COURSE MODULE

Course No. CE 26: Initial SSE/JE

Duration: 26Weeks **Effective Days:156**

S. N.	CM No.	Subjects	Periods
1	26.1	Introduction to Railway Organization, P.Way and Track Machines	68
2	26.2	Electrical & Electronics	148
3	26.3	Hydraulics, Pneumatics & Mechanical	148
4	26.4	I.C. Engine & Workshop Technology	148
5	26.5	Track Machines & Working Principles	148
6	26.6	Establishment, Stores, Accounts &Rajbhasha	54
7	26.7	Group Inter Personal Skill Development (GIPSD)	12
8	26.8	Computer	36
9	26.9	Technical Film Show	12
10	26.10	Library	22
11	26.11	Visit to CPOH & Track Machines Working Sites	50
12	26.12	Examination (Theory/Practical/Viva-voce)	36
13	26.13	Introduction& Valediction	2
		Total	884

Note: A. 1. Eligibility: Directly Recruited SSE/JE and such Promoted SSE/JE (Coming from other than Track Machine organization), who has no exposure of track machines working.

2. **Computer, Technical Film Show and Library periods shall be scheduled during the afternoon session.**
3. **M&C Training shall be covered under Module No. 26.4. Faculty for M&C Training may be drawn from M&C Directorate of RDSO.**
4. **Medical Awareness Programme shall be covered under Module No. 26.6.Faculty for this programme may be drawn from Medical Department.**
5. **Faculty for GIPSD may be drawn from CBWE, Min. of Labour & Employment or from Management Institutes.**
6. **To bridge the gap between theory and practical, every alternate week visit to CPOH & Track Machines Working Sites shall be arranged for demonstration and proper understanding of machine working.**
7. **Practical demonstration in Model rooms shall be given along with theoretical sessions as and when required besides Practical sessions specifically earmarked for Model Rooms.**

B. Besides above training at IRTMTC, the zonal railways will arrange 3-4 week Initial Transportation training in Train working rules at their ZTCs during the six months field training.

INDUCTION COURSE – INITIAL SSE/JE
Course No. CE 26 Module No.26.1

SUB: Introduction to Railway Organization, P. Way and Track Machines.
Duration: 68 Periods

Sub-discipline	Lesson	Contents	Period	Total Period
Track Technology	**Introduction to Railway Organization**	History of Railways, Zonal Railways Divisions and Production units.	2	**4**
		TT Organization on Indian railways, Organization at headquarters Divisional levels, CPOH and Bridge Workshop.	2	
	Railway Track	Constituents of Railway Track. Requirements of Good Railway Track, Classification of Routes. Different Gauges.	2	**2**
	Formation	Formations in Embankment and Cutting. Sub-Grade materials and Track Drainage	2	**2**
	Rails	Functions, Types & Standard Rail Section. Standard length, Rolling marks &UTS.	2	**2**
	Sleepers	Functions, Types & Sleeper Density, Requirements of PRC sleepers-their advantages and disadvantages.	2	**2**
	Fastenings	Rail to Rail fastenings and Rail to Sleeper fastenings.	2	**2**
	Ballast	Functions & Specifications and Ballast profile	2	**2**
	Points & Crossings	Functions & Important terminology ,Constituents of Turnout	2	**12**
		Types of switches and crossing and Switch Angle Flange way clearance Heel divergence and Throw of switch	4	
		Types of Crossings, Crossing number & Main constituents of Built-up Crossing ,Standard Turnouts &permissible speed ,Position of Sleepers at Points & Xing	4 13	
		Yard Visit	2	
	Welding of Rails and LWR	Welding Terminology , Evil effects of Rail joints Different types of welding	2	**10**
		Development of Welded rails and Theory of Welded rails	2	
		Thermal forces in LWR and Permitted locations of LWR/CWR	2	
		Different Temperature Zones and De-stressing	2	
		Yard visit	2	
	Track Renewal	Classification of Track Renewals Factors governing rail renewal	2 (20)	**2**

	Maintenance of Track	General Instructions as contained in IRPWM, Provisions on Regular Track Maintenance as contained in IRPWM	2	**6**
		Provisions on Works incidental to Regular Track Maintenance with thrust on Deep Screening Provisions on Maintenance of Track in Track Circuited areas as contained in IRPWM	2	
		Provisions on Maintenance of Track in Electrified Areas as contained in IRPWM Precautions during Machine working	2	
	Engineering Restrictions & Indicators	Categories of Engineering Works Engineering Fixed Signals/Indicators: Temporary and Permanent	2	**4**
		Emergency Protection of track: Single Line& Double Line, Detonators & Flare Signals.	2	
	Curves	Necessity of curves , Types of curves	2	**10**
		TTP, CTP &**Transition** lengths, Radius, Degree, Versine & field measurement	2	
		Super-elevation: Cant deficiency, Cant excess **Cant** gradient, Equilibrium cant and Negative Super-elevation	3	
		Gauge widening and Safe Speed on Curves	2	
		Field visit	1 (30)	
	Track Tolerances	Different Track Parameters and Service tolerances	2	**8**
		Different Schedules and Standard Dimensions	2	
		Loading Gauge and Over Dimensioned Consignment (ODC)	2	
		Classification of ODCs and Introduction to various track machines	2	
		Total	68	**68**

INDUCTION COURSE – INITIAL SSE/JE
Course No.CE 26 Module No.26.2
SUB: ELECTRICAL & ELECTRONICS SYSTEM
Duration: 148 Periods

Sub-discipline	Lesson	Contents	Period	Total Period
Electrical System:	**Fundamentals of Electricity**	Symbols**,** Basic Concept of voltage and current, Ohm's law, Power law	2	**2**
	Electrical Components	Resistor: Definition, Unit, Symbol, Power Rating, Tolerance, Types, Resistor: Colour coding, Combination, Application, Faults &Troubleshooting	2	**10**
		Capacitor: Definition, Unit, Symbol Types, Combinations , Application, Faults and Troubleshooting .	2	
		Inductor: Definition, Unit, Symbol Types, Combinations, Application, Faults and Troubleshooting.	2	
		Electronics Model Room for demonstration, checking of Resistor, Capacitor & Inductor	4	
	Auto Electrical	Battery: Definition of Cell &Battery, Types, Rating , Specific Gravity, Construction, Working of Lead-acid Cell & Battery. Maintenance, Testing by Hydrometer and Load tester.	2	18
		Alternator, Regulator, Construction, Working, Maintenance and Trouble- shooting.	2	
		Self starter: Construction, Working, Maintenance and Troubleshooting.	2	
		Relay: Definition, Construction & Operation, Types, Pin diagrams	1	
		Electronics Model Room for demonstration, checking and testing of Relays	1	
		Engine Circuit: Description, Function and Types	1	
		Safety Components, Faults & Troubleshooting	2	
		Z.F. Circuit: Description,	2	
		Z.F. Circuit: Working, Safety Components, Sensors, Faults & Troubleshooting	1	
		Lighting & Safety circuits of different machine	2	
		Warning circuits of different machines	1	
		Locking and unlocking Circuit of different Machines	1	
Electronic System:	**Fundamentals of Electronics**	Electronics Symbols and Nomenclatures, Fundamentals of Electronics and Applications , Active components and Passive components	4	**4**
	Semiconductor Theory	Difference between Conductor, Semiconductor & Insulator. Properties of Semiconductor, Covalent Bonds, Energy Bands, Types of semiconductor, i.e. Intrinsic, extrinsic, (P-Type, N-Type)	2	2
	Semiconductor Diode	Semiconductor Diode: Construction Working, Forward bias and Reverse bias, V-I Characteristics of P.N. Junction, Application of P.N. Junction Diode, Rectifier - Half wave & Full wave Rectifiers (Centre Tap and Bridge Rectifier), Polarity, Protection Device	2	3

		Types of Diodes, Construction, Working Symbol and Application of Zenor Diode, LED, Photo Diode, Opt coupler	1	
	Transistor	Transistor, Construction, Description of Terminals, NPN & PNP, Transistor Mode of Connections, Amplifying function, Applications as Switch and Amplifier, Testing	1	**3**
		Electronics Model Room for demonstration, checking and testing of Diodes and Transistors.	2	
	Transducer	Definition, Principle, Classification, Types, Tamping Depth Transducer, Function and Calibration	2	**8**
		Lining and Measuring Transducer, , Function and Calibration, Satellite Transducer, Hook Transducer, , Function and Calibration	2	
		Pendulum, Height Transducer, Encoder, Function and Calibration	1	
		Height Transducer, Encoder, Function and Calibration	1	
		Electronics model room for demonstration of checking and calibration of Transducers	2	
	Operational Amplifier	Definition of Operational Amplifier, Symbol, Function of each terminal, Open loop, Close loop, +ve feed back, –ve feedback, Characteristics	2	**8**
		Application of Operational Amplifier as Buffer, Inverter, Non Inverter, Adder, Sub- tractor, Integrator etc.	2	
		Operational Amplifier ICs used in different PCBs in machines and their Pin diagrams	1	
		Electronics Model Room for demonstration of working of Operational Amplifiers in different applications	3	
	Digital Electronics	Number system i.e. Binary, Octal, Decimal, Hexadecimal, Logic Gates and Flip-Flop	2	**6**
		Basic Idea of Microprocessor, Semiconductor memories, Multiplexer	1	
		Electronics model room for demonstration of working of Logic Gates	3	
	Electronic Circuits and PCBs:	Discrete Circuit & Integrated Circuit, Advantage & Disadvantage of PCBs used in different machines, Description, Name Quantity and their Functions.	1	**2**
		Description of Data sender and data receiver PCB.	1	
	Power Supply:	Need of Power supply, Types of power supply, DC to DC Converter & Regulator Electronics Model Room for demonstration, checking and calibration of PCB EK813SV	1	**6**
		Functional description of Power supply PCBs EK 813SV,812 SV, EK816SV, , Calibration, Testing &Troubleshooting	2	
		Functional description of Power supply PCBs EK ,EK819SV,EK851SV, , Calibration, Testing &Troubleshooting	1	
		Electronics Model Room for demonstration, checking and calibration of PCB EK813SV, EK	2	

		812SV,EK 816SV,EK 819SV & EK 851SV.		
	Programmer unit and Logic Plan.	Function and Description of Programmer Unit, Description of EK552P, EK554P, Different Parts of Logic Plan, Description of different PCBs of Programmer Unit i.e. EK 501P, EK553P	2	**10**
		Reading of Logic Plan and Input & Output of Programmer with the help of Logic Plan	2	
		Electronics Model Room for demonstration, checking and testing of Programmer unit	3	
		Electronics Model Room for demonstration of Logic Plan	3	
	Multi-check/ Multiplexer PCB	Description of Multi-check PCB EK28V, EK207V Different measurements taken by Multi-check PCB.	2	**4**
		Electronics Model Room for demonstration of Multi-check PCB	2	
	Tamping Unit Control Circuit VPR/DUO/ CSM/3X and 3X Dynamic /Unimat	Functional Description of Tamping Unit Control Circuit, Different Positions of Tamping Unit & their Description, Current of Proportional valve.	2	**12**
		Function and Calibration of Depth Selector and Depth Transducer	1	
		Functional Description of Tamping Unit control PCBs EK16V.	2	
		Functional Description of Tamping Unit Control PCBs EK132V	2	
		Functional Description of Tamping Unit Control PCBs EK176V.	2	
		Functional Description of Tamping Unit Control PCBs EK1AP7.	2	
		Electronics Model Room for demonstration, testing, Trouble shooting and calibration of Tamping unit PCB	1	
	Lining Control Circuit, VPR/DUO/ CSM/3X and 3X Dynamic /Unimat	Functional Description of Lining Control Circuit and Input Potentiometer (Slew & Versine)	1	**12**
		Functional Description of Lining PCBEK349LV	3	
		Functional Description of Lining PCBE K335 LV	2	
		Calibration of Servo Valve, Transducers &Input Potentiometer.	1	
		Basic concept of 3 Point Regulator / 3 Stage Regulator	1	
		Functional Description of EK2038LV	1	
		Functional Description of EK2173LV	1	
		Functional Description of Over-slew PCB EK290LV	1	
		Calibration of Lining PCBs and Troubleshooting	1	
	Front Input Circuit: VPR/DUO/ CSM/3X and 3X Dynamic /Unimat	Front Input Potentiometer, Slew, Versine, General Lift ,Basic idea of ALC, GVA and Laser Lining, Calibration, Troubleshooting & Fault finding.	1	**6**
		Functional Description of EK2072LV Front Input Circuit	1	
		Functional Description of EK345LV Front Input Circuit	1	
		Functional Description of 09-3X Front Input Circuit	1	
		Functional Description of UNIMAT Front Input Circuit	1	

		Functional Description of 09-3X Dynamic Front Input Circuit.	1	
	Leveling & Lifting Control Circuit of VPR/DUO/ CSM/3X and 3x dynamic /Unimat	Functional Description of Leveling & Lifting Control Circuit, Transducers and Input Potentiometers.	1	**1 0**
		Functional Description of PCB EK347 LV	2	
		Functional Description of PCB EK346 LV	2	
		Functional Description of PCB EK2041LV	2	
		Functional Description of PCB EK2042LV	2	
		Calibration of Leveling & Lifting, PCBs and Troubleshooting	1	
	Lesson-XVI Satellite Control Circuit:	Functional Description of Satellite Control Circuit, Description of different positions of Satellite, Satellite Transducer, PCBs	2	**6**
		Functional Description of Satellite Control PCBs EK24V	2	
		Functional Description of Satellite Control PCBs EK202V	1	
		Calibration of Satellite Control, PCB, Troubleshooting & Fault finding.	1	
	Work Drive Control Circuit:	Functional. Description of. Work Drive Control Circuit.	1	**6**
		Functional Description of PCBELT-5034	1	
		Functional Description of Work Drive PCB EK319LV	2	
		Functional Description of PCB VT-3005.	1	
		Calibration of Work Drive PCB, Troubleshooting & Faultfinding	1	
	Hook Control circuit	Functional Description of Hook Control Circuit and Transducer	1	**6**
		Functional Description of Hook Control PCB EK120V	2	
		Functional Description of Hook Control PCB EK144V	2	
		Calibration of Hook Control PCB, Troubleshooting & Faultfinding	1	
	Panel Boxes & Cable List	Main Panel Boxes i.e. Working & Engine Panel boxes, Cable list of different machines	2	**2**
	Plasser Intelligent Control System (Pics)	Description of Plasser Intelligent Control System (Pics)	1	**2**
		Electronics Model Room for demonstration and calibration **of** Plasser Intelligent Control System (Pics)	1	
		Total	148	**148**

INDUCTION COURSE – INITIAL SSE/JE
Course No.CE 26 Module No.26.3

SUB: HYDRAULICS, PNEUMATICS & MECHANICAL
Duration: 148 Periods

Sub-discipline	Lesson	Session wise Contents	Periods	Total periods
Hydraulics	**Fundamentals**	Introduction, Pascal's Law, Bernoulli's Theorem, Advantages of Hydraulic system,	2	**2**
	Hydraulic Symbols	Hydraulic Symbols	2	**2**
	Hydraulic Oil	Functions and Properties.	2	**2**
	Hydraulic Tank	Functions and Parts.	2	**2**
	Hydraulic Filter	Functions, Types, Filtering material, Contaminants Control, Importance of filtration.	2	**2**
	Hydraulic Hose and Fitting	Functions, Types, Hose specification: DIN, SAE & EN standards, Hydraulic Fittings, Precautions during mounting Hydraulic Hoses and Fittings.	2	**2**
	Hydraulic Seal and 'O' Ring	Functions, Types, Seals materials, Precautions during providing hydraulic Seals, Causes of Failure.	2	**2**
	Hydraulic Pump	Definition, Functions and Classification	1	**10**
		Working and Construction of Vane pump	1	
		Practical disassembly and assembly of Vane pump	2	
		Working and Construction of Gear Pump	1	
		Working and Construction of Axial Piston Pump.	2	
		Practical disassembly and assembly Axial Piston Pump	1	
		Precautions during mounting &Troubleshooting, Aeration & Cavitation	2	
	Pressure Control Valve	Working and Construction of Relief Valve Troubleshooting	1	**6**
		Practical disassembly and assembly of Relief Valve	1	
		Working and Construction of Unloader valve, Troubleshooting	1	
		Practical disassembly and assembly of Unloader valve	1	
		Working and Construction of Pressure reducing valve, Troubleshooting	1	
		Practical disassembly and assembly of Pressure reducing valve	1	
	Direction Control Valve	Function and Types such as Spring centered valves; Spring offset valves.	3	**10**
		Practical disassembly and assembly of DC valve	2	
		Working of check valve ,double check valve and Pilot Operated Check valve (POC)	2	
		Practical disassembly and assembly of check valve , POC valve	1	
		Working of Logic valve (cartridge valve)	1	
		Precautions during mounting of D.C.Valve and	1	

		Troubleshooting		
	Proportional and Servo Valve	Function and Troubleshooting of Proportional Valve.	2	**8**
		Practical disassembly and assembly of Proportional Valve	2	
		Function and Troubleshooting of Servo Valve	2	
		Practical disassembly and assembly of Servo Valve	2	
	Flow Control Valve	Function, Types and Troubleshooting	1	**2**
		Demonstration in model room	1	
	Accumulator	Functions, Types, Working of Bladder & Diaphragm Type Accumulator, Charging.	2	**2**
	Hydraulic Cylinder	Function, Types and Parts, failure analysis	2	**3**
		Practical disassembly and assembly of hydraulic cylinder	1	
	Hydraulic Motor	Definition, Classification of Hydraulic motor	1	**6**
		Working of Vane motor, Gear motor.	1	
		Working of Axial Piston motor.	1	
		Mounting Precautions and Troubleshooting.	1	
		Practical disassembly and assembly of vane motor, demonstration of Axial Piston motor.	2	
	Heat Exchanger	Function and Maintenance aspects.	1	**1**
	Demonstration of Hydraulic Transparent Models	Hydraulic motors, D.C. Valves, Cylinder, Accumulators, Pressure Gauge etc.	2	**4**
		Pressure control valves, Flow control valves, Check Valve, Pilot Operated Check Valve etc.	2	
	Hydraulic Circuits	Introduction of different kinds of hydraulic circuit such as constant pressure, regenerating, closed loop circuit etc.	1	**14**
		Hydraulic circuits of 08-Duomatic , WST & VPR	1	
		Hydraulic circuit of 09-CSM	1	
		Hydraulic circuit of 09-3X	1	
		Hydraulic circuit of 3X dynamic	1	
		Hydraulic circuit of Unimat – 2S, 3S, 4S , MPT	2	
		Hydraulic circuit of BCM, SBCM,.HOBCM	3	
		Hydraulic circuit of PQRS and T-28	1	
		Hydraulic circuit of BRM	1	
		Hydraulic circuit of DGS	1	
		Hydraulic circuit of TRT	1	
	Demonstration of Hydraulic Equipment Sets	Demonstration of Hydraulic circuits using FluidsimH Software	1	**4**
		Work exercises	1	
		Demonstration of Hydraulic circuits using FluidsimH software	1	
		Work exercises	1	
Pneumatics	**Pneumatic Symbols**	Pneumatics symbols and Application of air on Track machines.	2	**2**
		Working and maintenance of Air compressor, Cooling coil, Safety valve, Air dryer, Water separator and Air oiler	2	**4**
		Working and maintenance of DC Valve, KE Valve, Cylinder and Pneumatic hoses.	2	
	Pneumatic Circuits	Pneumatic Working circuits.	2	**4**
		Pneumatic Brake circuits.	2	

	Troubleshooting	Failure Analysis and Troubleshooting of Pneumatic assemblies.	2	**2**
	Demonstration of Pneumatic Equipment Sets	Demonstration of Pneumatic circuits using FluidsimP Software & Work exercises.	4	**4**
Mechanical	**Power Transmission**	Mechanical Transmission, 'V' belt, Chain, Pulley, Cardon Shaft.	1	**1**
	Gear Box and Clutch Assembly in UNO/DUO	Working, Construction and Maintenance practices of Main gear box and Clutch assembly.	2	**4**
		Working, Construction and Maintenance practices of Reversing gear box and Six speed gear box.	2	
	Distributor Gear Box	Working, Construction and Maintenance practices.	2	**2**
	Driving and Running Axle	Function, Parts and Maintenance aspects, setting of crown & tail pinion.	2	**2**
	Z.F. Hydro-Dynamic Gear Box	Function and Construction.	2	**6**
		Precautions during working and Maintenance aspects.	2	
		Failure Analysis and Troubleshooting.	2	
	Funk Gear Box	Working, Construction and Maintenance practices.	2	**2**
	Reduction Gear Box	Working, Construction and Maintenance practices.	2	**2**
	Satellite Axle Gear Box	Working, Construction and Maintenance practices	1	**2**
		Precautionary steps to avoid failure	1	
	Tamping Unit	Function , Non-synchronous tamping principle and specifications	1	**11**
		Function and Parts of tamping unit of 09-CSM,	1	
		Function and Parts of tamping unit of 09-3X	1	
		Function and Parts of tamping units of Unimat-3S , 4S	2	
		Dimensions of different Parts and Tolerances, setting of bearings and spacers on vibration shaft.	2	
		Maintenance schedule, Precautions during working & repairing	2	
		Failure Analysis and Troubleshooting.	2	
	Lifting and Lining Unit	Function, assembly and maintenance aspects.	2	**2**
	Bearings	Functions, Types, Bearing Clearance and Maintenance aspects.	2	**2**
	BCM Assemblies	Working, and Construction of Excavation unit	1	**4**
		Maintenance practices of Excavation unit	1	
		Working and Construction of Conveyor Belts and Screens	1	
		Maintenance practices of Conveyor Belts and Screens.	1	
	Lubrication	Oil and Lubricants used in different gear boxes, Tamping unit, Lifting unit, Screen -drum etc., types and their capacities.	2	**2**
	Lesson-XIV: Maintenance Schedules	Maintenance Schedules of Tamping machines	2	**6**
		Maintenance Schedules of Non-tamping machines	2	
		IOH/POH of machines.	2	
		Total	148	**148**

INDUCTION COURSE – INITIAL SSE/JE
Course No.CE 26 Module No.26.4
SUB: I.C. ENGINE & WORKSHOP TECHNOLOGY
Duration: 148 Periods

Sub-discipline	Lesson	Session wise Contents	Periods	Total Periods
I.C. Engine (including QST-30)	**General**	History and Development of Engine, I.C. & E.C. Engine Advantages and disadvantages	2	**4**
		Classification of I.C. Engine, Main Systems of I.C. Engine.	2	
	Constructional Details of Engine	Cylinder, Cylinder head, Piston and Piston rings	2	**8**
		Connecting rod and Crank shaft	1	
		Fly wheel, Cam shaft, oil Sump Inlet and Exhaust valve	2	
		Push rod, Rocker arm, Valve clearance, Valve operating mechanism	1	
		Demonstration of Engine component in I.C. Engine Model Room	2	
	Basic Terminology	T.D.C., BDC, Swept volume, Clearance volume, Stroke length, Cylinder bore, Compression ratio.	2	**2**
	Working Principle of I.C. Engine	Working Principle of 2 Stroke Diesel Engine, 4 Stroke Diesel Engine (Diesel cycle).	2	**16**
		Working Principle of 2 Stroke Petrol Engine (Otto cycle).	1	
		Working Principle of 4 Stroke Petrol Engine (Otto cycle)	1	
		Actual Working cycle of 2 Stroke Diesel Engine (Diesel cycle).	1	
		Actual Working cycle of 4 Stroke Diesel Engine (Diesel cycle).	1	
		Actual Working cycle of 2 Stroke Petrol Engine (Otto cycle)	1	
		Actual Working cycle of 4 Stroke Petrol Engine (Otto cycle)	1	
		Deviations between Actual Working cycle and theoretical cycle	1	
		Firing Order of all engines provided on track machines , Combustion of Fuel	2	
		Valve timing diagram, Importance of tappet setting	2	
		Power flow in multi cylinder engine	1	
		Demonstration in I.C. Engine Model Room	2	
	Air Supply system of Diesel engine	Requirement of Air, Types of Air cleaner	2	**8**
		Cleaning and checking of Dry type Air cleaner	1	
		Cleaning and checking of Oil Bath type filter	1	
		Draw backs of choking of Air Cleaner	1	
		Working principle of Supercharger	1	
		Working principle of Turbo charger	1	
		Importance of After cooler	1	
	Fuel Supply system of Diesel Engine	Functions Fuel supply system, Classification of Fuel supply system	2	**12**
		Block diagram of fuel supply system, Working principle of Fuel Injection Pumps	2	
		Working principle of Injectors and Filters	2	
		Working principle of Mico Bosch Fuel supply	1	

		system		
		Working principle of Cummins PT Fuel supply system	1	
		Difference between Mico Bosch and Cummins PT Fuel supply system	1	
		Calibration of MICO Bosch Fuel supply system	1	
		Calibration of Cummins Fuel supply system	1	
		Demonstration in I.C. Engine Model Room	1	
	Lubricating System of Diesel Engine	Concept of lubrication, Functions of Lubricating oil, Properties of Lubricating oil, Oil Additives	4	**12**
		Viscosity rating	1	
		Lubricating circuit of an engine, Different types of Lubricating systems.	2	
		Working principle of Oil pump and Relief Valve	1	
		Importance of Lube oil filters	1	
		Importance of Oil cooler	1	
		Importance of Oil pressure Gauge and crank case ventilation	1	
		Demonstration in I.C. Engine Model Room.	1	
	Cooling system of Diesel Engine	Necessity of Cooling, Different methods of Engine cooling	2	**8**
		Air Cooling system	1	
		Water Cooling system	1	
		Difference between Air and Water cooling	1	
		Drawbacks of over cooling , Reasons for overheating.	1	
		Demonstration in I.C. Engine Model Room	2	
	Maintenance Schedule Maintenance Steps	Maintenance Schedules of Cummins Engine	1	**25**
		Maintenance Schedules of Duetz Engine	1	
		Maintenance Schedules of MWM Engine	1	
		Maintenance Schedules of kirlosker Engine	1	
		Maintenance Schedules of QST 30 Engine	1	
		Precautions in providing Piston ring on Piston	1	
		Assembly of Cylinder liner	1	
		Adjustment of Injection timing & Valve (Tappet) clearance	2	
		Testing of Nozzles, Inspection of Crankshaft	2	
		Symptoms of Troubleshooting of Cummins Engine	1	
		Symptoms of Troubleshooting of Deuetz Engine	1	
		Symptoms of Troubleshooting of MWM Engine	1	
		Symptoms of Troubleshooting of Kirlosker Engine	1	
		Symptoms of Troubleshooting of QST 30 Engine	1	
		Setting of torque wrenches, Tightening torque of different engine assemblies	2	
		Clearance of moving parts	1	
		Failure analysis of Cummins Engine	1	
		Failure analysis of MWM Engine	1	
		Failure analysis of Deutz Engine .	1	
		Failure analysis of Kirlosker Engine	1	
		Failure analysis of Engine QST 30 .	2	

Metallurgical & Chemical Training	**M&C Training**	Manufacturing of Iron & Steel	1	**12**
		Shaping of Metals & Alloys	1	
		Classification of Steel on the basis of percentage of Carbon	1	
		Micro- constituents of Iron and Steel & Carbon Steel	2	
		Alloy Steel & Cast Iron	1	
		Physical Metallurgy	1	
		Mechanical properties of Cast Iron ,Steel & Non Ferrous Alloy	1	
		Heat Treatment: Hardening, Tempering Annealing	1	
		Normalizing, Case Hardening Nitriding	1	
		Inspection and testing of Materials for property evaluation	1	
		Introduction to various standards: IRS, SAE, DIN, ISI, BS etc. and Acceptance Criteria.	1	
Workshop Technology	**Smiting and Forging**	Forging Materials, Heating Devices	1	**4**
		Forging Temperatures, Smith Forging Operations	1	
		Forging Processes: Hand Forging, Power Forging	2	
	Welding and Related Processes	Types of Welding and Metallurgy of Welding	2	**8**
		Gas Welding, Oxy-acetylene and Air-Acetylene	2	
		Arc Welding and Resistance Welding	1	
		Related Processes: Soldering, Brazing etc.	1	
		Procedure for welding of tamping tool and defects in Tamping Tool welding	1	
		Welding of BCM turret gears, main links, intermediate links and cutter bar and grinding operation	1	
	Bench Work and Fitting	Various Tools and their uses and Bench work	2	**2**
	Measurement and Inspection	Standards of Measurement, Linear Measurement	2	**6**
		Classification of Measuring Instruments, Comparators and Measuring Machines	1	
		Angular and Taper Measurements	1	
		Demonstration in Model Room	2	
	Limits, Fits and Surface Quality	Interchangeability, Limits, Fits, Allowances, Tolerances and Surface finish.	2	**2**
	Workshop Machines	Lathe Machines, Different Lathe Machine Operations.	2	**15**
		Drilling machine and Boring Machine	2	
		Shaper machine and Planner machine	2	
		Slotting machine and Grinding Machine	2	
		Milling Machine, Gear Cutting Machine.	2	
		Jigs & Fixtures, Presses	2	
		Broaching machine, Sawing Machine	1	
		Workshop visit	2	
	Threads	Threads (Use and Applications), Different types of threads.	2	**2**
	Quality Control	Statistical Quality Control, Control Charts and their application.	2	**2**
		Total	**148**	**148**

INDUCTION COURSE – INITIAL SSE/JE
Course No.CE 26 Module No.26.5
SUB: TRACK MACHINES & WORKING PRINCIPLES
Duration: 148 Periods

Tamping Machines	**08-Duomatic/ WST/VPR**	Main features and Technical Data.	1	**6**
		Main assemblies and components.	2	
		Working Principle	1	
		Power Transmission	1	
		Name of PCBs, their functions and Electrical System	1	
	09-32-CSM	Main features and Technical Data	1	**6**
		Main assemblies and components.	2	
		Working Principle	1	
		Power Transmission	1	
		Name of PCBs, their functions and Electrical System	1	
	08-275- 2S UNIMAT	Main features and Technical Data,	1	**6**
		Main assemblies and components.	2	
		Working Principle	1	
		Power Transmission	1	
		Name of PCBs, their functions and Electrical System.	1	
	08-275-3S UNIMAT &MPT	Main features of machine	1	**6**
		Main assemblies and components.	1	
		Working Principle	1	
		Power Transmission	1	
		Name of PCBs, their functions and Electrical System.	1	
		Difference between 2S & 3SUnimat.	1	
	08-275-4S UNIMAT	Main features and Technical Data	1	**6**
		Main assemblies and components.	2	
		Working Principle	1	
		Power Transmission	1	
		Name of PCBs, their functions and Electrical System.	1	
	09-3X Tamping Express and 09-3X Dynamic	Main features and Technical Data	1	**6**
		Main assemblies and components.	2	
		Working Principle	1	
		Power Transmission	1	
		Name of PCBs, their functions and Electrical System.	1	
Ballast Handling & Material Handling m/c Machines	**BCM: RM-76 and RM-80**	Main features	1	**6**
		Main units and their functions.	1	
		Power Transmission & Technical Data	2	
		Working Principle	1	
		Precaution during work	1	
	BCM: RM-80-92U and HOBCM	Main features, Main units and their functions.	2	**6**
		Power Transmission & Technical Data	2	
		Working Principle	1	
		Precaution during work	1	

	FRM-80 & 85	Main features main units and their functions.	1	**6**
		Main units and their functions.	1	
		Power Transmission	1	
		Technical Data	1	
		Working Principle	1	
		Precaution during work	1	
	UTV and RBMV,MDU	Main features	1	**6**
		Main units and their functions.	1	
		Power Transmission	1	**RK**
		Technical Data	1	
		Working Principle	1	
		Precaution during work	1	
	B.R.M PBR 400 & Kershaw.	Main features	1	**4**
		Main units and their functions.	1	
		Power transmission, Technical Data	1	
		Working principle & precaution during work	1	
Track Laying Machines	**TLE**	Main features	1	**6**
		Main units and their functions.	1	
		Yard Activities, Fabrication of Panels	1	
		Rake Formation, Amenities at Base Depot	1	
		Working Principle	1	
		Auxiliary Track and Mode of working.	1	
	TRT	Main features	1	**6**
		Main units and their functions.	1	
		Yard activities	1	
		Modified BRHs & Rake Formation	1	
		Working Principle & SRs after relaying.	2	
	T-28	Main features	1	**4**
		Main units and their functions.	1	
		Power Transmission	1	
		Working Principle.	1	
Dynamic Track Stabilizer	**DTS/DGS 09-3X- Dynamic Stabilizer**	Main features main units and their functions	1	**4**
		Main units and their functions.	1	
		Technical Data & Power Transmission	1	
		Name of PCB's and their function.	1	
RGM	**RGM-72**	Main features	1	**4 AKY**
		Main units and their functions, ,	1	
		Technical Data & Power Transmission	1	
		Name of PCB's and their function.	1	
Quality Control	**Tamping Machines, DTS**	Pre-requisites	1	**4**
		Pre-tamping Operations.	1	
		Operations during tamping	1	
		Post tamping Operations.	1	
	BCM, SBCM & BRM	Pre-requisites, Operations prior to deployment,	1	**2**
		Operations during Traffic Block and Post Block Operations.	1	
	PQRS, TRT & T-28	Pre-requisites, Operations prior to deployment,	1	**2**
		Operations during Traffic Block and Post Block Operations.	1	
Maintena-nce Schedule	**Tamping Machines**	Maintenance schedules of Tamping machines.	1	**2**
		Re-Railment Technique for different types of Track Machines.	1	
	BCM & FRM	Maintenance schedules of RM-76, RM-80,	1	**2 (50)**
		Maintenance schedules of FRM-80, FRM-85 & KSC-600.	1 (AKY	
	DTS & BRM	Maintenance schedules of DTS	1	**2**
		Maintenance schedules of BRM.	1	
	UNIMAT	Maintenance schedule of 08-275 2S & 3S-Unimat.	1	**2**

		Maintenance schedule of 4S & MPT	1	
IRTMM	**Introduction to IRTMM and RDSO TM Reports**	Track Machine Organization	1	**6 (55)**
		Duties of AEN, SSE, Operator & Technician.	1	
		Rules for Movement & Working of track Machines.	1	
		Provision of rerailment techniques of different Track machine ,Operation & Monitoring of Track Machines	1	
		Unit cost.	1	
		Brief on other Chapters of IRTMM and RDSO TM Reports.	1	
Working Principle	**Lining**	Principle of Lining, Single chord system	2	**20 AKY**
		4 Point lining	2	
		3 Point lining	2	
		Principle of 4 Point lining & Left over error.	2	
		Calculation of V_m value on Transition Curve, Direction of Toggle switch.	1	
		Calculation of Vm value for Reverse Curve	1	
		Non-suitability of 4 Point lining on Straight.	1	
		Feeding method of Vm value at Reverse curve	1	
		Feeding method of Vm value at Compound curve.	1	
		3 Point lining & Left over error.	2	
		Calculation of 'V' value for each machine.	1	
		Method of feeding 'V' value.	1	
		Design lining, Laser lining and measuring run method.	2	
		Potentiometers & their calibration.	1	
	Leveling	Types of leveling system,	1	**18**
		Double chord system.	1	
		General lift, ramp in & ramp out**.**	1	
		Criteria for selection of Base line.	1	
		Double chord follow up system	1	
		Fixed chord system,	1	
		Proportional leveling, Error reduction ratio.	1	
		Method of feeding of Cant on CSM.	2	
		Method of feeding of Cant on other machines.	2	
		Method of Calculation of Correction value('K' Value),	1	
		Function of Pendulum- Front, Middle, Rear Pendulum & Twist correction.	2	
		Method of data feeding on Tamping Machines Manually	1	
		Method of data feeding on Tamping Machines by Computer(ALC)	1	
		Design leveling and feeding of target height	2	
		Total	**148**	**148**

INDUCTION COURSE – INITIAL SSE/JE

Course No.CE 26 Module No.26.6

SUB: ESTABLISHMENT, ACCOUNTS, STORES & RAJBHASHA

Duration: 54 Periods

Sub-discipline	Lesson	Session wise Contents	Periods	Total periods
Establishment	**Leave Rules**	Various types of Leaves, Eligibility etc.	2	**2**
	Pass Rules	Various types of passes, Eligibility etc.	2	**2**
	P.L. Bonus & GIS	Terms of Payments PLB, GIS Monthly subscription, Payment at retirement.	2	**2**
	Allowances & Overtime	Various Types of Allowances & Eligibility	2	**2**
	P.F.	Meaning, Rate Withdrawal.	2	**2**
	Pension Rules	Pension Rules	2	**2**
	DCRG	Amount of DCRG, Emoluments.	2	**2**
	D&A Rules	Minor Penalties.	2	**2**
		Major Penalties.	2	**2**
	Service Conduct Rules	Explanation and understanding of different Conduct rules.	2	**4**
		Manpower Planning & Training Welfare Measures in Railways, PNM, JCM & PREM.	2	
	Objectives and understanding of Various Acts	Minimum Wages Act, Factory Act, Industrial Dispute Act,.	1	**2**
		Contractor Labour Act& Workmen Compensation Act	1	
	HOER	Classification and Duty roster	2	**2**
	Awards	Different Awards.	2	**2**
Accounts	**Estimates**	Definition & Necessity of Estimates.	2	**2**
		Kinds of Estimates & their Vetting.	2	**2**
	Tenders	Different types of tenders.	2	**2**
		Power for Invitation of tenders &NIT.	2	**2**
	Railway Budget	Parliamentary Control over Railway Finance	1	**2**
		Public Accountability, Canons of financial Propriety.	1	
		Railway Budget, Budgetary Terms, Budgetary Cycle	1	**2**
		Demand of Grants, Expenditure classification ,Works Programme	1	
Store	**Introduction to Engg. Stores& Inventory Control**	Stock heads of Accounts, Disposal of released and surplus materials.	2	**2**
		Indenting procedure, Issue note and Write- off statement.	2	**2**
		Stock verification and Inventory Control Technique**.**	2	**2**
Medical Awareness Programme	**Medical Awareness Programme**	Family Welfare, AIDS, Family Management & First Aid.	2	**2**
		Stress Management &Disaster Management.	2	**2**
Rajbhasha	**Rajbhasha**	Constitutional Provisions, Official Language Act 1963, Official Language Rules1976.	2	**2**
		Policy Guidelines & Instructions.	2	**2**

		Total	54	**54**

INDUCTION COURSE – INITIAL SSE/JE
Course No.CE 26 Module No.26.7

SUB: GROUP INTER PERSONAL SKILL DEVELOPMENT (GIPSD)
Duration: 12 Periods

Sub-discipline	Lesson	Session wise Contents	Periods	Total Periods
GIPSD	**Communication**	Communication Skills and Importance in Railway Organization.	2	**2**
	Motivation	Motivation Skills	2	**2**
	Leadership	Types of Leadership & Leadership Skills.	2	**2**
	Inter Personal Relations	Need for Inter Personal Relations in Railway Organization.	2	**2**
	Attitude Building & Team Work	Importance of Positive Attitude, Team Work and Team Building.	2	**2**
	Practical Workouts	Exercise on Group Dynamics/other aspects related with development of managerial/work related skills.	2	**2**
		Total	12	**12**

INDUCTION COURSE – INITIAL SSE/JE
Course No.CE 26Module No. 26.8
SUB:COMPUTER
Duration: 36 Periods

Sub-discipline	Lesson	Session wise Contents	Periods	Total Period
	Internet & E-mail	Internet & Web-surfing.	**1**	**2**
		e-mail & demonstration for making e-mail ID	**1**	
	Automatic Guide Computer (ALC)	Introduction to Automatic Guide Computer (ALC) & its Hardware and WinALC Software	**2**	**10**
		Working in Measuring Run mode	**3**	
		Working in Geometry mode	**3**	
		Working in Design mode	**2**	
	CMS	Description of Computer measurement system Electronics Model Room for demonstration and calibration of CMS	**10**	**10**
	CWS	Description of Computer measurement system Electronics Model Room for demonstration and calibration of CWS	**10**	**10**
	DRP	Description of Computer measurement system Electronics Model Room for demonstration and calibration of DRP	**4**	**4**
		Total	**36**	**36**