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BE Project Handbook

(Guidelines Document)

(Institute is approved by AICTE &
affiliated to Savitribai Phule Pune University)

Preamble

Project work is an important component of engineering and technology education. As per the University curriculum, all final year students of engineering are required to carry out a project work, jointly in a group of 4 members. These projects are carried out by students under the supervision of project guide. The primary objective of a project work is to expose the students to the applications of concepts and theories that they have learned through out the courses.

Project activity of final year engineering is one of the most important activity of the curriculum for an Engineering Graduate. Right from selecting the idea for project work upto the final viva voce of project, is a journey that has to be completed systematically by following standard procedure. Students are learning to do the project activities right from SE and TE under the activity of mini projects / project based learning and in the final year they have to work on this capstone project, which has great importance from placement point of view. Project activity is the only activity in 4 years engineering curriculum, wherein almost all POs are mapped and students get opportunity to show their skill through higher order Bloom's level ie analysis, evaluation and creativity.

This project handbook is designed to serve the purpose and facilitate the task of students, guides and project coordinator. This document will serve as a guideline to reflect accountability, punctuality, technical writing ability and work flow of the project undertaken.

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Basic Terminology related to Project Activity

1. Abstract :Abstract is an outline / brief summary of the whole project work. It should have an introduction, main text and conclusion. It highlights major points of project work, importance and purpose of project work, how project was carried out and what was the conclusion. Abstract is to be included in the project report.

2. Bloom's Taxonomy :Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. There are 6 levels of Bloom's Taxonomy in order (lowest to highest) - *Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating.*

3. Paper Publication :A research paper is one of the many outputs of the project work. A research paper is the culmination and final product of an involved process of research, critical thinking, source evaluation, organization, and composition based on the project work undertaken. Publishing paper in reputed journal or conference is the most important and the ultimate part of any successful research work.

4. Patent Publication :A patent is a form of intellectual property that gives its owner the legal right to exclude others from making, using, or selling an invention for a limited period of years in exchange for publishing an enabling public disclosure of the invention. A patent gives an inventor the right to stop other people making or using their invention. If someone makes or uses that invention without being allowed to, the inventor can sue that person in court to make them stop. If students project is on innovative idea, he / she can apply for patent publication.

5. Plagiarism : It is cheating by claiming someone else's work as our own. It is to copy and paste any text from any source unless it is quoted to make it clear that it is copied and not our own words.

6. Poster presentation :A poster presentation consists of a visual display of project findings combined with an interactive question and answer period with a panel of examiners. A poster presentation is a way to communicate students project and understanding of a topic with the help of making a poster in a short and concise format. Few project competitions are held in the form of poster presentations on the project work.

7. Problem Statement : A problem statement is a concise description of an issue to be addressed or a condition to be improved upon. It is a concise statement of the problems which initiate / spark the research. It identifies the gap between the current state and desired state of a process or product. It outlines the negative points of the current situation.

8. Program Outcomes (POs) : The NBA (National Board of Accreditation) has specified 12 Program Outcomes as a part of OBE (Outcome Based Education) for an engineering student intending to produce a professional engineer. So that a graduate engineer will be able to demonstrate knowledge, skills and attitudes, acquired on a successful completion of 4 years program of engineering study.

9. Project Assessment & Evaluation : To monitor the progress and to assist the timely completion of the project, internal as well as external presentation reviews are planned by project coordinator during different phases of project through out the academic year. In the assessment and evaluation process, students' content knowledge as well as additional skills like creativity, collaboration, problem solving, decision making, leadership, communication etc are tested.

10. Project batch : A group of 4 students (as specified in the University curriculum) working on the same project under a common project guide on particular project during the academic year of final year engineering.

11. Project Competition : These are the competitions of project exhibition, idea representation, paper presentation etc based on the project work, organized every year by various engineering institutes and reputed industries on State / National / International level, so that students should get appreciation and motivation for their good quality project work. Project guides and project coordinators motivate the students to participate in such competitions.

12. Project Coordinator : Project coordinator is a faculty member from particular department who is responsible to coordinate all the project guide and project batches during the academic year. He / she is primarily responsible for administrative tasks of monitoring closely all the project activities efficiently. (such as documentation, information distribution, report collection, intercommunication support).

13. Project Diary (Workbook / Logbook) : A project diary is a written record to be maintained by students of significant activities, events or processes that occur during the project work. The Project Diary is a summation of all of the daily activities on a project. It provides a meaningful reflection on the time that may be needed to implement the project effectively.

14. Project guide (Supervisor) :Project guide is a faculty member who is responsible for coordinating project activities / different tasks to get completed successfully from a batch of students working on that project during the academic year.

15. Project Record Notebook : It is a written record to be maintained by project guide of weekly task given to students and the remarks on the weekly task completed by each student.

16. Project Report :A Project Report is a document, written in a standard format, which provides details on the overall picture of the project work completed by students during the academic year.

17. Project Work :Project is an individual or collaborative enterprise that is carefully planned to achieve a particular aim. The intention of Project work is to conceive an idea and to implement it systematically by using knowledge derived during the course of education mainly to innovate or facilitate. A group of Under Graduate students at Final Year will undertake project over academic year. Work involves study of feasibility of the project, planning of project, studying existing systems, tools available to implement the project and state of art software testing procedures and technology with use of case tools, design is to be implemented into a working model (software or hardware or both) with necessary software interface as an executable package.

18. Prototype : A prototype is an early sample, model, or release of a product built to test a concept or process. A prototype is generally used to evaluate a new design to enhance precision by system analysts and users. Prototyping serves to provide specifications for a real, working system rather than a theoretical one.

19. Rubrics : Rubrics are the short narrative descriptions of the characteristics of the outstanding work, acceptable work, non acceptable work and so on. It provides a brief description of the performance that merits each possible rating to show the degree of “the things we are looking for” are present. It allows guide to distinguish between different levels of performance of students in project work.

20. Synopsis :Synopsis of a research project is a document submitted to an authority (here a project guide) for the purpose of ethical clearance. Synopsis is the gist of planned project submitted for approval to the guide / project review committee. A synopsis should be constructed in a manner that facilitates the reviewer to understand the project work at a glance. It should be brief but precise. A synopsis should include – title, statement of the problem, objectives, working methodology and scope of project. Synopsis is to be submitted before the approval / start of project.

Importance of BE Project

Project is one of the most important aspects of engineering degree. The intention of Project work is to conceive an idea and to implement it systematically by using knowledge derived during the course of education mainly to innovate or facilitate. Project activity is very important from academics as well as placement point of view.

1) Academic Importance of project work :

- ❖ There are 200 marks for project work in the University syllabus. So getting good marks in project activity definitely help the students to get first class and distinction in their final year of engineering.
- ❖ Students get hands on experience through project work for the concepts and theory, learnt by them in theory classes of all courses.
- ❖ Project work can lead to the publication of research paper / patent.
- ❖ Students can get good tips about their career through healthy interaction with project guide / industry guide.

2) Importance of project work in placement activity :

- ❖ In campus placement interview, majority companies ask the questions on project work, as freshers don't have any work experience.
- ❖ Professional qualities are enhanced in the students due to different project activities, such as communication skill, team work, ethical practices etc.
- ❖ Students get opportunities to get selected in their interested domain due to their project work carried out in the same domain.
- ❖ Students, who worked on research project, can develop interest in research and has opportunity to work with R&D department of industry / Govt. organization.

3) Importance of project work in entrepreneurship :

- ❖ Students can identify basic entrepreneurship skills in project management.
- ❖ Interested students get motivation to think of start up business after their graduation.

Objectives of Project Work

1. To apply the knowledge for solving realistic problems pertaining to industry / society / current applications from engineering domain.
2. To allocate roles to the students with clear lines of responsibility & accountability and learn team work, ethics and professionalism.
3. To apply communication skill to effectively promote ideas, goals or products.
4. To expose the students to product development cycle using industrial experience and using state of the art technologies.
5. To encourage and expose the students for participation in National level project competitions.
6. To get hands on experience on working with tools, tackles and machines.

Project Course Outcomes [COs]

On completion of the project work, students will be able to

1. Identify, analyse and create economical feasible solution for societal/ industrial problems by applying knowledge and skills and inculcating the practice of life long learning.
2. Select and apply an appropriate models / methods / mathematical simulations to analyse the data, exhibiting project management skills.
3. Provide solution to problems by using modern tools and techniques and experimental methodologies and by considering environmental and ethical issues.
4. Develop skill to work effectively in a team to achieve a common goal.
5. Write technical precise project report and develop presentation skill to communicate effectively.
6. Participate effectively in multi-disciplinary- National / International competitions, exhibiting team work, Inter-personal relationships, and leadership quality.

SPPU Structure for project Work (2015 Pattern)

<i>Sem - I</i>							
<i>Branch</i>	<i>Sub Code</i>	<i>Subject</i>	<i>Tut / pract</i>	<i>TW</i>	<i>Oral</i>	<i>Total</i>	<i>Credit</i>
Comp	410248		2	-	50	50	2
Elect	403146		2	-	50	50	2
E&TC	404188		2	-	50	50	2
IT	414460		2	50	-	50	2
Mech	402046		4	25	25	50	2
<i>Sem - II</i>							
<i>Branch</i>	<i>Sub Code</i>	<i>Subject</i>	<i>Tut / pract</i>	<i>TW</i>	<i>Oral</i>	<i>Total</i>	<i>Credit</i>
Comp	410256		6	100	50	150	6
Elect	403146		6	50	100	150	6
E&TC	404195		6	150	50	200	6
IT	414468		6	50	100	150	6
Mech	402051		12	100	100	200	6

Project Categories

The projects should be based on societal & technological issues, which are to be designed and developed by final year students with the great diversification. Students as well faculties should think on doing the projects related to different areas like agriculture, public health, smart city, home automation, industrial problems, renewable energy, environmental monitoring etc.

The projects can be broadly categorized as :

- 1.** The design and development of new processes, products and equipments.
eg–Design and development of semi automatic Noodle machine
- 2.** Simulation and analysis of systems.
eg - Simulation and analysis of mechanical behaviour of soft and weak rocks in the construction of a tunnel opening
- 3.** Optimization of new processes, products and equipments.
eg – Design and optimization of steering knuckle to reduce the weight using FEA.
- 4.** To design and implement a system to solve society oriented real life problems.
eg – Agro Robot for multi operations (ploughing, seeding and planning) in the farm using solar energy.
(<https://www.youtube.com/watch?v=OTk0heBUth8>)

Sr. No	Way of Classification	Name of project category	
1	According to end user	1. Industry:eg-Productivity Improvement by Work and Time Study Technique for Earth Energy-glass Manufacturing Company 2. Society:eg-Fully Automated Lawn Mowing System 3. Research oriented :eg - Design & development of linear compressor for window air-conditioner. 4. Lab development (Mechatronics lab) : eg - Development of a robotic arm which is controlled by mobile phone over blue tooth / Arduino programming	
2	According to funding required for project work	1. Sponsored by industry 2. Sponsored by Institute 3. Sponsored by University / Govtscheme. 4. Self funded	
3	According to domain	<p>[A] Comp</p> 1. Networking & Security 2. Computational Theory 3. Computer System Architecture & Design 4. Database Management	<p>[C] E&TC</p> 1. Electronic Design 2. Signal Processing 3. Programming & Industrial Management 4. Interdisciplinary
		<p>B] Electrical</p> 1. Power System 2. Electric Mobility 3. Control & Automation 4. Interdisciplinary	<p>[D] IT</p> 1. Computer Networking 2. Web Technology 3. Database Management 4. Software Development
		<p>[E] Mechanical</p> 1. Thermal & Fluid 2. Design & CAE 3. Renewable Energy 4. Interdisciplinary	

Project Activity Academic Calendar [2022-23]

Sr. No.	Class & Sem	Project Activity	If seminar / mini proj is in TE-I [Comp, Elect & IT]	If seminar / mini proj is in TE-II [Mech & E&TC]
			Week & Month	Week & Month
1	TE – I or II	Conduction of meeting of all last year project guides by project coordinator	3 rd week June 2021	3 rd week Dec 2021
2		Conduction of session by project coordinator for all TE students. (offline or online)	3 rd week June 2021	3 rd week Dec 2021
3		Formation of project batches by TE students	1 st week July 2021	1 st week Jan 2022
4		Finalisation of proposal of domain / topic of project and allotment of project guide	3 rd week July 2021	3 rd week Jan 2022
5		Finalisation of seminar topic by project guide	1 st week Aug 2021	1 st week Feb 2022
6		1 st internal review presentation of seminar	3 rd week Aug 2021	3 rd week Feb 2022
7		2 nd internal review presentation of seminar	1 st week Sept 2021	1 st week Mar 2022
8		Final presentation of seminar	3 rd week Sept 2021	3 rd week Mar 2022
9		Finalisation of proposed project title and scope of project work	4 th week Sept 2021	4 th week Mar 2022
Winter / Summer break for University examination (oral/pract/theory)			Oct to Dec	April to June
10	BE - I	Submission of project synopsis and bar chart by students to guide & project coordinator	2 nd week July 2022	
11		1 st internal project review presentation	4 th week July 2022	
12		2 nd internal project review presentation	2 nd week Sept 2022	
13		Submission of project stage – I report to guide	3 rd week Sept 2022	

14		University project stage – I examination (presentation)	As per Univ Timetable
Winter break for University examination (oral/pract/theory) [Oct to Dec]			
15	BE - II	3 rd internal project review presentation	3 rd week Jan 2023
16		4 th internal project review presentation	3 rd week Mar 2023
17		Project competition / poster presentation competition	4 th week Mar 2023
18		Submission of short video on project work (3 mins)	1 st week April 2023
19		Submission of final project report	2 st week April 2023
20		Preparation of project abstract handbook	3 rd week April 2023
21		University viva-voce of project	As per Univ Timetable
22	<i>To participate in National level project competitions such as SIH, KPIT Sparkle, Vishwakarma award, Quest Ingenium etc.</i>		
23	<i>Weekly interaction of project guide with students must take place as per class time table between Monday to Friday.</i>		

Students project diary / workbook / logbook

It is mandatory for every project batch to maintain a project diary to record all project activities weekly in it. They have to record all findings, data, factual information, task allotted by guide, discussions / interaction with the guide in every week. They have to show the project diary to external examiner at the time of viva-voce. Guide has to sign in the project diary during every weekly meeting with students.

Project record notebook of guide

Project guide has to maintain a record of interactions / discussions / task assigned to every student in his / her project record notebook during weekly meeting. He / she also has to keep record of activities carried out / task completed by each and every team member individually or in a group in the project record notebook.

Responsibility of Project Guide

1. Guide has to explain the students how to check the feasibility of project (refer ***Annexure-I*** for feasibility parameters).
2. Guide should help students to formulate the problem statement and to help in finalising objectives, and methodology of a project.
3. Guide should explain the students how to prepare bar chart of entire project activity and keep strict monitoring to follow it.
4. Guide should continuously monitor the progress of project development by conducting weekly scheduled meeting as per class time table and to keep regular interaction with the students for the completion of each phase of project in time.
5. He / she has to sign in the students' project diary after every interaction on that particular day.
6. He / she has to maintain record of all meetings, discussions, suggestions, contributions and roles played by each member of the team as an individual and in a team in his / her project record notebook.
7. Guide has to motivate the students to take part in intercollegiate, State level and National level project competition.
8. Guide has to encourage the students to publish research paper in journal or conference and help in writing research paper.
9. Guide has to provide the project status and other details of project to project coordinator, as and when asked by him / her.
10. Guide has to play a role of GFM (mentor) of project students and provide them moral, academic and placement support and guide them in choosing their career path.
11. Guide has to help the students in campus placement activity by practicing the commonly asked questions on project in the interview.
12. Guide has to map project activities with POs and PSOs and find out attainment of students.
13. Guide has to monitor the students' progress and has to assess and evaluate the students performance in unbiased manner in all internal and external project review presentations.
14. Guide has to keep himself / herself updated in guiding the project activity for the betterment of students as well as his / her own progress.

Responsibility of Student as a Team Member

1. Students have to weekly interact with the guide in a slot provided for seminar work as well as for project work as per the class timetable.
2. Students have to maintain a common project diary for project work. However they can also maintain their own project diary individually for project work.
3. Students have to bring the project diary for each meeting with guide. Also students have to write down the tasks allotted by guide and summary of discussion with guide in the diary during the meeting only. Also they have to take sign of guide below it.
4. Students have to show the project diary to project coordinator once in a month. (one every 4th Saturday).
5. The project diary should be produced at the time of all discussions, presentations and internal and external examinations.
6. The project diary must be submitted to project coordinator/ guide/ department / college after successful examination at the end of year.
7. Students have to follow all deadlines of project activities and submit all required documents strictly as per prescribed formats.
8. Students have to follow all the guidelines from University syllabus for writing project reports at the end of both the semesters.
9. Students have to strictly follow the project academic calendar effectively to complete the project work in time.
10. Students have to submit soft copies of all internal review presentations as well as soft copy of project stage-I report, final project report & short video on project work at the time of respective presentation.
11. Students have to get checked project report from the guide and after guide's approval only they can give it for binding.
12. Number of copies of project report to be submitted are = no of students + guide + department library. In case of industrial project, one copy of project report should be submitted to industry guide.
13. In project report writing, students have to maintain consistent tense and passive voice (eg :was done / has been done).
14. After the final viva-voce of project work, all students have to submit the feedback to the project coordinator via mail in the standard format provided.
1. Any problems / conflict encountered in conducting the project, should be brought to the attention of the guide by students, as soon as possible after they occur so that remedial action can be taken immediately.

Responsibility of Project Coordinator

1. Project coordinator has to conduct meeting of all previous AY project guides in June 3rd week or Dec 3rd week, (depending on branch) every year to discuss last years constraints / shortfalls of project activities / any suggestions to improve the project activity for next AY.
2. He / she has to give a presentation for all TE students in June 3rd week or Dec 3rd week, (depending on branch) every year to give information about final year project (domains, concerned industries for job opportunities, faculty and module coordinators details, guidelines about forming project batches, selecting guide, searching project topic etc).
3. Project coordinator has to allot minimum one project batch to every faculty, irrespective of their experience. Remaining batches to be allotted as per the faculty interest in consultation with HoD.
4. He / she has to allot the project topic and project guide to all project batches as per the choices received from students and details received from the module coordinators, without any conflict and friction.
5. He / she has to maintain effective communication with all project guides, project students as well as with all module coordinators (via mail, over phone and in person).
6. He / she has to display important notices on project notice board about project activities.
7. He / she should organize all internal and external project review / examination presentations smoothly.
8. Project coordinator has to organize project exhibition / project competition / poster presentation in March last week, every year.
9. He / she has to arrange for short video recording of project event (2-3 mins) and forward it to FE, SE and TE students whatsapp group to motivate the junior students for making project activity more effective.
10. Project coordinator has to prepare tentative academic calendar of all reputed National level and International level project competitions happening through out the year based on earlier events. He / she has to motivate the students to participate in such project competitions.
11. Project coordinator has to prepare a booklet of abstracts of all projects completed during academic year after the submission of project reports by all project batches.

12. After the final viva-voce of project work (in June), project coordinator has to get online feedback from the students to improve the next year project planning and implementation.
13. Project coordinator has to take written feedback from external examiners on quality of project in the standard format, after the viva-voce.
14. Project coordinator has to submit MoM and brief reports of meetings / sessions held with students / faculties to HoD within 3 days from that activity.
15. Project coordinator has to maintain all necessary documents of project activity process.
16. Project coordinator has to develop digital contents of necessary data of project to upload on Moodle.

Responsibility of HoD towards Project Activity

1. HoD should appoint project coordinator based on following considerations :
 - i) More teaching / industrial experience.
 - ii) Interest / willingness / initiative approach
 - iii) Good administrative skill
 - iv) Previous performance
 - v) Good behavior with students
 - vi) Need of department
2. HoD should not change the portfolio of project coordinatorship of a faculty for minimum 3 years, unless and until genuine difficulty.
3. HoD has to support project coordinator to run the project activity smoothly through out the year.
4. HoD has to see that there should be a good synchronization between project coordinator and seminar coordinator, as both the activities run hand in hand and their outcomes are to be measured at programme level.
5. HoD has to give the final decision in case of any issue / conflict between project guide, project coordinator, such as allotment of guide, selection of project etc.
6. HoD has to give one technical asst / lab asst to project coordinator to assist him / her in all administration tasks of project work through out the year.

Project Activity and Process (AY 2022-23)

The project activity is an essence of all engineering graduate attributes learned in the entire program. The identification of the project topic begins with the mentoring session by the Project coordinator for TE students in 1st semester ie in June 3rd week or 2nd semester ie in Dec 3rd week (depending on branch). The importance and significance of capstone project activity is explained and also the guidelines for selection of project topic are given by the project coordinator in his presentation for the students. The allocation of project guide is done on the basis of expertise of teacher, choice of students group and the demand of the selected project title. It is preferred to select an innovative idea as a solution for a complex problem identified in a society, industry related to particular discipline or an interdisciplinary problem in other engineering disciplines. Following table gives detailed process for each project activity. The responsible person for each project activity is also mentioned along with the timeline.

Sr. No	Project Activity	Process	Responsible person & Schedule
1	Project coordinator has to conduct meeting of all previous AY project guides to take suggestions to improve the project activity for next AY.	<ol style="list-style-type: none"> 1. Project coordinator will communicate to all project guides 8 days before the scheduled date of meeting. 2. Project guides will bring their points / the shortfalls in the project activity, observed time to time during last AY. (should have noted down in their project record notebook). 3. Project coordinator will put forth the suggestions given by external examiners of earlier AY year to incorporate for next project batches, if feasible. 4. Project coordinator will read important feedback of last year students on project activity and will discuss it for betterment of project activity. 5. A thorough and healthy discussions should be held in the meeting to improve the project activity for coming batches. 6. Project coordinator will inform module coordinators to conduct brain storming session of their respective course coordinators on project topics in the coming week. 7. Project coordinator will submit MoM to HoD within 3 days after the meeting. 	Project Coordinator (3 rd week, June 21 or Dec 22)
2	Project coordinator has to conduct a session of all TE students on	<ol style="list-style-type: none"> 1. Project coordinator will send notice to all TE students as well as to all module coordinators, including seminar coordinator to attend his / her presentation (online or offline mode). 	Project coordinator (3 rd week,

<p>“project activity details”, (offline or online)</p>	<p>2. Project coordinator has to prepare a detailed presentation, which should include:</p> <ul style="list-style-type: none"> i) Names of major domains (ie modules) with names of module coordinators, name of seminar coordinator. ii) Names of prominent industries (domain wise) & job opportunities in it due to concerned project. iii) Names of all faculties with their domain expertise. iv) Names of reputed project competitions, their themes floated during last 2-3 years, benefits of participation in it and awards won by earlier project batches, if any. v) Analysis of last AY projects category wise (In-house / Industry, lab development, domain wise, society oriented, agricultural based, funded by external agencies (DST, BCUD etc), vi) Guidance about “how to form project batch and how to search project topic”. vii) How to search for academic research papers on the topics (in which they are interested) on internet by referring the renowned publishers such as Elsevier, Tailor & Francis, Springer, Web of Science, Google Scholar, IEEE, Research Gate, SciELO, Wiley, Pro-Quest, Pub-MED, JSTOR etc. viii) Importance of laptop (or PC) for carrying out project activities, budget for self funded project. ix) Becoming member of students clubs (in the deptt or interdisciplinary), relevant to project domain. x) List of electives-I, II, II, IV in BE sem-I & II related with project domains and students’ interest. xi) Brief information about project assessment & evaluation (internal & external) at various presentation stages along with rubrics information. xii) Selection of seminar topics relevant to proposed project topic. xiii) Importance of regular use of project diary. ix) Use of project handbook. <p>3. Project coordinator will give responsibility of taking students attendance, photos of the session & other necessary arrangement to lab asst to maintain it as a record.</p> <p>4. Project coordinator will make appeal to students to visit the projects completed by earlier batches (kept in project lab / resp. subject lab) and go through project reports kept in department library.</p> <p>5. All module co-ordinators and faculty club incharges will attend the session.</p> <p>6. Project coordinator will form a group of mail-IDs of all TE students within 3 days after the</p>	<p>June 21 or Dec 22)</p>
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		<p>presentation. (Class coordinators will assist to him / her)</p> <p>7. Project coordinator will mail list of domain wise prominent industries, list of module coordinators & faculties with domain expertise, sample rubrics, project registration format, project handbook & project diary to all TE students group within 7 days from presentation. Also same will be put on project NB.</p> <p>8. Project coordinator will submit report of presentation to HoD within 3 days after the meeting.</p>	
3	<p>Students have to start forming batches and start searching project topics in their interested domain</p>	<p>1. Students will contact like minded classmates / batchmates (same div or different div) to form the project batch of 4 students. (Batch size : as per Univ guidelines)</p> <p>2. A batch / students will start searching project topic as per the guidelines given in the project activity session, conducted by project coordinator.</p> <p>3. If students are having any idea in their mind, they will take guidance of concerned module coordinator or course coordinator to check the feasibility of converting that idea into project work.</p> <p>4. A batch / students can extend their mini project activity / PBL activity into capstone project (final year project).</p> <p>5. A batch / students will visit industry to get the industrial project, if they are having contact / relations in the industry. (official permission letter requesting for project work will be provided by project coordinator).</p> <p>6. It is mandatory for all students to form the batches and search at least three project topics on their interested domain and submit it to the concerned module coordinator in the standard format provided to them before the 5th July 21 or 5th January 2022.</p> <p>7. A batch can mention a proposed name of guide in the format, whom they wish to take as a guide.</p> <p>8. Project batches will submit the proposed project topics and other details to module coordinators by 5th Jan 2021.</p>	<p>Students (4th week, June 21 or Dec 22)</p>
4	<p>Module coordinators have to conduct brain storming session of respective course coordinators to discuss about project topics for in-house and from industry.</p>	<p>1. Every module coordinator will conduct a brain storming session of their respective course coordinators within a week from attending the presentation of project coordinator.</p> <p>2. In the session, module coordinator will provide information on "how to search academic research papers on internet by referring the renowned publishers such as Elsevier, Tailor & Francis, Springer, Web of Science, Google Scholar, IEEE, Research Gate, SciELO, Wiley, Pro-Quest, Pub-MED, JSTOR etc. They can also refer to renowned Journal Indexing database such as Scopus or SCI.</p> <p>3. In the session module coordinator will also guide how to use other means to search the</p>	<p>Module coordinator (4th week, June 21 or Dec 22)</p>

		<p>project topics.</p> <p>4. Course coordinators will go through all titles of journal papers / articles and note down interested papers related to that particular module. Download / scan / take photos of interested papers. Check the feasibility of project work based on that paper. (refer Annexure-I for feasibility parameters).</p> <p>5. Course coordinators will search from the syllabus minimum 3 topics, on which lab development project are possible. Alternatively course coordinators to think on possibility of projects by utilizing the existing lab equipments. (retrofitting / modification / attachment / using IoT / using micro-processor / using AI / simulation etc).</p> <p>6. Course coordinators will search on internet the themes of project competition, floated during last 2-3 years by organizers, such as KPIT Sparkle, Smart India Hackathon etc to search the project topics.</p> <p>7. If course coordinator is pursuing Ph.D., he / she can give the project topics from the Ph.D. work.</p> <p>8. Course coordinators will visit the industries, within 2 weeks (if not visited during last sem / AY) to get the industry sponsored projects.</p> <p>9. Course coordinators will submit minimum 3 project topics to module coordinator within a week from the date of meeting conducted.</p> <p>10. Each module coordinator will write MoM and submit to project coordinator.</p>	
5	Course coordinators have to mail project topics & other details to module coordinators	<p>Course coordinators will submit following data to module coordinators (within a week from the date of brain storming session, conducted by module coordinator). (refer Annexure-II).</p> <p>1. Names of minimum 3 project topics including category of project, scope of project written in one paragraph, facilities required for project work, tentative project cost and name of industry (in case of industrial project) etc.</p> <p>2. Details of journal papers referred (in the format of standard references, as written in project report).</p> <p>3. Names of themes of different project competitions, searched and studied.</p> <p>4. Names of industries visited, if any.</p>	Course coordinators (1 st week, July 21 or Jan 22)
6	Students / Project batches have to submit / mail project topics & other details to module coordinators	<p>Project batches will submit to module coordinators (by 5th July 21 or 5th Jan 2021) : (refer Annexure-II).</p> <p>1. Name of minimum 3 project topics including category of project, scope of project written in one paragraph, facilities required for project work, tentative project cost and name of industry (in case of industrial project).</p> <p>2. Details of journal papers referred (in the format of standard references, as written in</p>	Students (1 st week, July 21 or Jan 22)

		<p>project report) to search the project topic.</p> <p>3. Names of themes of different project competitions, searched and studied.</p> <p>4. Name of mini project / PBL topic completed during earlier semesters and which they wish to extend as a final year project</p> <p>5. Names of industries visited, if any, to get the project.</p> <p>6. Respective TE class coordinators / division coordinators will take follow up with TE students to submit this details to module coordinator by each and every TE student in time.</p>	
7	Module coordinators have to mail list of proposed project topics to project coordinator.	<p>1. Module coordinator will go through all project topics and other details, received from respective course coordinators. In case of any discrepancy, he / she will get clarification from respective course coordinator.</p> <p>1. Module coordinator will go through all project topics and other details, received from project batches. In case of any discrepancy, he / she will discuss with the students and get clarification.</p> <p>2. Module coordinator will submit all the project details received from course coordinators as well as from project batches in the standard format to the project coordinator by 10th July 21 or 10th Jan 2022. (refer Annexure-III).</p>	Module coordinator (2 nd week, July 21 or Jan 22)
8	Project coordinator has to distribute / allot the proposed project topics and guides to all project batches and have to mail the list of project distribution to all TE students and faculties.	<p>1. Project coordinator will check whether all module coordinators have mailed the list of proposed project topics with other details in the standard format to him / her. In case of any discrepancy, he / she will contact respective module coordinator. (refer Annexure-III).</p> <p>2. Project coordinator will finalise the project topics and distribute those to project batches, based on the data received from all module coordinators. He / she also allot the project guide to project batches relevant to project topics. He / she will involve module coordinators in finalizing the proposed project topics and project guides, if required.</p> <p>3. Project coordinator will ask the faculty his / her choice, if more than one batches have shown interest in the same project, offered by him / her.</p> <p>4. With the help of all TE class coordinators, project coordinator will check whether all TE students have formed the project groups and have been allotted the proposed project topic and guide.</p> <p>5. Project coordinator will collect the names of non responded students from TE class coordinators and will form the project batches of such students, allot them project and guide as per his / her logic based on the proposed project topics received from faculties.</p> <p>6. Project coordinator will mail the complete list of proposed project distribution to all TE students as well as to all faculties.</p> <p>7. Project coordinator will write dead line in the mail for TE students to submit if any query or</p>	Project coordinator (3 rd week, July 21 or Jan 22)

		discrepancy in the allotment of project topic and guide. 8. Project coordinator will also display the list of project distribution on project NB.																			
9	Students have to approach project coordinator, in case of any discrepancy in allotment of proposed project topic & guide to their project batch.	1. Students will submit in writing to project coordinator, if they found any discrepancy in allotment of proposed project topics, guide names and project batches. 2. In case of any type of conflicts, HoD will give the final decision.	Students (3 rd week, July 21 or Jan 22)																		
10	Project coordinator has to mail and also display on project NB - the final list of project batches along with proposed project topics and guides' names in the standard format.	1. Project coordinator will give unique batch number to each project group in the sequence of seniority of faculty, written in the muster. (Sample batch no 222301 for AY 22-23). 2. Project coordinator will give instructions to all TE class coordinators to change the division of the students, if all 4 students from same batch are not in one division, if necessary. 3. Project coordinator will submit list of project distribution in the following format to the HoD and after approval from HoD, he / she will mail this sheet to all students and faculties. It will also be displayed on project NB. <table border="1" data-bbox="680 767 1760 906"> <thead> <tr> <th>Sr. No</th> <th>Roll No</th> <th>Name of student</th> <th>Mobile No of student</th> <th>Batch No</th> <th>Project Topic</th> <th>Name of guide</th> <th>Mobile No of Guide</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Sr. No	Roll No	Name of student	Mobile No of student	Batch No	Project Topic	Name of guide	Mobile No of Guide	Remarks										Project coordinator (4 th week, July 21 or Jan 22)
Sr. No	Roll No	Name of student	Mobile No of student	Batch No	Project Topic	Name of guide	Mobile No of Guide	Remarks													
11	Project guide has to allocate 4 different topics for seminar, based on project topic and give all instructions about seminar activity	1. All students from a project team will meet respective guide in the slot provided for seminar in their class time table. 2. Guide will allocate 4 different seminar topics by discussing with the students related to their project topic and will tell names of journals to refer for searching relevant material for seminar topic. 2. Guide will explain outline of seminar which includes introduction of topic, literature review, main text related to topic, conclusion, references etc.	Project guide (1 st week, Aug 21 or Feb 22)																		
12	Every project batch has to meet weekly their respective guides as per class timetable to get	1. Every project batch will meet their guide during the slot provided for seminar work, as per class time table and interact with guide weekly to make progress on seminar. 2. Seminar coordinator (ie project coordinator) will look after the seminar activity till it gets completed.	Students (every week in Aug & Sept 21 or Feb &																		

	guidance about seminar work.		March 22)
13	Students have to prepare presentation & seminar report & get it checked from guide	<ol style="list-style-type: none"> 1. Every student will prepare seminar report and presentation based on the guidelines given in University syllabus and will show it to guide. 2. Guide will check and correct the seminar report and presentation submitted by every student. 	Project guide (2 nd week, Sept 21 or Mar 22)
14	Guides have to do the seminar assessment and evaluation of their students through internal / external presentation of seminar.	<ol style="list-style-type: none"> 1. Guide will do the assessment and evaluation of seminar report. 2. Guide will do the assessment and evaluation of seminar presentation by student with the help of internal / external examiner , as per the criteria, mentioned in the University syllabus. 3. All students will submit their seminar reports in the form of soft copy and hard copy (spiral bound) to seminar coordinator and to respective guide. 	Project guide (3 rd week, Sept 21 or Mar 22)
15	Guide has to restart project work & conduct meeting of students to finalise project title and scope of project and will discuss about next AY project activity calendar.	<ol style="list-style-type: none"> 1. Guide will restart project work and conduct a meeting of his / her project students after completing seminar delivery. 2. Guide will mail project academic calendar & bar chart format. 3. Guide will explain scope of project work and will guide how to write synopsis, objectives, methodology and what sort of conclusion is expected from the project work etc. 	Project guide (4 th week, Sept 21 or Mar 22)
Break for TE-I or TE-II University exam (1st week of Oct to 2nd week of Dec 21 or 1st week April to 2nd week June 2022)			
16	Project coordinator has to prepare project academic calendar along with its bar chart to monitor the project activities through out the AY.	<ol style="list-style-type: none"> 1. Project coordinator will list out all the activities happening through out the AY such as submission of synopsis, 1st internal project review, submission of 1st stage project report etc. and prepare its academic calendar. 2. Project coordinator will refer institute level academic calendar to avoid the overlapping of events / examinations / presentations. 3. Project coordinator will prepare bar chart based on project academic calendar and get it approved by HoD. 4. He / she will mail project academic calendar and bar chart to all project guides and to all BE students. Also will display on project NB. 	Project coordinator (2 nd week June 22)
17	Regular weekly meetings of students with guide, as per class timetable	<ol style="list-style-type: none"> 1. Guide will keep record of attendance of all 4 students in his project record notebook. 2. Guide will fill students monthly attendance report online / offline by 5th date of every month in both the semesters. 3. Guide will sign in students project diary in every week after students write their 	Project guide (Every week As per TT)

		discussions / tasks / work completed in last week. 4. Guide will note down important points in his / her project record notebook.	
18	Confirmation of project title along with objectives, methodology, scope of project, expected conclusion and bar chart	1. Guide will discuss about objectives, methodology, scope of project and synopsis by showing 2-3 good sample project reports. 2. He / she will finalise the title of the project from discussions (if not finalized earlier). 3. He / she will explain how to prepare bar chart for project activities & will help them in improving it. 4. He / she will give deadline to submit synopsis and bar chart by next week meeting	Project guide (1 st week July 2022)
19	Submission of project synopsis and bar chart by students to project coordinator after getting approval sign of guide.	1. Students will take print out of synopsis and bar chart (standard format will be provided by guide), take guide approval sign on it and submit hard copies to project coordinator as well as to guide. 2. They will also mail approved soft copy of synopsis and bar chart to their guide and project coordinator.	Students (2 nd week July 2022)
20	The Project coordinator, in consultation with HoD has to form a project review committee for internal assessment of project work	1. Project coordinator will form a Project Review Committee (PR Committee) by including names of all module coordinators or their representatives, in consultation with HoD, at least one week before the 1 st internal project review presentation. 2. Project guide of respective project batch will be one committee member of PR committee, by default at the time of presentation. 2. Project coordinator will communicate to all PR committee members that they would be working as PR committee members for all internal review project presentations during that AY.	Project coordinator (3 rd week July 2022)
21	1 st internal project review presentation (refer assessment & evaluation guidelines)	1. Project coordinator will prepare time table of 1st internal review presentation for all batches. 2. He / she in consultation with HoD will form Project Review Committee (same committee will work for all internal reviews). Committee should include all module coordinators or their representatives. 3. Will make all arrangements of review presentations as follows – seating arrangement, allocation of lab asst, LCD projector, students attendance sheet, rubrics of said exam, students assessment sheets, synopsis and bar chart of students, 4. He / she will collect and keep all assessment sheets in one file.	Project coordinator (4 th week, July 2022)
22	Project coordinator has to reform few project	1. After SPPU result declaration, project coordinator will ask the list of TE YD students from department.	Project coordinator

	batches based on YD students at TE SPPU result.	2. He / she will ask the names of TE YD students who are taking provisional admission to final year, from office. Based on YD students and provisional admission data, project coordinator will reallocate the students batches.	(1 st week Aug 2022)
23	Simulation / analysis / numerical treatment / FEA / CFD / selection of suitable mechanism etc.	Guide will check following things from students task : a) which software is used for simulation / computation / numerical treatment / modeling / analysis etc. b) recommend students not to use piratedsoftwares. c) whether students are following the correct procedure	Project guide (1 st to 3 rd week, Aug 2022)
24	Guide has to check whether students have considered factors related to environment, safety and ethics in their project.	Guide will check from the discussions with the students 1. whether environmental considerations are required in the project work? 2. what safety measurements are required to follow in the project work? 3. what are the ethical considerations in the project work? Also are students following ethical practices in doing project work?	Project guide (1 st to 3 rd week, Aug 2022)
25	Design of parts / selection of parts / part drawing / assembly drawing / use of standards	Guide will check from the discussions with the students : 1. which design data book / handbook / reference book etc, students are referring to design the parts?? 2. which modeling softwares are used to draw part and assembly drawings? Whether all dimensions and required tolerances are given in the drawings, prepared? 3. whether material selection & design calculations of the parts have been verified by the students? 4. which IS standards are used in design? 5. which parts are directly selected? on what basis? 6. whether students have referred hints / suggestions from the relevant research papers?	Project guide (2 nd week Aug to 1 st week Sept 2022)
26	2 nd internal project review presentation (refer assessment & evaluation guidelines)	Same process parameters as mentioned in internal project 1st review are to be checked.	Project coordinator (2 nd week, Sept 2022)
27	Preparing list of items with specifications (bought out / fabricated) [bill of material] and do the cost analysis	Guide will check from the discussions with the students 1. bill of material required for project work is prepared correctly. 2. will check the list of suppliers / shops / fabricators, from where the parts are to be purchased or getting manufactured. 3. what references students have used to finalize these suppliers / fabricators.	Project guide (1 st & 2 nd week, Sept 2022)

	(material / fabrication / bought out / total)	3. will check costing details and total cost considered correctly? whether saving in cost possible w/o hampering the quality of parts?	
28	Submission of project stage-I report to guide	<p>Guide will check from the discussions with the students</p> <ol style="list-style-type: none"> 1. while writing project stage-I report all the guidelines mentioned in the syllabus are followed? 2. whether all chapters are thoroughly written with full understanding in the report? (introduction, literature review, objectives, methodology, analysis / modeling, design considerations, drawings, bill of material, cost analysis) 3. whether all project activities are completed as per bar chart or any activity is lagging and requires modification in bar chart? 4. Guide will give guidelines of preparing presentation for project stage-I exam. 	Project guide (3 rd week, Sept 2022)
29	Preparation of presentation for University project stage - I exam.	<p>Guide will check from the presentation shown by students</p> <ol style="list-style-type: none"> 1. all important contents related to project are covered in the presentation. 2. planning of distribution of topics to be presented by 4 team members. 3. smart art work, colour combinations, visibility of text & diagrams in the ppt are considered. 4. probable questions (along with answers) to be asked by external examiners. 5. trial of total time required for presentation and practice of presentation in a team. 	Project guide (4 th week, Sept 2022)
30	University project stage-I exam	<ol style="list-style-type: none"> 1. Will prepare 1 day / 2 days time table of project stage exam-I for all batches. 2. Will get confirmation from external examiners availability, date and timing. If any discrepancy, then to resolve it by contacting project chairman 3. Will make all necessary arrangements for conduction of presentation as follows – seating arrangement, allocation of lab asst, LCD projector, students attendance sheet, rubrics of said exam, students assessment sheets etc. 4. Will inform guides and students about exam schedule via hard copy as well as on whatsapp groups. 5. Will inform the students to come in college uniform only with I card. 6. Will remind students to bring project diary and project stage-I report at the time of presentation. 7. Will get filled all marks from their respective guides on University portal and check it thoroughly. 8. Will get submitted project stage-I reports of all students. 	Project coordinator (1 st week, Oct 2022)

Break for BE-I University exam (3rd week Oct to 2nd week Dec 2022)			
31	Finalisation of suppliers / manufacturers / traders etc for purchasing, manufacturing parts / items.	<ol style="list-style-type: none"> 1. Will visit the fabricator / supplier / shop for getting confirmation and to motivate the students to get smooth and effective work done by them. 2. Will check the delivery time of items purchased / fabrication time required. 3. Will check payment terms and conditions and accordingly discuss with the students. 4. If few parts are manufactured in college workshop, check availability of machines, plan and do the work under the guidance of instructors with safety. 	Project guide (3 rd & 4 th week, Dec 2022)
32	Manufacturing and assembly	<ol style="list-style-type: none"> 1. Students will see the manufacturing of parts (if permitted) and get understood the whole process of manufacturing of parts. 2. Which machines are used for manufacturing? What are the specifications of machines? What operations are carried out in what sequence? 3. What measuring instruments are used to check the dimensions? Their specifications, least count etc. 3. For assembly of parts what are the different joining processes are used? What are the reasons behind selecting the joining processes? 4. What are the geometric and dimensioning tolerances required for manufacturing and assembling process? How are they achieved? 5. Get to know details about ISO 9001, (if certified), applicable to that industry / manufacturer / fabricator. 	Project guide (4 th week, Dec to 2 nd week Jan 2022)
33	3 rd internal project review presentation (refer assessment & evaluation guidelines)	Same process parameters as mentioned in internal project 1st review are to be checked.	Project coordinator (3 rd week Jan 2022)
34	Experimentation / trial / testing	<ol style="list-style-type: none"> 1. Venue of experimentation and testing? 2. Prototype / model is working properly? 3. Desired output is getting from the functioning of experimental set up? 4. Readings are recorded and analyzed to get expected conclusion? 5. Any modification / improvement / changes are required, if not working properly. 	Project guide (3 rd & 4 th week, Jan 2022)
35	Failure analysis and modifications, improvement, if applicable	<ol style="list-style-type: none"> 1. Type of failure occurs - Prototype / model not working? ; some part is breaking continuously? ; not getting expected readings? ; not getting desired motion? ; etc. 2. Find out fault. 3. Check design parameters and calculations. 	Students and project guide (3 rd week Jan to 1 st week Feb)

		4. Take advice of expert faculty in that domain or industry person or interested, practical minded colleague.	2022)
36	Final testing with results	<ol style="list-style-type: none"> 1. Students will write all readings in project diary. 2. Students will record the working of prototype / model / functioning etc and preserve it. 3. Students will write details / specifications of the measuring instruments, used for taking readings of various parameters. 4. They will make analysis from the readings taken to write the conclusion. 5. If analysis from the readings is not giving expected conclusion, students have to write its explanation in the project diary. 	Students (3 rd & 4 th week Feb 2022)
37	Use of modern technology such as app development, IoT	<ol style="list-style-type: none"> 1. Any use of latest technology or interdisciplinary skill is possible to incorporate in the project work? Such as use of Internet of Things, Artificial intelligence, app development, use of programming language. 2. Students will draw graphs in excel format by using different colours and labeling all the data shown in the graphs. 3. In preparing ppts, students can use smart art to make the presentation more effective. 4. Students will make short video (not more than 3 mins) to explain their overall project work. Also they can upload it on YouTube. 	Students (4 th week Feb & 1 st week March 22)
38	Results, discussions & conclusion	<ol style="list-style-type: none"> 1. Students will write detailed analysis from the readings taken, for results and discussion chapter of project report. 2. Students will write readings in tabular form, draw graphs from the readings, compare the data. (if applicable) 3. Students will draw correct conclusion from the results and discussions of the experimentation. 4. In the scope of future work, students will write the constraints / limitations of the existing project work. They will also include what sort of the future work to be carried out further. 	Students (2 nd week Mar 2022)
39	4 th internal project review presentation (refer assessment & evaluation guidelines)	Same process parameters as mentioned in internal project 1st review are to be checked.	Project coordinator (3 rd week Mar 2022)
40	Project competition / poster presentation competition (deptt level)	<ol style="list-style-type: none"> 1. Project exhibition / project competition / poster presentation will be organized by project coordinator in March last week. 2. It should be made mandatory for all project batches to participate in the said event. 3. If any batch cannot participate due to official reason (such as outdoor project competition at the same time), they have to submit soft copy of poster based on their project work, 	Project coordinator (4 th week Mar 2022)

		<p>before they attend the competition.</p> <p>4. If any batch remains absent for personal reason without prior written permission, their final TW marks are to be reduced by 10 %.</p> <p>5. Project coordinator will arrange for video recording of project event and forward it to FE, SE and TE students' whatsapp group to motivate the junior students for making project activity more effective.</p>	
41	Report writing	<p>1. Students have to follow all the guidelines, mentioned in the University syllabus about project report writing.</p> <p>2. Students have to read Annexure-I of JSPM project handbook about organization of all chapters in the report as well as sample chapters mentioned over there.</p> <p>3. Students will start writing of few initial chapters of project report from January month.</p> <p>4. Students should get checked project report chapter wise from guide as and when it will be completed. (in soft copy).</p>	Students (1 st week Jan to 4 th week Mar 2022)
42	Checking of project write up by guide	<p>1. Guide will check project report chapter wise as and when submitted by students for checking.</p> <p>2. He / she will explain the major corrections in the report across the table (face to face), instead of sending corrections in soft copy.</p>	Project guide (2 nd week Jan to 1 st week April 2022)
43	Submission of short video recording based on total project.	<p>1. Students will make short video (not more than 3 mins) to explain their overall project work and submit it to project coordinator after getting approved from the guide.</p> <p>2. Students can upload the said video on YouTube</p> <p>2. Project coordinator will keep all videos module wise in the digital section of department library.</p>	Students (1 st week April 2022)
44	Submission of project report	<p>1. After completion of project report checking by concerned guide, students will make 6 copies (7 copies in case of industry sponsored project) of project report (hard bound), take signature of all authorities mentioned in the guidelines and submit 2 copies to the guide.</p> <p>2. Guide will send 1 copy of project report to the department library.</p>	Students and project guide (1 st week April 2022)
45	Late submission of project report	<p>1. Guide will note down the reason of late submission of project report by the students.</p> <p>2. According to the genuineness of the reason, guide will take action.</p>	Project guide (2 nd week April 2022)
46	Preparation of booklet of abstracts of all project reports	<p>1. Project coordinator will send mail / notice to all project batches to submit their one page project abstract (in soft copy) within 3 days from the date of mail received.</p> <p>2. Project coordinator will collect abstracts from the project guides in soft copy, in case project batches not responded / submitted in time.</p> <p>3. Project coordinator will edit abstracts received, if not similar, take print outs and prepare a</p>	Project coordinator (2 nd week April 2022)

		<p>booklet (spiral bound) of all abstracts and keep it in department library.</p> <p>4. He / she will mail soft copy of abstract booklet to all project guides for reference and to avoid plagiarism for next year project batches.</p> <p>5. Project coordinator will prepare feedback form to take feedback from external examiners at the time of final viva-voce.</p> <p>6. Project coordinator will prepare feedback form to take feedback from all final year students on project activity, will mail it to them after the final viva-voce..</p>	
47	University final viva voce	<p>1. After receiving the mail from University regarding conduction of project viva-voce, project coordinator will contact all external examiners to conduct exam on mentioned dates. (external examiners are from other University / industry).</p> <p>2. If external examiners shows his / her inability to conduct exam, contact University project chairman and take new examiners name. Contact them.</p> <p>3. After getting confirmation from external examiners prepare 1 day / 2 days time table of final viva of project exam for all batches.</p> <p>4. Display project exam time table on NB, send it on students' whatsapp groups as well as faculties whatsapp groups.</p> <p>5. Make all necessary arrangements for conduction of presentation as follows – seating arrangement, allocation of lab asst, LCD projector, students attendance sheet, rubrics of said exam, students assessment sheets etc.</p> <p>6. Inform the students to come in college uniform only with I card.</p> <p>7. Remind students to bring project diary and project report at the time of presentation.</p> <p>8. Get filled all marks from their respective guides on University portal and check it thoroughly.</p> <p>9. Preserve all internal and external marks of the projects in the soft copy.</p>	<p>Project coordinator (4th week May & 1st week June 2022)</p>
48	National level project competitions	<p>1. Based on the earlier data base, project coordinator will prepare tentative calendar of all reputed National level and International level project competitions happening through out the year. Inform to all TE and BE students as well as all faculties.</p> <p>2. He / she will display on NB last 3 years themes of these competitions to get an idea of topics for project competition.</p> <p>3. Should send the notice to students (through whatsapp groups as well as on NB) to give their names to project coordinator for participation in such competition, within 15 days after reading the notice.</p>	<p>Project coordinator & guides (As per schedule)</p>

		<p><i>4. Inform the students as well as all project guides, the details of project competitions immediately after getting mails from respective organizers.</i></p> <p><i>5. Submit list of project batches with their guide name, participating in the project competition to HoD and Principal.</i></p> <p><i>6. Keep follow up with guides to complete all various tasks of project competition, before deadline. Guides will take follow up of their batch.</i></p> <p><i>7. After completion of competition, take written feedback from participants to improve the next year planning and implementation.</i></p>	
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Activity and Process of Project Batch Formation

As per the University guidelines project batch should consist of 4 students. Formation of project batch is very important activity, as all team members have to work together for more than one year with full coordination with each other to complete the project successfully. Project batch formation process starts during the 1st semester or 2nd semester of TE. Following table gives specific guidelines for formation of project batch and also mentions its process.

Sr. No	Activity	Process	Responsible person and Timeline
1	After attending the session on "project activity details" conducted by project coordinator in 3 rd week Dec 2020, TE students have to search project topic in the interested domain, form a batch of 4 students and will ask faculty of interested module for his / her guidance.	<p>1. Students will get following information from the presentation by project coordinator :</p> <p>i) Names of major domains (modules) with names of module coordinators.</p> <p>ii) Names of prominent industries (domain wise) & job opportunities in it due to concerned project.</p> <p>iii) Names of all faculties with their domain expertise.</p> <p>iv) Names of reputed project competitions, their themes floated during last 2-3 years, benefits of participation in it and awards won by earlier project batches, if any.</p> <p>vii) How to search for academic research papers on the topics, in which they are interested on internet by referring the renowned publishers such as Elsevier, Taylor & Francis, Springer, Web of Science, Google Scholar, IEEE, ResearchGate, SciELO, Wiley, ProQuest, PubMed, JSTOR etc.</p> <p>2. All TE students will receive mail from project coordinator which consists of information</p>	Project coordinator (3 rd week, June 21 or Dec 22)

		<p>on list of domain wise prominent industries, list of module coordinators & faculties with domain expertise & project handbook. They can also read it from project NB.</p> <p>3. Students will see the projects completed by earlier batches (kept in project lab / resp. subject lab) and will go through project reports kept in department library.</p> <p>4. Based on this input, students will start searching project topics.</p>	
2	<p>Students have to start forming batches and will start searching project topics in their interested domain</p>	<p>1. Students will contact like minded classmates / batchmates to form the project batch of 4 students.</p> <p>2. A batch / students will start searching project topic as per the guidelines given in the project activity session, conducted by project coordinator.</p> <p>3. If students are having any idea in their mind, they will take guidance of concerned module coordinator or course coordinator to check the feasibility of converting that idea into project work.</p> <p>4. A batch / students can extend their mini project activity / PBL activity into capstone project (final year project).</p> <p>5. A batch / students will visit industry to get the industrial project, if they are having contact / relations in the industry. (official permission letter requesting for project work will be provided by project coordinator).</p> <p>6. It is mandatory for all students to form the batches and search at least one project topic on their interested domain and submit it to the concerned module coordinator in the standard format provided to them before the 5th January 2021. (refer Annexure II).</p> <p>7. A batch can mention a proposed name of guide in the format, whom they wish to take as a guide.</p> <p>8. Project batches will submit the project topics and other details to module coordinators by 5th July 21 or Jan 22.</p>	<p>Students (4th week, June 21 or Dec 22)</p>
3	<p>Students / Project batches have to submit / mail project topics & other details to module coordinators</p>	<p>Project batches will submit to module coordinators (by 5th July 21 or Jan 22) :</p> <p>1. Name of minimum 1 project topic including category of project, scope of project written in one paragraph, facilities required for project work, tentative project cost and name of industry (in case of industrial project).</p> <p>2. Details of journal papers referred (in the format of standard references, as written in project report) to search the project topic.</p> <p>3. Names of themes of different project competitions, searched and studied.</p> <p>4. Name of mini project / PBL topic completed during earlier semesters and which they wish to extend as a final year project</p> <p>5. Names of industries visited, if any, to get the project.</p>	<p>Students (1st week, July 21 or Jan 22)</p>

		6. Respective TE class coordinators will take follow up with TE students to submit this details to module coordinator by each and every TE student in time.	
4	Module coordinators have to mail list of project topics to project coordinator.	<p>1. Module coordinator will go through all project topics and other details, received from respective course coordinators. In case of any discrepancy, he / she will get clarification from respective course coordinator.</p> <p>1. Module coordinator will go through all project topics and other details, received from project batches. In case of any discrepancy, he / she will discuss with the students and get clarification.</p> <p>2. Module coordinator will submit all the project details received from course coordinators as well as from project batches in the standard format to the project coordinator by 10th July 21 or Jan 22. (refer Annexure III).</p>	Module coordinator (2 nd week, July 21 or Jan 22)
5	Project coordinator has to mail the list of project distribution to all TE students and faculties after allotting the project guides to project batches for particular project topics.	<p>1. Project coordinator will check whether all module coordinators have mailed the list of project topics with other details in the standard format to him / her. In case of any discrepancy, he / she will contact respective module coordinator.</p> <p>2. Project coordinator will ask the faculty his / her choice, if more than one batches have shown interest in the same project, offered by him / her.</p> <p>3. Project coordinator will finalise the project topics and distribute those to project batches, based on the data received from all module coordinators. He / she also allot the project guide to project batches relevant to project topics.</p> <p>4. With the help of all TE class coordinators, project coordinator will check whether all TE students have formed the project groups and have been allotted the project and guide.</p> <p>5. Project coordinator will form the project batches of non responded students, allot them project and guide as per his / her logic based on the project topics received from faculties.</p> <p>6. Project coordinator will mail the complete list of project distribution to all TE students as well as to all faculties.</p> <p>7. Project coordinator will write dead line in the mail for TE students to submit if any query or discrepancy in the allotment of project topic and guide.</p> <p>8. Project coordinator will also display the list of project distribution on project NB.</p>	Project coordinator (3 rd week, July 21 or Jan 22)
6	Students have to approach project coordinator, in case of any correction / modification / changes in project topic and guide allotted to them.	<p>1. Students will submit in writing if they found any mistake in allotted project names, guide names and project batches.</p> <p>2. In case of any type of conflicts, HoD will give the final decision.</p>	Students (3 rd week, July 21 or Jan 22)

7	Project coordinator has to mail and also display on project NB the final list of project batches along with topics and guides' names in the standard format.	<p>1. Project coordinator will give unique batch number to each project group in the sequence of seniority of faculty, written in the muster. (Sample batch no 222301 for AY 22-23).</p> <p>2. Project coordinator will give instructions to all TE class coordinators to change the division of the students, if all 4 students from same batch are not in one division. (optional).</p> <p>3. Project coordinator will submit list of project distribution in the following format to the HoD and after approval from HoD, he / she will mail this sheet to all students and faculties. It will also be displayed on project NB.</p> <table border="1" data-bbox="707 453 1789 592"> <thead> <tr> <th>Sr. No</th> <th>Roll No</th> <th>Name of student</th> <th>Mobile No of student</th> <th>Batch No</th> <th>Project Topic</th> <th>Name of guide</th> <th>Mobile No of Guide</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Sr. No	Roll No	Name of student	Mobile No of student	Batch No	Project Topic	Name of guide	Mobile No of Guide	Remarks										Project coordinator (4 th week, July 21 or Jan 22)
Sr. No	Roll No	Name of student	Mobile No of student	Batch No	Project Topic	Name of guide	Mobile No of Guide	Remarks													
8	Project guide has to allocate 4 different topics for seminar based on project topic and give all instructions about seminar activity	<p>1. All students from a project team will meet respective guide in the slot provided for seminar in their class time table.</p> <p>2. Guide will allocate 4 different seminar topics by discussing with the students related to their project topic and will tell names of journals to refer to search material for seminar.</p> <p>2. Guide will tell outline of seminar which includes introduction of topic, literature review, main text related to topic, conclusion, references etc.</p>	Seminar / project guide (1 st week, Aug 21 or Feb 22)																		
9	Every project batch has to meet their respective guides weekly as per class timetable to get guidance about seminar & project work during their respective semesters.	Every project batch will meet their guide during the slot provided for seminar work, as per class time table and interact with guide weekly to make a progress on seminar.	Students (every week)																		

Activity and Process for Selection of Project

Selection of project topic depends on many factors including facilities available, interest and ability of students, problem solving attitude of students, expertise of faculty in searching good project in particular domain, time management, requirement of industry. Following table gives specific guidelines for selecting of project and also mentions its process.

Sr. No	Activity	Process	Responsible person and Timeline
1	Project coordinator has to conduct meeting of all faculties including all module coordinators.	1. Project coordinator will communicate to all faculties / project guides 8 days before the scheduled date of meeting. 4. Project coordinator will inform module coordinators to conduct brain storming session of their respective course coordinators on project topics in the next week. 5. Project coordinator will give guidelines to module coordinators about selection of project by each course coordinator.	Project Coordinator (3 rd week, June 21 or Dec 22)
2	After attending the session on “ project activity details ” conducted by project coordinator in 3 rd week June 21 or Dec 22, all TE students have to search project topic in their interested domain, as per the guidelines given.	<p>[A] From research papers :</p> 1. Students will search for academic research papers on the topics, in which they are interested on internet by referring the renowned publishers such as Elsevier, Taylor & Francis, Springer, Web of Science, Google Scholar, IEEE, ResearchGate, SciELO, Wiley, ProQuest, PubMed, JSTOR etc. They can also refer to renowned Journal Indexing database such as Scopus or SCI. (eg standard Journals such as International Journal of Refrigeration, Journal of sound and vibrations. Mechatronics Journal). 2. By referring such academic research papers, published in standard journals, students can get in innovative idea for their project work or they can carry out the similar work in the same domain by changing parameters or methodology etc. 3. They should check feasibility of such innovative ideas to convert into the project work or carrying out the similar project work in stipulated time period of 1 year and within the available facilities. (see the feasibility parameters given in Annexure I) <p>[B] Industrial project :</p> 4. Students will visit the industry, if they are having any contact or influence in the small scale / medium scale / large scale industry. 5. Industry may allow the students to work on their challenging problem faced by them in day to day routine such as improving productivity, small automation, machine condition monitoring,	TE students (3 rd week June 21 or Dec 22)

		<p>developing attachment, use of IIoT etc. (it is desirable to take one faculty with them to introduce the about college & deptt achievements.</p> <p>[C] From different project competitions :</p> <p>6. Students will search on Google - the themes of National level / International level / renowned project competitions, floated during last 2-3 years by organizers, such as KPIT Sparkle, Smart India Hackathon, Quest Ingenium, IT Olympiad, VishwakarmaChhatra award, Go carting etc.</p> <p>7. They will get an idea based on the same theme or different innovative theme for the the project work.</p> <p>8. Students will interact with the faculties, who have guided such types of projects in earlier competitions or have shown interest to guide such projects / competitions.</p> <p>[D] From NRDC (Ministry of Science & Technology, Govt of India) :</p> <p>9. From the section of "Technology Updates" "Success Stories", students can get idea of doing the project in any interested domain. (eg – A process of sugarcane juice clarification to obtain sulphurless sugar)</p>	
2	<p>Module coordinators will conduct brain storming session of course coordinators to discuss about project topics for in-house and from industry.</p>	<p>1. Module coordinator will tell names of standard journals related to the domain to all course coordinators. Course coordinators will search for academic research papers on the topics based on their module / domain on internet by referring the renowned publishers such as Elsevier, Tailor & Francis, Springer, Web of Science, Google Scholar, IEEE, ResearchGate, SciELO, Wiley, ProQuest, PubMed, JSTOR etc. They can also refer to renowned Journal Indexing database such as Scopus or SCI.</p> <p>2. Course coordinators will go through all titles of journal papers / articles and note down interested papers related to that particular module. Download / scan / take photos of interested papers. Check the feasibility of project work based on that paper. (see the feasibility parameters to check, given in Annexure I)</p> <p>3. Faculties will search on Google - the themes of National level / International level / renowned project competitions, floated during last 2-3 years by organizers, such as KPIT Sparkle, Smart India Hackathon, Quest Ingenium, IT Olympiad, VishwakarmaChhatra award, Go carting etc.</p> <p>4. Course coordinators will get ideas by studying the details of the projects from NRDC (Ministry of Science & Technology, Govt of India) from the section of "Technology Updates" and "Success Stories". (eg – A process of sugarcane juice clarification to obtain sulphurless sugar)</p> <p>5. Course coordinators / lab incharges will search from the syllabus and practicals, minimum 3 topics, on which lab development project are possible. They can also think on doing project from content beyond syllabus of that subject / lab work. Or course coordinators to think on</p>	<p>Module coordinator (4th week, June 21 or Dec 22)</p>

		<p>possibility of projects by utilizing the existing lab equipments. (retrofitting / modification / attachment / using IoT / using micro-processor / using AI etc). Thus minimum 3 project topics will be submitted by each course coordinator to module coordinator.</p> <p>6. Faculties will visit the industries, within 2 weeks (if not visited during last sem / AY) to get the industry sponsored projects.</p> <p>7. Example of selection of project for E&TC – should be related to real life applications in the field of Electronics and Telecommunication or investment of the latest development in a specific field of electronics or communication or signal processing or investigation of practical problem in manufacture and / or testing of electronics or communication equipments or the micro processor / micro controller based applications or software development project related to VHDL, communication, instrumentation, signal processing, and agricultural engg.</p>	
3	<p>Course coordinators have to mail project topics & scope of work to module coordinators in two categories: 1) industrial project 2) in-house project.</p>	<p>1. Each course coordinator will submit minimum 3 project topics to respective module coordinator.</p> <p>2. Project topic will consist of following information :</p> <p>i). Names of minimum 3 project topics along with a scope of project written in one paragraph.</p> <p>ii) Titles of journal papers referred (in the format of standard references written in project report).</p> <p>iii) Names of themes of different National level project competitions - searched and studied.</p> <p>iv) Names of industries visited, if any.</p>	<p>Course coordinators (1st week, July 21 or Jan 22)</p>
4	<p>Students / Project batches have to submit / mail project topics & other details to module coordinators</p>	<p>Project batches will submit to module coordinators (by 5th July 21 or Jan 22) :</p> <p>1. Name of minimum 1 project topic including category of project, scope of project written in one paragraph, facilities required for project work, tentative project cost and name of industry (in case of industrial project).</p> <p>2. Details of journal papers referred (in the format of standard references, as written in project report) to search the project topic.</p> <p>3. Names of themes of different project competitions, searched and studied.</p> <p>4. Name of mini project / PBL topic completed during earlier semesters and which they wish to extend as a final year project</p> <p>5. Names of industries visited, if any, to get the project.</p> <p>6. Respective TE class coordinators will take follow up with TE students to submit this details to module coordinator by each and every TE student in time.</p>	<p>Students (1st week, July 21 or Jan 22)</p>
5	<p>Module coordinators have to mail list of project topics to</p>	<p>1. Module coordinator will go through all project topics and other details, received from respective course coordinators. In case of any discrepancy, he / she will get clarification from respective course coordinator.</p>	<p>Module coordinator (2nd week,</p>

	project coordinator.	<ol style="list-style-type: none"> 1. Module coordinator will go through all project topics and other details, received from project batches. In case of any discrepancy, he / she will discuss with the students and get clarification. 2. Module coordinator will submit all the project details received from course coordinators as well as from project batches in the standard format to the project coordinator by 10th July 21 or Jan 22. (refer Annexure III). 	July 21 or Jan 22)
6	Project coordinator have to mail the list of project distribution to all TE students and faculties after allotting the project guides to project batches for particular project topics.	<ol style="list-style-type: none"> 1. Project coordinator will check whether all module coordinators have mailed the list of project topics with other details in the standard format to him / her. In case of any discrepancy, he / she will contact respective module coordinator. 2. Project coordinator will ask the faculty his / her choice, if more than one batches have shown interest in the same project, offered by him / her. 3. Project coordinator will finalise the project topics and distribute those to project batches, based on the data received from all module coordinators. He / she also allot the project guide to project batches relevant to project topics. 4. With the help of all TE class coordinators, project coordinator will check whether all TE students have formed the project groups and have been allotted the project and guide. 5. Project coordinator will form the project batches of non responded students, allot them project and guide as per his / her logic based on the project topics received from faculties. 6. Project coordinator will mail the complete list of project distribution to all TE students as well as to all faculties. 7. Project coordinator will write dead line in the mail for TE students to submit if any query or discrepancy in the allotment of project topic and guide. 8. Project coordinator will also display the list of project distribution on project NB. 	Project coordinator (3 rd week, July 21 or Jan 22)
7	Students have to approach project coordinator, in case of any correction / modification / changes in project topic and guide allotted to them.	<ol style="list-style-type: none"> 1. Students will submit in writing if they found any mistake in allotted project names, guide names and project batches. 2. In case of any type of conflicts, HoD will give the final decision. 	Students (3 rd week, July 21 or Jan 22)
8	Project coordinator has to mail and also display on project NB the final list of project batches along with	<ol style="list-style-type: none"> 1. Project coordinator will give unique batch number to each project group in the sequence of seniority of faculty, written in the muster. (Sample batch no 222301 for AY 22-23). 2. Project coordinator will give instructions to all TE class coordinators to change the division of the students, if all 4 students from same batch are not in one division. 3. Project coordinator will submit list of project distribution in the following format to the 	Project coordinator (4 th week, July 21 or Jan 22)

	topics and guides' names in the standard format.	HoDandafter approval from HoD, he / she will mail this sheet to all students and faculties. It will also be displayed on project NB.																			
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10	Project guide has to allocate 4 different topics for seminar based on project topic and give all instructions about seminar activity	<p>1. All students from a project team will meet respective guide in the slot provided for seminar in their class time table.</p> <p>2. Guide will allocate 4 different seminar topics by discussing with the students related to their project topic and will tell names of journals to refer to search material for seminar.</p> <p>2. Guide will tell outline of seminar which includes introduction of topic, literature review, main text related to topic, conclusion, references etc.</p>	Seminar / project guide (1 st week, Aug 21 or Feb 22)																		

Activity and Process for Allotment of Guide

The department faculty member is appointed as a project guide based on the criteria of specialization of the faculty members, work domain of the faculty, work experience in the domain, interest shown by the faculty in the given domain and student suggestion for faculty to work as a guide for them. Following table gives detailed process for allotment of guide for for different project batches and project topics.

Sr. No	Activity	Process	Responsible person and Timeline
1	After attending the session on "project activity details" conducted by project coordinator in 3 rd week June 21 or Dec 22, TE students will search project	<p>1. Students will get following information from the presentation by project coordinator:</p> <p>i) Names of major domains (modules) with names of module coordinators.</p> <p>ii) Names of prominent industries (domain wise) & job opportunities in it due to concerned project.</p> <p>iii) Names of all faculties with their domain expertise.</p> <p>iv) Names of reputed project competitions, their themes floated during last 2-3 years, benefits of participation in it and awards won by earlier project batches, if any.</p> <p>vii) How to search for academic research papers on the topics, in which they are interested on internet by referring the renowned publishers such as Elsevier, Tailor & Francis, Springer, Web</p>	Project coordinator (3 rd week, June 21 or Dec 22)

	topic in the interested domain, form a batch of 4 students and will ask faculty of interested module for his / her guidance.	of Science, Google Scholar, IEEE, ResearchGate, SciELO, Wiley, ProQuest, PubMed, JSTOR etc. 2. All TE students will receive mail from project coordinator which consists of information on list of domain wise prominent industries, list of module coordinators & faculties with domain expertise & project handbook. They can also read it from project NB. 3. Students will see the projects completed by earlier batches (kept in project lab / resp. subject lab) and will go through project reports kept in department library. 4. Based on this input, students will search the project topics. 5. After getting few project topics from the above mentioned sources, students can contact particular faculty and request him / her to check feasibility of project. 6. If the project is feasible, students can request that particular faculty to become their guide. (Guide has authority to accept it or not based on his / her interest in that particular domain).	
2	Students / Project batches have to submit / mail project topics & other details to module coordinators	Project batches will submit following documents to module coordinators (by 5 th Jan 2021) : 1. Name of minimum 1 project topic including category of project, scope of project written in one paragraph, facilities required for project work, tentative project cost and name of industry (in case of industrial project). 2. Details of journal papers referred (in the format of standard references, as written in project report) to search the project topic. 3. Names of themes of different project competitions, searched and studied. 4. Name of mini project / PBL topic completed during earlier semesters and which they wish to extend as a final year project 5. Names of industries visited, if any, to get the project.	Students (1 st week, July 21 or Jan 22)
3	Module coordinators have to mail list of project topics to project coordinator.	1. Module coordinator will go through all project topics and other details, received from respective course coordinators. In case of any discrepancy, he / she will get clarification from respective course coordinator. 1. Module coordinator will go through all project topics and other details, received from project batches. In case of any discrepancy, he / she will discuss with the students and get clarification. 2. Module coordinator will submit all the project details received from course coordinators as well as from project batches in the standard format to the project coordinator by 10 th July 21 or Jan 22. (refer Annexure III).	Module coordinator (2 nd week, July 21 or Jan 22)
4	Project coordinator has to mail the list of project distribution to all TE students and	1. Project coordinator will go through all project topics, received from module coordinators and will check technical feasibility, economic viability, and time frame. 2. Project coordinator will then finalize the project topic and will allot the project guides based on the following criteria :	Project coordinator (3 rd week, July 21 or

	faculties after allotting the project guides to project batches for particular project topics.	<p>i) Specialisation and experience of from a similar domain and distribute those to project batches, based on the details received from all module coordinators. Criteria for Allocation of the faculty member as a guide is as follows;</p> <p>Specialization and educational background Work experience and domain Interest /request by the faculty Student suggestion/preference for the guide.</p> <p>3. Project coordinator will ask the faculty his / her choice, if more than one batches have shown interest in the same project, offered by him / her</p> <p>4. With the help of all TE class coordinators, project coordinator will check whether all TE students have formed the project groups and have been allotted the project and guide.</p> <p>5. Project coordinator will form the project batches of non responded students, allot them project and guide as per his / her logic based on the project topics received from faculties.</p> <p>6. Project coordinator will mail the complete list of project distribution to all TE students as well as to all faculties.</p> <p>7. Project coordinator will write dead line in the mail for TE students to submit if any query or discrepancy in the allotment of project topic and guide.</p> <p>8. Project coordinator will also display the list of project distribution on project NB.</p>	Jan 22)
5	Students have to approach project coordinator, in case of any correction / modification / changes in project topic and guide allotted to them.	<p>1. Students will submit in writing if they found any mistake in allotted project names, guide names and project batches.</p> <p>2. In case of any type of conflicts, HoD will give the final decision.</p>	Students (3 rd week, July 21 or Jan 22)
6	Project coordinator has to mail and also display on project NB the final list of project batches along with topics and guides' names in the standard	<p>1. Project coordinator will give unique batch number to each project group in the sequence of seniority of faculty, written in the muster. (Sample batch no 222301 for AY 22-23).</p> <p>2. Project coordinator will give instructions to all TE class coordinators to change the division of the students, if all 4 students from same batch are not in one division.</p> <p>3. Project coordinator will submit list of project distribution in the following format to the HoD and after approval from HoD, he / she will mail this sheet to all students and faculties. It will also be displayed on project NB.</p>	Project coordinator (4 th week, July 21 or Jan 22)

	format.		Sr. No	Roll No	Name of student	Mobile No of student	Batch No	Project Topic	Name of guide	Mobile No of Guide	Remarks	
7	Project guide has to allocate 4 different topics for seminar based on project topic and give all instructions about seminar activity	<p>1. All students from a project team will meet respective guide in the slot provided for seminar in their class time table.</p> <p>2. Guide will allocate 4 different seminar topics by discussing with the students related to their project topic and will tell names of journals to refer to search material for seminar.</p> <p>2. Guide will tell outline of seminar which includes introduction of topic, literature review, main text related to topic, conclusion, references etc.</p>										Seminar / project guide (1 st week, Aug 21 or Feb 22)

Assessment and Evaluation of the Project

- ❖ The assessment and evaluation about the progress of the project is done by project guide and the Project Review Committee members as per the schedule, given in the project activity schedule. This helps the students to complete their project work effectively within the time. Project guide and Project Review Committee assess the performance of each student as an individual as well as in a team and motivate them to complete the project work in a right way. The members of the Project Review Committee are the module coordinators or their representatives, appointed by project coordinator in consultation with HoD.
- ❖ The continuous progress of the project work has to be evaluated through 4 internal project reviews (2 in each semester) by project guide and Project Review Committee. In first semester, two evaluations each of 25 marks are carried out and in second semester also two evaluations each of 25 marks are conducted, internally. Similarly there is an external project presentation scheduled in each semester by the University. At the end of 1st semester, project stage-I examination and at the end of 2nd semester, final viva-voce is carried out externally by the University.
- ❖ All the assessments are based on outcome based education, wherein it has to be ensured that students have learnt important skills, attitudes and values of profession, along with the technicality. The reviewers check the documents of evidences of students' learning

through project diary. The assessment tool used for internal project review presentations is of direct-rubric type, whereas the assessment of external project review presentations is based on direct-graded type. Project activity performances cannot easily be quantified and has to be measured through rubrics, which are created for all 4 internal review presentations and for overall term assessment of project work. Creating rubrics for all internal review presentation of project work can ensure a more accurate, specific, and useful assessment. Rubrics have to be shared with all students, helping them to focus on specific actions they can take to improve their performance in project work.

- ❖ The discussion during evaluation process inculcates, various graduate attributes like identifying, understanding and formulating problem statements, finding innovative solution with modern tools usage, investigating and validating the results. (PO1, PO2, PO3, PO4 & PO5). Designing the prototype system with the consideration inculcates graduate attributes like environmental, ethical, legal and cultural issues. (PO6, PO7 & PO8). During the entire project work, students work as individual and in a team and make the necessary documentation, presentation, project managements which helps them further in future carrier / placement (PO9, PO10, PO11 & PO12).

Following table gives a detailed process of internal assessment activity of project work.

[A] Activity and Process for Internal Assessment of Project

Sr. No	Activity	Process	Responsible person and Timeline
1	The Project coordinator, in consultation with HoD has to form a project review committee for internal assessment of project work	1. Project coordinator will form a Project Review Committee (PR Committee) by including names of all module coordinators or their representatives, in consultation with HoD, one week before the 1 st internal project review presentation. Project guide of respective project batch will be one committee member of PR committee, by default at the time of presentation. 2. Project coordinator will communicate to all PR committee members that they would be working as PR committee members for all internal review project presentations during that AY.	Project coordinator (3 rd week July 2022)
2	Project Review	1. Project coordinator will prepare time table of 1st internal review presentation for all batches,	PR

	committee has to conduct internal project review presentations as per the guidelines given by project coordinator.	<p>which include project batch no, name of guide, day and date, timing, venue and names of PR members.</p> <p>2. In case of more number of batches, presentations can be conducted simultaneously at two different locations and PR committee can be divided into 2 groups, based on project domains topics.</p> <p>3. Before presentation, project coordinator will hand over file of assessment and evaluation details to PR committee, which consists of students attendance sheet, students assessment sheets, rubrics applicable to that particular review presentation, rough 2 pages.</p> <p>4. Students will bring their completed and duly signed project diary, synopsis and bar chart of project activity at the time of review presentation.</p> <p>5. Each examiner will write suggestions / remarks / comments in based on rubrics applicable and write marks accordingly the assessment sheet.</p> <p>6. Project coordinator will collect all assessment sheets and students attendance sheet from the committee and maintain all sheets in a separate file, as a part of necessary record keeping.</p> <p>7. Project coordinator will display marks obtained by all students (batch wise) on the NB. Also will mail a copy to all project guides.</p>	committee (4 th week, July 2022)
		<p>1. Similar procedure as mentioned above for 1st internal review presentation has to be followed for all remaining 3 internal review presentations as per the schedule of project activity.</p> <p>2. The Project Review committee will be responsible for evaluating the timely progress of the projects, through all 4 internal review presentations during both the semesters.</p>	PR committee (2 nd week Sept 2022, 3 rd week Jan 2023, 3 rd week Mar 2023)

The internal assessment and evaluation process is carried out as per the rubrics given for four internal reviews as given below.

- i) **Review-1** includes formulation of problem statement, literature review, framing objectives, determining methodology, writing synopsis and preparing bar chart.
- ii) **Review-2** includes design of individual part / circuit modules, simulation / analysis / numerical treatment. writing algorithm, flowchart, program code and PCB design etc.

- iii) **Review-3** includes manufacturing, assembly / development of complete prototype, experimentation, trial etc. testing and validating the results, preparing the first draft of project report.
- iv) **Review-4** includes testing, demonstration, results, conclusions, preparation & submission of final project report.

Rubrics for Internal Project Reviews

Rubrics are used effectively to design the continuous assessment of the students projects. The PIs (**Performance Indicators**) referred in the AICTE examination reform can be used as a measurement criteria in the rubric. For different phases of the project ie all 4 internal project review presentations, we can design the rubrics keeping in mind the deliverables of the project at that particular stage. Following tables give rubrics for all 4 internal reviews, rubrics for overall evaluation of contribution by each student. Final internal evaluation sheet will be addition of all internal reviews.

Rubrics for Project Review 1

PI Code	Dimensions ⇨	Scales [Maximum marks = 25]			
	Performance Indicator ⇩	Unsatisfactory [1M]	Developing [2M]	Satisfactory [3-4M]	Exemplary [5M]
2.1.1	Identify the Problem : Identify and/or articulate a problem and define objectives	Problem statement & objectives are not identified.	Problem statement & objectives are not clear.	Problem statement is clear & Objectives are not in line with problem statement	Problem statement is clear & Objectives are well defined.
2.2.3	Recognize & Consider Assumptions: Recognize/identify existing processes/solution methods for solving the problem, including	Not able to identify existing solution for solving the problem. The assumptions, approximations and justifications are also not identified.	Not able to identify existing solution for solving the problem. The assumptions, approximations and justifications are identified but not clear	Able to identify existing solution for solving the problem. Assumptions, and approximations are clear. Justification not clear.	Able to identify existing solution for solving the problem. Assumptions, approximations and justifications are clear

	forming justified approximations and consider assumptions when solving a problem.				
10.1.1	Literature Survey :Read, understand and interpret technical and non-technical information	Not able to identify and read technical and non-technical information from the relevant research papers.	Able to identify and read technical and non-technical information from the relevant research papers but not able to understand and interpret the information.	Able to read and understand technical and non-technical information from the relevant research papers but not able to interpret the information.	Able to read, understand and interpret the technical and/or non technical information from relevant research papers and find out the gap.
11.3.1	Preparation of synopsis :Identify the tasks required to complete an engineering activity, and the resources required to complete the tasks.	Not able to identify the tasks required to complete the project and the resources required to complete the tasks. Synopsis contains minimum explanation	Able to identify the tasks required to complete the project but not able to identify the resources required to complete the tasks. Synopsis contains moderate explanation.	Able to identify the tasks required to complete the project and able to identify the resources required to complete the tasks. Synopsis contains good explanation.	Able to identify the tasks required to complete the project and able to identify the resources required to complete the tasks. Synopsis contains detailed & extensive explanation.
11.3.2	Project management tool :Use project management tools to schedule an engineering project, so it is completed on time and on budget.	Not able to prepare bar chart as a project management tool to monitor the project activity for completion it in time.	Able to prepare bar chart, as a project management tool but all the tasks are not listed in the bar chart.	All the tasks are listed in the bar chart but does not encompass all project activities in sequence.	Bar chart provides a detailed and specific list of tasks in sequence, necessary to complete the project work.

Rubrics for Project Review 2

PI Code	Dimensions →	Scales [Maximum marks = 25]			
	Performance Indicator ↓	Unsatisfactory [1M]	Developing [2M]	Satisfactory [3-4M]	Exemplary [5M]
3.1.4	Engg codes & standards : Extract engineering requirements from relevant engineering Codes and Standards such as ASME, ASTM, BIS, ISO and ASHRAE	Not able to use engg codes & standards in the design methodology. No understanding of design concepts, design process and design calculations.	Able to use partially engg codes & standards in the design methodology without understanding of design concepts, design process and design calculations.	Able to use engg codes & standards in the design methodology with understanding of design concepts, design process and design calculations. Could not justify the selection.	Able to use effectively, engg codes & standards in the design methodology with full understanding of design concepts, design process and design calculations with proper justification.
3.1.5	Other design considerations : Explore and synthesize engineering requirements considering health, safety risks, environmental, cultural and societal issues	No consideration given to aesthetic, social, economic, environment, safety or health issues.	A little consideration given to aesthetic, social, economic, environment, safety or health issues without justification.	Proper consideration given to aesthetic, social, economic, environment, safety or health issues but without justification.	Demonstrate sophisticated justification for consideration given to aesthetic, social, economic, environment, safety or health issues
3.1.6	Design objectives : Determine design objectives, functional requirements and arrive at specifications	Not able to define clearly the design objectives, functional requirements of project. No specifications are given.	Able to define the design objectives, but unable to define functional requirements of project. No specifications are given.	Able to define the design objectives & functional requirements of project. Specifications are given partially.	Well-defined design objectives & functional requirements of project with complete specifications given.

5.1.1	Modern engg tool :Specify modern engineering tools such as computer-aided drafting, modeling, simulation and analysis; techniques and resources for engineering activities	Not able to use any modern tools such as comp aided design / drafting / modeling / simulation and analysis, though it was a part of project.	Able to use partially the modern tools such as comp aided design / drafting / modeling / simulation and analysis, without understanding.	Able to use the modern tools such as comp aided design / drafting / modeling / simulation and analysis, with understanding but didn't study the effect of variable parameters on output of project.	Able to use effectively the modern tools such as comp aided design / drafting / modeling / simulation and analysis, with full understanding and study the effect of variable parameters on output of project
10.3.1	Engg Drawings :Create engineering-standard figures, reports and drawings to complement writing and presentations	Not able to draw engg drawings & figures, as per the standard conventions. Design report not written.	Able to draw engg drawings & figures but not as per the standard conventions. Dimensions & tolerances are missing in the drawing. Design report written partially.	Able to draw engg drawings & figures as per the standard conventions. Dimensions are given but tolerances are missing in the drawing. Design report includes design calculations & design process.	Able to draw engg drawings & figures as per the standard conventions by giving all dimensions & tolerances in the drawing. Well described design report, which includes all design calculations, design process, assumptions and justification.

Rubrics for Project Review 3

PI Code	Dimensions ⇨	Scales [Maximum marks = 25]			
	Performance Indicator ↓	Unsatisfactory [1M]	Developing [2M]	Satisfactory [3-4M]	Exemplary [5M]
4.1.2	Manufacturing Method : Examine the relevant methods, tools and techniques of	No information about manufacturing process, tools & techniques.	Very little information about manufacturing process, tools & techniques.	Sufficient information about manufacturing process, tools & techniques.	Well presented, explained and justified information about manufacturing process,

	experiment design, system calibration, data acquisition, analysis and presentation				tools & techniques.
4.1.3	Instrumentation : Apply appropriate instrumentation and/or software tools to make measurements of physical quantities	Insufficient use of instrumentation for measurement of physical quantities during experimentation.	Moderate use of instrumentation for measurement of physical quantities during experimentation.	Substantial use of instrumentation for measurement of physical quantities during experimentation however readings are unexpected.	Substantial use of instrumentation for measurement of physical quantities during experimentation with expected results.
4.3.1	Experimentation :Use appropriate procedures, tools and techniques to conduct experiments and collect data	No testing of prototype / model is carried out.	Testing of prototype or model is conducted without measuring system performance. No safety measures considered.	Testing of prototype / model is conducted with respect to few system performance factors. Safety measures are considered.	Well-planned systematic test of prototype / model is conducted to test system performance with respect to all important factors. All safety measures are considered.
11.1.2	Bill of Material :Analyze different forms of financial statements to evaluate the financial status of an engineering project	Not able to evaluate financial status of project due to lack of bills of material and components.	Able to evaluate slightly the financial status of project as few bills of material and components are missing.	Able to evaluate moderately the financial status of project as bills of material and components are not clear & transparent..	Good evaluation of financial status of project as all bills of material and components are clear & transparent..
10.2.1	Question-Answers :Listen to and comprehend information, instructions, and viewpoints of others	Demonstrates an inability to answer expected questions	Demonstrates difficulty in answering expected questions.	Demonstrates sufficient knowledge of the work carried out to answer expected questions.	Demonstrates full knowledge of the work carried out & elaborates on expected questions.

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Rubrics for Project Review 4

PI Code	Dimensions ⇨	Scales [Maximum marks = 25]			
	Performance Indicator ⇩	Unsatisfactory [1M]	Developing [2M]	Satisfactory [3-4M]	Exemplary [5M]
2.4.2	Project Demonstration :Produce and validate results through skilful use of contemporary engineering tools and models	Not able to produce and validate experimental results. Not used any skilful contemporary engineering tools & techniques.	Able to produce experimental results but could not satisfactorily validate all results. Not used any skilful contemporary engineering tools & techniques.	Able to produce experimental results and results are validated satisfactorily to some extent. Used skilful contemporary engineering tools & techniques. System not working accurately.	Got excellent experimental results with complete validation. Used skilful contemporary engineering tools & techniques. System working accurately.
4.3.3	Presentation :Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions	Poor presentation of data. No analysis. No explanation.	Moderate representation of data in tabular / graphical form. Poor analysis. No explanation.	Good presentation of data in tabular / graphical form. Moderate analysis and explanation.	Excellent presentation of data in tabular / graphical form using smart art. Good analysis and explanation.
2.4.4	Conclusion :Extract desired understanding and conclusions consistent with objectives and	Project work is not summarized and concluded. Lack of desired understanding. Future extensions in	Project work summary and conclusions are not consistent with defined objectives. Moderate understanding. Future	Project work summary and conclusions are consistent with defined objectives. Understanding of project is satisfactory. Future	Project work is well summarized and understood. Conclusions are consistent with defined

	limitations of the analysis	the project are not specified.	extensions in the project are not specified	extensions in the project are specified	objectives. Future extensions in the project are well specified
9.3.1	Team work :Present results as a team, with smooth integration of contributions from all individual efforts	Poor presentation skill. Lack of coordination among team members. Less efforts by individual.	Moderate presentation skill. Average communication among team members. Unequal efforts by individual.	Good presentation skill. Satisfactory coordination among team members. Efforts taken by all.	Excellent presentation skill with fluent English and with full confidence & understanding. Excellent coordination among all team members. Equal contribution of efforts.
10.2.1	Question-Answers :Listen to and comprehend information, instructions, and viewpoints of others	Demonstrates an inability to answer expected questions	Demonstrates difficulty in answering expected questions.	Demonstrates sufficient knowledge of the work carried out to answer expected questions.	Demonstrates full knowledge of the work carried out & elaborates on expected questions.

Rubrics for Overall Internal Assessment of Project [50 M]

Dimensions ⇨	Scales [Maximum marks = 50]			
Performance criteria ↓	Unsatisfactory [1-2M]	Developing [3-4M]	Satisfactory [5-8M]	Exemplary [9-10M]
Regular meeting with guide	Hardly ever meets the guide.	Very seldom meets the guide.	Meets the guide regularly.	Have very frequent meetings with the guide.

Planning for project	Project plan is flawed & needs to be more systematic & appropriate.	Project plan needs improvement & should be more systematic & appropriate	Project plan is prepared systematically & appropriately	Project plan is prepared exceptionally well, systematically & appropriately
Efforts to complete project	Work is not conducted as per plan & has major difficulty adapting to changes.	Work is not completely conducted according to plan & has some difficulty adapting to changes.	Most work is conducted according to plan & can adapt to changes.	Conducts work according to plan & adapts well to changes
Involvement in the project	Shows no interest in the project, has major issues with completing tasks, highly dependent on the guide.	Shows some interest in the project but not fully committed. Moderately hardworking, dependent on the guide half of the time.	Shows an interest in the project & is hardworking, work independently as per instructions.	Shows a genuine interest in the project & is exceptionally hard working, work independently as per instructions.
Maintaining Project diary	Project diary is hardly completed. Don't bring at the time of meeting with guide. No sign of guide & project coordinator in it.	Project diary is partially completed & irregularity in bring diary at the time of meeting with guide. Few signatures of guide & project coordinators are missing in it.	Project diary is maintained well by writing all imp discussions with guide in almost every meeting but irregular in taking sign of guide and project coordinator.	Project diary is excellently maintained by writing all aspects of project discussed with the guide in every meeting. Take sign of guide & project coordinator time to time.

Final Internal Evaluation Sheet [150 M] (BE-II)

Sr. No	Group No	Name of the student	Project Title	Review-1 [25 M]	Review-2 [25 M]	Review-3 [25 M]	Review-4 [25 M]	Overall Assessment [50 M]	Total Int. Marks [150 M]
1	222301								

[B] Activity and Process for External Evaluation of Project

Following table gives a detailed process of external evaluation of project activity. The external evaluation is to be conducted by external examiner appointed by University jointly along with project guide as an internal examiner

Sr. No	Activity	Process	Responsible person and Timeline
1	Project coordinator has to prepare time table of project viva-voce	1. HoD / project coordinator will receive the project examination time table along with the dates and details of examiners from University. 2. Project coordinator will contact all the external examiners and get confirmed their availability on exam dates. 3. If appointed examiners will show their inability to conduct the examination on said dates, project coordinator will contact chairman of project exam and get new examiners appointed or get different dates of examination. 4. After getting confirmation from all examiners, project coordinator will prepare time table of project examination (2/3 days) and will mail it to all project guides. 5. Project coordinator will send notice of viva-voce (via whatsapp and mail) to all final year students. Also same will be put on NB. He / she highlight in the notice that students must bring project reports, project diary, soft copy of ppt, short video of project at the time of viva-voce. 6. Project examiner will prepare all necessary documents required to conduct external viva-voce. [students attendance sheets, external evaluation sheets. remuneration form, travelling allowance form etc.] 7. Project coordinator will make necessary arrangements of viva-voce, which consist of deciding venues, timing, allotment of lab asst, peon, food arrangement etc.	Project coordinator (4 th week May 2023)
2	Project viva-voce has to be conducted	1. Students will bring their completed and duly signed project diary and project reports along with their ppt, short video of project activity at the time of viva-voce. 2. Project coordinator / project guide will give common instructions and guidelines to all the students before starting the examination.	Project coordinator & Project guides (1 st)

	as per the guidelines provided by University.	<p>3. Lab asst will save all respective ppts and short videos on the PC, connected to the LCD projector.</p> <p>4. Project coordinator will collect all evaluation sheets and students attendance sheet from the project guides to make online entry of marks after the examination.</p> <p>5. Project coordinator will get written feedback from all external examiners on the last day to improve the system for next year project batches.</p> <p>6. After completing the examination, lab asst will keep all hard copies of project reports in department library. Afterwards one copy will be handed over to respective guide.</p> <p>7. Project coordinator will mail the feedback form to all final year students after the examination is over and get it submitted within a week period.</p>	week June 2023)
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External Evaluation Sheet (Direct – Graded)[100 M] (BE-II)

[External examiner may change weightage of the parameters as per his expertise & experience]

Sr. No	Group No	Name of the student	Project Title	Technicality [30 M]	Presentation Skill [20 M]	Social, environmental, ethical considerations [10 M]	Significance, novelty & usefulness [10 M]	Report writing [10 M]	Q & A [10 M]	Total Marks [100 M]
1	222301									

NBA Guidelines about Project Quality

Project is the key activity for the students to achieve all program outcomes & program specific outcomes which are supportive to acquire life long learning skills. The project titles are selected by considering societal and industrial problems with the addition of innovation, feasibility, reliability and cost effectiveness for quality assurance.

[A] Parameters to measure the Quality of Students Projects

<i>NBA SAR Criteria No</i>	<i>Quality of students' project</i>	<i>Total marks</i>
2.2.3	(Quality of the project is measured in terms of consideration to factors including, but not limited to, environment, safety, ethics, cost, type (application, product, research, review etc.) and standards. Processes related to project identification, allotment, continuous monitoring, evaluation including demonstration of working prototypes and enhancing the relevance of projects. Mention Implementation details including details of POs and PSOs addressed through the projects with justification)	25

[B] Evaluation Parameters to check Quality of Project

<i>NBA SAR Criteria No</i>	<i>Evaluation guidelines (Marks)</i>	<i>Observations / Justifications/ Reasons to be written by evaluator)</i>
2.2.3	A. Identification of projects and allocation methodology to Faculty (3)	
	B. Types and relevance of the projects and their contribution towards attainment of POs and PSOs (5)	
	C. Process for monitoring and evaluation (5)	

	D. Process to assess individual and team performance (5)	
	E. Quality of completed projects/working prototypes (5)	
	F. Evidences of papers published / Awards received by projects etc. (2)	

Mapping & Attainment of Project COs with POs and PSOs

The project work is an activity considered as an outcome of learning all program level courses, skills developed and its application to solve the problems in society and industry. It is an activity useful to apply all twelve attributes, learned in the program and hence contributing to the attainment of almost all POs. The project topics are selected by the students with application domain in the field of agriculture, public health, security, increasing productivity, environmental issues, renewable energy etc. The types and relevance of these projects & their contribution towards attainment of POs are as mentioned below :

- ❖ During the completion of the project, students apply engineering knowledge, formulate & analyze the problem to provide innovative solution & conduct the investigation to provide the valid conclusion. Thus students attain PO1, PO2, PO3 & PO4.
- ❖ While designing, manufacturing and testing of the prototype, the students also acquire the skills to work as an individual & in a team with contextual reference of public health, safety, environment, ethical, legal & cultural issues. This attains PO6, PO7, PO8, PO9 & PO10.
- ❖ During the project activity, the students also acquire the skills like modern tool usage, project management, finance & life long learning, which further helps them in future to work in the industry as a professional engineer. This attains PO5, PO11 & PO12.
- ❖ Project activity also make students to learn program specific competencies such as design & development of mechanical system, development of hardware part, development of software program etc. Thus it attains program specific outcomes by applying the knowledge gained in all the courses in the program.

The proper assessment of the COs and POs is one of the most important processes and it is to be done with precision and planning. It is recommended to assess the students continuously as they progress through the project activity. It is collectively one or more processes that

define, collect, and prepare data to evaluate the achievement of Program Outcomes. Every performance criteria is to be mapped to different POs and PSOs, based on their influence on them. The structure of mapping of COs of project work with POs& PSOs are shown in table 1.

Table : Sample Mapping of COs with POs and PSO

(To map above stated COs with POs by giving rating 1 – Slightly, 2 – Moderately, 3 – Substantially)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO2
CO1	2	1	1		1							1	2
CO2	1	2									1		1
CO3					1		1	1					1
CO4									2				
CO5										2			
CO6						1				1	1	1	

Reputed National Level Project Competitions

Students get opportunity to exhibit their project through various National & International project competitions, held in every year by reputed companies and academic institutions. It provides students a platform to solve some of the society problems faced by us in our daily lives, and thus inculcate a culture of product innovation and a mindset of problem-solving. It also promotes innovation out-of-the-box thinking in engineering students from across India.

Few reputed National level project competitions are mentioned below, wherein engineering students participate every year. Different themes are announced by the organizers one year in advance to enable the students to think and work on the project throughout the year.

Sr. No	Name of project competition	Name of organiser	Frequency of competition	Earlier Themes
1	Smart India Hackathon (SIH)	MHRD& AICTE	Yearly	Robotics & Drones, Waste management, Renewable energy, Security & Surveillance, Smart communications, Smart vehicles, Food processing, Clean water, Healthcare & biomedical devices, Agriculture & rural development.
2	KPIT Sparkle	KPIT Technologies Ltd.	Yearly	Mobility & energy for future, Next generation energy & transportation solutions,
3	ChattraVishwakarma Award	AICTE	Yearly	India's economic recovery post covid, Empowerment of villages through technologies, How to enhance the income of a village, Conver existing institute into smart institute using innovative approach.
4	Quest Ingenium	Quest Ingenium	Yearly	Calling future innovators, Mechatronics stream,
5	SAE - Baja	SAE India	Yearly	All terrain vehicle competition
6	SAE Supra	SAE India	Yearly	Formula racing car competition
7	Go carting	Indian Cart Racing	Yearly	Racing car competition
8	TIFAN (Technology Innovation Forum for Agricultural Nurturing)	SAE-John Deere- RahuriKrushiVidyapeeth	Yearly	Self propelled onion harvester.
9	Mind Rover	Tata Motors	Yearly	Innovative idea as a solution to the case challenge automobile sector.

Paper Publications Guidelines

The work undertaken is to be appreciated and recognized by the significant publications and / or IPR. The quality of the publications reflects the efforts and recognition of the work. So, it is highly recommended to publish work in consultation with the guide in referred national and international Journals of repute, with high Impact Factor and also in recognized conferences. There are some journals operating in different regions which use 'International' word, but in true sense are not International.

Following points must be considered while writing a research paper :

1. What are observations in the project work? (Findings from from project work).
2. What is the reference or bench mark of comparison of results? (Current state-of-the-art)
3. How does it compare to the existing work ? (Literature Survey). It means to find where the current boundary of the work exists ? Does the observations push the boundary forward ? If not, what does it showcase.
4. If the mathematical model clearly built with strong fundamentals?
5. Can it be presented in a form that conveys some important message clearly?

IPR Guidelines

The first legislation in India for protection of Industrial Designs was The Patents & Designs Protection Act, 1872. It supplemented the 1859 Act passed by Governor General of India for granting exclusive privileges to inventors and added protection for Industrial Design. The 1872 Act included the term —any new and original pattern or design, or the application of such pattern or design to any substance or article of manufacture. Hence it is recommended that students should know about Copyright and Patents.

FAQs on Project Work for Placement Interviews

1. Explain in brief about your project. (expected to tell objectives & conclusion within 2 mins)(Don't tell the title of the project in first place. Because sometimes it will not highlight the project even its an interesting idea. Always tell the topic of your project).
2. What was your role in the project?(team leader / team member) : If your answer will be team leader then you may be asked following questions :
 - i) How did you assign the work to your team members?
 - ii) On what basis did you divide the work and assigned it to them?
3. What new engineering skill you have acquired during project activity?
4. Did you use any recent technology in your project?
5. What was your contribution in the project?
6. What is the motivation for selecting this project?
7. What was the total cost of the project?
8. Can your project be commercialized?
9. Whether your project is useful for society or industry?
10. What difficulties have you faced during your project work and how did you overcome it?
11. Share some challenging tasks you faced while executing your project and what was your approach in solving them?
12. What is the conclusion of your project?
13. What are the future prospects relating to your project?
14. Can the technique / skill with respect to your project would prove useful for our company?

Feedback from Students about project work

Students feedback is taken online by project coordinator after the final viva-voce of project is conducted ie in the month of June. The feedback is analysed by the project coordinator and the suggestions / comments / discrepancies are discussed in the meeting with all project guides to improve the system for next AY project batches. Following is the feedback format used .

Name of student : _____

Name of guide : _____

Give rating from 1 to 5 to following questions ; 1 being poor and 5 being excellent.

1. Have you developed the problem solving ability to solve real life problem / industrial problem by applying knowledge & skill?

1	2	3	4	5

2. Have you learned any modern engineering / IT tool to evaluate alternative approaches in solving the problem?

1	2	3	4	5

3. Have you learnt to provide solution to problems considering social, environmental and ethical issues?

1	2	3	4	5

4. Have you learnt to communicate effectively, to make effective presentations and to write precise technical report?

1	2	3	4	5

5. Have you developed team work, interpersonal relationships and leadership qualities, while working on project?

1	2	3	4	5

6. How effective was the project guide in fulfilling the specified role of project guide and GFM?

1	2	3	4	5

7. How effective was the project coordinator in fulfilling the role & responsibilities of administrative task during your project activities?

1	2	3	4	5

8. Provide suggestions (if any) for the project guide to take into consideration for further project batches.

9. Provide suggestions (if any) for the project coordinator to take into consideration for improving the administrative responsibilities.

Feedback from external examiners about quality of projects

Intent of this feedback from external examiners is to further improve the quality of projects and also to improve an internal project management process. After conducting the final project viva-voce by external examiners appointed by University, a written feedback from all external examiners are taken in the following format. The feedback is analysed by the project coordinator and the suggestions / comments / discrepancies are discussed in the meeting with all project guides to inculcate the suggestions during next AY project batches.

Following is the feedback format used .

Name of examiner : _____

Industry / Institute of the examiner : _____

Give rating from 1 to 5 to following questions ; 1 being poor and 5 being excellent.

1. How satisfied are you with the students' project, overall?

1	2	3	4	5

2. How did find overall quality of projects?

1	2	3	4	5

3. On what aspects students have to be further developed to face challenges in their career?

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.....
.....

4. Your suggestions to improve upon the quality of projects for next AY project batches.

.....
.....
.....

5. Your suggestions for the department to improve upon the project management system in conducting project activity and its process..

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.....

Annexure – I

Parameters to check feasibility of project

1. Whether manufacturing facilities to be utilized for various parts of project are easily available?
2. Availability of material for various parts or availability of standard parts in affordable cost as and when required.
3. Whether total cost of the project is affordable to students for self funding project?, (if project is not sponsored by industry or any funding agency).
4. Whether project can be completed within a year (actual working period available for students is only approximately 6 months and all phases of project ie design, analysis, manufacturing, testing & report submission are possible to complete in stipulated time?)
5. Whether any validation (theoretical / numerical / experimental / computational) is possible to verify the results and conclusion drawn?
6. Whether any project activity does not harm the environment directly or indirectly by any means.
7. Whether the project work carried out is safe from human and equipment's safety point of view?

Annexure – II

Format to submit project topic to module coordinators

[by faculties and students]

1) Name of faculty / student (with mobile number) :

2) Name of module on which project is based :

3) Name of module coordinator :

Proposed names of the project topics :

1. _____

2. _____

3. _____

[A] Details of proposed project topic (Repeat for remaining topics to be submitted)

Sr. No.	Proposed project topic no 1 :
1	Name of faculty / student (with mob no) : _____
2	Category of the project : _____
3	Relevant name of module: _____
4	Proposed topic name: _____
5	Scope of the project (one paragraph) : _____
6	Facilities required for project work : _____
7	Rough estimation of project cost : _____
8	Industrial or in house project : _____
	Proposed project topic no 2 :
	Proposed project topic no 3 :

[B] Details of journal / conference papers referred

Details of journal / conference papers referred				
Sr. No	Name of Author	Title of paper	Name of journal / conference	Volume, page nos etc.
1				
2				
3				
4				
5				

[C] Details of themes of different project competitions searched

Details of themes of different project competitions searched				
Sr. No	Name of competition	Name of organizer	Titles of the themes	Year of competition
1				
2				
3				
4				
5				

[D] Details of mini projects / PBL activity / seminar to be extended for capstone project

Details of mini projects				
Sr. No	Domain / module of the mini project PBL activity	Title of the mini project / PBL activity	Guide of the mini project / PBL activity	Proposed project topic title

1				
2				
3				
4				
5				

[E] Details of industries visited

<i>Details of industries visited</i>				
<i>Sr. No</i>	<i>Name & location of the Industry</i>	<i>Name of industry person contacted with mob no.</i>	<i>Names of students visited</i>	<i>Outcome of visit</i>
1				
2				
3				
4				
5				

Annexure – III

Format to submit project topic to project coordinator by module coordinators

Name of module coordinator :				
Name of module :				
Sr. No	Name of faculty / student, who submitted project topic (with mob no)	Name of proposed project topc	From where the proposed topic selected (research paper / theme of proj competition / mini project / industry / own idea	Remarks
1				
2				
3				
4				
5				
6				

Annexure – IV

Sample Project Activity Bar Chart [AY 22-23]

(To be prepared by students)

Sr. No	Activity / Fortnightly	July- Apl (TE- II)	M- J	July 1 to 15	July 16 to 31	Aug 1 to 15	Aug 16 to 31	Sept 1 to 15	Sept 16 to 30	Oct 1 to 15	N- D	De c 16 to 31	Jan 1 to 15	Jan 16 to 31	Fe b 1 to 15	Fe b 16 to 28	Ma r 1 to 15	Ma r 16 to 31	April 1 to 15	May 25 to Jun e 10
1	Formation of project group, finalisation of project domain, allotment of project guide.																			
2	University May / June 22 exam																			
2	Finalisation of project title along with objectives, methodology, scope of project																			
3	Literature review																			
4	Submission of synopsis																			
5	Preparation of bar chart																			
6	1st project review presentation																			

1. Title of Project :“Design, Development and Testing of Linear Compressor for Household Refrigerator”

2. Introduction :

Over past many years, reciprocating compressors have been commercially used for refrigerator applications. These compressors have high mechanical losses during conversion from rotary to linear motion using crank and connecting rod mechanism. Most of the home appliances such as refrigerators, air-conditioners are powered by reciprocating compressors which consume most of its electricity. Since reciprocating compressors had many difficulties to increase efficiency, new kind of compressors have been paid much of attention by the compressor manufacturers. The Linear compressor having free piston mechanism has been one of those kinds, in which piston is directly coupled to a linear oscillating motor. Linear compressor has been successfully used for cryogenics applications. It's challenging to use it for refrigerators, which can save large energy globally, considering the use of large number of household refrigerators.

3. Objectives :

1. Design and develop linear motor driven linear compressor using flexure springs.
2. Test linear compressor with household refrigerator and with test rig.
3. Compare Performance characteristics of linear compressor with reciprocating compressor

4. Working Methodology :

Following working methodology will be adopted for developing the linear compressor.

1. Parametric analysis of linear compressor using mathematical simulator
2. Design of linear compressor.
3. Finite element analysis of flexure spring
5. Modal analysis of moving parts to achieve the resonance
6. Manufacturing and assembly of linear compressor.
7. Integration and Testing of linear compressor with household refrigerator and test rig.
8. Results, discussions and conclusions.

5. Scope of project :

In this project, linear compressor, using flexure springs will be designed and developed for household refrigerator. The mathematical simulator will be used to check the performance of linear compressor with the refrigerating system. The effect of varying parameters such as voltage, operating frequency, moving mass and spring stiffness on the performance of linear compressor will be studied. As linear Compressor is a resonant machine, resonant is necessary to get maximum amplitude of piston stroke with less motor force. So modal analysis of moving parts will be carried out to determine the number of flexure springs necessary to achieve the resonant frequency of 50 Hz. The linear compressor will be then integrated and tested with household refrigerator by replacing the reciprocating compressor. The temperature drop will be measured by multi point temperature indicator and refrigerant mass flow rate will be measured by attaching rotameter at the outlet of condenser. A separate test rig will be developed for determining performance characteristics of linear compressor, as it would be difficult to control and modify operating conditions by integrating linear compressor with household refrigerator.

6. Expected conclusion : Performance characteristics of linear compressor will be compared with that of reciprocating compressor and it is expected that linear compressor will perform better than reciprocating compressor.

7. References :

Annexure – VI

Organisation of Project Report

(A) Table of Contents

Sr. No	Title	Pg. No.
	TITLE PAGE	

		CERTIFICATE	i
		ACKNOWLEDGEMENT	ii
		ABSTRACT	iii
		LIST OF FIGURES	iv
		LIST OF TABLES	v
		NOMENCLATURE	vi
1.		INTRODUCTION	1
	1.1		
	1.2		
2.		LITERATURE REVIEW	
3.		MATHEMATICAL MODELING / SIMULATION / NUMERICAL OR THEORETICAL ANALYSIS / FEA / CFD	
	3.1		
	3.2		
4.		DESIGN / SELECTION OF PARTS	
	4.1		

	4.2		
5.		MANUFACTURING, ASSEMBLY & EXPERIMENTATION	
	5.1		
	5.2		
6.		RESULTS & DISCUSSIONS	
7.		CONCLUSION	
8.		FUTURE SCOPE	
		APPENDIX (If any)	
		REFERENCES	
		PUBLICATIONS (If any)	

(B) General Guidelines for writing project report with samples

Project report is a written presentation document submitted by the students on the project work, carried out by them. It should therefore be presented with a lot of care and thought. It tells about the project, methodology used, final findings, results and conclusion, etc. It is not a document, which is meant only for the author. It is in fact a valuable record, which is often referred by various persons working in that area. It is therefore essential to ensure that the report is written, organized and presented in such a manner that a reader has no difficulty in understanding it. It is an important document for the students to be carried with them for interviews, usually for freshers.

The following information, in the given sequence, will be useful in writing the project report effectively :

[i] ACKNOWLEDGEMENT :

- Should be in brief. (only 1 page)
- Avoid writing flowery prose.
- Do write the names of all those, who helped you. To be acknowledged in the sequence – guide, HoD, Principal, industry persons, other faculties (from same or other institutes), lab assistants, manufacturers (if applicable), friends, any other persons, who have helped significantly in your project. At the end you can write “Finally we are grateful to one and all, who are directly or indirectly involved in the successful completion of our project work”.
- Write names (first name and last name) of all 4 students below acknowledgement.

SAMPLE ACKNOWLEDGEMENT

We express our deep sense of gratitude to our project guide **Prof. (Name of guide)** for his continuous motivation and support in our project work. He has constantly encouraged us to work effectively and efficiently during our project work. He has not only guided us for the project work but also gave me moral support during our hard times.

We would like to extend our gratitude to the Head of Mechanical Engineering Department **Prof.(Name of HoD) and the Principal Prof. (Dr.) (Name of Principal)** for their constant support and time to time suggestions in our project work.

We are also thankful to **Prof. (Name of Teachers)** for giving valuable inputs in the design part of our project work. The practical suggestions and inputs given by **Prof. (Name of Teachers)** and **Prof. (Name of Teachers)** helped us a lot during our experimentation. We acknowledge the technical support and help extended by **(Name of person from industry)** and his team from **M/s (Name of company with location)**, Pune during the fabrication work of our project.

Finally we are grateful to one and all, who are directly or indirectly involved in the successful completion of our project work.

Write name of all 4 students

[ii] ABSTRACT :

In Abstract writing, students are assessed for the first time in their degree on how to summarize their project work in a concise manner. Abstract writing is challenging because it is widely acknowledged that writing a long story short is more difficult than writing a short story long. Such skill could also help students to prepare their future curriculum vitae in that it instills the skill of identifying what is important and then to convey that in concise manner.

- The Abstract should capture the essence of project report. Its purpose should be to enable a reader to decide whether the full report will be of interest to them. Everything important that you have done, discovered and concluded should be mentioned, but briefly and concisely.
- Maximum - 2 pages(not more than 200 words)
- Should cover outline / brief summary of the project (gist of complete project). It should highlight major points of the project such as overall purpose of the project, methodology you followed, major findings from project work., how you went about your project, what did you learn, and what you did you conclude etc.

It must contain the context/ relevance of the problem at hand, a description of what was done and a gist of the significant observations/ results.

- It's noteworthy that the abstract shall be prepared after project work is over and report is completed in all respect.
- Its good practice to mention Keywords relevant to the project work, below abstract. (approximately 5-7)

SAMPLE ABSTRACT

In the present project work, oil free, Linear Compressor, using flexure springs has been designed and developed for a household refrigerator. The moving coil type linear motor has been selected due to low inertia force and ease in design and high efficiency in controlling stroke. Mathematical simulator has been used to study the effect of various parameters such as voltage, operating frequency, moving mass and spring stiffness on the performance of linear compressor for the refrigerating system.

In the linear compressor, the flexure springs have been used instead of coil springs or leaf springs. The optimum design of flexure spring has been obtained from finite element analysis. Modal analysis of flexure springs has been carried out to determine the numbers of flexure springs necessary to achieve the resonant frequency of 50 Hz. The results obtained by modal analysis have been validated by using FFT Analyzer.

The different parts of linear compressor viz linear motor, piston, flexure spring, main body, end covers, etc. have been designed, manufactured, assembled & tested with the household refrigerator by replacing the existing reciprocating compressor. The instrumentation includes pressure gauges, temperature indicators and rotameter, used to measure the pressure, temperature and refrigerant flow respectively. The refrigeration effect performance of linear compressor and reciprocating compressor have been studied and compared experimentally with the help of the test rig. From the experimental readings, results and discussions, it has been concluded that linear compressor gives better performance than that of reciprocating compressor in terms of the required input power.

Keywords : linear compressor, linear motor, flexure spring, resonance, refrigerator.

[iii] LIST OF FIGURES :

- List of figures is important to quickly find out illustrations, drawings, photographs, graphs, and charts from the project report.
- List of figures is necessary when there are more than 2 figures in the project report.
- All figures must be labeled properly.

- List of figure should contain serial number, name of the figure and page number on which it is given.
- Figure should be placed in the respective chapter, above or below the concerned description of the figure.
- Figure should be numbered as per chapter number and figure number in sequence from that chapter. eg figure 4.3 should represent 3rd figure from chapter number 4.
- Name and number of the figure must be written below the figure.

SAMPLE LIST OF FIGURES

Figure No.	Title	Page No.
Figure 1.1	Fleming's left hand rule for direction of force	3
Figure 1.2	Working principle of linear Compressor	4
Figure 2.2	Flow chart for the numerical solution	15
Figure 3.1	Deformation due to cyclic stresses and S-N curve	39
Figure 3.2	CAD Model of moving masses in linear compressor	40

[iv] LIST OF TABLES :

- List of tables is important to quickly and easily navigate to data in your project report..
- List of tables is necessary when there are more than 2 tables in the project report.
- List of table should contain serial number, name of the table and page number on which it is given.
- Table should be placed in the respective chapter, above or below the concerned description of the table.
- Table should be numbered as per chapter number and table number in sequence from that chapter. egtable5.2 should represent 2nd table from chapter number 5.

- Name and number of the table must be written above the table.

SAMPLE LIST OF TABLES

Table No.	Title	Page No.
Table 1.1	Comparison of linear compressor with reciprocating compressor	2
Table 2.1	Simulation and experimental results for dynamic characteristics	16
Table 4.1	Standard properties of R134a from REFPROP	27
Table 5.1	Part list of the OPLC	52
Table 5.2	Comparison of natural frequencies by ANSYS & FFT analyzer	61

[v] NOMENCLATURE :

- Nomenclature is necessary, as symbols are generally used in technical project report writing. This is in order of English (i.e. Roman) letters (Uppercase followed by lowercase), Symbols in Greek letters (see Appendix for the alphabetical order of Greek letters), subscripts and superscripts used, Special Symbols, followed by acronyms (i.e., Abbreviations) if any; everything in alphabetical order.
- All entries in nomenclature should have appropriate units in SI system.

SAMPLE LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE

Abbreviation	Details
A	Cross sectional area of cylinder in m
ASHRAE	American Society of Heating, Refrigerating & Air-Conditioning Engineers

BDC	Bottom Dead Centre
C_e	Equivalent damping coefficient in Ns/m
COP	Coefficient of Performance
EER	Energy Efficient Ratio
h_g	Gap Height in motor in mm
TDC	Top Dead Centre
ρ	Density of refrigerant in kg/m ³

[vi] NUMBERING OF REPORT :

- Every page of the report other than the title page should be numbered.
- Pages of Certificate, Acknowledgement, Abstract, List of Tables, List of Figures and Nomenclature should be numbered with lower case Roman numerals (i, ii, iii, iv, ...etc.).
- From the first page of the first chapter onwards (ie from introduction), all the pages should be numbered using Hindu-Arabic numerals (1, 2, 3, ... etc.).
- The page numbers should appear at the bottom center as it is appearing in this document.

The number of chapters students need and their contents strongly depend on the topic selected and the subject matter to be presented. In general the following chapters may be included; however, it is students' own report and they have to structure it according to the flow of overall logic and organization.

[1] INTRODUCTION :

- In Introduction, the problem should be defined and introduced. The Introduction therefore contains the purpose of carrying out the project work and sufficient background material. Motivation behind this project work can also be written.
- It should include introductory information about the project and formulation of the problem that students want to address, the statement of the problem and its relevance.
- In the Introduction of a report, objectives, methodology and the scope of the project work, and the limitations of work should be included.
- It is also required to discuss the sources, methods and procedure employed in collecting and organizing the data.
- It should describe the structure of the rest of the report, indicating which chapter will address which issue ie layout of the report or paraphrased outline of the work.
- In short Introduction chapter should cover answers of following questions –what your project is about? why the project is worth doing? how the project is a good topic for fulfilling the objectives intended to accomplish the aims or goals, what is the scope of the project, who are the beneficiaries of the work done, what approach is used in carrying out the project etc.

SAMPLE INTRODUCTION

Since many years, reciprocating compressors with crank driven mechanism have been commercially used for refrigerator applications. These compressors suffer high mechanical losses during conversion from rotary to linear motion. Since many difficulties are countered in trying to increase the efficiency of reciprocating compressors, the manufacturers have paid more attention in manufacturing a new kind of compressor, the linear compressor, having free piston mechanism is one of those kinds, in which the piston is directly coupled to a linear oscillating motor. The linear compressor technology offers various advantages such as less frictional loss, less energy consumption, variable cooling power and less noise. Linear Compressor is most popular among recent compression technologies and is being used mostly for cryogenics in space applications.

Single piston linear compressor technology has been applied in electronics cooling and household refrigerators, as it has several advantages as compared to traditional compressor technology.

[2] LITERATURE REVIEW :

- The purpose of the literature review is to identify the gap in the literature / to identify information relevant to project work and the potential and known impacts of it within the project area.
- This section should include a comprehensive report of current market survey done with respect to problem. Include study of similar topics available, if any along with their pros and cons. Identify those areas where there is an absence or scarcity.
- It should be as exhaustive as possible but related to project work. It is expected to refer minimum 2 research papers from standard journals and / or standard conferences to get to know and write in literature review, the work carried out by other people in the same topic.
- Students should summarize the literature that they have read. Rather than literally copying the texts that they have read, they should present their own interpretation of the theory, abstract, conclusion read from the papers. This will help them in developing their own thinking discipline and technical language related to project work.
- In short mastering "Literature Review" will give the students the background of project topic. Students will get following info from literature review -
 - 1) What kinds of research have been done before on proposed project topic?
 - 2) What relevant kinds of studies or techniques need to be mastered for the project?
 - 3) Where is the state of the art today?
 - 4) How have others gone about trying to solve problems, students want to tackle, and in what ways will be their approach build on and vary from previous work?
- The last part of this section must contain a brief mention of the gaps in the literature and a justification for undertaking their project.
[Refer page -- -- from project handbook for sample Literature Review]

SAMPLE LITERATURE REVIEW

The aim of this literature review is to understand the performance of commercially available gasketed plate heat exchangers with specific chevron angle and plate geometry configurations to develop a Nusselt number correlation for the same. Number of research has been reported in literature on chevron angle 20° to 65 °deg in gasketed plate heat exchangers.

Fockeet *al.* (1985) established that the inclination angle between plate corrugations and the overall flow direction is a major parameter in the thermo hydraulic performance of plate heat exchangers. The observed maximum transfer rate at an angle of about 80° is explained from the observed flow patterns. At higher angles the flow pattern becomes less effective for transfer, in particular at 90° marked flow separation is observed [3].

Mehrabin and Poulter (2000) studied the local hydrodynamic and thermal characteristics of the flow between two identical APV SR3 plates and looks at the effect of corrugation angle on the performance when the plate spacing is fixed. The CFD calculations show that the inclination angle between the plate corrugations and the overall flow direction is a major parameter in the thermo hydraulic performance of plate heat exchangers [4].

Gradecket *al.* (2005) performed experiments to study effects of hydrodynamic conditions on the enhancement of heat transfer for single phase flow. These experiments have been conducted for a wide range of Reynolds numbers, ($0 < Re < 7500$) in order to obtain the different regimes from steady laminar to turbulent. Finally they have pointed out a strong relation between the wall velocity gradient and the Nusselt number. Further investigations made on two-phase and boiling flow in plate heat exchanger [5].

[3] OBJECTIVES :

- It sets a clear goal of what students want to accomplish by doing the project work.

- Students should state only the technical objectives of the project, such as “To evaluate the performance of compressor, to study the relationship between variable x and y.
- To write an objective statement, use measurable action verbs (e.g.design, test, describe, analyze, evaluate etc).
- Objectives should not be the objective of doing the final year project such as “To learn how to maintain team work”.

SAPMLE OBJECTIVES

1. Design and develop linear motor driven linear compressor using flexure springs.
2. Test linear compressor with household refrigerator and with test rig.
3. Compare Performance characteristics of linear compressor with reciprocating compressor

[4] METHODOLOGY :

- Methodology is the heart of the project work because it tells how the techniques are used to manage or evaluate any resource efficiently. It's a procedure, which ensures clearly to satisfy the requirements of project that defines, investigates, and reports on a topic relating science or technology.
- Students can write methodology by asking the following questions –
 - 1) What is the objective of the project?
 - 2) What do they want to measure? (e.g. time, storage size, current, cost, sensitivity, accuracy etc.)
 - 3) How will they perform the measurement? (e.g. built prototype)
 - 4) What are the tools required for the experiment? (e.g. simulation software or equipment such as oscilloscope, robot prototype etc.)
 - 5) How are the measurements going to be recorded? What is the procedure of the experiment?
 - 6) What error, situations, or part of the procedure that could interfere with the measurements and how to overcome them?

- 7) How do students analyze the result of the experiment? What kind of statistical tools / calculations / graphs / tables / figures could we used in order to make the data meaningful?

SAMPLE METHODOLOGY

1. Parametric analysis of linear compressor using mathematical simulator
2. Design of linear compressor.
3. Finite element analysis of flexure spring
5. Modal analysis of moving parts to achieve the resonance
6. Manufacturing and assembly of linear compressor.
7. Integration and Testing of linear compressor with household refrigerator and test rig.
8. Results, discussions and conclusions.

[5] SCOPE OF PROJECT :

- It sets a clear boundary (time, geography, environment, function etc) of project work to provide a common understanding of the project among stakeholders (students & faculties).
- Scope makes the project achievable and realistic by defining the limits and constraints of the study.

SAMPLE SCOPE OF PROJECT

In this project, linear compressor, using flexure springs will be designed and developed for household refrigerator. The mathematical simulator will be used to check the performance of linear compressor with the refrigerating system. The effect of varying parameters such as voltage, operating frequency, moving mass and spring stiffness on the performance of linear compressor will be studied. As linear Compressor is a resonant machine, resonant is necessary to get maximum amplitude of piston stroke with less motor force. So modal analysis of moving parts will be carried out to

determine the number of flexure springs necessary to achieve the resonant frequency of 50 Hz. The linear compressor will be then integrated and tested with household refrigerator by replacing the reciprocating compressor. The temperature drop will be measured by multi point temperature indicator and refrigerant mass flow rate will be measured by attaching rotameter at the outlet of condenser. A separate test rig will be developed for determining performance characteristics of linear compressor, as it would be difficult to control and modify operating conditions by integrating linear compressor with household refrigerator.

[6] RESULTS & DISCUSSIONS :

- Students should get the results of the study / experiments in the forms of graphs or tables that summarize the measurements (data).
- Students should write statements showing few variables of interest change due to changes in another variables and what trend is expected from this results / graphs.
- Students should obtain relationship between different variables & parameters, interpretation of the observed trends, comparison between theory & experiment, comparison with previous literature, limitations, justifications of prior assumptions made and inconsistencies.
- The discussions should logically lead to inferences and conclusions as well as scope for possible further future work.

SAMPLE RESULTS AND DISCUSSIONS

The refrigeration performance with linear compressor and reciprocating compressor has been studied experimentally with the help of test rig. Based on the data from test rig, various performance characteristics have been plotted by varying different operating parameters.

The effect of evaporating temperature has been studied for COP. Figure 5.4 shows COPs, measured for linear compressor and reciprocating compressors for different evaporating temperatures. The condenser temperature has been kept constant at 45 °C. From the graphs shown, it has been seen that COP of linear compressor is higher than that of reciprocating compressor at all evaporating temperatures.

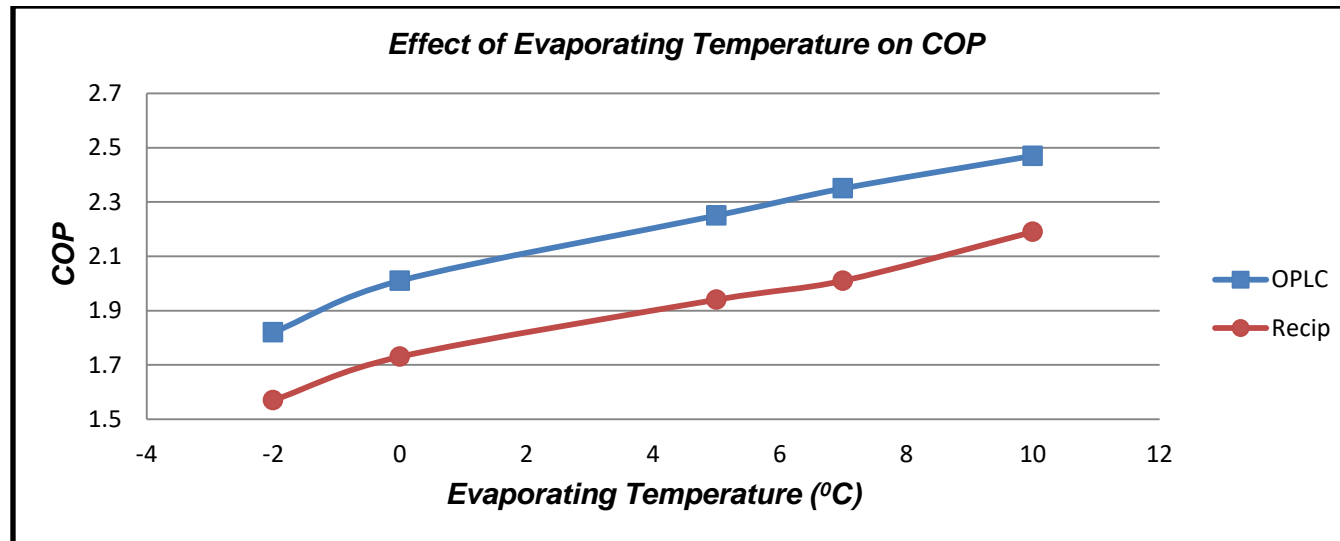


Figure 5.4 COP Vs. Evaporating Temperature [at T_c 45°C]

[7] CONCLUSIONS :

- This should be the final chapter of the project report.
- Conclusion should be written effectively in such a way that it should bring the reader back to the main objective.
- Conclusion section should include significant findings relevant to the aims and objectives of the project and a restatement of its main results, i.e. what has been learnt and what has been achieved.
- It should be derived from the logical analysis and interpretations, presented in the results & discussions chapter and clearly enumerated each point separately.
- Concluding statements should be written in third person point of view.

eg - From the results of modal analysis, it has been concluded that 30 number of flexure springs are required to achieve the resonance of linear compressor.

SAMPLE CONCLUSIONS

1. From the results of modal analysis using ANSYS software, which have been validated by FFT analyzer, it has been concluded that 30 number of flexure springs are required to achieve the resonance of opposed piston linear compressor at 50 Hz.
2. Performance characteristics of linear compressor and reciprocating compressor have been compared and it has been observed that linear compressor gives better performance characteristics than that of reciprocating compressor in terms of input power required. At an evaporator temperature of -2°C and a condenser temperature of 45°C , the COP of linear compressor is 1.82 and the COP of reciprocating compressor is 1.57, which shows 13.7 % increase in the COP at the cooling capacity of 309 W.

[8] SCOPE FOR FUTURE WORK :

- Students should write what is scope and desirability of further work on the problem, applications, potential areas, which he / she could not work on it due to constraints.

SAMPLE SCOPE FOR FUTURE WORK

The present project work was carried out to check the performance of linear compressor for household refrigerator. However due to challenges in geometrical and operating parameters of linear compressor, there is a lot of scope to improve performance of linear compressor to commercialise it by

1. Investigating inherent capacity modulation in linear compressor and to reduce energy consumption in refrigeration application.
2. Designing Opposed Piston linear Compressor which would have practically zero clearance volume like Single Piston linear Compressors.

[9] APPENDIX / ANNEXURE :

- Appendices are useful for those things that students consider important, but that do not fit in the main presentation of their work and breaks the regular flow.
- The contents of an annexure are essentially those, which support or elaborate the matter given in the main text. The matter, which is essential but will unnecessarily divert the attention of the reader from the main problem, is generally placed in the Annexure.
 - (a) calculation sheets; (b) lengthy derivations of mathematical formulae; (if that is not the project itself)
 - (c) supplementary details of instructions; (d) flow charts; (e) computer programmes; (f) assembly and part drawings
- Appendices are numbered as Appendix I, Appendix II, etc. or using capital English letters e.g. Appendix A, Appendix B, etc.

[10] REFERENCES :

- All references cited (mentioned) in the text-body should be there in the Reference list.
- **For giving reference of an article in a journal:** name of the authors, title of an article, name of the journal, volume (issue number), range of pages, and year. (Abraham, J., F.V. Bracco, and R.D. Reitz (1985), "Comparison of Computed and Measured Premixed Charge Engine Combustion", Combustion and Flame, Vol. 60, 309 – 322.)
- **For an article in conference proceedings:** name of the authors, title, name of conference, editors (if present), range of pages and year. (Kedare S.B. 'Optics, Design, Performance and Economics of the Dynamic Fresnel Paraboloid Reflector Concentrator Dish with Point Focus for High Temperature Solar Thermal Applications', Proceedings of National Renewable Energy Convention '99, Sawhney R.L. (Ed.), 9-15, 1999.)
- **For giving reference of a book:** name of the authors, title, publisher, city of publication and year of publication. (Anderson, J.D, Computational Fluid Dynamics. McGraw Hill, Singapore, 1995)
- **For giving reference of a web page :** <https://www.coursera.org/>

SAMPLE REFERENCES

- [01] Jong Kwon Kim, Ji Hwan Jeong, “Dynamic response of a capacity modulated linear compressor to supply voltage disturbances”, International Journal of Refrigeration 40 **(2014)** pp 84-96.
- [02] Yunho Hwang, Reinhard Radermacher, Hwang & Hyeong Kook Lee, “Performance potential of CO₂ cycle with a linear compressor” , International RAC conference at Purdue, **(2006)**.
- [03] Sadik K. and Hongtan Liu, (2002) “Heat Exchanger Selection, Rating, and Thermal Design”, Second Edition 389-390.
- [04] Kuppan T (2013) “Heat Exchanger Design Handbook “, Second Edition. 419
- [05] Catalogue-“Alfa-Laval”, M3-Plate Heat Exchanger . Available at:
<http://www.alfalaval.com/solution-finder/products/gasketed-industrial-range/phe/Documents/M3.pdf>

Annexure – VII

Programme Outcomes

POs :

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

PO2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the 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

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

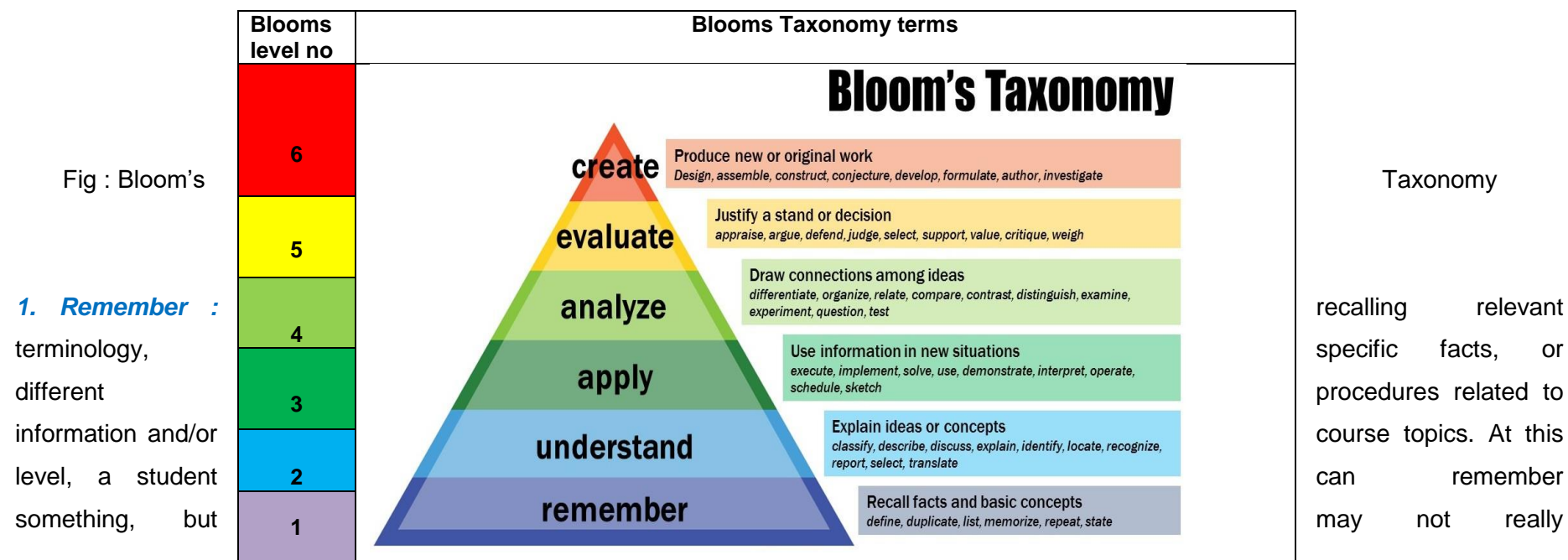
PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Annexure – VIII

Bloom's Taxonomy Levels

Bloom's Taxonomy: Learning Domains

- Any given task tends to be generally dominant in one of the three psychological domains: cognitive, affective, or psychomotor.
- The **cognitive domain** deals with a person's ability to process and utilize information in a meaningful way.
- The **psychomotor domain** involves manipulative or physical skills.
- The **affective domain** relates to the attitudes and feelings that result from or influence the learning process.
- This classification is for focus and convenience; all the three dimensions are involved to varying degrees in all intended learning experiences and activities.



understand it.

2. Understand : the ability to grasp the meaning of information (facts, definitions, concepts, etc.) that has been presented.

3. Apply : being able to use previously learned information in different situations or in problem solving.

4. Analyze : the ability to break information down into its component parts. Analysis also refers to the process of examining information in order to make conclusions regarding cause and effect, interpreting motives, making inferences, or finding evidence to support statements/arguments.

5. Evaluate : being able to judge the value of information and/or sources of information based on personal values or opinions.

6. Create : the ability to creatively or uniquely apply prior knowledge and/or skills to produce new and original thoughts, ideas, processes, etc. At this level, students are involved in creating their own thoughts and ideas.

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