Government of India
Ministry of Railways (Railway Board)

RBE No.11/2009.

No.E(MPP)/2009/3/16 New Delhi, dated 15 -01-2010.

The General Managers (All Indian Railways including Production Units)

The Director,
Indian Railways Institute of Electrical Engineering (IRIEEN), Nasik.

Subject :- Revised Training Module for Supervisors of Electrical Department.

The Report of the Task Force under Human Resource Reforms Committee constituted to review the Training Modules for Electrical Department has since been received. The Board (ML & MS) have approved the training modules recommended by the Committee. Accordingly, the revised training module for Supervisors of Electrical Department is circulated herewith. The details and sequence of the training programme is annexed at Annexure –I and the training module is annexed at Annexure-II.

2. For better management of training, the following decisions/inputs are also communicated:-

(i) The institutional training for electrical supervisors would be shifted from Centralised Electrical Training Institute, Thakurli to Indian Railway Institute of Electrical Engineering, Nasik in due course. However for the present Centralised Engineering Training Institute, Thakurli would continue to meet specialized and need based training requirements of Zonal Railways.

(ii) A 52 week induction programme with institutional training in two phases training has been approved for all categories of directly recruited Supervisors. The induction programme includes 8 weeks of field training and 14 weeks of Attachment/on the job experience. The details and sequence of the training under induction programme are given in Annexure-I.

(iii) Between the two phases of institutional training, the trainee Supervisors would be sent for field training/field visits wherein they should be given exposure to practical work at various field units where these candidates are likely to be posted on completion of their training programme. The detailed programme of field training should be given to the candidates before completion of the first phase of institutional training. Each Zonal Railway would nominate a SAG officer as nodal training manager in Headquarters Office who shall monitor the programme of induction training for Supervisors.

(iv) The course content for General and Subsidiary Rules training for Electrical Supervisors would be developed by respective ZRTIs. This course shall be conducted before sending trainee Supervisors for Attachment/on the job experience.

(v) Final phase of training shall comprise of on the job attachment wherein after completion of institutional and field training, the trainee supervisors shall be posted in the field units allocated to them by the concerned Railways. During this Period, the trainees would perform like a Supervisor working on an active assignment but would not be given independent charge. The programme for this attachment/on the job experience would be framed by the Officer in charge of the Division/extra Divisional Field Units where these Supervisors are to be finally posted.

(vi) The refresher course and promotional course for Electrical Supervisors shall stand merged and shall be delivered as a refresher course once in three years. This refresher course shall be delivered in an e-learning module which would include a component of institutional training for one week at the respective Zonal Electrical Training Schools. The details for e-learning module shall be worked out by Indian Railways Institute of Electrical Engineering (IRIEEN), Nasik in consultation with Zonal Railways.

The details of composite training module for institutional training of all categories of Electrical Supervisors have been indicated in Annexure-II. The lesson plans for the course content given in composite training module shall be developed by IRIEEN, Nasik/Centralised Electrical Training Institute, Thakurli.

Please acknowledge receipt.

K. Harikrishnan,
Director(MPP) Railway Board.

Annexure-1

The details and sequence of the training programme

(Figure in weeks)

S.No.	Module	JE (Electrical)	SSE (Electrical)
I	Joining Formalities	1	1
2	Phase I of Institutional Training	12	12
3	Field Training	8	8
4	Phase II of Institutional Training	12	12
5	General and Subsidiary Rules (ZRTI)	3	3
6	Attachment/on-the-job experience	14	14
7	Presentation/Project Work	1	1
9	Posting Exam		
	Total	**52 weeks**	**52 weeks**

ANNEXURE-II

Composite Training Module for Institutional Training of Electrical Supervisors

Sr.No.	Description	No. of Sessions
1.	**Basic Orientation** General introduction to Indian Railways – Brief History, salient features, freight & passenger business priorities, organizational structure. Introduction to Electrical Department- organizational structure, functions, salient features, role of electrical department in railway working , key priorities, challenges etc.	12
2	**Instrumentation** Basic concepts of Condition Monitoring of electrical and mechanical equipments, insulation Resistance, Polarization Index, Capacitance measurement, tan delta testing, partial discharge and surge comparison test, condition monitoring of transformers, Nondestructive testing techniques – visual testing, Dye penetrant testing, Magnetic Particle testing, eddy current testing and ultrasonic testing, NDT testing applications in various functions of elect department, Theory and practice of Dissolved Gas Analysis (DGA)/Gas Chromatograph radiographic test	30
3	**Basic Electronics** Classification of electronic components, theory of passive components – L,C,R, Active Components – semiconductor physics, construction and operating principle, specification and testing of Power Diodes, Zener Diodes, LEDs, BJTs, UJT, MOSFET, SCR, GTO and IGBT.Practical work on – oscilloscopes, testing of passive electronic components – L,C,R, Testing of active components – Diodes, Transistors, SCR, TRIAL, GTO, IGBT.	18
4	**Power Electronics** Control of 3 phase drives — Variable Voltage Variable Frequency (VVVF) drives, overview of power electronics in 3 phase locomotives, Static Inverter (SI Unit) and AC Coach Inverter Unit.	18
5	**Manufacturing Technology** Jigs and fixtures, specifications and selection of cutting tools and grinding wheels, welding techniques, checking of weld joints and defect prevention and classification, properties and selection of electrodes.	18
6	**Engineering Materials and Metallurgy** Classification and specification of steels used in Railways, heat treatment processes, corrosion prevention and paints, theory of metal wear and lubrication, plain and roller bearings — theory, application, selection, maintenance and precautions, lubricants specifications, properties and selection, rubber components specifications and storage, electrolytic copper, stress strain diagram	18
7	**Train Lighting** Introduction to Train Lighting Systems, theory and practice MOG/EOG/HOG schemes. Alternators, Rectifier /Regulator, Batteries including VRLA, Coach wiring, lighting and fans, microprocessor based drives, Rake Links, maintenance schedules and activities. Relevant Codes and Manuals, RDSO, SMIs and Modification Sheets	18

8	**Air Conditioning** Air Conditioning systems on Coaches — Heat load calculations and basic theory and practice of air conditioning, air conditioning systems on coaches, LHB coaches, familiarization with major equipment and ratings, microprocessor based drives maintenance scnedures and practices, Relevant Codes and Manuals, RDSO SMIs and Modification Sheets, Power Car – Theory and practice of diesel engines,maintenance schedules, microprocessor based control, spare parts.	18
9	**General Service** BEE Codes, I.E. Rules, ECBC Code, Energy Conservation Act, Information on star rated products, clean development mechanism and carbon credits, practicing energy conservation and management, Metering and tariff structures. Theory and practice of earthing, substation design,, and maintenance, transformer, switchgear, protection systems, transmission line maintenance, power distribution systems, illumination engineering, design of illumination systems for various indoor and outdoor applications, energy efficient lamps, drives with microprocessor control and motor selection and maintenance, and safety at workplace. Condition monitoring of transformer, transformer oil, cables and lead acid batteries. Design of water supply pumping installations, types of pumps their specifications and selection for various applications, energy conservation measures in water pumping installations and maintenance of pumps. Relevant codes, RDSO SMIs and Modification	36
10	**Traction Distribution-I** Basic concepts on Design, Operation and Maintenance interventions/activities related to Traction Power Supply Systems (25kv and 2X25 kv), Transmission Lines, Supervisory Control and Data Acquisition System (SCADA), Remote control system and Overhead Equipment (OHE). Familiarity with sectioning diagrams and Station Working Rules. ACTM to be followed.	24
11	**Traction Distribution-II** Design, selection, commissioning of foundation, structures, current collection system. Tower Wagon operation and maintenance issues. Safety issues related to TRD systems operation and maintenance. Precautions to be taken for working in electrified sections. Important actions to be taken during breakdowns and accidents –elaborate with interactive case studies Basic knowledge of interfaces – track, points and crossings, signalling systems. Bonds and earthing. Schedule of Dimensions. SEB/NTPC Tariff structures, energy conservation measures. Overview of Railway Electrification. Design operation, maintenance of Protection systems. Relay setting calculations. Microprocessor based solid state relays to be covered. Operation and maintenance of Circuit Breakers, Interruptors and manual switches.	24

12	**Traction Rolling Stock (Locomotive)** Basic Design aspects of Electric Locomotives – tractive effort, haulage capacity, adhesion, weight transfer, axle load. Types of electric locos and their characteristics and haulage capabilities. Power and control circuit description, working and trouble shooting. Description of mechanical systems and component – bogies, wheel sets, gears, gear cases, springs, snubbers, buffers, central buffer couplers, screw coupling etc. Pneumatic circuits and components including air dryers, Locomotive testing, maintenance and trouble shooting. Maintenance schedule of different types of locos. 3 phase locomotive – basic power and control circuit descriptions, Basic Operation and Maintenance of Power Converters, Auxiliary Converters, Transformers, Traction Motors, Vehicle electronics and diagnostics, brake equipments, motors, pantograph etc. Fault diagnostics. working of regenerative feature. Basic of Crew management and training, Road learning, classification of drivers, systems of monitoring and counseling, trip shed and crew booking point management, statistical data preparation for loco operation (4 A Statement). Description of Interface issues related to carriage and wagon and track. Evidence collection during accidents and enquiries. Relevant Codes, ACTMs, RDSO SMIs and Modification sheets.	36
13	**Electrical Multiple Unit** General description, equipment lay out, power and control circuit, pneumatic circuits etc. Basic Design aspects of EMUS. Power and control circuit description, working and trouble shooting. Description of mechanical systems and component — bogies, wheel sets, gears, gear cases, springs, rubbers, buffers, central buffer couplers, screw coupling etc. Pneumatic circuits and components including air dryers. Locomotives testing, maintenance and trouble shooting, Maintenance schedules in main shed and trip shed. Basic operation and Maintenance of Transformers, Rectifiers, Traction Motors, brake equipments, motors, pantograph, electronics etc and testing and troubleshooting. Description of interface issues related to carriage and wagon and track. Evidence collection during accident and enquiries. Relevant Codes, ACTMs, RDSO SMIs and Modification sheets.	36
14	**Material Management** Introduction to material management and concept of supply chain management, organization structure of material management organisation of IR, functions of material management — Planning and inventory management, purchase, Receipt and Inspection, Stocking and preservation, distribution, scrap disposal.	12
15	**Contract Management** Tenders & Contracts, Works Contracts, Arbitration financial Management (Railway Accounting and Financing Procedures).	18
16	**Establishment** Rules relating to leave, passes, travel on duty, Railway accommodation and Staff Welfare. Industrial relations and role of trade unions. Discipline and Appear Rules, Conduct Rules. Basics of RTI and Disabilities Acts and our obligations and responsibilities. Labour Laws and hours of employment rules (HOER)	18
17	**Disaster Management** Disaster Management, First-aid and fire fighting, Safety Rules, Electrical accidents – precaution & prevention.	12

18	**Information Technology** How IT can be effectively deployed in improving design, planning, and monitoring of electrical systems. Theory and practical to gain proficiency in MS Office – Word, excel and power point, e-mail and web browsing. Introduction to Management Information Systems. Case studies on MIS developed for Loco sheds, TRD and crew management. Introduction to Decision Support Systems.	18
19	**Managerial Skills** Aspects of leadership, leadership theory and evolution, leadership vs management, Role of supervisors in providing effective leadership. Improving Communication, written and verbal, explain the purpose of communication, communication process, barriers to effective communication, ways to improve communication skills – writing, reading, speaking and listening. Basic in change management. Team work, Importance of team work in organisations particularly in Railways, how to become a better team player. Interactive exercises in team work. Customer Satisfaction. Thinking from customer point of view – what are their needs/expectations and how can we best serve our customers .Innovation and quality management	24
20	Presentation feedback & group discussions. Final Examination/Viva voce	24
	Total Sessions	**432**

Note (i) : - The number of sessions on the given subject are suggestive only. The Centralised Training Institute may make necessary adjustment in training programmes for various categories of supervisors on need basis.

Note (ii) : Duration 24 weeks in two phases of 12 weeks
each Total Days allotted = 144 days
Total Number of Sessions @ 3 sessions/day = 432
1 session = 2 periods of 45 minutes each