



**MAHAVEER**  
**INSTITUTE OF SCIENCE & TECHNOLOGY**

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Vyasapuri, Bandlaguda, Post: Keshavgiri, Hyderabad-500005.

## **DEPARTMENT OF MECHANICAL ENGINEERING**

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*2.6.2. Attainment of Programme outcomes and course outcomes evaluated by the institution*

***2019-2023 BATCH***

# Attainment of Program Outcomes & Course Outcomes

  
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### DEPARTMENT OF MECHANICAL ENGINEERING

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## DEPARTMENT OF MECHANICAL ENGINEERING

### Department of Mechanical Engineering Engineering

Establish the correlation between the courses and the Program Outcomes (POs) and Program Specific Outcomes (PSOs)

#### (A) PROGRAM OUTCOMES

Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problem searching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.



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

### 8. Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### PROGRAMME SPECIFIC OUTCOMES

PSO1. Acquire analytical skills and knowledge for application and problem solving in the subjects related to product design, production, Thermal Engineering and other Mechanical Engineering domains in real time situations during students future endeavors.

PSO2. Develop a creative and research oriented approach, innovative ideas in students so as to contribute to society by developing technically advanced products in the field of Mechanical Engineering.

PSO3. Ability to analyze and design products using CAD/CAM softwares such as AUTOCAD, ANSYS, CREO, MASTER CAM etc.



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## DEPARTMENT OF MECHANICAL ENGINEERING

### Department of Mechanical Engineering-CourseList (R18) Regulation

| Year/Sem | Course   | CourseCode |
|----------|--|------------|
| I/I      | Mathematics - I                                | MA101BS    |
|          | Engineering Physics                            | PH102BS    |
|          | Programming for Problem Solving                | CS103ES    |
|          | Engineering Graphics                           | ME104ES    |
|          | Engineering Physics Lab                        | PH105BS    |
|          | Programming for Problem Solving Lab            | CS106ES    |
|          | Environmental Science                          | *MC109ES   |
| I/II     | Mathematics - II                               | MA201BS    |
|          | Chemistry                                      | CH202BS    |
|          | Engineering Mechanics                          | ME203ES    |
|          | Engineering Workshop                           | ME205ES    |
|          | English  | EN205HS    |
|          | Engineering Chemistry Lab                      | CH206BS    |
|          | English Language and Communication Skills Lab  | EN207HS    |
| II/I     | Probability and Statistics & Complex Variables | MA301BS    |
|          | Mechanics of Solids                            | ME302PC    |
|          | Material Science and Metallurgy                | ME303PC    |
|          | Production Technology                          | ME304PC    |
|          | Thermodynamics                                 | ME305PC    |
|          | Production Technology Lab                      | ME306PC    |
|          | Machine Drawing Practice                       | ME307PC    |
|          | Material Science and Mechanics of Solids       | ME308PC    |

  
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|       |  |         |
|-------|--|---------|
|       | Lab  |         |
|       | Constitution of India                            | *MC309  |
| II/II | Basic Electrical and Electronics Engineering     | EE401ES |
|       | Kinematics of Machinery                          | ME402PC |
|       | Thermal Engineering - I                          | ME403PC |
|       | Fluid Mechanics and Hydraulic Machines           | ME404PC |
|       | Fluid Mechanics and Hydraulic Machines           | ME404PC |
|       | Instrumentation and Control Systems              | ME405PC |
|       | Basic Electrical and Electronics Engineering Lab | EE409ES |
|       | Fluid Mechanics and Hydraulic Machines Lab       | ME407PC |
|       | Instrumentation and Control Systems Lab          | ME408PC |
|       | Gender Sensitization Lab                         | *MC409  |
| III-I | Dynamics of Machinery                            | ME501PC |
|       | Design of Machine Members-I                      | ME502PC |
|       | Metrology & Machine Tools                        | ME503PC |
|       | Business Economics & Financial Analysis          | SM504MS |
|       | Thermal Engineering-II                           | ME505PC |
|       | Operations Research                              | ME506PC |
|       | Thermal Engineering Lab                          | ME507PC |





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|        |  |         |
|--------|--|---------|
|        | ME508PC                                  | ME508PC |
|        | Kinematics & Dynamics Lab                | ME509PC |
|        | Intellectual Property Rights             | *MC510  |
| III-II | Design of Machine Members-II             | ME601PC |
|        | Heat Transfer                            | ME602PC |
|        | CAD & CAM                                | ME603PC |
|        | Unconventional Machining Processes       | ME611PE |
|        | Artificial Intelligence                  |         |
|        | Finite Element Methods                   | ME604PC |
|        | Heat Transfer Lab                        | ME605PC |
|        | CAD & CAM Lab                            | ME606PC |
|        | Advanced Communication Skills lab        | EN608HS |
|        | Environmental Science                    | *MC609  |
| IV-1   | Refrigeration & Air Conditioning         | ME701PC |
|        | Additive Manufacturing                   | ME711PE |
|        | Renewable Energy Sources                 | ME723PE |
|        | Fluid Power Systems                      | ME733PE |
|        | Python Programing                        |         |
|        | Industrial Oriented Mini Project/ Summer | ME702PC |

  
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|           |                                      |         |
|-----------|--------------------------------------|---------|
|           | Internship                           |         |
|           | Seminar                              | ME703PC |
|           | Project Stage - I                    | ME704PC |
| IV-<br>II | Industrial Robotics                  | ME811PE |
|           | Production and Operations Management | ME822PE |
|           | Basics of Power Plant Engineering    | ME721PE |
|           | Project Stage - II                   | ME801PC |

  
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#### CourseOutcomes: R18

|         |   |
|---------|---|
| ME303ES | II B. Tech MECH I sem:- Mechanics of Solids- Cos  |
| CO1     | CO1: Analyze and design structural members subjected to tension, compression, and torsion and bending using fundamental concepts of stress, strain and elastic behavior |
| CO2     | CO2: Compute bending stress and shear stress for various configurations of the beams and construct Shear Force and Bending Moment Diagrams                              |
| CO3     | CO3: Interpreting principal stresses strains and applies the concept of theories of failure to various structures.  |
| CO4     | CO4: Evaluate the resistance and deformation in members, which are subjected to axial, flexural and torsional loads   |
| CO5     | CO5: Implementing the torsion equation to compute torsional stresses in solid and hollow shafts; Analyze and design of thin cylinders                                   |
| ME305ES | II B. Tech MECH I sem:-Metallurgy and Material Science- Cos   |
| CO1     | CO1:Identify the properties of metals with respect to crystal structure and grain size  |
| CO2     | CO2:Interpret the phase diagrams of materials   |
| CO3     | CO3:Classify and Distinguish different types of cast irons, steels and non ferrous alloys   |
| CO4     | CO4:Describe the concept of heat treatment of steels & strengthening mechanisms   |

  
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|         |  |
|---------|--|
|         |  |
| CO5     | CO5: Explain the powder metallurgy process, types and manufacturing of composite materials |
| ME302ES | II B. Tech MECHI I sem: -Kinematics of Machinery-Cos                                       |

|         |   |
|---------|---|
| CO1     | CO1: To understand the basic components and layout of linkages in the assembly of a system / machine  |
| CO2     | CO2: To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism      |
| CO3     | CO3: To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions             |
| CO4     | CO4: To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components |
| CO5     | CO5: The main purpose is to give an idea about the relative motions obtained in all the above type of components used in mechanical Engineering.                    |
| ME407PC | II B. Tech MECH II-sem- Fluid Mechanics and Hydraulic Machines- Cos   |
| CO1     | Able to explain the effect of fluid properties on a flow system.  |
| CO2     | Able to identify type of fluid flow patterns, describe continuity equation and demonstrate boundary layer concepts  |
| CO3     | To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design.  |

  
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|                |   |
|----------------|---|
|                |   |
| CO4            | To select and analyze an appropriate turbine with reference to given situation in power plants.   |
| CO5            | To estimate performance parameters of a given Centrifugal and Reciprocating pump.   |
| <b>ME403PC</b> | <b>III B. Tech MECH I sem:-Thermal Engineering-I - Cos</b>  |
| CO1            | At the end of the course, the student should be able to evaluate the performance of IC engines and compressors under the given operating conditions |
| CO2            | Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air- conditioning cycles  |
| CO3            | Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance                     |
| CO4            | Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles.  |
| CO5            | Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance                     |
| <b>ME503PC</b> | <b>III B. Tech MECH I sem:-Metrology&amp; Machine Tools- Cos</b>  |
| CO1            | Identify techniques to minimize the errors in measurement.  |
| CO2            | Identify methods and devices for measurement of length, angle, and gear & thread parameters, surface roughness and geometric features of parts.     |



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|         |  |
|---------|--|
|         |  |
| CO3     | Understand working of lathe, shaper, planer, drilling, milling and grinding machines   |
| CO4     | Comprehend speed and feed mechanisms of machine tools.   |
| CO5     | Estimate machining times for machining operations on machine tools   |
| ME602PC | III B. Tech MECH II-sem: Heat Transfer- Cos  |
| CO1     | Understand the basic modes of heat transfer  |
| CO2     | Compute one dimensional steady state heat transfer with and without heat generation  |
| CO3     | Understand and analyze heat transfer through extended surfaces   |
| CO4     | Understand one dimensional transient conduction heat transfer  |
| CO5     | Understand concepts of continuity, momentum and energy equations   |
| ME601PC | III B. Tech MECH II sem: Design of Machine Member-II-Cos   |
| CO1     | Determine the basic lubrication mode in bearings, load in ball and roller bearings and its selection procedure based on manufacturer's catalogue data                |
| CO2     | Demonstrate the ability to apply the fundamentals of force and stress analysis in the design of various components to successfully satisfy the function of IC engine |

  
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|---------|--|
|         |  |
| CO3     | Design a power transmission system through belt, rope, and chain drive to meet desired needs in engineering applications             |
| CO4     | Analyze and evaluate the forces and stresses in various gear systems   |
| CO5     | Design the power screw for transmission applications   |
| ME603PC | IV B. Tech MECH Isem:CAD& CAM-Cos  |
| CO1     | Apply geometric transformation techniques in CAD and Develop mathematical models to represent curves and surfaces                    |
| CO2     | Formulate, analyze and create Models of engineering components using surface and solid modeling techniques.                          |
| CO3     | Formulate, analyse and generate the Part programs for CNC to manufacture industrial components                                       |
| CO4     | Utilize computers in various aspects of Manufacturing Design, Proper planning, Manufacturing cost, Layout & Material Handling system |
| CO5     | Recognize the necessity for integration of CAD and CAM in various industries.  |
| ME711PE | IV B. Tech MECH Isem: Additive Manufacturing Technology-Cos  |
| CO1     | Describe various CAD issues for 3D printing and rapid prototyping and related operations for STL model manipulation.`                |
| CO2     | Formulate and solve typical problems on reverse engineering for surface reconstruction from physical prototype                       |

  
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|         |  |
|---------|--|
|         | models through digitizing and spline-based surface   |
| CO3     | Formulate and solve typical problems on reverse engineering for surface reconstruction from digitized mesh models through topological modelling and subdivision surface fitting. |
| CO4     | Explain and summarize the principles and key characteristics of additive manufacturing technologies and commonly used 3D printing and additive manufacturing systems.            |
| CO5     | Explain and summarize typical rapid tooling processes for quick batch production of plastic and metal parts.   |
| ME723PE | IV B. Tech MECH II sem: Renewable Energy Sources-Cos   |
| CO1     | Understanding of renewable energy sources  |
| CO2     | Knowledge of working principle of various energy systems   |
| CO3     | Capability to carry out basic design of renewable energy systems   |
| CO4     | Utilization of renewable energy sources for both domestic and industrial applications  |
| CO5     | Analyze the environmental and cost economics of renewable energy sources in comparison with fossil fuels   |





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## CO-PO Mapping

| II B. Tech I Sem Subject: Mechanics of Solids |     |     |     |     |     |     |     |     |     |      |      |      |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 3   | -   | 3   |     |     | -   | -   | -   | -   | -    | 1    | 2    |
| CO2   | 3   | 3   | 3   |     |     | -   | -   | -   | -   | -    | 1    | -    |
| CO3   | 3   | -   | -   | 2   |     | -   | -   | -   | -   | -    | 1    | 2    |
| CO4   | 2   | 2   | 2   | -   |     | -   | -   | -   | -   | -    | 1    | 2    |
| CO5   | 2   | -   | -   | 2   |     | -   | -   | -   | -   | -    | 1    | 2    |
| Avg   | 2.6 | 2.5 | 2.6 | 2   | -   | -   | -   | -   | -   | -    | 1    | 2    |

| II B. Tech I Sem Subject: Metallurgy & Material Science |     |     |     |     |     |     |     |     |     |      |      |      |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 2   | 3   | -   | 2   | 2   | 1   | 2   | -   | -   | -    | -    | 3    |
| 3CO2  | 3   | 3   | -   | 2   | 2   | 1   | 2   | -   | -   | -    | -    | 3    |
| CO3   | 2   | 3   | -   | 2   | 2   | 1   | 2   | -   | -   | -    | -    | 3    |
| CO4   | 2   | 3   | -   | 2   | 2   | 1   | 2   | -   | -   | -    | -    | 3    |
| CO5   | 2   | 3   | -   | 2   | 2   | 1   | 2   | -   | -   | -    | -    | 3    |
| Avg   | 2.2 | 3   | -   | 2   | 2   | 1   | 2   | -   | -   | -    | -    | 3    |





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| II B. Tech II Sem Subject: Kinematics of Machinery |     |     |     |     |     |     |     |     |     |      |      |      |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | 3   | -   | -   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    |
| CO2  | 3   | -   | 3   | -   | -   | -   | -   | -   | -   | -    | 1    | -    |
| CO3  | 3   | 2   | 3   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    |
| CO4  | 3   | -   | 2   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    |
| CO5  | 3   | -   | -   | -   | -   | -   | -   | -   | -   | -    | 1    | 2    |
| Avg  | 2.8 | 2   | 2.7 | -   | -   | -   | -   | -   | -   | -    | 1    | 2    |

| II B. Tech II Sem Subject: Fluid Mechanics & Hydraulics of Machines |     |     |     |     |     |     |     |     |     |      |      |      |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 3   | 2   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | -    |
| CO2   | 3   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO3   | 3   | 2   | -   | 2   | 1   | -   | -   | -   | -   | -    | -    | -    |
| CO4   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO5   | 3   | 2   | 1   | -   | 1   | -   | -   | -   | -   | -    | -    | -    |
| Avg   | 3   | 2   | 1   | 2   | 1   | -   | -   | -   | -   | -    | -    | -    |

| III B. Tech I Sem Subject: Thermal Engineering-I |     |     |     |     |     |     |     |     |     |      |      |      |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | 2   | 3   | 3   | -   | 2   | -   | -   | -   | -   | 1    | -    | -    |
| CO2  | 3   | 2   | 3   | -   | 1   | -   | -   | -   | -   | 2    | -    | -    |



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|-----|---|-----|-----|-----|---|-----|---|---|---|---|---|-----|
| CO3 | 3 | 2   | 2   | 2   |   | 2   | - | - | - | 2 |   | 1   |
| CO4 | 3 | 2   | 1   | 2   |   | 0   | - | - | - | 2 |   | 2   |
| CO5 | 3 | 2   | 0   | 3   |   | 1   | - | - | - | 2 |   | 0   |
| Avg | 3 | 2.4 | 1.4 | 2.4 | - | 1.2 | - | - | - | 2 | - | 0.8 |
|     |   |     |     |     |   |     |   |   |   |   |   |     |

### III B. Tech I Sem Subject: Design of Machine Members-I

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 2   | 3   | 1   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO2 | 2   | -   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO3 | -   | 3   | 2   | 1   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO4 | 3   | 2   | 3   | 1   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO5 | -   | 3   | 2   | 1   | -   | -   | -   | -   | -   | -    | -    | -    |
| Avg | 2.6 | 2.5 | 2.2 | 1   | -   | -   | -   | -   | -   | -    | -    | -    |

### III B. Tech II Sem Subject: Finite Element Methods

|     | PO1  | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2    | 1   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO2 | -    | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO3 | -    | 1   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO4 | 3    | 2   | 2   | -   | 1   | -   | -   | -   | -   | 2    | -    | -    |
| CO5 | 2    | 2   | 3   | -   | 2   | -   | -   | -   | -   | 2    | -    | -    |
| Avg | 2.33 | 1.6 | 2.5 | 1   | 1.5 | -   | -   | -   | -   | 2    | -    | -    |

  
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| III B. Tech II Sem Subject: Heat Transfer                   |     |     |     |     |     |     |     |     |     |      |      |      |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 1   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO2   | 1   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO3   | 1   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO4   | 1   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO5   | 1   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| Avg   | 1   | 2   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| IV B. Tech I Sem Subject: ICS                               |     |     |     |     |     |     |     |     |     |      |      |      |
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| CO2   | -   | 2   | -   | -   | -   | 3   | -   | -   | -   | -    | -    | -    |
| CO3   | 3   | 3   | -   | -   | -   | 3   | -   | -   | -   | -    | -    | -    |
| CO4   | 3   | 3   | -   | -   | -   | 3   | -   | -   | -   | -    | -    | -    |
| CO5   | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    |
| Avg   | 3   | 2.6 | -   | -   | -   | 3   | -   | -   | -   | -    | -    | -    |
| IV B. Tech I Sem Subject: Advanced Manufacturing Technology |     |     |     |     |     |     |     |     |     |      |      |      |
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 3   | -   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 2    |
| CO2   | 3   | -   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 2    |
| CO3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |



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## DEPARTMENT OF MECHANICAL ENGINEERING

|     |   |      |   |   |     |   |   |   |   |   |   |
|-----|---|------|---|---|-----|---|---|---|---|---|---|
| CO4 | 3 | 2    | - | - | 1   | 1 | - | - | - | - | 2 |
| CO5 | - | 2    | - | - | 2   | 1 | 1 | - | - | - | 2 |
| Avg | 3 | 2.33 | - | - | 1.5 | 1 | 1 | - | - | - | 2 |

  
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### DEPARTMENT OF MECHANICAL ENGINEERING

#### ProgramlevelCourse-

**POmatrixofallcoursesINCLUDINGfirstyearcourses**Note: 1.Entercorrelationlevels1,2or3a  
sdefined1:Slight(Low)2:Moderate(Medium)3:Substantial(High),It  
thereisnocorrelation,put“”

|          |                                     | PO1 | PO2  | PO3  | PO4  | PO5  | PO6  | PO7 | PO8 | PO9  | PO10 | PO11 | PO12 |
|----------|-------------------------------------|-----|------|------|------|------|------|-----|-----|------|------|------|------|
| MA101BS  | Mathematics - I                     | 1.3 | 0.67 | 0.53 | 0.83 | 0.13 | 0.67 | -   | -   | -    | -    | -    | -    |
| PH102BS  | Engineering Physics                 | 1.2 | 0.13 | -    | 1    | 0.2  | 1    | 1   | 1   | -    | -    | -    | -    |
| CS103ES  | Programming for Problem Solving     | 1.8 | -    | -    | 2.5  | -    | -    | -   | -   | -    | -    | -    | -    |
| ME104ES  | Engineering Graphics                | 1   | -    | -    | 0.2  | -    | -    | -   | -   | -    | -    | -    | -    |
| PH105BS  | Engineering Physics Lab             | 1.8 | 0.2  | -    | -    | -    | -    | -   | -   | -    | -    | -    | -    |
| CS106ES  | Programming for Problem Solving Lab | 1.8 | 0.2  | -    | 2.5  | -    | -    | -   | -   | -    | -    | -    | -    |
| *MC109ES | Environmental Science               | 1   | 1    | 1    | 1    | 2    | 1    | 1.7 | -   | -    | -    | -    | -    |
| MA201BS  | Mathematics - II                    | 2.4 | -    | 1    | -    | -    | -    | -   | -   | -    | -    | -    | -    |
| CH202BS  | Chemistry                           | 1.8 | 0.2  | -    | 1    | -    | -    | -   | -   | -    | -    | -    | -    |
| ME203ES  | Engineering                         | 2.2 | 1.6  | -    | 1    | -    | -    | -   | 1   | -0.2 | -    | -    | -    |



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## DEPARTMENT OF MECHANICAL ENGINEERING

|         |  |      |      |     |     |      |     |   |   |   |     |   |   |
|---------|--|------|------|-----|-----|------|-----|---|---|---|-----|---|---|
|         | Mechanics                                      |      |      |     |     |      |     |   |   |   |     |   |   |
| ME205ES | Engineering Workshop                           | 1.4  | 0.2  | 0.4 | 1   | -    | -   | - | - | - | -   | - | - |
| EN205HS | English  | 2.6  | 1.2  | 0.4 | 1   | -    | -   | - | - | - | -   | - | - |
| CH206BS | Engineering Chemistry Lab                      | 1.8  | 0.2  | -   | 1   | -    | 0.2 | 1 | 1 | - | -   | - | - |
| EN207HS | English Language and Communication Skills Lab  | 2.6  | 1.2  | -   | -   | -    | -   | - | - | - | -   | - | - |
| MA301BS | Probability and Statistics & Complex Variables | 3    | 2.5  | 3   | 2.5 | 3    | 1   | 1 | 1 | 1 | -   | 1 | 1 |
| ME302PC | Mechanics of Solids                            | 2.5  | 2.5  | 2.5 | 2   | -    | -   | - | - | - | -   | - | - |
| ME303PC | Material Science and Metallurgy                | 2.25 | 3    | -   | 2   | 2    | 1   | 2 | - | - | -   | - | 3 |
| ME304PC | Production Technology                          | 3    | 2.5  | 3   | 2.5 | 3    | 1   | 1 | 1 | 1 | 1   | 1 | 1 |
| ME305PC | Thermodynamics                                 | 2.75 | 2.33 | 1   | 2   | 1.67 | 2   | 3 | - | - | -   | - | - |
| ME306PC | Production Technology Lab                      | 2.8  | 2.4  | 2   | 1.4 | -    | -   | - | - | 1 | .8  | - | 2 |
| ME307PC | Machine Drawing                                | 2.2  | 2.2  | 2.8 | -   | 1.6  | -   | - | - | - | 1.6 | - | - |

  
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## DEPARTMENT OF MECHANICAL ENGINEERING

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|---------|--|------|-----|------|-----|------|---|-----|---|---|---|---|---|
|         | Practice   |      |     |      |     |      |   |     |   |   |   |   |   |
| ME308PC | Material Science and Mechanics of Solids Lab     | 2.2  | 2   | 2.1  | 2   | 2.5  | - | -   | - | - | - | - | - |
| *MC309  | Constitution of India                            | 1.6  | 2.5 | 1.2  | -   | -    | 1 | -   | - | 1 | - | - | - |
| EE401ES | Basic Electrical and Electronics Engineering     | 3    | 2.5 | 3    | 2.5 | 3    | 1 | 1   | 1 | 1 | - | 1 | 1 |
| ME402PC | Kinematics of Machinery                          | 2.8  | 2.5 | 2.75 | 2.5 | 2.5  | 2 | 1   | 1 | 1 | 1 | 1 | 1 |
| ME403PC | Thermal Engineering - I                          | 2.25 | 2   | 2.7  | -   | 1.5- | - | -   | - | - | 2 | - | - |
| ME404PC | Fluid Mechanics and Hydraulic Machines           | 2.75 | 2   | 2.25 | 2   | 1    | - | -   | - | - | - | - | - |
| ME405PC | Instrumentation and Control Systems              | 3    | 2.6 | 3    | -   | -    | 3 | -   | - | - | - | - | - |
| EE409ES | Basic Electrical and Electronics Engineering Lab | 2    | 2   | 1    | 1   | 2    | - | -   | - | - | 1 | - | - |
| ME407PC | Fluid Mechanics and Hydraulic Machines Lab       | 2.0  | 1.0 | 1.0  | 1.0 | -    | - | -   | - | - | - | - | - |
| ME408PC | Instrumentation and Control Systems Lab          | 2    | 2   | 1    | 1   | 2    | - | -   | - | - | - | - | - |
| *MC409  | Gender Sensitization Lab                         | 1.6  | 2.6 | 1.2  | -   | 0.6  | - | 0.7 | - | - | - | - | - |

  
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|         |   |      |      |      |     |   |   |   |     |     |   |   |     |
|---------|---|------|------|------|-----|---|---|---|-----|-----|---|---|-----|
| ME501PC | Dynamics of Machinery                   | 2    | 2    | 2    | 1.5 | 1 | 1 | 2 | 1.5 | 1   | 2 | 1 | 1.5 |
| ME502PC | Design of Machine Members-I             | 2.5  | 2.67 | 2    | 1   | - | - | - | -   | -   | - | - | -   |
| ME503PC | Metrology & Machine Tools               | 2    | 3    | 2    | -   | - | - | - | -   | -   | - | - | -   |
| SM504MS | Business Economics & Financial Analysis | 2    | 1    | 2.67 | 2   | - | - | - | -   | -   | - | - | -   |
| ME505PC | Thermal Engineering-II                  | 2.67 | 2    | -    | 2   | - | - | - | -   | -   | - | - | -   |
| ME506PC | Operations Research                     | 2.75 | 2.75 | 2    | -   | - | 2 | - | -   | -   | - | - | -   |
| ME507PC | Thermal Engineering Lab                 | 3    | -    | 3    | -   | - | - | 2 | -   | 2   | - | - | -   |
| ME508PC | Metrology & Machine Tools Lab           | 3    | 1.2  | 1    | 3   | 1 | 1 | 1 | 2   | 0.8 | 1 | - | -   |
| ME509PC | Kinematics & Dynamics Lab               | 2.75 | 2    | 2.67 | 2   | - | - | - | -   | -   | - | - | -   |
| *MC510  | Intellectual Property Rights            | 2    | 2    | 1    | 1   | - | - | - | -   | -   | - | - | -   |
| ME601PC | Design of Machine Members-II            | 3    | 2.5  | 3    | 2.5 | 3 | 1 | 1 | 1   | 1   | 1 | 1 | 11  |
| ME602PC | Heat Transfer                           | 1    | 2    | 1    | 2   | - | - | - | -   | -   | - | - | -   |
| ME603PC | CAD & CAM                               | 2.75 | 2    | 1    | -   | - | - | - | -   | -   | - | - | -   |
| ME611PE | Unconventional Machining Processes      | 2.75 | 2.33 | -    | 3   | 3 | 3 | - | -   | -   | - | - | -   |
| ME604PC | Finite Element                          | 2    | 1.67 | 1    | 2   | - | - | - | -   | -   | - | - | -   |

  
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## DEPARTMENT OF MECHANICAL ENGINEERING

|         | Methods   |      |      |      |     |     |   |   |   |   |   |   |   |   |
|---------|---|------|------|------|-----|-----|---|---|---|---|---|---|---|---|
| ME605PC | Heat Transfer Lab                                   | 2.8  | 2.4  | 1    | 1   | 1   | - | - | - | - | - | - | - | - |
| ME606PC | CAD & CAM Lab                                       | 3    | 3    | 2    | 3   | 2   | 2 | 2 | 3 | 2 | 2 | - | - |   |
| EN608HS | Advanced Communication Skills lab                   | 3    | 2.6  | 1.2  | -   | 0.6 | - | 1 | 1 | 1 | 1 | - | 1 |   |
| *MC609  | Environmental Science                               | 1.6  | 2.6  | 1.2  | -   | 0.6 | - | 1 | 1 | 1 | 1 | - | 1 |   |
| ME701PC | Refrigeration & Air Conditioning                    | 2    | 2.75 | 2    | 2   | 1   | 1 | 1 | 1 | 1 | - | 1 | 1 |   |
| ME711PE | Additive Manufacturing                              | 2.75 | 2.33 | 1.75 | 2   | 1.5 | 1 | 2 | - | - | - | - | - |   |
| ME723PE | Renewable Energy Sources                            | 2    | -    | 2    | 1   | 1   | 1 | - | - | - | 1 | 1 | 1 |   |
| ME733PE | Fluid Power Systems                                 | 3    | 2.5  | 3    | 2.5 | 2.5 | 1 | 1 | 1 | 1 | - | 1 | 1 |   |
| ME702PC | Industrial Oriented Mini Project/ Summer Internship | 3    | 3    | 3    | 3   | 3   | 3 | 3 | 3 | 3 | 3 | 3 | 3 |   |
| ME703PC | Seminar   | 2    | 2    | 2    | 2   | 1   | 2 | 1 | - | 2 | 2 | 2 | 2 |   |
| ME704PC | Project Stage - I                                   | 3    | 2    | 3    | 3   | 3   | 3 | 2 | 3 | 3 | 3 | 3 | 3 |   |
| ME811PE | Industrial Robotics                                 | 2    | 1.67 | 1    | 2   | -   | - | - | - | - | - | - | - |   |
| ME810PE | Basics of Power Plant Engineering                   | 2.3  | 3    | 2.75 | 3   | 3   | 3 | 3 | 2 | 3 | 3 | 3 | 3 |   |
| ME822PE | PRODUCTION AND OPERATIONS MANAGEMENT                | 3    | 2.5  | 3    | 2.3 | 3   | 1 | 1 | 1 | 1 | - | 1 | 1 |   |

  
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## DEPARTMENT OF MECHANICAL ENGINEERING

|         |                    |   |   |   |   |   |   |   |   |   |   |   |   |
|---------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| ME801PC | Project Stage - II | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |
|---------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|

### CO Attainment:

The direct CO attainment is calculated by combining the internal attainment and Indirect attainment in a ratio of 25:75.

**CO Direct Attainment = 25% of Internal Exam**

**Attainment Level + 75% of External Exam Attainment Level = Final CO Attainment value** is calculated by combining CO Direct attainment and Course Exit Survey

**Final CO attainment = 80% of CO**

**Direct Attainment + 20% of Course End Survey attainment = CO Attainment Target Value: 1.8**

| Year/ Sem | Course Code | Course                          | CO Attainment Value | Attained Target Value |
|-----------|-------------|---------------------------------|---------------------|-----------------------|
| I/I       | MA101BS     | Mathematics - I                 | 2.0<br>4            | YES                   |
|           | PH102BS     | Engineering Physics             | 2.8<br>6            | YES                   |
|           | CS103ES     | Programming for Problem Solving | 2.8<br>4            | YES                   |
|           | ME104ES     | Engineering Graphics            | 2.8<br>6            | YES                   |



### DEPARTMENT OF MECHANICAL ENGINEERING

|      |          |  |          |     |
|------|----------|--|----------|-----|
|      | PH105BS  | Engineering Physics Lab                        | 2.8<br>6 | YES |
|      | CS106ES  | Programming for Problem Solving Lab            | 2.0<br>2 | YES |
|      | *MC109ES | Environmental Science                          | 2.9      | YES |
| I/I  | MA201BS  | Mathematics - II                               | 2.0<br>6 | YES |
|      | CH202BS  | Chemistry                                      | 2.0<br>2 | YES |
|      | ME203ES  | Engineering Mechanics                          | 2.0<br>4 | YES |
|      | ME205ES  | Engineering Workshop                           | 2.1      | YES |
|      | EN205HS  | English  | 2.8<br>8 | YES |
|      | CH206BS  | Engineering Chemistry Lab                      | 2.8<br>8 | YES |
|      | EN207HS  | English Language and Communication Skills Lab  | 2.9      | YES |
| II/I | MA301BS  | Probability and Statistics & Complex Variables | 1.6      | YES |
|      | ME302PC  | Mechanics of Solids                            | 1.6      | YES |
|      | ME303PC  | Material Science and Metallurgy                | 1.6      | YES |
|      | ME304PC  | Production Technology                          | 2.4      | YES |
|      | ME305PC  | Thermodynamics                                 | 1.6      | YES |
|      | ME306PC  | Production Technology Lab                      | 2.4      | YES |



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## DEPARTMENT OF MECHANICAL ENGINEERING

|       |         |  |            |     |
|-------|---------|--|------------|-----|
|       | ME307PC | Machine Drawing Practice                         | 1.6        | YES |
|       | ME308PC | Material Science and Mechanics of Solids Lab     | 2.4        |     |
|       | *MC309  | Constitution of India                            | 2.4        | YES |
| II/II | EE401ES | Basic Electrical and Electronics Engineering     | 2.4        | YES |
|       | ME402PC | Kinematics of Machinery                          | 2.4        | YES |
|       | ME403PC | Thermal Engineering - I                          | 2.4        | YES |
|       | ME404PC | Fluid Mechanics and Hydraulic Machines           | 2.4        | YES |
|       | ME405PC | Instrumentation and Control Systems              | 2.4        | YES |
|       | EE409ES | Basic Electrical and Electronics Engineering Lab | 1.6        | YES |
|       | ME407PC | Fluid Mechanics and Hydraulic Machines Lab       | 2.4        | YES |
|       | ME408PC | Instrumentation and Control Systems Lab          | 2.4        | YES |
|       | *MC409  | Gender Sensitization Lab                         | 2.4        | YES |
| III-I | ME501PC | Dynamics of Machinery                            | 1.6        | YES |
|       | ME502PC | Design of Machine Members-I                      | 2.4        | YES |
|       | ME503PC | Metrology & Machine Tools                        | 1.6        | YES |
|       | SM504MS | Business Economics & Financial Analysis          | 2.4        | YES |
|       | ME505PC | Thermal Engineering-II                           | 2.4        | YES |
|       | ME506PC | Operations Research                              | 1.6        | YES |
| II/I  | ME507PC | Thermal Engineering Lab                          | 2.4        | YES |
|       | ME509PC | Kinematics & Dynamics Lab                        | <b>1.6</b> | YES |



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|         |  |     |     |
|---------|--|-----|-----|
| *MC510  | Intellectual Property Rights                           | 2.4 | YES |
| ME601PC | Design of Machine Members-II                           | 2.4 | YES |
| ME602PC | Heat Transfer  | 2.4 | YES |
| ME603PC | CAD & CAM  | 2.4 | YES |
| ME611PE | Unconventional Machining Processes                     | 2.4 | YES |
| ME604PC | Finite Element Methods                                 | 2.4 | YES |
| ME605PC | Heat Transfer Lab                                      | 2.4 | YES |
| ME606PC | CAD & CAM Lab  | 2.4 | YES |
| EN608HS | Advanced Communication Skills lab                      | 2.4 | YES |
| *MC609  | Environmental Science                                  | 2.4 | YES |
| ME701PC | Refrigeration & Air Conditioning                       | 2.4 | YES |
| ME711PE | Additive Manufacturing                                 | 2.4 | YES |
| ME723PE | Renewable Energy Sources                               | 1.6 | YES |
| ME733PE | Fluid Power Systems                                    | 2.4 | YES |
| ME702PC | Industrial Oriented Mini Project/<br>Summer Internship | 2.4 | YES |
| ME703PC | Seminar  | 2.4 | YES |
| ME704PC | Project Stage - I                                      | 2.4 | YES |
| ME811PE | Industrial Robotics                                    | 2.4 | YES |
| ME810PE | Basics of Power Plant Engineering                      | 2.4 |     |
| ME822PE | PRODUCTION AND OPERATIONS<br>MANAGEMENT                | 2.4 | YES |
| ME801PC | Project Stage - II                                     | 2.4 | YES |





### DEPARTMENT OF MECHANICAL ENGINEERING

#### PO Attainment:

Final PO attainment value is calculated by combining PO Direct Attainment, Employer Survey, and Alumni Survey Final PO

attainment = 80% of PO Direct Attainment + 10% of Course Exit Survey + 10% of Alumni Survey

PO Attainment Target Value: 1.8

|          |                                     | PO1 | PO2  | PO3  | PO4  | PO5  | PO6  | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|----------|-------------------------------------|-----|------|------|------|------|------|-----|-----|-----|------|------|------|
| MA101BS  | Mathematics - I                     | 1.3 | 0.67 | 0.53 | 0.89 | 0.13 | 0.67 | -   | -   | -   | -    | -    | -    |
| PH102BS  | Engineering Physics                 | 1.2 | 0.13 | -    | 1    | 0.2  | 1    | 1   | -   | -   | -    | -    | -    |
| CS103ES  | Programming for Problem Solving     | 1.8 | -    | -    | 2.5  | -    | -    | -   | -   | -   | -    | -    | -    |
| ME104ES  | Engineering Graphics                | 1   | -    | -    | 1    | 0.2  | -    | -   | 1   | -   | 1    | -    | -    |
| PH105BS  | Engineering Physics Lab             | 1.8 | 0.2  | -    | -    | -    | -    | -   | -   | -   | -    | -    | -    |
| CS106ES  | Programming for Problem Solving Lab | 1.8 | 0.2  | -    | 2.5  | -    | -    | -   | -   | -   | -    | -    | -    |
| *MC109ES | Environmental Science               | 1   | 1    | 1    | 1    | 2    | 1    | 1   | -   | -   | -    | -    | -    |
| MA201BS  | Mathematics - II                    | 2.4 | -    | 1    | -    | -    | -    | -   | -   | -   | -    | -    | -    |
| CH202BS  | Chemistry                           | 1.8 | 0.2  | -    | 1    | 0.2  | 1    | 1   | -   | -   | -    | -    | -    |
| ME203ES  | Engineering Mechanics               | 2.2 | 1.6  | -    | 1    | -    | -    | -   | 1   | -   | 0.2  | -    | -    |





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|---------|--|------|------|------|-----|------|-----|---|---|---|-----|---|-----|
| ME205ES | Engineering Workshop                           | 1.4  | 0.2  | 0.4  | 1   | -    | -   | - | - | - | -   | - | -   |
| EN205HS | English  | 2.6  | 1.2  | 0.4  | 1   | -    | -   | - | - | - | -   | - | -   |
| CH206BS | Engineering Chemistry Lab                      | 1.8  | 0.2  | -    | 1   | -    | 0.2 | 1 | 1 | - | -   | - | -   |
| EN207HS | English Language and Communication Skills Lab  | 2.6  | 1.2  | -    | -   | -    | -   | - | - | - | -   | - | -   |
| PH207BS | Engineering Physics lab                        | 1.8  | 0.2  | -    | -   | -    | -   | - | - | - | -   | - | -   |
| MA301BS | Probability and Statistics & Complex Variables | 3    | 2.5  | 3    | 2.5 | 3    | 1   | 1 | 1 | 1 | -   | 1 | 1   |
| ME302PC | Mechanics of Solids                            | 2.5  | 2.5  | 2.5  | 2   | -    | -   | - | - | - | -   | - | -   |
| ME303PC | Material Science and Metallurgy                | 2.25 | 3    | -    | 2   | 2    | 1   | 2 | - | - | -   | - | 3   |
| ME304PC | Production Technology                          | 3    | 2.5  | 3    | 2.5 | 3    | 1   | 1 | 1 | 1 | -   | 1 | 1   |
| ME305PC | Thermodynamics                                 | 2.72 | 2.33 | 1    | 2   | 1.67 | 213 | - | - | - | -   | - | -   |
| ME306PC | Production Technology Lab                      | 2.8  | 2.4  | 2    | 1.4 | -    | -   | - | - | 1 | 0.8 | - | 2   |
| ME307PC | Machine Drawing Practice                       | 2.2  | 2.2  | 2.8  | -   | 1.6  | -   | - | - | - | 1.6 | - | 1.6 |
| ME308PC | Material Science and Mechanics of Solids Lab   | 2.2  | 2    | 2.1  | 2   | 2.5  | -   | - | - | - | -   | - | -   |
| *MC309  | Constitution of India                          | 1.6  | 2.5  | 1.2  | -   | -    | 1   | - | - | 1 | -   | - | -   |
| EE401ES | Basic Electrical and Electronics Engineering   | 3    | 2.5  | 3    | 2.5 | 3    | 1   | 1 | 1 | 1 | -   | 1 | 1   |
| ME402P  | Kinematics of Machinery                        | 2.8  | 2.5  | 2.75 | 2.5 | 2.5  | 3   | 1 | 1 | 1 | 1   | 1 | -   |

  
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## DEPARTMENT OF MECHANICAL ENGINEERING

|             |  |      |      |      |     |     |   |     |     |   |   |   |     |   |
|-------------|--|------|------|------|-----|-----|---|-----|-----|---|---|---|-----|---|
| C           |  |      |      |      |     |     |   |     |     |   |   |   |     |   |
| ME403P<br>C | Thermal Engineering - I                          | 2.25 | 2    | 2.7  | -   | 1.5 | - | -   | -   | - | 2 | - | -   | - |
| ME404P<br>C | Fluid Mechanics and Hydraulic Machines           | 2.75 | 2    | 2.25 | 2   | 1   | - | -   | -   | - | - | - | -   | - |
| ME405P<br>C | Instrumentation and Control Systems              | 3    | 2.6  | 3    | -   | -   | 3 | -   | -   | - | - | - | -   | - |
| EE409ES     | Basic Electrical and Electronics Engineering Lab | 2    | 2    | 1    | 1   | 2   | - | -   | -   | - | 1 | - | -   | - |
| ME407P<br>C | Fluid Mechanics and Hydraulic Machines Lab       | 2    | 1    | 1    | 1   | -   | - | -   | -   | - | - | - | -   | - |
| ME408P<br>C | Instrumentation and Control Systems Lab          | 2    | 2    | 1    | 1   | 2   | - | -   | -   | - | - | - | -   | - |
| *MC409      | Gender Sensitization Lab                         | 1.6  | 2.6  | 1.2  | -   | 0.6 | - | 0.7 | --  | - | - | - | -   | - |
| ME501P<br>C | Dynamics of Machinery                            | 2    | 2    | 2    | 1.5 | 1   | 1 | 2   | 1.5 | 1 | 2 | 1 | 1.5 | - |
| ME502P<br>C | Design of Machine Members-I                      | 2.5  | 2.67 | 2    | 1   | -   | - | -   | -   | - | - | - | -   | - |
| ME503P<br>C | Metrology & Machine Tools                        | 2    | 3    | 2    | -   | -   | - | -   | -   | - | - | - | -   | - |
| SM504M<br>S | Business Economics & Financial Analysis          | 1    | 1    | 2.6  | 2   | -   | - | -   | -   | - | - | - | -   | - |
| ME505P<br>C | Thermal Engineering-II                           | 2.67 | 2    | -    | 1   | -   | - | -   | -   | - | - | - | -   | - |
| ME506P<br>C | Operations Research                              | 2.75 | 2.75 | 2    | -   | -   | 2 | -   | -   | - | - | - | -   | - |
| ME507P<br>C | Thermal Engineering Lab                          | 3    | -    | 3    | -   | -   | - | 2   | -   | - | 2 | - | -   | - |

  
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## DEPARTMENT OF MECHANICAL ENGINEERING

|               |                                    |      |      |      |     |     |   |     |   |     |   |   |   |
|---------------|------------------------------------|------|------|------|-----|-----|---|-----|---|-----|---|---|---|
| ME508P<br>C   | Metrology & Machine Tools Lab      | 3    | 1.2  | 1    | 3   | 1   | 1 | 1   | 2 | 0.8 | 1 | - | - |
| ME509P<br>C   | Kinematics & Dynamics Lab          | 2.75 | 2    | 2.67 | 2   | -   | - | -   | - | -   | - | - | - |
| *MC510        | Intellectual Property Rights       | 2    | 2    | 1    | 1   | -   | - | -   | 1 | -   | - | - | - |
| ME601P<br>C   | Design of Machine Members-II       | 3    | 2.5  | 3    | 2.5 | 3   | 1 | 1   | 1 | 1   | 1 | 1 | 1 |
| ME602P<br>C   | Heat Transfer                      | 1    | 2    | 1    | -   | -   | - | -   | - | -   | - | - | - |
| ME603P<br>C   | CAD & CAM                          | 2.75 | 2    | 1    | -   | -   | - | -   | - | -   | - | - | - |
| ME611PE       | Unconventional Machining Processes | 2.75 | 2.33 | -    | 3   | 3   | 3 | -   | - | -   | - | - | - |
| ME604P<br>C   | Finite Element Methods             | 2    | 1.67 | 1    | 2   | -   | - | -   | - | -   | - | - | - |
| ME605P<br>C   | Heat Transfer Lab                  | 2.8  | 2.4  | 1    | 1   | 1   | - | -   | - | -   | - | - | - |
| ME606P<br>C C | CAD & CAM Lab                      | 3    | 3    | 2    | 3   | 2   | 2 | 2   | 3 | 2   | 2 | - | 1 |
| EN608HS       | Advanced Communication Skills lab  | 3    | 2.5  | 1    | 0.8 | -   | 2 | 0.8 | - | 1   | 1 | - | 1 |
| *MC609        | Environmental Science              | 1.6  | 2.6  | 1.2  | -   | 0.6 | 1 | -   | - | -   | 1 | - | - |
| ME701P<br>C   | Refrigeration & Air Conditioning   | 2    | 2.75 | 2    | 2   | 2   | 1 | 1   | 1 | 1   | - | 1 | 1 |
| ME711PE       | Additive Manufacturing             | 2.75 | 2.33 | 1.75 | 2   | 1.5 | 1 | 2   | - | -   | - | - | - |
| ME723PE       | Renewable Energy Sources           | 2    | -    | 2    | 1   | 1   | 1 | -   | - | -   | 1 | 1 | 1 |
| ME733PE       | Fluid Power Systems                | 3    | 2.5  | 3    | 2.5 | 2.5 | 1 | 1   | 1 | 1   | 1 | 1 | 1 |

  
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## DEPARTMENT OF MECHANICAL ENGINEERING

|                         |   |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------------------|---|------|------|------|------|------|------|------|------|------|------|------|------|
| ME702P<br>C             | Industrial Oriented Mini Project/ Summer Internship | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    |
| ME703P<br>C             | Seminar   | 2    | 2    | 2    | 2    | 1    | 2    | 1    | -    | 2    | 2    | 2    | 2    |
| ME704P<br>C             | Project Stage - I                                   | 3    | 2    | 3    | 3    | 3    | 3    | 3    | 2    | 3    | 3    | 3    | 3    |
| ME811PE                 | Industrial Robotics                                 | 2    | 1.67 | 1    | 2    | -    | -    | -    | -    | -    | -    | -    | -    |
| ME822PE                 | Production and Operations Management                | 3    | 2.5  | 3    | 2.3  | 3    | 1    | 1    | 1    | 1    | -    | 1    | 1    |
| ME810PE                 | Basics of Power Plant Engineering                   | 2.3  | 3    | 2.75 | 3    | 3    | 3    | 2    | 2    | 2    | 1    | 1    | 1    |
| ME801P<br>C             | Project Stage - II                                  | 3    | 2    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    |
| AVGAttainment           |   | 2.35 | 1.95 | 1.91 | 1.86 | 1.86 | 1.57 | 1.45 | 1.44 | 1.44 | 1.4  | 1.4  | 1.5  |
| 80%ofDirectAttainment   |   | 1.2  | 1.5  | 1.5  | 1.4  | 1.4  | 1.2  | 1.1  | 1.1  | 1.1  | 1.12 | 1.12 | 1.2  |
| IndirectAttainment      |   | 2.5  | 2.4  | 2.3  | 2.2  | 2.1  | 2.3  | 2.4  | 2.3  | 2.5  | 2.4  | 2.5  | 2.2  |
| 20%ofIndirectAttainment |   | 0.5  | 0.48 | 0.46 | 0.44 | 0.42 | 0.46 | 0.48 | 0.46 | 0.5  | 0.48 | 0.5  | 0.44 |
| FinalAttainment         |   | 1.7  | 1.98 | 1.96 | 1.84 | 1.82 | 1.66 | 1.58 | 1.56 | 1.6  | 1.68 | 1.62 | 1.46 |

  
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2.6.2. Attainment of Programme outcomes and course outcomes evaluated by the institution

## **CO – PO / PSO ASSESSMENT(R18)**



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## Department of Civil Engineering

**Establish the correlation between the courses and the Program Outcomes (POs) and Program Specific Outcomes (PSOs)**

### (A) PROGRAM OUTCOMES

Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the Information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.



**10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

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

### (B) PROGRAM SPECIFIC OUTCOMES (PSOs)

**After Successful completion of the program, the graduates will be able to :**

**PSO 1(Understanding):** Graduates will have an ability to describe, analysis and solve problems using mathematics and systematic problems solving technique.

**PSO 2(Analytical skill):** Graduates will have an ability to plan, execute, manage, maintain and rehabilitate Civil Engineering Systems and process.

**PSO 3(Executive Skill):** Graduates will have an ability to interact and work seamlessly in multi disciplinary teams.

**PSO 4(Responsibility):** Graduates will have requisite understanding on impact of civil engineering projects and processes in a global, economic societal context.



### CIVIL Department-Course List (R18 Regulation)

| Year/Sem | Course   | Course Code |
|----------|--|-------------|
| I/I      | Mathematics - I                                  | MA101BS     |
|          | Engineering Physics                              | PH102BS     |
|          | Programming for Problem Solving                  | CS103ES     |
|          | Engineering Graphics                             | ME104ES     |
|          | Engineering Physics Lab                          | PH105BS     |
|          | Programming for Problem Solving Lab              | CS106ES     |
|          | Environmental Science                            | *MC109ES    |
| I/II     | Mathematics - II                                 | MA201BS     |
|          | Chemistry  | CH202BS     |
|          | Engineering Mechanics                            | ME203ES     |
|          | Engineering Workshop                             | ME205ES     |
|          | English  | EN205HS     |
|          | Engineering Chemistry Lab                        | CH206BS     |
|          | English Language and Communication Skills Lab    | EN207HS     |
| II/I     | Surveying and Geomatics                          | CE301PC     |
|          | Engineering Geology                              | CE302PC     |
|          | Strength of Materials - I                        | CE303PC     |
|          | Probability and Statistics                       | MA304BS     |
|          | Fluid Mechanics                                  | CE305PC     |
|          | Surveying Lab                                    | CE306PC     |
|          | Strength of Materials Lab                        | CE307PC     |
|          | Engineering Geology Lab                          | CE308PC     |
|          | Constitution of India                            | *MC309      |
|          | Basic Electrical and Electronics Engineering     | EE401ES     |
|          | Basic Mechanical Engineering for Civil Engineers | CE402ES     |
|          | Building Materials, Construction and Planning    | CE403PC     |



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|                       |  |         |
|-----------------------|--|---------|
| II/II                 | Strength of Materials - II                       | CE404PC |
|                       | Hydraulics and Hydraulic Machinery               | CE405PC |
|                       | Structural Analysis - I                          | CE406PC |
|                       | Hydraulics and Hydraulic Machinery Lab           | CE409PC |
|                       | Basic Electrical and Electronics Engineering Lab | EE409ES |
| III- I                | Structural Analysis-II                           | CE501PC |
|                       | Geotechnical Engineering                         | CE502PC |
|                       | Structural Engineering –I (RCC)                  | CE503PC |
|                       | Transportation Engineering                       | CE504PC |
|                       | Concrete Technology(PE-I)                        | CE511PE |
|                       | Engineering Economics and Accountancy            | SM505MS |
|                       | Highway Engineering and Concrete Technology Lab  | CE506PC |
|                       | Geotechnical Engineering Lab                     | CE507PC |
|                       | Advanced Communication Skills Lab                | EN508HS |
|                       | Intellectual Property Rights                     | *MC509  |
| III-II                | Hydrology & Water Resources Engineering          | CE601PC |
|                       | Environmental Engineering                        | CE602PC |
|                       | Foundation Engineering                           | CE603PC |
|                       | Structural Engineering –II (Steel)               | CE604PC |
|                       | Advanced Structural Analysis (PE –II)            | CE613PE |
|                       | Entrepreneurship (OE–I)                          | CS600OE |
|                       | Environmental Engineering Lab                    | CE605PC |
|                       | Computer Aided Design Lab                        | CE606PC |
| Environmental Science | *MC609   |         |



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|       |  |           |
|-------|--|-----------|
| IV-I  | Estimation, Costing and Project Management   | CE701PC   |
|       | Ground Improvement Techniques(PE-III)        | CE712PE   |
|       | Ground Water Hydrology(PE-IV)                | CE723PE   |
|       | Basics of Aeronautical Engineering(OE-II)    | OE-II     |
|       | Professional Practice Law & Ethics           | SM702MS   |
|       | Industrial Oriented Mini Project             | CE703PC   |
|       | Seminar                                      | CE704PC   |
|       | Project Stage - I                            | CE705PC   |
| IV-II | Environmental Impact Assessment(PE-V)        | CE812PE   |
|       | Urban Transportation Planning(PE-VI)         | CE822PE   |
|       | Non-Conventional Sources of Energy(OE – III) | (ME800OE) |
|       | Project Stage-II                             | CE801PC   |





### Course Outcomes

| CE301PC | II B.Tech CE I sem:- <b>Surveying and Geomatics</b> -Cos  |  |
|---------|---|--|
| CO1     | Apply the knowledge to calculate angles, distances and levels                                       |  |
| CO2     | Identify data collection methods and prepare field notes  |  |
| CO3     | Understand the working principles of survey instruments, measurement errors and corrective measures |  |
| CO4     | Relate the knowledge to the modern equipment and methodologies                                      |  |
| CO5     | Estimate measurement errors and apply corrections, levels by different type of equipment            |  |

| CE305PC | II B.Tech CE I sem:- <b>Fluid Mechanics</b> –Cos   |  |
|---------|--|--|
| CO1     | Understand the broad principles of fluid statics, kinematics and dynamics                                    |  |
| CO2     | Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow |  |
| CO3     | Understand classifications of fluid flow   |  |



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|     |   |  |
|-----|---|--|
| CO4 | Be able to apply the continuity, momentum and energy principles |  |
| CO5 | Describe the physical properties of a fluid                     |  |

|                |  |  |
|----------------|--|--|
| <b>CE403PC</b> | <b>II B.Tech CE II sem:- Building Materials, Construction and Planning – Cos</b> |  |
| CO1            | Define the Basic terminology that is used in the industry                        |  |
| CO2            | Categorize different building materials, properties and their uses               |  |
| CO3            | Understand the Prevention of damage measures and good workmanship                |  |
| CO4            | Explain different building services  |  |
| CO5            | Study the prevalent building by laws   |  |





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| CE405PC | II B.Tech CE II- sem - <b>Hydraulics and Hydraulic Machinery</b> – Cos   |  |
|---------|--|--|
| CO1     | Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.                |  |
| CO2     | Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions. |  |
| CO3     | Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.   |  |
| CO4     | Get the knowledge on different hydraulic machinery devices and its principles.   |  |
| CO5     | That will be utilized in hydropower development and for other practical usages.  |  |

| CE503PC | III B.Tech CE I sem:- <b>Structural Engineering–I (RCC)</b> –Cos                        |  |
|---------|---|--|
| CO1     | Compare and Design the singly reinforced, doubly reinforced and flanged sections.       |  |
| CO2     | Design the axially loaded, uniaxial and biaxial bending columns.                        |  |
| CO3     | Classify the footings and Design the isolated square, rectangular and circular footings |  |
| CO4     | Distinguish and Design the one-way and two- way slabs.                                  |  |
| CO5     | Identify and calculate the design loads and distribution                                |  |



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| CE504PC | III B.Tech CE I sem-: <b>Transportation Engineering</b> –Cos  |  |
|---------|---|--|
| CO1     | An ability to apply the knowledge of mathematics, science and engineering in the areas of <u>traffic engineering, highway development and maintenance</u>   |  |
| CO2     | An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of <u>highways</u> . |  |
| CO3     | An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil subgrade and environmental conditions using the standards stipulated by Indian <u>Roads Congress</u> .   |  |
| CO4     | An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or <u>designed overlays using Indian Roads congress guidelines</u> .   |  |
| CO5     | An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioural patterns.  |  |



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| CE602PC | III B.Tech CE II-sem: <b>Environmental Engineering</b> –Cos                 |  |
|---------|---|--|
| CO1     | Assess characteristics of water and wastewater and their impacts            |  |
| CO2     | Estimate quantities of water and waste water and plan conveyance components |  |
| CO3     | Design components of water and waste water treatment plants                 |  |
| CO4     | Be conversant with issues of air pollution and control                      |  |
| CO5     | Design sewerage system  |  |

| CE603PC | III B.Tech CE II sem: <b>Foundation Engineering</b> – Cos                    |  |
|---------|--|--|
| CO1     | Understand the principles and methods of Geotechnical Exploration            |  |
| CO2     | Decide the suitability of soils and check the stability of slopes            |  |
| CO3     | Calculate lateral earth pressures and check the stability of retaining walls |  |
| CO4     | Analyse and design the shallow and deep foundations                          |  |
| CO5     | Understand soil exploration methods  |  |



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| CE701PC | IV B.Tech CE I sem: <b>Estimation, Costing and Project Management</b> – Cos   |  |
|---------|---|--|
| CO1     | Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.                |  |
| CO2     | Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure. |  |
| CO3     | Understand how competitive bidding works and how to submit a competitive bid proposal.  |  |
| CO4     | An idea of how to optimize construction projects based on costs.  |  |
| CO5     | An idea how construction projects are administered with respect to contract structures and issues.  |  |

| CE712PE | IV B.Tech CE I sem: <b>Ground Improvement Techniques(PE-III)</b> - Cos                           |  |
|---------|--|--|
| CO1     | Know the necessity of ground improvement.  |  |
| CO2     | Understand the various ground improvement techniques available.                                  |  |
| CO3     | Select & design suitable ground improvement technique for existing soil conditions in the field. |  |
| CO4     | To conduct different soil tests.   |  |
| CO5     | Real time case studies on soil stabilization.  |  |



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|                |  |  |
|----------------|--|--|
| <b>CE812PE</b> | IV B.Tech CE II Sem:- <b>Environmental Impact Assessment (PE –V)</b> –Cos                          |  |
| CO1            | Identify the environmental attributes to be considered for the EIA study                           |  |
| CO2            | Formulate objectives of the EIA studies  |  |
| CO3            | Identify the methodology to prepare rapid EIA  |  |
| CO4            | Prepare EIA reports and environmental management plans.  |  |
| CO5            | Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules. |  |

|                |  |  |
|----------------|--|--|
| <b>CE822PE</b> | IV B.Tech CE II sem: <b>Urban Transportation Planning(PE-VI)</b> - Cos |  |
| CO1            | Identify urban transportation problems                                 |  |
| CO2            | Estimate urban travel demand   |  |
| CO3            | Plan urban transport networks  |  |
| CO4            | Identify urban transport corridors                                     |  |
| CO5            | Prepare urban transportation plans                                     |  |



### CO-PO Mapping

|     | II B.Tech I Sem Subject: <b>Surveying and Geomatics</b> |     |     |     |     |     |     |     |     |      |      |      |
|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|     | PO1   | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | -   | -   | 2   | -   | 2   | -   | 1   | -   | -   | 1    | -    | -    |
| CO2 | 3   | 2   | 3   | -   | 1   | -   | 3   | -   | -   | 2    | -    | -    |
| CO3 | 2   | 2   | 3   | -   | 2   | -   | 2   | -   | -   | 2    | -    | -    |
| CO4 | 2   | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | -    | -    |
| CO5 | 2   | 2   | 3   | -   | 2   | -   | -   | -   | -   | 2    | -    | -    |
| Avg | 2.25  | 2   | 2.6 | -   | 2   | -   | 2   | -   | -   | 1.8  | -    | -    |





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| II B.Tech I Sem Subject: <b>Fluid Mechanics</b> |     |      |     |     |     |     |     |     |     |      |      |      |
|---|-----|------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1 | PO2  | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 2   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO2   | 1   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO3   | 1   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO4   | 2   | 2    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO5   | 1.5 | 1.25 | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| Avg   | 2   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |





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| II B.Tech II Sem Subject: <b>Building Materials &amp; Construction Planning</b> |           |     |     |     |     |     |     |     |     |      |      |      |
|---|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1       | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | -         | -   | 2   | -   | 2   | 1   | 1   | -   | -   | 1    | -    | 3    |
| CO2   | 3         | 2   | 3   | -   | 1   | -   | 3   | -   | -   | 2    | -    | -    |
| CO3   | 2         | 2   | 3   | -   | 2   | -   | 2   | -   | -   | 2    | -    | 2    |
| CO4   | 2         | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| CO5   | 2         | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| Avg   | 2.3333333 | 2   | 2.5 | -   | 2   | 1   | 2   | -   | -   | 1.75 | 1    | 2.5  |



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| II B.Tech II Sem Subject: <b>Hydraulics &amp;Hydraulic Machines</b> |      |     |      |     |     |     |     |     |     |      |      |      |
|---|------|-----|------|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1  | PO2 | PO3  | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 2    | 3   | 1    | 2   | -   | 1   | -   | -   | -   | 1    | -    | -    |
| CO2   | 2    | 2   | 2    | 1   | -   | 1   | -   | -   | -   | 1    | -    | -    |
| CO3   | 2    | 3   | 3    | 2   | 1   | -   | -   | -   | -   | 1    | -    | -    |
| CO4   | 3    | 2   | 3    | 1   | 3   | -   | -   | -   | -   | 2    | -    | -    |
| CO5   | 2.25 | 2.5 | 2.25 | 1.5 | 2   | 1   | -   | -   | -   | 1.25 | -    | -    |
| Avg   | 2    | 3   | 1    | 2   | -   | 1   | -   | -   | -   | 1    | -    | -    |



| III B.Tech I Sem Subject: <b>Structural Engineering-I(RCC)</b> |               |     |     |     |     |     |     |     |     |      |      |      |
|--|---------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1           | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | -             | -   | 2   | -   | 2   | 1   | 1   | -   | -   | 1    | -    | 3    |
| CO2  | 3             | 2   | 3   | -   | 1   | -   | 3   | -   | -   | 2    | -    | -    |
| CO3  | 2             | 2   | 3   | -   | 2   | -   | 2   | -   | -   | 2    | -    | 2    |
| CO4  | 2             | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| CO5  | 2             | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| Avg  | 2.33333<br>33 | 2   | 2.5 | -   | 2   | 1   | 2   | -   | -   | 1.75 | 1    | 2.5  |

| III B.Tech I Sem Subject: <b>Transporation Engineering</b> |     |      |     |     |     |     |     |     |     |      |      |      |
|--|-----|------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1 | PO2  | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | 2   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO2  | 1   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO3  | 1   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO4  | 2   | 2    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| CO5  | 1.5 | 1.25 | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |
| Avg  | 2   | 1    | 1   | -   | -   | -   | -   | -   | 1   | 1    | -    | -    |



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| III B.Tech II Sem Subject: <b>Environmental Engineering</b> |             |             |             |     |          |     |     |     |     |             |             |      |
|---|-------------|-------------|-------------|-----|----------|-----|-----|-----|-----|-------------|-------------|------|
|   | PO1         | PO2         | PO3         | PO4 | PO5      | PO6 | PO7 | PO8 | PO9 | PO10        | PO11        | PO12 |
| CO1   | -           | -           | 2           | -   | 2        | 1   | 1   | -   | -   | 1           | -           | 3    |
| CO2   | 3           | 2           | 3           | -   | 1        | -   | 3   | -   | -   | 2           | -           | -    |
| CO3   | 2           | 2           | 3           | -   | 2        | -   | 2   | -   | -   | 2           | -           | 2    |
| CO4   | 2           | 2           | 2           | -   | 3        | -   | -   | -   | -   | 2           | 1           | -    |
| CO5   | 2           | 2           | 2           | -   | 3        | -   | -   | -   | -   | 2           | 1           | -    |
| Avg   | <b>1.33</b> | <b>1.33</b> | <b>1.33</b> | -   | <b>2</b> | -   | -   | -   | -   | <b>1.33</b> | <b>0.67</b> | -    |

| III B.Tech II Sem Subject: <b>Foundation Engineering</b> |     |     |     |     |     |     |     |     |     |      |      |      |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | -   | -   | 2   | -   | 2   | 1   | 1   | -   | -   | 1    | -    | 3    |
| CO2  | 3   | 2   | 3   | -   | 1   | -   | 3   | -   | -   | 2    | -    | -    |
| CO3  | 2   | 2   | 3   | -   | 2   | -   | 2   | -   | -   | 2    | -    | 2    |
| CO4  | 2   | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| CO5  | 2   | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| Avg  | -   | -   | 2   | -   | 2   | 1   | 1   | -   | -   | 1    | -    | 3    |



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| IV B.Tech I Sem Subject: <b>Estimation, Costing &amp; Project Management</b> |     |     |     |     |     |     |     |     |     |      |      |      |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | 2   | 3   | 3   | 2   | 2   | 2   | 1   | 1   | 2   | 2    | 3    | 3    |
| CO2  | 3   | 2   | 1   | 3   | 3   | 2   | 1   | 1   | 2   | 2    | 3    | 2    |
| CO3  | 2   | 3   | 2   | 2   | 2   | 2   | 1   | 1   | 2   | 2    | 3    | 2    |
| CO4  | 2   | 2   | 2   | 2   | 2   | 1   | 1   | 1   | 2   | 2    | 3    | 2    |
| CO5  | 2   | 2   | 2   | 3   | 2   | 1   | 1   | 1   | 2   | 2    | 3    | 2    |
| Avg  | 2.2 | 2.4 | 2   | 2.4 | 2.2 | 1.6 | 1   | 1   | 2   | 2    | 3    | 2.2  |

| IV B.Tech I Sem Subject: <b>Ground Improvement Techniques</b> |     |     |     |     |     |     |     |     |     |      |      |      |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1   | 3   | 3   | 2   | 3   | 3   | 2   | 2   | 1   | 2   | 2    | 3    | 3    |
| CO2   | 1   | 2   | -   | 2   | 3   | -   | -   | -   | 2   | 1    | 2    | 2    |



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|     |   |     |       |     |     |     |       |   |      |      |     |     |
|-----|---|-----|-------|-----|-----|-----|-------|---|------|------|-----|-----|
| CO3 | 1 | 2   | 3     | 3   | 2   | -   | -     | - | 1    | -    | 2   | 2   |
| CO4 | 2 | 2   | -     | 3   | 3   | -   | 1     | - | -    | 1    | 3   | 3   |
| CO5 | 3 | 2   | 3     | 3   | 3   | 1   | 2     | 1 | 2    | 1    | 2   | 2   |
| Avg | 2 | 2.2 | 2.667 | 2.8 | 2.8 | 1.5 | 1.667 | 1 | 1.75 | 1.25 | 2.4 | 2.4 |

| IV B.Tech II Sem Subject: <b>Professional Practice, Law &amp; Ethics</b> |           |     |     |     |     |     |     |     |     |      |      |      |
|--|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|  | PO1       | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1  | -         | -   | 2   | -   | 2   | 1   | 1   | -   | -   | 1    | -    | 3    |
| CO2  | 3         | 2   | 3   | -   | 1   | -   | 3   | -   | -   | 2    | -    | -    |
| CO3  | 2         | 2   | 3   | -   | 2   | -   | 2   | -   | -   | 2    | -    | 2    |
| CO4  | 2         | 2   | 2   | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| CO5  | 2         | 1   | 2   | -   | 3   | -   | -   | -   | -   | 3    | 1    | -    |
| Avg  | 2.3333333 | 2   | 2.5 | -   | 2   | 1   | 2   | -   | -   | 1.75 | 1    | 2.5  |



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|     | IV B.Tech II Sem Subject: <b>Urban Transportation Planning</b> |      |      |     |     |     |     |     |     |      |      |      |
|-----|--|------|------|-----|-----|-----|-----|-----|-----|------|------|------|
|     | PO1  | PO2  | PO3  | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | -  | -    | 2    | -   | 2   | 1   | 1   | -   | -   | 1    | -    | 3    |
| CO2 | 3  | 2    | 3    | -   | 1   | -   | 3   | -   | -   | 2    | -    | -    |
| CO3 | 2  | 2    | 3    | -   | 2   | -   | 2   | -   | -   | 2    | -    | 2    |
| CO4 | 2  | 2    | 2    | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| CO5 | 2  | 2    | 2    | -   | 3   | -   | -   | -   | -   | 2    | 1    | -    |
| Avg | 1.33   | 1.33 | 1.33 | -   | 2   | -   | -   | -   | -   | 1.33 | 0.67 | -    |





### Program level Course-PO matrix of all courses INCLUDING first year courses

**Note:** 1. Enter correlation levels 1, 2 or 3 as defined 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High), If there is no correlation, put “ ”

|          |                                     | PO1 | PO2  | PO3  | PO4  | PO5  | PO6  | PO7 | PO8 | PO9  | PO10 | PO11 | PO12 |
|----------|-------------------------------------|-----|------|------|------|------|------|-----|-----|------|------|------|------|
| MA101BS  | Mathematics - I                     | 1.3 | 0.67 | 0.53 | 0.83 | 0.13 | 0.67 | -   | -   | -    | -    | -    | -    |
| PH102BS  | Engineering Physics                 | 1.2 | 0.13 | -    | 1    | 0.2  | 1    | 1   | 1   | -    | -    | -    | -    |
| CS103ES  | Programming for Problem Solving     | 1.8 | -    | -    | 2.5  | -    | -    | -   | -   | -    | -    | -    | -    |
| ME104ES  | Engineering Graphics                | 1   | -    | -    | 0.2  | -    | -    | -   | -   | -    | -    | -    | -    |
| PH105BS  | Engineering Physics Lab             | 1.8 | 0.2  | -    | -    | -    | -    | -   | -   | -    | -    | -    | -    |
| CS106ES  | Programming for Problem Solving Lab | 1.8 | 0.2  | -    | 2.5  | -    | -    | -   | -   | -    | -    | -    | -    |
| *MC109ES | Environmental Science               | 1   | 1    | 1    | 1    | 2    | 1    | 1.7 | -   | -    | -    | -    | -    |
| MA201BS  | Mathematics - II                    | 2.4 | -    | 1    | -    | -    | -    | -   | -   | -    | -    | -    | -    |
| CH202BS  | Chemistry                           | 1.8 | 0.2  | -    | 1    | -    | -    | -   | -   | -    | -    | -    | -    |
| ME203ES  | Engineering Mechanics               | 2.2 | 1.6  | -    | 1    | -    | -    | -   | 1   | -0.2 | -    | -    | -    |
| ME205ES  | Engineering Workshop                | 1.4 | 0.2  | 0.4  | 1    | -    | -    | -   | -   | -    | -    | -    | -    |
| EN205HS  | English                             | 2.6 | 1.2  | 0.4  | 1    | -    | -    | -   | -   | -    | -    | -    | -    |



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|---------|--|------|------|------|-----|------|------|------|---|------|------|------|------|
| CH206BS | Engineering Chemistry Lab                        | 1.8  | 0.2  | -    | 1   | -    | 0.2  | 1    | 1 | -    | -    | -    | -    |
| EN207HS | English Language and Communication Skills Lab    | 2.6  | 1.2  | -    | -   | -    | -    | -    | - | -    | -    | -    | -    |
| CE301PC | Surveying and Geomatics                          | 1.5  | 1.33 | 1.73 | -   | 1.33 | -    | 1.33 | - | -    | 1.2  | -    | -    |
| CE302PC | Engineering Geology                              | 1.8  | 0.4  | 0.4  | 1   | -    | -    | -    | - | -    | -    | -    | -    |
| CE303PC | Strength of Materials - I                        | 2    | 2.4  | 2.8  | 2.4 | 1.8  | 1.8  | 1.4  | 2 | 2.2  | 2    | 1.8  | 1.8  |
| MA304BS | Probability and Statistics                       | 3    | 2.5  | 3    | 2.5 | 3    | 1    | 1    | 1 | 1    | -    | 1    | 1    |
| CE305PC | Fluid Mechanics                                  | 1    | 0.83 | 0.67 | -   | -    | -    | -    | - | 0.67 | 0.67 | -    | -    |
| CE306PC | Surveying Lab                                    | 2.25 | 2    | 2.6  | -   | 2    | -    | 2    | - | -    | 1.8  | -    | -    |
| CE307PC | Strength of Materials Lab                        | 2.2  | 2.4  | -    | -   | 2    | -    | -    | - | -    | 1.6  | -    | -    |
| CE308PC | Engineering Geology Lab                          | 2.2  | 2.2  | 3    | -   | 2.4  | -    | -    | - | -    | 1.6  | -    | -    |
| *MC309  | Constitution of India                            | 2.4  | 2.2  | 3    | -   | 2.2  | -    | -    | - | -    | 1.6  | -    | -    |
| EE401ES | Basic Electrical and Electronics Engineering     | 2.3  | 2.4  | -    | -   | 2    | -    | -    | - | -    | 1.8  | -    | -    |
| CE402ES | Basic Mechanical Engineering for Civil Engineers | 2.2  | 2.2  | 2.8  | 2.4 | 1.8  | 1.8  | 1.4  | 2 | 2.2  | 2    | 1.8  | 1.6  |
| CE403PC | Building Materials, Construction                 | 1.56 | 1.33 | 1.67 | -   | 1.33 | 0.67 | 1.33 | - | -    | 1.17 | 0.67 | 1.67 |



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|----------|--|------|------|------|-----|------|------|------|---|-----|------|------|------|
|          | and Planning                                     |      |      |      |     |      |      |      |   |     |      |      |      |
| CE404PC  | Strength of Materials - II                       | 1    | 2    | 3    | -   | 2    | -    | -    | - | -   | 1.2  | -    | -    |
| CE405PC  | Hydraulics and Hydraulic Machinery               | 1    | 2    | -    | -   | 2    | -    | -    | - | -   | 1.4  | -    | -    |
| CE406PC  | Structural Analysis - I                          | 1.4  | 1.5  | -    | -   | 1.33 | 2    | -    | - | -   | 1    | -    | -    |
| CE407PC  | Computer aided Civil Engineering Drawing         | 1    | 1.75 | -    | -   | 2    | 2    | -    | - | -   | 1.2  | 2    | -    |
| CE409PC  | Hydraulics and Hydraulic Machinery Lab           | 1.5  | 1.67 | 1.5  | 1   | 1.33 | 0.67 | -    | - | -   | 0.83 | -    | -    |
| EE409ES  | Basic Electrical and Electronics Engineering Lab | 2.3  | 2.4  | -    | -   | 2    | -    | -    | - | -   | 1.8  | -    | -    |
| CE501PC  | Structural Analysis-II                           | 1.4  | 1.6  | -    | -   | 1.3  | 2    | -    | - | -   | 1    | -    | -    |
| CE502PC  | Geotechnical Engineering                         | 1.56 | 1.33 | 1.67 | -   | 1.33 | 0.67 | 1.33 | - | -   | 1.17 | 0.67 | 1.67 |
| CE503PC  | Structural Engineering –I (RCC)                  | 2.2  | 2.2  | 3    | -   | 1.6  | -    | -    | - | -   | 1.8  | -    | -    |
| CE504PC  | Transportation Engineering                       | 2.6  | 2.8  | 3    | 2.4 | 2.25 | 2.25 | -    | - | 2.8 | 2.2  | 2.4  | 2.6  |
| CE511PE  | Concrete Technology(PE-I)                        | 1.56 | 1.33 | 1.67 | -   | 1.33 | 0.67 | 1.33 | - | -   | 1.17 | 0.67 | 1.67 |
| SM505M S | Engineering Economics and                        | 1.33 | -    | -    | -   | 1.25 | -    | -    | 1 | 2   | 1.2  | 1.6  | -    |



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|---------|---|------|------|------|-----|------|-----|------|---|-----|------|------|-----|
|         | Accountancy                                     |      |      |      |     |      |     |      |   |     |      |      |     |
| CE506PC | Highway Engineering and Concrete Technology Lab | 1.5  | 2    | 1.75 | 2   | 1.6  | 2   | 1.8  | - | 2   | 1.6  | 2    | 2   |
| CE507PC | Geotechnical Engineering Lab                    | 2.4  | 2.2  | 3    | -   | 1.6  | -   | -    | - | -   | 1.8  | -    | -   |
| EN508HS | Advanced Communication Skills Lab               | 3    | 2.6  | 1.2  | -   | 0.6  | -   | 1    | 1 | 1   | 1    | -    | 1   |
| *MC509  | Intellectual Property Rights                    | 2    | 2.2  | 3    | -   | 2    | -   | -    | - | -   | 1.4  | -    | -   |
| CE601PC | Hydrology & Water Resources Engineering         | 1.8  | 2    | 2    | 1.6 | 2    | 1.4 | -    | 3 | 1.2 | 3    | -    | 1.2 |
| CE602PC | Environmental Engineering                       | 2    | 2.2  | 3    | -   | 2.2  | -   | -    | - | -   | 1.6  | -    | -   |
| CE603PC | Foundation Engineering                          | 1.33 | 1.33 | 1.33 | -   | 2    | -   | -    | - | -   | 1.33 | 0.67 | -   |
| CE604PC | Structural Engineering –II (Steel)              | 0.75 | 0.67 | 0.87 | -   | 0.67 | -   | 0.67 | - | -   | 0.6  | -    | -   |
| CE613PE | Advanced Structural Analysis (PE –II)           | 2.2  | 2.2  | 2.8  | -   | 1.6  | -   | -    | - | -   | 1.6  | -    | -   |
| CS600OE | Entrepreneurship (OE–I)                         | 1    | 2    | 2    | -   | -    | -   | 1.5  | - | -   | 1.4  | -    | -   |
| CE605PC | Environmental Engineering Lab                   | 1.6  | -    | 1.2  | 1   | 2.3  | -   | -    | - | -   | 1.2  | -    | -   |
| CE606PC | Computer Aided                                  | 2.4  | 2.2  | 3    | -   | 2.2  | -   | -    | - | -   | 1.6  | -    | 1.8 |



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|         |  |      |      |      |      |      |      |      |      |      |      |      |      |
|---------|--|------|------|------|------|------|------|------|------|------|------|------|------|
|         | Design Lab                                 |      |      |      |      |      |      |      |      |      |      |      |      |
| *MC609  | Environmental Science                      | 1.6  | 2.6  | 1.2  | -    | 0.6  | -    | 1    | 1    | 1    | 1    | -    | 1    |
| CE701PC | Estimation, Costing and Project Management | 1.47 | 1.6  | 1.33 | 1.6  | 1.47 | 1.1  | 0.67 | 0.67 | 1.33 | 1.33 | 2    | 1.47 |
| CE712PE | Ground Improvement Techniques(PE-III)      | 1.33 | 1.47 | 1.78 | 1.87 | 1.87 | 1    | 1.11 | 0.67 | 1.17 | 0.83 | 1.6  | 1.6  |
| CE723PE | Ground Water Hydrology(PE-IV)              | 2.4  | 2.2  | 2.6  | 2.8  | 2    | 2.4  | 2    | -    | 2.2  | 2.4  | 2    | 2.4  |
| OE-II   | Basics of Aeronautical Engineering(OE-II)  | 2    | 2.4  | 2.2  | 2.8  | 2    | 1.2  | 2.4  | -    | 2.2  | 2    | 2    | 2.4  |
| SM702MS | Professional Practice Law & Ethics         | 1.56 | 1.33 | 1.67 | -    | 1.33 | 0.67 | 1.33 | -    | -    | 1.17 | 0.67 | 1.67 |
| CE703PC | Industrial Oriented Mini Project           | 2    | 2.2  | 3    | 2.2  | 2.4  | 2    | 2    | -    | 2.4  | 2.4  | -    | 2.2  |
| CE704PC | Seminar                                    | 2.2  | 2.2  | 3    | 2.2  | 2.2  | 2    | 2    | -    | 2.4  | 2.4  | 2.4  | 2.2  |
| CE705PC | Project Stage - I                          | 2    | 3    | 2.8  | 3    | 3    | 2.4  | 3    | 2.8  | 2.8  | 2.2  | 3    | 3    |
| CE812PE | Environmental Impact Assessment(PE-V)      | 2.2  | 3    | 2.8  | 3    | 3    | 2.4  | 3    | 2.8  | 2.8  | 2.2  | 3    | 3    |
| CE822PE | Urban Transportation                       | 1.33 | 1.33 | 1.33 | -    | 2    | -    | -    | -    | -    | 1.33 | 0.67 | -    |



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|-----------|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|           | Planning.(PE-VI)                                       |     |     |     |     |     |     |     |     |     |     |     |     |
| (ME800OE) | Non-<br>Conventional<br>Sources of<br>Energy(OE – III) | 2.8 | 2.4 | 2.8 | 2.6 | 2.4 | 2.4 | 2.6 | 2.8 | 2.2 | 2.2 | 2.6 | 2.2 |
| CE801PC   | Project Stage-II                                       | 2.6 | 2.6 | 2.8 | 2.2 | 2.6 | 2.2 | 2.2 | 2.2 | 2.6 | 2.2 | 2.6 | 2.8 |





### CO Attainment:

The direct CO attainment is calculated by combining the internal attainment and Indirect attainment in a ratio of 25: 75.

**CO Direct Attainment = 25% of Internal Exam Attainment Level + 75% of External Exam Attainment Level**

**Final CO attainment value is calculated by combining CO Direct attainment and Course Exit Survey**

**Final CO attainment= 80% of CO Direct Attainment + 20% of Course End survey attainment**

**CO Attainment Target Value: 1.5**

| Year/Sem | Course Code | Course                              | CO Attainment Value | Attained Target Value |
|----------|-------------|-------------------------------------|---------------------|-----------------------|
| I/I      | MA101BS     | Mathematics - I                     | 2.15                | YES                   |
|          | PH102BS     | Engineering Physics                 | 3.36                | YES                   |
|          | CS103ES     | Programming for Problem Solving     | 3                   | YES                   |
|          | ME104ES     | Engineering Graphics                | 3.25                | YES                   |
|          | PH105BS     | Engineering Physics Lab             | 3                   | YES                   |
|          | CS106ES     | Programming for Problem Solving Lab | 2.15                | YES                   |
|          | *MC109ES    | Environmental Science               | 3.15                | YES                   |
| I/II     | MA201BS     | Mathematics - II                    | 2.8                 | YES                   |
|          | CH202BS     | Chemistry                           | 2.6                 | YES                   |
|          | ME203ES     | Engineering Mechanics               | 2                   | YES                   |
|          | ME205ES     | Engineering Workshop                | 2                   | YES                   |
|          | EN205HS     | English                             | 3                   | YES                   |



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|       |         |  |     |     |
|-------|---------|--|-----|-----|
|       | CH206BS | Engineering Chemistry Lab                        | 3   | YES |
|       | EN207HS | English Language and Communication Skills Lab    | 3   | YES |
| II/I  | CE301PC | Surveying and Geomatics                          | 2.2 | YES |
|       | CE302PC | Engineering Geology                              | 3   | YES |
|       | CE303PC | Strength of Materials - I                        | 2.8 | YES |
|       | MA304BS | Probability and Statistics                       | 2.8 | YES |
|       | CE305PC | Fluid Mechanics                                  | 2.8 | YES |
|       | CE306PC | Surveying Lab                                    | 3   | YES |
|       | CE307PC | Strength of Materials Lab                        | 3   | YES |
|       | CE308PC | Engineering Geology Lab                          | 2.8 | YES |
|       | *MC309  | Constitution of India                            | 3   | YES |
| II/II | EE401ES | Basic Electrical and Electronics Engineering     | 2.8 | YES |
|       | CE402ES | Basic Mechanical Engineering for Civil Engineers | 2.8 | YES |
|       | CE403PC | Building Materials, Construction and Planning    | 2.8 | YES |
|       | CE404PC | Strength of Materials - II                       | 2.8 | YES |
|       | CE405PC | Hydraulics and Hydraulic Machinery               | 3   | YES |
|       | CE406PC | Structural Analysis - I                          | 2.8 | YES |
|       | CE407PC | Computer aided Civil Engineering Drawing         | 2.8 | YES |
|       | CE409PC | Hydraulics and Hydraulic Machinery Lab           | 2.8 | YES |
|       | EE409ES | Basic Electrical and Electronics Engineering Lab | 3   | YES |
|       | CE501PC | Structural Analysis-II                           | 2.8 | YES |
|       | CE502PC | Geotechnical Engineering                         | 2.8 | YES |



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|              |         |  |     |     |
|--------------|---------|--|-----|-----|
| <b>III-I</b> | CE503PC | Structural Engineering –I ( <b>RCC</b> )           | 2.8 | YES |
|              | CE504PC | Transportation Engineering                         | 3   | YES |
|              | CE511PE | Concrete Technology(PE-I)                          | 2.8 | YES |
|              | SM505MS | Engineering Economics and<br>Accountancy           | 2.8 | YES |
|              | CE506PC | Highway Engineering and<br>Concrete Technology Lab | 2   | YES |

|               |         |   |     |     |
|---------------|---------|---|-----|-----|
|               | CE507PC | Geotechnical Engineering Lab                  | 3   | YES |
|               | EN508HS | Advanced Communication Skills<br>Lab          | 3   | YES |
|               | *MC509  | Intellectual Property Rights                  |     |     |
| <b>III-II</b> | CE601PC | Hydrology & Water Resources<br>Engineering    | 2   | YES |
|               | CE602PC | Environmental Engineering                     | 2.8 | YES |
|               | CE603PC | Foundation Engineering                        | 2   | YES |
|               | CE604PC | Structural Engineering –II ( <b>Steel</b> )   | 2.2 | YES |
|               | CE613PE | Advanced Structural Analysis<br>(PE –II)      | 2.8 | YES |
|               | CS600OE | Entrepreneurship (OE–I)                       | 2.6 | YES |
|               | CE605PC | Environmental Engineering Lab                 | 3   | YES |
|               | CE606PC | Computer Aided Design Lab                     | 2.8 | YES |
|               | *MC609  | Environmental Science                         |     |     |
| <b>IV-I</b>   | CE701PC | Estimation, Costing and Project<br>Management | 2   | YES |
|               | CE712PE | Ground Improvement<br>Techniques(PE-III)      | 2   | YES |
|               | CE723PE | Ground Water Hydrology(PE-IV)                 | 2   | YES |
|               | OE-II   | Basics of Aeronautical<br>Engineering(OE-II)  | 2   | YES |



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|              |           |  |     |     |
|--------------|-----------|--|-----|-----|
|              | SM702MS   | Professional Practice Law & Ethics           | 2   | YES |
|              | CE703PC   | Industrial Oriented Mini Project             | 2.4 | YES |
|              | CE704PC   | Seminar                                      | 3   | YES |
|              | CE705PC   | Project Stage - I                            | 3   | YES |
| <b>IV-II</b> | CE812PE   | Environmental Impact Assessment(PE-V)        | 2.8 | YES |
|              | CE822PE   | Urban Transportation Planning.(PE-VI)        | 2   | YES |
|              | (ME800OE) | Non-Conventional Sources of Energy(OE – III) | 2.2 | YES |
|              | CE801PC   | Project Stage-II                             | 3   | YES |



PO Attainment:

**Final PO attainment value is calculated by combining PO Direct Attainment, Employer Survey, and Alumni Survey**

**Final PO attainment= 80% of PO Direct Attainment + 10% of Course Exit Survey + 10% of Alumni Survey**

**PO Attainment Target Value: 1.8**

|          |                                     | PO1 | PO2  | PO3  | PO4  | PO5  | PO6  | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|----------|-------------------------------------|-----|------|------|------|------|------|-----|-----|-----|------|------|------|
| MA101BS  | Mathematics - I                     | 1.3 | 0.67 | 0.53 | 0.83 | 0.13 | 0.67 | -   | -   | -   | -    | -    | -    |
| PH102BS  | Engineering Physics                 | 1.2 | 0.13 | -    | 1    | 0.2  | 1    | 1   | 1   | -   | -    | -    | -    |
| CS103ES  | Programming for Problem Solving     | 1.8 | -    | -    | 2.5  | -    | -    | -   | -   | -   | -    | -    | -    |
| ME104ES  | Engineering Graphics                | 1   | -    | -    | 0.2  | -    | -    | -   | -   | -   | -    | -    | -    |
| PH105BS  | Engineering Physics Lab             | 1.8 | 0.2  | -    | -    | -    | -    | -   | -   | -   | -    | -    | -    |
| CS106ES  | Programming for Problem Solving Lab | 1.8 | 0.2  | -    | 2.5  | -    | -    | -   | -   | -   | -    | -    | -    |
| *MC109ES | Environmental Science               | 1   | 1    | 1    | 1    | 2    | 1    | 1.7 | -   | -   | -    | -    | -    |





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|         |   |      |      |      |     |      |     |      |   |      |      |     |     |
|---------|---|------|------|------|-----|------|-----|------|---|------|------|-----|-----|
| MA201BS | Mathematics - II                              | 2.4  | -    | 1    | -   | -    | -   | -    | - | -    | -    | -   | -   |
| CH202BS | Chemistry                                     | 1.8  | 0.2  | -    | 1   |      |     |      |   |      |      |     |     |
| ME203ES | Engineering Mechanics                         | 2.2  | 1.6  | -    | 1   | -    | -   | -    | 1 | -0.2 | -    | -   | -   |
| ME205ES | Engineering Workshop                          | 1.4  | 0.2  | 0.4  | 1   | -    | -   | -    | - | -    | -    | -   | -   |
| EN205HS | English                                       | 2.6  | 1.2  | 0.4  | 1   | -    | -   | -    | - | -    | -    | -   | -   |
| CH206BS | Engineering Chemistry Lab                     | 1.8  | 0.2  | -    | 1   | -    | 0.2 | 1    | 1 | -    | -    | -   | -   |
| EN207HS | English Language and Communication Skills Lab | 2.6  | 1.2  | -    | -   | -    | -   | -    | - | -    | -    | -   | -   |
| CE301PC | Surveying and Geomatics                       | 1.5  | 1.33 | 1.73 | -   | 1.33 | -   | 1.33 | - | -    | 1.2  | -   | -   |
| CE302PC | Engineering Geology                           | 1.8  | 0.4  | 0.4  | 1   | -    | -   | -    | - | -    | -    | -   | -   |
| CE303PC | Strength of Materials - I                     | 2    | 2.4  | 2.8  | 2.4 | 1.8  | 1.8 | 1.4  | 2 | 2.2  | 2    | 1.8 | 1.8 |
| MA304BS | Probability and Statistics                    | 3    | 2.5  | 3    | 2.5 | 3    | 1   | 1    | 1 | 1    | -    | 1   | 1   |
| CE305PC | Fluid Mechanics                               | 1    | 0.83 | 0.67 | -   | -    | -   | -    | - | 0.67 | 0.67 | -   | -   |
| CE306PC | Surveying Lab                                 | 2.25 | 2    | 2.6  | -   | 2    | -   | 2    | - | -    | 1.8  | -   | -   |
| CE307PC | Strength of Materials Lab                     | 2.2  | 2.4  | -    | -   | 2    | -   | -    | - | -    | 1.6  | -   | -   |
| CE308PC | Engineering Geology Lab                       | 2.2  | 2.2  | 3    | -   | 2.4  | -   | -    | - | -    | 1.6  | -   | -   |
| *MC309  | Constitution of India                         | 2.4  | 2.2  | 3    | -   | 2.2  | -   | -    | - | -    | 1.6  | -   | -   |
| EE401ES | Basic Electrical and Electronics              | 2.3  | 2.4  | -    | -   | 2    | -   | -    | - | -    | 1.8  | -   | -   |





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|---------|--|------|------|------|-----|------|------|------|---|-----|------|------|------|
|         | Engineering                                      |      |      |      |     |      |      |      |   |     |      |      |      |
| CE402ES | Basic Mechanical Engineering for Civil Engineers | 2.2  | 2.2  | 2.8  | 2.4 | 1.8  | 1.8  | 1.4  | 2 | 2.2 | 2    | 1.8  | 1.6  |
| CE403PC | Building Materials, Construction and Planning    | 1.56 | 1.33 | 1.67 | -   | 1.33 | 0.67 | 1.33 | - | -   | 1.17 | 0.67 | 1.67 |
| CE404PC | Strength of Materials - II                       | 1    | 2    | 3    | -   | 2    | -    | -    | - | -   | 1.2  | -    | -    |
| CE405PC | Hydraulics and Hydraulic Machinery               | 1    | 2    | -    | -   | 2    | -    | -    | - | -   | 1.4  | -    | -    |
| CE406PC | Structural Analysis - I                          | 1.4  | 1.5  | -    | -   | 1.33 | 2    | -    | - | -   | 1    | -    | -    |
| CE407PC | Computer aided Civil Engineering Drawing         | 1    | 1.75 | -    | -   | 2    | 2    | -    | - | -   | 1.2  | 2    | -    |
| CE409PC | Hydraulics and Hydraulic Machinery Lab           | 1.5  | 1.67 | 1.5  | 1   | 1.33 | 0.67 | -    | - | -   | 0.83 | -    | -    |
| EE409ES | Basic Electrical and Electronics Engineering Lab | 2.3  | 2.4  | -    | -   | 2    | -    | -    | - | -   | 1.8  | -    | -    |
| CE501PC | Structural Analysis-II                           | 1.4  | 1.6  | -    | -   | 1.3  | 2    | -    | - | -   | 1    | -    | -    |
| CE502PC | Geotechnical Engineering                         | 1.56 | 1.33 | 1.67 | -   | 1.33 | 0.67 | 1.33 | - | -   | 1.17 | 0.67 | 1.67 |



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|---------|---|------|------|------|-----|------|------|------|---|-----|------|------|------|
| CE503PC | Structural Engineering –I (RCC)                 | 2.2  | 2.2  | 3    | -   | 1.6  | -    | -    | - | -   | 1.8  | -    | -    |
| CE504PC | Transportation Engineering                      | 2.6  | 2.8  | 3    | 2.4 | 2.25 | 2.25 | -    | - | 2.8 | 2.2  | 2.4  | 2.6  |
| CE511PE | Concrete Technology(P E-I)                      | 1.56 | 1.33 | 1.67 | -   | 1.33 | 0.67 | 1.33 | - | -   | 1.17 | 0.67 | 1.67 |
| SM505MS | Engineering Economics and Accountancy           | 1.33 | -    | -    | -   | 1.25 | -    | -    | 1 | 2   | 1.2  | 1.6  | -    |
| CE506PC | Highway Engineering and Concrete Technology Lab | 1.5  | 2    | 1.75 | 2   | 1.6  | 2    | 1.8  | - | 2   | 1.6  | 2    | 2    |
| CE507PC | Geotechnical Engineering Lab                    | 2.4  | 2.2  | 3    | -   | 1.6  | -    | -    | - | -   | 1.8  | -    | -    |
| EN508HS | Advanced Communication Skills Lab               | 3    | 2.6  | 1.2  | -   | 0.6  | -    | 1    | 1 | 1   | 1    | -    | 1    |
| *MC509  | Intellectual Property Rights                    | 2    | 2.2  | 3    | -   | 2    | -    | -    | - | -   | 1.4  | -    | -    |
| CE601PC | Hydrology & Water Resources Engineering         | 1.8  | 2    | 2    | 1.6 | 2    | 1.4  | -    | 3 | 1.2 | 3    | -    | 1.2  |
| CE602PC | Environmental Engineering                       | 2    | 2.2  | 3    | -   | 2.2  | -    | -    | - | -   | 1.6  | -    | -    |
| CE603PC | Foundation Engineering                          | 1.33 | 1.33 | 1.33 | -   | 2    | -    | -    | - | -   | 1.33 | 0.67 | -    |
| CE604PC | Structural Engineering –                        | 0.75 | 0.67 | 0.87 | -   | 0.67 | -    | 0.67 | - | -   | 0.6  | -    | -    |



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|---------|--|------|------|------|------|------|------|------|------|------|------|------|------|
|         | II (Steel)                                 |      |      |      |      |      |      |      |      |      |      |      |      |
| CE613PE | Advanced Structural Analysis (PE – II)     | 2.2  | 2.2  | 2.8  | -    | 1.6  | -    | -    | -    | -    | 1.6  | -    | -    |
| CS600OE | Entrepreneurship (OE-I)                    | 1    | 2    | 2    | -    | -    | -    | 1.5  | -    | -    | 1.4  | -    | -    |
| CE605PC | Environmental Engineering Lab              | 1.6  | -    | 1.2  | 1    | 2.3  | -    | -    | -    | -    | 1.2  | -    | -    |
| CE606PC | Computer Aided Design Lab                  | 2.4  | 2.2  | 3    | -    | 2.2  | -    | -    | -    | -    | 1.6  | -    | 1.8  |
| *MC609  | Environmental Science                      | 1.6  | 2.6  | 1.2  | -    | 0.6  | -    | 1    | 1    | 1    | 1    | -    | 1    |
| CE701PC | Estimation, Costing and Project Management | 1.47 | 1.6  | 1.33 | 1.6  | 1.47 | 1.1  | 0.67 | 0.67 | 1.33 | 1.33 | 2    | 1.47 |
| CE712PE | Ground Improvement Techniques (PE-III)     | 1.33 | 1.47 | 1.78 | 1.87 | 1.87 | 1    | 1.11 | 0.67 | 1.17 | 0.83 | 1.6  | 1.6  |
| CE723PE | Ground Water Hydrology (PE-IV)             | 2.4  | 2.2  | 2.6  | 2.8  | 2    | 2.4  | 2    | -    | 2.2  | 2.4  | 2    | 2.4  |
| OE-II   | Basics of Aeronautical Engineering (OE-II) | 2    | 2.4  | 2.2  | 2.8  | 2    | 1.2  | 2.4  | -    | 2.2  | 2    | 2    | 2.4  |
| SM702MS | Professional Practice Law & Ethics         | 1.56 | 1.33 | 1.67 | -    | 1.33 | 0.67 | 1.33 | -    | -    | 1.17 | 0.67 | 1.67 |
| CE703PC | Industrial                                 |      |      |      |      |      |      |      |      |      | 2.4  |      |      |



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|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|
|                            | Oriented Mini Project                        | 2    | 2.2  | 3    | 2.2  | 2.4  | 2    | 2    | -    | 2.4  |      | -    | 2.2  |
| CE704PC                    | Seminar                                      | 2.2  | 2.2  | 3    | 2.2  | 2.2  | 2    | 2    | -    | 2.4  | 2.4  | 2.4  | 2.2  |
| CE705PC                    | Project Stage - I                            | 2    | 3    | 2.8  | 3    | 3    | 2.4  | 3    | 2.8  | 2.8  | 2.2  | 3    | 3    |
| CE812PE                    | Environmental Impact Assessment(PE -V)       | 2.2  | 3    | 2.8  | 3    | 3    | 2.4  | 3    | 2.8  | 2.8  | 2.2  | 3    | 3    |
| CE822PE                    | Urban Transportation Planning.(PE-VI)        | 1.33 | 1.33 | 1.33 | -    | 2    | -    | -    | -    | -    | 1.33 | 0.67 | -    |
| (ME800OE)                  | Non-Conventional Sources of Energy(OE - III) | 2.8  | 2.4  | 2.8  | 2.6  | 2.4  | 2.4  | 2.6  | 2.8  | 2.2  | 2.2  | 2.6  | 2.2  |
| CE801PC                    | Project Stage-II                             | 2.6  | 2.6  | 2.8  | 2.2  | 2.6  | 2.2  | 2.2  | 2.2  | 2.6  | 2.2  | 2.6  | 2.8  |
| AVG Attainment PENDING     |  | 1.8  | 1.75 | 2.38 | 1.75 | 1.71 | 1.85 | 1.72 | 2.01 | 2.12 | 1.75 | 2.12 | 2.15 |
| 80% of Direct Attainment   |  | 1.38 | 1.40 | 2.02 | 1.40 | 1.37 | 1.36 | 1.38 | 1.60 | 1.64 | 1.30 | 1.60 | 1.57 |
| 20% of Indirect Attainment |  | 0.37 | 0.36 | 0.56 | 0.45 | 0.47 | 0.36 | 0.52 | 0.45 | 0.28 | 0.37 | 0.29 | 0.32 |
| Final Attainment           |  | 1.82 | 1.84 | 2.65 | 1.95 | 1.75 | 1.93 | 1.98 | 2.15 | 1.98 | 1.75 | 1.96 | 1.97 |