# SARDAR PATEL COLLEGE OF ENGINEERING, MUMBAI

## Final Year B. Tech. Mechanical Engineering

## Academic Course Credit System and Evaluation Scheme

## (REGULATION 2022)

## Academic Year 2025-26

| Scheme for Final Year B.Tech. in Mechanical Engineering (Semester VII)_ R22 Academic Year 2025-26 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sr. No.** | **Course Name** | **Code** | **Course Plan per Week (Hrs)** | | | **SL/Sem (Hrs)** | **Credits** | **In semester Evaluation (Points)** | | | **End Semester Evaluation (Points)** | | **End semester weightage (%)** | **Term work/Practical** | **Total Points** |
| | | | **L** | **P** | **T** | | | **Mid Term** | **Time (Hrs)** | **IE** | **Points** | **Time (Hrs)** | | | |
| **Core Courses** | | | | | | | | | | | | | | | |
| 1 | Design of Machines and Mechanical Systems | PC-BTM711 | 3 | 0 | 1 | 64 | 4 | 30 | 1.5 | 10 | 100 | 3 | 60% | 50 | 150 |
| 2 | Industrial Engineering and Project Management | PC-BTM714 | 3 | 0 | 1 | 64 | 4 | 30 | 1.5 | 10 | 100 | 3 | 60% | 50 | 150 |
| **Professional Elective Course #** | | | | | | | | | | | | | | | |
| 3 | Professional Elective - III | PE-BTM7xx | 3 | 0 | 1 | 64 | 4 | 30 | 1.5 | 10 | 100 | 3 | 60% | 50 | 150 |
| 4 | Professional Elective - IV | PE-BTM7xx | 3 | 0 | 1 | 64 | 4 | 30 | 1.5 | 10 | 100 | 3 | 60% | 50 | 150 |
| **Open Elective Course #** | | | | | | | | | | | | | | | |
| 5 | Open Elective - II | OE-BTM7xx | 2 | 0 | 1 | 48 | 3 | 30 | 1.5 | 10 | 100 | 3 | 60% | 50 | 150 |
| **Project Course** | | | | | | | | | | | | | | | |
| 6 | Project Stage II | PR-BTM798 | 2+10[$] | | | | ~~4~~ | One In Sem Evaluation. and one End Sem. Evaluation (Ref Academic Rules) | | | | | | | 200 |
| **Online Courses #** | | | | | | | | | | | | | | | |
| 7 | Online Course | OL-BTMxxx | | | | | | | | | | | | | |
| **Value Added Courses #** | | | | | | | | | | | | | | | |
| 8 | Value Added Tech./Non-Tech. | VA-BTMxxx, VN-BTxxx | Courses offered by CCE | | | | | | | | | | | | |
| | **TOTAL** | | | | | | **23** | | | | | | | | |

L: Lecture, T: Tutorial, P: Practical, and SL: Self Learning.

**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 wok and self-learning by students.**

#List of course will be announced at the start of Semester / Academic year. $ Number of Hrs student needs to work

| Courses Offered for Final Year B.Tech. in Mechanical Engineering (Semester VIII) under *Regulation-22* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sr. No.** | **Course Name** | **Code** | **Course Plan per Week (Hrs)** | | | **Credits** | **In semester Evaluation** | | | **End Semester Evaluation (Points)** | | **End semester weightage (%)** | **Total Points** |
| | | | **L** | **P** | **T** | | **Mid Term points** | **Mid Term Hrs** | **IE points** | **Points** | **Time (Hrs)** | | |
| **Open Elective Course** | | | | | | | | | | | | | |
| 1 | Open Elective –III<br>Offered in online mode through SWAYAM/ NPTEL[#] or Institute | PR-BTX8xx | 3 | -- | -- | 3 | 30 | 1.5 | 10 | 100 | - | 60 | 100 |
| **Internship** | | | | | | | | | | | | | |
| 2 | External / Internal Internship | PR-BTM801 | | | | 9 | 100 points | | | 200 points | | 100 | 300 |
| Total | | | | | | 12 | | | | | | | 400 |

# Refer Academic rules for detail

**NOTES (R22):**

1. The Evaluation of any course shall be such that all Course Outcomes are uniformly mapped and as per the scheme.
2. **Assessment criteria** for laboratory/Tutorial work. i.e., weightage for assessment shall be as follows: i) Attendance in Laboratory/Tutorial = 20%, (ii) Journal= 40%, (iii) Practical Examination (and/or) Mini project (and/or) Quiz (and/or) Seminar (and/or) Oral (and/or) Industry visit report=40%.
3. **Internal Evaluation (IE)** will be carried out by the course instructor for 10 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 04. 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 10 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. Student can opt for an online course available on https://swayam.gov.in/ or https://onlinecourses.nptel.ac.in/ subject to approval from the department. After successful completion of the course, the course title can appear on the grade card of student.
5. The Mandatory courses are with Pass (P) and No Pass (NP) grades.
6. Department will offer Value Added courses in a semester, subject to availability of resources and enrolment of minimum 20 students opting for the course. Upon completion of the Value-Added course, the course title shall appear in the grade card of the student.
7. Students can optionally opt for Non-Technical Value-Added courses offered by Centre for Continuing Education (CCE-SPCE). Upon successful completion of the course, the course title shall appear on the grade card of the student.
8. The contents of core courses are aligned with the latest GATE syllabus. The mapping between GATE syllabus topics and core courses is given in Table GATE-MAP. .
9. For Open Elective course II, students with C.P.I. higher than 8.5, can opt for an online course (approved by the department) offered through SWAYAM or NPTEL portal instead of elective courses offered by department/institute. Upon successful completion of the course, the score given on certificate issued by SWAYAM/NPTEL will be converted to letter grade as per applicable examination regulation.
10. For Project Course: Contact hours =2 and self-learning hours will be as per student's choice; It will have in-semester evaluation which shall include one or more in-semester presentations. 10 points for report and 10 points for presentation and viva voce examined by supervisor and one internal examiner.
11. The evaluation of the courses offered by department through SWAYAM/ NPTEL platform shall be carried out by department or the score given on certificate issued by SWAYAM/NPTEL will be converted to letter grade as per applicable examination regulation.
12. Internship Evaluation shall be as per Academic Rules.

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

**TABLE:1**
**Professional Elective Courses – III and IV**

| Sr. No. | Course Name | Specialization | Code |
|---|---|---|---|
| 1 | Process Eqpt. Design and Piping Engg. | D | PE-BTM711 |
| 2 | Fatigue, Fracture and Failure Analysis | D | PE-BTM718 |
| 3 | Industrial Robotics | M | PE-BTM733 |
| 4 | Supply Chain Management | M | PE-BTM734 |
| 5 | Welding Process and Welding Technology | M | PE-BTM735 |
| 6 | Computational Fluid Dynamics | T | PE-BTM752 |
| 7 | Introduction to Cryogenics | T | PE-BTM753 |
| 8 | Power Plant Engineering | T | PE-BTM754 |
| 9 | Automobile Engineering | T | PE-BTM755 |
| 10 | Renewable Energy Sources and Utilization | T | PE-BTM756 |

**TABLE: 2**
**Open Elective Courses - II and III**

| Sr. No. | Course Name | Code |
|---|---|---|
| 1 | Introduction to Research Methodology | OE-BTM712 |
| 2 | Introduction to MEMS | OE-BTM714 |
| 3 | Solar and Wind Technology | OE-BTM715 |
| 4 | Digital Twin | OE-BTM617 |
| 5 | Fundamentals of AI and Machine Learning | OE-BTM718 |
| 6 | Value Engineering | OE-BTM719 |
| 7 | Generative Design | OE-BTM721 |
| 8 | Big Data Analytics | OE-BTM891 |
| 9 | Introduction to Augmented Reality | OE-BTM717 |
| 10 | Online Course from SWAYAM/NPTEL **Refer TABLE SWAYAM / NPTL** | OE-BTS7Mx |

Additional OEC available: Refer open elective courses offered by the Civil and Electrical Engineering Department of SPCE

**Table 3.**

**GATE-MAP: Alignment of Course Content with GATE Syllabus**

**B.Tech. in Mechanical Engineering**

| No. | Section | Core courses in SPCE Curriculum 2023-24 | Topics From GATE Syllabus |
|---|---|---|---|
| 1 | D | Machine Design | Machine Design |
| 2 | D | Design of Machines and Mech. Systems | Machine Design |
| 3 | D | Kinematics of Machinery | Theory of Machines |
| 4 | D | Dynamics of Machinery | Theory of Machines, Vibrations |
| 6 | D | Strength of Materials | Mechanics of Materials |
| 7 | D | Computer Aided Machine Drawing | Machine Design |
| 8 | M | CAD/CAM/CIM | Computer Integrated Manufacturing |
| 9 | M | Mechanical Engineering Measurements | Metrology and Inspection |
| 10 | M | Manufacturing Science | Casting, Forming and Joining Processes; Machining and machine tool operations |
| 11 | M | Manufacturing Planing and Control | Production Planning and Control, Inventory Control, Operations Research |
| 12 | M | Mechatronics | Computer Integrated Manufacturing |
| 13 | M | Ind. Engg. And Proj./Fin. Mgmt. | Production Planning and Control, Operations Research |
| 14 | M | Material Science | Engineering materials |
| 15 | T | Thermal Systems | Applications of Fluid mechanics and Thermal sciences |
| 16 | T | Fluid Mechanics | Fluid Mechanics |
| 17 | T | Heat and Mass Transfer | Heat-Transfer |
| 18 | T | Refrigeration and Air-conditioning | Applications of Fluid mechanics and Thermal sciences |
| 19 | T | Thermodynamics | Thermodynamics |
| 20 | T | Energy Engineering | Applications of Fluid mechanics and Thermal sciences |
| 21 | MATH | Applied Mathematics, | Linear Algebra, Calculus, Differential Equations, Complex variables, Probability and Statistics, Numerical Methods |

**Note:** Sections are: D - Applied Mechanics and Design, M -Materials, Manufacturing and Industrial Engineering, T - Fluid Mechanics and Thermal Sciences,MATH - Engineering Mathematics

**TABLE 4**
**Online Courses (12 Week) offered by SWAYAM or NPTL Portal for OE-II, III**

| Sr. No. | Course Name | Coordinating Institute | Proposed Faculty Coordinator |
|---|---|---|---|
| 1 | Heat Exchangers: Fundamentals And Design Analysis | IITG | RSM |
| 2 | Finite Element Method: Variational Methods to Computer Programming | IITK | NRR |
| 3 | Computational Continuum Mechanics | IITM | RBB |
| 4 | Metal Additive Manufacturing | IITG | RBB |
| 5 | Numerical Methods for Engineers | IITG | HSM |
| 6 | Solar Energy Engineering and Technology | IITK | KSB |
| 7 | Heat Exchangers: Fundamentals And Design Analysis | IITM | NRR/DNJ |
| 8 | Finite Element Method: Variational Methods to Computer Programming | IITG | SRV |
| 9 | Computational Continuum Mechanics | IITG | RSM |
| 10 | Metal Additive Manufacturing | IITK | KSB |
| 11 | Numerical Methods for Engineers | IITM | RSM |
| 12 | Solar Energy Engineering and Technology | IITG | BNB |
| 13 | Heat Exchangers: Fundamentals And Design Analysis | IITG | RSM |
| 14 | Finite Element Method: Variational Methods to Computer Programming | IITK | DNJ/NRR |
| 15 | Computational Continuum Mechanics | IITM | DNJ/NRR |
| 16 | Metal Additive Manufacturing | IITG | KSB |
| 17 | Numerical Methods for Engineers | IITG | RSM |
| 18 | Solar Energy Engineering and Technology | IITK | RSM |

**NOTE:** Students should explore for latest details of the course at **SWAYAM or NPTL Portal**.
Course enrollment dates are generally in the month of July-August and December-Jan