

2.6.2 Process for calculating Attainment of COs , POs and PSOs

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Department of Electronics Engineering

1) Mapping of Course outcomes with program outcomes

PROGRAM OUTCOMES (POs)

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.

Sample subject : DSP Processor &Architecture

Subject	Course Outcomes	Program Outcomes											
		1	2	3	4	5	6	7	8	9	10	11	12
DSP Processor &Architecture	1. To understand the fundamental of basic Programmable DSPs and data types.	2	2	3	3	2	3				2	2	3
	2. To describe the detailed architecture, bus structure and addressing modes of TMS320C5X DSP processor.	2	2	3	3	2	3				2	2	3
	3. To understand and make use of Assembly Language Instructions to design simple ALP and describe operations of DSP starter kit.	2	2	3	3	2	3				2	2	3
	4. To describe the detailed architecture and addressing modes of TMS320C54X DSP processor.	2	3	2	2	2	2				2	2	3
	5. To compare the various advanced Programmable DSPs and understand the Code Composer Studio.	2	3	2	2	2	2				2	2	3
	6. To design multi-rate filters and evaluate performance of DFT and FFT for filtering data sequences.	2	2	2	3	3	1				2	2	3
Average		2	3	2	3	2	2				2	2	3

2) Mapping of Course outcomes with program specific outcomes of Electronics Dept**Program Specific Outcomes (PSOs)****Engineering Graduates will be able to:**

1. To identify, formulate and analyze the problems in Electronics Engineering by using principles of Mathematics and Engineering fundamentals.
2. Applying Electronics Engineering knowledge to design a system, analyze and interpret data to obtain valid conclusions.
3. Use of various Simulation tools such as Tanner Tool, MATLAB, MULTISIM, ORCAD etc for design and analysis of various systems.

Subject	Course Outcomes	Program specific outcomes		
		1	2	3
DSP Processor & Architecture	1. To understand the fundamental of basic Programmable DSPs and data types.	2	2	2
	2. To describe the detailed architecture, bus structure and addressing modes of TMS320C5X DSP processor.	3	1	2
	3. To understand and make use of Assembly Language Instructions to design simple ALP and describe operations of DSP starter kit.	2	3	3
	4. To describe the detailed architecture and addressing modes of TMS320C54X DSP processor.	2	3	2
	5. To compare the various advanced Programmable DSPs and understand the Code Composer Studio.	3	3	3
	6. To design multi-rate filters and evaluate performance of DFT and FFT for filtering data sequences.	2	2	2
Average		2	3	2

3) Program level Course- PO matrix

Sem/Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Sem-I &II												
Applied Mathematics-I	3	3	2	3	1		1			1		
Engineering Physics	3	3	3	3	1	3	2	2	1	3		3
Engineering Chemistry	2	1	2	1	1	2	2	1		2		2
Basic Electrical Engineering	2	3	2	3		1	2	1		1	1	3
Basics of Civil Engineering	2	3	3	1	1	3	3	2	1	1	1	2
Engineering Graphics -1–	3	3	3	3	3	2	2	2	3	3	3	2
Communication Skill			2	1	1	2	2	2	2	3	1	3
Applied Mathematics -II	3	3	1	2	2	1	1			1	1	
Advanced Physics	3	3	3	3	1	3	2	2	1	3		3
Materials Chemistry	2	1	2	2		2	2	2				2
Engineering Mechanics	3	3	1	3	1	2	1	1	2	1	2	3
Advanced Electrical Engineering	2	2	3	2		1	2	1		1	1	2
Engineering Graphics -II	3	3	3	3	3	2	2	2	3	3	3	2
SEM III												
-Applied Mathematics III	3	2		3	2		1		1	3		1
Electronic Devices And Circuits	3	3		3	2					2	2	2
Electronic Measurements & Instrumentation	2	2	3	3	2	2		3		3	2	2
Network analysis and synthesis	3	3										
Object oriented programming & Data Structure	3	3		2	2	3				3	2	3
SEM IV												
Applied Mathematics IV	3	3		2							1	1
Digital Circuits & Fundamental of Microprocessors	3	3	2	3	3	2	1		1		1	1
Signals & Systems	3	2	2	3	2	2		1		3	2	3

Sem/Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Electromagnetic Fields	3	3	2	3	3	2			2	2	2	2
Power Devices and Machines	3	3		3		2			1	1	2	2
SEM V												
Switching Theory & Antenna	3	2	2	3	2	2		1				1
Analog Circuits & Design	3	3	2	2		2	3	1	3	2	1	2
Engg Economics & Ed	3	2	2			3	2	3	3	2	2	
Communication Electronics	3	3	2	2	3			1	1	2	1	1
Microprocessor & Microcontroller	3	2	2	3				1		2		2
SEM VI												
Microwave Engineering	2	1	2	1	1	1	1	2	1	2	2	2
Control System Engineering	3	3	1	3			1	1	1		2	2
Digital Signal processing	3	3	3	3	1	1	2	1	1	2	3	3
Functional English						2			3	2	3	2
Digital Communication	3	2	2	2	2	3	2	1	2	1	1	2
SEM VII												
DSPA & Arch	2	3	2	3	2	2				2	2	3
Optical Communication	3	3	2	3	3		2	2	1	1	1	1
Embedded System	2	3	3	2	3	3	2	1	1		2	1
ADSD	3	3	2	3	3	2	3	2	2	2	3	2
Mobile Communication	3	3	2	1	1	2	2	1	1	2	2	3
DIP	3	3	3	3	3	2						1
SEM VIII												
Computer Communication Network	3	2	3	2	2	3	2	2	2	2	1	2
MEMS	3	2	3	3	2	1		1	1	1	1	
CMOS	3	3	2	3	3	2	1		1		1	1
WSN	3	2	3	3	3	3	2	3	3	3	2	3
DCE	3	3	2	2	2	3				1	1	3

4) Method of Measuring Attainment of CO:

CO attainment is measured in terms of actual percentage of students getting set (target) percentage of marks. If targets are achieved then all the course outcomes are attained for that year. If targets are not achieved, the Programme put in place an action plan to attain the target in subsequent years.

- The attainment levels are set considering average performance levels in all examinations throughout the semester or year. Attainment level is measured in terms of student performance in internal assessments with respect to the COs of a course and the performance in the University examination.
- Attainment levels are stated in terms of percentage of students getting more than the targeted average marks.
- Assessment Tools, process, and levels for CO attainment used are given in following tables.

iii) Assessment Tools used:

- ☐ **Home Assignment**-Each and every student is assigned with course related tasks during every course work .twice and assessment will be done based on their performance. Grades are assigned depending on their innovation in solving the problems.
- ☐ **Class Assessment Test**-This type of performance assessment is carried out during the examination sessions which are held twice a semester. Each test is focused in attaining the course outcomes.
- ☐ **Semester End Examination**-Semester End examination is a metric for assessing whether all the COs are attained or not. Examination is more focused on attainment of course outcomes and program outcomes using a descriptive exam.
- ☐ **Project Evaluation**- Project review seminars are conducted twice in a semester and are evaluated by internal and external evaluators.
- ☐ **Laboratory Assessment**- Each experiment is assessed by the subject teacher on different parameters like performance of experiment and oral questions. Grades are assigned to each experiment based on continuous assessment.
- ☐ **Student portfolios**- Department has a student forum, various portfolios are assigned to the students like president, vice president, secretary, treasurer, various committees are also formed like technical committee, discipline committee etc. Students are members of these committees. Curricular and extracurricular activities are conducted by these students under the supervision of teachers.

Assessment Tools	Assessment criterion	Process for data Collection
CAT-1	CAT-1 is based on first two units of the syllabus. 3 Questions are asked based on unit 1 & 2 of the syllabus.	Evaluation of the test copies and the score of the students out of 20.
CAT-2	CAT-2 is based on next two units of the syllabus. 3 Questions are asked based on unit 3 & 4 of the syllabus.	Evaluation of the test copies and the score of the students out of 20.
Assignment-1	Based on Unit No. 1, 2 & 3. Questions are given for home assignments.	Evaluation of assignment copies and grades scored by the students.
Assignment-2	Based on Unit No. 4,5 & 6. Questions are given for home assignments.	Evaluation of assignment copies and grades scored by the students.
Sessional Exam	Two sets of Question papers as per the university pattern are given in the sessional exams on complete syllabus	Evaluation of answer sheets solved by the students and marks scored by the students out of 80.
Project	Seminars are conducted through out the session and performance is evaluated by the reviewers and guide based on the rubrics defined.	Rubrics Evaluation sheet
Students portfolios	Performance is evaluated from active participation of students in co-curricular and extra curricular activities through out the year.	Feedback from respective Faculty Incharges.

iv) **Course Attainment Level**

Assessment Tool	Assessment Tool	Year	Level 1 Slightly (LOW)	Level 2 Moderately (MEDIUM)	Level 3 Substantially (HIGH)
with weightage					
Internal Assessment (20%)	CAT_1, CAT_2 and Sessional Exam	2nd	40% student scoring more than 40% marks	50% student scoring more than 40% marks	60% student scoring more than 40% marks
		3rd	40% student scoring more than 45% marks	50% student scoring more than 45% marks	60% student scoring more than 45% marks
		4th	40% student scoring more than 50% marks	50% student scoring more than 50% marks	60% student scoring more than 50% marks
	Assignment 1&2	2nd, 3rd and 4th	40% student scoring more than 80% marks (Grade A)	50% student scoring more than 80% marks (Grade A)	60% student scoring more than 80% marks (Grade A)
	Project	4th	60 % of students scoring more than 75% marks	70 % of students scoring more than 75% marks	80 % of students scoring more than 75% marks
University Assessment (80%)	University Result	2nd	40% student scoring more than 30% marks	50% student scoring more than 30% marks	60% student scoring more than 30% marks
		3rd	40% student scoring more than 35% marks	50% student scoring more than 35% marks	60% student scoring more than 35% marks
		4th	40% student scoring more than 40% marks	50% student scoring more than 40% marks	60% student scoring more than 40% marks

5) Average attainment levels of COs of all subject

Sem/Course Name	Attainment through University Examination	Attainment through Internal assessment	80% weightage to University Exam	20% weightage to Internal assessment	Average Attainment Level of CO
SEM III			a	b	a+b
Applied Mathematics III	2	1.16	1.8	0.39	2.19
Electronic Devices And Circuits	3	1.59	2.4	0.31	2.71
Electronic Measurements & Instrumentation	0	1.77	0	0.35	0.35
Network analysis and synthesis	0	2.22	0	0.44	0.44
Object oriented programming & Data Structure	3	1.31	2.4	0.31	2.71
SEM IV					
Applied Mathematics IV	3	1.5	2.4	0.3	2.7
Digital Circuits & Fundamental of Microprocessors	3	2	2.4	0.4	2.8
Signals & Systems	3	2.83	2.4	0.57	2.97
Electromagnetic Fields	3	1.6	2.4	0.32	2.72
Power Devices and Machines	3	1.5	2.4	0.3	2.7
SEM V					
Industrial Economics & Entrepreneurship Development	1	2.27	0.8	0.45	1.25
Analog Circuits & Design	2	1.88	2.4	0.37	2.77
Switching Theory & Autometa	0	1.63	0	0.32	0.32
Communication Electronics	1	1.43	0.8	0.28	1.085
Microprocessor & Microcontroller	0	1.72	0	0.32	0.32
SEM VI					
Microwave Engineering	1	1.43	0.8	0.28	1.08
Control System Engineering	0	1.13	0.8	0.22	1.02
Digital Signal processing	2	1.71	1.6	0.33	1.93
Functional English	3	2.16	2.4	0.43	2.83
Digital Communication	1	1.22	0.8	0.24	1.04
SEM VII					

Sem/Course Name	Attainment through University Examination	Attainment through Internal assessment	80% weightage to University Exam	20% weightage to Internal assessment	Average Attainment Level of CO
DSPA&A	3	1.93	2.4	0.38	2.78
Optical Communication	3	1.94	2.4	0.36	2.78
Embedded System	3	1.27	2.4	0.25	2.65
ADSD	1	2.6	0.8	0.41	1.21
MCOM	3	1.63	2.4	0.44	2.84
DIP	1	1.61	0.8	0.32	1.12
SEM VIII					
MEMS	3	2.58	2.4	0.51	2.91
CMOS	3	2.47	2.4	0.49	2.89
WSN	0	1.47	0	0.29	0.29
DCE	3	1.33	2.4	0.26	2.66
Computer Communication Network	3	1.65	2.4	0.37	2.77

6) Attainment of POs and PSOs

- Program Outcomes are defined by National Board of Accreditation, New Delhi while the Program Specific Outcomes (PSOs) are defined by individual programs. COs are mapped with Program outcomes and Program Specific Outcomes (PSOs).
- The PO and PSO attainment is calculated for complete batch of students which progresses through all the courses of a particular program including Co-curricular and Extra-curricular activities and the project work. The attainment is calculated based upon the association level, i.e., low-moderate-high, of a particular course/ CO/ activity with respect to the PO or PSO in the scale of 1-3.

i) Method of Measuring Attainment of PO and PSO:

The step by step process for assessing program outcomes and Program Specific Outcomes is listed below.

Step 1: The Program assessment committee analyses each outcome into elements (different abilities specified in the outcome) and a set of attributes are defined for each element (actions that explicitly demonstrate mastery of the abilities specified). In addition, generate well designed surveys to assess the outcome.

Step 2: For each outcome define performance indicators (Assessment criteria) and their targets.

Step 3: Identify/select courses that address the outcome (each course contributes to at least one of the outcomes). Hence, each outcome is assessed in several courses to ensure that students acquire an appropriate level in terms of knowledge/skills of an outcome.

Step 4: The Class coordinators collect the qualitative and quantitative data used for outcome assessment in a continual process.

Step 5: The Program assessment committee analyzes the collected data. If the assessed data meets the performance targets which are specified in step 2, the outcome is attained. Otherwise, consider step 6.

Step 6: The Department Advisory Board recommends steps to improve the attainment level of COs and POs like content delivery methods, extra classes, improvement tests as needed.

ii) Direct and indirect assessment tools are used and are shown in the Table below.

	Assessment Method	Assessment Tool	Source for data Collection	Frequency of Assessment tools
PO/PSO	Direct Assessment (80%)	Internal Assessment of the Courses related to the respective PO	Average CO attainment level calculated	Throughout the semester
		University Assessment of the Courses related to the respective PO		
	Indirect Assessment (20%)	Project & EWS Project	Marks given by the project guide and reviewer	
		Graduate survey and Alumni Survey	Analysis of survey forms	End of the Academic Year
		Co-curricular Activities	Responses from Participants	Throughout the semester
		Industrial Visit / Industrial Training		

7)PO Attainment for Session 2015-16

Course	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P O 11	P O 12
SEM III (CBS)												
Applied Mathematics III	2.19	2.19		2.19	2.19					2.19		
Electronic Devices And Circuits	2.75	2.75		2.75	2.75					2.75	2.75	2.75
Electronic Measurements & Instrumentation	0.42	0.42	0.42	0.42	0.42	0.42		0.42		0.42	0.42	0.42
Network analysis and synthesis	0.44	0.44										
Object oriented programming & Data Structure	2.71	2.71		2.71	2.71	2.71				2.71	2.71	2.71
SEM IV (CBS)												
Applied Mathematics IV	2.7	2.7	2.7	2.7						2.7		
Digital Circuits & Fundamental of Microprocessors	2.8	2.8	2.8	2.8	2.8	2.8						
Signals & Systems	2.97	2.97	2.97	2.97	2.97	2.97				2.97	2.97	2.97
Electromagnetic Fields	2.72	2.72	2.72	2.72	2.72	2.72			2.72	2.72	2.72	2.72
Power Devices and Machines	2.7	2.7		2.7		2.7					2.7	2.7
SEM V (CBS)												
Industrial Economics & Entrepreneurship Development	1.25	1.25	1.25			1.25	1.25	1.25	1.25	1.25	1.25	
Analog circuits & design	2.77	2.77	2.77	2.77		2.77	2.77		2.77	2.77		2.77
Switching theory and automata	0.32	0.32	0.32	0.32	0.32							
Communication electronics	1.08	1.08	1.08	1.08	1.08					1.08		
Microprocessor & Microcontroller	0.32		0.32							0.32	0.32	0.32
SEM VI (CBS)												
Microwave engginering	1.08	1.08	1.08	1.08		1.08				1.08	1.08	1.08
Control System Engineering	1.02	1.02		1.02							1.02	1.02
Digital Signal processing	1.96	1.96	1.96	1.96			1.96			1.96		

Course	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	P O 11	P O 12
Functional English	-					2.83			2.83	2.83	2.83	2.83
Digital Communication	1.04	1.04	1.04	1.04	1.04	1.04	1.04		1.04			1.04
Electronic Workshop Practice	3	3	3	3	3	3	3	3	3	3	3	3
SEM VII												
ADSD	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
OC	2.78	2.78	2.78	2.78		2.78		2.78	2.78			
DSPA&A	2.79	2.79	2.79	2.79	2.79	2.79				2.79	2.79	2.79
MCOM	2.73	2.73	2.73			2.73	2.73			2.73	2.73	2.73
ES	2.65	2.65	2.65	2.65	2.65	2.65	2.65				2.65	
DIP	1.12	1.12	1.12	1.12	1.12	1.12						
SEM VIII												
DCE	2.67	2.67	2.67	2.67	2.67	2.67						2.67
MEMS	2.81	2.81	2.81	2.81	2.81							
CCN	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73		2.73
CMOS&VLSI	2.84	2.84	2.84	2.84	2.84	2.84						
WSN	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Project	3	3	3	3	3	3	3	3	3	3	3	3
Average Direct Attainment	2.16	2.03	1.85	2.29	2.25		2.44	2.56			2.12	
80% of Direct Attainment	1.72	1.62	1.48	1.83	1.80		1.95	2.05			1.69	
Indirect Attainment	3	3	3	3	3	3	3	3	3	3	3	3
20% of Indirect Attainment	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overall Attainment	2.32	2.22	2.08	2.43	2.40		2.55	2.65			2.29	
% Overall Attainment	77.6	74.15	69.33	81.13	80.13		85.06	88.33			76.57	

Direct attainment level of a PO is determined by taking average across all courses addressing that PO. Fractional numbers may be used for example 1.55.

Indirect attainment level of a PO is determined based on the graduate surveys and alumni surveys.

The program outcomes are assessed with the help of course outcomes of the relevant courses through direct and indirect methods. Direct measures are provided through direct examinations or observations of student knowledge or skills against measureable course outcomes. The knowledge and skills described by the course outcomes are mapped to specific problems on internal exams/home assignment/group task. Throughout the semester the faculty records the performance of each student on each course outcome.

Program Outcomes Assessment and Attainment (Session 2015-16)

Direct Assessment of PO

Program outcome 1: Engineering Knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.

The program assessment committee reviews all course outcomes of the courses which are relevant to this PO. Specifically the task is to review the course outcome assessment results towards PO assessment for each course and to draw some conclusion on how the program outcomes are attained. This program outcome is considered as two sub program outcomes namely ability of applying the knowledge of mathematics and sciences and Engineering/Computing fundamentals. The abilities are broadly assessed with programming skills, logical thinking, problem solving and design of engineering problems. The student ability in applying knowledge of mathematics/Science principles to provide numerical solution to model the problem is evaluated with course outcomes towards tabulated courses.

Tools for assessment are both direct and indirect tools which are specified in the Table below.

	Assessment Method	Assessment Tool	Source for data Collection	Attainment Criterion	Frequency of Assessment
PO-1	Direct Assessment (80%)	Internal Assessment of the Courses related to PO1	Average CO attainment level calculated.	Defined in point no.	During the Semester
		University Assessment of the Courses related to PO1			
	Indirect Assessment (20%)	Project	Project Evaluation Sheet	% of students scoring more than 80% marks	End of the Semester
		Graduate survey and Alumni Survey	Analysis of survey forms	% of satisfactory responses	End of the Academic Year

Direct PO attainment is calculated from CO attainment of the courses addressing PO-1 .CO attainment is calculated from the process already described above. Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.

		Relevant Courses:	Average CO Attainment
I SEM	C101T	Applied Mathematics–I	3
	C102T	Engineering Physics	3
	C103T	Engineering Chemistry	3
	C104T	Basic Electrical Engineering	3
	C105T	Basic Civil Engineering	2
II SEM	C107T	Applied Mathematics–II	3
	C108T	Advanced Physics	3
	C109T	Materials Chemistry	3
	C1010T	Engineering Mechanics	1
III Sem	BEENE302T	Electronic Devices And Circuits	2.75
	BEENE301T	Applied Mathematics III	2.19
	BEENE305T	Network analysis and synthesis	0.44
	BEENE303T	Electronic Measurements & Instrumentation	0.42
	BEENE304P	Object oriented programming & Data Structure	2.71
IV SEM	BEENE401T	Applied Mathematics IV	2.7
	BEENE404T	Digital Circuits & Fundamental of Microprocessors	2.8
	BEENE405T	Signals & Systems	2.97
	BEENE403T	Electromagnetic Fields	2.7
	BEENE402T	Power devices and Machines	2.7

V Sem	BEENE505T	IEED	1.25
	BEENE503T	Analog Circuits & Design	2.77
	BEENE504T	Communication Electronics	1.08
	BEENE502T	Microprocessor & Microcontroller	0.32
	BEENE501T	Switching theory and automata	0.32
VI Sem	BEENE602T	Digital Signal processing	1.96
	BEENE604T	Digital Communication	1.04
	BEENE601T	Microwave communication	1.08
	BEENE603T	Control System Engineering	1.02
VII Sem	BEENE704T	ADSD	1.21
	BEENE701T	DSPAA	2.79
	BEENE705T	DIP	1.12
	BEENE703T	Optical communication	2.78
	BEENE705T	Mobile communication	2.73
	BEENE702T	ES	2.65
VIII sem	BEENE801T	MEMS	2.81
	BEENE805T	DCE	2.67
	BEENE802T	Computer communication network	2.73
	BEENE803T	CMOS	2.84
	BEENE805T	WSN	2.80
Total Average of Direct Assessment:			2.16

Indirect Assessment of PO-1,

Indirect PO assessment is done using assessment tools like graduate survey, alumni survey, projects etc .as described in following table.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Graduate survey	Have you learned the fundamental principles underlying the major areas of mathematics and sciences in your courses?	78	74	3
	Have you applied knowledge of mathematics, science and engineering / computing, fundamentals in solving Engineering problems in your program?	78	77	3
Alumni survey	What is your general impression of the Bachelor's degree program in Mathematics and Sciences?	22	20	3
	Are you able to develop a broad appreciation for mathematics and science both as a discipline and as a tool for solving real world problems?	22	20	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Indirect assessment methods to assess Program outcome 1

Average Attainment of PO-1

Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 1	Direct Assessment (80%)	2.16	80 % of 2.16=1.72	1.72+0.6=2.32	77.6
	Indirect Assessment (20%)	3	20% of 3=0.6		

Assessment of Program outcome 1

Program outcome 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.

Direct Assessment of PO-2,

Direct PO attainment is calculated from CO attainment of the courses addressing PO-2 .CO attainment is calculated from the process described in 3.2.1. Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

P O2: 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.			
	Direct Assessment:		Average
I SEM	C101T	Applied Mathematics–I	2
	C102T	Engineering Physics	3

	C103T	Engineering Chemistry	3
	C104T	Basic Electrical Engineering	2.67
	C105T	Basic Civil Engineering	1
II SEM	C107T	Applied Mathematics–II	3
	C108T	Advanced Physics	3
	C109T	Materials Chemistry	2
	C1010T	Engineering Mechanics	3
III Sem	BEENE301T	Applied Mathematics III	2.75
	BEENE302T	Electronic Devices And Circuits	2.19
	BEENE303T	Electronic Measurements & Instrumentation	0.44
	BEENE304T	Network analysis and synthesis	0.42
	BEENE305T	Object oriented programming & Data Structure	2.71
IV SEM	BEENE401T	Applied Mathematics IV	2.7
	BEENE404T	Digital Circuits & Fundamental of Microprocessors	2.8
	BEENE405T	Signals & Systems	2.97
	BEENE403T	Electromagnetic Fields	2.7
	BEENE402T	Power devices and Machines	2.7
V Sem	BEENE503T	Analog Circuits & Design	1.25
	BEENE504T	Communication Electronics	2.77
	BEENE502T	Microprocessor & Microcontroller	1.08
	BEENE501T	Switching theory and automata	0.32
VI Sem	BEENE602T	Digital Signal processing	0.32
	BEENE604T	Digital Communication	1.96

	BEENE603T	Control System Engineering	1.04
VII Sem	BEENE704T	ADSD	1.02
	BEENE703T	OC	1.21
	BEENE701T	DSPPA	2.79
	BEENE705T	MCOM	1.12
	BEENE706T	DIP	2.78
	BEENE702T	ES	2.73
VIII sem	BEENE804T	DCE	2.65
	BEENE801T	MEMS	2.81
	BEENE805T	WSN	2.67
	BEENE802T	Computer communication network	2.73
	BEENE803T	CMOS	2.84
		Total Average of Direct Assessment:	2.03

Indirect Assessment of PO-2,

Indirect PO assessment is done using assessment tools like graduate survey, alumni survey, projects etc .as described in following table.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Graduate survey	PO2: : Are you able to apply engineering knowledge to design experiments ,analyze, and interpret data to obtain valid conclusions?	78	74	3

Indirect Assessment methods

Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 2	Direct Assessment (80%)	2.03	80 % of 2=1.62	1.62+0.6=2.22	74.15
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

1. This outcome is assessed from courses having design projects like Electronic System Design, Analog circuit design, Communication based and mini and main project work etc.
2. The rubrics used for the project assessment are used here which consists of a well defined evaluation process .

Direct Assessment of PO-3

Direct PO attainment is calculated from CO attainment of the courses addressing PO-3 .CO attainment is calculated from the above mentioned process. Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

PO3: 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.			
		Direct Assessment:	Average
I Sem	C101T	Applied Mathematics–I	2.5
	C103T	Engineering Chemistry	3
	C104T	Basic Electrical Engineering	
	C105T	Basic Civil Engineering	2
II Sem	C107T	Applied Mathematics–II	2.33
	C109T	Materials Chemistry	3
	C1010T	Engineering Mechanics	1
		Ethical Sciences	2.2
III Sem	BEENE303T	Electronic Measurements & Instrumentation	0.42
IV SEM	BEENE404T	Digital Circuits & Fundamental of Microprocessors	2.8
	BEENE405T	Signals & Systems	2.97
	BEENE403T	EMF	2.7
V Sem	BEENE503T	Analog Circuits & Design	2.77
	BEENE504T	Communication Electronics	1.08
	BEENE502T	Microprocessor & Microcontroller	0.32
	BEENE501T	STA	0.32
	BEENE505T	IEED	1.25

VI Sem	BEENE602T	Digital Signal processing	1.96
	BEENE604T	Digital Communication	1.04
	BEENE601T	MEW	1.08
VII Sem	BEENE704T	ADSD	1.02
	BEENE703T	OC	1.21
	BEENE701T	DSPPA	2.79
	BEENE705T	MCOM	1.12
	BEENE706T	DIP	2.78
	BEENE702T	ES	2.73
VIII sem	BEENE804T	DCE	2.65
	BEENE801T	MEMS	2.81
	BEENE805T	WSN	2.67
	BEENE802T	Computer communication network	2.73
	BEENE803T	CMOS	2.84
		Total Average of Direct Assessment:	1.853

Indirect Assessment of PO-3,

Indirect PO assessment is done using assessment tools like graduate survey, alumni survey, projects etc .as described in following table.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Graduate survey	PO3: How comfortable are you in identifying and designing an appropriate solution for an engineering problem?	78	74	3

Indirect Assessment methods

Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Allumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment of PO-3

Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 3	Direct Assessment (80%)	1.85	80 % of 1.85=1.48	1.48+0.6=2.08	69.33
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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-4	Assessment Method	Assessment Tool	Source for data Collection	Attainment Criterion	Frequency of Assessment
	Direct Assessment (80%)	Internal Assessment of the Courses related to PO4	Average CO attainment level calculated	Defined in point no.	During the Semester

		University Assessment of the Courses related to PO4			
	Indirect Assessment (20%)	Project	Project Evaluation Sheet	% of students scoring more than 80% marks	End of the Semester
		Graduate survey and Alumni Survey	Analysis of survey forms	% of satisfactory responses	End of the Academic Year

1. There are theory courses available in the curriculum which have supporting laboratory courses for experimentation, interpretation and analysis of related data e.g. Electronic Devices and Circuits, Analog circuit design etc.

- The above outcome is achieved if students score 7 at least 80% of the students successfully complete the theory course along with the supporting laboratory course.
- The result of courses for PO 4 is as given below for its attainment.
- The attainment of above outcome can be assessed by going through practical records and university practical examination results.

Direct Assessment of PO-4

Direct PO attainment is calculated from CO attainment of the courses addressing PO-4 .CO attainment is calculated from the above described process. Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

All practical related subjects :

PO4: 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.			
		Direct Assessment:	Average
I SEM	C102T	Engineering Physics	3
	C104T	Basic Electrical Engineering	2.8
		Engineering Graphics–I	3
II SEM		Advanced Physics	3
	C1010T	Engineering Mechanics	2

III Sem	BEENE302T	Electronic Devices And Circuits	2.75
	BEENE303T	Electronic Measurements & Instrumentation	0.42
	BEENE304T	Object oriented programming & Data Structure	2.71
IV Sem	BEENE404T	Digital Circuits & Fundamental of Microprocessors	2.8
	BEENE402T	Power devices and Machines	2.7
V Sem	BEENE503T	Analog Circuits & Design	2.77
	BEENE504T	Communication Electronics	1.08
	BEENE502T	Microprocessor & Microcontroller	0.32
VI Sem	BEENE602T	Digital Signal processing	1.96
	BEENE704T	ADSD	1.21
VII sem	BEENE701T	DSPAA	2.79
	BEENE702T	ES	2.65
VIII SEM		BEENE803T CMOS	2.84
		BEENE802T CCN	2.73
			2.29

Indirect Assessment of PO-4,

Indirect PO assessment is done using assessment tools like graduate survey, alumni survey, projects etc .as described in following table.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Alumni survey	PO4: Are you able to apply engineering knowledge to design experiments ,analyze, and interpret data to obtain valid conclusions?	22	20	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment of PO-4

Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 4	Direct Assessment (80%)	2.29	80% of 2.29=1.83	2.43	81.13
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

- ☐ This outcome is assessed from design courses, final year projects, laboratory experiments where students learn techniques, skills and use tools of today's engineering practices.
- ☐ The various courses involving laboratory work and design courses use the skills and techniques for development and implementation of systems.

PO5: 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.

		Direct Assessment:	Average
I SEM	C101T	Applied Mathematics–I	3
	C105T	Basic Civil Engineering	2
		Engineering Graphics–I	3
II SEM	C107T	Applied Mathematics–II	3
	C1010T	Engineering Mechanics	2
III SEM	BEENE301T	MIII	2.19
	BEENE302T	Electronic Devices And Circuits	2.75
	BEENE303T	EMI	0.42
IV SEM	BEENE304T	Object oriented programming & Data Structure	2.71
	BEENE405T	Signal & System	2.97
	BEENE404T	Digital Circuits & Fundamental of Microprocessors	2.8
	BEENE403T	Electromagnetic Field	2.7
V Sem	BEENE504T	Communication Electronics	1.08
	BEENE501T	Switching theory and automata	0.32
VI Sem	BEENE604T	Digital Communication	1.04
VII sem	BEENE701T	DSPAA	2.79

VIII SEM	BEENE703T	OC	2.78
	BEENE702T	ES	2.65
	BEENE704T	ADSD	1.21
	BEENE706T	DIP	1.12
	BEENE802T	CCN	2.73
	BEENE803T	CMOS	2.84
	BEENE804T	WSN	2.80
	BEENE801T	MEMS	2.81
	BEENE805T	DCE	2.67
			2.25

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey .as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

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Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Alumni survey	PO5:How satisfied are you in using new software/environment?	22	20	3
Graduate survey	PO5: Given a new tool or environment how comfortable are you to utilize and develop with it?	78	74	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3

Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 5	Direct Assessment (80%)	2.25	80 % of 2.27=1.80	1.8+0.6=2.40	80.13
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

- The fifth semester students also undergo a course on Engineering Economics and Industrial Management where they are exposed to management related issues.
- This outcome is satisfied if more than 75% students are involved in extracurricular and co-curricular activities

PO6: 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.			
Direct Assessment:			Average
I SEM	C105T	Basic Civil Engineering	2
II SEM		Ethical Sciences	2

III SEM	BEENE303T	EMI	0.42
	BEENE304T	OODS	2.71
IV SEM	BEENE404T	DCFM	2.8
	BEENE405T	SS	2.97
	BEENE403T	EMF	2.7
	BEENE402T	PDMC	2.7
V Sem	BEENE503T	ACD	2.77
	BEENE504T	CE	1.08
	BEENE505T	Industrial Economics & Entrepreneurship Development	1.25
VI Sem	BEENE601T	MEW	1.08
	BEENE604T	DCOM	1.04
	BEENE605T	Functional English	2.83
VII Sem	BEENE701T	DSPAA	2.79
	BEENE702T	ES	2.78
	BEENE705T	MCOM	2.73
	BEENE706T	DIP	1.12
	BEENE704T	ADSD	1.21
VIII	BEENE802T	CCN	2.73
	BEENE803T	CMOS	2.84
	BEENE804T	WSN	2.80
	BEENE805T	DCE	2.67
	BEENE806P	Project	3
Total Average of Direct Assessment:			2.20

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey .as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 1	Direct Assessment (80%)	2.20	80 % of 2.20 =1.762	2.367	78.91
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

- The students are made aware of current events in the social and political front by organizing guest lectures on current topics. This also relates to contemporary technical issues and its impact on society.
- Students are made to participate in activities like debates, group discussion, article writing in Newsletter and departmental magazine.

- Students are made familiar with organizational operations by their involvement in forum activities of student society through various governing posts like president, secretary etc.
- In order to expose the students in identifying the contemporary issues, understanding the global and societal context to fulfill community and societal needs a test questionnaire is given to students. It consists of questions, asking students about contemporary issues. Number of Students' answering appropriate to the questionnaire is considered as one of the assessment tool.
-

PO7: 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.			
		Direct Assessment:	Average
	C103T	Engineering Chemistry	3
	C105T	Basic Civil Engineering	2
		Engineering Graphics–I	3
II SEM	C109T	Materials Chemistry	3
	C1010T	Engineering Mechanics	2
		Ethical Sciences	3
IV Sem	BEENE406T	EVS	3
V Sem	BEENE503T	ACD	2.77
	BEENE505T	Industrial Economics & Entrepreneurship Development	1.25
VI Sem	BEENE602T	DSP	1.96
	BEENE604T	DCOM	1.04
VII sem	BEENE703T	OC	2.78
	BEENE704T	ADSD	1.21
	BEENE705T	MCOM	2.73
	BEENE702T	ES	2.65

VIII SEM	BEENE802T	CCN	2.73
	BEENE804T	WSN	2.80
	BEENE806T	Project	3
		Total Average of Direct Assessment:	2.44

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey .as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Alumni survey	PO5:How satisfied are you in using new software/environment?	22	20	3
Graduate survey	PO5: Given a new tool or environment how comfortable are you to utilize and develop with it?	78	74	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment				
PO	Assessment Tool	Attainment Level	Overall Attainment	% Attainment

PO 7	Direct Assessment (80%)	2.44	80 % of 2.44=1.95	1.96+0.6=2.55	85.06
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.

Graduates are intended to understand ethics and professional conduct. To achieve this as a part of curriculum, extra curriculum aspects are considered. Having the knowledge of social responsibilities, graduates in fact improves professional growth and serves the society. This PO is assessed with the help of indirect assessment methods such as Surveys

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.			
Direct Assessment:			
Sem/Code		Subject	Average Attainment
II Sem	BESII-8	Ethical Sciences	1.06
IV Sem	BEENE406T	EVS	3
V Sem	BEENE505T	Industrial Economics & Entrepreneurship Development	1.25
VI sem	BEENE606P	Mini Project	3
VIII sem	BEENE806P	Major Project	3
Total Average of Direct Assessment:			2.56

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey .as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

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Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Graduate Survey	PO8:Do you follow any non-technical constraints such as environmental , social , political, ethical, health and safety and sustainability?	78	74	3
	PO8:Have you ever participated in NGO activities or any external social welfare association during the college?	78	77	3
Alumni survey	PO8: How well you understand the professional responsibility and ethics ?	22	20	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment				
PO	Assessment Tool	Attainment Level	Overall Attainment	% Attainment

PO 8	Direct Assessment (80%)	2.56	80 % of 2.56=2.05	2.05+0.6=2.65	88.33
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

1. Team work has always been common element in engineering learning. This PO is evaluated by developing the professional skills which includes responsible teamwork, creativity and communication skills and to prepare them for the complex actual work environment and for life-long learning. The attainment of these can be accessed through the tabulated courses that are part of the curriculum using direct and indirect assessment tools
2. This outcome is assessed from courses having design projects like mini and main project work.
3. The performance as team members is assessed by scores awarded to the students working in team based on their individual contributions for successfully completing the project as given in the table below.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. Direct Assessment:			
Sem/Code		Subject	Average
II SEM	BESII-8	Ethical Sciences	2.5
V Sem	BEENE505T	Industrial Economics & Entrepreneurship Development	1.25
VI sem	BEENE606T	Mini Project	3

	BEENE605T	Functional English	2.83
VIII sem	BEENE806T	Major Project	3
Total Average of Direct Assessment:			2.51

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey .as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Alumni survey	PO9: Are you able to work effectively in multidisciplinary teams?	22	20	3
Graduate Survey	PO9:How frequently are you able to function effectively on tems to accomplish a common goal?	78	77	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment				
PO	Assessment Tool	Attainment Level	Overall Attainment	% Attainment

PO 9	Direct Assessment (80%)	2.51	80 % of 2.51=2.008	2.008+0.6=2.60	86.93
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

1. Students are asked to prepare a written report on a topic within the scope of the course and make oral presentations before the class.
2. They also submit reports on Industrial training and visits. Also they are required to give presentations on Project work and related literature survey as regular seminars for project assessment.
3. The quality of the report and the oral presentation is evaluated by the teacher and project evaluation committee.

Measurements considered under this section to assess the PO are:

Number of students participated in various extracurricular activities like Workshops, Seminars, Paper Presentations, and Technical Quiz etc.

The attainment of these can be accessed through direct and indirect assessment tools.

Documentation:

- ☐ Records of seminar reports, evaluation by the teacher.
- ☐ Records of Oral presentation, evaluation by the teacher.
- ☐ Record of papers presented by the students

	Assessment Method	Assessment Tool	Source for data Collection	Attainment Criterion	Frequency of Assessment
PO-10	Direct Assessment (80%)	Internal Assessment of the Courses related to PO1	Average CO attainment level calculated	Defined	During the Semester
		University Assessment of the Courses related to PO1			

	Indirect Assessment (20%)	Project	Project Evaluation Sheet	% of students scoring more than 80% marks	End of the Semester
		Graduate survey and Alumni Survey	Analysis of survey forms	% of satisfactory responses	End of the Academic Year

Direct Assessment of PO-10,

Direct PO attainment is calculated from CO attainment of the courses addressing PO-10 .CO attainment is calculated from the process described in 3.2.1. Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

		PO10: 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.		
		Direct Assessment:		Average
I SEM	C102T	Engineering Physics		3
	C104T	Basic Electrical Engineering		2.8
	BESI-6T	Engineering Graphics-I		3
II SEM	C108T	Advanced Physics		3
	C1010T	Engineering Mechanics		2
III Sem	BEENE302T	Electronic Devices And Circuits		2.75
	BEENE303T	Electronic Measurements & Instrumentation		0.42
	BEENE304T	Object oriented programming & Data Structure		2.71
IV SEM	BEENE405T	S&S		2.97
	BEENE403T	EMF		2.7
V Sem	BEENE503T	Analog Circuits & Design		2.77
	BEENE504T	Communication Electronics		1.08
	BEENE502T	Microprocessor & Microcontroller		0.32
	BEENE505T	IEED		1.25

VI Sem	BEENE601T	MEW	1.08
	BEENE602T	DSP	1.96
	BEENE605T	FE	2.83
	BEENE606T	Electronic Workshop Practice	3
VII sem	BEENE701T	DSPAA	2.79
	BEENE704T	ADSD	1.21
	BEENE705T	MCOM	3.73
VIII sem	BEENE802T	CCN	2.73
	BEENE804T	WSN	2.80
	BEENE806T	Project	3
Total Average of Direct Assessment:			2.32

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Indirect Assessment methods				
Survey type	Question	Survey Data		
		Number of Responses	Satisfaction Number	Attainment Level
Alumni survey	PO10: How far you have developed the ability to communicate effectively ,write precise reports and design documentation applying the engineering knowledge?	22	20	3

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Alumni survey	89.47	3
Average Indirect Attainment		3

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 10	Direct Assessment (80%)	2.32	80 % of 2.32 = 1.85	1.85+0.6=2.45	81.86
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

- ☐ This outcome is assessed from, final year projects, where students are made aware of project, project team & project control
- ☐ Deliver project seminars on time & also with effective professional content.
- ☐ The various courses involving laboratory work and design courses use the skills and techniques for development and implementation of Project

	Assessment Method	Assessment Tool	Source for data Collection	Attainment Criterion	Frequency of Assessment
PO-11	Direct Assessment (80%)	Internal Assessment of the Courses related to PO1	Average CO attainment level calculated	Defined in point no. 1	During the Semester
		University Assessment of the Courses related to PO1			
	Indirect Assessment (20%)	Project	Project Evaluation Sheet	% of students scoring more than 80% marks	End of the Semester
		Graduate survey and Alumni Survey	Analysis of survey forms	% of satisfactory responses	End of the Academic Year

Direct Assessment of PO-11,

Direct PO attainment is calculated from CO attainment of the courses addressing PO-11 .CO attainment is calculated from the process described in 3.2.1. Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

PO11: 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.			
		Direct Assessment:	Average
I SEM	C101T	Basic Civil Engineering	1
	BESI-6T	Engineering Graphics-I	3
II SEM	C105T	Engineering Mechanics	1
	BESII-8	Ethical Sciences	2.6
V Sem	BEENE505T	Industrial Economics & Entrepreneurship Development	1.25
VI sem	BEENE606T	Mini Project	3
VIII sem	BEENE806T	Major Project	3
Total Average of Direct Assessment:			2.12

Indirect assessment strategies are implemented by embedding them in the course end survey, Exit survey and Alumni Survey.

Indirect Assessment of PO

Indirect PO assessment is done using, graduate survey and alumni survey .as described in following table. Finally, the average of direct and indirect assessment is calculated which is the attainment level for that PO.

Indirect Assessment methods		
Survey type	Question	Survey Data

		Number of Responses	Satisfaction Number	Attainment Level
Alumni survey	PO11: How well you prepare a specific time line and sequence of activities and use them manage the overall project to ensure its timely completion ?	22	20	3

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 11	Direct Assessment (80%)	2.12	80 % of 2.12=1.69	1.69+0.6=2.29	76.57
	Indirect Assessment (20%)	3	20% of 3=0.6		

Program outcome 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.

The student's participation in the following activities are consider for direct assessment of PO.

1. Participation in Paper presentations, workshops and seminars
2. Internships/ Visits to industry
3. Appearance and Qualification in GATE and PGCET

	Assessment Method	Assessment Tool	Source for data Collection	Attainment Criterion	Frequency of Assessment
PO-12	Direct Assessment (80%)	Internal Assessment of the Courses related to PO1	Average CO attainment level calculated	Defined in point no. 1	During the Semester
		University Assessment of the Courses related to PO1			
	Indirect Assessment (20%)	Project	Project Evaluation Sheet	% of students scoring more than 80% marks	End of the Semester
		Graduate survey and Alumni Survey	Analysis of survey forms	% of satisfactory responses	End of the Academic Year

Direct Assessment of PO-12,

Direct PO attainment is calculated from CO attainment of the courses addressing PO-12 .CO attainment is calculated from the process described . Average CO attainment level of all courses addressing this PO is calculated which is mentioned in following table.

PO12: 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.			
		Direct Assessment:	Average
I SEM	C104T	Basic Electrical Engineering	2.83
	C101T	Basic Civil Engineering	3
II SEM	C1010T	Engineering Mechanics	2
III Sem	BEENE302T	Electronic Devices And Circuits	2.75
	BEENE304T	OODS	2.71
	BEENE303T	Electronic Measurements & Instrumentation	0.42
IV SEM	BEENE403T	EMF	2.7
	BEENE405T	Signals & Systems	2.97
	BEENE402T	Power Devices and Machines	2.7
V Sem	BEENE503T	Analog Circuits & Design	2.77
	BEENE502T	Microprocessor & Microcontroller	0.32
VI Sem	BEENE601T	MEW	1.08
	BEENE603T	Control System Engineering	1.02
	BEENE605T	FE	2.83
	BEENE604T	Digital Communication	1.04
	BEENE606T	Electronic Workshop Practice	3
VII Sem	BEENE701T	DSPAA	2.79
	BEENE704T	ADSD	1.21
	BEENE705T	MCOM	2.73
VIII sem	BEENE802T	CCN	2.73

	BEENE804T	WSN	2.80
	BEENE805T	DCE	2.67
	BEENE806T	Project	3
Total Average of Direct Assessment:			2.26

Indirect Assessment of PO-12,

Indirect PO assessment is done using assessment tools like graduate survey, alumni survey, projects etc .as described in following table.

Indirect Assessment methods		
Assessment tool	% target level attainment	Attainment Level
Graduate survey	89.47	3
Alumni survey	81.82	3
Project	90.67	3
Average Indirect Attainment		3

Average Attainment					
PO	Assessment Tool	Attainment Level		Overall Attainment	% Attainment
PO 12	Direct Assessment (80%)	2.26	80 % of 2.26 =1.81	1.81+0.6=2.41	80.37
	Indirect Assessment (20%)	3	20% of 3=0.6		

8) Program Specific Outcomes Assessment and Attainment (Session 2015-16)

Direct Assessment of PSO

Program specific outcome 1: To identify, formulate and analyze the problems in Electronics Engineering by using principles of Mathematics and Engineering fundamentals.

PSO1: To identify, formulate and analyze the problems in Electronics Engineering by using principles of Mathematics and Engineering fundamentals.		
Direct Assessment:		Average
I SEM	Applied Mathematics–I	3
	Engineering Physics	3
	Engineering Chemistry	3
	Basic Electrical Engineering	3
	Basic Civil Engineering	2
	Applied Mathematics–II	3
	Advanced Physics	3
	Materials Chemistry	3
	Engineering Mechanics	1
III Sem	Electronic Devices And Circuits	2.75
	Applied Mathematics III	2.19
	Network analysis and synthesis	0.44
	Electronic Measurements & Instrumentation	0.42

	Object oriented programming & Data Structure	2.71
IV SEM	Applied Mathematics IV	2.7
	Digital Circuits & Fundamental of Microprocessors	2.8
	Signals & Systems	2.97
	Electromagnetic Fields	2.7
	Power devices and Machines	2.7
V Sem	IEED	
	Analog Circuits & Design	2.77
	Communication Electronics	1.08
	Microprocessor & Microcontroller	0.32
	Switching theory and automata	0.32
VI Sem	Digital Signal processing	1.96
	Digital Communication	1.04
	Microwave communication	1.08
	Control System Engineering Functional English	1.02
VII Sem	ADSD	1.21
	DSPAA	2.79
	DIP	1.12
		2.78
	Optical communication	
	Mobile communication	2.73
VIII sem	ES	2.65
	MEMS	2.81
	DCE	2.67
	CCN	2.73
	CMOS	2.84

	WSN	2.80
	Project	3
Total Average of Direct Assessment:		2.21

Program specific outcome 2: Applying Electronics Engineering knowledge to design a system, analyze and interpret data to obtain valid conclusions.

PSO2: Applying Electronics Engineering knowledge to design a system, analyze and interpret data to obtain valid conclusions.		
Relevant Courses:		Average CO Attainment
I SEM	Applied Mathematics–I	3
	Engineering Physics	3
	Engineering Chemistry	3
	Basic Electrical Engineering	3
	Basic Civil Engineering	2
II SEM	Applied Mathematics–II	3
	Advanced Physics	3
	Materials Chemistry	3
	Engineering Mechanics	1
III Sem	Electronic Devices And Circuits	2.75
	Applied Mathematics III	2.19
	Network analysis and synthesis	0.44
	Object oriented programming & Data Structure	2.71
IV SEM	Applied Mathematics IV	2.7

	Digital Circuits & Fundamental of Microprocessors	2.8
	Signals & Systems	2.97
	Electromagnetic Fields	2.7
	Analog Circuits & Design	2.77
	Communication Electronics	1.08
	Microprocessor & Microcontroller	0.32
	Switching theory and automata	0.32
VI Sem	Digital Signal processing	1.96
	Digital Communication	1.04
	Microwave communication	1.08
	Control System Engineering	1.02
VII Sem	ADSD	1.21
	DSPAA	2.79
	DIP	1.12
	Optical communication	2.78
	Mobile communication	2.73
	ES	2.65
VIII sem	MEMS	2.81
	DCE	2.67
	Computer communication network	2.73
	CMOS	2.84
	WSN	2.80
Total Average of Direct Assessment:		2.217

Program specific outcome 3: Use of various Simulation tools such as Tanner Tool, MATLAB, MULTISIM, ORCAD etc for design and analysis of various systems.

PSO3: Use of various Simulation tools such as Tanner Tool, MATLAB, MULTISIM, ORCAD etc for design and analysis of various systems.

Relevant Courses:		Average CO Attainment
I SEM	Applied Mathematics-I	3
	Engineering Physics	3
	Engineering Chemistry	3
	Basic Electrical Engineering	3
	Basic Civil Engineering	2
II SEM	Applied Mathematics-II	3
	Advanced Physics	3
	Materials Chemistry	3
	Engineering Mechanics	1
III Sem	Electronic Devices And Circuits	2.75
	Electronic Measurements & Instrumentation	0.42
IV SEM	Digital Circuits & Fundamental of Microprocessors	2.8
	Signals & Systems	2.97
	Electromagnetic Fields	2.7
V Sem	Analog Circuits & Design	2.77
	Communication Electronics	1.08
	Microprocessor & Microcontroller	0.32
VI Sem	Digital Signal processing	1.96
	Digital Communication	1.04
	Microwave communication	1.08

	Control System Engineering	1.02
VII Sem	ADSD	1.21
	DSPAA	2.79
	DIP	1.12
	Optical communication	2.78
	ES	2.65
VIII Sem	DCE	2.67
	Computer communication network	2.73
	CMOS	2.84
	WSN	2.80
Total Average of Direct Assessment:		2.302

9)Average Attainment Table of POS & PSOS

Sr. No.	POS	% Attainment	Levels
1	PO1-Engineering Knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.	77.6	Level -2 Moderately High
2	PO2: 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.	74.15	Level -2 Moderately High
3	PO3: 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.	69.33	Level -2 Low
4	PO4: 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.	81.13	Level -2 High
5	PO5: 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.	80.13	Level -2 High
6	PO6: 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.	78.91	Level -2 Moderately High
7	PO7: 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.	85.06	Level -2 High
8	PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	88.33	Level -2 High
9	PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	86.93	Level -2 High
10	PO10: Communication: Communicate effectively on complex Engineering activities with the Engineering community		Level -2

	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.	81.86	High
11	PO11: 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.	76.57	Level -2 Moderately High
12	PO12: 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.	80.37	Level -2 High
PSO Attainment			
1	PSO1: To identify, formulate and analyze the problems in Electronics Engineering by using principles of Mathematics and Engineering fundamentals.	73.66	Level -2 Moderately High
2	PSO2: Applying Electronics Engineering knowledge to design a system, analyze and interpret data to obtain valid conclusions.	73.67	Level -2 Moderately High
3	PSO3: Use of various Simulation tools such as Tanner Tool, MATLAB, MULTISIM, ORCAD etc for design and analysis of various systems.	76.67	Level -2 Moderately High

PO Attainment Table:-

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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C10	3	2	2.5	-	3	-	-	-	-	-	-	--
C102T	3	3	-	3		-	-	-	-	3	-	-
C103T	3	1	3	-	-	-	3	-	-	-	-	-
C104T	3	2.67	-	2.8	-	-	-	-	-	-	-	3
C105T	2	1	2	-	2	3	2	-	-	3	1	3
C107T	-	-	-	3	3	-	3	-	-	-	3	-
C108T	3	3	2.33	-	3	-	-	-	-	-	-	-
C109T	3	3	-	3	-	-	-	-	-	3	-	-
C1010T	3	3	3	-	-	-	3	-	-	-	-	-
BEENE 302T	2.19	2.19		2.19	2.19					2.19		
BEENE 301T	2.75	2.75		2.75	2.75					2.75	2.75	2.75
BEENE 305T	0.42	0.42	0.42	0.42	0.42	0.42		0.42		0.42	0.42	0.42
BEENE 303T	0.44	0.44										
BEENE 304P	2.71	2.71		2.71	2.71	2.71				2.71	2.71	2.71
BEENE 401T	2.7	2.7	2.7	2.7						2.7		
BEENE 404T	2.8	2.8	2.8	2.8	2.8	2.8						
BEENE 405T	2.97	2.97	2.97	2.97	2.97	2.97				2.97	2.97	2.97
BEENE 403T	2.72	2.72	2.72	2.72	2.72	2.72			2.72	2.72	2.72	2.72
BEENE 402T	2.7	2.7		2.7		2.7					2.7	2.7
BEENE 505T	1.25	1.25	1.25			1.25	1.25	1.25	1.25	1.25	1.25	
BEENE 503T	2.77	2.77	2.77	2.77		2.77	2.77		2.77	2.77		2.77
BEENE 504T	0.32	0.32	0.32	0.32	0.32							

BEENE 502T	1.08	1.08	1.08	1.08	1.08					1.08		
BEENE 501T	0.32		0.32							0.32	0.32	0.32
BEENE 602T	1.08	1.08	1.08	1.08		1.08				1.08	1.08	1.08
BEENE 604T	1.02	1.02		1.02							1.02	1.02
BEENE 601T	1.96	1.96	1.96	1.96			1.96			1.96		
BEENE 603T	1.04	1.04	1.04	1.04	1.04	1.04	1.04		1.04			1.04
BEENE 704T	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
BEENE 701T	2.78	2.78	2.78	2.78		2.78		2.78	2.78			
BEENE 706T	2.79	2.79	2.79	2.79	2.79	2.79				2.79	2.79	2.79
BEENE 703T	2.73	2.73	2.73			2.73	2.73			2.73	2.73	2.73
BEENE 705T	2.65	2.65	2.65	2.65	2.65	2.65	2.65				2.65	
BEENE 702T	1.12	1.12	1.12	1.12	1.12	1.12						
BEENE 801T	2.67	2.67	2.67	2.67	2.67	2.67						2.67
BEENE 804T	2.81	2.81	2.81	2.81	2.81							
BEENE 802T	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73		2.73
BEENE 803T	2.84	2.84	2.84	2.84	2.84	2.84						
BEENE 805T	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80

PO Attainment Summary

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO Attainment	2.32	2.22	2.08	2.43	2.40	2.36	2.55	2.55	2.6	2.45	2.19	2.41

Direct Attainment	2.16	2.03	1.85	2.29	2.25	2.20	2.44	2.56	2.51	2.32	2.12	2.26
In Direct Attainment	3	3	3	3	3	3	3	3	3	3	3	3

PSO Attainment Summary

Course	PSO1	PSO2	PSO3
C101T	3	3	3
C102T	3	3	3
C103T	3	3	3
C104T	3	3	3
C105T	2	2	2
C107T	3	3	3
C108T	3	3	3
C109T	3	3	3
C1010T	1	1	1
BEENE302T	2.75	2.75	2.75
BEENE301T	2.19	2.19	0
BEENE305T	0.44	0.44	0
BEENE303T	0.42	0	0.42
BEENE304P	2.71	2.71	0
BEENE401T	2.7	2.7	0
BEENE404T	2.8	2.8	2.8
BEENE405T	2.97	2.97	2.97
BEENE403T	2.7	2.7	2.7

BEENE402T	2.7	0	0
BEENE505T	0	0	0
BEENE503T	2.77	2.77	2.77
BEENE504T	1.08	1.08	1.08
BEENE502T	0.32	0.32	0.32
BEENE501T	0.32	0.32	0
BEENE602T	1.96	1.04	1.96
BEENE604T	1.04	1.04	1.04
BEENE601T	1.08	1.08	1.08
BEENE603T	1.02	1.02	1.02
BEENE704T	1.21	1.21	1.21
BEENE701T	2.79	2.79	2.79
BEENE705T	1.12	1.12	1.12
BEENE703T	2.78	2.78	2.78
BEENE705T	2.73	2.73	0
BEENE702T	2.65	2.65	2.65
BEENE801T	2.81	2.81	0
BEENE805T	2.67	2.67	2.67
BEENE802T	2.73	2.73	2.73
BEENE803T	2.84	2.84	2.84
BEENE805T	2	2.80	2.80