East Central Railway

Office of the
General Manager(P)
Hajipur

No:- ECR/HRD/GAZ/Engg/254/AEN(Gr.-'B')/30%/2018

Date 03.05.2019

Secy. to GM- for kind information of GM
Secy. to AGM- for kind information of AGM
PCE/ECR/HJP, CAO/Con/South & North/MHX
CAO/DLF, CAO/GELF, CAO/RWP, CAO/WPO
PCPO/NER, PCPO/ER, PCPO/SER & PCPO/NR
SDGM/ECR/HJP, PFA/ECR/HJP.
DG/RDSO, All PSUs
All Chief Engineer/Con/MHX
GM(P)/CORE/Allahabad.
CPO(A) & CPO(IR&W)/ECR/HJP
DRM/ECR/DNR, MGS, DHN, SEE & SPJ.
CWM/PD/MGS, CMA/DHN & WS/SPJ.
CPM/RE/DNR , SPO/PD/MGS
Sr.DPO/ECR/ DNR, MGS, DHN, SEE & SPJ.
Sr. DEN/Co-ord/ECR/ DNR, MGS, DHN, SEE & SPJ
WPO/Patna, CRW/HRT & RWP/Bela.
Dy.CPO/HRD/ECR/HJP & Dy.CPO(Con)/MHX.
Principal/ZRTI/E.C.Rly/Bhuli & MFP.
All Extra Divisioanl Units.
General Secretary/ECRKU
APO/MPP/HJP- for uploading on website.

05/IT

Sub:- Limited Departmental Competitive Examination (LDCE) for the post of AEN (Gr. 'B') in pay band₹ 9300-34800 (Level-8) Grade pay ₹ 4800 against 30% quota.

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It has been decided with the approval of General Manager to hold a LDCE for forming a panel against 14 vacancies (UR-08, SC-04, ST-02) of AEN(Gr.-'B') against 30% quota on E.C.Railway, as per details given below:-

(1) TENTATIVE PROGRAMME OF PRE-QYALIFYING, MAIN EXAMINATION & VIVA-VOCE

(A) Date of Pre-qualifying examination(100 Marks/Objective type MCQ):- **Will be notified in due couse.**

(B) Date of Main examination(100 Marks/Descriptive type) :- **Will be notified in due couse.**

(C) Venue :- **E. C. Rly's Sr. Sec. School, Danapur, Khagual,Ptana**
(D) Duration :- 03 hours of each paper.(10.30 hrs to 13.30 hrs.)
(E) Viva-voce :- Separate advice will be issued.

(2) Eligibility:-(As on 25.10.2015)

(a) All permanent Group 'C' technical staff of Civil Engineering Department including those who are working in other Railways on deputation having lien and seniority on E. C. Railway in 6th CPC pay band PB-2,(₹9300-34800) with Grade Pay of ₹ 4200(7th CPC level-6) who have completed minimum 05 years of non-fortuitous service in the grade(including non-fortuitous service rendered in the corresponding pre-revised grades) as on **25.10.15** will be eligible to volunteer for the above written examination. However, those Gr.'C' employees who have been given financial upgradetion in Grade Pay ₹ 4200 in PB-2(₹9300-34800) under ACP/MACP are not eligible to volunteers for the above (LDCE)written examination.

Contd.... P/2

The cut-off date of eligibility for candidates for 30% LDCE is **25.10.2015** which is same as the selection of 70% quota.

(b) As per Railway Board's letter No. E(GP)2005/2/74 dt.13.03.08(RBE 40/08) in case of persons transferred at his own request to a new unit in the same category of post and assigned bottom seniority therein, the service rendered by them in the previous unit may be reckoned for determining their eligibility wherever a minimum length of service is prescribed as a condition for promotion in the new unit, subject to the condition that the length of service which is so allowed to be counted does not exceed the length of service of their immediate senior in the new unit.

(3) Eligible staff working in the Construction/Project Organization on deputation, training and any Ex-cadre Organization and having lien and seniority in ECR, who desire to volunteer for the above LDCE may also submit their application through proper channel i.e. their respective Personnel Branch officer, where they hold lien. The concerned Division/Unit should send copy of notice to the staff who are on deputation after being released from that Division/Unit.

(4) Eligible staff who desire to volunteer for the above LDCE may submit their application through proper channel to their respective Personnel Branch officer where they hold their lien.

(5) All the volunteers who fulfill the above mentioned conditions of eligibility will get the chance to compete in the said LDCE, without any restrictions to the number of eligible candidates to be allowed for appearing in the examination.

(6) The above LDCE will be based on the candidate's performance in written examination, viva-voce & record of service. Only the candidates, who qualify in the written examination and found medically fit for Safety category of AEN(Gr.B) as prescribed in Indian Railway Medical Manual will be called for Viva-voce test. The placement of the candidates in the panel will be based on their performance in Written examination, Viva-voce test and Record of service as per extant instructions issued by Railway Board and ammended time to time.

(7) In terms of RBE No. 53/2019, dt. 19.03.19, the Written Examination will be held in two stages viz. Pre-qualifying Examination and Main Examination as elaborated below:-

7.1- Pre-qualifiying Examination:

(a) There shall be a Pre-qualifying single paper examination of 100 marks which shall have 100% Objective type Multiple Choice question only.

(b) The distribution of marks will be as under:

Technical subject	40 marks
General Knowledge including optional Questions on Official language Policy	30 marks
Establishmet & Financial Rules	30 marks

Note : There shall be negative marking for incorrect answers. One-third of the marks allotted for each question will be deducted for every wrong answer. No corrections of any type(viz. cutting, overwriting, scoring off a ticked answer & ticking another answer, erasing, modifying the answer in any way) will be permitted Zero marks will be awarded in such cases of corrections.

7.2- Qualifiying Marks:

The candidates scoring **75% marks and above** in the Pre-qualifying examination shall be eligible for appearing in the main examination and for this, number of candidates should be restricted to **5 times** the number of respective vacancies in order of merit.

7.3- Main examination:

The Pre-qualifying examination will be followed by one descriptive type paper on professional subject comprising of **100 marks** and the qualifying marks in the written examination will be **60% and above.**

Contd.... P/3

(8) Total marks and qualifying marks under the heading "Viva-Voce and Record of service" are as under:-

Head	Maximum Marks	Qualifying Marks
Record of Service -	25 } Total	30, in which 15 marks for Record of service will be essential.
Viva-voce test -	25 } 50 marks	

(9) The question paper will be bi-lingual, i.e both in Hindi and English. It will be candidate's choice to write in any one of these languages. The candidate should clearly indicate his/her choice of language in the space of the application format.

(10) The syllabus for selection to the post of AEN(Gr-B) against 30% quota is enclosed herewith as Annexure –" B".

(11)(a)The Controlling Officers should give the wide publicity of this notification amongst the eligible staff under their control and ensure submission of applications by the candidates in the prescribed Proforma (Specimen Copy enclosed as **Annexure-"A"**).

(b) The last date for submission of the application by candidates is 04.06.2019.

(c) The Controlling officers are also advised that applications submitted by the candidates (in prescribed proforma) must be forwarded to concerned Personnel Branch/ Unit office within stipulated time.

(d) The applications should be scrutinized properly in Personnel Branch with the Service Record to avoid any factual errors and further complications. The applications should also be signed by the Controlling Officer with official seal and should have the counter signature of the concerned 'Personnel' Branch Officer.

(e) All the scrutinized applications should be sent in a bunch through special messenger to **Dy.CPO/Gaz. /ECR/ HJP on or before 10.06.2019 positively. Applications forwarded after the target date will not be entertained under any circumstances.**

It may also be noted that application other than in prescribed proforma, having incomplete information or without signed by controlling officer and countersigned signed by Personnel branch officer will not be entertained.

(12) In case the service particulars furnished by the volunteers and certified to be in order by the concerned authority are found incorrect/false subsequently, the candidature of the volunteer will be liable to be cancelled at any stage and suitable departmental action will be initiated against him/her.

(13) TRAINING OF SC/ST CANDIDATES:-

It may be noted that before conducting the written examination, mandatory Pre-Selection coaching of 3-4 weeks (21 working days) for eligible SC/ST candidates will be arranged by the department concerned in terms of Railway Board's letter No. E(MPP)96/3/23 dated 21.07.2000. PCE/ECR/HJP is requested to nominate an JAG or above officer of Engineering Department as an in-charge of Pre-Selection coaching for the SC/ST candidates. The in-charge of Pre-Selection coaching will intimate the date and venue of the Pre-Selection coaching to the eligible SC/ST candidates in due course.

If any SC/ST candidate refuse to undergo Pre-Selection coaching, a written undertaking should be obtained from him/her and the same may be sent to Dy.CPO(Gaz.)/ECR/HJP as well as PCE/ECR/HJP. The Controlling Officers will ensure that the SC/ST candidates under their control should be spared well in time without fail to participate in such coaching.

The SC/ST candidates may also be advised to insist their controlling officers, in their own interest to spare them for the said coaching.

(13.1) Duty of the in-charge of Pre-Selection Coaching (Nominated by PCE):-

(i) To inform in writing through special messenger to the concerned SC/ST employee with details of date, time & venue of coaching.

(ii) To obtain in writing unwillingness for coaching, if any, from the concerned SC/ST employees.

(iii) To arrange sparing of the candidates and liaison with respective Controlling Officers/Supervisors.

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(iv) To chalk out coaching schedule and adhere to it.

(v) To ensure maintenance of daily attendance of SC/ST candidates on the attendance sheet, who attend the coaching.

(vi) After completion of such coaching, the in-charge of the Pre-Selection coaching will give a written report along with all supporting documents/papers including attendance sheet of SC/ST participants to Dy.CPO(Gaz) /ECR/HJP imediately after completion of Pre-Selection coaching for records and further action. On receipt of compliance report of Pre-Selection coaching, written examination will be conducted.

(13.2) Duty of Controlling Officer:-

To spare the candidates under their control well in time without fail with direction to participate in the coaching.

(13.3) Duty of concerned SC/ST applicant:-

(i) To manage their sparing from duty by insisting their Controlling Officers in their own interest.

(ii) If any problem occurs in sparing, the candidate should report in writing to concerned in-charge of Pre-Selection coaching on the same date. No representation will be entertained in case of failure to report to the concerned in-charge of Pre-Selection coaching and it will be deemed for refusal for such coaching.

(iii) Failure of concerned SC/ST employees to avail Pre-Selection coaching on any account including leave etc. will be considered on their part and will not entitle them to additional coaching classes.

(iv) No appeal will be entertained by GM(P)/ECR/HJP after completion of Pre-Selection coaching.

(14) The eligible staff should also be advised that no absentee written examination would be held for the absentees under any circumstances. As per rule, there is no provision of absentee exam in LDCE.

(15) The Controlling/Authorized Officer should ensure the issue of individual sparing letter/identity slip duly attesting specimen signature of the candidate on the sparing letter/identity slip. The candidates without proper sparing letter/identity slip will not be allowed to appear in the examination.

(16) The concerned Personnel Branch Officer & Controlling Officers should ensure the submission of service records and ACRs/APARs last 05 years and DAR/SPE/Vigilance clearance in respect of staff declared qualified for the viva-voce in due course immediately after publication of the result of main examination through special messenger to Dy.CPO/Gaz/ECR/HJP.

(17) The above selection will be held as per procedure laid down in Master Circular No. 68, governing promotion from Gr. 'C' to Gr. 'B' issued by Railway Board and the instructions issued time to time. The said Master Circular is available on website www.indianrailways.gov.in....>ministry of railway...>railway board .....>Raiway Baord Directorates... >Establishment...>E(GP)circular → Master Circular. The department/ division/unit should ensure the compliance of instructions of item 15 of Master Circular- 68.

This notification may be downloaded from this railway's website www.ecr.indianrailways. gov. in→Hajipur HQ→ Personnel → recruitment /selection notification.

Please acknowledge receipt.

DA:- Annexure A & B.

03/5/09

(Dilip Paswan)
SPO/Gaz
For General Manager(P)/HJP

ANNEXURE- "B"

PROFORMA OF APPLICATION TO BE FILLED UP BY THE VOLUNTEER FOR LDCE OF AEN/GR-'B' AGAINST 30% QUOTA ATTACHED WITH THIS OFFICE NOTIFICATION NO. ECR/HRD/GAZ/254/ Engg/AEN/30%(Gr.'B')/2018 DATED 03/05/2019

1. Full Name (in Block Letters) :-
2. Designation and station :-
3. Working under :-
4. Date of Birth :-
5. Date of appointment (Post with Grade pay and Department):-
6. Divn/Unit where lien/seniority held :-
7. Dt. of Joining in Present lien/seniority unit & Grade Pay:-
   (Please mentioned:-Direct Rectt. /Own request transfer/Mutual transfer/Administrative ground)-
8. PF/NPS No. :-
9. Educational Qualification :-
10. Whether the candidate belongs to SC/ST :-
    Community (if yes, a copy of caste Certificate duly attested by a Gazetted Officer should be enclosed.)
11. Date of appointment/promotion to the following grade on regular basis (7th CPC) in Engg. Deptt. :-

Pay-Band & Grade-Pay	Days	Month	Year
(a) Level 6 in 7th CPC (PB-II, GP- 4200 in 6th CPC)			
(b) Level 7 in 7th CPC (PB-II, GP- 4600 in 6th CPC)			

12. Length of non-fortuitous service (Regular Promotion) in the following grade in present lien/seniority unit (Engg. deptt.) as on 25.10.15 .

Pay-Band & Grade-Pay	As on	Year	Month	Days
(a) Level 6 of Pay Matrix (PB-II, GP- 4200 in 6th CPC)	25.10.15			
(b) Level 7 in 7th CPC (PB-II, GP- 4600 in 6th CPC)	25.10.15			

13. Present pay, scale & date of promotion to present scale /Grade Pay:-
14. Choice of language to answer the questions (English /Hindi). :-
    (The candidate should indicate his/her choice)

15. DECLARATION OF THE CANDIDATE:-

(i) I..... do hereby declare that the above particulars furnished by me are true to the best of my knowledge and belief. I further undertake that any above entry is found incorrect or not in order, my candidature shall liable to be cancelled at any stage during pendency of the above selection.

SIGNATURE OF THE CANDIDATE

(A) Forwarding the application (filled-up) submitted by the candidates to the cadre controlling officer (Personnel Branch) by his/her controlling officer:-

The application is in prescribed proforma duly filled-up by the Shri /Smt._____ Designation_____ received within the target date is hereby forwarded to his/her respective cadre controlling officer (Personnel Branch) for verification with the service record and also for onward transmission to the General Manager (P)/ECR/HJP.

SIGNATURE OF CONTROLLING OFFICER
(With office seal & date)

(B) Certificate to be furnished by the cadre controlling officer (Personnel Branch):-

If the volunteer come under the circumstances mentioned in item no. (b) of para 2 of the notification, the service rendered by immediate senior employee as on **25.10.2015** should be indicated invariably in the following format:-

Sl. No	Name (S/Shri) of immediate senior	Desig.	Pay Band (II) & GP	Year	Month	Day
			Level 6 in 7th CPC (PB-II, GP- 4200 in 6thCPC)			
			Level 7 in 7th CPC (PB-II, GP- 4600 in 6thCPC)			

It is certified that the service particulars/Bio-Data furnished by Shri/Smt. ..... Designation..... in the prescribed proforma have been verified with his/her service record and found correct. The above mentioned candidate is eligible to appear in the said selection, accordingly the same is hereby forwarded to GM(P)/Hajipur for further necessary action.

SIGNATURE OF THE CADRE OFFICER
(With office seal & date)

Note:- The application with any column unfilled will be summarily rejected.

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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)
*****

RBE NO.: 140 /2016

No.E(GP)2008/2/06 **New Delhi, dt: 25.11.2016**

The General Managers,
All Indian Railways and Production Units.

Sub: Syllabus for professional papers for 30% LDCE for promotion to Group 'B' post of AEN in Civil Engineering Department of Railways/Production Units.

Ref: Railway Board's letter No. E(GP)2008/2/6 dated 09.08.2012 & 24.06.2014.

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A revised syllabus for professional papers for 30% Limited Departmental Competitive Examination for promotion from Group 'C' to Group 'B' posts of AEN in Civil Engineering Department of Railways/Production Units is enclosed herewith for guidance. The revised syllabus may be given wide publicity and circulated amongst the eligible candidates.

2. The revised syllabus shall be effective from the date of issue of this letter. However, LDCEs for which written examinations have already been held or which are at an advanced stage, need not be disturbed.

3. Please acknowledge receipt.

Encl: As above

M. Saluja. 24/11/16

(MEENAKSHI SALUJA)
DY. DIRECTOR ESTT.(GP)III
RAILWAY BOARD

(A) Civil Engineering (General)

1. Surveying

(a) Types

i) Chain and Compass survey –

Basic principles; base lines; check lines; tick lines; perpendicular and oblique offsets; conventional signs; plotting of survey; true and magnetic bearings; open and closed traverses; recording plotting of traverse, closing errors.

ii) Plane Table Survey –

Techniques of using Distomat and total stations. Method of setting layouts & curves using these equipment.

iii) Levelling –

Level Lines – datum, bench marks, simple leveling, fly leveling; recording the levels in field book; method of reducing levels; arithmetical check; longitudinal and cross-section controuring.

iv) Theodolite Survey –

Types of theodolites; measurement of horizontal angles, vertical angles, magnetic bearings and deflection angles; prolonging a straight line; traversing by method of included angles; balancing the survey – closing errors; calculations of latitude and departure

v) Curves –

Elements of simple circular curves; setting out simple circular curves; different

vi) Set out works –

Setting out buildings, culverts, Central line of Railway alignment. Usage of GPS technology in setting out Centre line of Railway alignments.

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(b) **Care & Custody of Survey Instruments-**

Handling of instruments – Transport and protection; permanent adjustments; repairs and periodical overhaul

2. **Strength of Materials, Structural Designs & Drawings**

(a) **Strength of Materials :**

Stress, strain, Hooke's Law, working stress, factor of safety; bending moment and shear force in simply supported beams and cantilevers; simple theory of bending; moving loads on simply supported beams; influence lines for bending moment and shear force in statically determinate beams; short columns, long columns – empirical formulae.

(b) **Structural Design & Drawings syllabus to be rearranged**

(i) Drawings

Different sizes of paper, folding and storage of drawing, plan, elevation, sections, isometric view.

(ii) RCC Structures

RCC, methods of design Working Stress Method and Limit State Method. Design of singly and doubly reinforced rectangular beams including T and L beams. Design of slabs. Design of columns. IRS Code of Practice for RCC (Concrete Bridge Code), Use of computer aided software such as STADD, FEM based software. Basic requirements for usage of these software.

(iii) Steel Structures

Rivets and welds. Sketch and detailing of connections. Different types of joints and strength determination. Design of tension member and compression member. Plate Girders. IRS Code of Practice for Steel Structures.

3. **Construction materials :**

Description, specification, properties and uses of building materials – stones, sand, timber, bricks, cement, lime, building hardware, paints varnishes, glasses, tiles.

4. **Foundation & Construction Engineering**

(a) Soil Mechanics

Different type of Soil, Three phase diagram and their relationships, IS classification of soil, index and engineering properties of soil, compaction, consolidation, shear strength, earth pressure theories, slope stability. Specification and construction of earthwork in embankment and cuttings.

(b) Foundation Engineering

Functions of foundation, different type of foundations, open foundations well foundations and pile foundations, determination of safe bearing capacity, stress and settlement analysis, methods of reducing differential settlements

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5. **Hydraulics & Hydrology**

a) **Hydraulics –**
Elements of hydraulics – Open Channel flow; flow in pipes, frictional loss, empirical formulae.

b) **Hydrology**
Rainfall and run-off; rainfall statistics; rain gauges, run-off calculations by empirical methods; flood discharge estimation; measurement of flood discharge-current meter.

c) **Hydraulic structures**
Design of bridges – alignment, number of spans; economic spans; waterway calculations; scour depth afflux; clearance; depth afflux; clearance; depth of foundations; BOX and Pipe Culverts, river training works-spurs, groynes, aprons, levees. Water way calculations (i.e. estimation of design discharge based on para 4.3.4 of sub structure code namely using RDSO report RBF-16 for catchment size less than 25 sqkm and using flood estimation report (Synthetic unit hydrograph concept) for catchment size 25 sqkm to 25oo sqkm). In the sub topic river training works the following should be added. Guide bunds including launching aprons & protection works " drop wall & curtain wall i.e protection measures for minor bridges).

6. **PUBLIC HEALTH ENGINEERING**

a) **Water Supply**

i) Standards of Quality of drinking water-physical, chemical and bacteriological standards of water; water-born diseases; water demand- methods of forecasting; sources of water; Method of treatment of water- aeration, sedimentation, filtration (slow and rapid sand filters); disinfection, hardness- methods of removal.

ii) **Conveyance and Distribution:-**

Preparation of Schemes for New Water Supply/Augmentation of Existing Water Supply; Estimating Requirements of Water; Types, Selection & Installation of Pumps; Capacity of Pumping, Conveyance of Water; rising mains; systems of distribution, residual pressure; different types of pipes and fittings; testing of pipes, Pipe Laying and Fitting of Valves and Meters. Storage tanks; Capacity, maintenance and Cleaning of Storage Tanks, Water-Supply Plans.

iii) Planning & design of layouts for rain water drains. Principles of rain water harvesting, methods, estimation of capacity of rain water harvesting pits/salient etc.

iv) Water Audit and water Management :-
Conservation of Water, water reuse, water recycling, water recycling plant, flow measurement system, identification of losses & leakages.

b) **Sewerage:**

Preparation of Schemes of Sewerage, Sewage & waste water-collection and carriage; design of sewers; house connections; storm water drains; disposal of sewage - river pollution and control; sewage treatment; land irrigation, septic tanks, primary clarifier, sludge and scum removal, trickling filters, activated sludge process, sludge digesting, principles of anaerobic digestion, sludge gas, sludge drying and disposal.

(B) Civil Engineering (Railways)

1. Railway Surveys & Construction

Provisions in Engineering Code regarding - Classification of Surveys, Terms of Reference, Principles governing Railway alignment, Ruling gradients, Grade compensation for curves, Horizontal and vertical curves, ; Hill Surveys, Catch sidings, tunnels, preparation of various maps and drawings, preparation of Survey reports for RECT, PECT and FLS, Project estimates.

2. Railway Track

Sl. No.	Existing Syllabus	Suggested Syllabus	Remarks
1	2. <u>Railway Track:-</u> Description, specifications and functions of the structure elements; Rails, sleepers, fastenings ballast, formation and other sub-structures; points and crossings; geometry and design features Track layouts.	2. <u>Railway Track:-</u> Description, specifications and functions of the structural elements; Rails, sleepers, fastenings, ballast, blanket, formation (embankment/ cutting), drainage system and other sub-structures; points and crossings; geometry and design features, and Track layouts.	Minor changes

3. Maintenance of Permanent Way:-

a) Duties:-

Duties of Assistant Divisional Engineers; duties of SSE/JE (P.Way); SSE/JE (Works), SSE/JE (Bridges), Gangmates, Keymen, Trackmen, Gatekeeper.

b) Maintenance of Permanent way:-

Methods of maintenance; Beater packing, Machine packing, Systems of maintenance; (conventional and mechanized), overhauling, systematic through packing, picking up slacks, Directed Track Maintenance; Miscellaneous works; lifting and lowering of track, shallow/deep screening of ballast; Maintenance of drains, lubrication of rail joints; adjustment of creep, maintenance of level crossings, Maintenance of points and crossings, track on bridges;

(9)

c) **Special Maintenance Works:**

Maintenance of short welded rails, long welded and continuous welded rails; maintenance of Switch Expansion Joints, maintenance in electrified section; special precautions; maintenance of track circuited sections; special precautions.

d) **Design, Maintenance of curved track and realignment of curves:** Curvature, transitions, super elevation of curves, safe speeds, cant deficiency, speed on curves with turnouts, Realignments of curves: method, extra clearances on curves

e) Testing Monitoring of track with by track recording car, frequency of recording based on category, OMS frequency, and category, interpretation of track recording charts results and exception reports; analysis of the charts TRC reports to improve track parameters. The allowable limits of parameters category-wise, prioritization of attention to track defects etc.

f) Heavy axle traffic and different types, precautions and checks to ensure safety of track and bridges.

g) Maintenance and working of various track machines.

h) Formation treatment works for Railway embankments - various methods, and their advantages and disadvantages. of the methods.

4. Maintenance of Bridges

a) Maintenance of bridges: Responsibility of the engineering officials, Action to be taken after inspection of bridges; Maintenance of foundations; Protective works and waterways - maintenance of foundations, maintenance of protective works, maintenance of waterways; Maintenance of substructure - abutments, piers, wing walls and return walls, Maintenance of arches, Dismantling of arches, Details of common repair techniques - Cement pressure grouting, Epoxy grouting, Shotcreting / Guniting; Maintenance of RCC & PSC super structures - periodical maintenance, Common defects and repair/strengthening techniques; Maintenance of super structure steel girders - loss of camber in steel girders, cracks in steel works, strengthening of weak girders, replacement of loose rivets, maintenance of HSFG bolts, corrosion and its prevention, protective coatings by painting - periodicity and precautions, patch painting, ordinary paints – for severe and no severe corrosion, metallising & epoxy based paints, Maintenance of welded girders; Action taken for maintenance of composite girders; Various defects of bed blocks and their remedies; Bearings; Precautions while carrying out maintenance works on bridges.

b) Inspection of bridges: Classification of bridges – major, minor, important; Inspection of Bridges by Permanent Way and Works Inspectors, by Bridge Inspectors (SSE/JE-P.Way, Works, Bridges) - Periodicity schedule and details of inspection, Record of Bridge Inspection, Registers to be maintained by the Bridge Inspectors, Certificate of Inspection. By Assistant Divisional Engineers - Bridge Inspection Register, Numerical Rating System (NRS), Unique Rating Number, Condition Rating Number, Overall Rating Number, Certificate by the Assistant Engineer.

Details of Inspection of a Bridge - Flooring and foundations, Masonry in substructure, Under-water substructure inspection, arch bridges, Protective works and water ways, Girder alignment and seating, Structural condition of girders, Track on the bridge approaches, Trolley and safety refuges, Foot paths, Painting, marking HFL and Danger level, providing foundation particulars and bridge name boards, Flood records at important bridges, Road over/under bridges, Concrete bridges, Health Monitoring of Very Important Bridges, Special Inspection During Monsoon, Equipment Required For Inspection of Bridges.

Works connected with maintenance of bridges; Laying of bridge sleepers; Replacing cracked bed blocks; Painting of steelworks.

5. Inspection and Maintenance of Tunnels and Deep Cuttings:

a) Tunnels - Inspection by Engineering Inspectors, Items to be covered in the Inspection, Record of Inspection, Mobile staging for Inspection, Details of tunnel inspection, Ventilation of tunnels, Leakage in tunnels and methods of correction Works connected with the maintenance of tunnels.

b) Deep Cuttings – General, Inspection Register of Vulnerable Cuttings, Points to be noted during inspection of cuttings, Action to be taken in the case of boulder drops, Action to be taken after inspection of cutting, Guarding of Vulnerable Cuttings.

6. Inspection and maintenance of turntable and weigh-bridge pits:

Coordination for satisfactory working of turntable; adjustments and overhauling of turntable; inspection and maintenance; erection and dismantling of turntables; Weighbridge pits and approaches – responsibility of engineering staff; inspection and maintenance of weigh bridge pits; drainage of weighbridge pits; construction of new weighbridges.

6.1 Track Management System:- Salient feature of TMS, pre-requisites for introducing TMS in division, advantage of TMS etc.

6.2 Mobility Index:- Concept, principles, methods of evolution etc.

7. Inspection & Maintenance of buildings & structures other than Bridges

The following is in addition to existing syllabus on this topic.

-Vacant Railway Buildings,
-Building Registers,
-Periodical maintenance of Works including repairs to leaky roof/water proofing of roofs,
-Standard Measurement Registers for Buildings,
-Dismantling of buildings/structures.
-Retro-fitting / structural repairs of existing weak buildings/structures,
-Seismic retro-fitting and repairs/strengthening of buildings/structures.

8. Maintenance of sanitary and hygienic conditions in station yards and railway colonies; water supply, drainage and sewerage:

a) Sanitation:

Formation of sanitation committee; inspection by sanitation committee, sanitary arrangements in stations and colonies, drinking water wells-protection; Cleaning of wells; disinfection; prevention of infectious diseases; disinfection of quarters.

b) Water supply:

Source of water supply; water sample analysis; open wells – sizes; pumping capacity, improving yield; shallow tube wells; deep tube wells; impounding reservoirs; storage capacity; flood discharge; record of water levels in wells; rainfall registers; high level

(7)

storage tanks; precaution against pollution; pumps – types, selection, installation; aqueducts and pipelines-types, selection, laying, estimating requirements of water; layout of distribution systems; water supply from outside sources; maintenance and operation of water supply installation – responsibilities of Engineering department, ~~and~~ Mechanical department and Electrical Department.

c) Drainage and Sewerage:

Drainage systems, waterborne sewerage; sizes of sewers; sewage treatment systems; sewage disposals; sewage purification systems; surface drainage – layout, size of drains; disposal of sullage effluent; drainage of latrines; maintenance of sewerage and drainage systems; maintenance of open sullage drains; storm water drains; house connections; conservancy and sanitary arrangements; responsibilities of engineering staff.

9. Acquisition, management and disposal of land:

General code/ Manual rules:

Ownership of Railway land; sanctioning authority for acquisition and relinquishment; Principles of acquisition and relinquishment; Procedure for acquisition and relinquishment; Land plans and schedule; Documents of Handing over and taking over Railway Land ; Land Records- Responsibility and procedure for demarcation , verification of railway boundary , land plan etc. maintenance of right of way; religious structure. Management of railway Land – leasing, licensing of land, way leave facility and easement rights, grow more food. Leasing licensing for merchants and vendors at stations, bulk oil installation. Encroachment and responsibly ; Rules of permission for construction of building near Railway land; instructions regarding cutting/ trimming and sale of natural product like mature tree, dry trees within and outside railway boundary, near electric or telegraph lines , sale of grass right etc.

10. Large Scale Permanent Way renewals:

Classification of routes and tracks; track renewal programmes, factors governing permanent way renewal; preparation for relaying; preliminary work; systematic operation for complete relaying; speed restrictions to be observed during relaying; post relaying work; classification and disposal of released materials.

11. Rehabilitation of Bridges

Reasons for Rehabilitation, Special Strengthening, Imposition of speed restriction, Priority for rehabilitation of bridges, Special Inspection, Site Data, Execution of rehabilitation works, Precautions when working on bridges; rebuilding of alterations to bridges – design and execution of bridge works; te789mporary arrangements; false work for erection of girders; assembly and erection of girders; cranes for erection of girders; testing of girders; proposal for strengthening existing girder spans; methods of regirdering major bridges; Strengthening of foundations, Strengthening / rebuilding of substructure, Shaken/displaced/ cracked bed blocks, Distressed arch bridges, Replacement of non standard girders, Replacement of pipe culverts, Distress in parapets, Replacement of small opening, Distress in superstructure, Replacement of Meter Gauge Bridges.

12. Works Affecting Railway Safety and Opening New Works

General – Reference to rules; works requiring sanction of the CRS and notice there for; application to the CRS – execution of works and Safety Certificates; documents to

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accompany application; submission of Safety Certificate; deviations from plans approved by CRS; applications for running of new types of locomotives and/or rolling stock and for increase in speed; notification to railway officials when opening works; works arising out of accidents including breaches; opening of new lines; Infringements to Schedule of Dimensions – condonation; procedure thereof; movement of ODCs – types and procedure for sanction for movement, precautions during movements.

13. Railway Operation :

a. General :

Reference to G.&S.R.; types of signals and their significance; rules for working of trains; block working rules – types, introduction of temporary single line working.

b. Engineering restrictions and indicators :

General – Definitions: Responsibility of the Inspector incharge; works of short duration; protection of line in block section and procedure for passing trains; works of long duration; temporary engineering fixed signals; arrangements prior to commencement of work; protection in block section for speed restrictions; procedure for blocking lines for engineering purposes; works at times of poor visibility; temporary signals in emergency; periodical notices of engineering restrictions; permanent speed restriction indicators; review of permanent speed restrictions; indicators – General.

c. Level Crossings :

General – Classification, Standard Specifications; normal position of gates; level crossing equipment, traffic and engineering gates; siding gate lodges; appointment of gatemen; duties of gatemen; maintenance of level crossings; examination of gate equipment and gatemen in rules; level crossings register; road traffic census; manning/demanning of level crossings.

d. Working of Trollies :

General Instructions: rules for working; distinction between trollies, lorries and motor trollies; Certificate of competency; officials permitted to use trollies and lorries; responsibility for safe working; working at night or in bad weather; working on track circuited sections; conveyance of non-railway officials; trolley permits for private sidings; trolley refuges; protection; equipment on trollies and lorries; working of trollies and lorries; in block sections, in station limits.

e. Ballast and material trains

General – Rules for working; Restrictions in running; ordering of ballast trains; issue of "fit to run" Certificate; equipment; testing of brake power; working in block sections; running on Ghat section; loading and unloading from hopper wagons; planning of ballast and material train movements; training out materials and daily reports of ballast train working; charges for ballast trains; register of engineering vehicles.

14. **Accidents** :

General – Observance of rules; intimation of accidents b y station masters; duties and responsibility of the engineering officials in the event of accident impairing through traffic action at site, reporting details of accident – provisions of Accident Manual; action in case of derailments; examination of site and preparation of sketches; recording track and rolling stock measurements – accident procedure; use of recorded data; restoration of through running; procurement and arrangement of labour and equipment; temporary arrangements at site of accident; transshipment; funds required during emergencies;

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attendance of police at accidents; driver's reports on defects in track; action on receipt of reports of defective track; abnormal occurrence attributable to oscillation of locomotives; accidents not impairing through traffic; records of accidents.

15. **Rivers & Floods, pre-monsoon precautionary measures and patrolling of Railway lines:**

Rivers and Floods: General – Behavior of rivers; Past History of Bridges, Danger level at Bridges, Watchman at important bridges, Duties and Equipment of Bridge watchmen; Special Inspection during Monsoon, Action to be taken in the case of weather warning, pitching stone, boulder and monsoon reserve; vigilance during floods; flood records during and after the monsoon; survey of the course of river; river protection works; types, design, repairs and maintenance records – rivers and floods. Flooded Causeways / Dips. Special precautions when track is submerged. Rivers and flood register, Flood Reports, Rainfall data, Provision of Anemometer on Bridges.

a) **Pre-monsoon precautionary measures:**
General precautions to be taken before monsoon, Vulnerable sections; materials for anticipated emergencies; monsoon emergency rakes; equipment tools, rail clusters, temporary bridge spans; protective works; Railway affecting works and tanks; R.A.W. tablet, joint inspection of WAR/RAT, inspection and vigilance over railway affecting tanks during heavy rain; pre-monsoon, during monsoon.

b) **Monsoon and emergency patrol:**
Types of Patrolling, keymen's daily patrol, gang patrol during abnormal rain; night patrolling during monsoon, Security patrolling during civil disturbances and for movement of VIP specials, Hot weather patrolling for LWR/CWR, stationary watchman at vulnerable points; Protection of line in case of Emergency, Commencement and termination, Preparation of Patrol Charts, Distribution of Patrol Charts, Patrol Books and Systematic Patrolling, duties of patrolmen and their equipment, review of patrolling systems and vulnerable locations, Selection of Patrolman, Certificate to be submitted by P.W.I. (JE/SSE(P.Way)), Duties of Patrolmen, reporting damage & obstruction on track to Station Masters; Action by A.E.N. and P.W.1. on receipt of information regarding Damage to the Line, check over patrolling; inspection of equipment; surprise checking at night, Responsibility of Engineering Officials in the matter of Patrolling, Vulnerable locations (Points).

16 **Preparation of Plans and Estimates:**

Preparation of plans:
General procedure; plan for other departments; size of drawings; titles and numbering of drawings; scale of drawings; details on drawings; symbols and colours ~~of~~ in drawings; RDSO drawings; CE's plan; Plans in Divisional/Asstt. Engineer's/Inspector's Offices; Completion drawings; care and filing of tracings/Ferro/Prints; Preparations of estimates – code rules; technical details, rates and quantities; schedule of rates and price – listing of stores; report – and justification; rent statement for staff quarters; special features of estimates for remodelling of station yards, track renewal works, deposit works; Urgency Certificate; Supplementary Estimates, Revised Estimates.

17 Contracts and Execution Of Works

a) Contracts

General – Code reference for contracts; schedule of rates; Analysis, non schedules rates, tenders; types; tender documents, drawings and specifications, tender committees, acceptance of tenders, contracts; types, contract documents, General and special condition of contract; measurement and measurement books – code reference; recording measurements; 'on account' and final measurements; standard measurements Books ; responsibilities of Inspectors/JE/SSE) and Asst Engineers for measurement of works; ballast measurement; computation of quantities; preparation of abstract in measurement books; submission of bills; checking of bills; bill registers; Variations; PVC; Basics Of Arbitration.

b) Execution of Works:

General instructions – Code rules; agencies for executing works; responsibilities of executive officers; deposit works; excess and savings on estimates; attention to public interests; prevention of accidents; planning – activity, milestone, barcharts, critical path networks, PERT; departmental execution of work – record; progress reports, charges for stores and labour, execution of works in Engineering workshops; contracted works; issue of work orders; completion documents; zonal works.

18 Miscellaneous:

a) Engineering plant:

General – code rules; engineering plant reserve, plant register; valuation of plant; maintenance; storage and repairs; requisitioning of plants; use of plant at site; maintenance of log books; hiring out of engineering plant; examination of boilers of the engineering department.

b) Explosives:

General – Issue of instructions on use of explosives; observance of rule of carriage of explosives; commonly used explosives; selection of explosives; storage and conveyance to work site; blasting operations; boring holes; amount of charge; preparation of charge; electrical and safety fuses; precaution to be observed during blasting; misfires; protection of trains and railway property; destruction of explosives; detonating signals – care and custody; use of detonators and test, competency certificates for handling explosives.

c) Management of Engineering Stores:

General – Reference to code and Rules; procurement of stores; requisition; receipt and issue of challans; claims of short receipts; etc.; custody of stores – classification, handling and storage, Account head of stores – operation, records and returns; disposal of released and surplus stores – return to stores Depot, disposal by auction; verification of stock and adjustment for shortage/excesses.

d) Law and Order

Railway Police; lodging complaints; cooperation with railway police; cognizable offences; non cognizable offences; powers of arrest by railway staff; warrant against railway staff; action by railway staff in case of attempted sabotage; answering of court summons;

prevention of trespass; disposal of human bodies found run over; disposal of cattle found dead on the line.

19. Track Machines

i) Provisions of Indian Railway Track Machines Manual.

ii) Working principles and performance parameter of various Track Machines on Indian Railways.

iii) Controls and working systems of various Track Machines.

iv) Working of various Track Machines: Pre- requisites, pre- block preparatory works, and operations during block, post-block attention works.

v) Working of tamping machines in design mode.

vi) Performance and quality parameters in tamping, squeezing pressure, squeezing time, vibration pressure and tamping depth.

vii) Maintenances schedules of various track machines.

viii) Troubleshooting

ix) Rules for movement and working of track machines.

x) Types of small track machines required for maintenance of track and their maintenance systems.