-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

Hanover House
24 Douglas Street
GLASGOW G2 7NG

NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- **0064207** **-Session-1986-87**

-Superclass- **XJ**

-Title- **SWITCHING SYSTEMS 1**

-DESCRIPTION-

Type and Purpose

A specialist module which introduces the student to the switching systems used in telecommunications.

Preferred Entry Level

04200 Basic Telecommunications

Learning Outcomes

The student should:

1. know the principal functions of the induction coil, the regulator and signalling associated with a telephone instrument;
2. solve problems in telephone traffic involving the concepts of busy hour, grade of service, traffic intensity and call queuing;
3. know and compare the basic principles of operation of the listed telephone exchanges;
4. know the basic principles of the Telex System;
5. know the use and limitations of the non-digital signalling systems in common use.

Content/ Context

Corresponding to the Learning Outcomes:

1. (a) presence of side tone. Function of induction coil in speech transmission, speech reception, and control of side tone.

   (b) need for and operation of the regulator.

(c) generation and detection of signalling for:

customer calling;
dial pulses;
bell ringing;
called customer answer;
called customer clearing;
calling customer clearing.

2. (a) an exchange as a series of stages which concentrate, switch and distribute calls. Telephone traffic and its variation over 24 hours.

Level of exchange equipment provision. Significance of busy hour in relation to traffic measurements and equipment capacity.

(b) grade of service of items of equipment in terms of traffic offered and traffic lost. Overall grade of service between different ranks of selectors.

(c) traffic intensities (in Realigns) from data relating to frequency and duration of calls. Pure chance and smooth traffic.

(d) concepts of call queuing.

Types of queues. 3. exchanges:

(a) step by step (Strowger);
(b) common control;
(c) digital.

Trunking diagrams showing how a call is routed from one exchange line to another on (a) a four digit non-director exchange. (b) a director exchange (indicating the short holding time (SIT) equipment). Outlet formation of uniselectors and two motion selectors. Selector hunters and line finders. Matching the outlets of one rank to the inlets of the succeeding rank by grading. Grading charts, full and limited availability.

Principle of operation of common control. Advantages over step by step exchanges, i.e. cost saving, automatic alternative switching paths, fault tolerance, additional customer facilities. Trunking diagram showing routing of a call from one exchange line to another in:

(a) TXK1 Crossbar exchange;
(b) TXE2 Reed relay exchange.

Basic principle of time-space-time (TSB) switching. Interconnection between incoming and outgoing channels using a TST switch.

4. origination and detection of the following Telex conditions by the teleprinter and exchange equipment: customer calls the exchange, customer dials, exchange calls the customer, called terminal answers, and clear down. Trunking diagrams showing call routing via area and zone exchanges.

5. use, advantages and limitations of the signalling systems: single current, double current, loop disconnect, single frequency, multi frequency.

Suggested Learning and Teaching Approaches

Since the module encompasses the knowledge of specialised telecommunication techniques a traditional approach to teaching is recommended.

The specialist equipment described in the module is available to the student in his workplace, but maximum use should be made in demonstrating the use of components which would be available, eg., the telephone instrument, uniselectors, reed relays, P.C.B's, etc. Computer simulations could greatly enhance the student's understanding of operation of exchanges if the equipment is available.

Assessment Procedures

All Learning Outcomes must be validly assessed.

The student must be informed of the tasks which contribute to summative assessment. Any unsatisfactory aspects of performance should, if possible, be discussed with the student as and when they arise.

Acceptable performance in the module will be satisfactory achievement of the performance criteria specified for each Learning Outcome.

The following abbreviations are used below:

LO Learning Outcome
IA Instrument of Assessment
PC Performance Criteria

LO1 IA Written short answer test.

PC The student correctly lists the principle functions of the following elements of a telephone instrument:

(i) induction coil;
(ii) regulator;
(iii) signalling.

LO2 IA Written/graphical exercise.

PC Given specified problems involving:

(a) busy hour;

(b) grade of service;

(c) traffic intensity;

(d) call queuing;

the student successfully indicates workable solutions.

LO3 IA Written/graphical exercise.

PC The student successfully describes and compares the basic principles of:

(a) step by step (Strowger);

(b) common control;

(c) digital

LO4 IA Written short answer test.

PC The student correctly describes the basic principles of the telex system.

LO5 IA Written short answer test.

PC The student correctly describes the use and limitations of the following signalling systems:

(i) single current;
(ii) double current;
(iii) loop disconnect;
(iv) single frequency;
(v) multi frequency.