TABLE OF CONTENTS

UNIT 1 – The Field of Mechanical Engineering 17
Reading 1-*A workplace interview with a run plant engineer* 18
Reading 2-*The different functions of engineers* 20
Vocabulary 1 22
Vocabulary 2 22
Vocabulary-Quiz 23
Speaking 1 24
Speaking 2 25
Writing 1 26
Writing 2 27
Writing 3 28
Free reading 1-*Henry Ford* 28
Free reading 2-*The flight engineer's duties* 30
Use of language-*Describing functions/uses* 31

UNIT 2 – An introduction to Fluid Mechanics 33
Reading 1-*Fluid Mechanics* 34
Reading 2-*Fluid Dynamics or Hydrodynamics* 35
Vocabulary 37
Vocabulary-Quiz 37
Use of English 1-*Compressible Flows* 38
Use of English 2-*Subsonic Flow vs. Supersonic Flow* 39
Writing 40
Free reading-*Isaac Newton* 42
Use of language-*Zero conditional* 43

UNIT 3 – An introduction to Thermodynamics 45
Reading 1-*The First Law of Thermodynamics* 46
Reading 2-*The Second and Third Laws of Thermodynamics* 47
Vocabulary 49
Vocabulary-Quiz 49
Use of English-*Thermodynamics and the Theory of Heat* 50
Writing 51

Free reading-*Nicolas Léonard Sadi Carnot* 53
Use of language-*Prepositions* 54

UNIT 4 – Engine Theory (Heat Engines) 55
Reading 1-*Heat Engine Efficiency* 56
Reading 2-*The Valves* 57
Reading 3-*The Four-Stroke Cycle* 59
Vocabulary 1 60
Vocabulary 2 61
Free reading-*Steam Locos and their Future* 62
Use of language-*Relative Clauses with a Participle* 63

UNIT 5 – External Combustion Engines 65
Reading 1-*External Combustion Engines* 66
Reading 2-*The Development of the Steam Engine* 66
Reading 3-*Newcomen's Engine* 68
Reading 4- *The operation of the Reciprocating Steam Engine* 69
Reading 5-*The operation of the Steam Turbine* 70
Use of English-*The Steam Turbine vs. the Reciprocating Engine* 71
Vocabulary 72
Writing 1 72
Writing 2 73
Speaking 1 76
Speaking 2 76
Free reading-*The Paddle Steamer "Montreux"* 76
Use of language-*Prepositions of Place* 77

UNIT 6 – Internal Combustion Engines 79
Reading 1-*Internal Combustion Engines* 80
Reading 2-*The Electric Motor: History and Development* 81
Reading 3-*The Carburetor* 82
Use of English 1-*Filters* 83
Use of English 2-*The Automobile* 84
Vocabulary-Quiz 85
Vocabulary 1 86
Vocabulary 2 87
Vocabulary 3a 87
Vocabulary 3b 88
Writing 89

Free reading 1-*Cuban Cars* 90
Free reading 2-*The Jeepney Business* 92
Free reading 3-*The design of the aircraft jet engine* 93
Use of language-*Making Comparisons* 95

UNIT 7 – Fuel - Lubricants 97
Reading 1-*Fossil Fuels - Petroleum* 98
Use of English 1-*Fuel* 99
Reading 2-*Lubricants: How Useful Are They?* 100
Use of English 2-*Lubrication: One Method to Reduce Friction* 101
Vocabulary-Quiz 1 102
Vocabulary-Quiz 2 102
Speaking 1 103
Speaking 2 103
Free reading 1-*Enrico Fermi* 105
Free reading 1-*Aviation fuel* 106
Use of language-*Simple Present Passive* 107

UNIT 8 – Hydraulics - Pneumatics 109
Reading 1-*The Five Elements of Hydraulic-Power Systems* 110
Reading 2-*Major Types of Pneumatic Devices* 112
Use of English-*Pneumatic uses in aircraft* 114
Cloze-*Pneumatic Tools Serving in Many Ways* 115
Vocabulary-Quiz 116
Writing 117
Free reading-*Archimedes' Water Clock* 118
Use of language-*Nouns, Adjectives and Adverbs* 119

UNIT 9 – Engineering Materials - Joining Methods 121
Reading 1-*Aluminum, One of the most Common Elements* 122
Reading 2-*Focus on Steel* 124
Reading 3-*Gas Welding* 125
Use of English 1-*Titanium* 127
Use of English 2-*How Materials Conduct Electricity* 127
Vocabulary 128
Vocabulary-Quiz 129
Speaking 130
Free reading 1-*The Metal-Work of Greece* 130
Free reading 2-*Raw aircraft materials* 132

Use of language-*Zero Conditional: Revision* 133

UNIT 10 – Factory Automation - Industrial Robotics - Industrial Safety 135

Reading 1-*Robots in Manufacturing* 136
Reading 2-*Industrial Safety* 137
Vocabulary 1 139
Vocabulary 2 139
Vocabulary-Quiz 1 140
Vocabulary-Quiz 2 141
Use of English-*An Industrial Application of Robots* 141
Speaking 1 142
Speaking 2 143
Writing 144
Free reading 1-*Talos the Robot* 144
Free reading 2-*Intelligent Machines in Greek Mythology* 145
Free reading 3-*Robotics takes off in aerospace industry* 146
Use of language-*Revision: Simple Present/Past/Present Perfect/Future* 147

UNIT 11 – Alternative Sources of Energy 149

Reading 1-*Wind and Solar Power* 150
Reading 2-*Fuel Cells* 152
Vocabulary 1 154
Vocabulary 2 154
Vocabulary-Quiz 155
Use of English 1-*Solar Power* 155
Use of English 2-*Wind Energy System Components* 156
Use of English 3-*Natural Gas and Hydrogen-based System* 158
Cloze-*Reliability of Wind Energy* 158
Writing 160
Speaking 161
Free reading 1-*Solar Power* 162
Free reading 2-*The "Sol Ambition"* 163
Free reading 3-*The Solar Impulse project: constructing the zero fuel plane* 164
Use of language-*Revision: Simple Present/Past/Present Perfect/Past Perfect/Future* 165

UNIT 12 – Protection of the Environment 167
Reading 1-*Air Pollution* 168
Reading 2-*The Exxon Valdez Oil Spill* 170
Vocabulary 171
Vocabulary-Quiz 1 172
Vocabulary-Quiz 2 173
Use of English 1-*The Exxon Valdez Tanker Accident* 173
Use of English 2-*The Environmental Protection Agency* 175
Speaking 176
Writing 176
Free reading-*The Bhopal Disaster* 177
Use of language-*Conditional Sentences* 179

REFERENCES 182

ANSWER KEY 183

UNIT One *183*
UNIT Two *186*
UNIT Three *188*
UNIT Four *190*
UNIT Five *191*
UNIT Six *193*
UNIT Seven *195*
UNIT Eight *198*
UNIT Nine *200*
UNIT Ten *202*
UNIT Eleven *204*
UNIT Twelve *206*

UNILINGUAL GLOSSARY 208

BILINGUAL GLOSSARY 229