**BHUBANANANDA ODISHA SCHOOL OF ENGINEERING, CUTTACK**

**DEPARTMENT OF MATHEMATICS & SCIENCE**



**LESSON PLAN**

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| SUBJECT: ENGINEERING MECHANICS (TH-4) | ACCADEMIC SESSION: 2022-23 |
| FACULTY: ACHYUT KUMAR PATRA | SEMESTER: 1ST |
|  | SEC: A |

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| H O D H O D (Math & Science Dept.) | |
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| **Discipline:**  **Civil Engineering** | **Semester: 1ST** | **Section-A** | | **Name of the teaching faculty:**  **Achyut Kumar Patra** |
| **Subject:**  **Engineering Mechanics** | **No. of Days/ per week class allotted: 04periods per week**  **(Mon-1 period, Tues-1 period, Wed-1 period, Fri -1 period)** | | | **Semester From Date: 25-10-2022 To Date: 31-01-2023**  **No. of weeks: 14 weeks** |
| **Week** | **Class Day** | | **No of period available** | **Theory Topics** |
| 1ST | 25/10/2022 | | 1 | **1. FUNDAMENTALS OF ENGINEERING MECHANICS**  1.1 Fundamentals.  Definitions of Mechanics, Statics, Dynamics, Rigid Bodies, |
| 26/10/2022 | | 1 | 1.2 Force & its types. |
| 28/10/2022 | | 1 | Force System.  Definition, Classification of force system according to plane & line of action. |
| 2nd | 31/10/2022 | | 1 | Characteristics of Force & effect of Force. Principles of Transmissibility  Principles of Superposition. |
| 01/11/2022 | | 1 | Concept of Free Body Diagram. |
| 02/11/2022 | | 1 | 1.3 Resolution of a Force.  Definition, Method of Resolution |
| 04/11/2022 | | 1 | Types of Component forces, Perpendicular  components & non-perpendicular components |
| 3rd | 07/11/2022 | | 1 | 1.4 Composition of Forces.  Definition, Resultant Force, Method of composition of forces, such as  1.4.1 Analytical Method such as Law of Parallelogram of forces |
| 09/11/2022 | | 1 | Method of composition of forces, such as method of resolution. |
| 11/11/2022 | | 1 | 1.4.2. Graphical Method.  Introduction, Space diagram, Vector diagram, Polygon law of forces. |
| 4th | 14/11/2022 | | 1 | 1.5 Moment of Force. Definition, Geometrical meaning of moment of a force, measurement of Moment of a force & its S.I units. Classification of moments according to direction of rotation, sign convention |
| 15/11/2022 | | 1 | Law of moments, Varignon’s Theorem,: |
| 16/11/2022 | | 1 | Couple – Definition, S.I. units, measurement of couple, properties of couple |
| 18/11/2022 | | 1 | **2. EQUILIBRIUM**  2.1 Definition, condition of equilibrium, Analytical conditions& Graphical conditions. |
| 5th | 21/11/2022 | | 1 | Analytical conditions of equilibrium for concurrent, non-concurrent force system. |
| 22/11/2022 | | 1 | Graphical conditions of equilibrium for concurrent, non-concurrent force system |
| 23/11/2022 | | 1 | Free Body Diagram. |
| 25/11/2022 | | 1 | 2.2 Lamia’s Theorem – Statement, Application for solving various engineering problems |
| 6th | 28/11/2022 | | 1 | **3. FRICTION**  3.1 Definition of friction, Frictional forces, Limiting frictional force, Coefficient of Friction. |
| 29/11/2022 | | 1 | Angle of Friction & Repose, Laws of Friction, Advantages & Disadvantages of Friction. |
| 30/11/2022 | | 1 | 3.2 Equilibrium of bodies on level plane – Force applied on horizontal & inclined plane (up &down). |
| 02/12/2022 | |  | 3.3 Ladder Friction. |
| 7TH | 05/12/2022 | | 1 | 3.3 Wedge Friction. |
| 06/12/2022 | | 1 | Solve Simple problem. |
| 07/12/2022 | | 1 | **Monthly Class Test 1** |
| 09/12/2022 | | 1 | **4. CENTROID & MOMENT OF INERTIA**  4.1 Centroid – Definition, Moment of an area about an axis. |
| 8TH | 12/12/2022 | | 1 | Centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles & quarter circles. |
| 13/12/2022 | | 1 | Centroid of composite figures. |
| 14/12/2022 | | 1 | Centroid of composite figures. |
| 16/12/2022 | | 1 | 4.2 Moment of Inertia – Definition and its type. |
| 9TH | 19/12/2022 | | 1 | Parallel axis theorem |
| 20/12/2022 | | 1 | Perpendicular axis Theorems |
| 21/12/2022 | | 1 | M.I. of plane lamina |
| 23/12/2022 | | 1 | **Internal Assessment Exam** |
| 10TH | 02/01/2022 | | 1 | M.I. of different engineering sections. |
| 03/01/2022 | | 1 | **5. SIMPLE MACHINES**  5.1 Definition of simple machine, velocity ratio of simple and compound gear train. |
| 04/01/2022 | | 1 | Explain simple & compound lifting machine, define M.A, V.R. & Efficiency & State the relation between them. |
| 06/01/2022 | | 1 | State Law of Machine, Reversibility of Machine, Self-Locking Machine. |
| 11TH | 09/01/2022 | | 1 | Solve Simple problem. |
| 10/01/2022 | | 1 | 5.2 Study of simple machines – simple axle & wheel, single purchase crab winch & double purchase crab winch |
| 11/01/2022 | | 1 | Worm & Worm Wheel |
| 12/01/2022 | | 1 | Screw Jack. |
| 12TH | 16/01/2022 | | 1 | 5.3 Types of hoisting machine like derricks etc., Their use and working principle. |
| 17/01/2022 | | 1 | **Monthly Class Test 2** |
| 18/01/2022 | | 1 | **6. DYNAMICS**  6.1 Kinematics & Kinetics, Principles of Dynamics, Newton’s Laws of Motion |
| 20/01/2022 | | 1 | Motion of Particle acted upon by a constant force, Equations of motion, De- Alembert’s Principle. |
| 13TH | 23/01/2022 | | 1 | 6.2 Work, Power, Energy & its Engineering Applications, Kinetic & Potential energy & its application. |
| 24/01/2022 | | 1 | Momentum & impulse, conservation of energy & linear momentum |
| 25/01/2022 | | 1 | Collision of elastic bodies, and Coefficient of Restitution. |
| 27/01/2022 | | 1 | Revision |
| 14TH | 30/01/2022 | | 1 | Revision |
| 31/01/2022 | | 1 | Previous Year Questions Discussion |