

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Programme Name/s | : Automobile Engineering./ Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Automation and Robotics/<br>Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/<br>Computer Technology/<br>Computer Engineering/ Civil & Rural Engineering/ Construction Technology/<br>Computer Science & Engineering/<br>Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./<br>Electrical and Electronics Engineering/ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/<br>Computer Hardware & Maintenance/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/<br>Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/<br>Production Engineering/<br>Computer Science/ Electronics & Computer Engg. |
| Programme Code   | : AE/ AI/ AN/ AO/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DE/ DS/ EE/ EJ/ EK/ EP/ ET/ EX/ HA/ IE/ IF/ IH/ LE/ ME/ MK/ PG/ SE/ TE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Semester         | : Sixth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Course Title     | : CAPSTONE PROJECT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Course Code      | : 316004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## I. RATIONALE

Capstone projects in engineering study are considered important as it allow students to integrate and apply the knowledge and skills acquired throughout their academic program and effectively demonstrating their learning of programme by tackling a real-world problem, ultimately keeping them well prepared for the job market. The capstone project is usually the final assignment and plays a vital role in preparing students for the world of work to its practical applications and ability to help hone students' professional knowledge and skills. Normally, capstone projects are developed in collaboration with industries or businesses, providing students with valuable insights. Capstone projects has been considered as an integral part of diploma curriculum. It helps learners to perform and demonstrate skills gained due to early courses of Diploma study independent. Therefore, this is considered as a course of final year/semester study.

## II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Apply professional skills for solving , executing and demonstrating solutions to real-world problems

## III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Elaborate the identified field problem from the perspective of project work at institute.
- CO2 - Conduct feasibility & viability analysis (using data collection, experiments, Simulation , Coding) to validate required resources, cost, support of the project work.
- CO3 - Apply the acquired knowledge and skills in providing solutions to the real field/industrial problems.
- CO4 - Present Project and its output/ findings / achievements alongwith its exhibits.

## IV. TEACHING-LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title     | Abbr | Course Category/s | Learning Scheme          |    |    |     |     | Credits | Assessment Scheme |        |       |       |   |                  |     |       |     |             |     |     | Total Marks |  |
|-------------|------------------|------|-------------------|--------------------------|----|----|-----|-----|---------|-------------------|--------|-------|-------|---|------------------|-----|-------|-----|-------------|-----|-----|-------------|--|
|             |                  |      |                   | Actual Contact Hrs./Week |    |    | SLH | NLH |         | Paper Duration    | Theory |       |       |   | Based on LL & TL |     |       |     | Based on SL |     |     |             |  |
|             |                  |      |                   |                          |    |    |     |     |         |                   |        |       |       |   | Practical        |     |       |     |             |     |     |             |  |
|             |                  |      |                   | CL                       | TL | LL |     |     |         |                   | FA-TH  | SA-TH | Total |   | FA-PR            |     | SA-PR |     | SLA         |     |     |             |  |
|             |                  |      |                   |                          |    |    | Max | Min |         |                   |        |       |       |   | Max              | Min | Max   | Min | Max         | Min |     |             |  |
| 316004      | CAPSTONE PROJECT | CPE  | INP               | -                        | -  | 2  | 2   | 4   | 2       | -                 | -      | -     | -     | - | 50               | 20  | 50#   | 20  | 50          | 20  | 150 |             |  |

## V. General guidelines for PROJECT WORK

- The Project- problems must be related to the programme or may be interdisciplinary, based on the industry expected outcomes.
- The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work they would like to execute.
- Project titles are to be finalized in co-ordination/consultation with the Faculty mentor. However, faculty may form a team of students as per specific roles- Literature survey/data collection, data Analysts, model/prototype developers, testers, Project managers using IoTs ITES and software /application development. Study type project is NOT advisable.
- Project must be assigned to a group of 3-4 students under the guidance of identified faculty mentor.
- Students are required to prepare a prototype/working model/software of the Project and simultaneously prepare a report.
- Students shall Submit One Hard copy and one Soft copy each of Project Report and soft-copy of the project code or the working model.
- Students must maintain a project execution diary having the progress steps and details. The concerned faculty should check the diary on a weekly basis and accordingly interact with students based on the progress shown and keep proper record with feedback if any.
- Project shall address National Thrust area such as Environment, Digitization, Automation, sustainability and similar domains.
- Student shall try to use the national and international standards wherever possible ( processes / materials / equipments etc .. )

## VI. Project facilitation guidelines:

Once the Project statement has been finalized and allotted to the students, the Faculty Mentor role is very important as guide, motivator, catalyser to promote learning and sustain the interest of the students. At the same time the Faculty Mentor is not expected to guide the students on each step, otherwise it will curb the creativity of the students-group. The Faculty Mentor has to work as a mentor. Following should be kept in mind while facilitating the project at the institute:

**1.Project orientation cum -briefing:** the project should be relevant to the curriculum of the programme. The project shall be cost effective taking safety aspects, ethical issues, environmental issues and confidentiality as per expectation of industry(if any) into consideration, The work may be industry Sponsored.

**2.Information search and data collection:** the information and data should be realistic and relevant to the problem /project. Hypothetical data is not to be taken into consideration.

**3.Implementation and Monitoring:** The project must have important steps /milestones to achieve as per the time frame/action plan prepared by students and faculty. The monitoring mechanism such as daily/weekly dairy (**Format given below**) must be clearly explained and delineated for the students.

## VII.Criteria of Assessment /Evaluation of Project work

### A. Formative Assessment (FA) criteria

The **Formative Assessment (FA)** of the students for 50 marks is to be done based on following criteria.

**Appropriate RUBRICS may be used for assessment**

#### Rubrics for Assessment of the team

| Sr.No. | Criteria                                                    | Marks |
|--------|-------------------------------------------------------------|-------|
| 1      | Project Selection & Problem definition                      | 05    |
| 2      | Literature survey and data collection/ Gathering            | 05    |
| 3      | Design / concept of project/ Working - Execution of Project | 10    |
| 4      | Stage wise progress as per Action plan/milestone            | 05    |
| 5      | Quality Report Writing                                      | 05    |

#### Rubrics for Individual Assessment

| Sr.No. | Criteria                      | Marks |
|--------|-------------------------------|-------|
| 1      | Contribution as a team member | 05    |
| 2      | Depth of Knowledge            | 10    |
| 3      | Presentation                  | 05    |

### B. Summative Assessment Criteria

- The summative assessment for 50 marks is to be done and based on following criteria. This assessment shall be done by the faculty mentor and External examiner.

| Sr.No. | Criteria                                                   | Marks |
|--------|------------------------------------------------------------|-------|
| 1      | Capstone Project Completion as per plan                    | 10    |
| 2      | Project related Requirement Analysis & Designing           | 10    |
| 3      | Developing a Solution with proper justifications, Teamwork | 10    |
| 4      | Project Report Writing                                     | 10    |
| 5      | Project Presentation                                       | 10    |

( **NOTE :** Team based and Individual performance based summative assessment may include Innovativeness , Technology used , user friendliness , cost effectiveness , society benefits etc..)

## SUGGESTED RUBRIC FOR SUMMATIVE ASSESSMENT OF CAPSTONE PROJECT

| PROJECT ASSESSMENT        |           |      |      |      |
|---------------------------|-----------|------|------|------|
| Project Title:            |           |      |      |      |
| Project Assessment Rubric |           |      |      |      |
| Performance               | Excellent | Good | Fair | Poor |

| Criteria                                                    | 9-10 marks.                                                                                                   | 6-8 marks.                                                                                   | 4-5 marks.                                                                      | 0-3 marks                                                        |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------|
|                                                             | Excellent                                                                                                     | Good                                                                                         | Fair                                                                            | Poor                                                             |
| Capstone Project Completion                                 | The project is completed as per tasks described in synopsis.                                                  | The project is completed but require minor modifications.                                    | The project is completed but require several modifications.                     | The project is not completed as per tasks described in synopsis. |
| Project related Requirement Analysis & Designing            | Effectively contributed in requirement analysis and designing.                                                | Partially Contributed in requirement analysis and designing.                                 | Attempted to contribute in requirement analysis and designing                   | No contribution in requirement analysis and designing.           |
| Developing a Solution with proper justifications , Teamwork | Developed the critical solution modules with Innovation, optimized design and worked very well with the team. | Developed some solutions with higher complexity and worked well with the team.               | Attempted to develop few solutions and worked with the team.                    | No contribution in developing a solution and in the team.        |
| Project Report Writing                                      | Worked very well to submit an excellent project report .                                                      | Worked well to submit the project report with covering all the aspects of a standard report. | Tried to submit the project report but standard of report was not satisfactory. | No contribution in project report writing.                       |
| Project Presentation                                        | Presented the project work flawlessly.                                                                        | Presented the project work very nice.                                                        | Presented the project work not so well.                                         | Presentation skill is not up to the mark.                        |
| Project Group Members                                       |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
| ROLL NUMBER/Enrollment Number                               |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
| NAME                                                        |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
|                                                             |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
|                                                             |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
|                                                             |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
|                                                             |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
|                                                             |                                                                                                               |                                                                                              |                                                                                 |                                                                  |
| Comments (if any)                                           |                                                                                                               |                                                                                              |                                                                                 |                                                                  |

**NOTE :** “ These are suggestive rubrics Faculty mentor and external examiner may frame different rubrics as per Programme need and assigned Project work “

### C. Self Learning Assessment

Self Learning Assessment

Max Marks -50

| Sr.No. | Criteria                                                                            | Max Marks | Marks Obtained |
|--------|-------------------------------------------------------------------------------------|-----------|----------------|
| 1      | Project Selection & Problem definition                                              | 10        |                |
| 2      | Literature survey and data collection/ Gathering                                    | 05        |                |
| 3      | Design / concept of project/ Working - Execution of Project                         | 15        |                |
| 4      | Stage wise progress as per Action plan/milestone/ psychomotor motor skills acquired | 10        |                |
| 5      | Quality Report Writing                                                              | 10        |                |

### VIII. CO-PO Mapping

CO-PO mapping will vary project wise and shall be prepared by concerned faculty for the given project

### IX. Typographical instructions/guidelines for Project report writing

Following is the suggestive format for preparing the Project report. Actual report may differ slightly depending upon the nature of industry. The training report may contain the following.

- The PROJECT report shall be computer typed (English- British) and printed on A4 size paper.
- Text Font -Times New Roman (TNR), Size-12 point
- Subsection heading TNR- 12 point bold normal
- Section heading TNR- 12 capital bold
- Chapter Name/ Topic Name – TNR- 14 Capital
- All text should be justified. (Settings in the Paragraph)
- The report must be typed on one side only with double space with a margin 3.5 cm on the left, 2.5 cm on the top, and 1.25 cm on the right and at bottom.
- The training report must be hardbound/ Spiralbound with cover page in black colour. The name of the candidate, diploma (department), year of submission, name of the institute shall be printed on the cover [Refer sample sheet (outer cover)]
- The training report, the title page [Refer sample sheet (inner cover)] should be given first then the Certificate followed by the acknowledgment and then contents with page numbers.

### X. Project Report

On completion of the project work, every student will submit a project report which should contain the following:

- Cover Page (as per annexure 1)
- Title page (as per annexure 2)
- Certificate by the Guide (as per annexure 3)
- Acknowledgment (The candidate may thank all those who helped in the execution of the project.)
- Abstract (It should be in one page and include the purpose of the study; the methodology used.)
- Table of Contents (as per general guidelines): Detailed description of the project (This should be split in various chapters/sections with each chapter/section describing a project activity in totality).

Chapter–1 Introduction (background of the Industry or User based Problem/Task)

Chapter–2 Literature Survey (to finalize and define the Problem Statement)

Chapter–3 Scope of the project

Chapter–4 Methodology/Approach, if any

Chapter-5 Details of designs, working and processes

Chapter-6 Results and Applications

- Conclusion

- References (The listing of references should be typed 2 spaces below the heading “REFERENCES” in alphabetical order in single spacing left – justified. It should be numbered consecutively (in square [ ] brackets, throughout the text and should be collected together in the reference list at the end of the report. The



references should be numbered in the order they are used in the text. The name of the author/authors should be immediately followed by the year and other details). Typical examples of the references are given below:

**NOTE:**

1. Project report must contain only a relevant and short mention – technology or platform or tools used. It must be more focussed on project work and its implementation
2. Students can add/remove/edit chapter names as per the discussion with their guide

**Formats****Project Report**

“Project Title-----”

as a partial fulfilment of requirement of the  
**THIRD YEAR DIPLOMA IN**

Submitted by

|                   |                   |
|-------------------|-------------------|
| 1)Name Of Student | Enrollment Number |
| 2)Name Of Student | Enrollment Number |
| 3)Name Of Student | Enrollment Number |
| 4)Name Of Student | Enrollment Number |

Are the bonafide on  
**FOR THE ACADEMIC YEAR**

20----20---

(H.O.D)

(Principal)

(Internal Guide)

(External Examiner)

Department Name

(If NBA Accredited mention that )

**Institute Name****(An Affiliated Institute of Maharashtra State Board of Technical Education)****Table of Contents**

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**Note:**

**\*Students can add/remove/edit chapter names as per the discussion with their guide**

Annexure

PROJECT DIARY (Weekly/Daily)

Name of the Student : \_\_\_\_\_

Name of Guide (Faculty ) : \_\_\_\_\_

Enrollment Number : \_\_\_\_\_ Semester: \_\_\_\_\_ Project batch Number : \_\_\_\_\_

WEEK : \_\_\_\_\_

| Date      | Activity carried out (Details) | Achievement of mile stone/step as per plan | Remark of Faculty |
|-----------|--------------------------------|--------------------------------------------|-------------------|
| Monday    |                                |                                            |                   |
| Tuesday   |                                |                                            |                   |
| Wednesday |                                |                                            |                   |
| Thursday  |                                |                                            |                   |
| Friday    |                                |                                            |                   |
| Saturday  |                                |                                            |                   |

Dated Signature of Faculty

Dated Signature of HOD



MSBTE LOGO    INST LOGO

Certificate

*This is to certify that*

*Mr./Ms.*  *bearing examination seat No.*  *has*

*Satisfactorily completed his/her **PROJECT** entitled*

*Along with his/her batchmates in partial fulfillment for the*

*Diploma Course in*

**< PROGRAMME NAME >**

*Of the **Maharashtra State Board of Technical Education** at our Polytechnic during the Academic Year 20 -20 .*

*The Project is completed by a group consisting of  Persons under the guidance of the Faculty Guide*

|                                                  |                                                                |                                                         |
|--------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------|
| <b>Faculty Name and Signature<br/>(Internal)</b> | <b>Faculty Name and Signature<br/>(External if applicable)</b> | <b>HOD Name and Signature with<br/>Department Stamp</b> |
| <b>Date and Time</b>                             |                                                                |                                                         |