

**QUESTION PAPER FOR SELECTION FOR GROUP-B
MECHANICAL DEPARTMENT ECR
(Paper on Professional subject, Establishment and Financial Rules)**

1. a) Why the official language Act -1963 was framed and how it is helpful in national integration?
b) What items are to be complied under Section 3(3) under this Act?
c) How our country is divided into different regional category for implementation of this Act and how the correspondence is made as per the provision of this Act between different region as per category?
- 2 a) What is zero-base Budgeting?
b) Describe the process to be followed in Budgeting, starting from August review till final modification estimate is submitted. How the expenditure control is exercised through Budgeting?
- 3 a) Which Railway Establishment are coming under the purview of HOER and Factory Act respectively?
b) How the Railway employees are classified under HOER? How the Duty Hours, Rest, Overtime are provided to the Railway employees under HOER.
4. Write short notes on any three
 - i) Paternity Leave
 - ii) Procurement of non-stock items
 - iii) Special Casual Leave
 - iv) ISO 9001-2000
 - v) Workmen's Compensation Act
 - vi) Staff Benefit Fund
5. a) Why Discipline and Appeal rule has been framed? What are minor and major penalties?
b) Describe various procedures to be followed for imposing major penalty to a Group-C Railway employee who has been charged with misappropriation of Railway property.
6. State what these abbreviation stand for
 - i) COFMOW
 - ii) RCF
 - iii) DLW
 - iv) WWW
 - v) CBC
 - vi) UNESCO
 - vii) RITES
 - viii) IRCA
 - ix) IPO
 - x) RVNL
 - xi) CORE
 - xii) DMU
 - xiii) CLW
 - xiv) ECoRSA
 - xv) ROB
7. a) What preventive maintenance schedules for coaching rake are followed for primary and secondary rake? What are the periodicity and time allowance permitted for over due schedules?
b) How the total requirement of coaches calculated including traffic and maintenance spares?
c) In a coaching depot, 6 primary rakes are to be maintained per day. Each primary rake consists of 24 coaches. Draw a layout diagram for maintenance of the primary rakes as per CAMTECH. Design indicating the requirement of pit lines and other facilities if each rake has to be given full 6 hours for maintenance on pit lines.
8. a) Which of the following braking items is better and why?
 - i) Vacuum Brake system
 - ii) Air brake systemb) Draw a schematic layout diagram of a twin pipe graduated Release Air brake

system, used for coaching train. Explain the principle of operation of the system.

How the Distributor valve performance is checked?

9. a) What are the advantages of Bogie Mounted brake system over conventional air brake system?

b) Draw a schematic diagram of a standard all coil ICF bogie and indicate important items of bogie. Explain its salient features regarding its construction, suspension arrangement, vibration isolation/riding comfort, transmission of vertical load, tractive and braking force.

10. a) What are the classifications of wagon maintenance depot for examination of freight trains? Which category Depot is specified for Premium CC rake for PME to run 6000 KM distance of 30 days whichever is earlier before its next PME.

b) Draw a layout diagram of a PME Depot for maintenance of 5 premium CC rake/day with 8 hours examination time for each rake. Indicate the facilities, M&P and manpower required for the PME of 5 rake/day. What is the percentage of brake power specified for premium CC rake?

11. a) What is the use of type detect gauge? Explain with sketch. What is the permissible limit for flat tyres for coaching wheel?

b) Explain the following defects of wheels

i) Shattered rim

ii) Shelled tread

iii) Thermal crack

12. Write short notes on any five

i) Wheel distance gauge and permissible tolerance on gauge of coaching wheel

ii) Enhanced draw gear and screw coupling of ICF/RCF coaches

iii) AAR type CBC of BG wagons

iv) Effect on BOXN wagons due to enhanced load of CC+8+2 tonnes

v) Train parting and its prevention

vi) Single car Test rig

vii) BOST wagons

viii) Casnub Bogie

13. a) Why POH of coaches is done and what is periodicity of POH of PCB's? What time allowance is permitted for marking return date after POH of PCV's?

b) Describe with schematic layout diagram for various POH activities undertaken starting from incoming examination for POH till outgoing examination after POH and final dispatch.

c) What quality control measures are taken at various stages to ensure safety and reliability of off POH coaches?

14. a) What is the speed potential of high speed coaches used in Rajdhani Express? How riding comfort is achieved in coaches carrying passengers?

b) Draw a schematic layout diagram of a standard bogie shop. Describe various stages of repair and stage inspection/testing of bogie components to ensure quality and reliability. Describe the bogie frame alignment procedure/checks before assembly.

15. a) What are the advantages of Bogie mounted brake system over conventional air brake system?

b) Describe the conversion process of vacuum brake system to bogie mounted air brake system. What check/stage inspection are done to ensure quality and reliability of brake system?

16. a) Why incentive scheme is introduced in workshop?

b) What are the salient features of the Tirupati Workshop type incentive scheme?

What are the benefits to workers and management as compared to CLW pattern of incentive scheme? What panel provision has been provided to safeguard against poor quality and delay in POH?

17. a) Why ISO 9001-2000 and ISO 14000 required to be introduced in Workshop and open lines?

b) Describe the following as used in ISO 9001-2000 system

i) Quality policy and objectives of MCSW

ii) Internal Audit

iii) Surveillance audit

iv) Controlled Document

v) Quality Manual

18. a) Write short notes on any five

i) Factory Act & its salient features

ii) Painting Schedule of coaches

iii) CO2 welding

iv) Phosphating

v) Non-stock local purchase

vi) Shearing Machine

vii) NTR examination

viii) POH of Roller bearing

19. a) Why preventive maintenance of Diesel Locomotive is required? What revised schedules are followed now and what are their periodicity? What advantage are achieved now as against the earlier schedules?

b) 100 locomotives are required to be based in a Diesel Shed. Draw a layout diagram of Diesel loco maintenance shed for homing above locomotives. Describe various facilities required in respect of following.

i) Pit lines

ii) M&P

iii) Manpower as per benchmark

iv) Work benches

20. a) Why load box test is required in a Diesel loco-shed and when it is done?

b) Describe the method for conducting load box test. Calculate the Horsepower developed and improvement needed to achieve specified horsepower if load box result shows less.

21. a) What is golden hour rule concept for disaster manager in Indian Railways?

b) What is the composition of A-class ART and Break down Crane.

c) Describe the various modern equipment/tools provided for rescue and relief operation in a 3 coach SPART comprising of a medical van, a tool van and supervisor/staff van.

22. a) Why crew review for goods and coaching train operation is conducted? What 10 points criteria of Railway Board is followed for categorization of Crew into A, B & C? Who is responsible for monitoring performance and categorization of crew?

b) What is stalling? What steps should be taken to prevent stalling?

c) How the calculation of Kilometers to be paid to the crew is made for passengers train for the following:

i) Duty hours upto 4 hours

ii) 4 hours and above but less than 5 hrs

iii) 5 hours and above

23 a) Explain with sketch the working principle of 4 stroke Diesel cycle engine for the following stroke.

i) Suction, ii) Compression, iii) Expansion, iv) Exhaust

b) Draw the theoretical pressure volume (p-v) diagram of a four stroke Diesel cycle

c) The following data is given. Derive the formula to be used for calculation of (i) work done and (ii) indicated Horse Power (IHP) of a 4 stroke Diesel Engine with one cylinder

p_m = Indicated mean effective pressure in bar

A = Area of the piston (meter)²

L = Length of stroke, meter

N = Speed of engine, RPM

K = 1/2 for four stroke engine

24. Write short notes on any five

i) GDR check of BPC

ii) Failure of Engine/power assembly & system improvement action plan

iii) Explosive power guard

iv) Quality control of HSD oil

v) Summer precaution of diesel locomotive

vi) Improvement to running Room as per Rg room improvement committee

vii) 10 hour duty implementation

viii) Fire safety measure implementation in Diesel Locomotive

25. a) Why the official language of our country and how it is helping our country's integration?

b) What items are to be complied under Section 3(3) under this Act?

c) East Coast Railway HQ comes under which region as per classification under official language act and what are various incentives provided for more and more use of official language in our official work?

26. a) What is different between budgeting and zero based budgeting?

b) Describe various Budgeting process to be followed starting from August review Estimate till Final Modification Estimate is submitted. How budgeting helps in controlling expenditure?

27. a) What are the classification of penalties under D&A rules and indicate the various penalties under these classifications?

b) Who is the appointing Authority? Is appointing Authority constant or variable?

c) Under which classification of penalty, dismissal from service can be imposed?

Can an employee be qualified for future employment under the Government or Railway Administration after dismissal? Describe the various steps to be followed under D&A rules for imposing the penalty of dismissal.

28. a) Is Diesel Loco shed coming under the provision of Factory Act or HOER?

b) Accordingly indicate how the duty hours of Railway employees, their provision of rest period, overtime and welfare measures are regulated for Diesel Loco Shed employees?

29. Write shorts notes on any three

i) Right to Information Act

ii) PNM

iii) Staff Benefit Fund

iv) PTO under Pass rules

v) ISO 9001-2000

vi) Commuted Leave

30. State what these abbreviation stand for

i) DMW

ii) CLW

iii) JCM

iv) WHO

v) RDSO

vi) NDT

vii) IRCON

viii) UNESCO

ix) EMU

x) CRIS

xi) COFMOW

xii) CRPF

xiii) WWW

xiv) IT

xv) SERSA

31.a) Describe various revised preventive maintenance schedules followed now for maintenance of Diesel Locomotive in maintenance Shed. What is the revised periodicity of POH of WDG3 Locomotive? How revised periodicity of locomotive maintenance schedule is helping for better utilization of Diesel Locomotive?

b) What percentage of berthing capacity of a(100) Locomotive Diesel Shed should be adopted for calculating berthing capacity? Draw a layout diagram for homing 100 Locomotive and describe various facilities required for the following:

i) Pit lines

ii) M&P

iii) Work benches

iv) Man power as per bench mark

32. a) What is load factor of a Diesel hauled train? What different methods are adopted for load factor calculation? What is the permissible load factor for a diesel hauled train? If the load factor exceeds the prescribed limit, what effect it would have

on performance of a Diesel Locomotive?

b) What is explosive and non-explosive power ground? What steps for repair/maintenance should be followed for WDG3 locomotive to prevent such power ground cases?

c) Describe the various maintenance attention given to the Traction motor of WDG3 Locomotive during M24 schedule.

33. a) What is the difference between a petrol engine and diesel engine? Explain with sketch the working principle of a 4-stroke diesel cycle engine and draw the pressure volume (P-V) diagram of a 4-stroke Diesel cycle.

b) Describe the various maintenance and testing done to the governor of WDG3 locomotive during M24 & M48 schedules.

34. a) What is 10 hour duty rules for running staff under HOER? What are goods and coaching crew review? Why it is conducted and what are the periods prescribed for such review?

b) What is 3 coach SPART as based at Divisional HQ of ECoR? For what purposes 3 coach SPART are used? What are the various equipments/facilities provided in 3 coach SPART for attending disasters in case of a coaching train accident? How it helps in complying Golden Hours Rule concept?

35. Write short notes on any five

i) Load Box Test

ii) System improvement action plan for improving reliability of diesel locomotive

iii) Standing gear

iv) Flasher light

v) Lubricating Oil Testing by spectro-meter

vi) Speed Recorder

vii) Torque wrench

viii) Air brake of WDG3 locomotive

36. a) What is running room? Who are supposed to use the facilities of a running room? Describe various improvements as suggested by Running Room improvement committee for improving the condition of running rooms.

b) What is crew lobby/crew booking point? What checks are conducted before the running staff (Loco Pilot & Asstt. Loco Pilot) are allowed for running duty? What registers are maintained at crew booking point and what are their uses?

37. Give full form of the followings

i) UNESCO ii) UNDP iii) BSNL

iv) MIS v) CNC Machine vi) HRD

vii) CD viii) RCF

ix) HOER x) ODC xi) RAM

xii) IRFC xiii) RITES xiv) SRSF xv) HDD

38. Write short notes on any three

a) Spread sheet'

b) How to send and receive E-mail

c) Service Tax

d) Engineering Service Exam

e) Role of United Nations

f) Constitution of India

39. a) What for bar charts and pie charts are used. Explain with examples.

b) Calculate volume of a cone with diameter of base as 1 meter and height of 2 meters.

40. What is Section 3(3) of the Rajbhasa Adhiniyam? What are mandatory and non-mandatory provisions in the adhiniyam?

41. Write short notes on any four

i) Case hardening ii) Phosphating

iii) Shot peening iv) Magnaflux testing

v) Zyglo testing vi) Worn wheel profile

vii) Load factor viii) Power Ground

42. Write short notes on any two

- a) Supercharging of diesel engines
- b) Otto cycle with diagram
- c) DC motors
- d) PERT

43. a) How horse power of diesel engines is calculated?

b) For a single cylinder engine with 1000 lbs/sq. inch mean effective pressure, 8" piston stroke, 6" diameter of cylinder and running at a speed of 600 cycle/minute, calculate the horse power.

44. Write short notes on any four

- a) Yield strength
- b) Stress relieving
- c) Oil quenching
- d) Iron Carbon diagram
- e) Hoop stress
- f) Naturally aspirated vrs supercharged diesel engine

45. Give the layout of diesel shed to maintain 100 locos. Indicate the facilities required and staff required as per yardstick.

46. Write short notes on any four of the following

- a) Quality Assurance and how is it achieved?
- b) Surface Finish, how is it measured? Its importance in fatigue life.
- c) MIG/TIG welding
- d) Corrosion, what causes it and its effects on maintenance practices.
- e) Importance of lubrication.

47. Write short notes on any four

- a) Lathe machines
- b) Milling machines
- c) Cutting fluids
- d) at treatment of steel
- e) Hardness of materials and how is it checked
- f) Types of roller bearing failures
- g) Preventive maintenance of M&P

48. Make layout of a ROH depot for BOXN for 250 wagons/month. Indicate the facilities and staff required.

49. Write short notes on any four

- i) Leadership qualities
- ii) Role of Personnel Officer in divisions/workshop
- iii) Industrial Dispute Act
- iv) JCM
- v) Role of Audit
- vi) Staff Benefit Fund
- vii) Duties of principle Employer
- viii) Factories Act

50. a) Explain in detail the procedure to be adopted for imposition of a Major penalty.

b) How are workers classified in different categories under HOER? Explain in detail.

51. Write short notes on any five

- a) Audit Special Letter
- b) Draft Paragraph
- c) Cannons of Financial property
- d) Schedule of Powers
- e) August Review
- f) Demand for Grants
- g) Accounts Stock Verification Sheets
- h) Objectionable Expenditure

52. How is control over expenditure exercised on the Indian Railways? What are the different stages of budget formulations? Give time schedule for each stage.

53. Write notes on any five

- i) Maintenance of DVs
- ii) High tensile CBC Coupler
- iii) Riding index of passenger coach
- iv) USFD for wagon axles
- v) Auto switching ON, Flasher Light
- vi) Stalling of Trains
- vii) Electronic Governor
- viii) Explosive Power Groun

54. You are called upon to attend a serious passenger train accident in which a number of coaches have got derailed/capsized. There seems to be some causalities as well. You are the first officer to reach the sight of accident. Please detail out in chronological order the actions that will be taken by you on reaching the site of accident.

55. Explain the working of air brakes on a passenger coach with schematic sketches describing the functions of each component.

56. What are the causes for train parting and how would you remedy them?

57. Describe with neat sketch the functioning of a slack adjuster for BOXN Wagon and the critical dimensions that are to be ensure for its proper functioning.

58. Describe the features of closed circuit rakes for freight trains. What are the advantages and disadvantages? How is the correctness of brake power certificate checked?

59. Describe the procedure for overhauling of roller bearing and axle box of ICF coaches and precautions taken for assembly.

60. How are crew requirements worked out? Illustrate with examples.

61. What are the causes of drivers passing signal at danger? What remedies do you suggest?

62. Name the important areas that have to be attended to in order to minimize lube oil consumption on WDM2 Locomotives.

63. How will you attend to the following on lines.

- i) Radiator Fan not working
- ii) Engine shutting down automatically without any indication
- iii) Engine shutting down with Hot Engine Alarm
- iv) Continuous Wheel Slip on all notches
- v) Fuel Oil pressure not building up
- vi) Engine over speeding and shutting down without any indication
- vii) Vacuum not being created
- viii) MR Pressure not building up
- ix) Independent brake not releasing
- x) Excessive first notch current and locomotive giving jerk

64. What is T034 HF statement? List some important statistics that are derived from this statement and their effect on the performance of Railways.

65. What are the components required to be replaced 100% during POH of WDM2 locomotives? Name the components which are replaced on condition basis.

66. How are the causes of diesel loco failures classified? What is meant by 'Statistical Failure'? How will you bring down failures on account of Bad Workmanship in Shed?

67. Describe the procedure for testing air brake system of a full rake, a single coach and individual assembly.

68. Write notes on any four:

- i) Mandatory Training Courses for Running Staff
- ii) Engine Links and Crew Links
- iii) Calculating Running staff requirement
- iv) Principles of Crew Booking
- v) Testing of springs in shops
- vi) Testing of paints
- vii) Treatments for inhibiting corrosion
- viii) Types of electrical insulation
- ix) Dye penetrant test
- x) Workshop Manufacturing Suspense