



S J P N Trust's

## Hirasugar Institute of Technology, Nidasoshi

*Inculcating Values, Promoting Prosperity*

Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi

Recognized under 2(f) & 12B of UGC Act, 1956

Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA:CSE,ECE,EEE & ME

EEE

NBA

PO,PSO  
Attainment

2021-22

### 3.3.1 Provide results of evaluation of each PO & PSO (40)

The result of evaluation of each PO for the assessment years 2020-21 is as shown in table below

#### Attainment of POs through Indirect Method

Survey Forms	Weightage in %	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Employer Survey	5	3.00	2.00	3.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	2.00	3.00
Alumni Survey	15	2.40	2.80	2.60	2.60	2.00	2.60	2.60	2.30	2.70	2.65	3.00	2.00
Senior Exit Survey	15	1.14	1.09	1.07	1.02	1.00	1.07	1.11	1.02	1.11	1.05	1.07	1.14
Activity Feedback	35	3.00	-	-	-	-	3.00	3.00	3.00	3.00	3.00	-	3.00
Course Exit Survey	15	2.58	2.24	1.79	1.82	1.80	1.85	1.57	1.46	1.67	1.45	1.52	1.48
Placement, Higher Education & Entrepreneurship (PHE)	15	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
<b>Total →</b>		<b>2.26</b>	<b>1.16</b>	<b>1.11</b>	<b>1.06</b>	<b>1.01</b>	<b>2.17</b>	<b>2.14</b>	<b>2.06</b>	<b>2.17</b>	<b>2.12</b>	<b>1.08</b>	<b>2.04</b>

#### Attainment of PO through Direct Method

Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	Engg. Mathematics-I	C101	1.72	1.15	0.57	-	-	-	-	-	-	-	-	0.57
2	Engg. Physics	C102	1.77	-	1.18	-	0.59	-	-	0.59	-	0.59	-	0.59
3	ECE. & Engg. Mech.	C103	1.38	1.38	0.92	0.92	-	0.46	-	0.46	-	-	0.46	0.92
4	EME	C104	2.23	1.49	-	-	-	-	0.74	-	-	-	-	-
5	Basic Electrical Engg.	C105	0.84	0.84	-	-	-	-	-	-	-	-	-	-
6	Workshop Lab	C106	2.66	1.66	3.00	1.33	-	3.00	-	3.00	2.00	2.00	3.00	2.50
7	Engg. Physics Lab	C107	2.91	-	-	-	0.97	-	-	0.97	1.94	1.94	-	0.97
8	Engg. Mathematics-II	C109	1.23	0.82	0.41	-	-	-	-	-	-	-	-	0.41
9	Engineering Chemistry	C110	1.32	1.05	0.88	0.44	-	0.79	-	-	0.88	0.88	-	0.44
10	Prog. in C & Data Str.	C111	1.10	0.88	0.95	-	-	-	-	-	-	-	-	0.37
11	CAED	C112	0.69	-	-	-	1.37	-	-	0.69	-	2.06	-	-
12	Basic Electronics Engg.	C113	1.43	1.43	1.43	0.95	-	0.48	-	-	-	-	-	0.95
13	Computer Prog. Lab	C114	2.61	2.61	2.61	-	-	-	-	0.87	1.74	1.74	-	0.87
14	Engg. Chemistry Lab	C115	2.93	2.93	2.93	-	-	1.95	-	-	-	-	-	0.98
15	Environmental Studies	C116	3.00	2.00	2.00	-	-	2.00	2.00	1.00	-	-	1.00	1.00
16	Engg. Mathematics-III	C201	1.03	0.68	0.34	-	-	-	-	-	-	-	-	0.34
17	Electric Circuit Analysis	C202	1.19	1.19	0.40	-	-	-	-	0.79	-	-	-	0.40
18	Transformer & Generators	C203	0.92	0.92	0.92	-	-	-	0.46	0.46	-	0.46	0.46	0.92
19	Analog Electronic Ckts	C204	1.37	1.37	0.91	0.91	0.91	-	-	0.46	-	-	-	-
20	Digital System Design	C205	1.11	1.11	-	-	0.37	-	0.37	0.37	0.37	-	-	0.37



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Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
21	Electr. & Electrn Measure.	C206	1.24	0.58	-	-	-	-	-	0.83	-	-	-	-
22	Electrical Machines Laboratory -I	C207	2.65	1.77	1.77	-	-	-	0.88	0.88	-	0.88	0.88	1.77
23	Electronics Laboratory	C208	2.93	2.93	1.95	-	-	-	-	0.98	0.98	-	-	-
24	Engineering Maths IV	C211	1.91	1.28	0.64	-	-	-	-	-	-	-	-	0.64
25	Power Generation and Economics	C212	1.38	0.92	-	-	-	1.38	1.38	-	-	-	-	-
26	Transmission and distribution	C213	1.23	0.82	0.41	-	-	0.41	0.41	0.41	0.41	0.41	0.41	-
27	Electric Motors	C214	1.06	1.06	1.06	-	-	-	-	0.53	-	-	-	0.53
28	Electromagnetic Theory	C215	1.54	1.54	1.03	-	-	-	0.51	0.51	-	0.51	0.51	1.03
29	Operational amplifier and Linear ICs	C216	0.95	1.43	1.43	-	-	0.48	0.48	0.48	-	0.48	0.48	-
30	Electric machine lab II	C217	2.81	1.87	1.87	-	-	-	0.94	0.94	-	0.94	0.94	1.87
31	Operational amplifier and Linear ICs Lab	C218	2.50	2.50	1.67	-	0.83	-	-	-	1.67	1.67	0.83	0.83
32	Management & Entrepreneurship	C301	0.88	-	-	-	-	-	-	0.88	0.88	0.88	0.88	0.88
33	Microcontroller	C302	1.63	1.09	0.54	-	-	-	-	0.54	-	0.54	-	0.54
34	Power Electronics	C303	1.67	1.56	1.11	-	-	-	-	1.11	-	-	-	1.11
35	Signals & Systems	C304	1.43	0.95	0.48	-	0.48	-	-	0.48	-	-	-	-
36	Estimating and Costing	C307	1.79	1.79	1.79	-	-	1.79	-	1.79	1.20	1.20	1.79	1.20
37	Programmable Logic Controllers	C310	2.29	1.53	1.53	-	2.29	1.53	-	1.53	0.76	1.53	-	1.53
38	Microcontroller Lab	C313	2.92	1.95	-	-	0.97	-	-	0.97	1.95	0.97	-	0.97
39	Power Electronics Lab	C314	3.00	2.00	2.00	-	-	2.00	-	2.00	2.00	2.00	-	2.00
40	Control System	C315	2.46	2.46	-	-	-	-	0.82	0.82	0.82	-	-	0.82
41	Power System Analysis-I	C316	2.83	2.83	1.89	-	-	-	-	0.94	-	-	-	0.94
42	Electrical Machine Design	C318	2.97	2.97	2.97	-	-	1.98	-	2.97	1.98	1.98	-	1.98
43	Computer Aided Electrical Drawing	C319	2.32	2.32	1.55	-	1.55	-	-	0.77	0.77	-	0.77	1.39
44	Sensors & Transducers	C324	2.97	1.98	1.98	-	-	1.98	-	1.98	-	-	-	1.98
45	Control System Lab	C327	2.69	1.79	0.90	-	0.90	-	-	0.90	1.79	0.90	-	0.90
46	Digital Signal Processing Lab	C328	2.86	1.90	-	-	-	-	-	-	1.90	0.95	-	-
47	Power System Analysis-II	C401	2.37	2.37	1.58	-	1.58	0.79	-	1.58	1.58	0.79	-	1.58
48	Power System Protection	C402	2.33	1.40	1.55	-	-	-	-	1.24	-	1.55	-	1.55
49	High Voltage Engineering	C403	2.58	2.58	1.72	-	-	1.72	-	1.72	-	-	-	1.72
50	Power System Planning	C407	2.31	2.31	1.54	-	-	-	-	0.77	-	-	-	0.77
51	Testing & Commissioning of Power System Apparatus	C409	2.03	1.35	1.35	-	-	1.35	-	1.35	1.35	1.35	-	0.68



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Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
52	Power System Simulation Laboratory	C412	2.90	2.90	1.93	-	1.93	1.93	-	1.93	1.93	1.93	-	1.93
53	Relay & High Voltage Laboratory	C413	2.95	1.97	-	-	-	-	-	0.98	1.97	0.98	-	-
54	Project Phase I + Seminar	C414	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
55	Power System Operation and Control	C415	1.90	1.90	1.27	0.63	1.27	-	-	1.27	-	1.27	-	0.63
56	Industrial Drives and Applications	C416	2.28	2.28	1.52	-	-	1.52	-	1.52	-	-	-	1.52
57	Smart Grid	C417	2.92	2.92	1.95	1.95	1.95	0.97	-	0.97	0.97	0.97	-	0.97
58	Internship/ Professional Practice	C421	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99
59	Project Work-II	C422	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
60	Seminar	C423	3.00	3.00	3.00	2.00	3.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00
<b>Direct Attainment (A)</b>			<b>2.08</b>	<b>1.81</b>	<b>1.55</b>	<b>1.65</b>	<b>1.58</b>	<b>1.65</b>	<b>1.40</b>	<b>1.24</b>	<b>1.62</b>	<b>1.37</b>	<b>1.38</b>	<b>1.21</b>
<b>Indirect Attainment (B)</b>			<b>2.26</b>	<b>1.16</b>	<b>1.11</b>	<b>1.06</b>	<b>1.01</b>	<b>2.17</b>	<b>2.14</b>	<b>2.06</b>	<b>2.17</b>	<b>2.12</b>	<b>1.08</b>	<b>2.04</b>
<b>Average (0.8A+0.2B)</b>			<b>2.12</b>	<b>1.68</b>	<b>1.46</b>	<b>1.53</b>	<b>1.46</b>	<b>1.75</b>	<b>1.55</b>	<b>1.40</b>	<b>1.73</b>	<b>1.52</b>	<b>1.32</b>	<b>1.37</b>

Criteria Coordinator

Program Coordinator

HOD



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The result of evaluation of each PSO for the assessment years 2020-21 is as shown in table below

**Attainment of PSOs through Indirect Method**

Survey Forms	Weightage in %	PSO1	PSO2
Employer Survey	5	3.00	3.00
Alumni Survey	15	-	-
Senior Exit Survey	15	1.07	1.05
Activity Feedback	35	3.00	-
Course Exit Survey	15	2.46	2.00
Placement, Higher Education & Entrepreneurship (PHE)	15	0.96	0.96
<b>Total →</b>		<b>1.87</b>	<b>0.75</b>

**Attainment of PSO through Direct Method**

Sl. No	Course	Code	PSO1	PSO2
1	Engg. Mathematics-III	C201	-	-
2	Electric Circuit Analysis	C202	1.19	-
3	Transformer & Generators	C203	1.38	-
4	Analog Electronic Ckts	C204	1.37	-
5	Digital System Design	C205	0.74	-
6	Electr. & Eelectrn Measure.	C206	0.83	-
7	Electrical Machines Laboratory -1	C207	2.65	1.77
8	Electronics Laboratory	C208	2.93	1.95
9	Engineering Maths IV	C211	-	-
10	Power Generation and Economics	C212	1.38	-
11	Transmission and distribution	C213	0.82	-
12	Electric Motors	C214	1.59	-
13	Electromagnetic Theory	C215	1.54	-
14	Operational amplifier and Linear ICs	C216	1.43	-
15	Electric machine lab II	C217	1.92	2.88
16	Operational amplifier and Linear ICs Lab	C218	2.50	0.83
17	Management & Entrepreneurship	C301	0.44	-
18	Microcontroller	C302	1.63	-
19	Power Electronics	C303	1.67	-
20	Signals & Systems	C304	0.95	-
21	Estimating and Costing	C307	1.79	-
22	Programmable Logic Controllers	C310	1.53	1.53



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2021-22

Sl. No	Course	Code	PSO1	PSO2
23	Microcontroller Lab	C313	2.92	1.95
24	Power Electronics Lab	C314	3.00	3.00
25	Control System	C315	2.46	-
26	Power System Analysis-I	C316	1.89	-
27	Electrical Machine Design	C318	2.97	-
28	Computer Aided Electrical Drawing	C319	2.32	2.32
29	Sensors & Transducers	C324	2.97	-
30	Control System Lab	C327	2.63	2.63
31	Digital Signal Processing Lab	C328	2.92	1.95
32	Power System Analysis-II	C401	2.37	0.79
33	Power System Protection	C402	2.33	-
34	High Voltage Engineering	C403	2.58	-
35	Power System Planning	C407	1.54	-
36	Testing & Commissioning of Power System Apparatus	C409	2.03	-
37	Power System Simulation Laboratory	C412	2.90	1.93
38	Relay & High Voltage Laboratory	C413	1.97	2.95
39	Project Phase I + Seminar	C414	3.00	3.00
40	Power System Operation and Control	C415	1.90	0.63
41	Industrial Drives and Applications	C416	2.28	-
42	Smart Grid	C417	2.92	-
43	Internship/ Professional Practice	C421	3.00	3.00
44	Project Work-II	C422	3.00	3.00
45	Seminar	C423	3.00	1.00
<b>Average</b>			<b>2.07</b>	<b>2.06</b>
<b>Indirect Attainment (B)</b>			<b>1.87</b>	<b>0.75</b>
<b>Average (0.8A+0.2B)</b>			<b>2.03</b>	<b>1.80</b>

Criteria Coordinator

Program Coordinator

HOD



## FACULTY COURSE ASSESSEMENT REPORT(FCAR)

Course Coordinator: Prof. M. P. Yanagimath

Class Strength:23

Semester: V Subject: Microcontroller

Code: 17EE52

### I. 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.



**II. Program Specific Outcomes (PSOs):**

The graduates of the program will be able to;

PSO1	Apply knowledge & competencies to analyze & design electrical & electronics circuits, control and power systems, machines & industrial drives.
PSO2	Use software/hardware tools for the design, simulation and analysis of electrical and electronics systems.

**III. Course Outcomes (COs):** The student, after successful completion of the course, will be able to:

CO	Description	Mapped POs	RBTL
C302.1	Discuss the history, features, internal architecture and addressing modes of 8051.	1.2.3.8.10.12	L1,L2,L3,L4
C302.2	Write assembly level program using arithmetic, logic, jump and call instructions.	1.2.3.8.10.12	L1,L2,L3,L4
C302.3	Develop 8051C programs for time delay, I/O, logic, data conversion/serialization and timer operation.	1.2.3.8.10.12	L1,L2,L3,L4
C302.4	Develop 8051 serial port and interrupt programming in assembly and C.	1.2.3.8.10.12	L1,L2,L3,L4
C302.5	Interface 8051 with real-world devices such as LCD's, keyboards, ADC, DAC chips, sensors, motor control devices and with 8255.	1.2.3.8.10.12	L1,L2,L3,L4

**IV. Mapping of Course Outcomes (COs) to Program Outcomes (POs):**

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C302.1	3	2	-	-	-	-	-	1	-	1	-	1
C302.2	3	2	1	-	-	-	-	1	-	1	-	1
C302.3	3	2	1	-	-	-	-	1	-	1	-	1
C302.4	3	2	1	-	-	-	-	1	-	1	-	1
C302.5	3	2	1	-	-	-	-	1	-	1	-	1
<b>AVG</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>1</b>



**V. Mapping of Course Outcomes (COs) to Program Specific Outcomes (PSOs):**

PSOs COs	PSO1	PSO2
C302.1	3	-
C302.2	3	-
C302.3	3	-
C302.4	3	-
C302.5	3	-
AVG	3	-

**VI. Justification of CO-PO Mapping:**

Mapping	Justification
C302.1-PO1	A strong correlation since explaining pin configuration and memory organization requires a certain level of knowledge of mathematics and engineering sciences.
C302.1-PO2	A medium correlation since to identify the use of microcontroller to solve complex engineering problem student require a certain level of problem analysis skills.
C302.1-PO8	A low correlation since to program microcontroller for various applications it is necessary to follow norms of engineering practice.
C302.1-PO10	A low correlation since to explain the use of microcontroller for various applications by interfacing different peripherals to the community it is necessary to write effective reports.
C302.1-PO12	A low correlation since programming skills of microcontroller will make students to engage in independent and life-long learning in the broadest context of technological change.
C302.2-PO1	A strong correlation since programming arithmetic and logical instructions microcontroller will make students to engage in independent and life-long learning in the broadest context of technological change.
C302.2-PO2	A medium correlation since to identify type of instruction used arithmetic and logical operations based on addressing modes requires a certain level of problem analysis skills.
C302.2-PO3	A low correlation since to solve complex engineering problem using arithmetic and logical instructions microcontroller student must correct program that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
C302.2-PO8	A low correlation since to program microcontroller for various applications it is necessary to follow norms of engineering practice.
C302.2-PO10	A low correlation since programming skills of microcontroller will make students to engage in independent and life-long learning in the broadest context of technological change.
C302.2-PO12	A low correlation since programming skills of microcontroller will make students to engage in independent and life-long learning in the broadest context of technological change.
C302.3-PO1	A strong correlation since explaining the concept of delay and timer requires a certain level of knowledge of mathematics and engineering sciences.





C302.3-PO2	A medium correlation since to identify type of pins those are used for timer delay microcontroller requires a certain level of problem analysis skills.
C302.3-PO3	A low correlation since to solve complex engineering problem using microcontroller student must choose the required hardware to meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
C302.3-PO8	A low correlation since to program microcontroller for various applications by interfacing different peripherals it is necessary to follow norms of engineering practice.
C302.3-PO10	A low correlation since to explain the use of microcontroller for various applications by interfacing different peripherals to the community it is necessary to write effective reports.
C302.3-PO12	A low correlation since programming skills of microcontroller with delay will make students to engage in independent and life-long learning in the broadest context of technological change.
C302.4-PO1	A strong correlation since explaining the concept interrupts and serial communication requires a certain level of knowledge of mathematics and engineering sciences.
C302.4-PO2	A medium correlation since to write source code for applications that use I/O ports, timer and interrupts requires a certain level of problem analysis skills.
C302.4-PO3	A low correlation since to solve complex engineering problem using interfacing student must choose the required hardware to meet the specified needs timer and interrupts with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
C302.4-PO8	A low correlation since to program microcontroller for various applications using timer by interfacing different peripherals it is necessary to follow norms of engineering practice.
C302.4-PO10	A low correlation since to explain the use of timer and I/O ports of microcontroller for various applications by interfacing different peripherals to the community it is necessary to write effective reports.
C302.4-PO12	A low correlation since programming skills of microcontroller with timer and interrupt students will engage in independent and life-long learning in the broadest context of technological change.
C302.5-PO1	A strong correlation since to explain concept of microcontroller interfacing applications students requires a certain level of knowledge of mathematics and engineering sciences.
C302.5-PO2	A medium correlation since to write source code for LCD,DAC and ADC interfacing with microcontroller students requires a certain level of problem analysis skills.
C302.5-PO8	A low correlation since to program 8051 microcontroller for different applications using different interfacing devices it is necessary to follow norms of engineering practice.
C302.5-PO10	A low correlation since to explain the 8051microcontroller for various applications by interfacing different peripherals to the community it is necessary to write effective reports.
C302.5-PO12	A low correlation since programming 8051 microcontroller for different applications students will engage in independent and life-long learning in the broadest context of technological change.



### VII. Justification of CO-PSO Mapping :

Mapping	Justification
C302.1-PSO1	A strong correlation since the knowledge of programming using microcontroller is very much essential electronics systems..
C302.2-PSO1	A strong correlation since the knowledge of different type of instructions to write program using microcontroller is very much essential electronics systems..
C302.3-PSO1	A strong correlation since the knowledge of I/O operation in microcontroller is very much essential electronics systems.
C302.4-PSO1	A strong correlation since the knowledge of serial communication and interrupt in microcontroller is very much essential electronics systems.
C302.5-PSO1	A strong correlation since the knowledge of interfacing in microcontroller is very much essential electronics systems.

### VIII. Bench Mark Setting

As the course is revised, CO attainment target is taken as 1.5.



## IX. DIRECT ASSESSMENT OF COs, POs & PSOs ATTAINMENT

### Teaching Methodology:

- Lecture by Teacher
- PPT or Online demo etc.

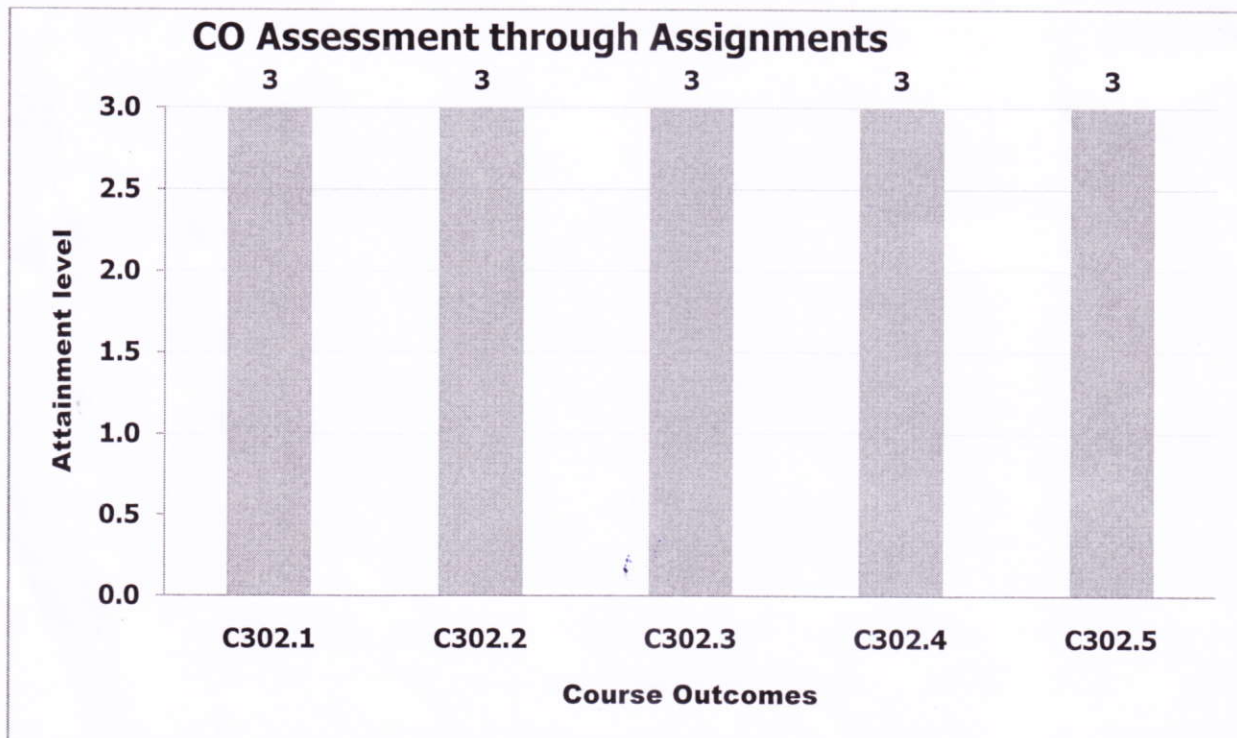
### Assessment Tools:

- Continuous assessment
- Laboratory experiments
- End semester exam

### 1. Assessment through Assignment:

A: Appeared    R: Reached    Low =1 (50-59 %)    Medium =2 (60-69 %)    High =3 (above 70 %)

COs	Assignment-1		Assignment-2		Assignment-3		Assignment-4		Assignment-5		Attainment level of CO in Percentage	Attainment level of CO	Mapped PO
	A	R	A	R	A	R	A	R	A	R			
C302.1	23	23									100.00	3	1,2,3,8,10,12
C302.2			23	23							100.00	3	1,2,3,8,10,12
C302.3					23	23					100.00	3	1,2,3,8,10,12
C302.4							23	23			100.00	3	1,2,3,8,10,12
C302.5									23	23	100.00	3	1,2,3,8,10,12

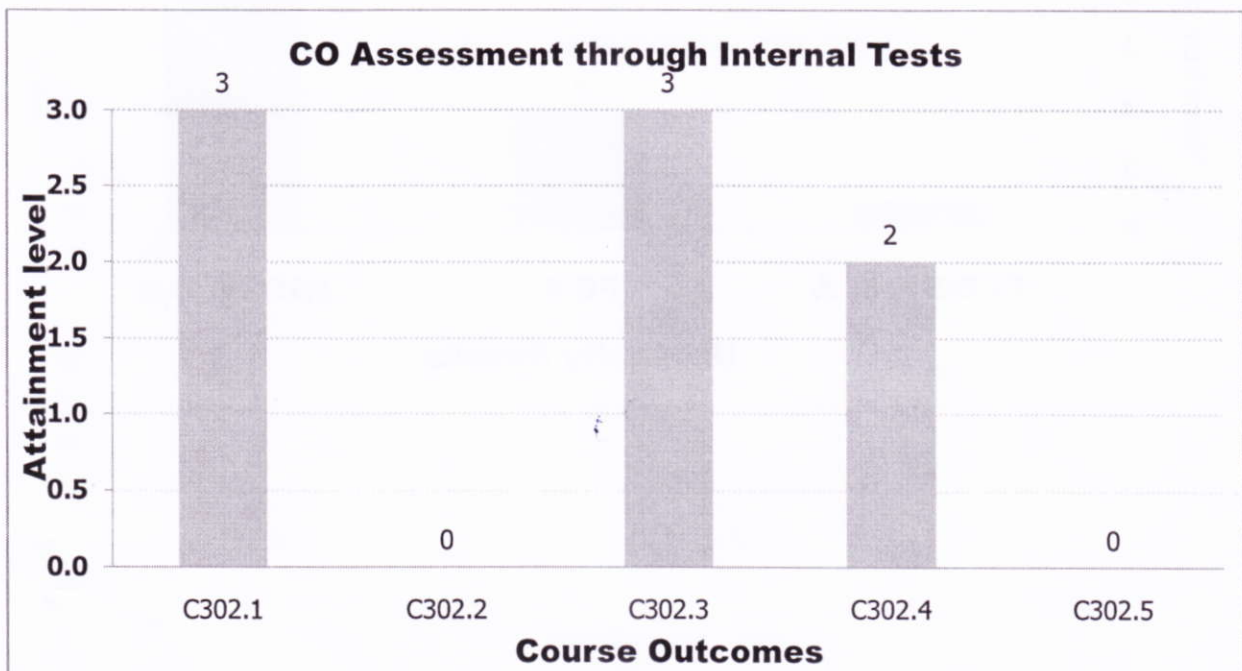




## 2. Assessment through Internal Marks:

A: Appeared    R: Reached    Low =1 (50-59 %)    Medium =2 (60-69 %)    High =3 (above 70 %)

COs	IA-1		IA-2				IA-3				Attainment level of CO	Mapped PO		
	Q.No.1 OR Q. No. 2		Q.No.3 OR Q. No. 4		Q.No.1 OR Q. No. 2		Q.No.3 OR Q. No. 4		Q.No.1 OR Q. No. 2				Q.No.3 OR Q. No. 4	
	A	R	A	R	A	R	A	R	A	R	A	R		
	C302.1	22	18											3
C302.2			22	5									0	1,2,3,8,10,12
C302.3					23	20	23	13					3	1,2,3,8,10,12
C302.4									23	14			2	1,2,3,8,10,12
C302.5											23	6	0	1,2,3,8,10,12





### 3. Semester End Exam Assessment Based on VTU Exam Results:

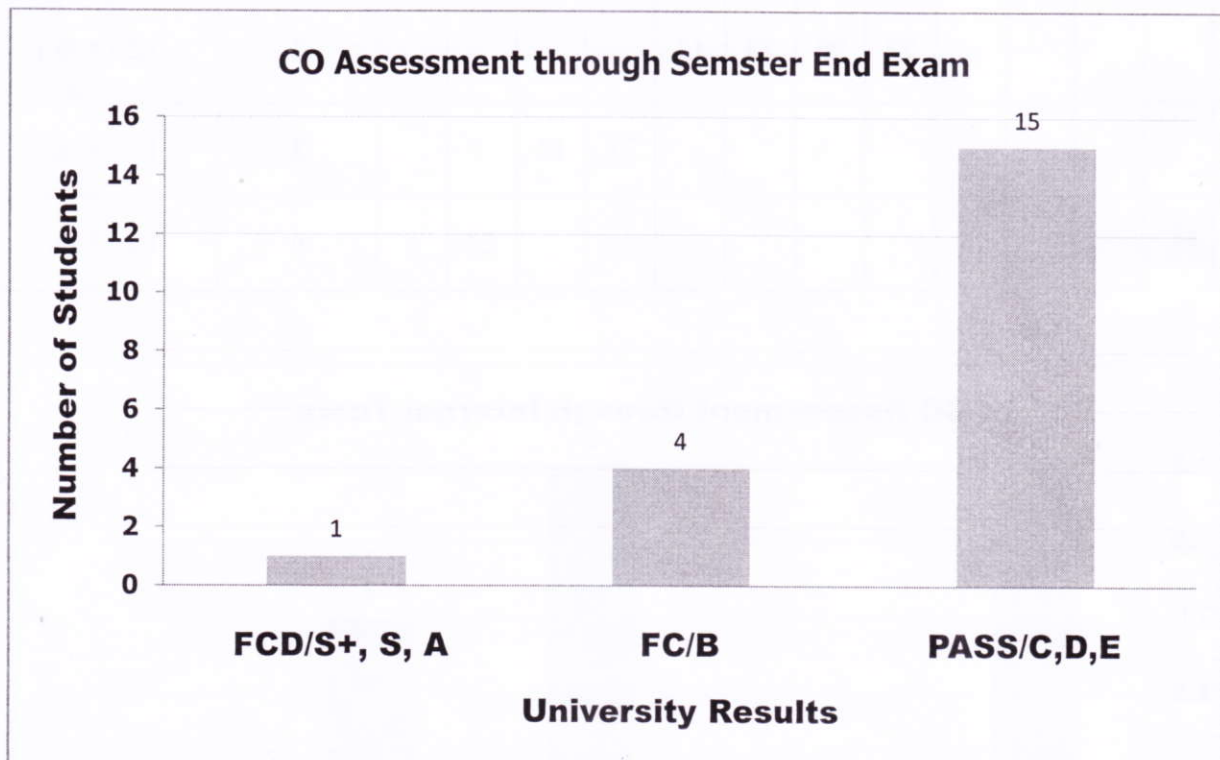
COs Attainment Levels:

FCD: S+, S, & A = 3;

FC (B) = 2;

Pass: C, D, & E = 1; Fail = 0

Total no. of Students Appeared	22	
Class/Grade↓	Total Number of Students	Course (COs) Attainment Through Semester End Exams
FCD/S+, S, A	1	3
FC/B	4	8
PASS/C,D,E	15	15
Total Percentage of Passing	90.91%	1.18

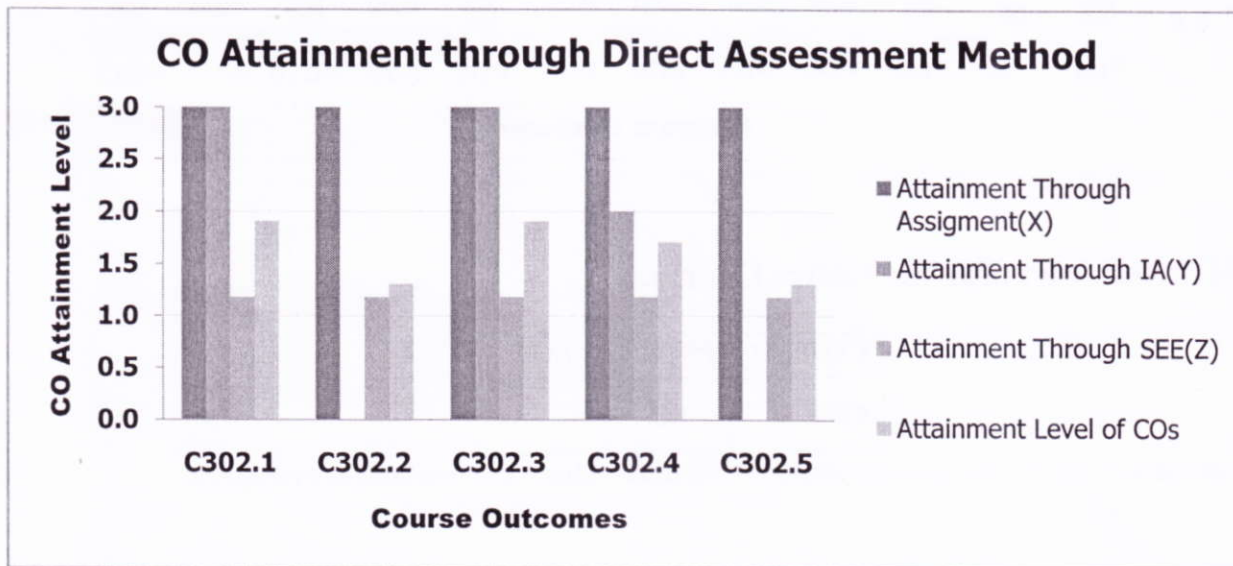




#### 4. CO Attainment:

#### CO Attainment through Direct Assessment Method

COs	Attainment Through Assignment(X)	Attainment Through IA Test(Y)	Attainment Through Semester End Exam(Z)	Attainment level of CO	Mapped POs
				$[0.4(X+Y)/2]+0.6Z$	
C302.1	3	3	1.18	1.91	1,2,3,8,10,12
C302.2	3	0	1.18	1.31	1,2,3,8,10,12
C302.3	3	3	1.18	1.91	1,2,3,8,10,12
C302.4	3	2	1.18	1.71	1,2,3,8,10,12
C302.5	3	0	1.18	1.31	1,2,3,8,10,12
<b>CO Attainment through Direct Assessment Method</b>				<b>1.63</b>	

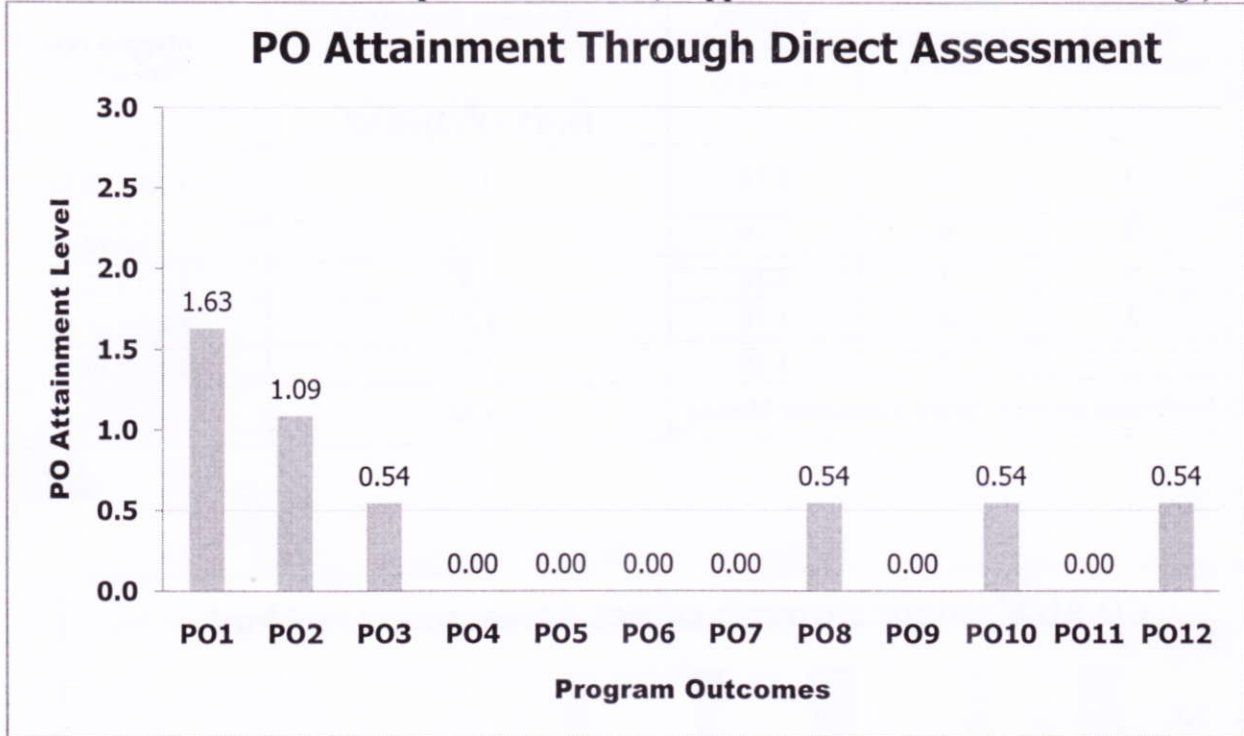




### 5. PO Attainment for the Entire Course:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C302	1.63	1.09	0.54	-	-	-	-	0.54	-	0.54	-	0.54

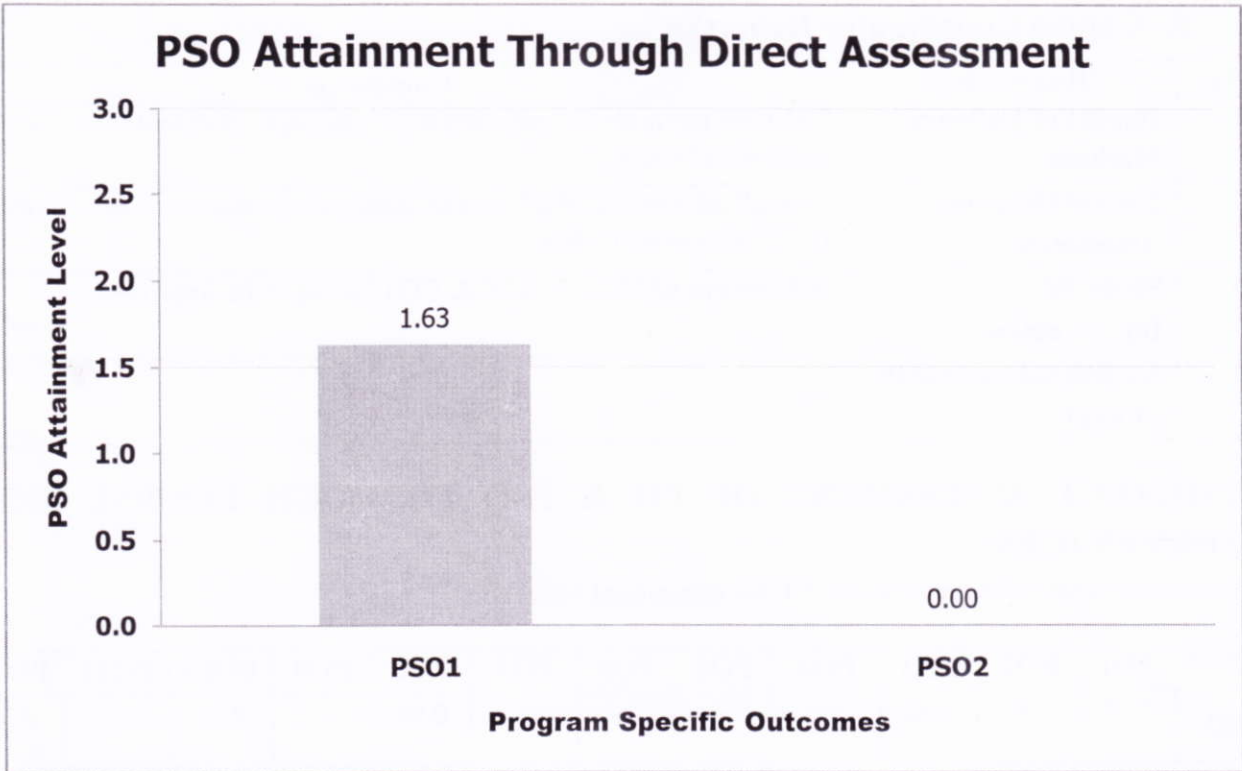
POs attainment value for the present course = (Mapped value \* CO attainment average)/3



### 6. PSO Attainment for the Entire Course:

CO/PSO	PSO1	PSO2
C302	1.63	-

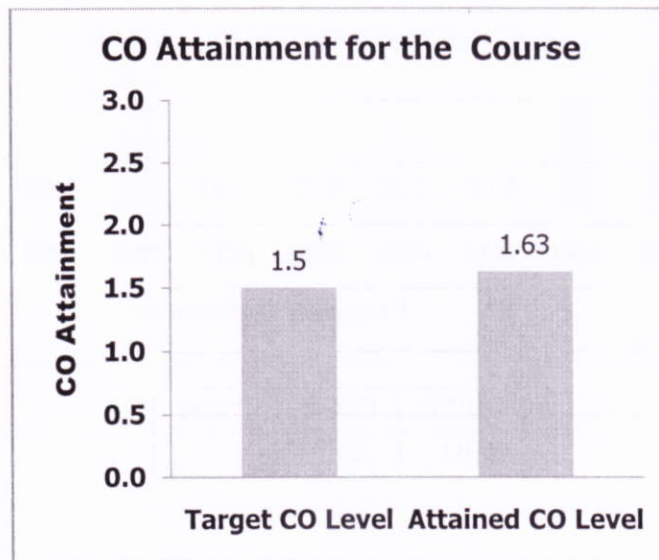
PSOs attainment value for the present course = (Mapped value \* CO attainment average)/3



**7. Target Attainment:**

As the course is revised, CO attainment target is taken as 2

Set Target Value (ITV)	1.5
Attained Value	1.63
New Target Level for the next Exam	1.63







### 8. Course Coordinator Remarks:

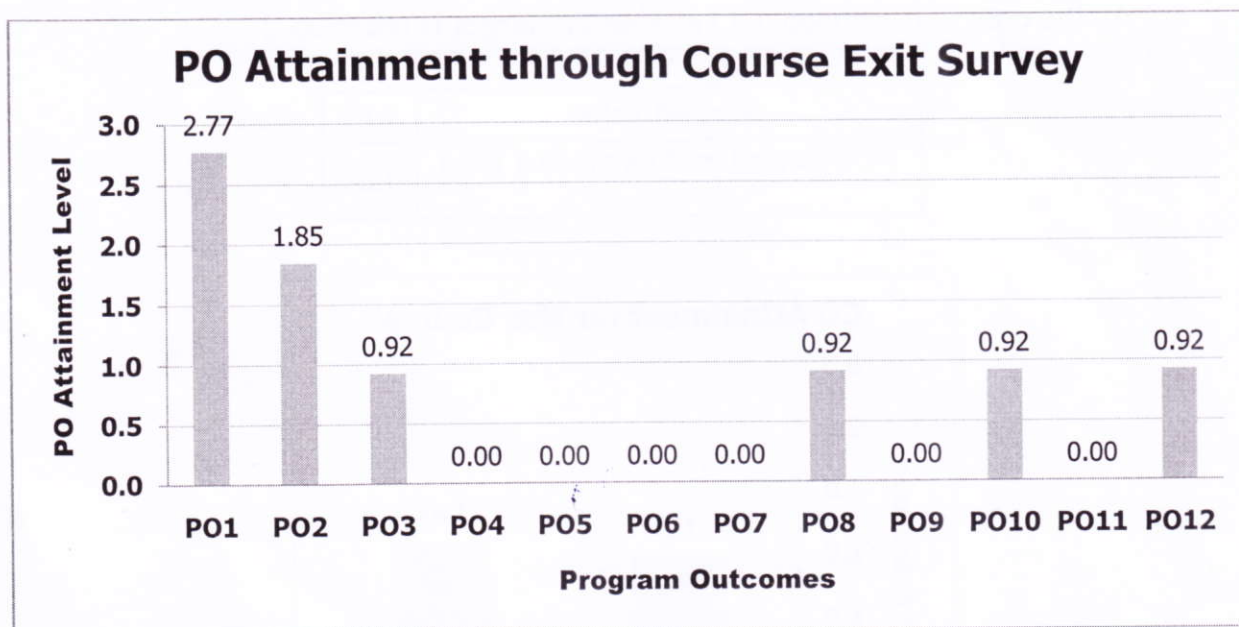
S. No.	Observations	Comments
1	<b>Impact of Delivery Methods</b>	Delivery methods are satisfactory. Pedagogy used to deliver lectures is quite satisfactory.
2	<b>Course Outcome Attainment</b>	Overall attainment of all course outcomes is moderate as it is observed in CO attainment table.
3	<b>Scope for Improvement</b>	Attainment of CO2, 3, 8,10 & CO12 need to be improved.
4	<b>Additional comments (if any)</b>	Nil

### X. INDIRECT ASSESSMENT OF PO & PSO THROUGH COURSE EXIT SURVEY (CES)

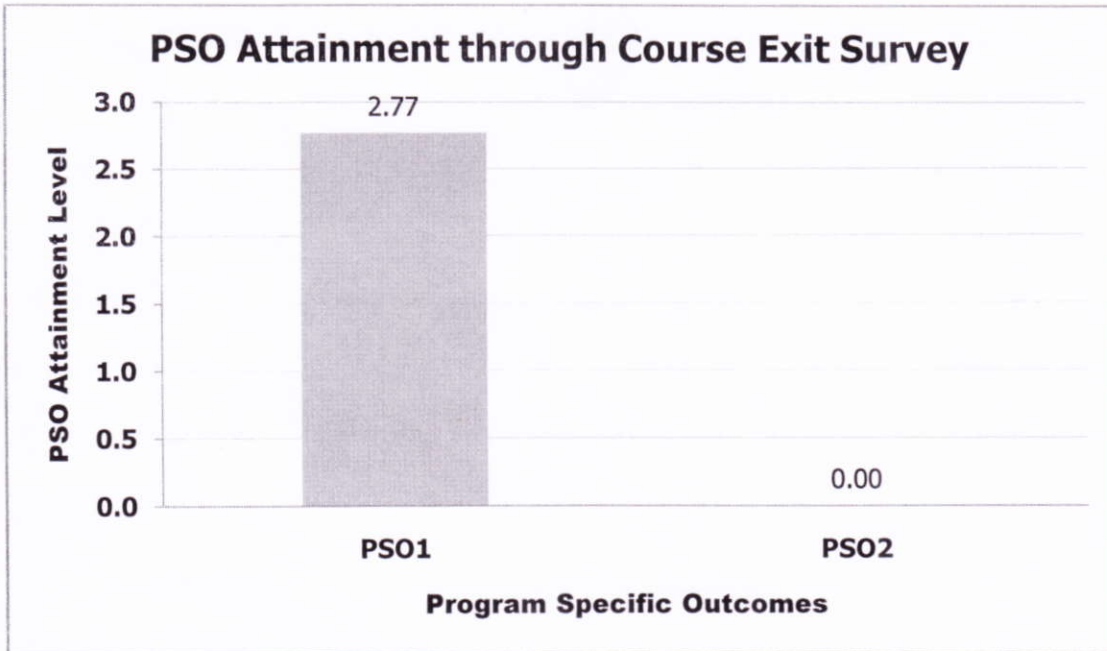
$$\text{PO Attainment} = (\text{Mapped value} * \text{CES attainment value})/3$$


CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C302	2.77	1.85	0.92	-	-	-	-	0.92	-	0.92	-	0.92


$$\text{PSO Attainment} = (\text{Mapped value} * \text{CES attainment value})/3$$



CO/PSO	PSO1	PSO2
C302	2.77	-



  
**Prof M. P Yanagimath**  
Name & Signature of Course  
Coordinator

  
Name & Signature of Module  
Coordinator

  
6/7/22  
HOD



### 3.3.1 Provide results of evaluation of each PO & PSO (40)

The result of evaluation of each PO for the assessment years 2019-20 is as shown in table below

**Attainment of POs through Indirect Method**

Survey Forms	Weightage in %	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Employer Survey	5	3.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	2.00	2.00	2.00
Alumni Survey	15	2.00	2.30	1.70	1.75	0.80	1.80	1.80	1.70	1.40	1.70	-	0.70
Senior Exit Survey	15	2.82	2.80	2.79	2.61	2.77	2.79	2.86	2.77	2.79	2.86	2.73	2.79
Activity Feedback	35	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Course Exit Survey	15	2.55	2.21	1.88	1.95	1.85	1.94	1.70	1.48	1.64	1.64	1.84	1.37
Placement, Higher Education & Entrepreneurship (PHE)	15	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
<b>Total →</b>		<b>2.49</b>	<b>2.48</b>	<b>2.29</b>	<b>2.28</b>	<b>2.20</b>	<b>2.36</b>	<b>2.34</b>	<b>2.28</b>	<b>2.26</b>	<b>2.26</b>	<b>2.02</b>	<b>2.06</b>

**Attainment of PO through Direct Method**

Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	Engg. Mathematics-I	C101	1.93	1.29	-	-	-	-	-	-	-	-	-	0.64
2	Engg. Physics	C102	1.99	-	1.33	-	0.66	-	-	0.66	-	0.66	-	0.66
3	ECE. & Engg. Mech.	C103	1.34	1.34	0.89	0.89	-	0.45	-	0.45	-	-	0.45	0.89
4	EME	C104	1.56	1.56	-	-	-	0.78	-	-	-	-	-	2.34
5	Basic Electrical Engg.	C105	0.94	0.94	-	-	-	-	-	-	-	-	-	-
6	Workshop Lab	C106	2.55	1.59	2.87	1.27	-	2.87	-	2.87	1.91	1.91	2.87	2.39
7	Engg. Physics Lab	C107	2.57	--	--	--	0.86	-	-	0.86	1.71	1.71	-	0.86
8	CIP and Prof. Ethics	C108	--	--	--	--	--	1.12	--	0.75	--	--	--	--
9	Engg. Mathematics-II	C109	1.23	0.82	-	-	-	-	-	-	-	-	-	0.41
10	Engineering Chemistry	C110	1.36	1.09	0.91	-	-	0.82	-	-	-	-	-	0.45
11	Prog. in C & Data Str.	C111	1.62	1.29	1.40	-	-	-	-	0.54	-	0.54	-	0.54
12	CAED	C112	0.84	-	-	-	1.69	-	-	0.28	-	2.53	-	-
13	Basic Electronics Engg.	C113	1.86	1.86	1.86	1.24	-	0.62	-	-	-	-	-	1.37
14	Computer Prog. Lab	C114	2.57	2.57	2.57	-	-	-	-	0.86	1.71	1.71	-	0.86
15	Engg. Chemistry Lab	C115	2.68	2.68	2.68	-	-	1.79	-	-	-	-	-	0.89
16	Environmental Studies	C116	2.44	1.63	1.63	-	-	1.63	1.63	0.81	-	-	0.81	0.81
17	Engg. Mathematics-III	C201	1.99	1.32	0.66	-	-	-	-	-	-	-	-	0.66
18	Electric Circuit Analysis	C202	1.36	1.36	0.45	-	-	-	-	0.91	-	-	-	0.45
19	Transfrs & Generators	C203	0.56	0.56	0.56	-	-	-	-	0.28	-	-	-	0.28
20	Analog Electronic Ckts	C204	0.56	0.56	0.56	-	-	-	-	0.28	-	-	-	0.28



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**Programmes Accredited by NBA: CSE, ECE, EEE & ME**

EEE
NBA
PO,PSO Attainment
2020-21

Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
21	Digital System Design	C205	1.21	1.21	-	-	0.40	-	0.40	0.40	0.40	-	-	0.40
22	Electr. & Electrn Measure.	C206	1.42	0.47	-	-	-	-	-	0.95	-	-	-	-
23	Electrical Machines Lab-1	C207	2.78	1.85	1.85	-	-	-	0.93	0.93	-	0.93	0.93	1.85
24	Electronics Laboratory	C208	2.73	2.73	1.82	-	-	1.82	-	0.91	0.91	-	-	1.82
25	Engineering Maths IV	C209	1.57	1.04	0.52	--	--	--	--	--	--	--	--	0.52
26	Power Generation and Economics	C210	1.86	1.24	-	-	-	1.86	1.86	-	-	-	-	-
27	Transmission and Distribution	C211	1.39	0.93	0.93	0.93	-	-	-	0.93	-	-	-	0.46
28	Electric Motors	C212	0.92	0.92	0.92	-	-	-	-	0.46	-	-	-	0.46
29	Electromagnetic Theory	C213	0.92	0.92	0.62	-	-	-	-	0.31	-	-	-	-
30	Operational Amplifier and Linear ICs	C214	0.97	0.64	0.97	0.97	-	-	0.32	0.32	0.32	-	0.32	0.32
31	Electric Machine Lab II	C215	2.50	1.67	1.67	-	-	-	0.83	0.83	-	0.83	0.83	1.67
32	Operational Amplifier and Linear ICs Lab	C216	0.97	0.64	0.97	0.97	-	-	0.32	0.32	0.32	-	0.32	0.32
33	Management & Entrepreneurship	C301	1.56	-	-	-	-	-	-	1.56	1.56	1.56	1.56	1.56
34	Microcontroller	C302	1.21	0.80	0.40	-	-	-	-	0.40	-	0.40	-	0.40
35	Power Electronics	C303	1.69	1.57	1.12	-	-	-	-	1.12	-	-	-	1.12
36	Signals & Systems	C304	1.14	1.14	1.14	-	-	-	-	0.57	-	-	-	0.57
37	Electrical Engineering Materials	C30	2.19	2.19	1.46	-	-	0.73	-	0.73	0.73	-	-	1.46
38	Estimating & Costing	C307	1.74	1.74	1.74	-	-	1.74	-	1.74	1.16	1.16	1.74	1.16
39	Programmable Logic Controllers	C310	1.56	1.04	1.04	-	1.56	1.04	-	1.04	0.52	1.04	-	1.04
40	Renewable energy sources	C311	1.19	1.19	-	-	0.60	-	-	1.19	-	-	-	-
41	Microcontroller Lab	C313	3.00	2.00	-	-	1.00	-	-	1.00	2.00	1.00	-	1.00
42	Power Electronics Lab	C314	1.98	1.98	0.99	-	-	-	-	0.99	1.98	1.98	-	-
43	Control System	C315	1.54	1.54	-	-	-	-	0.51	0.51	0.51	-	-	0.51
44	Power System Analysis-I	C316	1.64	1.64	1.09	1.09	-	-	-	1.09	-	-	-	0.55
45	Digital Signal Processing	C317	0.89	0.89	0.89	-	-	-	-	0.45	-	-	-	0.45
46	Electrical Machine Design	C318	1.93	1.93	1.93	-	-	1.29	-	1.93	1.29	1.29	-	1.29
47	Computer Aided Electrical Drawing	C319	1.54	1.54	1.54	-	-	-	-	0.77	-	-	-	0.77
48	Sensors & Transducers	C324	1.72	1.15	1.15	-	-	1.15	-	1.15	-	-	-	1.15
49	Control System Lab	C327	2.94	1.96	1.96	-	1.96	-	-	1.96	1.96	1.96	-	1.96
50	Digital Signal Processing Lab	C328	2.98	1.99	-	-	-	-	-	-	1.99	0.99	-	-
51	Power System Analysis-II	C401	1.91	1.91	1.28	1.28	1.28	0.64	-	1.28	1.28	0.64	-	1.28
52	Power System Protection	C402	2.50	1.50	1.67	-	-	-	-	1.33	-	1.67	-	1.67



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EEE

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PO,PSO  
Attainment

2020-21

Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
53	High Voltage Engineering	C403	2.11	2.11	1.40	-	-	1.40	-	1.40	1.40	1.40	-	0.70
54	Utilization of Electrical Power	C405	1.48	1.48	1.36	-	-	0.99	0.99	0.99	0.99	-	-	0.99
55	Power System Planning	C407	1.89	1.89	-	-	-	-	-	1.26	-	-	-	0.63
56	FACTS & HVDC Transmission	C408	2.20	2.20	1.47	0.73	0.73	-	-	0.73	0.73	-	-	0.73
57	Testing & Commissioning of Power System Apparatus	C409	1.49	0.99	0.99	0.50	-	0.99	-	0.99	0.99	0.99	-	0.50
58	Power System Simulation Laboratory	C412	3.00	3.00	2.00	2.00	2.00	2.00	-	2.00	2.00	2.00	-	2.00
59	Relay & High Voltage Laboratory	C413	3.00	2.00	-	-	-	-	-	1.00	2.00	1.00	-	-
60	Project Phase I + Seminar	C414	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
61	Power System Operation & Control	C415	1.55	1.55	1.04	0.52	1.04	-	-	1.04	-	1.04	-	0.52
62	Industrial Drives & Applications	C416	2.37	2.37	1.58	-	0.79	-	-	-	-	-	-	-
63	Smart Grid	C417	1.72	1.72	1.15	1.15	1.15	0.57	-	0.57	0.57	0.57	-	0.57
64	Integration of Distributed Generation	C419	1.37	1.37	-	-	-	-	0.46	0.46	0.46	-	-	0.46
65	Internship	C421	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
66	Project Work Phase - II	C422	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
67	Seminar	C423	2.40	2.40	2.40	1.60	2.40	1.60	2.40	2.40	2.40	1.60	1.60	1.60
<b>Direct Attainment (A)</b>			<b>1.82</b>	<b>1.56</b>	<b>1.40</b>	<b>1.24</b>	<b>1.33</b>	<b>1.35</b>	<b>1.19</b>	<b>1.03</b>	<b>1.32</b>	<b>1.34</b>	<b>1.33</b>	<b>1.01</b>
<b>Indirect Attainment (B)</b>			<b>2.49</b>	<b>2.48</b>	<b>2.29</b>	<b>2.28</b>	<b>2.20</b>	<b>2.36</b>	<b>2.34</b>	<b>2.28</b>	<b>2.26</b>	<b>2.26</b>	<b>2.02</b>	<b>2.06</b>
<b>Average (0.8A+0.2B)</b>			<b>1.95</b>	<b>1.74</b>	<b>1.58</b>	<b>1.45</b>	<b>1.51</b>	<b>1.55</b>	<b>1.42</b>	<b>1.28</b>	<b>1.51</b>	<b>1.53</b>	<b>1.47</b>	<b>1.22</b>

*Prinage*

Criteria Coordinator

*mp*

Program Coordinator

*P.O.*

HOD



The result of evaluation of each PSO for the assessment years 2019-20 is as shown in table below

**Attainment of PSOs through Indirect Method**

Survey Forms	Weightage in %	PSO1	PSO2
Employer Survey	5	-	-
Alumni Survey	15	-	-
Senior Exit Survey	15	2.84	2.82
Activity Feedback	35	-	-
Course Exit Survey	15	2.44	1.94
Placement, Higher Education & Entrepreneurship (PHE)	15	1.22	1.22
<b>Total →</b>		<b>0.97</b>	<b>0.90</b>

**Attainment of PSO through Direct Method**

Sl. No	Course	Code	PSO1	PSO2
1	Engg. Mathematics-III	C201	-	-
2	Electric Circuit Analysis	C202	0.91	-
3	Transfrs & Generators	C203	0.83	-
4	Analog Electronic Ckts	C204	0.83	-
5	Digital System Design	C205	0.81	-
6	Electr. & Eelectrn Measure.	C206	0.95	-
7	Electrical Machines Laboratory -1	C207	1.55	2.33
8	Electronics Laboratory	C208	2.73	1.82
9	Engineering Maths IV	C209	-	-
10	Power generation and economics	C210	0.88	-
11	Transmission and distribution	C211	0.93	-
12	Electric Motors	C212	1.38	-
13	Electromagnetic Theory	C213	0.92	-
14	Operational amplifier and linear Integrated Circuits	C214	0.97	-
15	Electric machine lab II	C215	1.71	2.57
16	Operational amplifier and linear ICs Lab	C216	0.97	-
17	Management & Entrepreneurship	C301	0.78	-
18	Microcontroller	C302	1.21	-
19	Power Electronics	C303	1.69	-
20	Signals & Systems	C304	1.70	-
21	Electrical Engineering Materials	C306	2.19	-



S J P N Trust's

**Hirasugar Institute of Technology, Nidasoshi***Inculcating Values, Promoting Prosperity*

Approved by AICTE, Recognized by Govt. of Karnataka and Affiliated to VTU Belagavi.

Accredited at 'A' Grade by NAAC

Programmes Accredited by NBA: CSE, ECE, EEE &amp; ME

EEE

NBA

PO,PSO  
Attainment

2020-21

Sl. No	Course	Code	PSO1	PSO2
22	Estimating & Costing	C307	1.74	-
23	Programmable Logic Controllers	C310	1.04	1.04
24	Renewable energy sources	C311	1.79	-
25	Microcontroller Lab	C313	3.00	2.00
26	Power Electronics Lab	C314	1.98	0.99
27	Control System	C315	1.54	-
28	Power System Analysis-I	C316	1.09	-
29	Digital Signal Processing	C317	1.34	-
30	Electrical Machine Design	C318	1.93	-
31	Computer Aided Electrical Drawing	C319	2.32	-
32	Sensors & Transducers	C324	1.72	-
33	Control System Lab	C327	2.94	2.94
34	Digital Signal Processing Lab	C328	2.99	1.99
35	Power System Analysis-II	C401	1.91	0.64
36	Power System Protection	C402	2.50	-
37	High Voltage Engineering	C403	2.11	-
38	Utilization of Electrical Power	C405	1.48	-
39	Power System Planning	C407	1.26	-
40	FACTS & HVDC Transmission	C408	1.47	-
41	Testing & Commissioning of Power System Apparatus	C409	1.49	-
42	Power System Simulation Laboratory	C412	3.00	2.00
43	Relay & High Voltage Laboratory	C413	1.50	1.00
44	Project Phase I + Seminar	C414	2.40	2.40
45	Power System Operation & Control	C415	1.55	0.52
46	Industrial Drives & Applications	C416	1.58	-
47	Smart Grid	C417	1.72	-
48	Integration of Distributed Generation	C419	1.37	-
49	Internship	C421	2.40	2.40
50	Project Work Phase - II	C422	2.40	2.40
51	Seminar	C423	2.40	0.80
Average			1.67	1.59
Indirect Attainment (B)			0.97	0.90
Average (0.8A+0.2B)			1.53	1.46

  
Criteria Coordinator

  
Program Coordinator

  
HOD



## FACULTY COURSE ASSESSEMENT REPORT(FCAR)

**Course Coordinator:** Prof: Amit. U. Neshti

**Class Strength:** 59

**Semester:** V

**Subject:** Renewable energy sources

**Code:** 15EE563

### **I. 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.





## II. Program Specific Outcomes (PSOs):

The graduates of the program will be able to;

PSO1	Apply knowledge & competencies to analyze & design electrical & electronics circuits, control and power systems, machines & industrial drives.
PSO2	Use software/hardware tools for the design, simulation and analysis of electrical and electronics systems.

## III. Course Outcomes (COs): The student, after successful completion of the course, will be able to:

CO	Description	Mapped POs	RBTL
C311.1:	Discuss causes of energy scarcity and its solution, Development, Classification and Availability of Renewable Energy and also Brief the Energy from sun.	PO1,PO2,PO5,PO8	L4
C311.2:	Discuss types of solar collectors, their configurations, solar cell system, its characteristics and their applications.	PO1,PO2,PO5,PO8	L3,L4
C311.3:	Discuss generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse .	PO1,PO2,PO5,PO8	L2
C311.4:	Discuss production of energy from biomass, biogas and Tidal energy .	PO1,PO2,PO5,PO8	L3,L4
C311.5:	Discuss power generation from sea wave energy and ocean thermal energy .	PO1,PO2,PO5,PO8	L3,L4

## IV. Mapping of Course Outcomes (COs) to Program Outcomes (POs):

POs→ COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C311.1	2	2	NA	NA	1	NA	NA	2	NA	NA	NA	NA
C311.2	2	2	NA	NA	1	NA	NA	2	NA	NA	NA	NA
C311.3	2	2	NA	NA	1	NA	NA	2	NA	NA	NA	NA
C311.4	2	2	NA	NA	1	NA	NA	2	NA	NA	NA	NA
C311.5	2	2	0	0	1	0	0	2	0	0	0	0
Average	2	2	0	0	1	0	0	2	0	0	0	0

## V. Mapping of Course Outcomes (COs) to Program Specific Outcomes (PSOs):

PSOs	PSO 1	PSO 2
COs		
C311.1	3	NA
C311.2	3	NA
C311.3	3	NA
C311.4	3	NA
C311.5	3	0
Average	3	0



#### VI. Justification of CO-PO Mapping:

Mapping	Justification
C311.1-PO1	A medium correlation because able to extract science and engg science but not able to engg specialization (Engineering knowledge) to solve Complex engg problem.
C311.1-PO2	A medium correlation because able to extract science and engg science but not able to engg specialization (Engineering knowledge) to solve Complex engg problem.
C311.1-PO5	A low correlation because difficulty in prediction and modeling to complex engineering activities with an understanding of the limitations.
C311.1-PO8	A medium correlation because not able to commit to professional ethics and responsibilities and norms of the engineering practice.
C311.2-PO1	A medium correlation because able to discuss applications of Transformers but not able to apply Engineering knowledge to solve Complex engg problem.
C311.2-PO2	A medium correlation since because able to discuss applications of Transformers but not able to analyze problem to solve Complex engg problem.
C311.2-PO5	A low correlation because difficulty in prediction and modeling to complex engineering activities with an understanding of the limitations.
C311.2-PO8	A medium correlation because not able to commit to professional ethics and responsibilities and norms of the engineering practice.
C311.3-PO1	A medium correlation because able to explain fundamentals of DC and AC Generators but not able to apply Engineering knowledge to solve Complex engg problem..
C311.3-PO2	A medium correlation since because able to explain fundamentals of DC and AC Generators but not able to analyze problem to solve Complex engg problem
C311.3-PO5	A low correlation because difficulty in prediction and modeling to complex engineering activities with an understanding of the limitations.
C311.3-PO8	A medium correlation because not able to commit to professional ethics and responsibilities and norms of the engineering practice.
C311.4-PO1	A High correlation since able to apply Engineering knowledge to solve Complex engg problem
C311.4-PO2	A High correlation since able to analyze problem to solve Complex engg problem
C311.4-PO5	A low correlation because difficulty in prediction and modeling to complex engineering activities with an understanding of the limitations.
C311.4-PO8	A medium correlation because not able to commit to professional ethics and responsibilities and norms of the engineering practice.
C311.5-PO1	A High correlation since able to apply Engineering knowledge to solve Complex engg problem
C311.5-PO2	A High correlation able to analyze problem to solve Complex engg problem
C311.5-PO5	A low correlation because difficulty in prediction and modeling to complex engineering activities with an understanding of the limitations.
C311.5-PO8	A medium correlation because not able to commit to professional ethics and responsibilities and norms of the engineering practice.



**VII. Justification of CO-PSO Mapping :**

Mapping	Justification
(C311.1 - C311.5)-PSO1	A high correlation because able to demonstrate the knowledge of renewable energy source.

**VIII. Bench Mark Setting**

NIL

**IX. DIRECT ASSESSMENT OF COs, POs & PSOs ATTAINMENT**

**Teaching Methodology:**

- Lecture by Teacher
- PPT or Online demo etc.

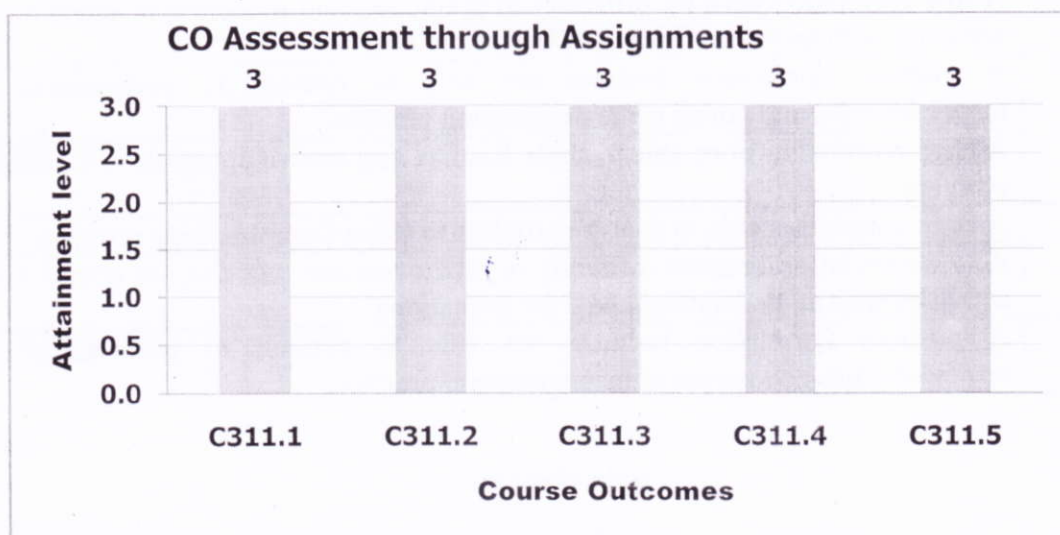
**Assessment Tools:**

- Continuous assessment
- Laboratory experiments
- End semester exam

**1. Assessment through Assignment:**

A: Appeared    R: Reached    Low =1 (50-59 %)    Medium =2 (60-69 %)    High =3 (above 70 %)

COs	Assignment-1		Assignment-2		Assignment-3		Assignment-4		Assignment-5		Attainment level of CO in Percentage	Attainment level of CO	Mapped PO
	A	R	A	R	A	R	A	R	A	R			
C311.1	43	43									100.00	3	PO1,PO2,PO5,PO8
C311.2			43	43							100.00	3	PO1,PO2,PO5,PO8
C311.3					43	43					100.00	3	PO1,PO2,PO5,PO8
C311.4							43	43			100.00	3	PO1,PO2,PO5,PO8
C311.5									43	43	100.00	3	PO1,PO2,PO5,PO8

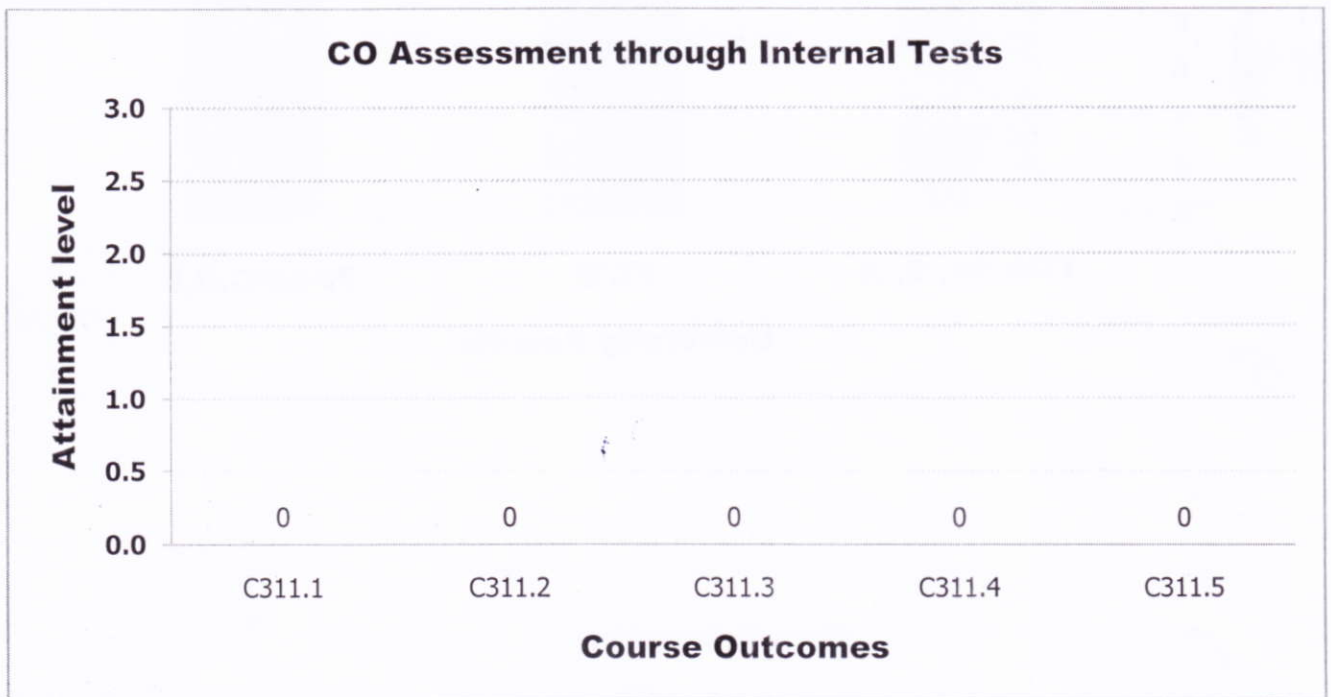




## 2. Assessment through Internal Marks:

A: Appeared    R: Reached    Low =1 (50-59 %)    Medium =2 (60-69 %)    High =3 (above 70 %)

COs	IA-1		IA-2		IA-3		Attainment level of CO	Mapped PO						
	Q.No.1 OR Q. No. 2		Q.No.3 OR Q. No. 4		Q.No.1 OR Q. No. 2				Q.No.3 OR Q. No. 4					
	A	R	A	R	A	R			A	R				
	C311.1	37	20	49	2							0	PO1,PO2,PO5,PO8	
C311.2					45	8			0	PO1,PO2,PO5,PO8				
C311.3							45	12	0	PO1,PO2,PO5,PO8				
C311.4									38	10	0	PO1,PO2,PO5,PO8		
C311.5											38	9	0	PO1,PO2,PO5,PO8





### 3. Semester End Exam Assessment Based on VTU Exam Results:

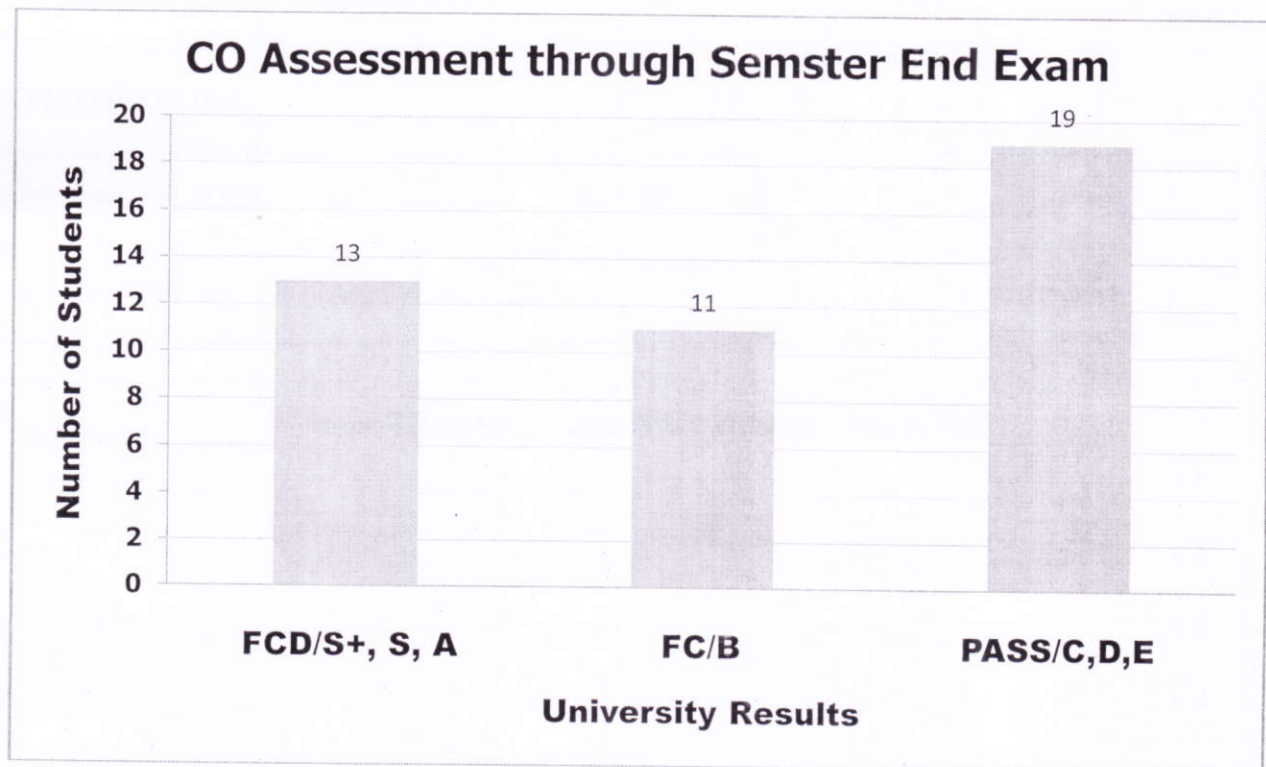
COs Attainment Levels:

FCD: S+, S, & A = 3;

FC (B) = 2;

Pass: C, D, & E = 1; Fail = 0

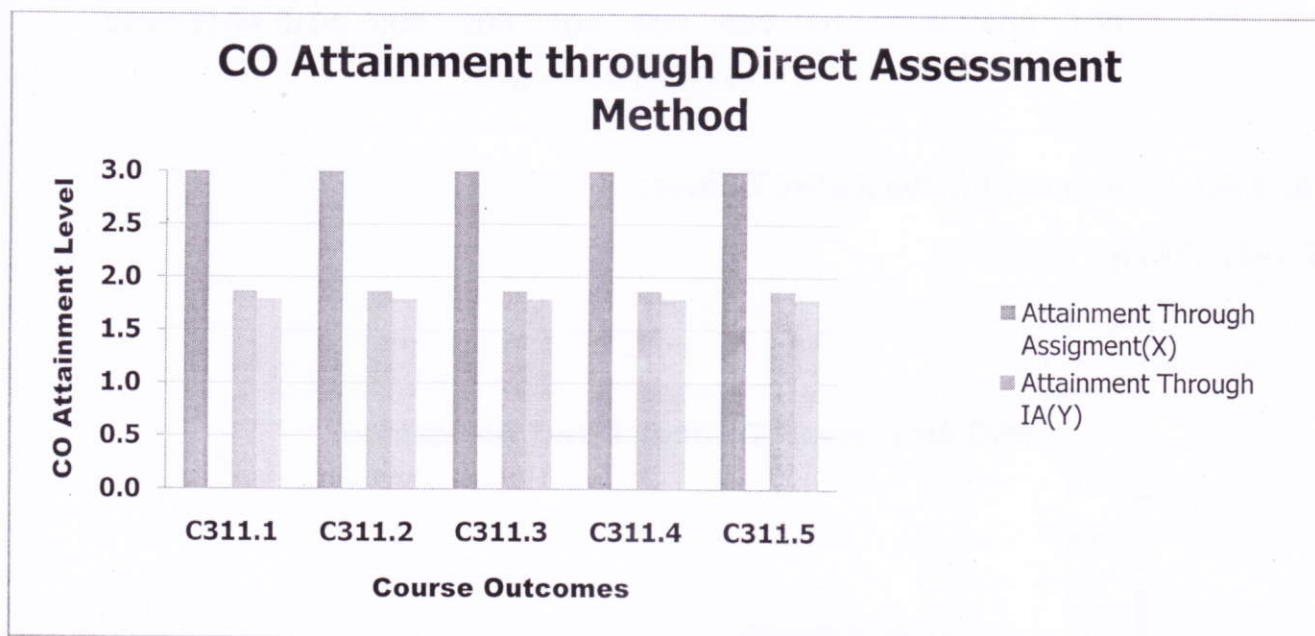
Total no. of Students Appeared	43	
Class/Grade↓	Total Number of Students	Course (COs) Attainment Through Semester End Exams
FCD/S+, S, A	13	39
FC/B	11	22
PASS/C,D,E	19	19
Total Percentage of Passing	100.00%	1.86





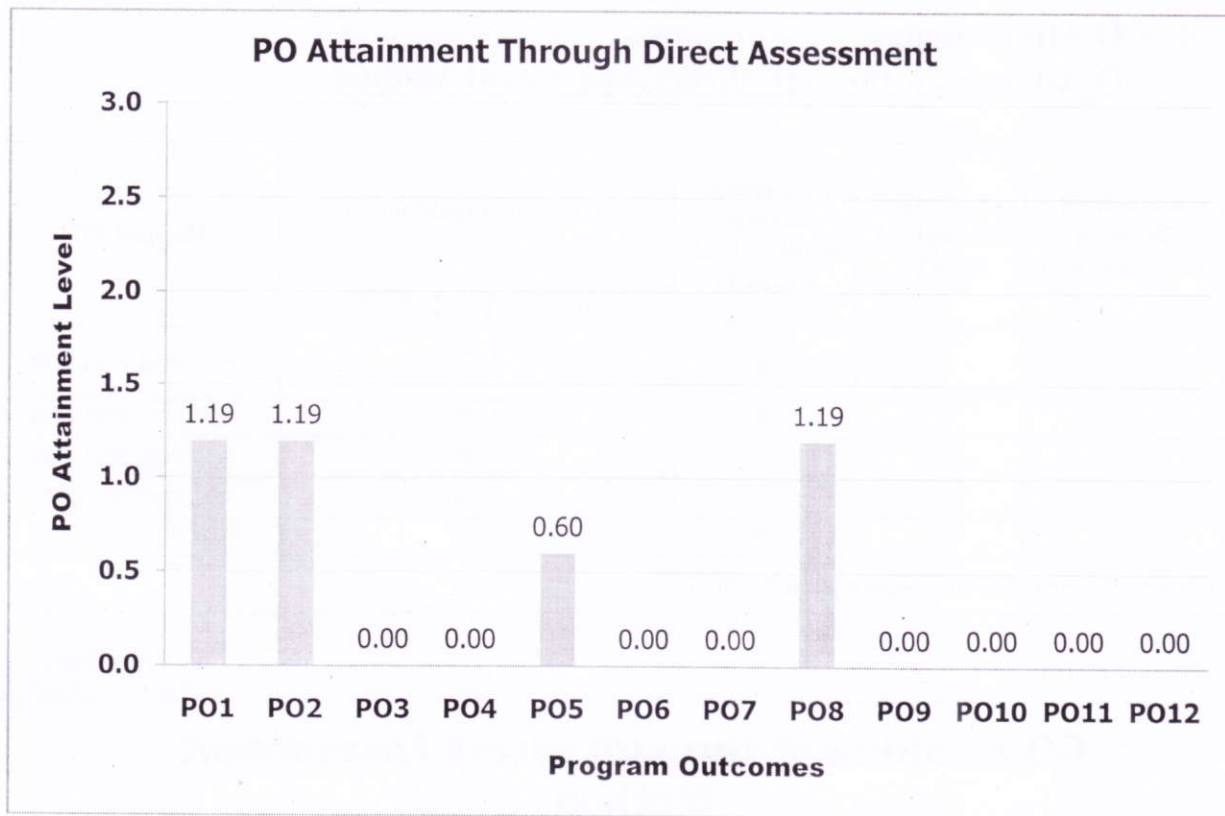
#### 4. CO Attainment: CO Attainment through Direct Assessment Method

COs	Attainment Through Assignment(X)	Attainment Through IA Test(Y)	Attainment Through Semester End Exam(Z)	Attainment level of CO	Mapped POs
				$[0.2(X+Y)/2]+0.8Z$	
C311.1	3	0	1.86	1.79	PO1,PO2,PO5,PO8
C311.2	3	0	1.86	1.79	PO1,PO2,PO5,PO8
C311.3	3	0	1.86	1.79	PO1,PO2,PO5,PO8
C311.4	3	0	1.86	1.79	PO1,PO2,PO5,PO8
C311.5	3	0	1.86	1.79	PO1,PO2,PO5,PO8
CO Attainment through Direct Assessment Method				1.79	



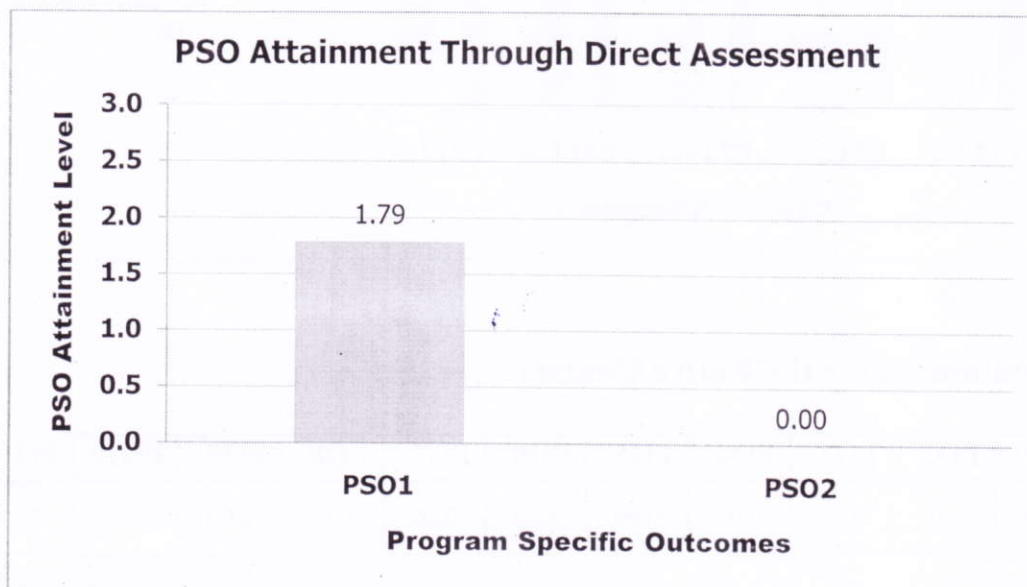
#### 5. PO Attainment for the Entire Course:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C311	1.19	1.19	0.00	0.00	0.60	0.00	0.00	1.19	0.00	0.00	0.00	0.00



**6. PSO Attainment for the Entire Course:**

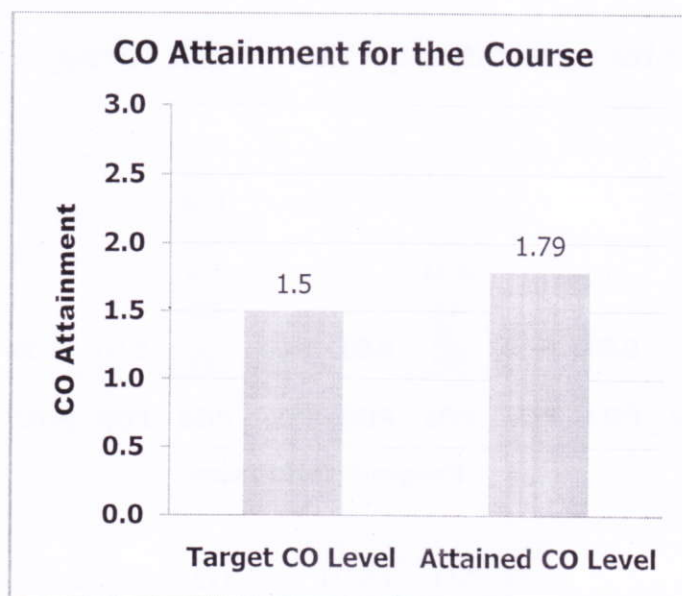
CO/PSO	PSO1	PSO2
C311	1.79	0.00





### 7. Target Attainment:

Set Target Value (ITV)	1.5
Attained Value	1.79
New Target Level for the next exam	1.79



### 8. Course Coordinator Remarks:

S. No.	Observations	Comments
1	Impact of Delivery Methods	Delivery methods are satisfactory. Pedagogy used to deliver lectures is quite satisfactory.
2	Course Outcome Attainment	Overall attainment of all course outcomes is moderate as it is observed in CO attainment table.
3	Scope for Improvement	Attainment of all need to be improved.
4	Additional comments (if any)	Nil



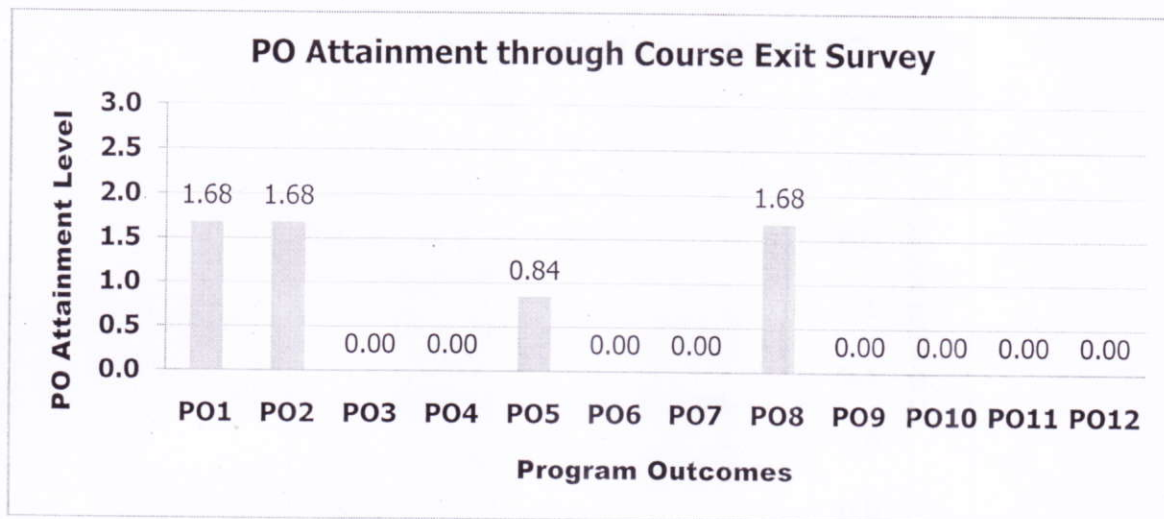


### X. INDIRECT ASSESSMENT OF PO & PSO THROUGH COURSE EXIT SURVEY (CES)

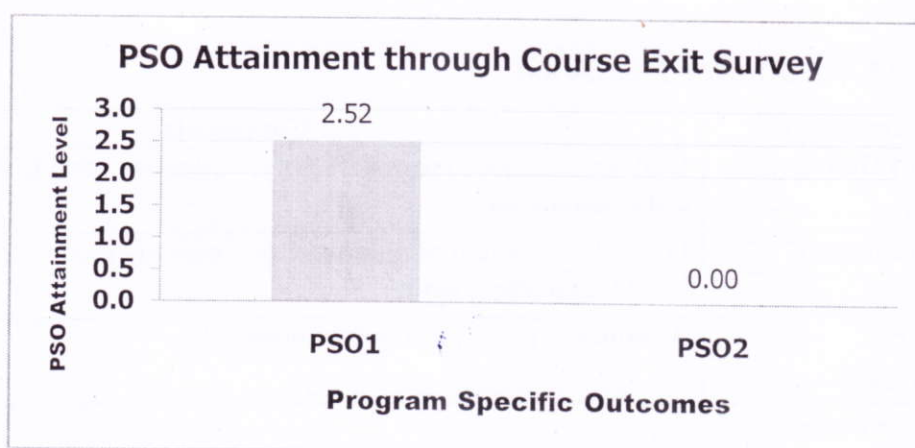
PO Attainment = (Mapped value \* CES attainment value)/3

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C311	1.68	1.68	0.00	0.00	0.84	0.00	0.00	1.68	0.00	0.00	0.00	0.00

PSO Attainment = (Mapped value \* CES attainment value)/3



CO/PSO	PSO1	PSO2
C311	2.52	0.00



*(Signature)*

*(Signature)*

*(Signature)*

Prof. A. U. Neshti	Prof. H. R. Zinage	(Signature)
Name & Signature of Course Coordinator	Name & Signature of Module Coordinator	HOD



EEE
NBA
PO, PSO Attainment
2019-20

### 3.3.1 Provide results of evaluation of each PO & PSO (40)

The result of evaluation of each PO for the assessment years 2018-19 is as shown in table below

**Attainment of POs through Indirect Method**

Survey Forms	Weightage in %	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Employer Survey	5	3.00	3.00	2.67	2.67	3.00	3.00	3.00	3.00	3.00	2.67	2.67	2.67
Alumni Survey	15	2.40	2.80	2.60	2.60	2.00	2.60	2.60	2.30	2.70	2.65	3.00	2.00
Senior Exit Survey	15	2.79	2.64	2.64	2.62	2.66	2.77	2.77	2.77	2.74	2.70	2.79	2.79
Activity Feedback	35	3.00	3.00	-	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Course Exit Survey	15	2.50	2.17	1.80	1.81	1.83	1.99	2.22	1.59	1.73	1.72	2.17	1.32
Placement, Higher Education & Entrepreneurship (PHE)	15	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
<b>Total →</b>		<b>2.45</b>	<b>2.44</b>	<b>1.29</b>	<b>1.29</b>	<b>2.28</b>	<b>2.41</b>	<b>2.44</b>	<b>2.30</b>	<b>2.38</b>	<b>2.35</b>	<b>2.48</b>	<b>2.20</b>

**Attainment of PO through Direct Method**

Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	Engg. Mathematics-I	C101	1.20	0.80	-	-	-	-	-	-	-	-	-	0.40
2	Engg. Physics	C102	1.40	-	0.93	-	0.47	-	-	0.47	-	0.47	-	0.47
3	ECE. & Engg. Mech.	C103	0.72	0.72	0.48	0.48	-	0.24	-	0.24	-	-	0.24	0.48
4	EME	C104	1.65	1.10	-	-	-	-	0.55	-	-	-	-	-
5	Basic Electrical Engg.	C105	0.81	0.81	-	-	-	-	-	-	-	-	-	-
6	Workshop Lab	C106	2.67	1.67	3.00	1.33	-	3.00	-	3.00	2.00	2.00	3.00	2.50
7	Engg. Physics Lab	C107	2.67	-	-	-	0.89	-	-	0.89	1.78	1.78	-	-
8	CIP and Prof. Ethics	C108	-	-	-	-	-	1.07	-	0.72	-	-	-	-
9	Engg. Mathematics-II	C109	1.05	0.70	-	-	-	-	-	-	-	-	-	0.35
10	Engineering Chemistry	C110	1.35	1.08	0.90	-	-	0.81	-	-	-	-	-	0.45
11	Prog. in C & Data Str.	C111	0.86	0.68	0.74	-	-	-	-	0.29	-	0.29	-	0.29
12	CAED	C112	0.69	-	-	-	1.37	-	-	0.69	-	2.06	-	-
13	Basic Electronics Engg.	C113	1.10	1.10	0.74	0.74	-	0.37	-	0.37	-	-	0.37	0.74
14	Computer Prog. Lab	C114	2.66	2.66	2.66	-	-	-	-	0.89	1.77	1.77	--	0.89
15	Engg. Chemistry Lab	C115	2.52	2.52	2.52	-	-	1.68	-	-	-	-	-	0.84
16	Environmental Studies	C116	2.24	1.49	1.49	-	-	1.49	1.49	0.75	-	-	0.75	0.75
17	Engg. Mathematics-III	C201	1.46	0.97	0.49	-	-	-	-	-	-	-	-	0.49
18	Electric Circuit Analysis	C202	1.01	1.01	0.34	-	-	-	-	0.68	-	-	-	0.34
19	Transfrs & Generators	C203	0.52	0.52	0.52	-	-	-	-	0.26	-	-	-	0.26
20	Analog Electronic Ckts	C204	1.00	1.00	0.67	-	0.67	-	-	0.33	-	-	-	-



Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
21	Digital System Design	C205	0.88	0.88	-	-	0.29	-	0.29	0.29	0.29	-	-	0.29
22	Electr. & Eelectrn Measure.	C206	1.16	0.62	-	-	-	-	-	0.89	-	-	-	-
23	Electronics Laboratory	C207	2.84	2.84	1.89	-	-	1.89	-	0.95	0.95	-	-	1.89
24	Electrical Machines Lab-I	C208	2.96	1.98	1.98	-	-	-	0.99	0.99	-	0.99	0.99	1.98
25	Engineering Maths IV	C209	1.89	1.26	0.63	-	-	-	-	-	-	-	-	0.63
26	Power Generation and Economics	C210	1.78	1.19	-	-	-	1.78	1.78	-	-	-	-	-
27	Transmission and distribution	C211	1.55	1.03	1.03	1.03	-	-	-	1.03	-	-	-	0.52
28	Electric Motors	C212	0.96	0.96	0.96	-	-	-	-	0.48	-	-	-	0.48
29	Electromagnetic Theory	C213	1.33	1.33	0.89	-	-	-	-	0.44	-	-	-	-
30	Operational amplifier and Linear ICs	C214	0.99	-	0.99	0.99	-	-	-	-	-	-	-	-
31	Electric machine Lab II	C215	2.67	1.78	1.78	-	-	-	0.89	0.89	-	0.89	0.89	1.78
32	Operational Amplifier and Linear ICs Lab	C216	2.76	2.76	-	-	-	-	-	-	2.76	2.76	-	-
33	Management & Entrepreneurship	C301	1.60	-	-	-	-	-	-	1.60	1.60	1.60	1.60	1.60
34	Microcontroller	C302	1.62	1.08	0.54	-	-	-	-	0.54	-	0.54	-	0.54
35	Power Electronics	C303	1.31	1.22	0.87	-	-	-	-	0.87	-	-	-	0.87
36	Signals & Systems	C304	1.03	1.03	1.03	-	-	-	-	0.52	-	-	-	0.52
37	Estimating & Costing	C307	1.50	1.07	1.61	-	-	1.61	1.07	1.61	1.07	1.07	1.61	-
38	Programmable Logic Controllers	C310	1.90	-	-	-	1.90	-	-	-	-	-	-	-
39	Renewable energy sources	C311	0.76	0.76	-	-	0.38	-	-	0.76	-	-	-	-
40	Microcontroller Lab	C313	2.95	1.97	-	-	0.98	-	-	0.98	1.97	0.98	-	0.98
41	Power Electronics Lab	C314	1.97	1.97	0.98	-	-	-	-	0.98	1.97	1.97	-	-
42	Control System	C315	1.83	1.83	-	-	-	-	0.61	0.61	0.61	-	-	0.61
43	Power System Analysis-I	C316	1.70	1.70	1.13	1.13	-	-	-	1.13	-	-	-	0.57
44	Digital Signal Processing	C317	1.06	0.71	0.71	-	0.35	-	-	0.35	-	-	-	0.35
45	Electrical Machine Design	C318	1.83	1.83	1.22	-	-	-	-	1.83	-	-	-	-
46	Computer Aided Electrical Drawing	C319	1.41	1.41	1.41	-	-	-	-	0.70	-	-	-	0.70
47	Sensors & Transducers	C324	1.75	1.17	1.17	-	-	1.17	-	1.17	-	-	-	1.17
48	Control System Lab	C327	2.95	1.96	0.98	-	0.98	-	-	0.98	1.96	0.98	-	0.98
49	Digital Signal Processing Lab	C328	1.91	0.95	-	-	-	-	-	-	1.91	0.95	-	-
50	Power System Analysis-II	C401	2.00	2.00	1.34	1.34	1.34	0.67	-	1.34	1.34	0.67	-	1.34
51	Power System Protection	C402	2.17	1.30	1.45	-	-	-	-	1.16	-	1.45	-	1.45
52	High Voltage Engineering	C403	1.94	1.94	1.29	-	-	1.29	-	1.29	1.29	1.29	-	0.65



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**Hirasugar Institute of Technology, Nidasoshi**  
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EEE

NBA

PO, PSO  
Attainment

2019-20

Sl. No	Course	Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
53	Utilization of Electrical Power	C405	1.81	1.81	1.66	-	-	1.21	1.21	1.21	1.21	-	-	1.21
54	Testing & Commissioning Of Power System Apparatus	C409	1.15	1.15	1.15	-	-	-	-	0.58	-	-	-	0.58
55	Power System Simulation Laboratory	C412	2.95	2.95	1.97	1.97	1.97	1.97	-	1.97	1.97	1.97	-	1.97
56	Relay & High Voltage Laboratory	C413	3.00	2.00	-	-	-	-	-	1.00	2.00	1.00	-	-
57	Project Phase I + Seminar	C414	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
58	Power System Operation & Control	C415	1.44	1.44	0.96	0.48	0.96	-	-	0.96	-	0.96	-	0.48
59	Industrial Drives & Applications	C416	2.11	2.11	1.41	-	0.70	-	-	-	-	-	-	-
60	Smart Grid	C417	1.80	1.80	1.20	1.20	1.20	0.60	-	0.60	0.60	0.60	-	0.60
61	Internship	C421	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
62	Project Work Phase - II	C422	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
63	Seminar	C423	2.37	2.37	2.37	1.58	2.37	1.58	2.37	2.37	2.37	1.58	-	-
<b>Direct Attainment (A)</b>			<b>1.75</b>	<b>1.50</b>	<b>1.32</b>	<b>1.39</b>	<b>1.26</b>	<b>1.48</b>	<b>1.42</b>	<b>1.02</b>	<b>1.68</b>	<b>1.40</b>	<b>1.51</b>	<b>0.96</b>
<b>Indirect Attainment (B)</b>			<b>2.45</b>	<b>2.44</b>	<b>1.29</b>	<b>1.29</b>	<b>2.28</b>	<b>2.41</b>	<b>2.41</b>	<b>2.29</b>	<b>2.38</b>	<b>2.34</b>	<b>2.43</b>	<b>2.21</b>
<b>Average (0.8A+0.2B)</b>			<b>1.89</b>	<b>1.69</b>	<b>1.31</b>	<b>1.37</b>	<b>1.47</b>	<b>1.67</b>	<b>1.62</b>	<b>1.27</b>	<b>1.82</b>	<b>1.59</b>	<b>1.70</b>	<b>1.21</b>

  
Criteria Coordinator

  
Program Coordinator

  
HOD



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PO, PSO  
Attainment

2019-20

The result of evaluation of each PSO for the assessment years 2018-19 is as shown in table below

**Attainment of PSOs through Indirect Method**

Survey Forms	Weightage in %	PSO1	PSO2
Employer Survey	5	3.00	3.00
Alumni Survey	15	-	-
Senior Exit Survey	15	2.81	2.70
Activity Feedback	35	3.00	3.00
Course Exit Survey	15	2.24	2.19
Placement, Higher Education & Entrepreneurship (PHE)	15	0.68	0.68
<b>Total →</b>		<b>2.06</b>	<b>2.04</b>

**Attainment of PSO through Direct Method**

Sl. No	Course	Code	PSO1	PSO2
1	Engg. Mathematics-III	C201	-	-
2	Electric Circuit Analysis	C202	0.68	-
3	Transfrs & Generators	C203	0.78	-
4	Analog Electronic Ckts	C204	0.67	-
5	Digital System Design	C205	0.88	-
6	Electr. & Eclectrn Measure.	C206	0.88	-
7	Electronics Laboratory	C207	2.84	1.89
8	Electrical Machines Laboratory -1	C208	2.96	1.98
9	Engineering Maths Iv	C209	-	-
10	Power Generation And Economics	C210	0.88	-
11	Transmission And Distribution	C211	1.03	-
12	Electric Motors	C212	1.44	-
13	Electromagnetic Theory	C213	1.33	-
14	Operational Amplifier And Linear ICs	C214	0.99	-
15	Electric Machine Lab II	C215	1.51	2.27
16	Operational Amplifier And Linear ICs Lab	C216	2.76	1.84
17	Management & Entrepreneurship	C301	0.80	-
18	Microcontroller	C302	1.62	-



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PO, PSO  
Attainment

2019-20

Sl. No	Course	Code	PSO1	PSO2
19	Power Electronics	C303	1.31	-
20	Signals & Systems	C304	1.55	-
21	Estimating & Costing	C307	1.50	-
22	Programmable Logic Controllers	C310	-	1.90
23	Renewable energy sources	C311	1.14	-
24	Microcontroller Lab	C313	2.95	1.97
25	Power Electronics Lab	C314	1.97	0.98
26	Control System	C315	1.83	-
27	Power System Analysis-I	C316	1.13	-
28	Digital Signal Processing	C317	0.71	-
29	Electrical Machine Design	C318	1.83	-
30	Computer Aided Electrical Drawing	C319	2.11	-
31	Sensors & Transducers	C324	1.75	-
32	Control System Lab	C327	2.95	2.95
33	Digital Signal Processing Lab	C328	1.90	2.85
34	Power System Analysis-II	C401	2.00	0.67
35	Power System Protection	C402	2.17	-
36	High Voltage Engineering	C403	1.94	-
37	Utilization of Electrical Power	C405	1.81	-
38	Testing & Commissioning of Power System Apparatus	C409	1.73	-
39	Power System Simulation Laboratory	C412	2.95	1.97
40	Relay & High Voltage Laboratory	C413	1.50	1.00
41	Project Phase I + Seminar	C414	2.40	2.40
42	Power System Operation & Control	C415	1.44	0.48
43	Industrial Drives & Applications	C416	2.11	-
44	Smart Grid	C417	1.80	-
45	Internship	C421	2.40	2.40
46	Project Work Phase - II	C422	2.40	2.40
47	Seminar	C423	2.37	0.79
Average			1.72	1.81
Indirect Attainment (B)			2.06	2.04
Average (0.8A+0.2B)			1.79	1.85

*Amritha*  
Criteria Coordinator

*MP A*  
Program Coordinator

*Prasanna*  
HOD



## FACULTY COURSE ASSESSEMENT REPORT(FCAR)

**Course Coordinator:** Prof. Hemalata R Zinage

**Class Strength:**47

**Semester:** VIII

**Subject:** Power System Operation & Control

**Code:** 15EE81

### **I. 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.



**II. Program Specific Outcomes (PSOs):**

The graduates of the program will be able to;

PSO1	Apply knowledge & competencies to analyze & design electrical & electronics circuits, control and power systems, machines & industrial drives.
PSO2	Use software/hardware tools for the design, simulation and analysis of electrical and electronics systems.

**III. Course Outcomes (COs):** The student, after successful completion of the course, will be able to:

CO	Description	Mapped POs	RBTL
C415.1	Describe various levels of controls in power systems, the vulnerability of the system, components, architecture and configuration of SCADA and solve unit commitment problems	PO1,PO2,PO3,PO4,PO5 PO8,PO10,PO12	L3
C415.2	Explain issues of hydrothermal scheduling and solutions to hydro thermal problems	PO1,PO2,PO3,PO4,PO5 PO8,PO10,PO12	L3,L4
C415.3	Explain basic generator control loops, and develop & analyze mathematical models of Automatic Load Frequency Control	PO1,PO2,PO3,PO4,PO5 PO8,PO10,PO12	L3,L4
C415.4	Explain automatic generation control, voltage and reactive power control in an interconnected power system.	PO1,PO2,PO3,PO4,PO5 PO8,PO10,PO12	L3,L4
C415.5	Explain reliability, security, contingency analysis, state estimation and related issues of power systems.	PO1,PO2,PO3,PO4,PO5 PO8,PO10,PO12	L3,L4

**IV. Mapping of Course Outcomes (COs) to Program Outcomes (POs):**

POs→	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
COs↓												
C415.1	3	3	2	1	2	-	-	2	-	2	-	1
C415.2	3	3	2	1	2	-	-	2	-	2	-	1
C415.3	3	3	2	1	2	-	-	2	-	2	-	1
C415.4	3	3	2	1	2	-	-	2	-	2	-	1
C415.5	3	3	2	1	2	-	-	2	-	2	-	1
Average	3	3	2	1	2	-	-	2	-	2	-	1





**V. Mapping of Course Outcomes (COs) to Program Specific Outcomes (PSOs):**

PSOs	PSO 1	PSO 2
COs		
C415.1	3	1
C415.2	3	1
C415.3	3	1
C415.4	3	1
C415.5	3	1
Average	3	1

**VI. Justification of CO-PO Mapping:**

Mapping	Justification
C415.1-PO1	A strong correlation since explaining the concept of mathematical modeling of AVR & ALFC loops requires the knowledge of mathematics and electrical engineering sciences.
C415.1-PO2	A strong correlation forming the mathematical modeling of AVR & ALFC loops requires a certain level of problem analysis skills based on literature research. However, first principles of mathematics, science are required.
C415.1-PO3	A medium correlation since forming the mathematical models of AVR & ALFC loops requires knowledge on designing/developing solutions considering public safety and environmental issues.
C415.1-PO4	A low correlation since explaining the concept requires design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
C415.1-PO5	A low correlation since explaining the concept requires knowledge about usage of modern engineering /software tools.
C415.1-PO8	A medium correlation since after studying these concept students require to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C415.1-PO10	A moderate correlation since the study of various levels of controls in power systems, the vulnerability of the system, components, architecture and configuration of SCADA and solve unit commitment problems may contribute for improvement of Verbal/Non-Verbal communication.
C415.1-PO12	A low correlation since understanding various levels of controls in power systems, the vulnerability of the system, components, architecture and configuration of SCADA and solve unit commitment problems will help to continue the learning process.
C 415.2-PO1	A strong correlation since explaining the concept of controlling voltage and reactive power requires the knowledge of mathematics and electrical engineering sciences.
C415.2-PO2	A medium correlation since explaining the concept requires a certain level of problem analysis skills based on literature research. However, first principles of mathematics, science are required.
C415.2-PO3	A medium correlation since explaining the concept require a certain level of knowledge on designing / developing solutions considering public safety and environmental issues
C415.2-PO4	A low correlation since explaining the concept requires design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
C415.2-PO5	A low correlation since explaining the concept requires knowledge about usage of modern engineering /software tools.



C415.2-PO8	A medium correlation since after studying these concept students require to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C415.2-PO10	A moderate correlation since the study of issues of hydrothermal scheduling and solutions to hydro thermal problems may contribute for improvement of Verbal/Non-Verbal communication.
C415.2-PO12	A low correlation since understanding issues of hydrothermal scheduling and solutions to hydro thermal problems will help to continue the learning process.
C415.3-PO1	A strong correlation since explaining the concept requires the knowledge of mathematics and electrical engineering sciences.
C415.3-PO2	A medium correlation since explaining the concept requires a certain level of problem analysis skills based on literature research. However, first principles of mathematics, science are required.
C415.3-PO3	A medium correlation since explaining the concept require a certain level of knowledge on designing / developing solutions considering public safety and environmental issues
C415.3-PO4	A low correlation since explaining the concept requires design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
C415.3-PO5	A low correlation since explaining the concept requires knowledge about usage of modern engineering /software tools.
C415.3-PO8	A medium correlation since after studying these concept students require to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C415.3-PO10	A moderate correlation since the study of basic generator control loops, and develop & analyze mathematical models of Automatic Load Frequency Control systems may contribute for improvement of Verbal/Non-Verbal communication.
C415.3-PO12	A low correlation since understanding basic generator control loops, and develop & analyze mathematical models of Automatic Load Frequency Control will help to continue the learning process.
C415.4-PO1	A strong correlation since explaining the concept require the knowledge of mathematics and electrical engineering sciences
C415.4-PO2	A medium correlation since explaining the concept requires a certain level of problem analysis skills based on literature research. However, first principles of mathematics, science are required.
C415.4-PO3	A medium correlation since explaining the concept require a certain level of knowledge on designing / developing solutions considering public safety and environmental issues
C415.4-PO4	A low correlation since explaining the concept requires design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
C415.4-PO5	A low correlation since explaining the concept requires knowledge about usage of modern engineering /software tools.
C415.4-PO8	A medium correlation since after studying these concept students require to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C415.4-PO10	A moderate correlation since the automatic generation control, voltage and reactive power control in an interconnected power may contribute for improvement of Verbal/Non-Verbal communication.



C415.4-PO12	A low correlation since understanding automatic generation control, voltage and reactive power control in an interconnected power will help to continue the learning process.
C415.5- PO1	A strong correlation since explaining the concept require the knowledge of mathematics and electrical engineering sciences.
C415.5- PO2	A medium correlation since explaining the concept requires a certain level of problem analysis skills based on literature research. However, first principles of mathematics, science are required
C415.5- PO3	A medium correlation since explaining the concept require a certain level of knowledge on designing / developing solutions considering public safety and environmental issues.
C415.5- PO4	A low correlation since explaining the concept requires design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
C415.5-PO5	A low correlation since explaining the concept requires knowledge about usage of modern engineering /software tools.
C415.5-PO8	A medium correlation since after studying these concept students require to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C415.5-PO10	A moderate correlation since the study of reliability, security, contingency analysis, state estimation and related issues of power systems may contribute for improvement of Verbal/Non-Verbal communication.
C415.5-PO12	A low correlation since understanding reliability, security, contingency analysis, state estimation and related issues of power systems will help to continue the learning process.

#### VII. Justification of CO-PSO Mapping :

Mapping	Justification
C415-PSO1	A strong correlation since after studying power system operation & control students will develop an ability to demonstrate knowledge & competencies to analyze & design electrical power systems.
C415-PSO2	A low correlation since after studying the various concepts of power system operation and control students will develop an ability to use software tools for the design, simulation and analysis of electrical power systems to some extent.

#### VIII. Bench Mark Setting

As the course is revised, CO attainment target is taken as 2.



## IX. DIRECT ASSESSMENT OF COs, POs & PSOs ATTAINMENT

### Teaching Methodology:

- Lecture by Teacher
- PPT or Online demo etc.

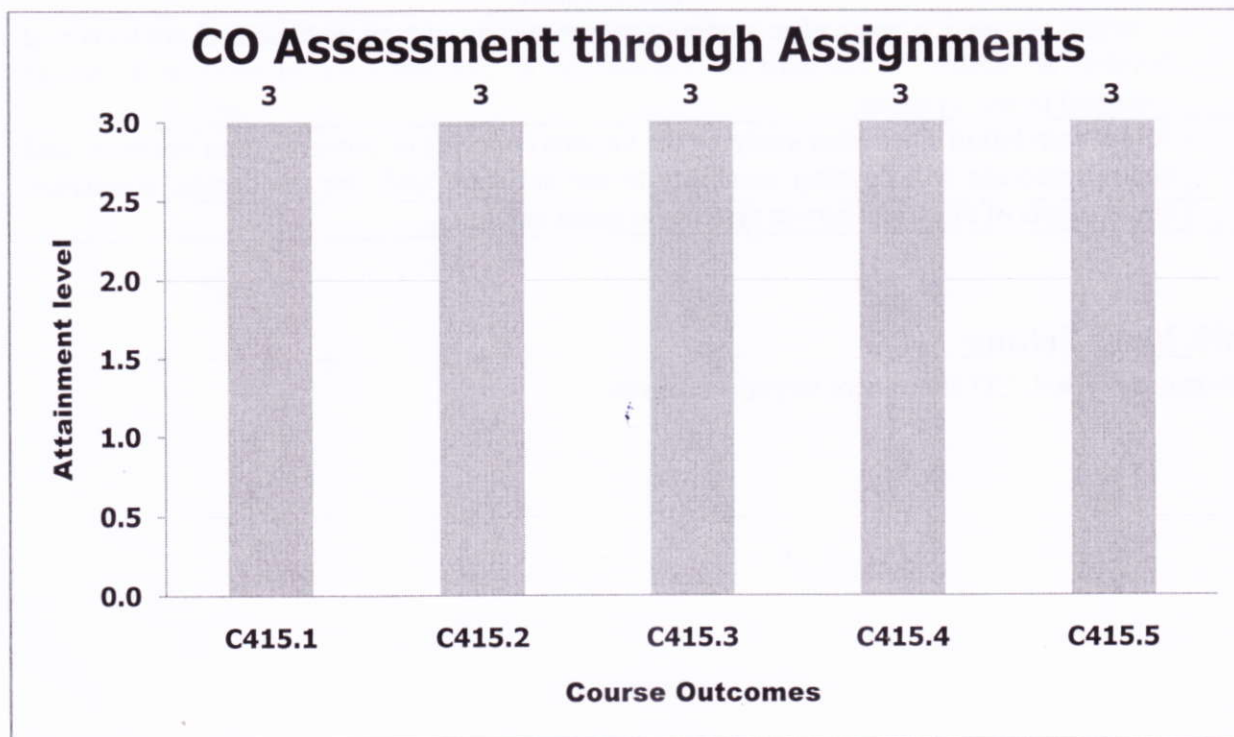
### Assessment Tools:

- Continuous assessment
- Laboratory experiments
- End semester exam

### 1. Assessment through Assignment:

A: Appeared    R: Reached    Low =1 (50-59 %)    Medium =2 (60-69 %)    High =3 (above 70 %)

COs	Assignment-1		Assignment-2		Assignment-3		Assignment-4		Assignment-5		Attainment level of CO in Percentage	Attainment level of CO	Mapped PO
	A	R	A	R	A	R	A	R	A	R			
C415.1	47	47									100.00	3	1,2,3,4,5,8,10
C415.2			47	47							100.00	3	1,2,3,4,5,8,10,12
C415.3					47	47					100.00	3	1,2,3,4,5,8,10,12
C415.4							47	47			100.00	3	1,2,3,4,5,8,10,12
C415.5									47	47	100.00	3	1,2,3,4,5,8,10,12

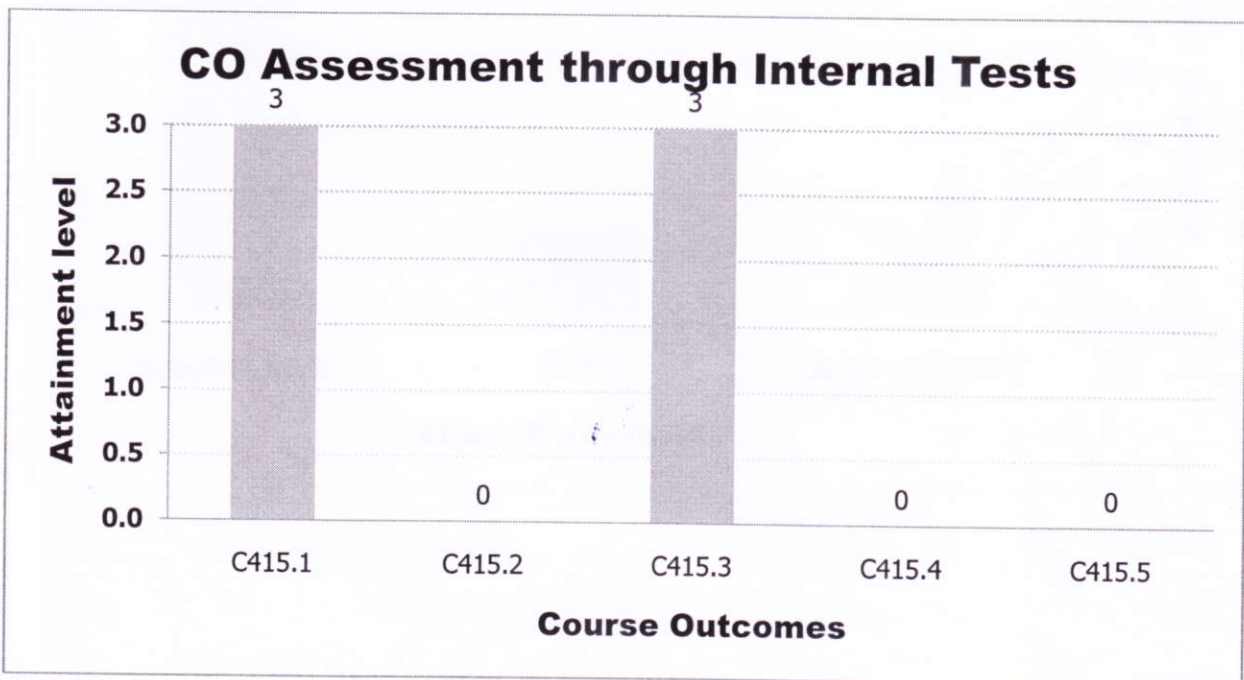




## 2. Assessment through Internal Marks:

A: Appeared    R: Reached    Low =1 (50-59 %)    Medium =2 (60-69 %)    High =3 (above 70 %)

COs	IA-1		IA-2		IA-3		Attainment level of CO	Mapped PO
	Q.No.1 OR Q. No. 2	Q.No.3 OR Q. No. 4	Q.No.1 OR Q. No. 2	Q.No.3 OR Q. No. 4	Q.No.1 OR Q. No. 2	Q.No.3 OR Q. No. 4		
	A	R	A	R	A	R	A	R
	C415.1	41	27	37	30			3
C415.2					36	9	0	1,2,3,4,5,8,10,12
C415.3					38	28	3	1,2,3,4,5,8,10,12
C415.4							0	1,2,3,4,5,8,10,12
C415.5							0	1,2,3,4,5,8,10,12





### 3. Semester End Exam Assessment Based on VTU Exam Results:

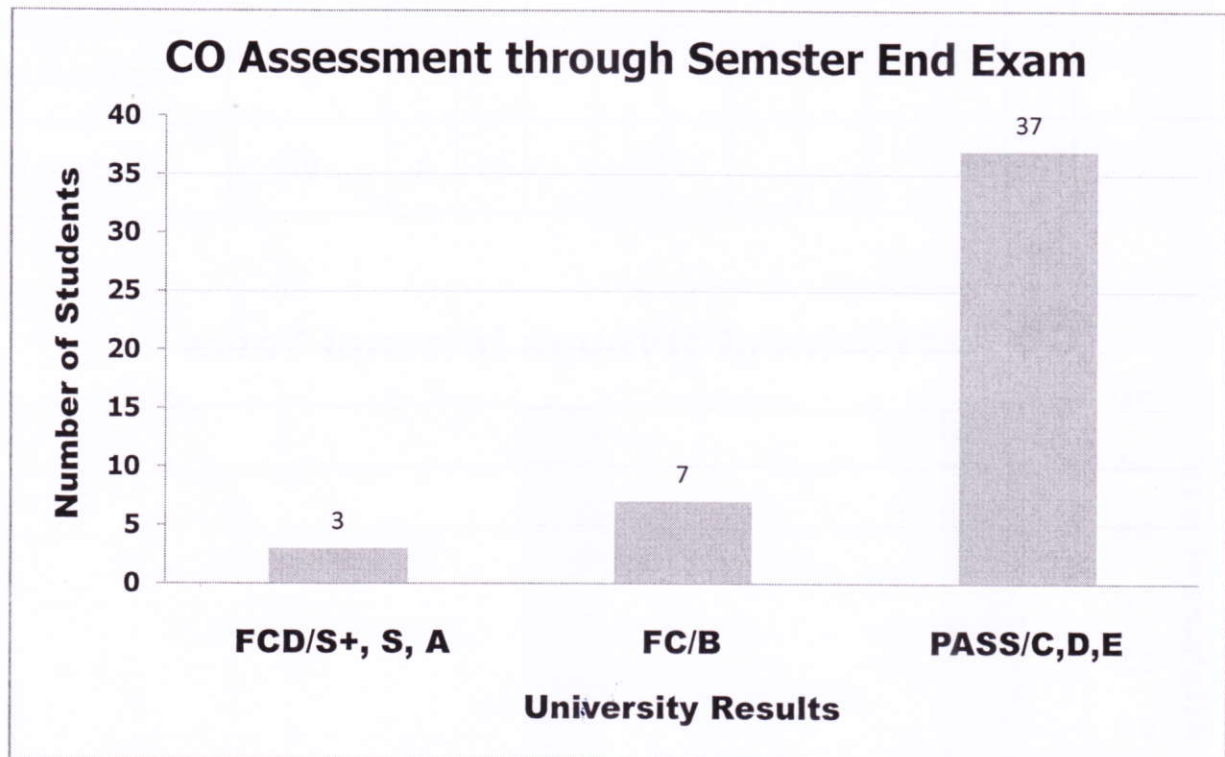
COs Attainment Levels:

FCD: S+, S, & A = 3;

FC (B) = 2;

Pass: C, D, & E = 1; Fail = 0

Total no. of Students Appeared	47	
Class/Grade↓	Total Number of Students	Course (COs) Attainment Through Semester End Exams
FCD/S+, S, A	3	9
FC/B	7	14
PASS/C,D,E	37	37
Total Percentage of Passing	100.00%	1.28

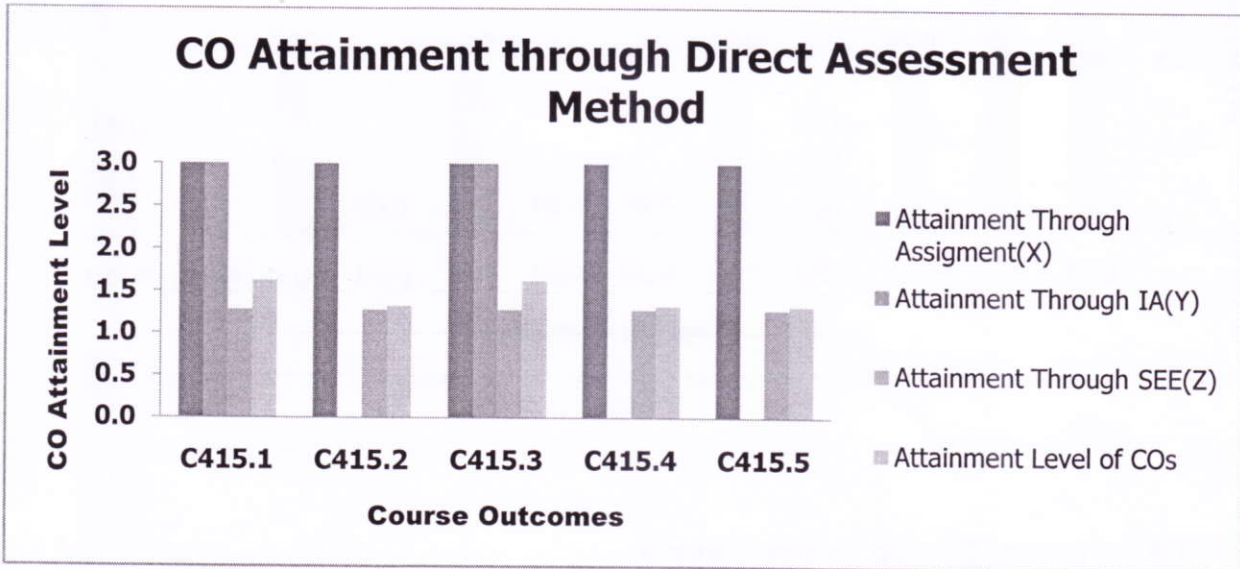




**4. CO Attainment:**

**CO Attainment through Direct Assessment Method**

COs	Attainment Through Assignment (X)	Attainment Through IA Test(Y)	Attainment Through Semester End Exam(Z)	Attainment level of CO	Mapped POs	Mapped PSOs
				$[0.2(X+Y)/2]+0.8Z$		
C415.1	3	3	1.28	1.62	1,2,3,4,5,8,10,12	1,2
C415.2	3	0	1.28	1.32	1,2,3,4,5,8,10,12	1,2
C415.3	3	3	1.28	1.62	1,2,3,4,5,8,10,12	1,2
C415.4	3	0	1.28	1.32	1,2,3,4,5,8,10,12	1,2
C415.5	3	0	1.28	1.32	1,2,3,4,5,8,10,12	1,2
Average				1.44		

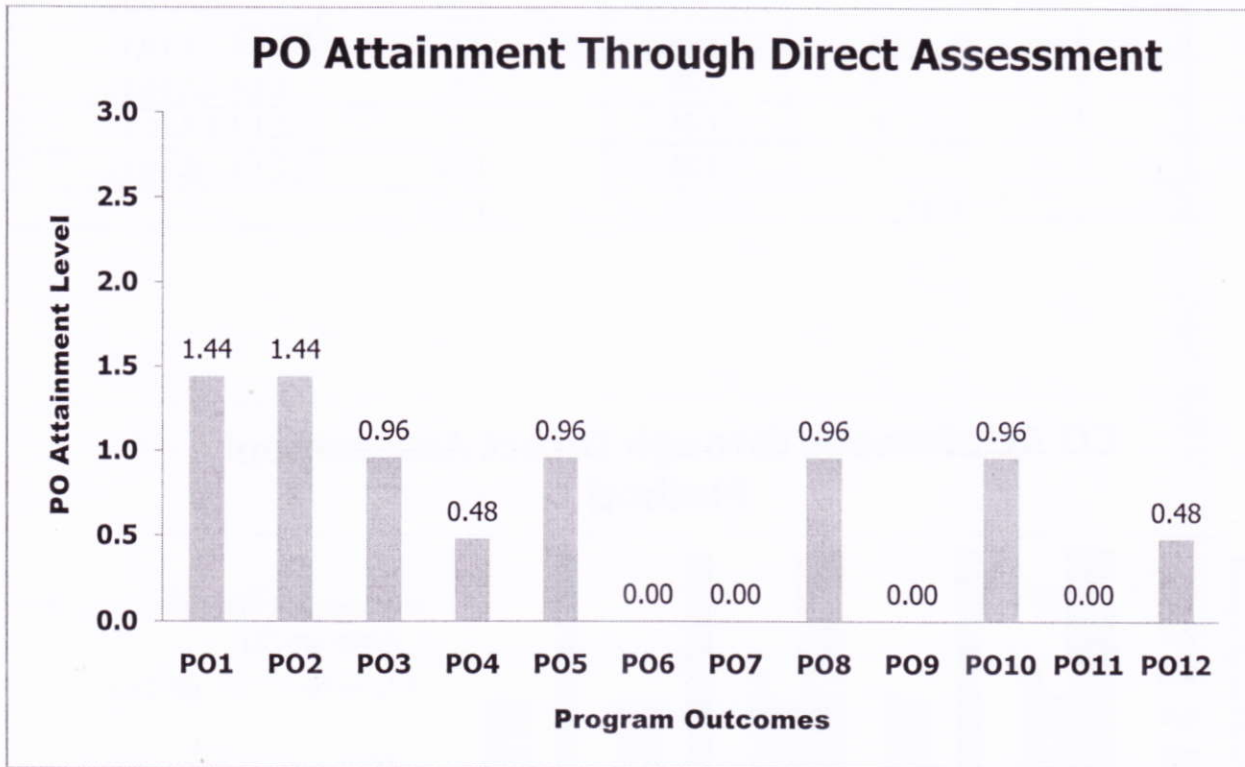




### 5. PO Attainment for the Entire Course:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C415	1.44	1.44	0.96	0.48	0.96	0.00	0.00	0.96	0.00	0.96	0.00	0.48

POs attainment value for the present course = (Mapped value \* CO attainment average)/3

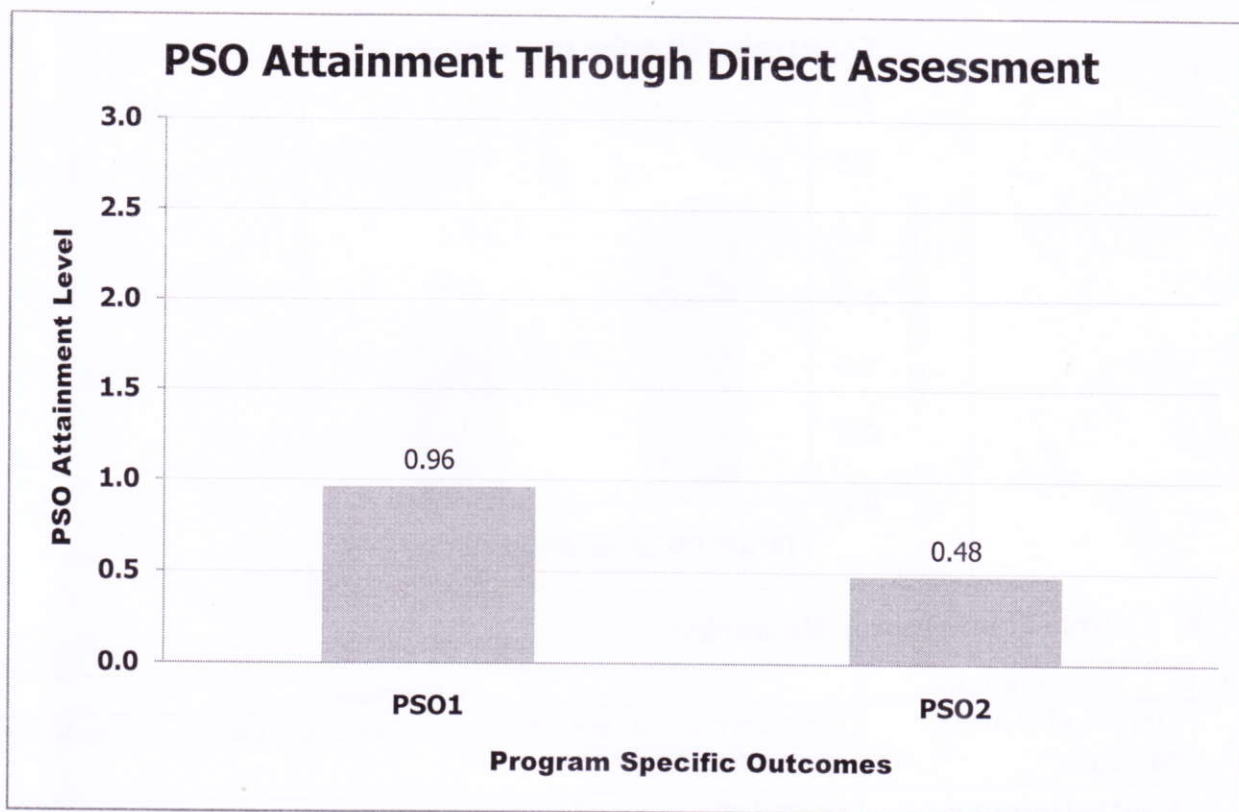


### 6. PSO Attainment for the Entire Course:

CO/PSO	PSO1	PSO2
C415	0.96	0.48

PSOs attainment value for the present course = (Mapped value \* CO attainment average)/3

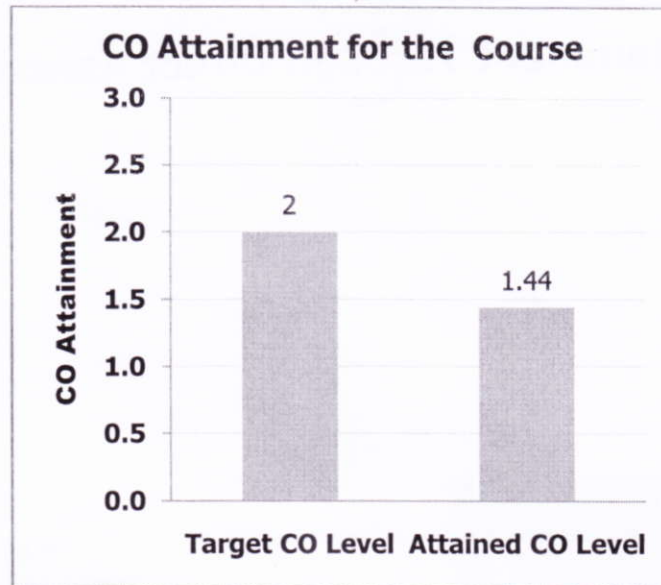




#### 7. Target Attainment:

As the course is revised, CO attainment target is taken as 2

Set Target Value (ITV)	2
Attained Value	1.44
New Target Level for the next Exam	2



### 8. Course Coordinator Remarks:

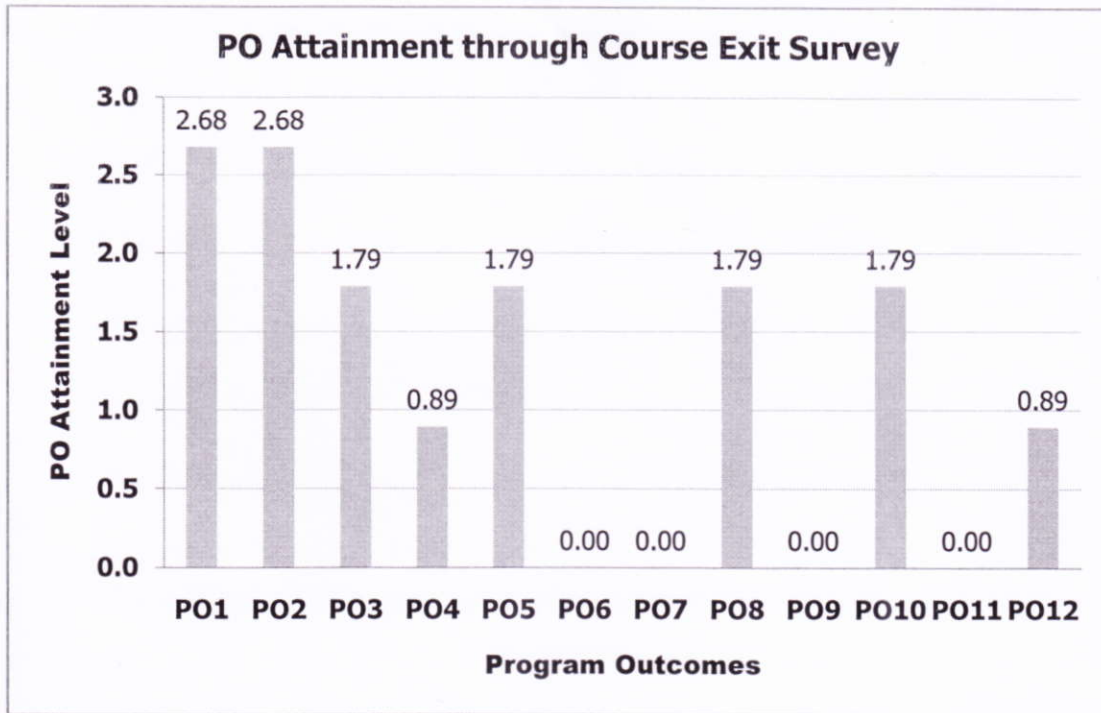
S. No.	Observations	Comments
1	Impact of Delivery Methods	Delivery methods are satisfactory. Pedagogy used to deliver lectures is quite satisfactory.
2	Course Outcome Attainment	Overall attainment of all course outcomes is moderate as it is observed in CO attainment table.
3	Scope for Improvement	Attainment of CO2, CO4 & CO5 need to be improved.
4	Additional comments (if any)	Nil

### X. INDIRECT ASSESSMENT OF PO & PSO THROUGH COURSE EXIT SURVEY (CES)

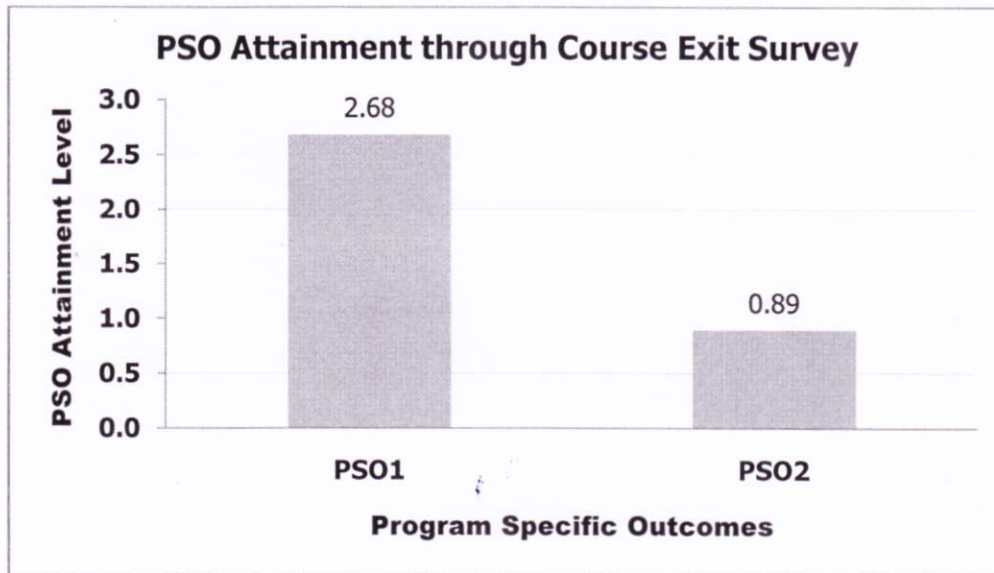
PO Attainment = (Mapped value \* CES attainment value)/3

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C415	2.68	2.68	1.79	0.89	1.79	0.00	0.00	1.79	0.00	1.79	0.00	0.89

PSO Attainment = (Mapped value \* CES attainment value)/3



CO/PSO	PSO1	PSO2
C415	2.68	0.89



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**HOD**