ELECTRONIC DEVICES AND CIRCUITS

Ref
621.3815
E138
2014

With DVD

3G ELEARNING

Ref
621.3815
E138
2014
4

JOHN B. LACSON FOUNDATION MARITIME UNIVERSITY
MOLO
LIBRARY
BOOK
22128-m

ELECTRONIC DEVICES AND CIRCUITS

3G CLEARNING

TABLE OF CONTENTS

1. Introduction Electronics Devices

1.1 Bridges 1
1.2 Potentiometers 2
1.3 A.C & D.C Current Probes 5
1.4 Extension Of Instrument Ranges 7
1.5 Q Meter 9
1.6 Waveform Analyzer 15
1.7 Digital Voltmeter 21
1.8 Digital Multimeter 33
1.9 Shielding And Grounding 38

2. Electronics Measurements

2.1 Resistance (R) Measurment 41
2.2 Self-Inductance (L) Measurement 46
2.3 Capacitance (C) Measurement 49
2.4 Voltage And Current Measurement 51
2.5 Power Measurement 57
2.6 Power Factor Measurement 63
2.7 Energy Measurement 67
2.7.1 Time, Phase and Frequency Measurements 68
2.7.2 Measurement of Phase 72
2.7.3 Frequency Measurements 77

3. Circuits Analysis

3.1 Circuits 84
3.1.1 Active And Passive Element 84
3.2 Kirchhoff's Law 92
3.3 Mesh and Nodal Analysis 92

4. Circuit Switching

4.1 Simple Switching Network 107
4.1.1 Circuit Switching Networks 109
4.2 Circuit Switching Concepts 109
4.2.1 Space Division Switching 110
4.2.2 Time Division Multiplexing 113
4.3 Control Signalling 115
4.3.1 Channel and Common Channel Signalling 116
4.4 Brief Idea of SS7 118
4.4.1 Advantages of SS7 119
4.5 Packet Switching 120
4.5.1 Packet- Switching Principles 123
4.6 Routing in Switching Networks 124
4.6.1 Routing in Circuit Switching Network 124
4.6.2 Routing in Packet Switching Networks 125
4.7 X.25 in Computer Networking 126
4.7.1 X.25 Applications 127

5. Combinational Circuits Objectives

5.1 Adder 129
5.1.1 Half Adder 129
5.1.2 Full-adder 130
5.2 Subtractor 131
5.2.1 Half-subtractor 132
5.2.2 Full subtractor 133
5.3 Encoder 134
5.3.1 Binary Encoders 134
5.3.2 Priority Encoders 135
5.4 Decoder 137

6. Combinational Logic Circuit Implementation

6.1 Multiplexers 142
6.1.1 Synthesis of Logic Functions Using Multiplexers 146
6.1.2 Multiplexer Synthesis Using Shannon's Expansion 149
6.2 Demultiplexer....151
6.3 Code-converters 154
6.4 Comparators....155

7. Standard Integrated Circuits (ICs)

7.1 Resistor-Transistor Logic (RTL) 158
7.2 Diode-Transistor Logic (DTL) 161
7.3 Transistor-Transistor Logic (TTL)..163
7.3.1 Test Parameters for TTL Devices... 166
7.4 Emitter-Coupled Logic (ECL).....167
7.4.1 Implementation....169
7.4.2 Operation....170
7.5 Integrated Circuit (IC).....171
7.5.1 Design....171
7.5.2 The Manufacturing Process 171
7.6 High Threshold Logic (HTL) 174
7.6.1 Advantages....175
7.6.2 Disadvantages....175
7.7 NMOS and CMOS Logic Gates 176
7.7.1 Overview of CMOS....178
7.7.2 Important Feature of CMOS 178
7.7.3 Test parameters of CMOS.....179
7.7.4 Important Feature of NMOS....183
7.7.5 CMOS versus TTL....183

8. Three Phase Circuits

8.1 Neutral Currents in Three Phase Wye Systems....189
8.1.1 Wye and Delta Configurations ..191
8.1.2 Voltage, Current, and Power Measurements in a Wye-Connected Circuit....191
8.1.3 Voltage, Current, and Power Measurements in a Delta-Connected Circuit 192
8.2 Measurement of Three-phase Power ... 195
8.2.1 The Two-Wattmeter Method 196
8.2.2 Neutral Current in an Unbalanced Three-phase Load....197
8.2.3 Advantages of Three-phase Systems....197
8.3 The Fundamentals of Three-Phase Power Measurements....198
8.3.1 Three-Phase Systems....198
8.4 Delta Connection 201
8.4.1 Wye and Delta Comparison....202
8.4.2 Power Measurements 203
8.4.3 Configuring Measurement Equipment 205
8.5 Power System Fault Analysis 206
8.5.1 Derivation of Sequence Networks . 208
8.6 Voltage Unbalance on the Performance of Three-Phase Induction Motor 210
8.6.1 Voltage Variations and Unbalance .. 211
8.7 Three-Phase Induction Motor Model... 212
8.8 Assessment of Voltage Unbalance ..213

Bibliography