

## INNOVATIONS BY THE FACULTY IN TEACHING AND LEARNING (20)

The department adopts various innovative teaching methodologies to enhance the students' and ready for taking up engineering as career. The department is presently following below mentioned methods of teaching and learning. These methods, different from conventional teaching and learning, proved to improve learning skills, created enthusiasm and enhanced communication skills of our students and made better the attainment of course outcomes, POs and PSOs.

The different approaches and methodologies are followed in the department. The following are the innovative methods of teaching and learning.

### i. NPTEL

Apart from the NPTEL videos on the college local server, links for the Selected NPTEL videos are placed here for reference.

II YEAR I SEMESTER		
S.NO	Course Title	LINKS
1.	AE	<a href="https://nptel.ac.in/courses/108102095/">https://nptel.ac.in/courses/108102095/</a> , <a href="https://nptel.ac.in/courses/108102097/">https://nptel.ac.in/courses/108102097/</a>
2.	ET	<a href="https://nptel.ac.in/courses/108108076/">https://nptel.ac.in/courses/108108076/</a>
3.	SSP /PTSP	<a href="https://nptel.ac.in/courses/117104074/">https://nptel.ac.in/courses/117104074/</a>
4.	NA	<a href="https://nptel.ac.in/courses/106105154/2">https://nptel.ac.in/courses/106105154/2</a> <a href="https://nptel.ac.in/courses/108102042/">https://nptel.ac.in/courses/108102042/</a>
5.	EDC	<a href="https://nptel.ac.in/courses/117103063/">https://nptel.ac.in/courses/117103063/</a>
6.	M-III	<a href="https://nptel.ac.in/courses/122107037/">https://nptel.ac.in/courses/122107037/</a>
II YEAR II SEMESTER		
7.	STLD	<a href="https://nptel.ac.in/courses/117106086/">https://nptel.ac.in/courses/117106086/</a>
8.	PDC	<a href="https://nptel.ac.in/courses/108102095/">https://nptel.ac.in/courses/108102095/</a>
9.	CS	<a href="https://nptel.ac.in/courses/108103007/4">https://nptel.ac.in/courses/108103007/4</a>
10.	AC	<a href="https://nptel.ac.in/courses/117105143/">https://nptel.ac.in/courses/117105143/</a>
11.	ECA	<a href="https://nptel.ac.in/courses/108102095/">https://nptel.ac.in/courses/108102095/</a> , <a href="https://nptel.ac.in/courses/108102097/">https://nptel.ac.in/courses/108102097/</a>
12.	EMTL	<a href="https://nptel.ac.in/courses/108104087/">https://nptel.ac.in/courses/108104087/</a> , <a href="https://nptel.ac.in/courses/117101056/">https://nptel.ac.in/courses/117101056/</a>
13.	DDTV	<a href="https://nptel.ac.in/courses/117106086/12">https://nptel.ac.in/courses/117106086/12</a>
14.		

III YEAR I SEMESTER		
15.	EMTL	<a href="https://nptel.ac.in/courses/108104087/">https://nptel.ac.in/courses/108104087/</a> , <a href="https://nptel.ac.in/courses/117101056/">https://nptel.ac.in/courses/117101056/</a>
16.	LDIC	<a href="https://nptel.ac.in/courses/108108111/">https://nptel.ac.in/courses/108108111/</a>
17.	DC	<a href="https://nptel.ac.in/courses/108102096/">https://nptel.ac.in/courses/108102096/</a>
18.	LDICA	<a href="https://nptel.ac.in/courses/117102012/">https://nptel.ac.in/courses/117102012/</a>
19.	DBMS	<a href="https://nptel.ac.in/courses/106105175/">https://nptel.ac.in/courses/106105175/</a>
20.	VLSI	<a href="https://nptel.ac.in/courses/117101105/">https://nptel.ac.in/courses/117101105/</a> , <a href="https://nptel.ac.in/courses/117106093/">https://nptel.ac.in/courses/117106093/</a>
III YEAR II SEMESTER		
21.	AWP	<a href="https://nptel.ac.in/courses/117107035/">https://nptel.ac.in/courses/117107035/</a> , <a href="https://nptel.ac.in/courses/108101092/">https://nptel.ac.in/courses/108101092/</a>
22.	MPMC	<a href="https://nptel.ac.in/courses/108105102/">https://nptel.ac.in/courses/108105102/</a>
23.	DSP	<a href="https://nptel.ac.in/courses/117104070/">https://nptel.ac.in/courses/117104070/</a>
24.	COOS	<a href="https://nptel.ac.in/courses/117105078/">https://nptel.ac.in/courses/117105078/</a>
25.	MEFA	<a href="https://nptel.ac.in/courses/110101005/">https://nptel.ac.in/courses/110101005/</a>
IV YEAR I SEMESTER		
26.	MWE	<a href="https://nptel.ac.in/courses/117105130/">https://nptel.ac.in/courses/117105130/</a>
27.	ES	<a href="https://nptel.ac.in/courses/108102045/">https://nptel.ac.in/courses/108102045/</a>
28.	CMC	<a href="https://onlinecourses.nptel.ac.in/noc17_cs37/preview">https://onlinecourses.nptel.ac.in/noc17_cs37/preview</a>
29.	CN	<a href="https://nptel.ac.in/courses/106105081/">https://nptel.ac.in/courses/106105081/</a>
30.	MS	<a href="https://nptel.ac.in/courses/122106031/">https://nptel.ac.in/courses/122106031/</a> <a href="https://nptel.ac.in/courses/122106032/">https://nptel.ac.in/courses/122106032/</a>
IV YEAR II SEMESTER		
31.	WCN	<a href="https://nptel.ac.in/courses/117102062/">https://nptel.ac.in/courses/117102062/</a>
32.	SC	<a href="https://nptel.ac.in/courses/117105131/">https://nptel.ac.in/courses/117105131/</a>

**ii. Project based learning, case studies:**

The case studies in respect of selective topics are discussed in the class in details. Few of the 3<sup>rd</sup> year students inspired by them worked on new projects and selected as their projects as per the following details

S.N	Topic	Description	Faculty
1	IOT Based motor control	Automatic on and off water pump controller using GSM modem via	B. Udayasri

		GRPS network to control the three phase water pump.	
2	Safe Bike Riding	Protective system in a helmet for safety of bike rider	Mr.J.SUNIL KUMAR

Projects selected by students

S.N	Title	Student name & Roll No
1	IOT BASED 3 phase/5 phase INDUCTION MOTOR CONTROL SYSTEM USING GSM/GPRS TECHNOLOGY	V. MAHATHI, 15UP1A0478 G. JOSHNA, 15UP1A0450 M.PRAVALLIKA,15UP1A0465
2	Smart Helmet & Intelligent Bike System	K. SRAVYA, 15UP1A0456 P. PRIYANKA, 15UP1A0472 D. SUGANDHA, 15UP1A0449

**iii. Group Discussions, Role plays, seminars and debates etc.**

Innovative technical events like Group discussions, Role plays, seminars and debates are conducted among the students regularly, evaluated by external experts as mentioned in following table

CAY (2018-19)					
Event name	Date	Judge	Winner	Runner	Mapping with POs, PSOs
Group discussion	27-10-18	Mrs s. Suzan shalini	Koripadu anitha devi,ii ece	Karne neelima, II ECE	PO1-12, PSO1-3
Debate	03-10-18	Dr. G. Prasad, retired scientist, CSIR	Sheela nikitha,iii ece	Kola keerthana ,II ECE	PO1-12, PSO1-3
Role play	08-10-18	Dr. K. Srinivasa rao, Md, Medequip pvt ltd	Sheela nikitha,iii ece	Koripadu anitha devi, II ECE	PO1-12, PSO1-3

Seminars	20-10-18	Mrs B. Madhavi	Shiva nikhitha, III ECE	Pooja, II ECE	PO1-12, PSO1-3
<b>CAYM1(2017-18)</b>					
GROUP DISCUSSION	18-01-18	Mr A. Kranthi Kumar	MURALA DHARANI, II ECE	KORIPAD U ANITHA DEVI, II ECE	PO1-12, PSO1-3
DEBATE	19-01-18	Dr. G. PRASAD, Retired Scientist, CEERI, CSIR	N V SAI MEGHAL A, II ECE	SHEELA NIKITHA, I II ECE	PO1-12, PSO1-3
ROLE PLAY	20-01-18	Dr. K. Srinivasa Rao, MD, MEDEQUI P Pvt Ltd	MURALA DHARANI, II ECE	SHIVA NIKHITHA, III ECE	PO1-12, PSO1-3
SEMINARS	22-01-18	Mrs P. Anusha	N V SAI MEGHAL A, II ECE Vaishnavi	POOJITH A, III ECE	PO1-12, PSO1-3
<b>CAY M2 (2016-17)</b>					
<b>Event name</b>	<b>Date</b>	<b>Judge</b>	<b>Winner</b>	<b>Runner</b>	<b>PO1-12, PSO1-3</b>
GROUP DISCUSSION	18-01-17	Dr. P.BHANU. PRASAD, Retired Scientist, CEERI, CSIR	PALVAI SWETHA REDDY, II ECE	MURALA DHARANI, II ECE	
DEBATE	19-01-17	Dr. K. Srinivasa Rao, MD, MEDEQUI P Pvt Ltd	PATCHAR LA TULASI, II ECE	N V SAI MEGHAL A, II ECE	PO1-12, PSO1-3
ROLE PLAY	23-01-17	Mrs.	MURALA	PALVAI	PO1-12,

		D.Rani	DHARANI, II ECE	SWETHA REDDY, II ECE	PSO1-3
SEMINARS	24-01-17	Mrs P. Anusha	N V SAI MEGHAL A, II ECE	PATCHAR LA TULASI, II ECE	PO1-12, PSO1-3

Innovations by the faculty in teaching and learning

- Instruction manuals designed as per the lab experiments including additional experiments are placed in the website. This would help the students to relate the topic of discussion in the class rooms.
- Subject notes and manuals for appropriated topics are placed in institute website and they are periodically updated.

### ***Guide Lines***

#### ***Evaluation Guidelines for Group Discussion***

Team Size: 3 Members

Scheme of Evaluation:

Contribution to discussion: 10 Marks

Knowledge/Expertise: 10 Marks

Communication: 10 Marks

#### ***Evaluation Guidelines for Debate Competition, Rolepay and Seminar***

Scheme of Evaluation:

Understanding Topic: 10 Marks

Information: 10 Marks

Use of facts: 10 Marks

### ***Iv PEER REVIEW AND CRITIQUE***

The department conducts periodic innovative events among the students and invite expert faculty (in-house as well as external) as judges and record the results of these events as per the details mentioned in table 5.5.4 for better attainment of course outcomes,

POs, PSOs. The experts will also record their valuable feedback in terms of peer review and critique. Important observations are placed here for reference

1. There was no rapid flow of speech among the students
2. Argumentation should be positive
3. Information was not clear and it has some inaccuracies
4. Some of the participants in the group discussion were out of relevance to the topic
5. Redundancy has been taken place while speaking.
6. The team did not show an adequate understanding of the topic
7. Lack of knowledge on pronunciation.
8. Many students used grammatical errors in their language.
9. Content knowledge must be updated.
10. There were some sarcastic remarks and the responses were consistently not respectful
11. There must be good listening skills. Students have to practice more to listen to the speakers accurately

## **V REPRODUCED AND DEVELOPED FURTHER BY OTHER SCHOLARS**

The innovative methods and work carried out by the department is effectively used by the other research scholars of different institutes. Apart from this the review and critiques about the methodologies are taken as feedback and selectively implemented wherever feasible.

List of colleges in which the scholars are using/ used our methodologies.

### **S.No. INSTITUTE NAME**

- |   |  |
|---|--|
| 1 | VIGNAN INSTITUTE OF TECHNOLOGY AND SCIENCE |
| 2 | TIRUMALA COLLEGE OF ENGINEERING            |
| 3 | SAMSKRUTHI COLLEGE OF ENGINEERING          |
| 4 | GURUNAK GROUP OF INSTITUTIONS              |

## **Details of innovative teaching and learning methods**

### **INSTRUCTIONAL METHODS:**

- i. **Teaching aids:** Use of modern teaching aids like LCD projectors, and such other methods are deployed in classrooms and other student learning environments.

- ii. Academic discussions:** Individual faculty and/or expert faculty initiate and monitors academic discussions on selected topics in class room among students while sharing study material in respect of these topics.
- iii Team teaching:** Some typical complex topics are handled by expert faculty for core subjects while all other topics in syllabus are dealt by the designated faculty.
- iv Project based learning:** Project based learning, case studies: The case studies in respect of selective topics are placed in the website. They are discussed in the class in details. Few of the 3<sup>rd</sup> year students inspired by them worked on new projects and submitted as projects dissertation work.
- v NPTEL videos:** NPTEL Videos server is made accessible in every class room/ Lab. Hence the faculty and students derive benefit of the facility.
- vi Digital library:** Digital library facilitates the faculty and students with E-journal (Springer), NPTEL Videos (with headphones).
- vii Enhancement of teaching skills:** Faculty members use department library, digital library and other Open Source platforms to enhance their teaching skills.
- Viii Advanced training to faculty:** The faculty members are encouraged to participate in short term courses, faculty development programs and workshops on advanced topics to keep pace with the advanced level of knowledge and skills.
- ix Interactive Learning**  
It is a creative learning that encourages student to independently learn through the use of computer technology or electronic media. It is a hands-on, real world approach to education. It reinvigorates the classroom for both students and faculty. Lectures are changed in to discussions and students and teachers become partners in the journey of knowledge acquisition. In this methodology students strengthen their critical thinking and problem solving skills using a much better holistic approach. This type of learning is carried out across the curriculum with technology. These are practiced in this department with the following methodologies:
- Teacher- student interaction with an advantage of hierarchical learning to enhance freedom of expression
  - Student-student interaction with an advantage of peer learning by grouping the students based on their marks, thinking levels and compatibility into 3 groups viz., A, B and C
  - The use of audio visuals, video with an advantage of long-

term memory retention

- Students learn some of the topics for a given subject by carrying out relevant experiments hands on in the laboratory under teacher's guidance that creates enthusiasm among the students.

**x BOTTOM UP LEARNING APPROACH**

In this approach the end requirements are specified in the beginning. The solution is arrived by working back words from the requirement to the possible execution. This method of teaching works well for carrying out circuit design, block diagram development, etc. Some of the faculty adopts this method of teaching the selected topics wherever the methodology helps.

*Example: Simple system design using microprocessor.*

**xi TEACHING CERTAIN TOPICS BY USING INNOVATIVE RELATED EXAMPLES FROM NATURE**

Solution to several problems is originated from nature.

*Example: Wireless communication.*

**xii SIMULATION WITH EXAMPLES**

Some of the difficult concepts of core subjects are best taught using simulation

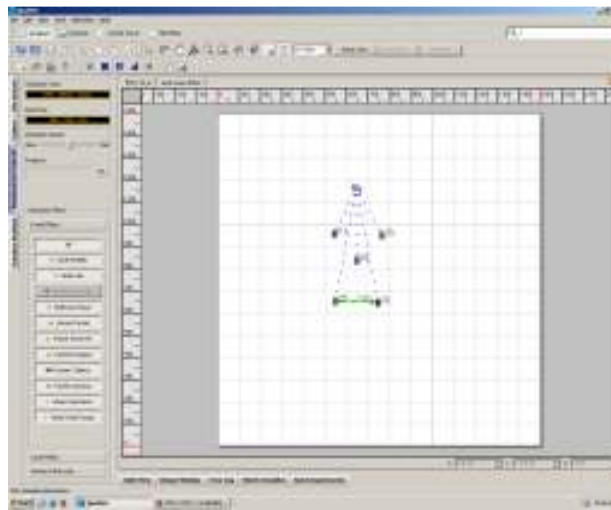
Example 1: Solving logical expressions using Karnaugh map in the course "Switching Theory And Logic Design" is taught using Karnaugh Map simulator 1.2.5.

Example 2: Routing algorithms of the course "Computer Networks" are taught using simulator software Qualnet network simulator version 5.0.2

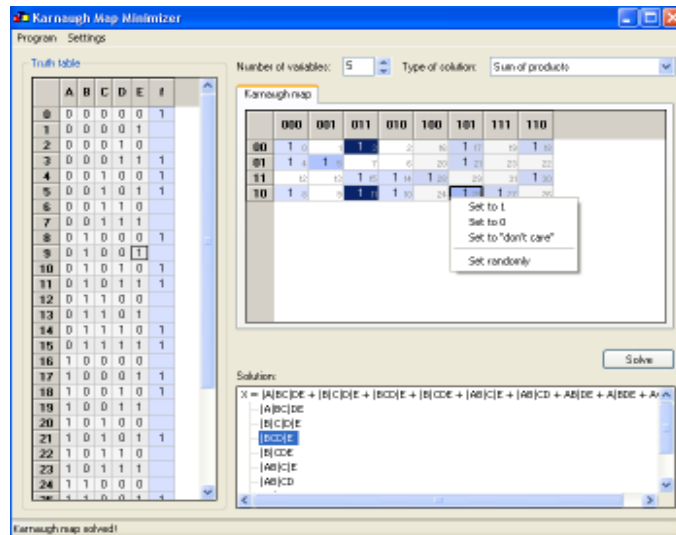
Example 3: FFT , Interpolation, Decimation of the course "Digital Signal Processing" are taught with MATLAB Simulink.

Few screen shots during simulations demonstrated to students  
Qualnet Simulation

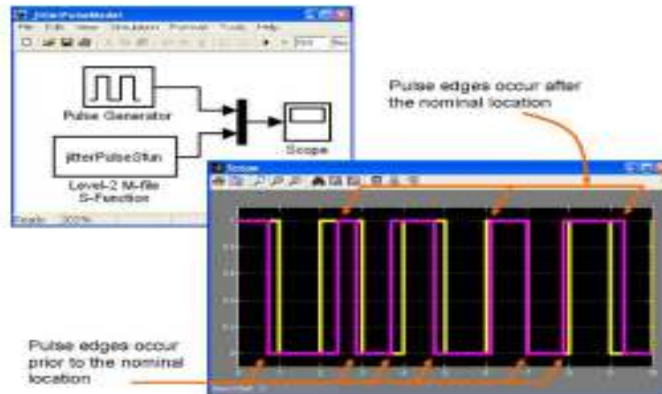




Karnaugh Simulation



MATLAB Simulink Simulation



The department added JAVA lab over and above the curriculum with in-department drafted syllabus to make students understand the subject effectively and thoroughly. Due to this students acquired good knowledge and command over the subjects and results improved constantly.

Course: OOPS	Results
2015-16	Not in curriculum
2016-17	74.47%
2017-18	100

Results

**Vii PEER LEARNING BASED MOCK TESTS**

Students are divided into groups as per their think abilities and compatibility. They are allowed to discuss, understand, solve the topics, problems related a subject. A mock test is conducted as per the external exam pattern at the end of the semester to enhance the confidence level of student.

**xvii INTRODUCING WEIGHTAGE TO MOCK TEST MARKS IN THE RESPECTIVE LAB INTERNALS**

The above mentioned MOCK test marks are evaluated in external exam pattern and 40% weight-age is given these marks in lab internal examination.

**xviii ENCOURAGE STUDENTS TO DESIGN MICRO PROJECTS USING THE CONCEPTS LEARNT IN LABS**

The bright and / or active students are encouraged to design various micro projects to inculcate creativity in the student. All such projects are demonstrated in respective laboratories. And sample pictures are placed here for reference



IR based street control system



Obstacle detection



Low cost fire alarm system



Air flow detector



Metal Detector



Human detected Device Control



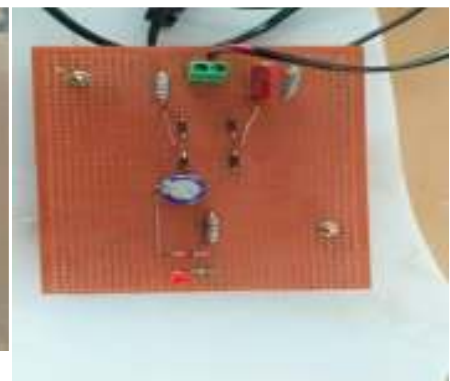
Street Light Circuit using LM358



Light activated Switch circuit



Kitchen Timer



SMPS

**xix Encouraging Students To Participate In Different Types Of Technical Events**

The students are encouraged to participate in various technical events on a regular basis to improve the oral, analytical and thinking abilities.

**xx Various additional technical courses in collaboration with the industry personnel to make the students industry ready**

The department organizes workshops, guest lectures etc to impart more knowledge to students. Apart from this the department also organizes long term technical courses in collaboration with industry experts to enhance the student skill set as mentioned in following table

<b>Details of Collaboration schedule</b>						
<b>Name of the Company</b>	<b>Academic Year</b>	<b>Name of course</b>	<b>Part of the course delivery</b>	<b>Students attended</b>	<b>No. of contact hours</b>	<b>Mapping with POs, PSOs</b>
BRAIN O VISION SOLUTION S	2018-19	Embedded Systems Design	Embedded C programming	100%	17	PO1-12, PSO1-3
BRAIN O VISION SOLUTION S	2017-18	Microprocessors and microcontrollers	8051 programming	100%	16	PO1-12, PSO1-3
BRAIN O VISION SOLUTION S	2016-17	COOS	OS programming	100%	17	PO1-12, PSO1-3
EDUONTECH	2018-19	Embedded Systems Design	RTOS programming	100%	15	PO1-12, PSO1-3
EDUONTECH	2017-18	Microprocessors and microcontrollers	8051 programming	100%	18	PO1-12, PSO1-3
EDUONTECH	2016-17	COOS	OS programming	100%	16	PO1-12, PSO1-3
ELEGANT EMBEDDED SOLUTIONS PVT LTD	2018-19	Embedded Systems Design	Embedded C programming	100%	17	PO1-12, PSO1-3
ELEGANT EMBEDDED SOLUTIONS PVT LTD	2017-18	DSP	Matlab Programming	100%	18	PO1-12, PSO1-3
ELEGANT EMBEDDED	2016-17	SS	Matlab Programmi	100%	16	PO1-12, PSO1-3

D SOULUTIONS PVT LTD			ng			
SIGMA Micro Systems	2018-19	Micro Processors and Micro Controllers	Micro Processor Bus Architectur es	100%	17	PO1-12, PSO1-3
SIGMA Micro Systems	2017-18	Micro Processors and Micro Controllers	Multi Processor System Design using 8086	100%	18	PO1-12, PSO1-3
SIGMA Micro Systems	2016-17	Embedde d System Design	RTOS Programmi ng	100%	16	PO1-12, PSO1-3

### Impact analysis of industry institute interaction and actions taken thereof

Impact Analysis of industry institute interaction is mentioned in the following table.

Parameter Company Name	Academic Year	Accessible to % of students	Benefit to students for Higher Studies in %	Benefit to students for Placements in %	Mapping with POs, PSOs
<b>BRAIN O VISION SOLUTIONS</b>	2015-16	All	3%	15%	PO1-12, PSO1-3
	2016-17	All	3%	20%	PO1-12, PSO1-3
	2017-18	All	--	5%	PO1-12, PSO1-3
<b>EDUONTECH</b>	2015-16	All	2%	15%	PO1-12, PSO1-3
	2016-17	All	2%	30%	PO1-12, PSO1-3
	2017-18	All	--	10%	PO1-12, PSO1-3
<b>ELEGANT EMBEDDED</b>	2015-16	All	2%	15%	PO1-12, PSO1-3

<b>SOOLUTIONS PVT LTD</b>	2016-17	All	3%	10%	PO1-12, PSO1-3
	2017-18	All	--	5%	PO1-12, PSO1-3
<b>SIGMA Micro Systems</b>	2015-16	All	2%	20%	PO1-12, PSO1-3
	2016-17	All	2%	15%	PO1-12, PSO1-3
	2017-18	All	--	5%	PO1-12, PSO1-3

Table: Impact Analysis of industry institute interaction

**xxi Train the students to give special content based seminars in the respective classes**

Students are encouraged to give special seminars in various topics of upcoming research and tools used in today's industry.

**xxii Create enthusiasm in students by conducting and evaluating group discussions, role play, debate etc**

The group discussions, role plays debate etc are conducted periodically and evaluated and on a regular basis.



Group Discussion



Debate



Role Play



Seminar

### **xxiii Instructional delivery**

**Student publications:** Over the past years the students have been participating /presenting papers in national/international conferences and publish their research work in national/international Conferences to enrich their knowledge. The details of student participation are filed in the department

#### **a Assessment**

The various instructional methodologies are periodically conducted among the students and assessed based on the artifacts and attributes of the students. The assessment procedure is different for different types of events and detailed guidelines are mentioned in the website

#### **B Evaluation**

The group discussions, role plays debate etc are conducted periodically and evaluated by external experts on a regular basis. Evaluation procedure is kept in website

### **xxiv Reflective critiques**

Apart from carrying out the above mentioned methodologies and events the reviews and critiques about the methodologies are taken as feedback and selectively implemented wherever feasible. Sample critiques are mentioned in following table

<b>S.No</b>	<b>Event</b>	<b>Critiques and Reviews</b>	<b>Implementation details</b>
<b>1</b>	GROUP DISCUSSION	<ul style="list-style-type: none"><li>• Few topics of over and above syllabus may be discussed</li><li>• Video recording must be made available to students for better improvement</li></ul>	<ul style="list-style-type: none"><li>• Criteria for topic selection modified to take the critique into account. Topics are updated by students and the respective faculty.</li><li>• Videos are recorded and kept in college server</li></ul>
<b>2</b>	DEBATE	Periodicity of the event may be improved	One more event is added and intimated to students in the class room
<b>3</b>	ROLE PLAY	The choice of the role model must be restricted to list mentioned by department	The appropriate list of Role Play is displayed in the notice board
<b>4</b>	SEMINARS	Seminar topics and procedures must be extended to mini	Mini and major project seminars are conducted and evaluated



		major projects of curriculum	
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