Shri G. S. Institute of Technology & Science, Indore (MP)

Outcome Based Education (OBE) Manual

Description of OBE Philosophy Followed by the Department

- Twenty first century learning system is transition from output based system to outcome based system. Outcome based system (OBE) curriculums are designed to meet measurable outcomes at different levels that the student is able to demonstrate.
- OBE philosophy based education system not only focus on program specific technical knowledge but also gives emphasis on development of effective domain attributes which are needed in real life work environment i.e.
- Interpersonal skills, analytical skills, learning through simulation, project based learning, validation, team leadership, work ethics, self (inner) motivation, e-source learning, writing review , creative and innovative projects.
- OBE system of education in implemented through NBA defined guidelines in India. The curriculum written with well defined Course outcomes, assessment methods, rubrics results in attaining outcomes defined for the program.
- A good feedback system helps to revise curriculum and outcomes to stay in the program field at lead position.
- OBE system takes inputs from industry as one of the stack holder in all its processes to prepare students ready for industry work environment through compulsory industry internship.

Vision & Mission of Institute

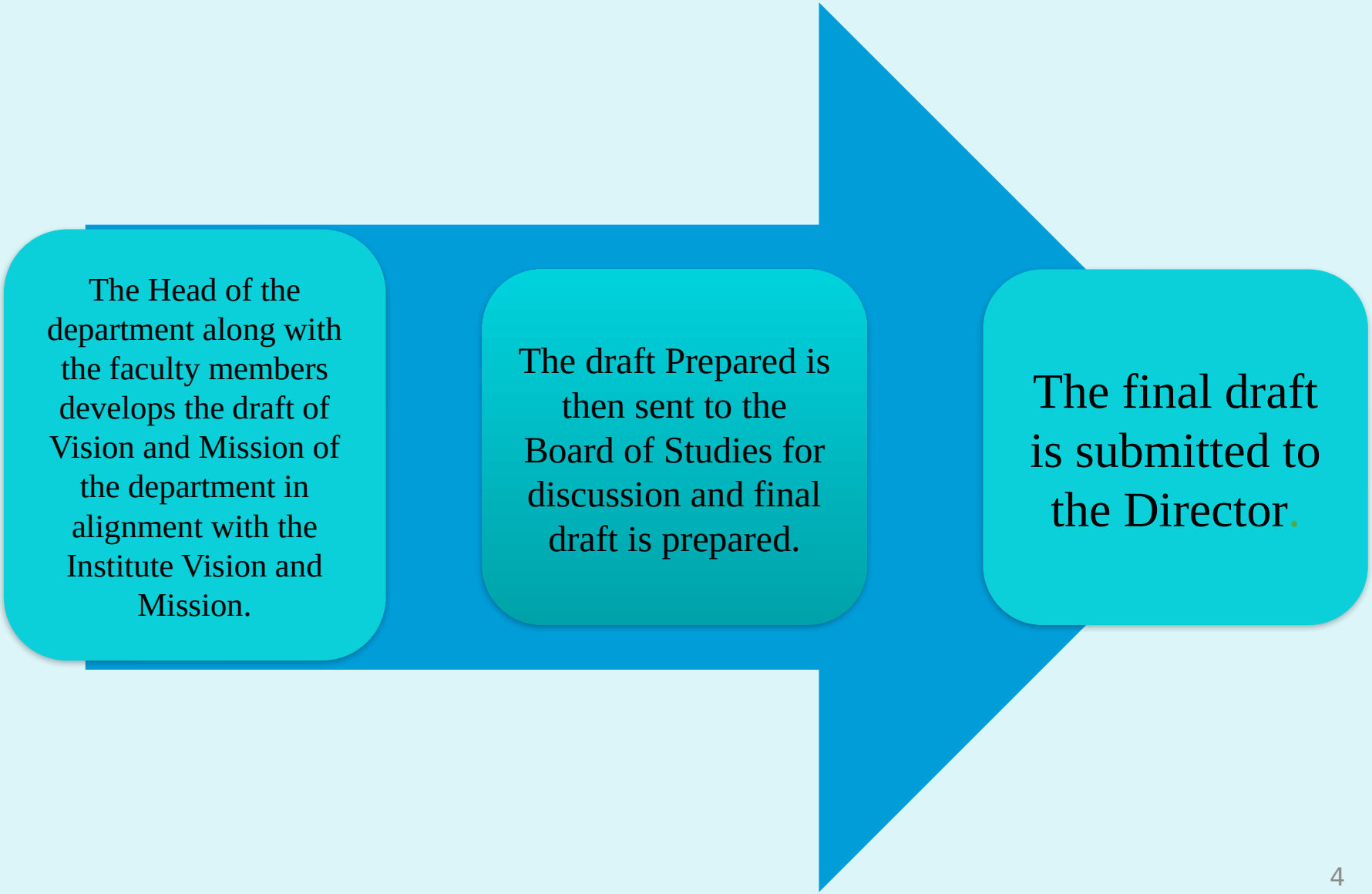
Vision

A front-line institute in Technology & Science making significant contribution to human resource development envisaging dynamic needs of the society.

Mission

To generate experts in Science & Technology akin to society for its accelerated socio-economic growth in professional and challenging environment, imparting human values.

Process of Drafting Vision and Mission of Department



Sample Vision & Mission of Department

Vision

To develop leading expertise in Electrical Engineering field making significant contribution to human resource development envisaging dynamic needs of the society and industries

Mission

M1: Develop expert in Electrical Engineering

M2: Provide human resources in the domain of Engineering

M3: Help the society for betterment of the environment and living

Programme Outcomes declared by NBA

PO#1

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering

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.

Programme Outcomes declared by NBA

PO#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.

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.

Programme Outcomes declared by NBA

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

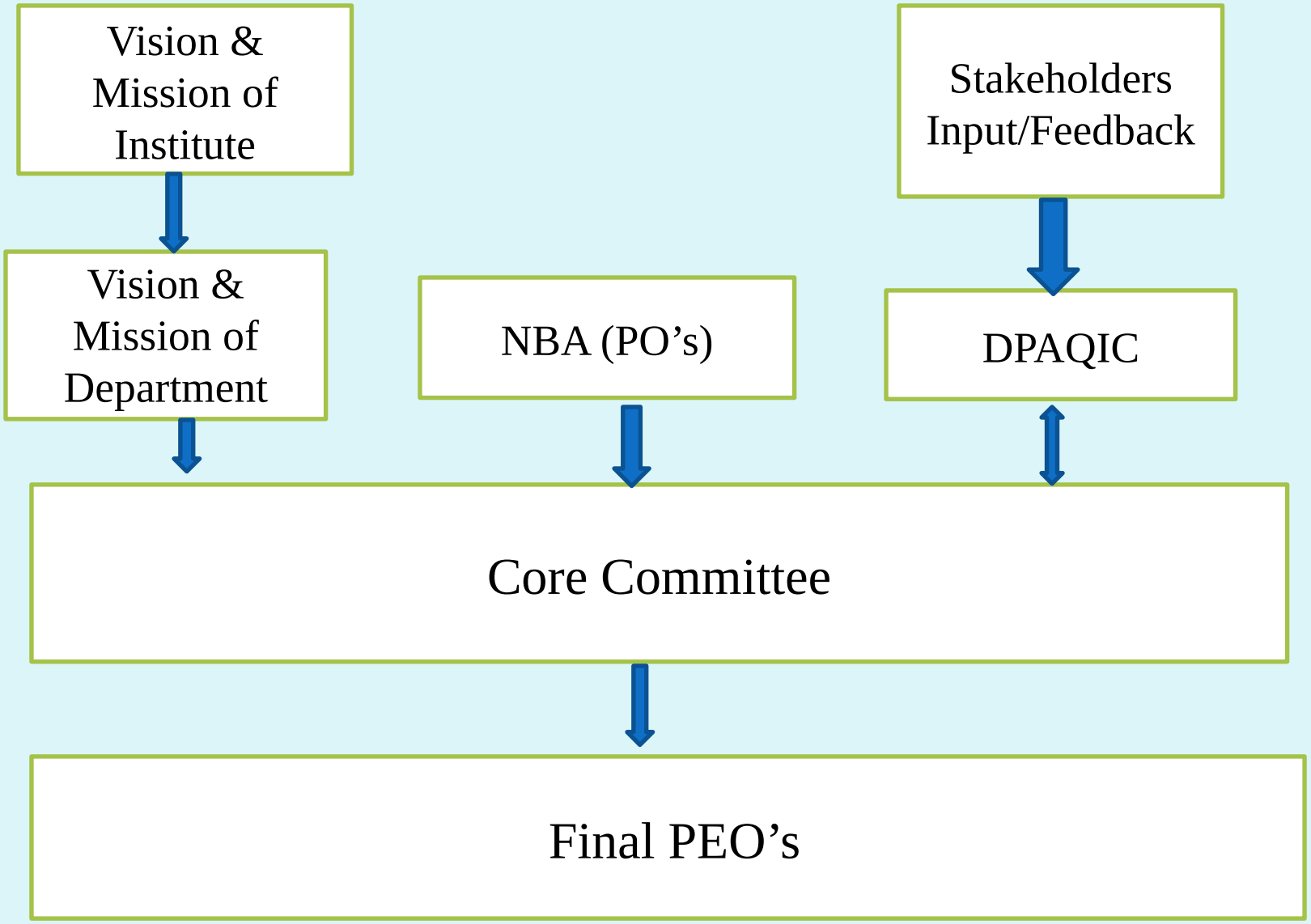
PO#11

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.

Process of Establishing the PEO's



Sample Programme Educational Objectives (PEOs)

PEO_1

To impart core knowledge of Electrical Engineering for technical careers.

PEO_2

To teach the advanced aspects of Electrical systems along with its design, simulation and fabrication together with good communication skills.

PEO_3

To motivate students for higher studies in Electrical Engineering so as to develop high vision in the technical career.

PEO_4

To attain professional excellence through lifelong learning.

PEO_5

To produce graduates to ensure ethical & moral behaviour.

Sample Programme Specific Outcomes

PSO#1

Demonstrate fundamental knowledge of mathematics, science and engineering to identify, formulate, analyse, investigate and solve complex problems in the field of electrical engineering.

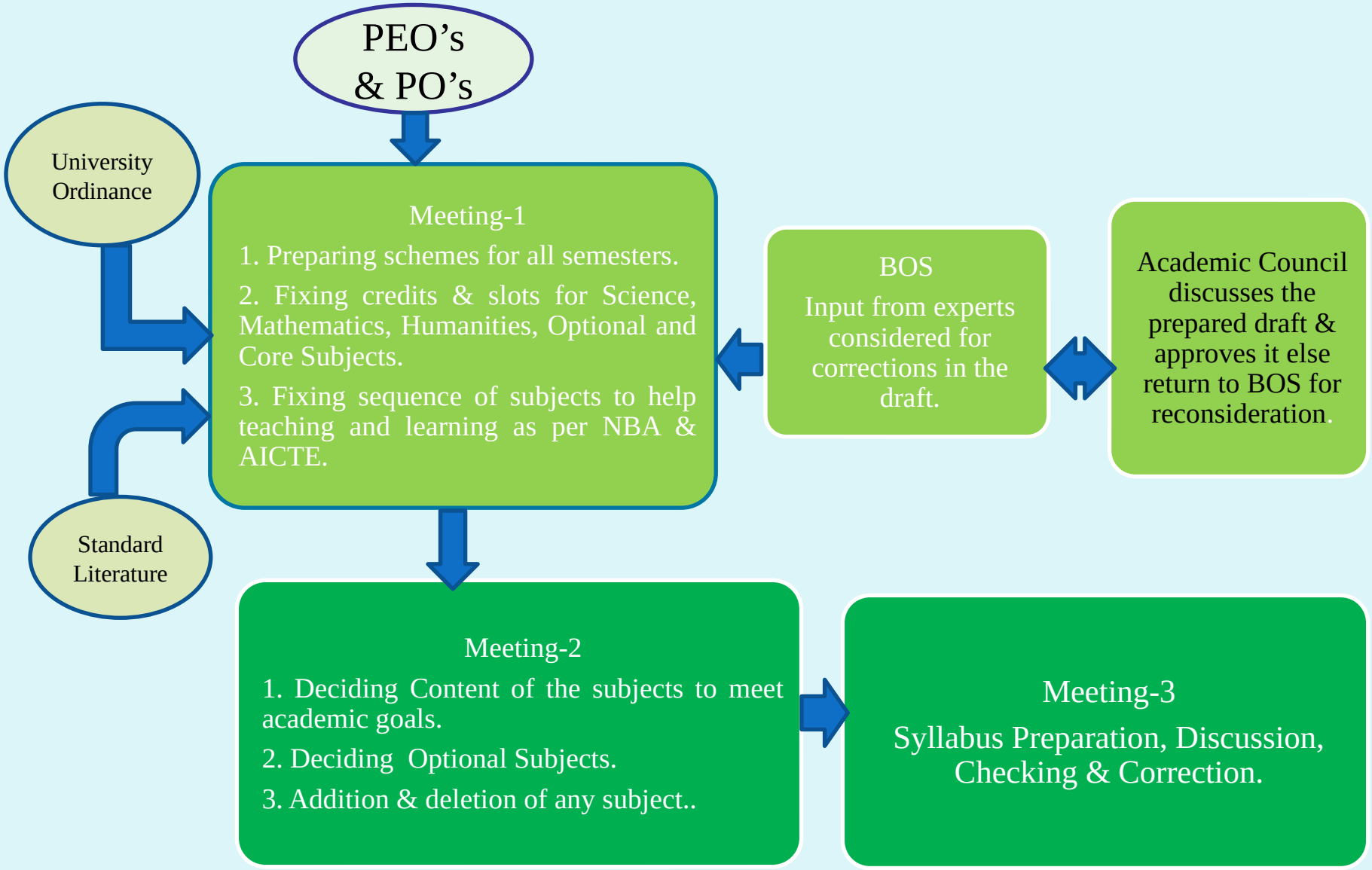
PSO#2

Apply the appropriate techniques and modern engineering tools to design and develop complex electrical engineering projects, adapt in multi-disciplinary environments and engage in life-long learning.

PSO#3

Propose & implement engineering solutions in the context of environment, society, economy, professional ethics and have good communication skills.

Curriculum Design



Course Outcome (COs) Sample :

EE32007 Power Electronics-I

Theory

After completing this course the students will able to:

CO1: Recognize and apply fundamental concepts of static switches in design of switching converters.

CO2: Classify topologies of single phase and three phase line commutated power converter circuits, analyze their performances and apply in selection of appropriate converter for field problem.

CO3: Apply the knowledge of synchronization, isolation and firing pulse generation in developing firing schemes for line commutated converters.

CO4: Demonstrate the knowledge of Dual Converters technology in applying speed control schemes of DC machines.

CO5: Identify the topologies of cyclo-converters and AC voltage controllers, compare their performances for real time applications.

Process for forming Course Articulation matrix (Mapping of COs with POs)

Mapping strength Criteria	Level
>=40%	Level-3
25 to 40%	Level-2
5 to 25%	Level-1
<5%	Level-0

CO-PO Mapping (Course Articulation Matrix):

EE32007: Power Electronics- I **Theory**

Articulation_COy-POx

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	1	-	-	-	-	-	-	-
CO2	-	3	3	1	1	-	-	-	-	-	-	-
CO3	3	3	-	-	1	-	-	-	-	-	-	-
CO4	3	3	3	1	1	-	-	-	-	-	-	-
CO5	3	3	3	-	1	-	-	-	-	-	-	-
Average	3	3	3	1	1	0	0	0	0	0	0	0

Sample Syllabus:
EE32007: Power Electronics I

UNIT: 1

Structure and operation of semiconductor power devices, their static and dynamic characteristics, series and parallel operation of devices, heat removal, ratings, snubber circuits, device data sheet interpretation.

UNIT: 2

Power converters: Classification of single phase and three phase converters, types of load on converters, steady state analysis of controlled converters and evaluation of performance parameters, transfer characteristics, effect of load inductance, back emf, freewheel diode, overlap and its effects, harmonic analysis.

UNIT: 3

Control circuits, firing circuit requirements for line commutated converters, synchronization, isolation, pulse transformer, opto-coupler, UJT, PUT, BJT, TCA-785 based firing circuit.

UNIT: 4

Dual converters: Operation in circulating and non-circulating mode, line loading, sub harmonic, control problems, four quadrant operation, and power circuit.

UNIT: 5

Cycloconverter-Operation, control problems, various power circuits, AC power controller-fully controlled and semi-controlled circuits, harmonic analysis, integral cycle control.

Course Outcome (COs) Sample :
EE32007 Power Electronics-I
Laboratory

After completing this course the students will able to

CO1: Recognize the functions of CRO, identify and select proper instruments to observe and record performance on different experimental set ups of power electronics laboratory.

CO2:Establish wiring and device connections to assemble experiments of static switches, line commutated converters and record their performances.

CO3: Analyze and compare the performance of various firing pulse generation circuits for triggering of SCR.

CO4:Apply professional quality textual and graphical tools to sketch and computing results, incorporating accepted data analysis and synthesis methods, mathematical software, and word-processing tools.

CO5:Group activities in terms of mini projects to demonstrate the creativity and ability to interact effectively on a social and interpersonal level, divide up and share task responsibilities to complete assignments.

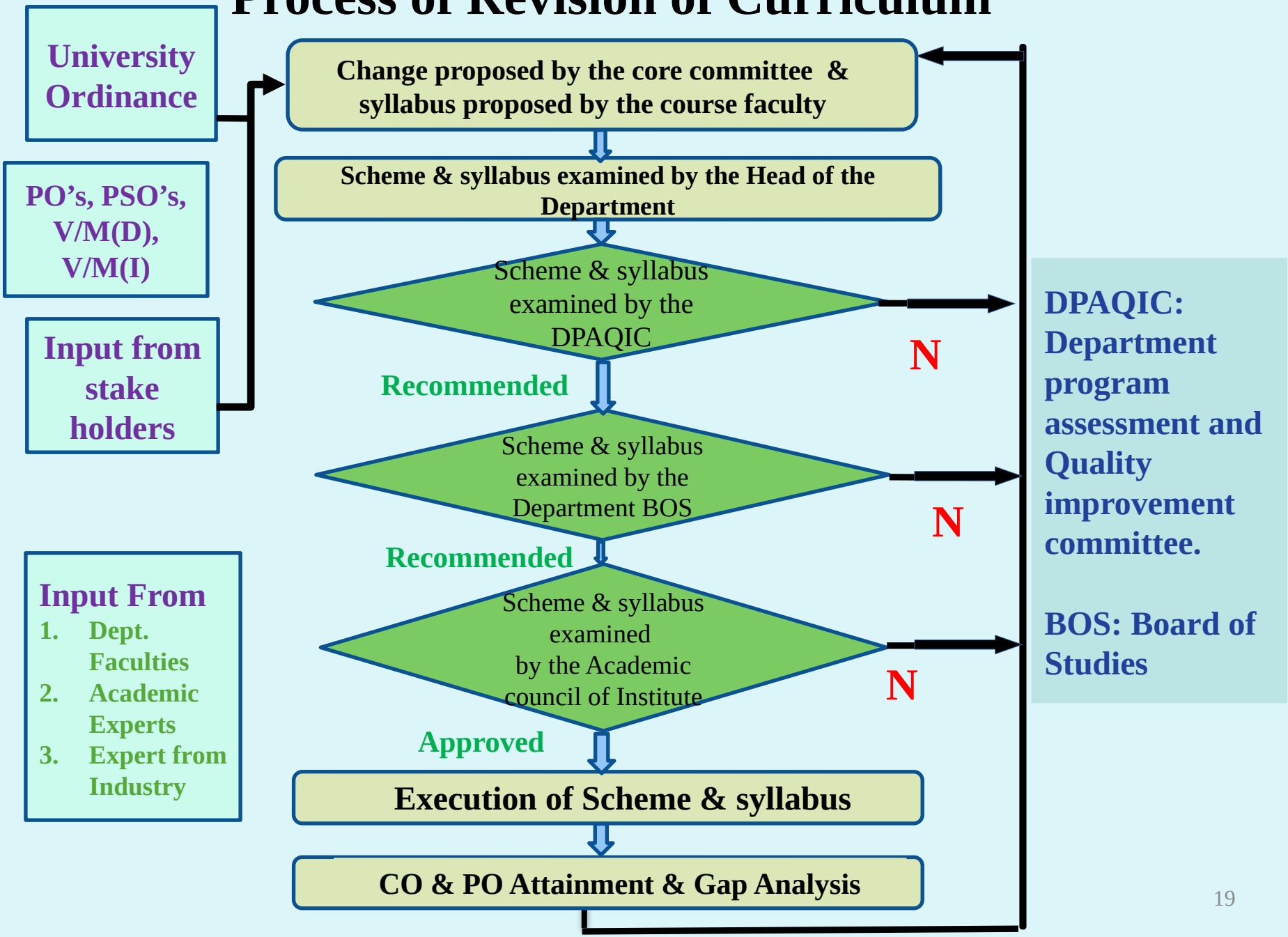
CO-PO Mapping (Course Articulation Matrix):

EE32007: Power Electronics- I

Laboratory

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	3	3	-	3	3	2	-	-
CO2	3	-	3	3	3	3	-	3	3	-	-	-
CO3	3	2	-	3	3	3	-	3	3	2	-	-
CO4	3	2	3	3	3	3	-	3	3	2	-	-
CO5	3	-	-	3	3	3	-	3	3	-	-	-
Average	3	2	3	3	3	3	-	3	3	2	-	-

Process of Revision of Curriculum



Teaching Learning Practices

- Adherence to Academic Calendar
- Maintenance of Course files
- Use of various instructional methods and pedagogical initiatives

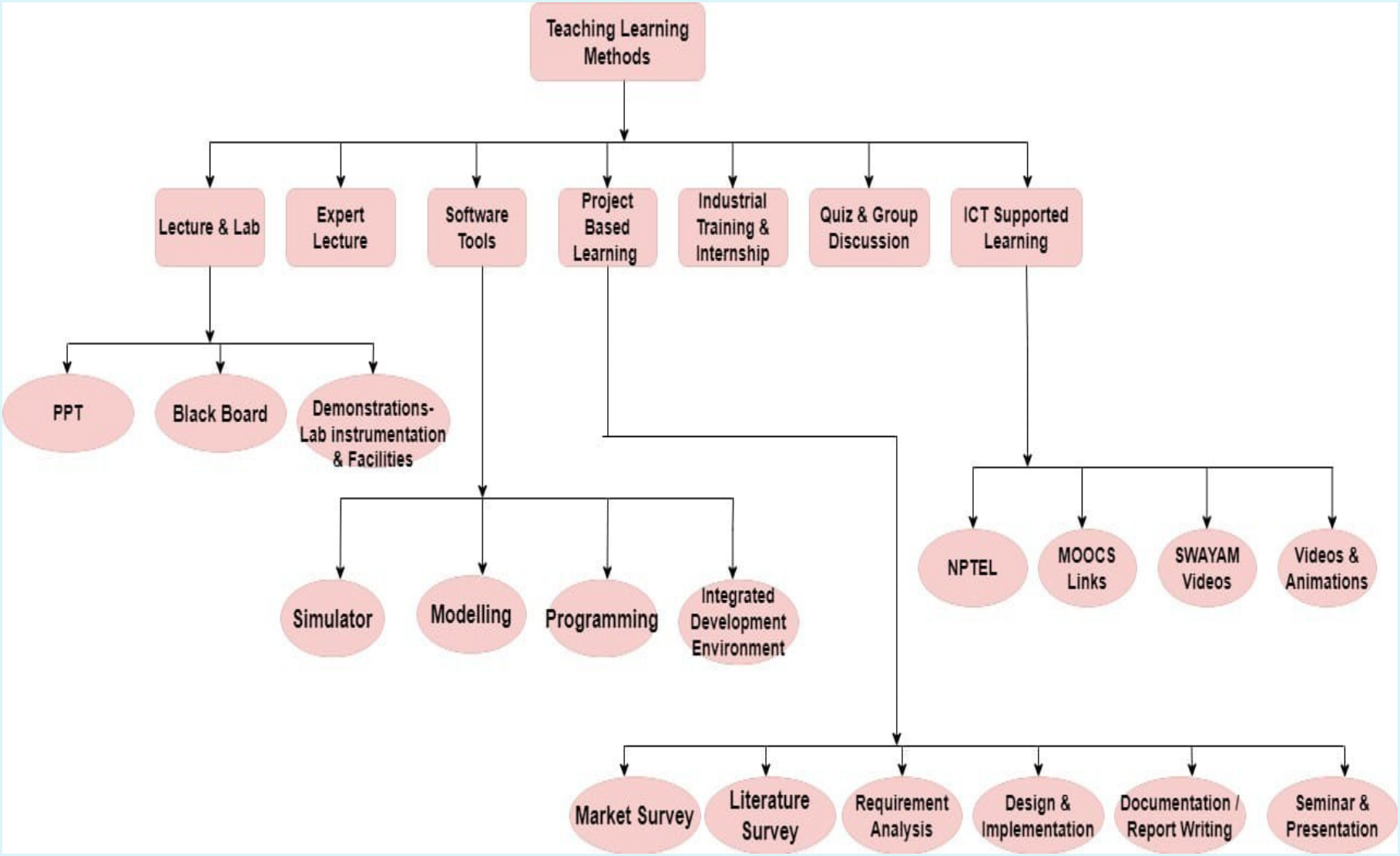
Class Room Teaching

1) Classroom Lectures supported by notes.
2) NPTEL videos lectures
3) ICT usage
4) Google classroom
5) Flip Classroom
6) Group Discussion
7) Open classroom
8) Discussion forum

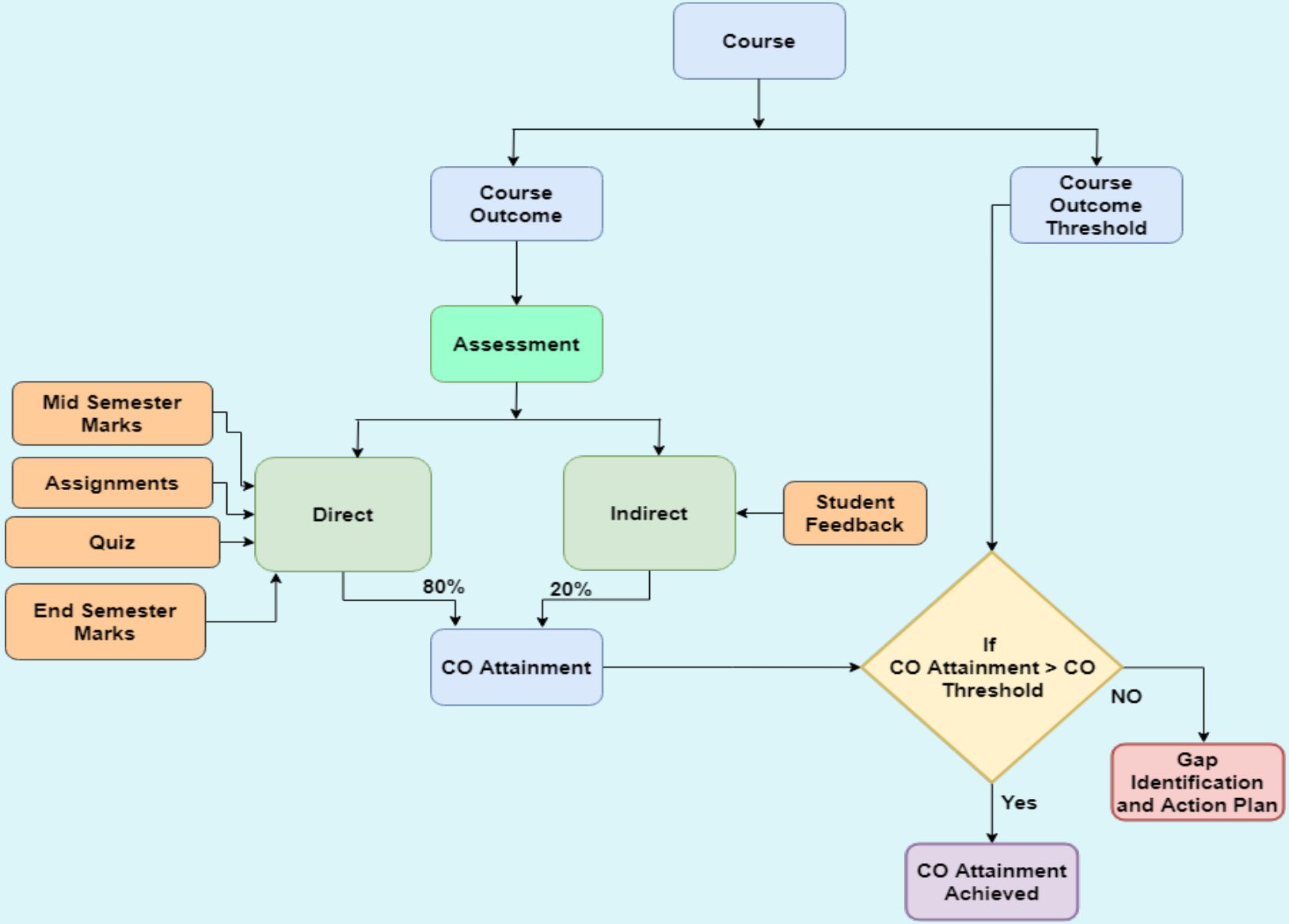
Laboratory Sessions

9) Online Simulator
10) Improved Instruction Methodology in Laboratories
11) Enquiry based learning
12) Market Survey
13) Project based learning
14) Seminars

Strategies for Effective Teaching- Learning



CO Attainment Process



CO-Attainment Tools* (Theory)

Direct Assessment Tools for Course Outcome

- Mid Semester Tests
- Assignments
- Quiz
- End Semester Exam

Indirect Assessment Tools for Course Outcome

- Students Feedback

*Faculty can include more tools, if required

Sample End Semester Paper (EE32007)

160

Dec. 2021 EXAMINATION III
B.TECH/B.E. (4YDC) EXAM
EE 32007/3207: POWER ELECTRONICS - I

[Max. Marks: 40

TOTAL NO. OF QUESTIONS IN THIS PAPER: 5

Note:
1. Answer all five questions. All questions carry equal marks.
2. In each question part there is choice between a and b part ,c is compulsory and part d has internal choice. Out of which part a or b (Max. 50 words) carry 2 marks, part c (Max. 100 words) carry 3 marks and part d (Max. 400 words) carry 3 marks . World limit would not be followed for diagram, numerical, derivation etc.
3. All parts of each question are to be attempted at one place.
4. Assume suitable value for missing data, if any.

			Marks	CO	BL
Q.1	(a)	Describe advantages of using SCR in line commutated converter.	(02)	1	1
	(b)	List out any four different kind of SCRs available in market.	(02)	1	1
	(c)	Justify the necessity of Snubber in power electronics and describe its purpose?	(03)	1	3
	(d)	Two SCRs are connected in parallel to share the load current of 500A. The on-state voltage drop of one SCR is 1.05V at 250A and for other SCR it is 1.5V at 250A. Determine the value of series resistances to force current sharing difference not more than 10%.	(03)	1	3
		OR			
		Prove using a suitable mathematical model that SCR is a latching device.			
Q.2	(a)	Draw the power circuit of any one single phase two quadrant line commutated converter feeding heavy inductive loads.	(02)	2	2
	(b)	Derive an expression of average output voltage of a single phase full bridge controlled rectifier feeding constant current load considering source inductance.	(02)	2	2
	(c)	Sketch the waveforms of supply voltage, supply current, load current, load voltage, SCR voltage and its current for single phase half wave half controlled rectifier circuit feeding battery load.	(03)	2	2
	(d)	A single-phase full bridge rectifier converter is supplied from 230 V, 50 Hz source. The load consist of R= 20 Ω and a large inductance so as to render the load current constant. For a firing angle delay of 45°, determine (a) average output voltage and current, (b) average and rms values of thyristor current and, (c) Distortion factor (d) displacement power factor and (e) the power factor.	(03)	2	3
		OR			
		A single-phase bridge semi-converter is supplied from 230 V, 50 Hz AC source. The load consists of R= 8 Ω, E= 90 V and a large inductance so as to render the load current level. For a firing delay angle of 36°, determine (a) average output voltage and current, (b) average and rms values of thyristor current, (c) average and rms values of diode current, (d) input power factor.			

1

Sample Assessment (EE32007-CIE (MST))

EE 32007 Power Electronics-I, Session July-Dec 2021-22								
Sr. No	Enrollment No	Student Name	Q.1	Q.2	Q.3	Q.4	Q.5	**CO1**
			BTL1	BTL2	BTL2	BTL1	BTL2	
			CO1	**CO1**	**CO1**	**CO1**	**CO1**	
			2 Marks	2 Marks	2 Marks	2 Marks	2 Marks	**10.0**
1	**123456789**	**Student1**	**1**	**2**	**1**	**1**	**2**	**7.0**
2	**123456789**	**Student2**	**2**	**2**	**1**	**1**	**2**	**8.0**
3	**123456789**	**Student3**	**1**	**2**	**1**	**1**	**2**	**7.0**
4	**123456789**	**-**	**1**	**1**	**1**	**2**	**2**	**7.0**
5	**123456789**	**-**	**0**	**2**	**1**	**2**	**0**	**6.0**
Average								**7.0**
Number of Students getting marks greater than Average marks of CO (Target)								**5**
CO Attainment Level								**3**

Total number of students	5	Attainment Level (On scale of 3)
35% - 50% of Total students	2	1
50% - 65% of Total students	3	2
65% of Total Students	4	3

Sample Assessment (EE32007-CIE (MST II))

Sr. No	Enrolment No	Student Name	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Q.8	Q.9	Q.10	Q.11	Q.12	Q.13	Q.14	Q.15	Q.16	Q.17	Q.18	Q.19	Q.20	CO2	CO3	CO4
			BTL3	BTL3	BTL3	BTL3	BTL3	BTL3	BTL3	BTL3	BTL3	BTL4	BTL4	BTL4	BTL2	BTL2	BTL2	BTL2	BTL2	BTL2	BTL2	BTL3			
			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12	4	4
			CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO2	CO3	CO3	CO3	CO3	CO4	CO4	CO4	CO2	CO2	CO4	CO2			
1	123456789	Student1	0	0	1	0	0	1	0	1	0	1	0	0	0	0	1	1	1	1	1	0	5	1	3
2	123456789	Student2	1	0	1	1	0	1	0	1	0	0	0	0	1	0	0	1	0	1	1	0	6	1	2
3	123456789	Student3	0	0	1	0	0	1	0	1	0	0	1	0	1	0	1	0	0	1	0	0	4	2	1
4	123456789	-	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	1	1	1	1	0	6	0	2
5	123456789	-	1	0	0	1	0	1	0	1	0	0	0	0	1	0	0	1	1	0	1	0	5	1	2
Average																							5.2	1.0	2.0
Number of Students getting marks greater than Average marks of CO (Target)																							3	4	4
CO Attainment Level																							*2*	*3*	*3*

Sample Assessment (EE32007-End Semester Exam)

Sr. No	Enrollment No	Q.1				Q.2				Q.3				Q.4				Q.5				CO1	CO2	CO3	CO4	CO5
		a or b		c	d	a or b		c	d	a or b		c	d	a or b		c	d	a or b		c	d					
		2		3	3	2		3	3	2		3	3	2		3	3	2		3	3	8	8	8	8	8
		CO1	CO1	CO1	CO1	CO2	CO2	CO2	CO2	CO3	CO3	CO3	CO3	CO4	CO4	CO4	CO4	CO5	CO5	CO5	CO5					
1	123		2	2	3		2	1	1		2	2	2		0	0	2	1		2		7	4	6	2	3
2	123		1	2	3		2	0	1		2	2			1	1	2	2		3		6	3	4	4	5
3	123		2	2		2		3	1		2	2			1	3		2		3		4	6	4	4	5
4	123			3	3		2	3	1		2	3	3		1	0		2		3		6	6	8	1	5
5	123		2	3	3		2	0	1		2	3	3		1	0	2	2		1		8	3	8	3	3
Average																						6.2	4.4	6	2.8	4.2
Number of Students getting marks greater than Average marks of CO (Target)																						2	2	3	3	3
CO Attainment Level																						1	1	2	2	2

CO Attainment (EE32007-Theory)

COs	CO1	CO2	CO3	CO4	CO5
CIE [MST I(10) Objective(%)]	3				
CIE [MST I(10) Subjective(%)]	3				
CIE[MST-II(20)]		2	3	3	
CIE[QUIZ(10)]	1				
CIE[Assignment(10)]	2	2			
Average CIE (%)	2.25	2	3	3	
End Semester Exam (ESE) (%)	1	1	2	2	2
Direct Attainment CIE(30%) + ESE(70%)	1.38	1.30	2.3	2.3	1.4
Indirect Attainment (Feedback)(%)	2.4	2.31	2.28	2.31	2.28
CO Attainment [Direct (80%)+Indirect(20%)]	1.58	1.50	2.3	2.3	1.58

CO- Attainment Tools*
(Laboratory)

Direct Assessment Tools for Course Outcome

- Report Assessment
- Quiz
- Internal Viva
- External Viva
- Laboratory Project

Indirect Assessment Tools for Course Outcome

- Students Feedback

*Faculty can include more tools, if required

Sample Report Assessment (EE32007-Laboratory)

Exp. No.			EXP.1	EXP.2	EXP.3	EXP.4	EXP.5	EXP.6	EXP.7	EXP.8	EXP.9	EXP.10	CO1	CO2	CO3	CO4
CO			1,2	1,2	1,2,4	1,3,4	1,3,4	1,3,4	1,2,4	1,2,4	1,2,4	1,2				
S.no	ENROLLMENT NO.	STUDENT NAME	2	2	2	2	2	2	2	2	2	2	7.6	5.4	2.0	4.7
1	0801BM191020	Divyansh Sapkale	2	2	2	2	1	2	1	2	1	2	6.6	4.8	1.7	3.7
2	0801CE191033	Disha Sondhiya	2	2	1	1	2	2	1	2	2	2	6.6	4.8	1.7	3.7
3	0801EE191001	Adesh Pathak	2	2	2	2	2	1	2	1	2	1	6.5	4.6	1.7	4.0
4	0801EE191002	Aditi Agrawal	2	2	2	2	2	2	1	2	1	1	6.5	4.3	2.0	4.0
5	0801EE191003	Aditi Namdeo	2	2	2	2	1	1	2	1	2	2	6.6	5.1	1.3	3.7
	Average												6.6	4.7	1.7	3.8
	Number of Students getting marks greater than Average marks of CO (Target)												2	3	4	2
	CO Attainment Level												1	2	3	1

Sample Laboratory Project Assessment (EE32007-Laboratory)

S.no.	Enrollment No.	Students Name	Laboratory Project				
			Working model	Report	Team Activity	**CO4**	**CO5**
			CO5	CO4	CO5	**3**	**7**
			4	**3**	**3**		
1	0801BM191020	Divyansh Sapkale	4	3	3	3	6
2	0801CE191033	Disha Sondhiya	4	3	3	3	6
3	0801EE191001	Adesh Pathak	4	3	3	3	7
4	0801EE191002	Aditi Agrawal	4	3	3	3	7
5	0801EE191003	Aditi Namdeo	4	3	3	3	6
AVERAGE						**2.82**	**6.58**
Number of Students getting marks greater than Average marks of CO (Target)						**5**	**2**
CO Attainment Level						**1**	**3**

Sample Internal Viva Assessment (EE32007-Laboratory)

S.no.	Enrollment No.	Students Name	Internal Viva								
			Technical	Analytical	Impact on Society/Environment	Confidence	CO1	CO2	CO3	CO4	CO5
			CO1,CO2, CO3,CO4	CO1,CO2,CO3,CO4	CO1,CO2,CO3,CO4	CO1,CO2, CO3,CO4					
			4	3	2	1	2.5	2.5	2.5	2.5	2.5
1	0801BM191020	Divyansh Sapkale	2	2	1	1	1.5	1.5	1.5	1.5	1.5
2	0801CE191033	Disha Sondhiya	2	1	1	0	1	1	1	1	1
3	0801EE191001	Adesh Pathak	3	2	2	1	2	2	2	2	2
4	0801EE191002	Aditi Agrawal	3	2	2	1	2	2	2	2	2
5	0801EE191003	Aditi Namdeo	2	2	1	1	1.5	1.5	1.5	1.5	1.5
Average							1.6	1.6	1.6	1.6	1.6
Number of Students getting marks greater than Average marks of CO (Target)							2	2	2	2	2
CO Attainment Level							1	1	1	1	1

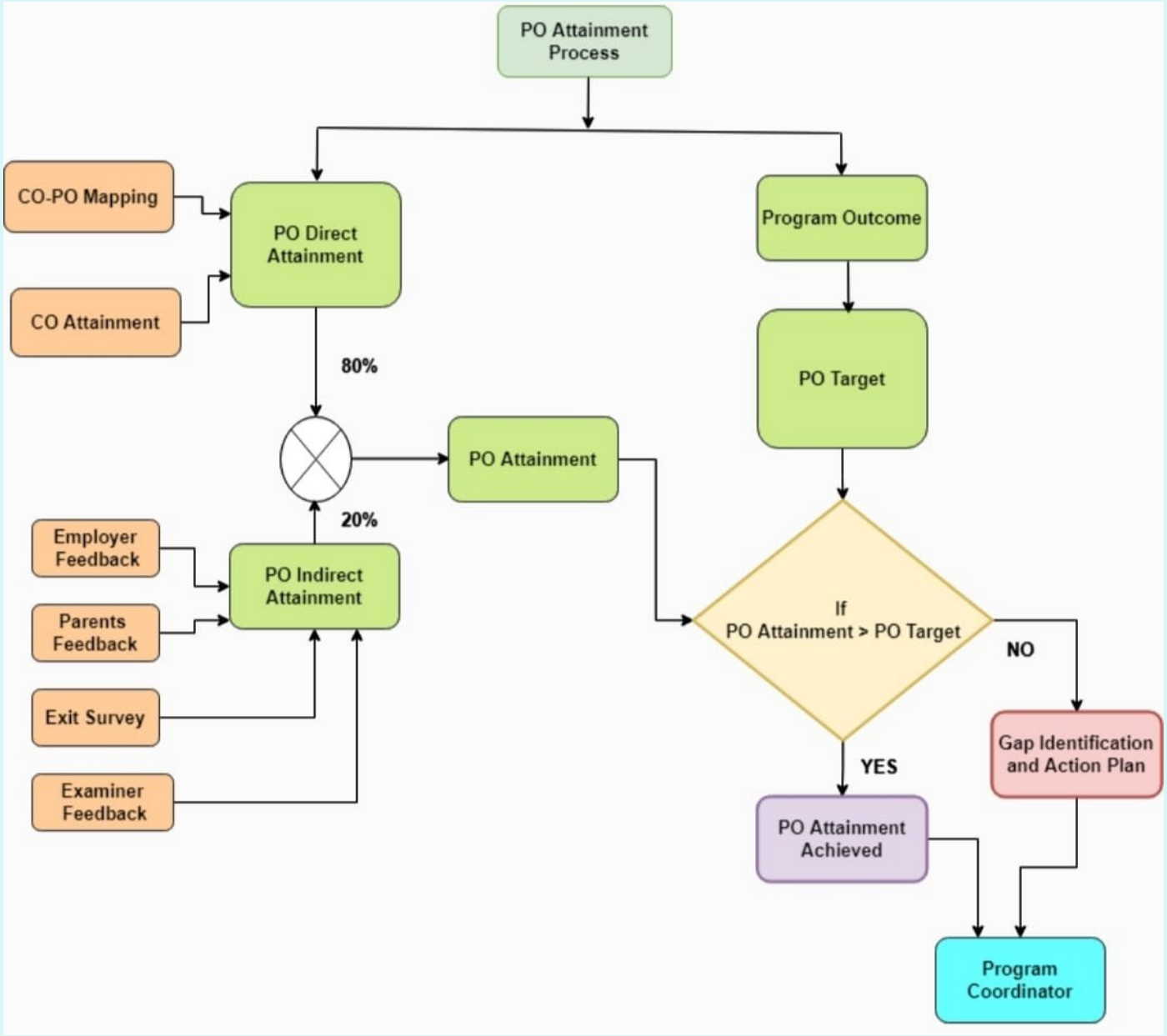
Sample CO Attainment (EE32007-Laboratory)

COs	CO1	CO2	CO3	CO4	CO5
CIE[Internal Viva]	1	1	1	1	1
CIE[Report and Report Questions]	1	2	3	1	
CIE[Quiz-I]	2	2	1		
CIE[Quiz-II]		2	3		
CIE[Lab Project]				1	3
Average CIE	1.33	1.75	2	1	2
ESE[End Sem Lab Quiz]	3	1	3		
ESE[End Sem Lab Viva]	2	2	1	3	2
Average ESE	2.5	1.5	2	3	2
Direct Attainment [CIE(40%) + ESE(60%)]	*2.03*	*1.6*	*2*	*2.2*	*2*
Indirect Attainment (Feedback)	3	3	2	2	2
CO Attainment [Direct (80%)+Indirect(20%)]	2.22	1.88	2	2.8	2

CO Attainment Gap Identification and Action Taken Report (EE32007-Theory)

CO	CO Threshold (65%)	CO Attainment	Gap Identification	Action Taken
CO1	1.95	1.58	-0.37	Device data sheet interpretation of Power Semiconductor devices physically.
CO2	1.95	1.50	-0.45	Designing of various rectifier circuits to be carried out with some more examples.
CO3	1.95	2.3	+0.35	Designing of various firing circuits for Power Semiconductor devices with some more design problems.
CO4	1.95	2.3	+0.35	Seminar on application of dual converters.
CO5	1.95	1.58	-0.37	Expert talk on power quality issues of AC converters.

Process for Attainment of Program Outcome (POs)



PO Direct Attainment (EE32007-Theory)

EE- 32007		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	1.58	1.58	-	-	0.53	-	-	-	-	-	-	-
	CO2	-	1.50	1.50	0.50	0.50	-	-	-	-	-	-	-
	CO3	2.3	2.3	-	-	0.77	-	-	-	-	-	-	-
	CO4	2.3	2.3	2.3	0.77	0.77	-	-	-	-	-	-	-
	CO5	1.58	1.58	1.58	-	0.53	-	-	-	-	-	-	-
PO Direct Attainment (Average)		**1.94**	**1.85**	**1.8**	**0.64**	**0.62**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO1	CO2	CO3	CO4	CO5
*CO Attainment (%)	1.58	1.50	2.3	2.3	1.58

Sample PO Direct Attainment (EE32007-Laboratory) (Attain_COy-POx)

EE-32007		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	2.22*	1.48	2.22	2.22	2.22	2.22	-	2.22	2.22	1.48	-	-
	CO2	1.88	-	1.88	1.88	1.88	1.88	-	1.88	1.88	-	-	-
	CO3	2	1.33	-	2	2	2	-	2	2	1.33	-	-
	CO4	2.8	1.87	2.8	2.8	2.8	2.8	-	2.8	2.8	1.87	-	-
	CO5	2	-	-	2	2	2	-	2	2	-	-	-
PO Direct Attainment (Average)		2.18	1.56	2.3	2.18	2.18	2.18	-	2.18	2.18	1.56	-	-

** Attain_COy-POx = Articulation_COy-POx X Attain_COx / 3*

	CO1	CO2	CO3	CO4	CO5
CO Attainment (Attain_COx)	2.22	1.88	2.0	2.8	2.0

Sample of PO Indirect Attainment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Exit Survey	2.56	2.56	2.54	2.54	2.62	2.6	2.6	2.61	2.67	2.61	2.6	2.6
Parents Feedback	2.4	2.4	2.4	2.4	2.48	2.37	1.9	1.9	1.9	1.38	1.64	1.64
Examiner Feedback	2.7	2.7	2.325	2.4	2.475	2.325	2.175	2.25	2.55	2.4	2.55	2.625
Employer feedback	2.1	2.4	2.4	1.8	1.8	1.8	2.4	2.1	2.4	2.2	2	1.5
PO Indirect Attainment	**2.44**	**2.52**	**2.42**	**2.29**	**2.34**	**2.27**	**2.27**	**2.22**	**2.38**	**2.15**	**2.20**	**2.09**

Sample Direct PO Attainment for EE32007

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PO Direct Attainment (Th)	**1.94**	**1.85**	**1.8**	**0.64**	**0.62**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
PO Direct Attainemnt (Lab)	**2.18**	**1.56**	**2.3**	**2.18**	**2.18**	**2.18**	**-**	**2.18**	**2.18**	**1.56**	**-**	**-**
PO Direct Attainment (Th+Lab) of EE32007	2.06	1.70	2.05	1.41	1.40	2.18	-	2.18	2.18	1.56	-	-

Sample PO Final Attainment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE32007	2.06	1.70	2.05	1.41	1.40	2.18	-	2.18	2.18	1.56	-	-
EE32005	2.0	2.35	1.65	2.5	0.6	1.72	2.01	1.8	2.4	1.6	2.8	1.3
EE												
EE												
Average PO Attainment	**2.05**	**1.95**	**2.14**	**1.75**	**1.86**	**1.42**	**2.35**	**2.46**	**1.74**	**2.56**	**0.7**	**2.15**
PO Indirect Attainment	**2.44**	**2.52**	**2.42**	**2.29**	**2.34**	**2.27**	**2.27**	**2.22**	**2.38**	**2.15**	**2.20**	**2.09**
Final PO Attainment Direct (80%)+ Indirect (20%)	2.14	1.86	2.12	1.59	1.59	2.2	2.35	2.41	1.87	2.48	1.0	2.14

PO GAP Analysis for AY 2021-22

PO#	PO Target	PO Attainment	GAP (Target – Attainment)	Action Taken
PO1	1.95	1.86	0.09	Addional tutorial classes for basic sciences and their fundamentals have been arranged for the first year students.
PO2	1.95	1.87	0.08	Several practical experiments are conducted
PO3	1.95	1.71	0.24	Tutorial sheets have been designed
PO4	1.95	1.41	0.54	Students are groomed to search application areas
PO5	1.95	1.33	0.62	utilize the facility of CIDI
PO6	1.95	1.08	0.87	create the social awareness
PO7	1.95	0.84	1.11	NSS and other programs are conducted
PO8	1.95	0.76	1.19	The role and significance of ethics
PO9	1.95	0.92	1.03	encouraged to participate in team/ group activities
PO10	1.95	1.04	0.91	Classes on English communication
PO11	1.95	0.82	1.13	Include project management and financial courses
PO12	1.95	1.03	0.92	Seminars by eminent professionals

PSO GAP Analysis for AY 2021-22

PSO#	PSO Target	PSO Attainment	GAP (Target – Attainment)	Action Taken
PO1	1.95	1.50	0.45	Demonstrate ability to apply fundamental knowledge of mathematics, science and engineering
PO2	1.95	1.70	0.25	Training programmes for use of software are conducted
PO3	1.95	1.56	0.39	Expert lectures from professionals from diversified domain arescheduled

Thank you