BANGLADESH RAILWAY TRAINING ACADEMY.
HALISHAHAR, CHITTAGONG.

SYLLABUS OF
SIGNAL & TELECOMMUNICATION DEPARTMENT

TWO YEARS TRAINING PROGRAMME OF PROB. ASTEs

1. Foundation Training in RTA/CTG	18 Weeks
2. Training in BPATC/Savar/DA	17 Weeks
3. Training in CSTE/CRB'S Office	4 Weeks
4. Fields Training:	16 Weeks

A. Attached to Divisional office:

I. Under DRM, DSTE/CTG, DA

a) Organizational setup of DRM/DSTE's Office, Functions.
Operational Training with ASM/CSM/PSM and Problems thereto.
b) Duties of ASTE, SSAE, MS, Diesel Mechanic and chargemen (Diesel)
c) Attending signalling & Interlocking failures, Accidents, Joints inspections and enquiries.
d) Study of Relay Interlocking & Block working at stations and yards at CTG, LKM, AKA, BCI, MYN, KRF.
e) Study of double wire Interlocking upper quadrant signals in section BCI-GRPM and TGI- MYN.
f) Study of train Control office and Maintenance of Tele communications.
g) At PHT Signal depots study of signaling Maintenance stores, their procurements, storage and disposal.

II UNDER DRM/DSTE/PXC. LMH:

a) Organizational set up of respective DRMs office, its functioning.
b) Attending signalling and interlocking failures, accidents, joint inspections and enquiries.
c) Duties of ASTE, SSAE, SAE & MS.
d) Study of signaling and Interlocking of stations and yard at ISD, PDB, STU, RB, PBT, PEY, SDP, KLN.
e) Study of signaling in RB-FDP, STU-BNRP and PDB-DSN sections.
f) At SDP Stores depot.

5. Attached to CSTE/CRB, RJHI's office	13	Weeks
6. Attached to PD/TC	8	Weeks
7. In Mechanical work shop	4	Weeks
8. With AEN for P-way Maintenance	2	Weeks
9. In control offices functions of control officials	2	Weeks
10. With SM/ASM/CSM	1	Weeks
11. Traveling on Engine foot plate	1	Weeks
12. Training in head Quarter offices		
a) In FA & CAO's office.	2	Weeks
b) In CCS/PHT's office	2	Weeks
c) IN COPS's office	2	Weeks
d) In CEE's office	2	Weeks
e) In CEE's office	2	Weeks
f) In GM & CPO's office	2	Weeks
13. Attached to construction works: (If construction goes on and programme be adjusted by CSTE accordingly)	2	Weeks
14. At RTA/CTG for Final Training.	4	Weeks
Total: 104 Weeks = 2 Years.		

TWO YEARS TRAINING PROGRAMME OF PROB. ASTE's

Duration-2 years.

1. Foundation training at RTA/CTG ..... 18 Weeks.
2. Training in BPATC, Saver ..... 17 Weeks.
3. Training under CSTE/E/CRB ..... 04 Weeks.
4. Field Training (To be chalked out by CSTE/E)- CRB ... 16 Weeks.

A: Attached to Divisional Office:

1. Under DRM/DSTE/CTG & DA

a) Organizational set up of the DRM/DSTE & SSAE's offices, Routine office works and correspondence.General Study of Technical, Establishment, Stores, Accounts Section, Accident and Enquiries. Study of Traffic operation in a large junction station, Working with ASM & YM to acquire knowledge of problems associated with Marshalling, Dispatch, Disposal of trains etc. Ashort period should be sent in the running shed, for study of General working including the disposal, preparation and listing of Engines.

b) Duties of ASTE, SSAE, SAE, M.S, Diesel Mechanic and Chargeman (Desel).

c) Attending failures, Accidents, Joint and sub-Joint Inspections and Enquiries, Annual and Bi-Annual Inspections.

d) Study of Relay Interlocking and methods of Block working at different Yards-Viz, CTG, STK, LKM, AKA, BCI, DA, MYN and KRF. Detailed study of all types of circuits, Identification and tracing of circuits (Locking, Control, detection, Special etc.) Localizing faults by practical test and rectification, Study of Track and Signalling layout of the yard, testing and adjustments to Track circuits, Point Machine, Signals etc. Testing of cables.

e) Detailed study of Double wire upper quadrant installation on section BCI-GRPM & RGE-MYN Lever frame, Trailable and non-trainable levers, clutch levers, direct levers, wire compensations, broken wire lock mechanism, point mechanism, signal mechanism etc.

f) Study of control office and way side equipments, their operation, installation and maintenance, Study of overhead lines-Installation and maintenance, Study of overhead lines-Installation and maintenance, liaison with Transportation and other departmental officers.

g) Pahartali Signal Deptt.

Study of Signalling maintenance stores, their procurement, storage and disposal.

2) Under DRM, DSTE/PXC & LMH.

a) Organizational set up of the DRM, DSTE & SSAE's offices, Routine office works and correspondence, General study of technical, Establishment, Stores and Accounts sections, Accidents & Enquiry etc.

b) Attending failures, Accidents, Joint and sub-joint I section Enquiries, Annual and bi-Annual inspections.

c) Duties of ASTE, SSAE, SAE & MIC.

d) Study of signalling, interlocking of yards at ISD, PDB, RB, STU, PBPEY, SDP, PXC & KLN, Lever frames, lever locks, locking table, dog charts, interlocking between cabins etc. reverses, signal motors, diesel generator & points motor, facing points locks.

e) Study of signaling on RB-PKB, STU-BNRP & DSN sections.

f) SDP stores various sites in connection with the above.

3) Attached to the offices of CSTE/East & West.

i) Drawing office of CSTE/East & West.

a) Drawing office procedure, essential information required for preparation of signal Drawings, Size of drawing, system of numbering and filing drawings, Method of getting drawing approved and their despatch.

b) Study of symbols-German, American English and swidish systems.

c) Symbols and their use in Mechanical & Electrical Rly. Signaling. Drawings, Printing to p-way and station yards.

d) Simple station yard layouts, preparation of interlocked yard diagrams, working rule diagrams l locking tables, Dog charts, Station master's control frames and circuit diagrams, Method of key locking on points and signals.

e) Preparation and reading of mechanical drawing for manufacturing of signalling gear.

f) Study of General & Subsidiary rules and their application in signalling.

g) Visit to various sites in connection with the above.

h) Signal workshop/CTG.

a) General:

1) Workshop organization and layout.

2) Work orders, Materials how arranged and received, disposal of finished products.

3) Handling layout-Recruitment, Training, Promotion, Retirement and dismissal etc. Overtime workshop, Factory rules, Action to be taken in emergencies like fire, strikes etc. Amerities provided for the staff.

b) Black smith and foundry shop:

Detailed study of the manufacture methods of Electrical & Mechanical components, General study of various works done in the shop.

c) Machine shop:

Detailed study of all the machine and their uses. Detailed study of how different machines can be employed to manufacture signalling component parts which are imported from abroad.

d) Battery Shop:

Study of different types of primary cells and their characteristics, employment in different circuits comparative study of primary cells of different manufacturer from economic point of view, study of acid and alkaline accommodations of different types. Practical preparation of Nicd. Cells (Varta & Nife type). Changing electroyte, Charging and discharging of cells, Characteristic study of secondary cells, Repair, maintenance and overhauling of cells.

e) Visit to station to see the Battery maintenance practice. Wireless and Telecommunication:-

a) Elementary Principles for wireless communication and the use of thermionic tubes, as detectors, rectifiers, amplifiers oscillators etc. Block diagrams for receivers and transmitters, Practical setting up of a wireless station including connection up of sarocials to transmitters, establishing contact etc. simple routine maintenance of wireless, equipment, checking up of frequencies etc.

b) Visit to various station in connection with the above.

Visit to control office.

Detailed programme will be worked out in consultation with CSET/West, and also considering availability of accommodation at different place etc.

5. Attached to project Director Telecommunication: 8 Weeks.
   a. Study of the Railway Telecommunication project.
   b. Visit to various site in connection with the above.

6. Mechanical workshop:- 4 Weeks.

   Study of organisation and workshop practice at PHT, SDP, including Diesel workshop at DA & PBT.

7 With AEN's for P-way maintenance: 2 Weeks.

   Visit to various sites in connection with the above.

8. Function of Control officers:- 2 Weeks.
   Visit to the control office at PHT, BCI, DA, MYN, SYT, FXC, PBT, LMH.

9. Performance of ASMs/PSMs/CSMs duties at Station Designed: 1 Weeks.

10. Traveling by Engine/Locomotive function running sheds etc.

11. 12 Weeks training in advance signaling either in training school, Labour of or staff college, barode of sccundrabad, Indian consultation with the Ministry.

    b) If the above arrangement does not materials the probationers shall undergo the following training in the head quarter offices of East ones:

FA & CAC office-	2
CCS office	2
CPO office	2
COPS office	2
CEE office	2
CE office	2
	12 Weeks.

12 Weeks.

12. *Attached to construction works:*
    i) Detailed study at site of installation of electrical signaling.
    a) Cable laying, Cable numbering, Cable termination (Both main &)
    b) Point machine installation and adjustment
    c) Track circuits (Series, Parallel)
    d) Wiring of relay rack control panel, power board and power supply equipments.
    ii) Detailed study at site of installation of D.W. upper quadrant signaling.
    a) Wire run b) Fixing signal mechanics c) Installing & adjusting point mechanism d) Fixing economical facing points lock, electing the lever frame and testing levers and looking. E) S.Ms Control.
5. AT RTA/CTG Final Course: -6 Weeks.

-104 Weeks.
=2 Years.

SYLLABUS FOR PROB. ASTE's FOUNDATION COURSE.

A: SIGNALING INTERLOCKING & TELECOMMUNICATION - 200 marks.

1. Signals: Types and kinds of signals, Provision of signal, A Working of Mechanical and Electrical signaling apparatus. Various types of signal levers, switches, Electrical power frames and relay panel, Isolation, point Indicator, Trap Indicator, Securing of points, Operation of signals, Points and level crossing gate, Securing of level crossing gates.

2. Interlocking:
Kinds of Interlocking Principles of Interlocking, Standards of Interlocking, Requirements of different standards of Interlocking, Maintenance of different gears and equipment of Interlocking. Simple track circuit, Detectors, Point machines, reversers, relays, repeaters, slots, Block Instrument, Train wires, cable laying, lever locks, HP key locks, SLMs, EFPL & FPLs Double wire signal and point mechanisms. KT; Aarm and light repeater; LVT; OT.

3. Development of signalling & Interlocking.
4. Maintenance and operation of Diesel generating set.
5. Maintenance of different gears and equipments of signals & Interlocking.
6. Construction and installation of signal and interlocking equipments, Block instruments, Block panels and Block phones.
7. Procurement and Accountal of stores.
8. Visit to signal workshop, open line stations provided with different types of interlocked, Signal, interlocked L/C Gates.
9. Telecommunication: Telecommunication system in B. Rly. Wire and wireless communication, Telephone exchange, control system and their maintenance, Inter communication system, Public Address system,
Development of Telecommunication system.

B: TRANSPORATION - 100 Marks.

1. G & S Rules Book, Part-1 to VI, VII (Rules 203 to 204, 205, 207 to 213 & 215-221), Chapter-VIII to X, XV-XVIII with appendices I-IX to part I and part-II.
2. Reading of Station diagram, Framing of station working rules, Different forms and their uses, Sectional capacity.
3. Transportation Practical:

a) Method of signaling trains with correct operation of single and double line Instruments.
b) Method of preparation different forms used in connection with train passing.
c) Demonstration of the methods of working trains at different classes of station.
d) Demonstration of the methods of working trains under the following abnormal conditions:
i) Single line working on double line.
ii) Total failure of communication on the double line and single lines.
iii) Failure of Electric Block and speaking instruments.
iv) Trains disabled, Train parted and divided.
v) Occasion for taking different release and their failures.
vi) Shunting at different classes of stations.

C: GENERAL PAPER –100 marks.
See General syllabus- A, B, C, E, F, G, H, I, J, K, L.

D: Physical Training: -100 Marks

E: First Aid and civil Defence- -100 Marks.

F: VIVA-VOCE -100 Marks.

SYLLABUS FOR PROB. ASTE's (FINAL COURSE)

Duration : 6 Weeks.

A: SIGNALLING, INTERLOCKING & TELECOMMUNICATION Marks - 200

1. Principle of Relay Interlocking, Types of Relay Interlocking:
   i) Individual.
   ii) N-X and
   iii) Route Relay Types.

Basic circuit approach for each system, geographical circuitry and its design approach, determination of route and control tables, principles of sectional route release, approach locking system, approach lighting system, block actuated approach lighting, integration of station relay interlocking system with token less working system.

2. Block working methods, (i) table/token system, methods of working, circuit design and fail-safe features of tablet/token system, (ii) Token less methods of block working, siemens token less type, Circuit Analysis, fails-safe features, token less working by FDM reed methods, Basic principles of the system and circuit analysis token less block by frequency transmission methods, principles of working, system design approach, fail-safe feature of the system. (iii) Double line lock and block method of token less working, principle of working, circuit analysis.
3. i) Relays,
   ii) Signals and
   iii) Point Machines.

Types of Relays, DC Track Relays, Neutral line Relays, Slow acting relays, Latching relays, Air-Contactor Relays, Lamp Proving relays etc. and their Characteristics.

Electrical point Machines, Principles of operation, Control, Locking and detention principles.

Main Signals, Subsidiary Signals, Position Light Shunt Signals, Types of Lamp used in each case, nominal rated voltage in each case, Consideration of such voltages.

4. Track Circuit Principles and Equipment:
   Lay-out of simple DC Track Circuit, Material estimate for such track Circuit, Calculation of different parameters of track circuit performances, such as Pick-up voltage, drop-way voltage, minimum ballast resistance etc.

5. Power supply equipment for relay interlocking, Types of battery used. charging equipment and their control circuit, static inverters, rotary converters etc.

   Types and characteristics of secondary cells used.

6. Installation of signals and interlocking equipment at station's and level crossing gates, determination of optimum equipment of signals and interlocking at different types of yards.
7. Signaling Rule Diagrams: Equipment of double wire mechanical upper quadrant type interlocking station, locking table, dog-chart for standard-I, II & III, Types of interlocking, Estimate of materials in each case.
8. Electro-mechanical methods of interlocking, inter-sloting, SM's Control, Circuit principles, signaling layout for "A" Class standard-III Double line station.
9. Principle of transmission thorough optical fibres, optical fibre transmition and reception equipment.

10. Principles of pulse code modulation and time division multiple system, Heireochy of PCM Analogue to Digital conversion and vice-verse re-generators.
11. Digital transmission over Radio, Principles and equipment.
12. Digital telephone exchanges, Principles of Working, Principles of signalling, trunking, Principles of local networks.
13. VHF/UHF transmission methods, system planning, Frequency Selection, Repeater working, Hand and Base stations working on VHF, Modulation Techniques, Basic Working principles etc.
14. Train control system, STC Type, Train control system new digital type, Principles of working, system of signaling and methods of transmission etc.
15. Maintenance procedure for all the above signaling and telecom equipment. Principles of working, system of signaling and methods of transmission etc.
16. Schedule of inspection and charter of duties of SAE, SSAE ASTE, DSTE AND TCE etc.

B- PLANNING MANAGEMENT – 100 Marks.

1.1 Project planning concept, objectives, element and prefect cycles with reference to Bangladesh.
1.2 Stages of project preparation.
1.3 Project Financing and fund release.
1.4 Project implementation and Evaluation.
2.1 Management: Theory and practice.
2.2 Group and interpersonal skills development.
2.3 Personnel Management.
2.4 Industrial Relation.
2.5 Functional areas of Management.
2.6 Financial Management.

C- Viva – Voce -100 Marks.

Duration : Foundation : 18 We
Refresher 5 We

A: SIGNALLING & INTERLOCKING 200 Marks.

1) G & S Rule Book: Chapter – 1 & II, 2) Appendix- I, II, III A, III B, IIIC, 3) Signaling Hand Book Signalling Blue Book, 5) Different Instructions issued by Heads of dept., 6) Different types of forms their uses 7) Different circuits, Dog. Chart 8) Interlocking & Principles of Interlocking, Essentials different standards of Interlocking, Different types of interlocking 9) Maintenance of signaling Interlocking Equipment and Maintenance of block Instruments, Batteries 10) Telecommunication syst on B. Rly. Wire and wireless communication, Control system, P. A system, Inter communication Maintenance of Telecommunication Equipments.

B- TRANSPORTATION- 100 MARKS.

1. G & S Rule book: Chapter- VI, VII-- 203 to 204, 205, 207-213, 215-221). Chapter-VIII-X, X XVIII with appendices-I-IX.

2. Reading of station diagram, Framing of station working rules, different forms and their us Sectional capacity.

3. Transportation Practical:

   a. Method of signaling trains with correct operation of single and double line blc Instruments.
   b. Demonstration of the methods of working trains at different classes of stations.
   c. Demonstration of the methods of working trains under the following abnorr conditions:
      i. Single line working on double line.
      ii. Total failure of Tele-communications on the double line and single lines.
      iii. Failure of electric block and speaking Instruments.
      iv. Trains stabled, Train parted and divided.
      v. Occasion for taking different releases & their failure.
      vi. Shunting at different classes of stations.

C: GENERAL PAPER -100 Marks.

See General Syllabus- A, B, C, E, F, G, H, I, J, K, L.

D: Physical Training, First aid & Civil Defence - 100 Marks.

E: VIVA – VOCE -100 Marks.

TRAINING SYLLABUS FOR MAINTAINER SIGNAL/MAINTAINTER-IN-CHARGE.

Duration : Foundation - 18 Weeks.
Promotion - 6 Weeks.
Refresher - 5 weeks.

A: SIGNALLING & INTERLOCKING 200 Marks.

1. G&S Rule Book : Chapter - II, Appendix - I, II, IIIA, IIIB, IIIC.
2. Signalling Hand Book.
3. Different Types of Forms and their uses.
4. Signalling Blue Book.
5. Electric Circuits, Track Circuit, Train Wire Circuit, K.T. Circuits, Arm and light Repeater Circuits.
6. Interlocking : Principles of Interlocking, Various types of Interlocking.

B: TRANSPORTATION 100 Marks.

1. G & S Rule Book : Chapter - I - VI, VII (rules 203 to 204, 205, 207-213, 215-221), Chapter - VIII - X, XV - XVIII with appendices I - IV.
2. Transportation Practical :
   a) Method of Signalling Trains with correct operation of Single and double line Block Instruments.
   b) Method of Preparation of different forms used in connection with train passing.
   c) Demonstration of the methods of working trains of different classes of Stations.

C: GENERAL PAPER. 100 Marks.

ESTABLISHMENT :

Govt. Servant Conduct Rule, Railway Organisation, E&D Rules, Leave Rule, Pass Rule, T.A.Rules, Railway Acts; Wages Act; Pension Rule, Hours of employment regulation.

P.Way :

General study on formation of Track, Curvatures, grades, Super-elevation, Points & Crossing, Defects in permanent way which may cause accidents.

LOCOMOTIVES :

Carriages and Wagons, repairs and maintenance of locomotives, Carriages and Wagons, Defects in Locomotives, Carriages and Wagons which may cause accidents.

ACCOUNTS :

Financial Management, Canons of financial Property, Receipt and Accountal disposal of Stores.

D: Physical Training, First aid & Civil Defence - 100 Marks.

E: VIVA – VOCE -100 Marks.