CO ATTAINMENT TOOLS:

Direct assessment tools	**:**	Internal Exams/CIE
		External Exams/SEE
Indirect assessment tools	**:**	Course end surveys

CO ATTAINMENT = **80%** OF DIRECT TOOLS + **20%** INDIRECT TOOLS

Direct Assessment Tools: The assessment tools for computing the course outcomes are explained below.

- First Mid Semester Examination: First Mid semester examination is conducted within 7-8 weeks after the start of each semester. The syllabus of the first mid examination covers around 40-50 % of the total course content.
- The second mid examination is conducted before the end semester examination with the remaining syllabus of total course content around 50-60%.
- End semester Examination: End semester examination is conducted at the end of semester. Complete syllabus is covered in this examination. Major weightage of marks is given to this component.
- Practical Courses: In these courses, Internal marks is based on day-to day evaluation, viva- voce and record submission. External practical exam is being conducted at the end of semester and evaluation is done by examiners.
- Project work: Project work is evaluated by taking reviews at regular intervals. The project guides and project coordinators will award the marks based on the performance of the student. The average of all the reviews will be awarded as their internal marks. University will nominate examiners to evaluate external project viva voce.

Indirect Assessment Tool: Course end Survey.

The quality/ Relevance of Assessment processes and Tools used:

To evaluate the attainment of COs, following tools are used.

1. **Direct Assessment tools:**
   a. Internal Evaluation
      i. Theory Courses (Mid Examination)
      ii. Lab courses (Continuous Evaluation)
      iii. Seminar (Reviews)
      iv. Project work (Reviews)
   b. University Exams
      i. Theory Courses
      ii. Lab Courses
      iii. Project work (Viva-Voce)
2. **Indirect Assessment Tools:**
   a. Course End Survey.

List of assessment tools used for CO attainment

S.No	Name of the Assessment Tool		Weightage	Frequency
1	Direct Assessment Tools	Mid sem examination	80%	End of Semester
		End sem examination		End of Semester
2	Indirect Assessment Tools	Course End Survey	20%	End of Semester

Step1: Direct Assessment

Measurement of Course attainment levels for Internal Examinations:

$$\left(\frac{\text{No.of students secured more than 60\%}}{\text{No. of students attempted}} * 100 \right) * 0.03$$

Measurement of Course attainment levels for External Examinations:

Course is categorized into three based on the depth of subject: Easy, Moderate, Hard.

$$\text{Course-Easy} = \left(\frac{\text{No. of students secured more than 60\%}}{\text{No.of Students attemped}} * 100\right) * 0.03$$

$$\text{Course-Moderate} = \left(\frac{\text{No. of students secured more than 50\%}}{\text{No.of Students attemped}} * 100\right) * 0.03$$

$$\text{Course-Hard} = \left(\frac{\text{No. of students secured more than 40\%}}{\text{No.of Students attemped}} * 100\right) * 0.03$$

Overall Direct Assessment including Internal and University Examinations:

Step2: Indirect Assessment:

Tools: Course End Survey

Process: Collect the feedback and calculate the weighted average as mentioned below

$$= \frac{\text{No. of Highs X 3 + No. of Moderates X 2 + No.Lows X 1}}{\text{Total No.of Students X 3}}$$

Step3: Overall Course Outcome Attainment including Direct and Indirect Survey:

Attainment of Course outcomes = 80% of Direct Assessment + 20% of Indirect Assessment.

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CO ATTAINMENT

Course Name:	**Signals & Systems**	
Course Code:	**15A04302**	**C213**
Session of Course:	July 2017 - December 2017	
T:Tu:C-	03:01:03	
Year/Semester	II B.Tech -I SEM	
Credits:	3	
Batch:	**2016-2020**	

Course Name: C213 Year of Study: 2017 – 18

CO mapping with mid question paper:

COURSE OUTCOMES		Test-1	Test-2
C213.1	**Classify** signals and systems(continuous and discrete)in time domain and apply fourier series to represent signals in frequency domain.	Q1,Q3,Q5	
C213.2	**Apply** Continuous Time Fourier Transform to Continuous time signals and convert Continuous time signals to Discrete time signals using sampling theorem	Q2,Q4	
C213.3	**Analyze** Signal Transmission through Linear System.		Q1,Q4
C213.4	**Apply** Discrete Time Fourier Transform to Discrete Time Signals.		Q2
C213.5	**Analyze** systems(continuous and discrete) using Laplace Transforms and Z-Transforms.		Q3,Q5

C213 is the third course in second year, first semester and '.1' to '.5' are the outcomes of this course.

Course Outcome Correlation with Program Outcome :

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C213.1	**3**	**3**	**1**	**1**									**3**	**1**
C213.2	**3**	**3**		**2**								**2**	**2**	**2**
C213.3	**3**	**2**	**2**										**3**	**2**
C213.4	**3**	**2**	**2**										**1**	**3**
C213.5	**3**	**3**	**1**	**1**								**2**	**2**	**3**

C213 is the third course in second year, first semester and '.1' to '.5' are the outcomes of this course.

Note: Enter correlation levels 1, 2 or 3 as defined below:1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
It there is no correlation, put"-"

STUDENTS MARKS SHEET:

S.No	USN/Reg no.	Test 1					Test 2					Univ. Marks
		T1-Q1	T1-Q2	T1-Q3	T1-Q4	T1-Q5	T2-Q1	T2-Q2	T2-Q3	T2-Q4	T2-Q5	
Max. Marks		**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**70**
60% Marks		**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**28**
1	16BF1A0401	10	10	10		8	9	10	10	2		46
2	16BF1A0402	9	10	10			5	10	10	8		54
3	16BF1A0403	10	2	10			9	9	10		4	40
4	16BF1A0404			6	2		10			9		46
5	16BF1A0405	4	5	5	4		10	5		7		28
6	16BF1A0406	8	9		10	8	10	10	9	10		67
7	16BF1A0407	9	10	10			10	9		9		58
8	16BF1A0408	6	10	7	4		10	10		8		40
9	16BF1A0409		10	10	8		10	9	10	9		37

274	17BF5A0438		5	10		8	7		8		7	42
275	17BF5A0439	4		9	10	10	3	7		4		60
276	17BF5A0440	9	3	9		9		7	3	8	2	17
277	17BF5A0441	10	10	10		10	10	8		9		41
278	17BF5A0442	2		4	1	2	9	7	3			42
279	17BF5A0443	3		6		8	8	6	3		2	51
Number of students attempted question		255	168	235	194	165	259	245	165	219	175	279
Number of students scoring more than 60%		219	135	187	116	113	220	192	101	161	129	224
CO Assessment		85.88	80.36	79.57	59.79	68.48	84.94	78.37	61.21	73.52	73.71	80.29
CO Assessment Level		2.58	2.41	2.39	1.79	2.05	2.55	2.35	1.84	2.21	2.21	2.41

Indirect Attainment: Course End Survey:

COs	**COURSE OUTCOMES**	**Good**	**Average**	**Satisfactory**	**Indirect Level**	**% Indirect Level**
		3	**2**	**1**		
C213.1	Are you able to classify signals and systems (continuous and discrete)in time domain and apply Fourier series to represent signals in frequency domain.	204	2	3	**2.96**	**98.72**
C213.2	Are you able to apply Continuous Time Fourier Transform to Continuous time signals and convert Continuous time signals to Discrete time signals using sampling theorem	200	3	6	**2.93**	**97.61**
C213.3	Are you able to analyze Signal Transmission through Linear System?	189	12	8	**2.87**	**95.53**
C213.4	Are you able to apply Discrete Time Fourier Transform to Discrete Time Signals.	189	13	7	**2.87**	**95.69**
C213.5	Are you able to analyze systems (continuous and discrete) using Laplace Transforms and Z-Transforms.	191	12	6	**2.89**	**96.17**

CO ATTAINMENT: **Target Level: 1.95**

Mapping of COs								External Attainment level	Direct Attainment levels	Indirect (CES) Attainment Level	CO Attained	% CO Attained
CO	**Mapping of Mid I & Mid II Term Examination**											
C213.1	2.58	2.39	2.05					2.41	2.36	2.96	**2.48**	**82.59**
C213.2	2.41	1.79						2.41	2.20	2.93	**2.35**	**78.30**
C213.3	2.55	2.21						2.41	2.39	2.87	**2.48**	**82.77**
C213.4	2.35							2.41	2.38	2.87	**2.48**	**82.60**
C213.5	1.84	2.21						2.41	2.15	2.89	**2.30**	**76.62**

CO Attainment Analysis:

Based on the above result CO's had reached the target level

ACTION SUGGESTED:

For the forth coming batch target level can be increased.

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PO ATTAINMENT TOOLS:

Direct assessment tools	**:**	**80 %** DIRECT ATTAINMENT OF EACH COURSE
Indirect assessment tools	**:**	**5%** EMPLOYER SURVEY
		5% ALUMNI SURVEY
		10%GRADUATE EXIT SURVEY
PO ATTAINMENT	=	**80%** OF DIRECT TOOLS+**20%** INDIRECT TOOLS

List of Assessment Tools:

- Attainment of POs and PSOs is based on direct assessment tools as well as indirect assessment tools.

Direct Assessment Tools:

- Direct assessment of POs and PSOs is based on the students' performance in both internal examinations and university examinations for all courses.
- Performance of all the students in different assessments such as internal tests and university exams lead to attainment of COs which in turn lead to attainment of POs and PSOs based on the mapping of COs with POs and PSOs.
- Direct Assessment Tools are given 80% weightage.

Indirect Assessment Tools:

- The indirect assessment tools that are used for attainment of POs and PSOs are
  - Graduate Exit Survey (10% weightage)
  - Survey (5% weightage)
  - Employer Survey (5% weightage)

The quality and Relevance of the Process used for measuring Attainment of POs and PSOs:

PO\PSO Attainment= 80% of Direct Assessment+20% Indirect Assessment.

Step1: Direct Assessment

- POs and PSOs attainment at course level is calculated by taking the average of arithmetic multiplication of course outcomes attainment levels and CO-PO matrix.

$$\left(\sum_{i,j}\left(\frac{CO_i \; X \; PO_j}{3}\right)\right)/(No.\,of\;Mapped\;COs)$$

$$Where$$

- **PO Attainment / Assessment=**

$$\begin{cases} i = 1\;to\;n_{\;where\;n\;is\;number\;of\;COs} \\ j = 1\;to\;14_{where\;\;1\;to\;12\;for\;PO1\;to\;PO12 \\ \qquad\qquad\qquad\qquad 13\;to\;14\;for\;PSO1\;to\;PSO2} \end{cases}$$

Step2: Indirect Assessment:

Tools: Graduate Exit Survey, Alumni Survey and Employer Survey

Process: Collect the Surveys and calculate the weighted average for each survey as mentioned below.

$$= \frac{\text{No.of Highs x 3} + \text{No. of Moderates x 2} + \text{No. of Lows x 1}}{\text{No. of students}}$$

Step3: Overall Attainment of POs and PSOs including Direct and Indirect Survey:

Attainment of POs and PSOs = 80% of Direct Assessment + 20% of Indirect assessment.

(0.8* Direct PO attainment+0.10* GES+ 0.05 * AS + 0.05 * ES)

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SAMPLE PO ATTAINMENT PROCESS

In continuation with sample CO attainment Process for a Course Signals and Systems, CO attainment values are

CO ATTAINMENT:

Mapping of COs								External Attainment level	Direct Attainment levels	Indirect (CES) Attainment Level	CO Attained	% CO Attained
CO	**Mapping of Mid I & Mid II Term Examination**											
C213.1	2.58	2.39	2.05					2.41	2.36	2.96	**2.48**	**82.59**
C213.2	2.41	1.79						2.41	2.20	2.93	**2.35**	**78.30**
C213.3	2.55	2.21						2.41	2.39	2.87	**2.48**	**82.77**
C213.4	2.35							2.41	2.38	2.87	**2.48**	**82.60**
C213.5	1.84	2.21						2.41	2.15	2.89	**2.30**	**76.62**

PO ATTAINMENT/ASSESSMENT LEVEL -PROBABILITY THEORY AND STOCHASTIC PROCESSES:

PO Attainment / Assessment=

$$\left(\sum_{i,j}\left(\frac{CO_i \; X \; PO_j}{3}\right)\right)/(No.\,of\;Mapped\;COs)$$

$$Where$$

$$\begin{cases} i = 1\;to\;n_{\;where\;n\;is\;number\;of\;COs} \\ j = 1\;to\;14_{\;where\;\;1\;to\;12\;for\;PO1\;to\;PO12 \\ \qquad\qquad\qquad\qquad 13\;to\;14\;for\;PSO1\;to\;PSO2} \end{cases}$$

CO-PO MAPPING:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	CO Attained Levels
C213.1	3	3	1	1									3	1	2.48
C213.2	3	3		2								2	2	2	2.35
C213.3	3	2	2										3	2	2.48
C213.4	3	2	2										1	3	2.48
C213.5	3	3	1	1								2	2	3	2.30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-PO LEVEL	2.42	2.09	1.22	1.05								1.55	1.78	1.76
% CO-PO	80.58	69.55	40.83	35.09								51.64	59.24	58.83

PO DIRECT ASSESSMENT/ ATTAINMENT LEVEL FOR ALL SUBJECTS INCLUDING FIRST YEAR:

S.No	Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	**Functional English 15A52101**	**C111**								1.77	1.77	2.65				
2	**Mathematics - I (15A54101)**	**C112**	1.90	2.38												
3	**Computer Programming (15A05101)**	**C113**	2.13	1.99	2.13	0.68									2.13	2.13

4	**Engineering Chemistry (15A51101)**	**C114**	2.39	2.39												
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	**Technical Seminar (15A04806)**	**C423**		1.98				1.98	1.98		2.96	2.96		2.97		
62	**Project (15A04807)**	**C424**	1.77	1.72	2.13	1.77	1.57	1.97	1.97	1.97	2.21	1.77	2.46	1.97	1.97	1.96
PO Attainment/ Assessment Level (Direct Attainment)			**2.22**	**2.13**	**2.30**	**2.15**	**2.07**	**1.95**	**2.00**	**1.98**	**1.89**	**2.00**	**2.13**	**2.32**	**2.19**	**2.04**

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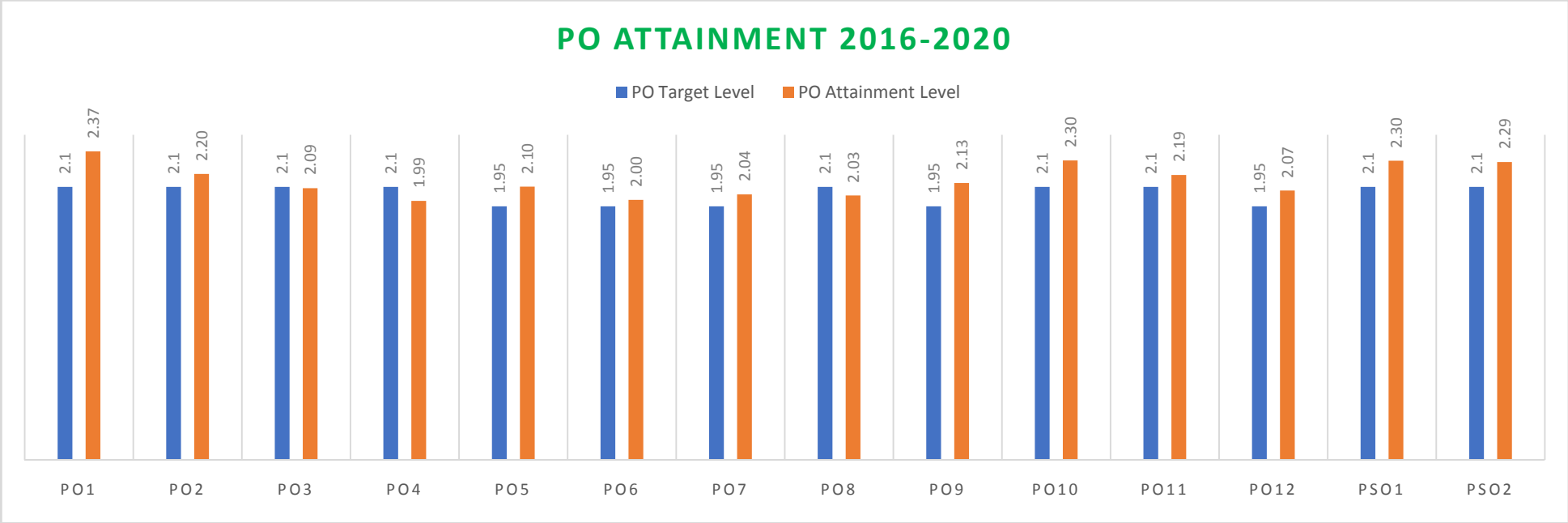
PO ATTAINMENT (2016-2020)

PO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Direct Attainment Level	PO Assessment	1.84	1.72	1.65	1.56	1.60	1.59	1.51	1.60	1.71	1.86	1.75	1.63	1.80	1.79
Indirect Attainment Level	Employer Survey (5%)	0.15	0.14	0.12	0.12	0.14	0.11	0.15	0.12	0.11	0.13	0.12	0.12	0.14	0.14
	Alumni Survey (5%)	0.12	0.12	0.11	0.11	0.13	0.11	0.12	0.11	0.12	0.11	0.11	0.11	0.12	0.12
	Graduate Exit Survey (10%)	0.26	0.23	0.20	0.20	0.23	0.20	0.26	0.20	0.20	0.21	0.21	0.21	0.24	0.23
Indirect Attainment Level		2.65	2.40	2.16	2.12	2.50	2.07	2.64	2.13	2.14	2.24	2.18	2.18	2.48	2.46
PO Attainment Level		2.37	2.20	2.09	1.99	2.10	2.00	2.04	2.03	2.13	2.30	2.19	2.07	2.30	2.29
PO Target Level		2.10	2.10	2.10	2.10	1.95	1.95	1.95	2.10	1.95	2.10	2.10	1.95	2.10	2.10
PO Attainment		Attained	Attained	Not Attained	Not Attained	Attained	Attained	Attained	Not Attained	Attained	Attained	Attained	Attained	Attained	Attained



ANALYSIS:

Based on the above result it was found that PO3,PO4,PO8 had not reached the target attainment level.

SUGGESTION:

- Conducting Research/Innovation awareness program among students and faculty.
- Arranging Technical visit to varies industries to gain knowledge on various practical solutions for real time problems.
- Encouraging to do more minor projects through technical clubs.
- Encouraging problem based learning.
- Conducting workshop on cutting edge technologies.
- Career readiness program, corporate lectures & motivational talks are arranged.
- Make the environment to apply their knowledge of ethics to the respective work place environment.

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