

## **Regulation -23**

(Under New Education Policy)

Academic Course Credit System and Evaluation Scheme  
**B.Tech. Mechanical Engineering (Working Professionals) Program**  
(Second Year)



**DEPARTMENT OF MECHANICAL ENGINEERING**  
**Sardar Patel College of Engineering, Mumbai**

**Scheme for Second Year B.Tech. in Mechanical Engineering (Working Professionals) with Minor in [\*\*\*\*], (SEMESTER-III)**  
**under Regulation-23 Academic Year 2026-27**

| Sr. No.                | Course Name                                   | Code      | Course Plan per Week (Hrs) |   |   | SL/ Sem. | Credits | In semester Evaluation (Points) |            |    | End Semester Evaluation (Points) |            | End semester weightage (%) | Total Points |
|------------------------|-----------------------------------------------|-----------|----------------------------|---|---|----------|---------|---------------------------------|------------|----|----------------------------------|------------|----------------------------|--------------|
|                        |                                               |           | L                          | P | T |          |         | Mid Term                        | Time (Hrs) | IE | Points                           | Time (Hrs) |                            |              |
| Core Courses           |                                               |           |                            |   |   |          |         |                                 |            |    |                                  |            |                            |              |
| 1                      | Linear Algebra and Vector Calculus            | ES-BTM301 | 2                          | 0 | 1 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 2                      | Thermodynamics                                | PC-BTM302 | 3                          | 0 | 1 | 64       | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 3                      | Material and Manufacturing Science            | PC-BTM303 | 3                          | 0 | 0 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 4                      | Strength of Materials                         | PC-BTM304 | 3                          | 0 | 0 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 5                      | Computer-Aided Mechanical Drawing             | PC-BTM305 | 1                          | 0 | 3 | 64       | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Laboratory Courses     |                                               |           |                            |   |   |          |         |                                 |            |    |                                  |            |                            |              |
| 6                      | Material and Manufacturing Science Laboratory | PC-BTM353 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| 7                      | Strength of Materials Laboratory              | PC-BTM354 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| 8                      | Machine Shop Practice                         | PC-BTM355 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| Value Education Course |                                               |           |                            |   |   |          |         |                                 |            |    |                                  |            |                            |              |
| 9                      | Health Safety and Sustainable Environment     | VE-BTM001 | 2                          | 0 | 0 |          | 2       | 30                              | 1.5        | 20 | 50                               | 3          | 100                        | 100          |
| TOTAL                  |                                               |           | 14                         | 6 | 5 |          | 22      |                                 |            |    |                                  |            |                            |              |

L: Lecture T: Tutorial P: Practical SL: Self Learning IE : Internal Evaluation

1 credit corresponds to 30 Hours of student engagement in a semester.

Apart from actual contact hours (L T P), the remaining hours are used for term work and self-learning by students

**Scheme for Second Year B.Tech. in Mechanical Engineering (Working Professionals) with Minor in [\*\*\*\*], (SEMESTER-IV)  
under Regulation-23 Academic Year 2026-27**

| Sr. No.            | Course Name                                   | Code      | Course Plan per Week (Hrs) |   |   | SL/ Sem. | Credits | In semester Evaluation (Points) |            |    | End Semester Evaluation (Points) |            | End semester weightage (%) | Total Points |
|--------------------|-----------------------------------------------|-----------|----------------------------|---|---|----------|---------|---------------------------------|------------|----|----------------------------------|------------|----------------------------|--------------|
|                    |                                               |           | L                          | P | T |          |         | Mid Term                        | Time (Hrs) | IE | Points                           | Time (Hrs) |                            |              |
| Core Courses       |                                               |           |                            |   |   |          |         |                                 |            |    |                                  |            |                            |              |
| 1                  | Statistics, Probability and Laplace Transform | ES-BTM401 | 2                          | 0 | 1 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 2                  | Fluid Mechanics                               | PC-BTM402 | 3                          | 0 | 0 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 3                  | Mechanical Measurement and Control            | PC-BTM403 | 3                          | 0 | 0 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 4                  | Kinematics of Machinery                       | PC-BTM404 | 3                          | 0 | 1 | 64       | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 5                  | Dynamics of Machinery                         | PC-BTM405 | 3                          | 0 | 0 | 48       | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Laboratory Courses |                                               |           |                            |   |   |          |         |                                 |            |    |                                  |            |                            |              |
| 6                  | Fluid Mechanics Lab.                          | PC-BTM452 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| 7                  | Mechanical Measurements and Control Lab.      | PC-BTM453 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| 8                  | Dynamics of Machinery Lab.                    | PC-BTM455 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| 9                  | Assembly Shop Practice                        | PC-BTM456 | 0                          | 2 | 0 | 2        | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| Minor Course       |                                               |           |                            |   |   |          |         |                                 |            |    |                                  |            |                            |              |
| 10                 | Minor-1                                       | MI-BT021  | 2                          | 0 | 0 | 32       | 2       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| TOTAL              |                                               |           | 16                         | 8 | 2 |          | 22      |                                 |            |    |                                  |            |                            |              |

L: Lecture T: Tutorial P: Practical SL: Self Learning IE : Internal Evaluation

1 credit corresponds to 30 Hours of student engagement in a semester.

Apart from actual contact hours (L T P), the remaining hours are used for term work and self-learning by students

## Evaluation for R23 : S.Y. B. Tech

1. The Evaluation of any course shall be such that all Course Outcomes are appropriately mapped.
2. Mid term: The courses under the category “Theory courses”, the evaluation is based on Mid Term of 30 points for 1.5 hours duration. Tentatively the first four modules of the course content will be covered in Mid Term. Any change in the same will be informed by the course instructor. The courses under the category “Skill Enhancement”, “Value Education”, the evaluation is based on activity (Presentation, Test, Mini project, Field project, Practical Examination) of 30 points each.
3. IE: Internal Evaluation will be carried out by the course instructor for 20 points. It is the continuous evaluation throughout the semester. The evaluation will be based on minimum three of the following activities decided by course instructor. The maximum points that can be assigned to one activity will be 07. The course instructor needs to inform the students and head of the department about the activities those will be considered for IE and the points assigned to them in first week of semester. The course instructor will submit the internal evaluation points (out of 20 with activity wise break up) to examination section before the beginning of End Semester examination. List of Activities: 1. Class Involvement 2. Assignments 3. Problem Solving 4. Mini project 5. Quizzes 6. Presentation 7. Oral.
4. End semester evaluation: The course under the category “Theory courses”, the evaluation is based on End semester examination of 100 points. The end semester examination will cover all the modules of the course content. The courses under the category “Skill Enhancement”, “Value Education”, the evaluation is based on activity (Presentation, Test, Mini project, Field project, Practical Examination) of 50/100 points.
5. The evaluation of the laboratory courses include internal evaluation IE of 25 points and End semester evaluation of 25 points. The internal evaluation is based on [10 points: Laboratory Attendance, 15 points: Laboratory work] and End semester evaluation is based on [25 points: Quizzes/ Presentation/ Practical Examination/ Mini project/Oral may be any two activities]
6. The co-curricular course credits in semester VIII can be earned through participation in various activities during his/ her graduation. The co-curricular course credits are not considered for CPI calculation.
7. The evaluation of Field project/ Project/ Internship shall be as mentioned in Academic Rules.

**Note: Refer Academic and Examination rules and regulations for further details.**

# **Regulation -23**

(Under New Education Policy)

Academic Course Credit System and Evaluation Scheme

## **B.Tech. Mechanical Engineering (Working Professionals) Program** (Third Year)



**DEPARTMENT OF MECHANICAL ENGINEERING**

**Sardar Patel College of Engineering, Mumbai**

**Scheme for Third Year B.Tech. in Mechanical Engineering (Working Professionals) with Minor in [\*\*\*\*], (SEMESTER-V) under Regulation-23 Academic Year 2026-27**

| Sr. No.                      | Course Name                            | Code      | Course Plan per Week (Hrs) |   |   | SL/ Sem | Credits | In semester Evaluation (Points) |            |    | End Semester Evaluation (Points) |            | End semester weightage (%) | Total Points |
|------------------------------|----------------------------------------|-----------|----------------------------|---|---|---------|---------|---------------------------------|------------|----|----------------------------------|------------|----------------------------|--------------|
|                              |                                        |           | L                          | P | T |         |         | Mid Term                        | Time (Hrs) | IE | Points                           | Time (Hrs) |                            |              |
| Core Courses                 |                                        |           |                            |   |   |         |         |                                 |            |    |                                  |            |                            |              |
| 1                            | Heat and Mass Transfer                 | PC-BTM501 | 3                          | 0 | 0 | 48      | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50%                        | 100          |
| 2                            | Design of Machine Elements             | PC-BTM502 | 3                          | 0 | 1 | 64      | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50%                        | 100          |
| 3                            | CAD/CAM/CIM                            | PC-BTM503 | 2                          | 0 | 0 | 32      | 2       | 30                              | 1.5        | 20 | 100                              | 3          | 50%                        | 100          |
| 4                            | Mechatronics & Automation              | PC-BTM504 | 2                          | 0 | 0 | 32      | 2       | 30                              | 1.5        | 20 | 100                              | 3          | 50%                        | 100          |
| Laboratory Courses           |                                        |           |                            |   |   |         |         |                                 |            |    |                                  |            |                            |              |
| 5                            | Heat and Mass Transfer Laboratory      | PC-BTM551 | 0                          | 2 | 0 | 2       | 1       | 0                               | 0          | 25 | 25                               | 0          | 100%                       | 50           |
| 6                            | CAD/CAM/CIM Laboratory                 | PC-BTM553 | 0                          | 2 | 0 | 2       | 1       | 0                               | 0          | 25 | 25                               | 0          | 100%                       | 50           |
| 7                            | Mechatronics and Automation Laboratory | PC-BTM554 | 0                          | 2 | 0 | 2       | 1       | 0                               | 0          | 25 | 25                               | 0          | 100%                       | 50           |
| Professional Elective Course |                                        |           |                            |   |   |         |         |                                 |            |    |                                  |            |                            |              |
| 8                            | Professional Elective - I              | PE-BTM5XX | 3                          | 0 | 1 |         | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50%                        | 100          |
| Minor Course                 |                                        |           |                            |   |   |         |         |                                 |            |    |                                  |            |                            |              |
| 9                            | Minor-2                                | MI-BT022  | 3                          | 0 | 1 |         | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50%                        | 100          |
| TOTAL                        |                                        |           | 16                         | 6 | 3 |         | 22      |                                 |            |    |                                  |            |                            |              |

L: Lecture T: Tutorial P: Practical SL: Self Learning IE : Internal Evaluation

1 credit corresponds to 30 Hours of student engagement in a semester.

Apart from actual contact hours (L T P), the remaining hours are used for term work and self-learning by students

**Scheme for Third Year B.Tech. in Mechanical Engineering (Working Professionals) with Minor in [\*\*\*\*], (SEMESTER-VI) under Regulation-23 Academic Year 2026-27**

| Sr. No.                                     | Course Name                            | Code      | Course Plan per Week (Hrs) |   |   | SL/sem | Credits | In semester Evaluation (Points) |            |    | End Semester Evaluation (Points) |            | End semester weightage (%) | Total Points |
|---------------------------------------------|----------------------------------------|-----------|----------------------------|---|---|--------|---------|---------------------------------|------------|----|----------------------------------|------------|----------------------------|--------------|
|                                             |                                        |           | L                          | P | T |        |         | Mid Term                        | Time (Hrs) | IE | Points                           | Time (Hrs) |                            |              |
| Core Courses                                |                                        |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 1                                           | Refrigeration and Air-conditioning     | PC-BTM601 | 3                          | 0 | 0 | 48     | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 2                                           | Thermal and Fluid Machines             | PC-BTM602 | 3                          | 0 | 0 | 48     | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 3                                           | Manufacturing Planning and Control     | PC-BTM603 | 3                          | 0 | 1 | 64     | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Laboratory Courses                          |                                        |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 4                                           | Refrigeration and Air-cond. Laboratory | PC-BTM651 | 0                          | 2 | 0 | 32     | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| 5                                           | Thermal and Fluid Machines Laboratory  | PC-BTM652 | 0                          | 2 | 0 | 32     | 1       | 0                               | 0          | 25 | 25                               | 0          | 100                        | 50           |
| Professional Elective courses               |                                        |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 6                                           | Professional Elective -II              | PE-BTM6xx | 3                          | 0 | 1 | 64     | 4       | 15                              | 15         | 20 | 100                              | 3          | 50                         | 100          |
| Community Engagement Project/ Field Project |                                        |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 7                                           | Field Project Stage I                  | FP-BTM601 | 2*+32                      |   |   |        | 2       | -                               | -          | 50 | 50                               | -          | 100                        | 100          |
| Minor Course                                |                                        |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 8                                           | Minor-3                                | MI-BT023  | 3                          | 0 | 1 | 64     | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| TOTAL                                       |                                        |           | 15                         | 8 | 3 |        | 22      |                                 |            |    |                                  |            |                            |              |

L: Lecture T: Tutorial P: Practical SL: Self Learning IE : Internal Evaluation

1 credit corresponds to 30 Hours of student engagement in a semester.

Apart from actual contact hours (L T P), the remaining hours are used for term work and self-learning by students

## Evaluation for R23 : T.Y. B. Tech

1. The Evaluation of any course shall be such that all Course Outcomes are appropriately mapped.
2. Mid term: The courses under the category “Theory courses”, the evaluation is based on Mid Term of 30 points for 1.5 hours duration. Tentatively the first four modules of the course content will be covered in Mid Term. Any change in the same will be informed by the course instructor. The courses under the category “Skill Enhancement”, “Value Education”, the evaluation is based on activity (Presentation, Test, Mini project, Field project, Practical Examination) of 30 points each.
3. IE: Internal Evaluation will be carried out by the course instructor for 20 points. It is the continuous evaluation throughout the semester. The evaluation will be based on minimum three of the following activities decided by course instructor. The maximum points that can be assigned to one activity will be 07. The course instructor needs to inform the students and head of the department about the activities those will be considered for IE and the points assigned to them in first week of semester. The course instructor will submit the internal evaluation points (out of 20 with activity wise break up) to examination section before the beginning of End Semester examination. List of Activities: 1. Class Involvement 2. Assignments 3. Problem Solving 4. Mini project 5. Quizzes 6. Presentation 7. Oral.
4. End semester evaluation: The course under the category “Theory courses”, the evaluation is based on End semester examination of 100 points. The end semester examination will cover all the modules of the course content. The courses under the category “Skill Enhancement”, “Value Education”, the evaluation is based on activity (Presentation, Test, Mini project, Field project, Practical Examination) of 50/100 points.
5. The evaluation of the laboratory courses include internal evaluation IE of 25 points and End semester evaluation of 25 points. The internal evaluation is based on [10 points: Laboratory Attendance, 15 points: Laboratory work] and End semester evaluation is based on [25 points: Quizzes/ Presentation/ Practical Examination/ Mini project/Oral may be any two activities]
6. The co-curricular course credits in semester VIII can be earned through participation in various activities during his/ her graduation. The co-curricular course credits are not considered for CPI calculation.
7. The evaluation of Field project/ Project/ Internship shall be as mentioned in Academic Rules.

**Note: Refer Academic and Examination rules and regulations for further details.**

## **Regulation -23**

(Under New Education Policy)

Academic Course Credit System and Evaluation Scheme  
**B.Tech. Mechanical Engineering Program**  
(Final Year)



**DEPARTMENT OF MECHANICAL ENGINEERING**  
**Sardar Patel College of Engineering, Mumbai**

|                              | Scheme for Final Year B.Tech. in Mechanical Engineering (Working Professionals) with Minor in [****], ( <u>SEMESTER-VII</u> ) under Regulation-23 Academic Year 2026-27 |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------|---|---|--------|---------|---------------------------------|------------|----|----------------------------------|------------|----------------------------|--------------|
| Sr. No.                      | Course Name                                                                                                                                                             | Code      | Course Plan per Week (Hrs) |   |   |        | Credits | In semester Evaluation (Points) |            |    | End Semester Evaluation (Points) |            | End semester weightage (%) | Total Points |
|                              |                                                                                                                                                                         |           | L                          | P | T | SL/sem |         | Mid Term                        | Time (Hrs) | IE | Points                           | Time (Hrs) |                            |              |
| Core Courses                 |                                                                                                                                                                         |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 1                            | Design of Machines and Mechanical Systems                                                                                                                               | PC-BTM701 | 3                          | 0 | 1 | 64     | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| 2                            | Industrial Engineering, Project and Finance Management                                                                                                                  | PC-BTM702 | 3                          | 0 | 1 | 64     | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Professional Elective Course |                                                                                                                                                                         |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 3                            | Professional Elective -III                                                                                                                                              | PE-BTM7xx | 2                          | 0 | 1 | 48     | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Open Elective Course         |                                                                                                                                                                         |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 4                            | Open Elective - I                                                                                                                                                       | OE-BTM7xx | 2                          | 0 | 1 | 48     | 3       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Institute Course             |                                                                                                                                                                         |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 5                            | Research Methodology and Ethics                                                                                                                                         | IC-BT01   | 2                          | 0 | 0 | 32     | 2       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| B. Tech Project              |                                                                                                                                                                         |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 6                            | Project                                                                                                                                                                 | PR-BTM701 | 2+6*                       |   |   |        | 4       |                                 |            | 50 | 50                               |            | 100                        | 100          |
| Minor Course                 |                                                                                                                                                                         |           |                            |   |   |        |         |                                 |            |    |                                  |            |                            |              |
| 7                            | Minor-4                                                                                                                                                                 | MI-BT024  | 3                          | 2 | 1 | 64     | 4       | 30                              | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| TOTAL                        |                                                                                                                                                                         |           | 15                         | 2 | 5 |        | 24      |                                 |            |    |                                  |            |                            |              |

L: Lecture T: Tutorial P: Practical SL: Self Learning IE : Internal Evaluation

1 credit corresponds to 30 Hours of student engagement in a semester.

Apart from actual contact hours (L T P), the remaining hours are used for term work and self-learning by students

**Scheme for Final Year B.Tech. in Mechanical Engineering (Working Professionals) with Minor in [\*\*\*\*], (SEMESTER-VIII) under Regulation-23 Academic Year 2026-27**

| Sr. No.                           | Course Name                | Code            | Course Plan per Week (Hrs) |   |   |    | Credits | In- semester Evaluation (Points) |            |    | End Semester Evaluation (Points) |            | End semester weightage (%) | Total Points |
|-----------------------------------|----------------------------|-----------------|----------------------------|---|---|----|---------|----------------------------------|------------|----|----------------------------------|------------|----------------------------|--------------|
|                                   |                            |                 | L                          | P | T | SL |         | Mid Term                         | Time (Hrs) | IE | Points                           | Time (Hrs) |                            |              |
| Professional Elective Course (PE) |                            |                 |                            |   |   |    |         |                                  |            |    |                                  |            |                            |              |
| 1.                                | Professional Elective -IV* | PE-BTM8xx       | 3                          | 0 | 1 | 64 | 4       | 30                               | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Open Elective Course (OE)         |                            |                 |                            |   |   |    |         |                                  |            |    |                                  |            |                            |              |
| 2.                                | Open Elective -II*         | OE-BTM8xx       | 2                          | 0 | 1 | 48 | 3       | 30                               | 1.5        | 20 | 100                              | 3          | 50                         | 100          |
| Ability Enhancement Course (AEC)  |                            |                 |                            |   |   |    |         |                                  |            |    |                                  |            |                            |              |
| 3.                                | Modern Indian Language     | AE-BT801 to 803 | 1                          | 0 | 0 | 16 | 1       | -                                | -          | 50 | 50                               | -          | 100                        | 100          |
| Cocurricular Activities (CC)      |                            |                 |                            |   |   |    |         |                                  |            |    |                                  |            |                            |              |
| 4.                                | Co-Curricular              | CC-BTM8XX       | Refer note                 |   |   |    | 2       | \$\$\$\$                         |            |    |                                  |            |                            | 100          |
| Project                           |                            |                 |                            |   |   |    |         |                                  |            |    |                                  |            |                            |              |
| 5.                                | Work Based Project         | PR-BTM801       | 8+12*                      |   |   |    | 10      | 100                              |            | -  | 100                              | -          | 100                        | 200          |
|                                   | TOTAL                      |                 | 7                          | 8 |   |    | 20      |                                  |            |    |                                  |            |                            |              |

\*PE-IV and OE-II may be floated by department or SWAYAM/NPTEL course of 12 weeks minimum.

L: Lecture T: Tutorial P: Practical SL: Self Learning IE: Internal Evaluation

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### **Evaluation for R23 : Final year B.Tech**

1. The Evaluation of any course shall be such that all Course Outcomes are properly mapped.
2. Mid term: The courses under the category “Theory courses”, the evaluation is based on Mid Term of 30 points for 1.5 hours duration. Tentatively the first four modules of the course content will be covered in Mid Term. Any change in the same will be informed by the course instructor. The courses under the category “Skill Enhancement”, “Value Education”, the evaluation is based on activity (Presentation, Test, Mini project, Field project, Practical Examination) of 30 points each.
3. IE: Internal Evaluation will be carried out by the course instructor for 20 points. It is the continuous evaluation throughout the semester. The evaluation will be based on minimum three of the following activities decided by course instructor. The maximum points that can be assigned to one activity will be 07. The course instructor needs to inform the students and head of the department about the activities those will be considered for IE and the points assigned to them in first week of semester. The course instructor will submit the internal evaluation points (out of 20 with activity wise break up) to examination section before the beginning of End Semester examination. List of Activities: 1. Class Involvement 2. Assignments 3. Problem Solving 4. Mini project 5. Quizzes 6. Presentation 7. Oral.
4. End semester evaluation: The course under the category “Theory courses”, the evaluation is based on End semester examination of 100 points. The end semester examination will cover all the modules of the course content. The courses under the category “Skill Enhancement”, “Value Education”, the evaluation is based on activity (Presentation, Test, Mini project, Field project, Practical Examination) of 50/100 points.
5. The evaluation of the laboratory courses include internal evaluation IE of 25 points and End semester evaluation of 25 points. The internal evaluation is based on [10 points: Laboratory Attendance, 15 points: Laboratory work] and End semester evaluation is based on [25 points: Quizzes/ Presentation/ Practical Examination/ Mini project/Oral may be any two activities]
6. The co-curricular course credits in semester VIII can be earned through participation in various activities during his/ her graduation. The co-curricular course credits are not considered for CPI calculation.
7. The evaluation of Field project/ Project/ Internship shall be as mentioned in Academic Rules.

**List of Professional Electives**

| Professional Elective-I                                   | Professional Elective-II                                              | Professional Elective-III                          | Professional Elective-IV                                                |
|-----------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------|
| Sem V                                                     | Sem VI                                                                | Sem VII                                            | Sem VIII                                                                |
| Finite Element Methods <b>PE-BTM511</b>                   | Computational Fluid Dynamics<br><b>PE-BTM611</b>                      | Industrial Robotics<br><b>PE-BTM711</b>            | SWAYAM / NPTEL portal as recommended by the department course committee |
| Lean and Green Manufacturing<br><b>PE-BTM512</b>          | Introduction to Composite Materials Technology<br><b>PE-BTM612</b>    | Renewable Energy Applications<br><b>PE-BTM712</b>  | Engineering Simulation Techniques <b>PE-BTM811</b>                      |
| Introduction to Cryogenics<br><b>PE-BTM513</b>            | Tool Engineering<br><b>PE-BTM613</b>                                  | Welding Process and Technology<br><b>PE-BTM713</b> | Intelligent CAD/CAM systems <b>PE-BTM812</b>                            |
| Compressible Fluid Flow<br><b>PE-BTM514</b>               | Mechanical Vibration<br><b>PE-BTM614</b>                              | Power Plant Engineering<br><b>PE-BTM714</b>        | Non-traditional Machining Processes <b>PE-BTM813</b>                    |
| Nature Inspired Design and Innovation<br><b>PE-BTM515</b> | <b>Industrial Management and Entrepreneurship</b><br><b>PE-BTM615</b> | Automobile Engineering<br><b>PE-BTM715</b>         |                                                                         |

**List of Open Electives (To be decided at institute level)**

| Open Elective -I                                          | Open Elective -II                                                 |
|-----------------------------------------------------------|-------------------------------------------------------------------|
| Sem VII                                                   | Sem VIII                                                          |
| Financial Planning and Wealth Management <b>OE-BTM701</b> | AI-Enabled Research Methodology <b>OE-BTM801</b>                  |
|                                                           | Value Engineering <b>OE-BTM802</b>                                |
|                                                           | Solar and Wind Technology <b>OE-BTM803</b>                        |
|                                                           | Generative Design <b>OE-BTM804</b>                                |
|                                                           | Introduction to Augmented Reality <b>OE-BTM805</b>                |
|                                                           | Introduction to Micro Electro Mechanical Systems <b>OE-BTM806</b> |

**List of Ability Enhancement Course (Modern Indian Language)**

| Sr. No. | Course Code | Course Title |
|---------|-------------|--------------|
| 1       | AE_BT801    | Hindi        |
| 2       | AE-BT802    | Sanskrit     |
| 3       | AE-BT803    | Marathi      |

**Table GATE-MAP**

| <b>Sr. No.</b> | <b>Topics from GATE Syllabus</b>                                                                                   | <b>Related Core Courses in Mechanical Engineering. Semester</b> |
|----------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 1              | Machine Design                                                                                                     | Machine Design                                                  |
| 2              | Machine Design                                                                                                     | Design of Machines and Mech. Systems                            |
| 3              | Theory of Machines                                                                                                 | Kinematics of Machinery                                         |
| 4              | Theory of Machines, Vibrations                                                                                     | Dynamics of Machinery                                           |
| 5              | Mechanics of Materials                                                                                             | Solid Mechanics                                                 |
| 6              | Mechanics of Materials                                                                                             | Strength of Materials                                           |
| 7              | Machine Design                                                                                                     | Computer Aided Machine Drawing                                  |
| 8              | Computer Integrated Manufacturing                                                                                  | CAD/CAM/CIM                                                     |
| 9              | Metrology and Inspection                                                                                           | Mechanical Engineering Measurements                             |
| 10             | Casting, Forming and Joining Processes; Machining and machine tool operations                                      | Manufacturing Science                                           |
| 11             | Production Planning and Control, Inventory Control, Operations Research                                            | Manufacturing Planning and Control                              |
| 12             | Computer Integrated Manufacturing                                                                                  | Mechatronics                                                    |
| 13             | Production Planning and Control, Operations Research                                                               | Ind. Engg. And Proj./Fin. Mgmt.                                 |
| 14             | Engineering materials                                                                                              | Material Science                                                |
| 15             | Applications of Fluid mechanics and Thermal sciences                                                               | Thermal Systems                                                 |
| 16             | Fluid Mechanics                                                                                                    | Fluid Mechanics                                                 |
| 17             | Heat-Transfer                                                                                                      | Heat and Mass Transfer                                          |
| 18             | Applications of Fluid mechanics and Thermal sciences                                                               | Refrigeration and Air-conditioning                              |
| 19             | Thermodynamics                                                                                                     | Thermodynamics                                                  |
| 20             | Applications of Fluid mechanics and Thermal sciences                                                               | Internal Combustion Engine                                      |
| 21             | Linear Algebra, Calculus, Differential Equations, Complex variables, Probability and Statistics, Numerical Methods | Applied Mathematics, I, II, III, IV                             |

**Minor courses in Department of Mechanical Engineering – ‘Industry 4.0 Technologies’****The list of courses:**

1. Internet of Things (Course code: MI-BT021) (*Minor 1*)
2. Additive Manufacturing (Course code: MI-BT022) (*Minor 2*)
3. Artificial Intelligence and Machine Learning (Course code: MI-BT023) (*Minor 3*)
4. Digital Twin (Course code: MI-BT024) (*Minor 4*)

| <b>Exit Courses under B.Tech. in Mechanical Engineering Program (Regulation-23)</b> |                                                        |                |
|-------------------------------------------------------------------------------------|--------------------------------------------------------|----------------|
| <b>Sr. No.</b>                                                                      | <b>Course Name</b>                                     | <b>Credits</b> |
| <b>Second Year of Engineering</b>                                                   |                                                        |                |
| 1                                                                                   | Advanced Excel, or                                     | 3              |
|                                                                                     | Advanced Python Programming                            |                |
|                                                                                     | CATIA (Assembly and Manufacturing Simulations)         |                |
|                                                                                     | Mechanical Analysis Software tool (ANSYS, ABAQUS etc.) |                |
|                                                                                     | LabVIEW software                                       |                |
|                                                                                     | CNC Programming                                        |                |
| 2                                                                                   | Instrument Calibration and Characterization            | 3              |
|                                                                                     | 3D printing operation                                  |                |
|                                                                                     | Simulink for System Modeling                           |                |
|                                                                                     | CNC Machine Operation and Maintenance,                 |                |
|                                                                                     | Advanced Welding Techniques                            |                |
|                                                                                     | Solar System Installation and Grid Integration         |                |
| 3                                                                                   | Two-week internship in a manufacturing industry        | 2              |

Note: The student needs to select one course from each group (1) and (2) as an exit course.

| Third Year of Engineering |                                                        |   |
|---------------------------|--------------------------------------------------------|---|
| 1                         | Advanced Excel, or                                     | 3 |
|                           | Advanced Python Programming                            |   |
|                           | MATLAB and its application in engineering              |   |
|                           | CNC Programming                                        |   |
|                           | Mechanical Analysis Software tool (ANSYS, ABAQUS etc.) |   |
| 2                         | AC and Refrigeration Repair and Maintenance            | 3 |
|                           | Piping Design using a Software                         |   |
|                           | 3D Printing and Design                                 |   |
|                           | Computational Fluid Dynamics Software                  |   |
|                           | Electrical vehicle design and maintenance              |   |
| 3                         | Two-week internship in a manufacturing industry        | 2 |

Note: The student needs to select one course from each group (1) and (2) as an exit course.