LESSON PLAN 3 SUBJECT : PHYSICS CLASS: XI

UNIT III: NEWTON LAWS OF MOTION

BRIEF DESCRIPTION- NEWTONS LAWS OF MOTION, CONCEPT OF MOMENTUM AND IMPULSE, ELEVATOR PROBLEM, PULLEY PROBLEM.

CONCEPT OF FRICTION AND ITS TYPES, LAWS OF FRICTION, CONCEPT OF COFFICIENT OF FRICTION AND INCLINED PLANE , WORK DONE ON INCLINED PLANE WHEN BODY IS MOVING UP AND DOWN.

CONCEPT OF ANGLE OF BANKING AND ANGLE OF BENDING.

KPI DEFINITION :

KPI 01: Students face problems in solving the problems based on banking of roads

KPI 02 : Students face problems in solving numerical portion/ mathematical calculations on pulley problem.

KPI 03 : Students Face problem in solving problems based on general impulse momentum theorem.

KPI 04: students face problem in framing a particular diagram/graph for any particular set of problems.

KPI 05: Students wont be able to understand the general properties related with friction and its types

OBJECTIVES:

SUBJECTIVE

1. Explain Newton's First Law of Motion and its implications regarding the concept of inertia."
2. "Discuss Newton's Second Law of Motion and its relationship between force, mass, and acceleration."
3. "Analyze Newton's Third Law of Motion and provide examples of action and reaction forces."

4. "Apply Newton's laws to describe and predict the motion of objects in various scenarios."
5. "Explore the concept of friction and its role in motion, including static and kinetic friction."

BEHAVIORIAL :

1. **Demonstrate Understanding:** Explain the three laws of motion proposed by Sir Isaac Newton and provide real-world examples to illustrate each law.
2. **Apply Newton's Laws:** Apply Newton's laws to analyze and predict the motion of objects under the influence of forces in one, two, and three dimensions.
3. **Calculate Forces and Accelerations:** Calculate forces, accelerations, and mass in various scenarios using Newton's Second Law of Motion (*F=ma*).
4. **Identify Action-Reaction Pairs:** Identify and describe action-reaction pairs in a given physical situation, following Newton's Third Law of Motion.
5. **Analyze Friction:** Analyze the role of friction in motion, distinguish between static and kinetic friction, and calculate frictional forces in practical contexts.
6. **Solve Complex Problems:** Develop problem-solving skills by applying Newton's laws to solve complex problems involving multiple forces and objects.
7. **Experimentation and Measurement:** Conduct experiments related to Newton's laws, measure forces and accelerations, and collect and analyze experimental data.
8. **Effective Communication:** Communicate their understanding and solutions clearly through written explanations, diagrams, and verbal presentations.
9. **Safety Awareness:** Recognize and practice safety precautions when conducting experiments or practical activities related to forces and motion.
10. **Interdisciplinary Connections:** Recognize the interdisciplinary nature of Newton's laws and their applications in fields such as engineering, physics, and biomechanics."

ASSESSMENT:

1. Written Examinations:

- Create written tests or exams with a variety of question types, including multiple-choice, short-answer, and essay questions, covering key concepts related to force, friction, and uniform circular motion.

2. Problem-Solving Assignments:

- Assign problem sets that require students to apply principles of force, friction, and circular motion to solve numerical and conceptual problems.
- Evaluate students based on their ability to analyze and solve complex problems.

3. Practical Experiments:

- Conduct laboratory experiments related to these topics, including investigations into the laws of motion, frictional forces, and centripetal acceleration in circular motion.
- Assess students based on their experimental skills, data collection, and analysis of results, and require them to write lab reports.

4. Project Work:

- Assign projects that involve real-world applications of these topics, such as designing a friction-reducing mechanism or analyzing the forces acting on amusement park rides.
- Assess projects based on research, data collection, analysis, and presentation of findings.

5. Group Discussions and Presentations:

- Organize group discussions or presentations where students explain concepts related to force, friction, and circular motion, and discuss practical applications or case studies.
- Evaluate students' ability to communicate complex ideas and engage in critical discussions.

6. Online Quizzes and Interactive Simulations:

- Use online platforms for quizzes and interactive simulations to engage students and reinforce theoretical concepts.
- Provide immediate feedback to help students understand and correct misconceptions.

7. Homework and Assignments:

- Assign regular homework and assignments that reinforce theoretical concepts and problem-solving skills.
- Provide constructive feedback on homework to support students' learning.

8. Concept Maps and Diagrams:

- Ask students to create concept maps, diagrams, or free-body diagrams to visually represent and explain the forces acting in various situations, including circular motion.

9. Peer Assessments:

- Incorporate peer assessments where students evaluate each other's understanding and contributions in group activities, projects, or presentations.

10. Real-World Applications: - Assign problems or scenarios that require students to apply force, friction, and circular motion principles to real-world situations, such as analyzing car accidents or the motion of objects on curved tracks.

11. Interdisciplinary Connections: - Encourage students to explore interdisciplinary connections between these topics and other scientific disciplines or engineering fields.

LEARNING OUTCOMES:

1. Understanding of Forces:

- Explain the fundamental principles of forces, including Newton's laws of motion.
- Differentiate between contact forces (e.g., friction, tension) and non-contact forces (e.g., gravity, electromagnetic forces).

2. Newton's Laws of Motion:

- Describe and apply Newton's three laws of motion to analyze and predict the behavior of objects subjected to forces.
- Understand the concept of inertia and its relationship to Newton's First Law.

3. Frictional Forces:

- Analyze and quantify frictional forces, including static and kinetic friction.
- Discuss the factors affecting the magnitude of friction and its applications in everyday life.

4. Centripetal Forces and Circular Motion:

- Explain the concept of uniform circular motion and identify the centripetal force responsible for keeping an object in circular motion.
- Calculate centripetal acceleration, velocity, and radius of circular motion using relevant formulas.

5. Free-Body Diagrams:

- Construct and interpret free-body diagrams to represent the forces acting on an object.
- Apply free-body diagrams to analyze and solve problems involving forces and equilibrium.

6. Problem-Solving Skills:

- Apply mathematical principles to solve problems related to forces, friction, and uniform circular motion.
- Develop critical thinking skills to solve complex problems involving multiple forces and objects.

7. Laboratory and Experimental Skills:

- Perform experiments related to forces and motion, including investigations into the laws of motion, friction, and circular motion.
- Collect and analyze experimental data, draw conclusions, and write lab reports.

8. Real-World Applications:

- Apply principles of forces and motion to analyze and understand real-world scenarios, such as car accidents, roller coaster dynamics, and satellite orbits.

9. Safety Awareness:

- Recognize and practice safety precautions when conducting experiments or practical activities involving forces and motion.
- Prioritize safety in all laboratory and practical work.

10. Effective Communication: - Communicate findings, explanations, and solutions clearly through written reports, diagrams, and verbal presentations. - Present and discuss complex ideas related to forces, friction, and circular motion effectively.

11. Interdisciplinary Connections: - Recognize the interdisciplinary nature of these topics and their relevance in various scientific and engineering disciplines. - Appreciate how concepts of force, friction, and circular motion contribute to technological advancements and innovations.