	2.40
Percent course outcome weightage			80.00	80.00	80.00	80.00	80.00	80.00
Attainment as per percent weightage			0.8	1.6	2.4	2.4	2.4	2.4
Final attainment			1	2	3	3	3	3



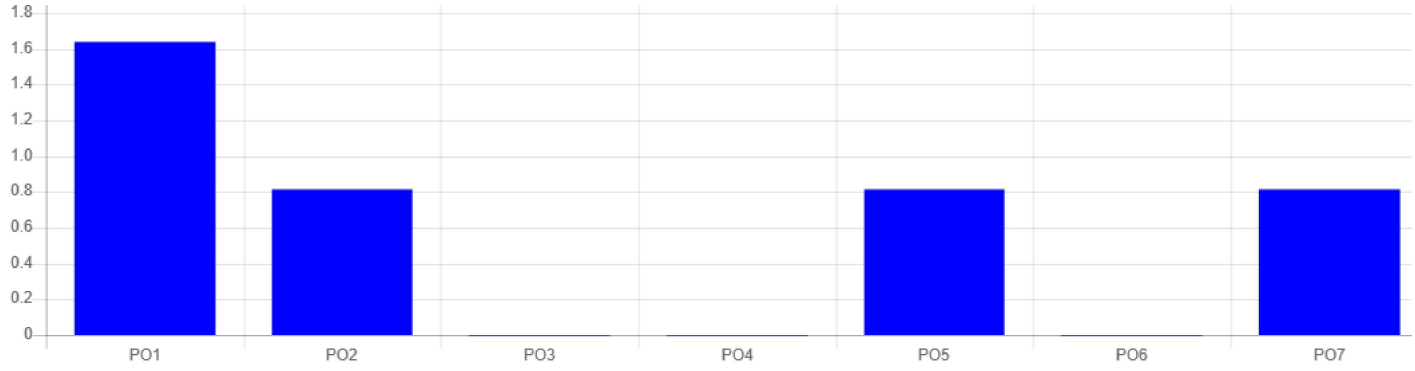
Direct Total Attainment

Course Outcome	Internal	External
107002.1	2.00	1.00
107002.2	2.00	2.00
107002.3	3.00	3.00

107002.4	3.00	3.00
107002.5	2.00	3.00
107002.6	2.00	3.00
Average	2.33	2.50
Weightage	20	80
Direct Total Attainment	0.47	2.00
Final Direct Course Attainment	2.47	

Final Attainment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Final Attainment	1.64	0.82			0.82		0.82		0.82			1.37
Percentage	54.67	27.33			27.33		27.33	45.67			27.33	



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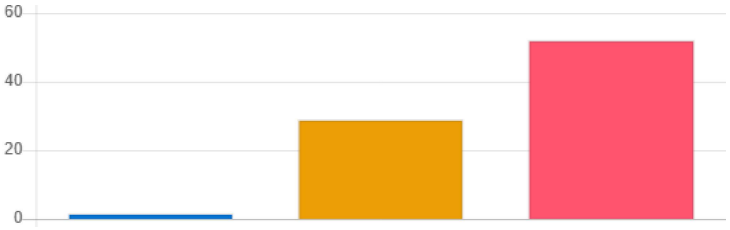
Feedback Analysis

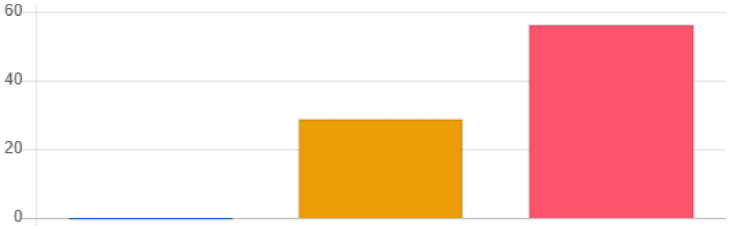
Title : FE 22-23 - Physics - Course End Survey
Academic Year : 2022-23
Class : SECOND SEMESTER (DIV D) [Engineering Science]
Details : Engineering Physics - Theory | Regular (Umesh Moharil)

Total number of response(s) : 46 / 75

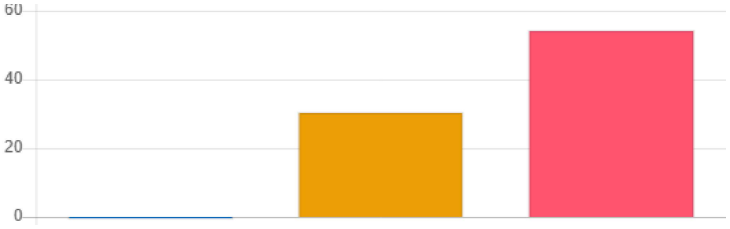
Question	Unit1-CO1: Do you feel that you have gained a basic knowledge of interference, diffraction and polarization and able to solve a few numerical? Do you got a broad picture of engineering applications of optics such as thin film, ARC, LCD?			
Answer	Value	No. of response(s)	Response value	Response %
At low level	1	2	2	1.45
At moderate level	2	20	40	28.99
At high level	3	24	72	52.17
Performance				82.61
Final Attainment				2.48

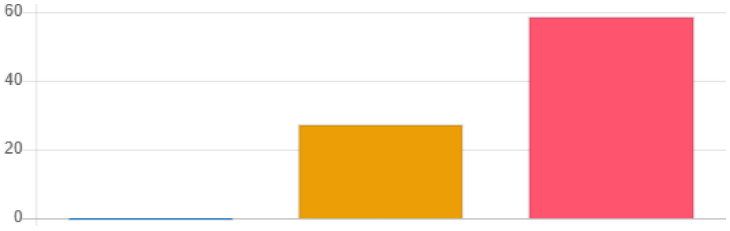


Question	Unit 2 - CO2: Do you feel that you have gained a basic knowledge of lasers and optical fibers and you were able to solve a few numerical? Were you able to understand the engineering applications of lasers and fiber optics such as fiber optic communication, industrial and holography?			
Answer	Value	No. of response(s)	Response value	Response %
At low level	1	0	0	0.00
At moderate level	2	20	40	28.99
At high level	3	26	78	56.52
Performance				85.51
Final Attainment				2.57



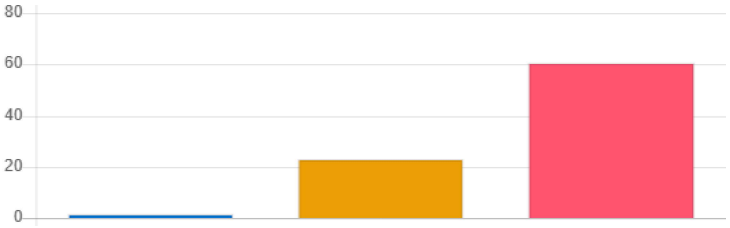
Question	Unit3-CO3: Do you feel that you have gained a basic understanding of quantum mechanics and would be able to solve a few numerical? Would you be able to realize how principles of Quantum Mechanics are extended to engineering applications such as STM and quantum computing and be able to predict a few potential applications of quantum computing?			
Answer	Value	No. of response(s)	Response value	Response %
At low level	1	0	0	0.00
At moderate level	2	21	42	30.43
At high level	3	25	75	54.35
Performance				84.78
Final Attainment				2.54



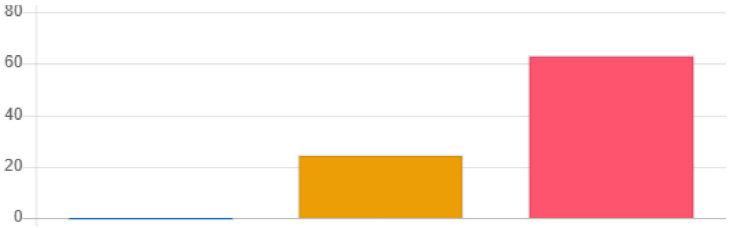


Question	Unit 4 - CO4: Do you feel that you have a basic understanding semiconductors physics and would be able to solve numerical? Would you able to understand the applications to diode, Solar cell, Hall effect?			
Answer	Value	No. of response(s)	Response value	Response %
At low level	1	0	0	0.00
At moderate level	2	19	38	27.54
At high level	3	27	81	58.70
Performance				86.23
Final Attainment				2.59

Question	Unit 5 - CO5: Do you feel that you have gained a basics knowledge of magnetism and extend this understanding to engineering applications such as magnetic storage, magneto-optical devices? Would you able to understand basics of superconductivity and extend this knowledge for understanding applications such as SQUID, MagLev Trains, Spintronic devices?			
Answer	Value	No. of response(s)	Response value	Response %
At low level	1	2	2	1.45
At moderate level	2	16	32	23.19
At high level	3	28	84	60.87
Performance				85.51
Final Attainment				2.57



Question	Unit 6 - CO6: Do you feel that you gained a basic understanding of a few NDT techniques? Do you able to understand problem analysis for flaw detection and solve a few numerical? Do you feel that you have gained a basic knowledge of nanotechnology and would you able to realize its modern day applications in the field of targeted drug delivery, automobiles, space and defense?			
Answer	Value	No. of response(s)	Response value	Response %
At low level	1	0	0	0.00
At moderate level	2	17	34	24.64
At high level	3	29	87	63.04
Performance				87.68
Final Attainment				2.63



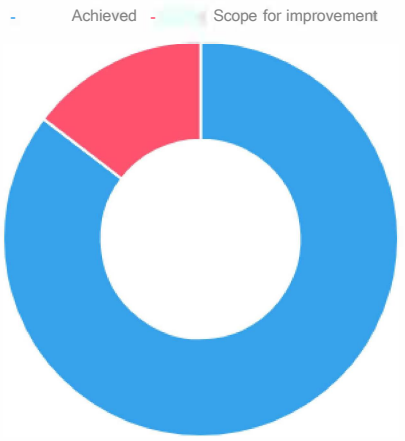
NOTE:

- Response Value = (Value * No.of Responses)
- Response % = (Response Value / (Max Value * No.of Responses))

Questionwise Attainment	
Activity Number	Attainment
1	2.48
2	2.57
3	2.54
4	2.59
5	2.57
6	2.63

Program outcome and question mapping												
AO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AO1	2	1			1				1			1
AO2	2	1			1				1			2
AO3	2	1			1				1			1
AO4	2	1			1		1		1			2
AO5	1	1			1		1		1			
AO6	1	1			1		1		1			1
Average	1.67	1.00			1.00		1.00		1.00			1.40

Program outcome attainment												
AO	AO Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
AO1	2.48	1.65	0.83			0.83				0.83			0.83
AO2	2.57	1.71	0.86			0.86				0.86			1.71
AO3	2.54	1.70	0.85			0.85				0.85			0.85
AO4	2.59	1.72	0.86			0.86		0.86		0.86			1.72
AO5	2.57	0.86	0.86			0.86		0.86		0.86			
AO6	2.63	0.88	0.88			0.88		0.88		0.88			0.88
Average	2.56	1.42	0.85			0.85		0.86		0.85			1.20



Achieved 85.39 | Scope for improvement 14.61

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CO-PO ASSESSMENT AND ATTAINMENT GUIDELINES

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CO-PO Assessment and Attainment Manual Guidelines

Academic Year 2022-23

Vision and Mission Statements: Institute

Vision:

The Vision of the Institution is to achieve “Techno-Social Excellence”

Mission:

The Mission of the Institution is to

- Enhance technology transfer
- Implement entrepreneurship
- Promote global competency
- Integrate innovative pedagogy
- Create excellent human resource

Core Values:

The Core Values of the Institution are

- Teamwork
- Value based ethics
- Societal trust
- Pleasant environment
- Industrial approach
- Committed faculty
- Standard report writing
- Adaptive research
- Lifelong learning

A - Engineering Program outcomes (POs) [All Branches]

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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.
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.
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.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
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.
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.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.
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.
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.

B - Course Objectives and Course Outcome Statements

The Course Objectives and Course Outcomes (COs) are defined in SPPU Curriculum. They are to be modified, if necessary, with proper justification.

Course Objectives
A course objective specifies a behavior, skill, or action that a student can demonstrate if they have achieved mastery of the objective.

Course Outcomes (COs): Statements indicating what a student can do after the successful completion of a course. Every Course leads to some Course Outcomes. The CO statements are defined by considering the course content covered in each module of a course. For every course there may be 5 or 6 COs. The keywords used to define COs are based on Bloom's Taxonomy.

C - CO-PO Mapping and Justification

CO-PO mapping matrix is to be prepared by the subject teacher by mapping CO with PO to levels 1 / 2 / 3 with proper justification.

D - Assessment methods for Course Outcomes

- The course needs to prepare a matrix of CO-PO & CO-PSO mapping
- The justification of CO-PO & CO-PSO mapping is to be provided.
- The tools for attainment of COs are needed to be defined for each course.
- The attainment of COs, POs, PSOs is calculated using direct and indirect tools
- Direct Evaluation Tools: It includes Internal and External Assessment Tools
- Internal Assessment tools (20%) Include Unit Tests, Assignments, Term Work, etc.
- External Assessment tools (80%): Include University In-Semester, End-Semester examinations, Oral / Practical, etc.
- Indirect Evaluation Tools (20%) : Indirect attainment of POs and PSOs is calculated based on various surveys and feedback.

E - Conclusion and Remedial Action

- Based on the summary of CO and PO attainment, observations / remedial / conclusions can be drawn.
- If for any subject, CO attainment is less than the expected target, remedial action would be suggested that may include extra lectures, remedial sessions, additional tests, additional assignments, lab sessions, etc.
- If for any subject, PO attainment is less, the related activities need to be planned in the next semester.