

**SYLLABUS FOR SELECTION TO THE POST OF INSTRUCTOR (SIGNAL)
IN STTC// MOULA-ALI**

1. ORGANISATION OF THE SIGNAL AND TELECOMMUNICATION DEPARTMENT

- 1.1 Organizational hierarchy in Railway board level
- 1.2 Organizational hierarchy in The Zonal level
- 1.3 Organizational hierarchy in the Division level
- 1.4 Duties Of SSE/JE/Technician

2. MEASURING INSTRUMENTS

- 2.1 Voltmeter, Ammeter, Digital Multi-meter
- 2.2 Clamp meter
- 2.3 Earth Tester
- 2.4 Megger
- 2.5 Earth Leakage Detector

3. POWER SUPPLY ARRANGEMENTS

- 3.1 Sources of power supply for Signalling systems
- 3.2 Secondary cells, Depth of Discharge, Capacity test
- 3.3 Battery chargers
- 3.4 LMLA cells – charging and maintenance
- 3.5 DC-DC converters
- 3.6 Transformers
- 3.7 Integrated Power Supply
- 3.8 IPS Pre –commissioning check list & Troubleshooting
- 3.9 Earthing and Bonding practices as per RDSO guidelines
- 3.10 Lightning and Surge protection devices and TAN of RDSO
- 3.11 Working, maintenance and trouble-shooting of DG set
- 3.12 Solar panel
- 3.13 Generators

4. BASIC ELECTRICITY, MAGNETISM AND DIGITAL ELECTRONICS

- 4.1 Idea about EMF, current, power, resistance, inductance, capacitance, power factor etc. and their measurements
- 4.2 Study of Ohm's law and its application, series and parallel connections
- 4.3 Idea about magnetism and magnetic induction (Electro magnetism)
- 4.4 Transformer-working principle, Rectifier – working principle
- 4.5 AC and DC principles & Kirchhoff's voltage law & current law
- 4.6 Digital electronics

5. SAFETY IN TRAIN OPERATIONS, SCHEDULE OF DIMENSIONS, DISASTER MANAGEMENT

- 5.1 Knowledge and importance of S&T MR & S&T Disconnection
- 5.2 Train operations during failure of Points and Signals
- 5.3 Authorities for passing signals at ON and precautions to be taken for train operations
- 5.4 Precautions to be taken during maintenance of Signalling assets
- 5.5 Rolling block programme
- 5.6 Working under integrated/ individual blocks

- 5.7 Protection of work site & Temporary single line working
- 5.8 Train operations during total communication failure
- 5.9 Responsibility of S&T staff in case of disaster
- 5.10 Safety procedures, accident management, role of S&T staff
- 5.11 Accident inquiry procedures
- 5.12 Safety circulars and instructions pertaining to S&T staff
- 5.13 Need of schedule of dimensions
- 5.14 Schedule of dimensions applicable to S&T gears

6. BASIC CONCEPTS OF SIGNALLING

- 6.1 Knowledge and necessity of signals – Fail safe feature of signalling system
- 6.2 Definition of Signalling terms as given in G&SR
- 6.3 Concept of colour light signalling
- 6.4 Location of signals
- 6.5 Subsidiary signals
- 6.6 Markers, Boards, Signs etc.
- 6.7 Overlaps, braking distance, sighting distance
- 6.8 Isolation, slip siding, catch siding
- 6.9 Simultaneous reception and despatch of trains
- 6.10 Classification of Stations
- 6.11 Standards of Interlocking
- 6.12 Placements of Signals to protect level crossing gates
- 6.13 Methods of block working, control of outlying sidings
- 6.14 Essentials of interlocking
- 6.15 Engineering Scale Plan
- 6.16 Signal Interlocking Plan
- 6.17 Table of control
- 6.18 Station working rules
- 6.19 Systems of train working

7. CONSTRUCTION PRACTICES

- 7.1 Planning of indoor & outdoor works
- 7.2 Execution of outdoor works
- 7.3 Execution of indoor works
- 7.4 Wiring diagrams and Bell test
- 7.5 Testing of installation including FAT, SAT, Functional and Square sheet
- 7.6 AFDAS-Maintenance & Testing
- 7.7 Pre- NI & NI works
- 7.8 Documentation
- 7.9 Safety in Execution of works
- 7.10 Mandatory sanctions for new works
- 7.11 CRS inspection

8. Inter-slotting, Electrical Key Transmitter and Electrical Detector

- 8.1 Inter cabin slotting arrangement for colour light signalling
- 8.2 Electrical Key Transmitter o Principle of working and usage
- 8.3 Maintenance, testing, trouble-shooting and rectification & Safety checks
- 8.4 Electrical Detector o IRS type Electrical Detector

9. RELAYS & CABLES

- 9.1 Symbols and Abbreviations
- 9.2 Various types of relays used in our signalling system
- 9.3 Colour light signals & LED– lamp proving arrangements and circuits
- 9.4 Electrical Key Transmitter
- 9.5 Various types of Cables used in our signalling system
- 9.6 Quad cable and its parameters
- 9.7 OFC fundamentals and usage of OTDR in cable loss measurements
- 9.8 Earth Leakage Detector

10. TRACK DETECTION DEVICES

- 10.1 DC track circuits in RE and Non-RE area working concepts
- 10.2 Parameters, adjustments, maintenance and its limitations
- 10.3 Single Section Digital Axle counter- Working
- 10.4 Maintenance , Error codes and failure analysis of different SSDAC models
- 10.5 High Availability Single Section Digital Axle counter - Working
- 10.6 MSDAC - Working (Familiarization of cards, Architecture, Inter-connectivity of sub-units,
- 10.7 Maintenance , Error codes and failure analysis of different MSDAC models
- 10.8 Testing and safety checks
- 10.9 IBS using MSDAC o ABS using MSDAC
- 10.10 With supervisory axle counter ▪ With main and redundant axle counters
- 10.11 Track circuiting in station yard using MSDAC
- 10.12 Protection of track devices during Engineering works
- 10.13 Provisions of SWR regarding SSDAC and MSDAC working
- 10.14 Remote monitoring
- 10.15 Policy guidelines on resetting of axle counters

11. POINTS AND LAY-OUTS

- 11.1 Electric Point and Lock Detector (IRS Type)
- 11.2 IRS Rotary Electric Point Machine
- 11.3 IRS Clamp type Electric Point Machine (TWS)
- 11.4 Installation & Maintenance of IRS Rotary and Clamp Type Point Machine
- 11.5 Siding points
- 11.6 Point control circuits (Using Siemens point group and QBCA1)
- 11.7 Crank handle grouping and cut out configuration

12. Panel Interlocking (British), RDSO Standardised Typical circuits

- 12.1 Features of control panel
- 12.2 Types of buttons, knobs, indications
- 12.3 Various controls
- 12.4 Basic principles of interlocking
- 12.5 Basic control circuits
- 12.6 Point control circuits
- 12.7 Route setting, checking and holding circuits
- 12.8 Signal control circuits
- 12.9 Route cancellation circuits
- 12.10 Route release circuits

13. Panel Interlocking (Siemens)

- 13.1 Features of control panel
- 13.2 Types of buttons, knobs, indications
- 13.3 Various controls
- 13.4 Different relay groups in use
- 13.5 Basic control circuits
- 13.6 Sub-route, full route and emergency cancellation
- 13.7 Installation, testing and commissioning practices
- 13.8 Maintenance activities and safety checks

14. DATALOGGER

- 14.1 Introduction, Networking and preventive maintenance of datalogger
- 14.2 Generation of Fault reports and analysis in data logger
- 14.3 RTU's

15. KAVACH

- 15.1 Overview and basics of Kavach and its working, SM's unit, OFC & RIU
- 15.2 Basics of onboard Kavach, Various Modes of operations, Train position, Movement authority, target distance
- 15.3 Overview of communication between station and loco Kavach
- 15.4 Types of RFID, RFID Layout & programming, RFID fixing and trouble-shooting
- 15.5 Overview of Kavach TOC, FAT, SAT, NMS and FRCAS
- 15.6 Radio Tower Design-Sub/Super structures Tests & Maintenance practices
- 15.7 Site Survey and Design Inputs to the Kavach System
- 15.8 Overview of Kavach Documentation

16. LEVEL CROSSING GATES

- 16.1 Policy on interlocking of LCs
- 16.2 Aspect control in interlocking of LC Gates
- 16.3 Mechanical lifting barrier gates
- 16.4 Various types of EOLB's
- 16.5 Functions of different parts
- 16.6 Sequence of relay operations
- 16.7 Power supply & cabling requirements
- 16.8 Installation practices & Pre-commissioning checklists
- 16.9 Maintenance activities including safety checks
- 16.10 Trouble shooting & failure restoration
- 16.11 Sliding Gate

17. EI & SigDATE

- 17.1 Need for Electronic Interlocking
- 17.2 Comparison between EI (Electronic Interlocking) and RRI/PI
- 17.3 Block diagram of EI and principle of working
- 17.4 Configurations of EI & I/O bit calculations
- 17.5 Application and Executive software's
- 17.6 Interface circuits ,Relay circuit – Boolean Logic conversion
- 17.7 Compilation & CRC and checksum
- 17.8 FAT & SAT
- 17.9 Earthing & Lightning & Surge protection arrangements
- 17.10 Pre-commissioning check lists
- 17.11 TSAA
- 17.12 RDSO approved circuits

18. BLOCK SIGNALLING

- 18.1 Single line tokenless handle type block instrument
- 18.2 SGE double line block instrument
- 18.3 Various types of UFSBI's
- 18.4 Various types of SSBPAC's
- 18.5 Intermediate Block Signalling System
- 18.6 Automatic Block Signalling System

19. EARTHING

- 19.1 Principles Of Protection
- 19.2 Conventional earth
- 19.3 Maintenance free earth
- 19.4 Class A,B,C,D type protections

20. BASIC ELECTRONICS

- 20.1 Electronic components
- 20.2 Fundamentals of digital circuits
- 20.3 Ohm's law and its applications
- 20.4 Hexa-decimal system

21. ESTABLISHMENT RULES

- 21.1 General conditions of service of railway servants, HOER,
- 21.2 Types Of Leaves & Passes
- 21.3 Workmen's Compensation Act, Payment of Wages Act
- 21.4 Railway servants D&A Rules, 1968 & amendment.
- 21.5 Railway services conduct rules 1966 & amendment.
- 21.6 Retirement benefits.
- 21.7 Welfare measures in railways, PNM, JCM & PREM.
- 21.8 Conduct Of Trade Test And Training Of Staff In Various Trades

22. STORES

- 22.1 Imprest stores, consumable stores, dead stock stores
- 22.2 Procurement Of Stock & Non-Stock Items
- 22.3 Maintenance of stores registers
- 22.4 Tools & Plant
- 22.5 Scrap procedure
- 22.6 Maintenance of stores, loss and theft of stores,
- 22.7 Stock verification
- 22.8 GeM

23. MANUALS

- 23.1 G & SR
- 23.2 SEM-I & SEM-II
- 23.3 Block Working Manual
- 23.4 Accident Manual

24. OFFICIAL LANGUAGE POLICY AND RULES - RAJBHASHA

- 24.1 The Official Language Act 1963 amended in 1967
- 24.2 Salient features of Official language rules 1976
- 24.3 Official Language Policy, Constitutional Provision Articles