Program Name	: All Branches of Diploma in Engineering and Technology.
Program Code	: CE/CR/CS/CH/CM/CO/IF/CW/DE/EJ/EN/EQ/ET/EX/IE/
	MU/EE/EP/EU/IS/IC/AE/FG/ME/PG/PT/DC/TX/TC
Semester	: Fifth
Course Title	: Capstone Project – Planning
Course Code	: 22058

1.   RATIONALE

To develop "learning to learn" skill in the students so that they continue to acquire on their own new knowledge and skills from different 'on the job experiences' during their career in industry. An educational 'project' just does that and may be defined as *'a purposeful student activity, planned, designed and performed by a student or group of students to solve/ complete the identified problem/task, which require students to integrate the various skills acquired over a period to accomplish higher level cognitive and affective domain outcomes and sometimes the psychomotor domain outcomes as well'*. Projects mainly serve this purpose of developing learning-to-learn skills with an aim to develop the following attributes in the students:

a) Initiative, confidence and ability to tackle new problems
b) Spirit of enquiry
c) Creativity and innovativeness
d) Planning and decision making skills
e) Ability to work in a team and to lead a team
f) Ability of self directed learning which is required for lifelong learning
g) Persistence (habit of not giving up quickly and trying different solutions in case of momentary failures, till success is achieved)
h) Resourcefulness
i) Habit of keeping proper records of events and to present a formal comprehensive report of their work.
   (Rational should not contain attributes and these attributes are repeated in CO s therefore may be eliminated)

2.   COMPETENCY

The course should be taught and implemented with the aim to develop the required course outcomes (COs) so that students will acquire following competency needed by the industry:

- **Plan innovative/creative solutions independently and/or collaboratively to integrate various competencies acquired during the semesters to solve/complete the identified problems/task/shortcomings faced by industry/user related to the concerned occupation.**

3.   COURSE OUTCOMES (COs)

The following could be some of the major course outcomes depending upon the nature of the projects undertaken. However, in case of some projects few of the following course outcomes may not be applicable.

a) Write the problem/task specification in existing systems related to the occupation.
b) Select, collect and use required information/knowledge to solve the problem/complete the task.
c) Logically choose relevant possible solution(s).
d) Consider the ethical issues related to the project (if there are any).
e) Assess the impact of the project on society (if there is any).

    f)   Prepare 'project proposals' with action plan.

    g)   Communicate effectively and confidently as a member and leader of team.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme															
					Theory							Practical							
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total				
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min			
--	--	2	2	--	--	--	--	--	--	--	25@	10	25	10	50	20			

@ - Internal Examination
Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment

5.   Capstones Project

One of the dictionary meaning is the 'crown' or the stone placed on top of the building structure like 'kalash on top of Temples and Mosques' or 'Cross on top of churches'. Capstone projects are culminating experiences in which students synthesize the competencies acquired over whole programme. In some cases they also integrate cross-disciplinary knowledge. Thus Capstone projects prepare students for entry into a career and can be described as a 'rite of passage' or 'minimal threshold' through which participants change their status from student to graduate. A capstone project therefore should serve as a synthesis — reflection and integration— to bridge the real-world preparatory experience to real life. Thus capstone project should have emphasis on integration, experiential learning, and real-world problem solving and hence these projects are very important for students. To develop the highly essential industry oriented skills and competencies in the students, the capstone projects are offered in the last two semesters to serve for following purposes:

    a)   Integrate the competencies acquired by the students in the previous and current semesters.

    b)   Provide opportunities for interdisciplinary work in tackling problems likely to be faced by them in industry which are exciting and challenging.

6.   Capstone Project Planning

Students are supposed to find out a suitable project and prepare a detailed plan in fifth semester so that it can be executed smoothly in sixth semester. The main characteristic of any project whether small or big is that it requires simultaneous application of various types of skills in the different domains of learning. In the process of arriving at a particular solution, the student must be required to make a number of decisions after scrutiny of the information s/he has accumulated from experiments, analysis, survey and other sources.

    The projects will have a detailed project proposal, which must be executed or implemented within the time allocated, simultaneously maintaining a project diary periodically monitored by the teacher. A detailed project report is to be prepared as project progresses, which has to be submitted after the project is over. Project diary will be assessed by teacher

    During the guidance and supervision of the project work, teachers' should ensure that students acquire following *learning outcomes* (depending upon the nature of the project work some of these learning outcomes may not be applicable):

    a)   Identify the problems in the area related to their programme.

    b)   Identify the information suggesting the cause of the problem and possible solutions.

    c)   Assess the feasibility of different solutions and the financial implications.

    d)   Collect relevant data from different sources (books/internet/market/suppliers/experts etc. through surveys/interviews).

e) Prepare required drawings and detailed plan for execution of the work.
f) Prepare seminar presentations to present findings/features of the project.

During the guidance and supervision of the project work, teachers' should ensure that the given rubrics are observed

If students are able to acquire these *learning outcomes*, then they would be able to acquire the COs as discussed in section 3.

7. Scopes of Projects
Scope of the project work should be decided based on following criteria:
   a) **Relation to diploma programme curriculum:**
   b) **Abilities possessed by the group of students:**
   c) **Resources Available:**
   d) **Suggested Type of Capstone Projects**
In general, the projects that the students can take up could be of the following types;
   i. Design projects
   ii. Prototype (design, make, test and evaluate).
   iii. Field works: This could include surveys, using equipment, charting data and information from visual observation and prepare a case study.
   iv. Fabrication of some equipment/machine etc.
   v. Construction of some structure.
   vi. Application development using hardware/software.

The best practice is that teacher should guide students about the above factors to be considered for choosing the project and based on these factors students should do the ground work and identify the possible projects and teachers should work as only facilitator and Guide in final selection of the project title and its scope.

8. GUIDELINES FOR UNDERTAKING A PROJECT
The selection of the *Capstone Project title* must have emphasis to attain with respect to CO's , PO's and PSO's of the programme. The students will then work on the identified problem/task through a rigorous process of understanding and analyzing the problem, conducting a literature search, deriving and discussing under the supervision of project guide. The project team will prepare the **Project Proposal** with the following sub-titles:
   a) Rationale (one page)
   b) Introduction
   c) Literature Survey
   d) Problem Definition
   e) Proposed Methodology of solving Identified problem
   f) Resources and consumables required.
   g) Action Plan (sequential list of activities with probable dates of completion)
Project Idea shall be approved by the teacher and HOD. The student will begin to maintain a dated Project Diary comprising of 15-20 pages for the whole semester. This diary should be assessed by teacher timely.
Suggested Project Activities to be performed in Semester V (Project Planning)
   a) Finalization of project team and allocation of project guide
   b) Identify project domain /area
   c) Submission of Project Proposals/ Project Ideas by the project team
   d) Finalization of Project Idea by project guide and HOD
   e) Weekly interaction of project team and project guide
   f) Project team should perform activities as mentioned in criteria no 8 and record in project diary (appendix D)
   g) Before the end of semester V, Project team should prepare and submit Project Planning Report as mentioned in criteria no 9.

h) Project team should prepare and submit detailed schedule of Project Execution and Report writing of Semester VI in consultation with project guide.

9. Project Planning Report

At the end of fifth Semester, the student will prepare a Semester V ,**Project Planning Report** with the following sub-titles:

- Certificate (in the Format given in this document as annexure A)
- Acknowledgements
- Abstract (in one paragraph not more than 150 words)
- Content Page
- Chapter-1 Introduction and background of the Industry or User based Problem
- Chapter-2 Literature Survey for Problem Identification and Specification,
- Chapter-3 Proposed Detailed Methodology of solving the identified problem with action plan
- References and Bibliography

Note: The report should contain relevant diagrams and figures, charts.

10. ASSESSMENT OF CAPSTONE PROJECT – PLANNING

Like other courses, assessment of Project work also has two components, first is progressive assessment, while another is end of the term assessment. The faculty will undertake the progressive assessment to develop the COs in the students. They can give oral informal feedback about their performance and their interpersonal behaviour while guiding them on their project work every week. There will also be regular progressive assessment by the teacher as per the criteria no 12 and 13 on the basis of rubrics mentioned in **Appendix –C** and in the formats as shown in **Appendix-B** and also for the end-of-semester examination.

11. PROGRESSIVE ASSESSMENT (PA) GUIDELINES AND CRITERIA

The assessment of the students in the fifth semester Progressive Assessment (PA) for 25 marks is to be done based on following criteria.

S. No.	Criteria	Marks
1	**Problem Identification/Project Title**	
2	**Industrial Survey and Literature Review**	
3	**Punctuality and overall contribution**	**10**
4	**Project Diary**	
5	**Report writing including documentation.**	**10**
6	**Presentation**	**05**
	Total	25

12 END-SEMESTER-EXAMINATION (ESE) ASSESSENT CRITERIA

The assessment of the students in the fifth semester end-semester-examination (ESE) for 25 marks is to be done based on following criteria. This assessment shall be done by the HOD/Senior Faculty in the presence of Project guide.

S. No.	Criteria	Marks
1	**Report writing including documentation.**	10
2	**Presentation**	15
	Total	25

Annexure- A
CERTIFICATE

This is to certify that Mr./Ms...

from (institute).. having Enrolment No: ....

has completed *Project Planning Report* having title ....

Individually/ in a group consisting of........................ Candidates under the guidance of the

Faculty Guide.

Name & Signature of Guide...

.Name & Signature of HOD: ....

Appendix–B
Evaluation Sheet (ESE)
for
Capstone Project Planning

Name of Student: ....Enrollment No............................

Name of Program... Semester: ....

Course Title and Code:..

Title of the Capstone Project: ....

A. POs addressed by the Capstone Project (Mention only those predominant POs)

    a) ....

    b) ....

    c) ....

    d) ....

B. COs addressed by the Capstone Project (Mention only those predominant POs)

    a) ....

    b) ....

    c) ....

    d) ....

C. Other learning outcomes achieved through this project

1. Unit Outcomes (Cognitive Domain)

a) ....

b) ....

c) ....

d) ....

2. Practical Outcomes (in Psychomotor Domain)

a)..

b) ....

c)..

d) ....

3. Affective Domain Outcomes

a) ....

b) ....

c) ....

d) ....

S. No.	Criteria	Max Marks	Marks Obtained
	PROGRESSIVE ASSESSMENT (PA) Sheet		
1	**Problem Identification/Project Title**		
2	**Industrial Survey and Literature Review**	**10**	
3	**Punctuality and overall contribution**		
4	**Project Diary**		
5	**Report writing including documentation.**	**10**	
6	**Presentation**	**05**	
	Total	**25**	

Name and Signature of Project Guide:

Appendix–C

SUGGESTED RUBRIC FOR ASSESSMENT OF CAPSTONE PROJECT

S. No.	Characteristic to be assessed	Poor	Average	Good	Excellent
1	Problem/Task Identification (Project Title)	Relate to very few POs Scope of Problem not clear at all	i. Related to some POs ii. Scope of Problem/Task vague	i. Take care of at-least Three POs ii. Scope of Problem/task not very specific	i. Take care of more than three POs ii. Scope of problem/task very clear
2	Literature Survey /Industrial Survey	Not more than ten sources (primary and secondary), very old reference	At-least 10 relevant sources, at least 5 latest	At –least 15 relevant sources, most latest	About 20 relevant sources, most latest
3	Project proposal	Methods are not appropriate, All steps not mentioned, Design of prototype not started (if applicable).	Appropriate plan but not in much detail. Plan B for critical activities not mentioned. Time line is not developed. Design of Prototype is not complete. (if applicable)	Appropriate and detailed plan with Plan B for critical activities mentioned, but clarity is not there in methods, time line is given but not appropriate. Design of prototype is not detailed (if applicable)	Appropriate and detailed plan with Plan B for critical activities mentioned, clarity in methods with time line, Detailed design of prototype (if applicable)

S. No.	Characteristic to be assessed	Poor	Average	Good	Excellent
4	**Project Diary**	Entries for most weeks are missing. There is no proper sequence and details are not correct.	Entries for some weeks are missing, details are not appropriate, not signed regularly by the guide.	Entries were made every week but are not in detail. Signed and approved by guide every week	Entries were made every week in detail, signed and approved by guide every week
5	**Final Report Preparation**	Very short, poor quality sketches, Details about methods, material, precaution and conclusions omitted, some details are wrong	Detailed, correct and clear description of methods, materials, precautions and	Conclusions. Sufficient Graphic Description.	Very detailed, correct, clear description of methods, materials, precautions and conclusions. Enough tables, charts and sketches
6	**Presentation**	Major information is not included, information is not well organized .	Includes major information but not well organized and not presented well	Includes major information and well organized but not presented well	Well organized, includes major information ,well presented
7	**Question and Answer session**	Could not reply to considerable number of question.	Replied to considerable number of questions but not very properly	Replied properly to considerable number of question.	Replied to most of the questions properly

Appendix D
Suggestive Project Diary format

Week no:
Activities planned:
Activities Executed:
Reason for delay if any
Corrective measures adopted
Remark and Signature of the Guide