**ANURAG GROUP OF INSTITUTIONS**

(Formerly CVSR COLLEGE OF ENGINEERING)

Venkatapur (V), Ghatkesar (M), R. R. Dist.

**(Autonomous)**

**DEPARTMENT OF MECHANICAL ENGINEERING**

Name of the Course: **MECHANICS OF SOLIDS LAB**

Name of the course coordinator: **Mr. S. Jush Kumar**

**Course Outcomes:**

After completion of this course the students will be able to:

1. Understand the different types of forces by performing experiments on various metal samples.
2. Conduct experiments on stiffness of springs.
3. Understand the various types of Beams.
4. Understand the various Mechanical Properties using different tests.
5. Understand the bending strength of the beams and compression strengths of wooden and cement cube specimen.

**Articulation matrix of CO’s with PO’s and PSO’s**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Program Outcome’s** | | | | | | | | | | | | **PSO’s** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO 10** | **PO 11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **3** | **3** | **2** | **2** | **-** | **2** | **1** | **-** | **1** | **1** | **2** | **2** | **3** |
| **CO2** | **3** | **3** | **3** | **2** | **-** | **-** | **-** | **2** | **1** | **-** | **1** | **1** | **3** | **2** | **1** |
| **CO3** | **3** | **3** | **3** | **2** | **-** | **2** | **-** | **2** | **-** | **-** | **1** | **1** | **2** | **2** | **3** |
| **CO4** | **3** | **3** | **3** | **-** | **1** | **2** | **-** | **2** | **-** | **2** | **2** | **-** | **3** | **2** | **2** |
| **CO5** | **3** | **3** | **3** | **3** | **1** | **2** | **-** | **1** | **-** | **-** | **1** | **1** | **2** | **2** | **1** |
| **AVG** | **3** | **3** | **3** | **3** | **1** | **2** | **-** | **2** | **1** | **2** | **1** | **1** | **2** | **2** | **2** |

***Note*: 1 - Slight**

**2 - Moderate**

**3 - Substantial**

**Program Outcomes**

PO1: The student shall be able to apply knowledge of mathematics, science, and engineering.

PO2: The student shall be able to design and conduct experiments, as well as to analyze and interpret data.

PO3: The student shall be able to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PO4: The student shall be able to function on multidisciplinary teams

PO5: The student shall be able to identify, formulate, and solve engineering problems

PO6: The student shall be able to understand the professional and ethical responsibility.

PO7: The student shall be able to communicate effectively.

PO8: The student shall understand the Broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

PO9: The student shall be able to Recognize the need for, and able to engage in life-long learning.

PO10: The student shall have the Knowledge of contemporary issues.

PO11: The student shall be able to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PO12: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadcast context of technological change.

**CO PO Mapping Justification**

|  |  |  |
| --- | --- | --- |
| **Mapping** | **Level** | **Justification** |
| CO1-PO1 | 3 | Student shall be able to apply knowledge of mathematics, science, and engineering in evaluating the different types of loads. |
| CO1-PO2 | 3 | Student shall be able to design and conduct experiments, as well as to analyze and interpret data by evaluating the stresses at different types of loads. |
| CO1-PO3 | 3 | Student shall be able to design a system or component which meets to test the component based on the type of load acting on the metal samples. |
| CO1-PO4 | 3 | Students will form in multidisciplanry teams to analysis the types of load acting on the metal samples |
| CO1-PO5 | 2 | Student shall be able to identify, formulate, and solve to find the resultant load acting on the metal sample based on the type of loading. |
| CO1-PO6 | 2 | Students must understand type of loading under professional and ethical responsibilities. |
| CO1-PO8 | 2 | Student shall understand the type of loading acting on the metal samples which is necessary to understand the impact of engineering solutions. |
| CO2-PO1 | 3 | Student shall be able to apply knowledge of mathematics, science, and engineering to do experiments on springs stiffness. |
| CO2-PO2 | 3 | Student shall be able to design and conduct experiments on springs to find stiffness. |
| CO2-PO3 | 3 | Student shall be able to design a system, component, or process to meet desired needs within realistic constraints to measure the stiffness of springs. |
| CO2-PO4 | 2 | Student shall be able to function on multidisciplinary teams to measure the stiffness of springs |
| CO2-PO8 | 2 | Student shall understand the concept of spring stiffness measurement which is necessary to understand the impact of engineering solutions. |
| CO3-PO1 | 3 | Student shall be able to apply knowledge of mathematics, science, and engineering to identify different types of beams under different loadings |
| CO3-PO2 | 3 | Student shall be able to design and conduct experiments, as well as to analyze and interpret data on the loadings of different types of beams. |
| CO3-PO3 | 3 | Student shall be able to design a system, component, or process to meet desired needs on different beam types and its loadings within realistic constraints such as economic, environmental, social, and safety manufacturability, and sustainability. |
| CO3-PO4 | 2 | Student shall be able to function on multidisciplinary teams to do different experiements on different types of beams and its loadings |
| CO3-PO6 | 2 | Student shall be able to understand different types of beams in the professional and ethical responsibility to find solutions for engineering problems |
| CO3-PO8 | 2 | The student shall understand the different beam types in mechanics of solids which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. |
| CO4-PO1 | 3 | Student shall be able to apply knowledge of mathematics, science, and engineering in analyzing the different mechanical properties under different tests |
| CO4-PO2 | 3 | Student shall be able to design and conduct experiments, as well as to analyze and interpret data to study mechanical characteristics of the given samples. |
| CO4-PO3 | 3 | Student shall be able to design a system, component, or process to meet desired needs in mechanical characteristics of given samples within realistic constraints. |
| CO4-PO6 | 2 | Student shall be able to understand the mechanical properties of diffent metals in enhancing the professional and ethical responsibility on materials. |
| CO4-PO8 | 2 | Student shall understand the mechanical characteristics of different metals which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. |
| CO4-PO10 | 2 | Student shall have the Knowledge of contemporary issues in metals by conducting different tests to identify mechanical properties. |
| CO4-PO11 | 2 | Student shall be able to use the techniques, skills, and modern engineering tools necessary for engineering practice for finding various mechanical propertie of the metals. |
| CO5-PO1 | 3 | Student shall be able to apply knowledge of mathematics, science, and engineering in finding the strength of metals, wood and cement materials. |
| CO5-PO2 | 3 | Student shall be able to design and conduct experiments, as well as to analyze and interpret data in finding the strength of the materials |
| CO5-PO3 | 3 | Student shall be able to design a system, component, or process to meet desired needs within realistic constraints in measuring the strength of different materials. |
| CO5-PO4 | 3 | The student shall be able to function on multidisciplinary teams in testing strengths of various materials. |
| CO5-PO6 | 2 | Student shall be able to understand the different concepts to find the strength of different materials which were professional and ethical responsibility in solving engineering problems. |
| CO1-PSO1 | 2 | Student shall able to understand the types of forces acting on structures to work in the domain of manufacturing and thermal to solve engineering problems using advanced technologies |
| CO1-PSO2 | 2 | In the Design of mechanical equipment and processes with the help of domain specific software tools students must able to identify different type of loads acting on the samples of different materails. |
| CO1-PSO3 | 3 | Studen must able to know about different types of loads acting on members to apply the knowledge of design and production processes to work effectively on multidisciplinary research areas for the benefit of society. |
| CO2-PSO1 | 3 | Students able to conduct experiemnts on different samples to work in the domain of manufacturing and design of structural components to solve engineering problems by utilizing advanced technologies |
| CO2-PSO2 | 2 | Students must able to conduct preliminary tests on different samples for Design the mechanical equipment and processes with the help of domain specific software tools. |
| CO3-PSO1 | 2 | Students shall able to find the different types of beams using in real time to Work in the domain of manufacturing and design to solve engineering problems. |
| CO3-PSO2 | 2 | Students able to know about different types of beams for Design the mechanical equipment and processes with the help of domain specific software tools. |
| CO3-PSO3 | 3 | Students must able to know about the different types of beams to apply the knowledge of design and production processes to work effectively on multidisciplinary research areas for the benefit of society |
| CO4-PSO1 | 3 | Student able to idientify mechanical properties of the material by doing different test to Work in the domain of design and manufacturing scinced to solve problems using advanced techniques. |
| CO4-PSO2 | 2 | Students able to know about mechanical properties obtained by different tests to Design the mechanical equipment and processes with the help of domain specific software tools. |
| CO4-PSO3 | 2 | Students must able to know how to measure the mechanical properties by using different tests to apply the knowledge of design and production processes to work effectively on multidisciplinary research areas for the benefit of society |
| CO5-PSO1 | 2 | Student able to find the strength of the beams of different materails in the deisning of strucutres to Work in the domain of manufacturing, thermal and fluid sciences to solve engineering problems by utilizing advanced technologies |
| CO5-PSO2 | 2 | Students shall be know about different strength of various materials to Design the mechanical equipment and processes with the help of domain specific software tools. |