**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 FLUIDS AND HYDRAULIC MACHINES**

Name of the course coordinator: **Mr. G. ARUN REDDY**

**Course Outcomes:**

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

1. Learn the units and dimensions and their applications,
2. Study fluid statics and fluids in motion,
3. Study fluid behavior of fluids under various flow conditions and fluid friction in pipes leading to design procedures for flow systems.
4. Study the performance of Pumps and hydraulic machines.
5. Study performance of hydraulic turbines, centrifugal and reciprocating pumps.

**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** | **1** | **1** | **-** | **1** | **-** | **-** | **-** | **1** | **1** | **-** | **3** | **-** | **1** |
| **CO2** | **2** | **2** | **-** | **2** | **1** | **2** | **3** | **3** | **-** | **-** | **3** | **2** | **3** | **2** | **-** |
| **CO3** | **3** | **3** | **3** | **2** | **-** | **3** | **3** | **3** | **2** | **1** | **2** | **2** | **3** | **2** | **-** |
| **CO4** | **3** | **3** | **3** | **2** | **1** | **2** | **3** | **3** | **2** | **1** | **2** | **2** | **3** | **2** | **1** |
| **CO5** | **3** | **3** | **3** | **-** | **2** | **2** | **3** | **3** | **2** | **1** | **2** | **2** | **3** | **2** | **2** |
| **AVG** | **3** | **3** | **3** | **2** | **1** | **2** | **3** | **3** | **2** | **1** | **2** | **2** | **3** | **2** | **1** |

***Note*: 1 - Slight**

**2 - Moderate**

**3 - Substantial**

**Signature of the Course Coordinator**

**Justification for CO-PO Mapping**

|  |  |  |  |
| --- | --- | --- | --- |
| PO/PSO | CO | Value | Justification |
| Justification for CO-PO Mapping | | | |
| I | I | 3 | Units and dimensions are substantial constituents of Engineering fundamentals |
| II | 2 | Knowledge of fluid statics and kinematics are significant parts of engineering science |
| III | 3 | Design procedures for flow systems substantially comprise complex engineering problems |
| IV | 3 | Pumps and hydraulic machines also substantially comprise complex engineering problems |
| V | 3 | Hydraulic turbines, centrifugal and reciprocating pumps substantially comprise engineering specialization for the solution of complex engineering problems |
| II | I | 3 | units and dimensions play a substantial role in analysis complex engineering problems |
| II | 2 | fluid statics and fluids in motion play a moderate role in natural sciences, and engineering sciences |
| III | 3 | behavior of fluids under various flow conditions substantially require identification and formulation using first principles of mathematics |
| IV | 3 | Pumps and hydraulic machines substantially require using first principles of mathematics, natural sciences, and engineering sciences. |
| V | 3 | hydraulic turbines, centrifugal and reciprocating pumps substantially require analyse complex engineering problems using first principles of mathematics |
| III | I | 1 | the units and dimensions and their applications are slight importance in  design solutions for complex engineering problems |
| III | 3 | fluid behavior of fluids under various flow conditions require substantial design solutions for complex engineering problems and design system components or processes |
| IV | 3 | performance of Pumps and hydraulic machines substantially include design solutions for complex engineering problems and design system components or processes |
| V | 3 | hydraulic turbines, centrifugal and reciprocating pumps substantially need design solutions for complex engineering problems and design system components or processes with environmental considerations |
| IV | I | 1 | units and dimensions and their applications play a slight role in  research methods including design of experiments, analysis and interpretation of data |
| II | 2 | fluid statics and fluids in motion are of moderate importance in  research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| III | 2 | fluids under various flow conditions are of moderate importance in  research methods including design of experiments, analysis and interpretation of data, and synthesis of the information |
| IV | 2 | Pumps and hydraulic machines are of moderate importance in  research methods including design of experiments, analysis and interpretation of data, and synthesis of the information |
| V | I | 1 | units and dimensions and their applications slightly influence selection, and application appropriate techniques |
| IV | 1 | Pumps and hydraulic machines slightly influence selection, and application appropriate techniques with an understanding of the limitations. |
| V | 2 | Performance of hydraulic turbines, centrifugal and reciprocating pumps moderately include prediction and modelling to complex engineering activities, with an understanding of the limitations |
| VI | I | 1 | Units, dimensions and their applications play a slight role in applying reasoning informed by the contextual knowledge. |
| II | 2 | fluid statics and fluids in motion moderately influence applying reasoning informed by the contextual knowledge consequent responsibilities relevant to the professional engineering practice. |
| III | 3 | fluid behavior of fluids under various flow conditions and fluid friction in pipes substantially influence applying reasoning informed by the contextual knowledge consequent responsibilities relevant to the professional engineering practice |
| IV | 2 | Pumps and hydraulic machines moderately influence applying reasoning informed by the contextual knowledge consequent responsibilities relevant to the professional engineering practice. |
| V | 2 | hydraulic turbines, centrifugal and reciprocating pumps moderately influence applying reasoning informed by the contextual knowledge consequent responsibilities relevant to the professional engineering practice |
| VII | II | 3 | fluid statics and fluids in motion substantially facilitate understanding the impact of the professional engineering solutions |
| III | 3 | Study fluid behavior of fluids under various flow conditions and fluid friction in pipes substantially facilitate understanding the impact of the professional engineering solutions |
| IV | 3 | Study the performance of Pumps and hydraulic machines substantially facilitate understanding the impact of the professional engineering solutions |
| V | 3 | Study performance of hydraulic turbines, centrifugal and reciprocating pumps substantially facilitate understanding the impact of the professional engineering solutions. |
| VIII | II | 3 | Units, dimensions and their applications substantially facilitate commitment to professional ethics and responsibilities and norms of the engineering practice. |
| III | 3 | Fluid statics and fluids in motion substantially facilitate commitment to professional ethics and responsibilities and norms of the engineering practice. |
| IV | 3 | Performance of Pumps and hydraulic machines fluid statics and fluids in motion substantially facilitate commitment to professional ethics and responsibilities and norms of the engineering practice. |
| V | 3 | Performance of hydraulic turbines, centrifugal and reciprocating pumps substantially facilitate commitment to professional ethics and responsibilities and norms of the engineering practice. |
| IX | III | 2 | fluid behavior of fluids under various flow conditions and fluid friction in pipes leading to design procedures for flow systems moderately require working in multidisciplinary settings. |
| IV | 2 | performance of Pumps and hydraulic machines moderately require working in multidisciplinary settings. |
| V | 2 | performance of hydraulic turbines, centrifugal and reciprocating pumps moderately require working in multidisciplinary settings. |
| X | I | 1 | Units, dimensions and their applications slightly influence effective communication on complex engineering activities with the engineering community. |
| III | 1 | fluid behavior of fluids under various flow conditions and fluid friction in pipes slightly influence effective communication on complex engineering activities with the engineering community. |
| IV | 1 | Pumps and hydraulic machines slightly influence effective communication on complex engineering activities with the engineering community. |
| V | 1 | hydraulic turbines, centrifugal and reciprocating pumps slightly influence effective communication on complex engineering activities with the engineering community. |
| XI | I | 1 | units and dimensions and their applications slightly influence understanding of the engineering and management principles. |
| II | 3 | fluid statics and fluids in motion substantially influence understanding of the engineering and management principles. |
| III | 2 | fluid behavior of fluids under various flow conditions moderately influence understanding of the engineering and management principles. |
| IV | 2 | Pumps and hydraulic machines moderately influence understanding of the engineering and management principles |
| V | 2 | hydraulic turbines, centrifugal and reciprocating pumps moderately influence understanding of the engineering and management principles |
| XII | II | 2 | fluid statics and fluids in motion moderately influence recognizing ability to engage in independent and life-long learning |
| III | 2 | fluid behavior of fluids under various flow conditions moderately influence recognizing ability to engage in independent and life-long learning |
| IV | 2 | Pumps and hydraulic machines moderately influence recognizing ability to engage in independent and life-long learning |
| V | 2 | hydraulic turbines, centrifugal and reciprocating pumps moderately influence recognizing ability to engage in independent and life-long learning |
| **Justification for CO-PSO Mapping** | | | |
| I | I | 3 | Units, dimensions and their applications substantially facilitate to work in the domain of thermal and fluid sciences to solve engineering problems by utilizing advanced technologies. |
| II | 3 | fluid statics and fluids in motion substantially facilitate to work in the domain of thermal and fluid sciences to solve engineering problems by utilizing advanced technologies |
| III | 3 | fluid behavior of fluids under various flow conditions and fluid friction in pipes substantially facilitate to work in the domain of thermal and fluid sciences to solve engineering problems by utilizing advanced technologies |
| IV | 3 | Pumps and hydraulic machines substantially facilitate to work in the domain of thermal and fluid sciences to solve engineering problems by utilizing advanced technologies |
| V | 3 | hydraulic turbines, centrifugal and reciprocating pumps substantially facilitate to work in the domain of thermal and fluid sciences to solve engineering problems by utilizing advanced technologies |
| III | I | 3 | Units, dimensions and their applications substantially facilitate to work  effectively on multidisciplinary research areas for the benefit of society. |
| II | 3 | fluid statics and fluids in motion substantially facilitate to work  effectively on multidisciplinary research areas for the benefit of society. |
| III | 3 | fluid behavior of fluids under various flow conditions and fluid friction in pipes substantially facilitate to work effectively on multidisciplinary research areas for the benefit of society. |
| IV | 3 | Pumps and hydraulic machines substantially facilitate to work  effectively on multidisciplinary research areas for the benefit of society. |
| V | 3 | hydraulic turbines, centrifugal and reciprocating pumps substantially facilitate to work in the domain of thermal and fluid sciences to solve engineering problems by utilizing advanced technologies |