CONTENTS

1. INTRODUCTION 1

1.1 Background 3
1.2. Objective 5
1.3. Scope 6
1.4. Users 6
1.5. Structure 7

2. MANAGEMENT 7

2.1 Software classification 7
2.2. Quality assurance programme 12
2.3. Infrastructure systems 27
2.4. Training and qualification 30
2.5. Non-conformance control and corrective actions 30
2.6. Software quality assurance programme documentation 34

3. PERFORMANCE 37

3.1. Work planning 37
3.2. Analysis, design and implementation 41
3.3. Procurement 57
3.4. Inspection and testing 62

4. ASSESSMENT 66

4.1. Management self-assessment 66
4.2. Independent assessment 71

APPENDIX I: ILLUSTRATION OF A GRADED SOFTWARE QUALITY ASSURANCE PROGRAMME 73

APPENDIX II: PROPOSED PROCEDURE FOR INTERFACE CONTROL 81

APPENDIX III: CONSIDERATIONS BEFORE ACQUISITION OF COMPUTERIZED TOOLS 86

APPENDIX IV: FUNCTIONS OF COMPUTER- PROGRAM UNDERSTANDING AND REVERSE ENGINEERING TOOLS 87

APPENDIX V: GENERAL TRAINING GUIDELINES 88
APPENDIX VI: PROPOSED OUTLINES FOR TRAINING PROGRAMMES ON QUALITY ASSURANCE .. 91
APPENDIX VII: CHARACTERISTICS OF DEFECT PREVENTION PROCESS .. 96
APPENDIX VIII: EXAMPLES OF SOFTWARE DEVELOPMENT LIFE-CYCLE MODELS .. 98
APPENDIX IX: RECOMMENDATIONS FOR DESIGN INPUT DOCUMENTATION FOR MONITORING. CONTROL AND SAFETY SYSTEM SOFTWARE . .. 107
APPENDIX X: RECOMMENDATIONS FOR SOFTWARE DEVELOPMENT PLANS APPLICABLE TO MONITORING, CONTROL AND SAFETY SYSTEM SOFTWARE 108
APPENDIX XI: RECOMMENDATIONS FOR STANDARDS AND PROCEDURES HANDBOOKS APPLICABLE TO MONITORING. CONTROL AND SAFETY SYSTEM SOFTWARE 110
APPENDIX XII: RECOMMENDATIONS ON THE CONTENT OF SOFTWARE REQUIREMENTS SPECIFICATIONS FOR MONITORING, CONTROL AND SAFETY SYSTEM SOFTWARE 113
APPENDIX XIII: RECOMMENDATIONS ON SOFTWARE DESIGN DESCRIPTIONS FOR MONITORING, CONTROL AND SAFETY SYSTEM SOFTWARE 115
APPENDIX XIV: RECOMMENDATIONS ON DESIGN AND DEVELOPMENT DOCUMENTS FOR DESIGN, ENGINEERING AND ANALYSIS SOFTWARE 118
APPENDIX XV: RECOMMENDATIONS ON APPLICATION DOCUMENTS FOR DESIGN, ENGINEERING AND ANALYSIS SOFTWARE 122
APPENDIX XVI: SUGGESTED GOOD CODING PRACTICES FOR DESIGN. ENGINEERING AND ANALYSIS SOFTWARE 125
APPENDIX XVII RECOMMENDATIONS ON PROGRAMMING OF MONITORING, CONTROL AND SAFETY SYSTEM SOFTWARE 127
APPENDIX XVIII: DISCUSSION OF VERIFICATION AND VALIDATION METHODS . . . 130

APPENDIX XIX: RECOMMENDATIONS ON VERIFICATION REPORTS AND ACTIVITIES FOR MONITORING. CONTROL AND SAFETY SYSTEM SOFTWARE . . 143
APPENDIX XX: RECOMMENDATIONS ON COMMISSIONING MONITORING. CONTROL AND SAFETY SYSTEM SOFTWARE . . . 149

GLOSSARY 153
REFERENCES 157
BIBLIOGRAPHY 159
CONTRIBUTORS TO DRAFTING AND REVIEW 161