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ABSTRACT

This instructional guide, one of a series developed by the Technical Education Advancement Modules (TEAM) project, is a 20-hour introduction to industrial physics that explains and demonstrates to industrial maintenance mechanics the direct relationship of physics to machinery. Project TEAM is intended to upgrade basic technical competencies of unemployed, underemployed, and existing industrial employees. The materials in this module serve as a student outline and an instructor guide. The manual identifies 12 units: (1) pretest (not included); (2) measurement and trigonometry; (3) motion and forces in one direction; (4) concurrent forces, work and energy; (5) simple machines; (6) rotation motion; (7) rotational motion and nonconcurrent forces; (8) matter; (9) fluids; (10) temperature and heat; (11) gas laws; and (12) posttest (not included). Page references to the text used in teaching this course are given for each session. (NLA)

PROJECT T.E.A.M.

(Technical Education Advancement Modules)

INTRODUCTION TO INDUSTRIAL PHYSICS

GREENVILLE TECHNICAL COLLEGE

GREENVILLE TECHNICAL COLLEGE

PROJECT TEAM
TECHNICAL EDUCATION ADVANCEMENT MODULES

INSTRUCTIONAL MODULE:

INTRODUCTION TO INDUSTRIAL PHYSICS

Developed by:

Dr. James E. Whisenhunt

Funded by:

Cooperative Demonstration Program CFDA No. 84.199A
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1989-1990
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1. Course Title
Industrial Physics

2. Session Number
Pre Session

ESSENTIAL INFORMATION

3. Session Objectives
To give the students a Pretest on the material covered by the class to determine the basic abilities of the students

4. Tools, Equipment and materials needed
Scantron Sheets, Copies of the Pretest
Number 2 Pencils
Scantron Reader (optional)

5. Training Aids Needed
Calculator

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Take the Pretest		120 min

1. Course Title
Industrial Physics

2. Session Number
1

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on MEASURMENT AND TRIGONOMETRY.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Introduction	Page 1 - 3	15 min
2. Scientific Notation	Page 6 - 8	20 min
3. Area & Volume	Page 13 - 21	10 min
4. Accuracy & Precision	Page 29 - 32	25 min
5. Right Triangles	Page 96 - 99	30 min
6. Pythagorean Theorem	Page 100 - 103	20 min

1. Course Title
Industrial Physics

2. Session Number
2

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on MOTION & FORCES IN ONE DIRECTION

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Speed vs velocity	Page 52 - 61	10 min
2. Acceleration & Deceleration	Page 62 - 68	20 min
3. Pendulum	Page 70 - 72	10 min
4. Law of Inertia	Page 73 - 74	10 min
5. Law of Acceleration	Page 75 - 78	10 min
6. Friction	Page 79 - 82	20 min
7. Gravity vs Weight	Page 86 - 88	20 min
8. Momentum	Page 89 - 95	20 min

1. Course Title
Industrial Physics

2. Session Number
3

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on CONCURRENT FORCES & WORK AND ENERGY

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Equilibrium In One Direction	Page 125 - 135	30 min
2. Work	Page 136 - 139	30 min
3. Power	Page 140 - 147	30 min
4. Conservation Of Energy	Page 148 - 151	30 min

1. Course Title
Industrial Physics

2. Session Number
4

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on SIMPLE MACHINES.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Mechanical Advantage	Page 152 - 155	30 min
2. Lever	Page 155 - 158	25 min
3. Wheel and Axle	Page 159 - 160	10 min
4. Pulley	Page 161 - 165	10 min
5. Incline Plane	Page 166 - 168	25 min
6. Screw	Page 169 - 171	10 min
7. Wedge	Page 172 - 173	10 min

1. Course Title
Industrial Physics

2. Session Number
5

ESSENTIAL INFORMATION

3. Session Objectives
   To introduce the students to the course by covering the sections on ROTATION MOTION.

4. Tools, Equipment and materials needed
   Text: Physics for Career Education, Third Edition
   by Ewen, Nelson, Schurter
   Prentice Hall, 1988

5. Training Aids Needed
   Blackboard and chalk, calculator for each student, text book

6. Time Allotted
   2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Measurment of Rotational Motion	Page 174 - 178	20 min
2. Torque	Page 179 - 181	20 min
3. Motion in a Curved Path	Page 182 - 183	20 min
4. Power in Rotary Systems	Page 184 - 186	20 min
5. Transferring Rotational Motion	Page 187 - 188	20 min
6. Gears & Gear Trains	Page 188 - 190	20 min

1. Course Title
Industrial Physics

2. Session Number
6

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on ROTATIONAL MOTION & NONCONCURRENT FORCES.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Gears & Gear Trains	Page 191 - 197	50 min
2. Pulleys Connected With A Belt	Page 198 - 199	30 min
3. Parallel Forces	Page 200 - 206	20 min
4. Center of Gravity	Page 207 - 209	20 min

1. Course Title
Industrial Physics

2. Session Number
7

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on MATTER.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Properties Of Matter	Page 210 - 211	30 min
2. Properties Of Solids	Page 212 - 220	20 min
3. Properties Of Liquids	Page 221 - 223	20 min
4. Properties Of Gases	Page 223 - 224	20 min
5. Density	Page 224 - 232	30 min

1. Course Title
Industrial Physics

2. Session Number
8

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on FLUIDS.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Pressure	Page 233 - 239	30 min
2. Hydraulic Principle	Page 240 - 242	30 min
3. Air Pressure	Page 243 - 245	20 min
4. Buoyancy	Page 246 - 247	20 min
5. Fluid Flow	Page 248 - 251	20 min

1. Course Title
Industrial Physics

2. Session Number
9

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on TEMPERATURE AND HEAT.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Temperature	Page 252 - 255	20 min
2. Heat	Page 256 - 257	10 min
3. Heat Transfer	Page 258 - 262	10 min
4. Specific Heat	Page 263 - 264	20 min
5. Method of Mixing	Page 265 - 267	10 min
6. Expansion of Solids	Page 268 - 272	20 min
7. Expansion of Liquids	Page 273 - 275	20 min
8. Changes of States	Page 276 - 285	10 min

1. Course Title
Industrial Physics

2. Session Number
10

ESSENTIAL INFORMATION

3. Session Objectives
To introduce the students to the course by covering the sections on GAS LAWS.

4. Tools, Equipment and materials needed
Text: Physics for Career Education, Third Edition
by Ewen, Nelson, Schurter
Prentice Hall, 1988

5. Training Aids Needed
Blackboard and chalk, calculator for each student, text book

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Charles' Law	Page 286 - 287	20 min
2. Boyles' Law	Page 288 - 290	20 min
3. Charles' & Boyles' Laws Combined	Page 291 - 292	20 min
4. REVIEW FOR FINAL EXAM	Page 1 - 292	60 min

1. Course Title
Industrial Physics

2. Session Number
Post Session

ESSENTIAL INFORMATION

3. Session Objectives
To give the students a Posttest on the material covered by the class to determine how effective the classes were.

4. Tools, Equipment and materials needed
Scantron Sheets, Copies of the Posttest
Number 2 Pencils
Scantron Reader (optional)

5. Training Aids Needed
Calculator

6. Time Allotted
2 hours (120 min)

SESSION OUTLINE	TEXT	TIME
1. Take the Posttest		120 min

Introduction:

The purpose of this manual is to serve as an instructional guide for the TEAM Grant module Introduction to Industrial Physics.

Introduction to Industrial Physics is a twenty hour overview course intended to explain and demonstrate to industrial maintenance mechanics the direct relationship of physics to machinery.

Overview of Project TEAM:

Project TEAM (Technical Education Advancement Modules) is a program targeted toward the unemployed, underemployed, and existing industrial employees who are in need of upgrading basic technical competencies. The program seeks to give adequate preparatory educational opportunities in generic technical skill areas and to create a public awareness of the need for these basic skills. Curriculum content was determined by an assessment team of local industrial employers. Their evaluation resulted in the development of 15 instructional modules; some of which may be industry specific, but most of which are applicable in and necessary to a majority of industrial settings. The modules may be used collectively or as a separate curriculum for a specific course or courses. The material contained in each manual will serve as a student outline and as an instructor guide which may be used selectively or in its entirety.