Government of India (Bharat Sarkar)
Ministry of Railways (Rail Mantralaya)
(Railway Board)

No. E(MPP)2019/3/25

RBE No. 124 /2019
New Delhi, Dated 31.07.2019

The General Managers **All Indian Railways/PUs** **Metro Railway/Kolkata** **Railway Electrification/Allahabad** **DG/RDSO/Lucknow** **CAO/DMW/Patiala** **CAO/COFMOW/New Delhi**	**DG/NAIR/Vadodara** **The Directors** **IRIEEN/Nasik** **IRIMEE/Jamalpur** **IRISET/Secunderabad** **ED/CAMTECH/Gwalior**

Sub: Introduction of refresher course for SSE/Bridges.

Ref: IRICEN's letter no.151/CoC 2019 dated 22.05.2019.

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To clear backlog of refresher training of SSE/Bridges, the proposal of IRICEN for imparting refresher training has been approved by Ministry of Railways.

Further, Ministry of Railways has accepted the proposal of revision of training modules of Refresher course for SSE/ Bridges to 3 weeks duration which inter-alia include all the contents of Refresher course mentioned in Board's letter no. E(MPP)2017/3/9 dt.23.04.2019 (RBE No.66/2019) and in addition, includes relevant new topics like co-ordination aspects with S&T and Electrical Department, preventive vigilance, ethics and integrity etc. Training Module/detailed course content is enclosed herewith.

DA: As above

AJha
31/7/19

(Ajay Jha)
Joint Director/ MPP
Railway Board.

No. E(MPP)2019/3/25 **New Delhi, Dated 31.07.2017**

Copy to:

1. The General Secretary, AIRF, 4 State Entry Road, New Delhi for information with 35 spares.
2. The General Secretary, NFIR, 3 Chelmsford Road, New Delhi for information with 35 spares.
3. The Secretary General, FROA, R.No.256-A, Rail Bhavan, New Delhi for information with 5 spares.
4. The Secretary General, IRPOF, R.No.268, Rail Bhavan, New Delhi for information with 5 spares.
5. All Members, Department Council & Secretary Staff side National Council 13-C, Ferozeshah Road, New Delhi with 90 spares.
6. The General Secretary, AIRPF Association, Room No.256-D, Rail Bhavan, New Delhi with 5 spares.
7. General Secretary, All India SC & ST Railway Employees Association, 171/B-3, Basant Lane Railway Colony, New Delhi (15 copies).

For Secretary/Railway Board

Copy to:

i. PS & ED(PG) to MR, MOS(R)

ii. PSO/Sr.PPS to CRB, FC, ML, ME, MM, MS, MT, DG(RHS) & DG(RPF)

iii. Sr.PPS/PPS/PS to AM(Budget), AM(CE), AM(C&IS), AM(Comml.), AM(Elect), AM(Fin), AM(Mech.), AM(Plg.), AM(Project), AM(PU), AM(Sig.), AM(Staff), AM(RS), AM(T&C), AM(Tele), AM(Traffic), AM(Works), Adv.L(RS), Adv(Vig.), Adv.Fin(Exp), Adv(IR), Adv(Safety), LA, OSD(MIS).

iv. ED(Plg.), ED(Accts.), EDF(BC), EDCE(B&S), EDCE(G), EDCE(Plg.), ED(CHG), ED(CC), ED(C&IS), ED(E&R), EDEE(Dev), EDEE(G), EDE, ED(RRB), EDE(N), EDE(Res), EDF, EDF€, EDF(S), EDF(B), EDF(RM), EDF(X)I, EDF(X)II, ED(H), EDLM, ED(MIS), EDE(GC), ED(T&MPP), EDME(Chg.), EDME(Fr.), EDME(Tr.), EDME(TOT), EDME(Dev.), EDME(W), ED(PC)I, ED(PC)II, ED(PP), ED(Project), ED(Project)/DMRC, EDRE, ED(Safety), JS, JS(C), JS€, JS(P), IG./RPF(Hqs), IG/RS, ED(S9g.), ED(Stat&Econ.), EDRS(C), EDRS(G), EDRS(P), EDRS(S), EDRS(W), ED(TD), EDTT(M), EDT(MC), EDT(P), ED(T&C), EDCE(P), ED(PM), ED(PG), EDTC-I, EDTC(FM), EDTT(F), EDTT(FM), EDTT(S), EDV(A), EDV€, EDV(T), ED(W).

v. Chief Commissioner of Railway Safety, Lucknow.

vi. E(Trg.), E(NG)I, E(NG)II, E(G), F(E)I, F(E)II, F(E)III, E(SCT)I, E(SCT)II branches of Railway Board.

Annexure-X

TRAINING MODULES

FOR

1. SSE/Bridges - INDUCTION COURSE
2. JE/Bridges - INDUCTION COURSE
3. JE/Bridges - PROMOTIONAL COURSE
4. SSE/JE/Bridges - Refresher Course

Annexure X

Course duration for Bridge Cadre

Course	Duration		
	Class room training including field visit	Field Training	Total
a) Initial SSE/Bridges	15 weeks	89 weeks	104 weeks
b) Initial JE/Bridges	15 weeks	89 weeks	104 weeks
c) Promotional JE/Bridges	10 weeks	-	10 weeka
d) Refresher Course SSE/JE/Bridges	3 Weeks	-	3 Weeks

Comparison between the syllabus of Refresher Training Module at ZTS and syllabus of proposed refresher course at SSTW/Pune of SSE/Bridges

S.No.5

Lesson Content (Refresher Training Module at ZTS)	Module No. (ZTS)	Hours allotted in the syllabus (ZTS)	Sl. No. SSTW/Pune
Duties of JE/SSE/Bridges	BRC101	2	1
Basic concept and classification of bridges	BRC102	2	-
Investigation and Survey for construction of bridges	BRC103	2	-
Concrete Technology, Reinforcement and Formwork	BRC104	4	14.1, 14.3, 14.4 & 15.1
Construction of substructures of bridges	BRC105	7	17.7
Bearing	BRC106	2	15.4, 15.5 & 17.6
Construction of super structure of bridges	BRC107	7	13.1, 15.1-15.3, 16.6 & 17.3
Erection of Bridge Super structure	BRC108	7	16.1 to 16.6
Construction of Misc structures	BRC109	2	15.2
Temporary arrangement for bridge works	BRC110	3	16.1 to 16.3
Inspection of bridges and Misc. structures	BRC111	7	17.1 to 17.8
Underwater inspection	BRC112	2	17.9
Maintenance of bridges and Misc. structures	BRC113	7	11, 17.1 to 17.8
Inspection and maintenance of Tunnels and Deep Cuttings	BRC114	2	-
Rehabilitation of bridges	BRC115	4	18
Precautions while executing works in electrified section	BRC116	1	-
Plant and machinery of the Engineering Department	BRC117	2	19.1 to 19.4
Laying channel sleepers on steel girder bridges & replacing of Elastomeric bearing in PSC girders	BRC118	2	17.6
Track on bridges, track protection during bridge maintenance	BRC119	1	5.1
Quality control & safety and vigilance related issues	BRC120	3	10.2, 10.3
Bridge rules & specifications, Bridge code of practice, bridge management system and updating bridge data	BRC121	4	12
Action during accidents and breaches	BRC122	3	20
Schedule of dimensions and CRS sanction	BRC123	2	5.2

Method of inspection, Accompany inspection and action taken for the inspection	BRC124	1	17.1
Contract management & finance and budget	BRC125	4	9, 10
Official language Rajbhasa	BRC126	2	4
Establishment rules	BRC127	4	3
Stores	BRC128	2	2
Introduction to computers	BRC129	5	-
Library and Video	BRC130	6	-
General	BRC1312	2	-
Test and examination	BRC132	6	-

108 working hours, 20 days, say 3 weeks

New topics included in the training module proposed by the IRICEN

Interaction with other departments	Sl. No. 6	2		
Training on soft skill	Sl. No. 7			
Navigation of RDSO site and IRCEP & IRICEN website	Sl. No. 8	1		
Approval of steel works by RDSO, Zone	15.4			
Disaster Management	Sl. No. 21	1		
Field visit	Sl. No. 22	6		

CATEGORY : SSE/JE Bridge

TRAINING MODULE FOR REFRESHER COURSE		
	DURATION OF COURSE: 03 WEEKS	
SN	TOPIC DETAILS	PDS
1	**Duties of JE/SSE Bridges-**	1
2	**Stores - accountal of material, stock verification, preparation of indents etc.**	3
3	**Establishment rules-** Pass & Leave rules, conduct rules, D&A rules, HOER, Witnessing of payment, Minimum wages act, Factory Act & workmen's compensation act.	3
4	**Rajbhasha** - Directives for implementation of Rajbhasha, Unicode usage.	1
5	**General rules and subsidiary rules and SOD**	5
5.1	General rules applicable to all Railway servants, Signals – General provisions, Descriptions of Fixed signals, Hand signals, Detonating signals, Flare signals, General rules and procedure to be followed while carry out engineering works, protection of track, working of lorries, trolleys, motor trolleys, works of short duration, long duration, engineering indicators, protection of track, single line, double line, safety during execution of works on bridges,	3
5.2	Schedule of dimensions - Dimensions and clearances of fixed structures for B.G. & M.G, ODC, CRS sanction, Works requiring CRS sanction.	2
6	**Interaction with other departments-** Working in track circuited & Electrified sections, Co-ordination with P.Way and Works; and with other departments like S&T, TRD, Operating, Personal, RPF etc.	2
7	**Training on soft skill-** Managerial skill, Leadership, Personal Development and Soft Skill, Personal Management. Meditation, Ethical Training.	2
8	**Navigation of RDSO site and IRCEP and IRICEN Website**	1
9	**Engineering codes/Manuals-** IRPWM, IRBM. Latest correction slips, PCE, CBE circulars. Steel Bridge Code, Welded bridge Code, IRS B1, BS report Nos. 102, 103, 110, 111, 113, 115	14
10	**Contract Management-**	6
10.1	Types & forms of contracts, tenders, GCC&SCC, SOR.	2
10.2	Quality control measures at site, various registers to be maintained for progress, quality, safety of contractor's persons, safety measures at work site, accountal of new and released material, issue and receipt from contractors, important points from vigilance angle, Dos and don'ts for different works.	4
10.3	**Vigilance related issues-** Do's and Don'ts and other precautions, Up-keep of records, contract and material management.	2
11	Field demo on layout for bridges and Camber measurement using total station	8
12	**Bridge management system**	4
13	**Construction of Super Structure of Concrete bridges-**	6
13.1	Basic concept of Pre stressing- equipment for stressing, method of pre stressing, formwork for PSC, stages of pre stressing. Load test for girders.	4
13.2	Rehabilitation of Pre stressed concrete structures.	2
14	**Concrete Technology, Reinforcement and Formwork-**	8
14.1	Ingredients of concrete, Types of cement, Design Mix, Admixtures & chemicals, Mixing & Placing of Concrete, Curing.	2

14.2	Test on fresh concrete, Test on hardened concrete- Destructive & Non-Destructive.	2
14.3	Grade of steel, High tensile steel, bar bending and placement of reinforcement	
14.4	Formwork- types, fabrication, erection and removal of formwork. Preparation of Bed for casting of girder, Bottom and side shuttering, placing of reinforcement and PSC duct,	2
15	**Fabrication of Steel Bridge girder and other steel structures-**	**21**
15.1	Procurement of steel- specification; testing.	2
15.2	Fabrication of steel girders and steel structures (FOB, platform shelters)	6
15.3	Welding- Types of welding, Manual arc welding, Flux core arc welding with gas shielding, CO2 welding, Submerged arc welding. Welding electrodes, welding methods, welding equipment, setting up techniques and safety precautions (practical training). Defects in welds, Non-destructive test of welds, Rectification of defective welds. Quality control in welding – approval of weld joints, WPQR, WPSS.	2
15.4	Approval of steel works by RDSO, Zone etc.	1
15.5	Visit to EWS	8
15.6	**Fabrication and Erection of bearing-** Manufacturing of bearing. Quality control, inspection and approval while procurement of Bearings. Erection and Replacement of Bearings.	2
16	**Temporary staging, Crane working and Erection of Girders-**	**11**
16.1	Various types of temporary arrangements. Material for temporary arrangements, Precaution in Erection of temporary arrangements.	2
16.2	C.C. crib, Use of steel trestles, Service girders deferent types, Overall length effective span and clear span,	2
16.3	Details of Callender Hamilton span its transportation and erection.	1
16.4	Crane Working rules - safety measures - testing of tackles, chains rope etc. Capacity of - cranes in propelled and un-propelled conditions at different radii.	2
16.5	Launching of girder-Preliminary arrangement before girder erection, precautions and safety measures in erection, Machinery/Equipment for erection. Erection by use of cranes, derricks.	1
16.6	Launching of girder-End launching method, side sluing method, launching of triangulated girders on the trestle, launching of girder by using service span, end launching of open web girders with help of launching nose, erection by cantilever methods, enveloping methods., Erection of PSC box girder, segmental construction, Segmental erection, girder erection.	3
17	**Inspection, maintenance and repairs of bridges**	**17**
17.1	Schedule of inspection, Action to be taken after inspection of bridges.	1
17.2	**Registers for inspection-** Steel work in bridges, rivet testing register, Weld test register, PSC bridge/Composite girder bridge inspection register, Annual inspection register, movement of inspection registers.	1
17.3	**Numerical Rating System.**	2
17.4	Inspection and maintenance of concrete & PSC bridges - Girder alignment & seating, Structural condition of girder, Periodical Maintenance of PSC and RCC structures. Measurement of camber. Protective coat for PSC & RCC superstructures.	2

17.5	**Inspection and maintenance of Steel/ Composite bridges** - Girder alignment & seating, Structural condition of girder, Condition of steel work, painting. Camber measurement – method and procedure, Loss of camber in steel girders, cracks in steel work, strengthening of steel girder. Rivet testing, Method of testing, Sample testing, Loose rivet diagram, Replacement of loose and corroded rivets. Cracks in steel works – strengthening of weak girders, Maintenance of welded girders.	2
17.6	**Bearings**- Need of bearing, Selection of bearing, Types of bearing - Sliding bearing, Roller bearing, Rocker & Roller bearing, Elastomeric bearing, Pot-PTFE bearing, Thermal movement of girders , Greasing of bearings - Method and material used for greasing. Replacement of bearing.	3
17.7	**Bed block-** Details of common repair techniques- Cement pressure grouting, Epoxy grouting, and Shot creating/Guniting,	2
17.8	**Painting of steel Bridges**- Corrosion and its prevention, protective coating by painting, Types of paint systems used and schedule of painting, importance of surface preparation and correct painting procedure, paints film defects, Metalizing and epoxy based paints, standard measurements and covering capacity of different paints, paint film thickness measurements.	2
~~17.9~~	**Under water inspection**	2
~~18~~	**Rehabilitation of Bridges**- Reasons for rehabilitation, Special strengthening, Imposition of speed restriction, Priority for rehabilitation of bridges, Special inspection Collection of site data, Execution of rehabilitation works, Strengthening of foundations strengthening/rebuilding of sub-structures, Shaken/displaced/cracked bed blocks, Replacement of non-standard girders, Replacement of pipe culverts, Arch bridges, small openings, Steel & PSC super structure.	3
19	**T&P of Engineering Department-**	**8**
19.1	Use of oxyacetylene gases - safety measures - different types of flames and their uses - Oxyacetylene torches for cutting and welding - gas cutting - pug cutting machines gas welding - electrodes.,	2
19.2	Control of plant and machinery, Engineering plant Reserve and machinery for maintenance, Plant and machinery procured for works against specific, Plant numbers/project, Register for Engineering plant reserve, Valuation of plant Maintenance, storage and repairs to plant, Requisition by DEN on plant depot, Use of Engineering reserve plant at site of work,	2
19.3	Debits for plant and staff supplied on departmental, Maintenance of Log book for plant, Log Book for plants, Log Book for Motor Trolley and Motor Vehicles, Hiring out of engineering plant, Plants and machinery – radial drills, pneumatic drilling machines, air compressed, shear and punching machines, grinding machines, lathes and milling machines, grinding wheels, air pressure required for different pneumatic equipment,	2
~~19.4~~	Hydraulic jacks – case and maintenance screw jacks (Duff Norton types) – Transverse bases – use of derricks including erection – pulley block guy ropes, wire and manila ropes, use of different types of knots – Maxpull arrangement (practical training) case of equipment.	2

20	**Action during Accidents and breaches-** Accidents and breaches: Duties of SE/Bridges, sounding of hooters, & classification of accidents, action to be taken on reaching site, first aid, preservation of clues, assessments of men and material for restoration, expeditious restoration, breaches & its types, Action during breach, washout of bridges, temporary restoration, restoration of bridges, enquires, provisions of ARS – water ways, scour, flood discharges, protection works, sounding – flood register.	1
21	**Disaster management-** DM Act 2005, NDMA, Role of NDRF, NPDM. Risk reduction, recovery, rehabilitation, medical aid- first aid, food and health.	1
22	**Field visit** – Field visits at important constructions/project/Regirdering site/Girder fabrication site.	16
	TOTAL NUMBER OF PERIODS	**144**
	TOTAL NUMBER OF DAYS	**18**
	TOTAL NUMBER OF WEEKS	**3**

PROPOSED TRAINING MODULES FOR REFRESHER COURSE TO SSE/JE/BRIDGES

Module No.	Lesson Content	Proposed Hours		Proposed Field Visit
		Class Room	Model room	
BRC101	**Duties of JE/SSE/Bridges**	2		
1	Inspection, maintenance of bridges and other structures.			
2	Knowledge of Rules and Regulations			
3	Go-ordination with permanent way. works and higher staff of other Departments			
4	Accompanying on Inspections of Higher officials			
5	Execution of works			
6	Action in case of Emergency			
7	Establishment			
8	Correspondence and records			
9	Relinquishment of charge			
BRC102	**Basic concept and classification of bridges**	2		
1	Definition of bridge and Components of bridge.			
2	Classification of Railway bridges, different types of Loading Standard for Railway bridges/Road bridges			
BRC103	**Investigation and Survey for construction of bridges**	2		
1	Investigation of Minor, Major and Important bridges.			
2	Hydrological investigation			
3	Factors governing the choose of site			
4	Design discharge, Design discharge for foundation, Design of waterways, Vertical clearance, Free board, Afflux, Scour depth.			
BRC104	**Concrete Technology, Reinforcement and Formwork**	4		
1	Ingredients of concrete, Types of cement, Design Mix, Admixtures & chemicals, Test on fresh concrete, Test on hardened concrete-Destructive & Non-Destructive , Concrete for PCC, RCC & PSC, use of concrete codes.			
2	Grade of steel, fabrication of reinforcement, preventing methods for corrosion of reinforcement.			
3	Various type of Formwork- Fabrication & erection of formwork, removal formwork.			

BRC105	Construction of Substructure of bridges	7		
1	Soil investigation and classification. Load bearing capacity of soil.			
2	Setting the layout of bridges, Coffer dam, Island formation, Trim concrete, Tilt & Shift, Quick sand, Anchoring of foundation.			
3	Open foundation, Pile foundation, Well foundation, Box Caisson.			
4	Pile load test, Plate load test,			
5	Pier, Abutment, Wing wall, Return wall and Protective works.			
6	Bed block and trestle beam			
BRC106	Bearing	2		
1	Need of bearing, Selection of bearing.			
2	Types of bearing- Sliding bearing, Roller bearing, Rocker & Roller bearing, Elastomeric bearing, Pot bearing, PTFE bearing, Phosphor bronze bearing Teflon bearing,			
3	Manufacturing of bearing- Erection of bearing			
BRC107	Construction of Super Structure of bridges	7		
1	PSC Slab/Girder- Basic concept of Pre stressing- High strength concrete, High tensile steel, equipment for stressing, method of pre stressing, losses of prestress, formwork for PSC, stages of pre stressing, Design of PSC, Rehabilitation of Pre stressed concrete structures.			
2	Composite Girder			
3	Types of steel girders, Fabrication of Steel Girder- Preparation of fabrication, trail shop erection, welding techniques, riveting.			
4	Misc. RCC slab, Box culvert, Limited Use Subway (LUS), Pipe culvert, Box pushing, Pipe pushing, Box Siphon,			
5	Load test for girders/slab.			