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QUESTION BANK FOR SELECTION TO THE POST OF JUNIOR ENGINEER (AC)

**GRADE - II IN PB: Rs. 9300 - Rs. 34800 WITH GRADE PAY Rs. 4200/-
AGAINST LDCE QUOTA IN ELECTRICAL (GS) DEPARTMENT ON SC
DIVISION.**

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Note: This Question Bank is only indicative in nature but not exhaustive.

Sr DEE/M/SC

- 1) Size of V belts used for 25KW Alternator (c)
a. C121 c. C122
b. C123 d. C124
- 2) Capacity of battery fuse in AC Coaches (a)
a. 315 A & 400 (HRC) c. 16 A (HRC)
b. 63 A (HRC) d. 5 A (HRC)
- 3) The gap between the two halves of axle pulley should be (c)
a. 0.5 – 1.0 mm c. 3.0 – 4.0 mm
b. 2.0 – 3.0 mm d. 5.0 – 5.5 mm
- 4) What are the AH capacity of cells used in all types of AC coaches (b)
a. 800 Ah Lead Acid & 1100 Ah VRLA c. 1100 Ah
b. 800 & 1100 Ah Lead Acid & 1100 Ah VRLA d. 800 Ah
- 5) Name the Acid used in lead acid cells (a)
a. Sulphuric Acid c. Nitric acid
b. Hydrochloric Acid d. Phosphoric Acid
- 6) The Specific gravity & Voltage of fully charged cells are (a)
a. 1220 & 2.2 a. 1200 & 2.2
b. 1220 & 2.1 b. 1200 & 2.1
- 7) Cut in speed for brushless alternator in AC application (b)
a. 21 c. 19
b. 20 d. 18
- 8) Inverter converts (a)
a. DC to AC c. AC to AC
b. DC to DC d. AC to DC
- 9) IGBT are used as (a)
a. High frequency switching device c. Low frequency switching device
b. Illuminating device d. Amplifier
- 10) Boost charge of VRLA cells is (a)
a. 2.3 V/Cell c. 2.25 V/Cell
b. 110 V/Cell d. 115 V/Cell
- 11) Trickle charging of VRLA cells is (c)
a. 2.3 V/Cell c. 2.25 V/Cell
b. 110 V/Cell d. 115 V/Cell
- 12) Rectifier converts (b)
a. DC to AC c. AC to AC
b. AC to DC d. DC to DC
- 13) Give the half load setting of RRU for AC application at 1500 rpm (a)
a. 97 Amps c. 21 Amps
b. 20 Amps d. 22 Amps
- 14) Required level of Illumination in corridor of 2-Tier AC coach is (c)
a. 14 Lux c. 40 Lux
b. 22 Lux d. 16 Lux

- 26 PG : Performance Guarantee
27 CRI : Colour rendering Index
28 EEPROM : Electrically Erasable Programmable Read Only Memory
29 RDSO : Research Design & Specification Organization
30 PPCP : Poly Propylene Co-Polymer

II. **FILL IN THE BLANKS:**

- 1) The process of removing heat from low temperature level and rejecting at high temperature is called. **REFRIGERATION.**
- 2) Any substances for change of its state at constant temperature absorbs/give up heat is called **LATENT HEAT.**
- 3) The sum of sensible heat and latent heat of substance in process is called **ENTHALPY.**
- 4) The latent heat of fusing ice is **144 BTU/LB.**
- 5) The unit of refrigeration is **TON OF REFREGIRATION – 12000 Btu/Hr or 3023.98 K.Cal/Hr.**
- 6) The temperature measured by ordinary thermometer is called **SENSIBLE HEAT.**
- 7) What is the boiling point of water **100 °C.**
- 8) AT what temperature water starts freezing **0 °C.**
- 9) One watt is **3.412 BTU.**
- 10) One BTU is **0.252 K.calaries.**
- 11) The unit of heat is **BTU OR K.CAL**
- 12) RMPU means **ROOF MOUNTED PACKAGE UNIT**
- 13) The setting of HP cutout in RMPU coaches is **415 psi.**
- 14) The setting of LP cutout in under slung coaches is **35 psi.**
- 15) The boiling point of refrigerant R22 **-40.8 °C.**
- 16) The boiling point of refrigerant R12. **-29.8 °C.**
- 17) Artificial respiration is required to the person met with **electrical** accident.
- 18) R12 is being replaced with **R-134a** in latest Refrigeration system.
- 19) The latent heat of evaporation **IS THE HEAT REQUIRED TO CHANGE THE LIQUID INTO VAPOUR.**
- 20) The temperature maintained in the refrigerator is LESS than **0 °C.**
- 21) The dry bulb and wet bulb temperatures equals then the **RH** is 100%
- 22) The moisture absorption in refrigeration circuit is done by **DEHYDRATOR CUM FILTER.**
- 23) The commonly used refrigerants are **R 12 & R 22**
- 24) The lubrication of system in the sealed compressors is done by **FREEZOL**
- 25) The 3-phase voltage unbalance in supply should not exceed **2.5. % To 5%**
- 26) For maintaining power supply quality the rate of change of frequency should not exceed. **1 HZ/Sec.**
- 27) The voltage of 11 KV supply is **11000V**
- 28) Tender Notice is to be published for. **Open tender**
- 29) **Copper** is the good conductor of electricity.
- 30) Completion estimate is not **required** for calling tender.
- 31) **Contingencies** charges mean Transportation charges.
- 32) Detailed estimate is to be prepared for **sanctioned** works.
- 33) Detailed estimate needs **sanction** of HOD.

- 34) The fire extinguisher used for Electrical fire is **CO2**
- 35) Fire is the combination of **material** and **temperature & Oxygen**.
- 36) **B** Type of fire extinguisher used to nullify the oil fires.
- 37) Electric type of fire is clarified as **D** type.
- 38) CO2 type fire extinguisher is used for **electrical** fires.
- 39) Ordinary fire can be extinguished by **water**.
- 40) **RUBBER HAND GLOVES** are to be used while operating isolator handle in substations.
- 41) Ordinary fire can be extinguished by **WATER OR SAND**.
- 42) Artificial respiration is required to the person met with **ELECTRICAL** accident.
- 43) Abbreviation for IOD is **INJURED ON DUTY**
- 44) The accident causes with loss of human life is called **fatal** accident.
- 45) If a man touches a live wire, he gets **shock/electrocuted**.
- 46) CTC type extinguisher is used for **ELECTRICAL** fire.
- 47) If a transformer catches fire **FOAM** type of fire.
- 48) The fire extinguisher used for Electrical fire is **CO2 TYPE**.
- 49) Fire is the combination of **Material, temperature and oxygen**.
- 50) **B** type of fire extinguisher used to nullify the oil fires.
- 51) Electric type of fire is clarified as D type.
- 52) CO2 type fire extinguisher is used for **ELECTRICAL** fires.
- 53) Soda ash type fire extinguisher is used for **GENERAL** fires.
- 54) **CTC OR FOAM** type of fire extinguishers will be used to extinguisher chemical fires.
- 55) **Axle Driven** system working on 110 V DC supply.

III. **INDICATE TRUE OR FALSE TO THE FOLLOWING :**

- 1) Without EMD the tender offer is valid. **False**
- 2) Amps is the unit of current **True**
- 3) Tinned copper conductor of 14SWG is used as earth continuity wire in the Internal Wiring system. **True**
- 4) Wood is the bad conductor of electricity. **True**
- 5) Oil is used as a insulation in the power transformers. **False**
- 6) The minimum capacity of power transformer on electrical General Services is 100KVA **True**
- 7) Finance vetting is required, if the cost of NS item exceeds Rs. 50,000/- while Procuring through COS. **True**
- 8) The open tenders are to be opened in presence of Accounts Officer. **True**
- 9) The codal life of VLRA batteries is 04 years. **True**
- 10) If a cell voltage is found less than 1.9 Volts, it should be weed out. **False**
- 11) The SPG of sulphuric acid which is used to make electrolyte is 1.835. **True**
- 12) The L1, L2 and Fan Circuit fuse rating is 16 A in Roof Junction Box. **True**
- 13) The bulk inverter capacity in AC 2 tier for cell phone charging is 6KVA. **False**
- 14) Single-phase preventer should be used to protect the motor from single phasing. **True**
- 15) The minimum safe value of insulation resistance of motor is 20 MΩ. **False**
- 16) Multi meter is used to measure insulation resistance and megger is used to measure the winding resistance of the motor. **False**
- 17) If a motor is getting unduly hot, the reason may be overloaded or bearing may be defective. **True**

- 20) Compressor works like a pump by drawing refrigerant vapor from the evaporator and sends to condenser. **True**
- 21) The change of liquid state into vapour state is called condensation. **False**
- 22) OL is provided to trip the condenser motor incase of over voltage and single phasing. **False**
- 23) Dew point is the temperature of air at which the moisture present in air starts condensing. **True**
- 24) The purpose of contactor provided in the control panel of RMPU is to switch ON supply to condenser motors. **True**
- 25) The purpose of TDR 1 provided in control panel of RMPU to delay compressor II operation for 2 minutes. **False**

IV. SHORT ANSWER TYPE QUESTIONS:

1) What are the main components of Lead Acid

Cell? Ans. Main Components of Lead Acid Cells are:

- a) Positive Plates which are tubular in shape made of PbO_2 .
- b) Negative Plates usually consists of a lead grid into which active material of Sponge lead is pressed.
- c) Separators, which are made by Synthetic used between +ve and –ve plates.
- d) Container is made of hard rubber or PPCP with high insulating strength to resist acids which are used as Electrolyte.
- e) Cell covers which covers container having vent plugs and level indicator.

2) What is meant by SMF batteries?

Ans. To overcome problems of frequent Topping up and Leakage of Electrolyte. Sealed maintenance free batteries are developed Electrolyte in these batteries is in immobilized form and these can be used in any position that is horizontal or vertical.

3) What is significance of Green and Red mark of the float guide of Lead Acid cells? Ans.

The float stem will have markings to indicate the lowest in red and highest in green of permissible electrolyte levels. It should be ensured that the electrolyte level is maintained in service by adding pure distilled / dematerialized water.

4) What are the equipments available in PELE box and when they are utilized?

Ans. The equipments available in PELE box are:

01	TRIPOD STAND	05	BULBS
02	HOLDER	06	HAND LAMP
03	FLEXIBLE WIRE 25 METERS	07	LOG BOOK
04	CROCODILE CLIPS	08	LAMP FITTINGS

These are used in emergency conditions train service. This box is kept in the Guard Compartment.

5) What are the safety checks in under gear in AC Coaches?

Ans: Alternator safety chains, Suspension pin with anti- rotation plate,

suspension pin with nylon bushes, Alternator pulleys, Axle pulley with bolts condition of battery box channels, nuts & bolts, WRA, Under Slung Inverter suspension arrangements and split pins of all under gear electrical suspension equipments.

6) How do check Pulleys of Axle & Alternator?

Ans: Axle pulleys nuts and bolts with split pins, condition of grooves, and gap between two halves of the axle pulleys. Alternator pulley castle nut with split pin.

7) What are the reasons for V-Belt dropping?

Ans: The reasons for V-belt dropping are may be due to locking of barrel bush, locking of alternator safety chains, misalignments of axle pulleys, Alternator bearing jam and due to cattle run over.

8) What are the schedule attentions on Lead Acid Batteries in FNE schedule?

Ans: Cleaning of ICC, topping up of distilled water, applying of petroleum jelly on terminals ports. Checking of SPG. Providing charging. Checking of ON load and OFF load voltage of individual cells and group.

9) What is meant by Specific Gravity in Cells & its significance?

Ans: SPG is the ratio of the density of electrolyte to the density of water fully charged lead acid cell will have a SPG of 1.250 and fully discharge cell 1.150.

10) What are the various defects noticed in Cells?

Ans: Open circuit, short circuits, container leakage, reverse polarity, low SPG and voltage.

11) What is the gap between the Mounting Bracket to adjustment nut in Tension device & how to adjust?

Ans: The gap between the Mounting Bracket to adjustment nut in Tension device is 75 mm & it can be adjusted by opening check nut and adjusting barrel bush.

12) Why earthing is necessary for any electrical equipments, domestic installation & service building etc?

Ans: To drain away any leakage of currents due to poor insulation and to save human life from dangerous shock and also to avoid burnt of electrical equipment.

13) What is the procedure for using Fire extinguisher?

Ans: a) Pull the pin at the top of the extinguisher.
b) Aim the nozzle towards the base of the fire.
c) Stand approximately 8 feet away from the fire and squeeze the handle to discharge the extinguisher.
d) Sweep the nozzle back and forth at the base of the fire.

14) Classification of low tension and high- tension lines with respect to voltages?

Ans: a) Low Voltage Lines = Less than 250V b) Medium Voltage Lines = 250 V to 650V c) High Voltage Lines = 650V to 33 KV d) Extra High Voltage Lines = Above 33 KV

15) Write down types of motors?

AC motors - single- & three phase AC motors
DC motors - Shunt motors, Series motors & Compound motors.

16) How do you change the direction of rotation of a D.C. motor?

Ans: The direction of rotation of DC motor can be changed either by changing the field winding connections or by changing the armature winding connection.

17) Write down the cause of sparking at the brushes of a DC Motor?

Ans: Sparking at the brushes may occur due to poor quality of carbon brushes, poor armature, loose connection of carbon brush holder and loose spring tension.

18) How do you change the direction of rotation of 1 ϕ AC motor & 3 ϕ AC motor?

Ans: The direction of rotation of single-phase AC motor is changed by changing the capacitor connections from starting winding to running winding and vice versa. The direction of rotation of three-phase AC motor is changed by changing the phase sequence of three-phase supply.

19) If a single phase motor fails to start or run slow what action to be taken?

Ans: If it is not starting check the supply and test the winding if it found normal check capacitor.

20) Will a three-phase motor continue to run even if the fuse on one-phase is blown?

Ans: Yes it will be run but the motor will be getting heated up and chances of motor winding may be burnt.

21) Draw the tube light circuit diagram?

22) (a) Define Ohms Law?

Ans. Temperature remaining constant the flow of current is directly proportional to applied Voltage.

$$I \propto V, \quad I = V/R \text{ (resistance of the conductor)}$$

(b) Define Kirchoff's Voltage Law?

Ans. It states, "The sum of the Voltage drops around a DC series circuit equals the source or applied voltage.

$$E = E_1 + E_2 = E_3.$$

(c) Define Kirchoff's Current Law?

Ans. It states " the current flowing toward a point in a circuit must equal to the current flowing away from that point.

$$I = I_1 + I_2 + I_3.$$

(d) State Faraday's laws of electromagnetic induction?

Ans. **First Law:** Whenever the flux linked with a circuit is changed an e.m.f. is induced in the circuit

Second Law: The magnitude of the induced e.m.f is equal to the rate of change of flux linkages.

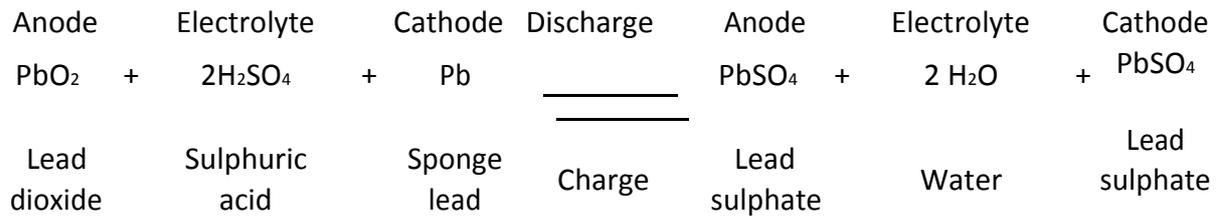
(e) What are the fundamental laws of Thermodynamics? Ans:

- (i) Energy can neither be created nor destroyed, the total energy associated with an energy conversion remains constant.

- (ii) Heat will not flow up a temperature hill unless energy is supplied to force it to do so.

23) Give the charge and discharge reaction of the lead acid battery?

Ans.



24) What is Refrigerator and what is the effect of water in the refrigerant?

Ans: The Substance which absorbs heat at low temperature and pressure and leaves heat at high temperature and pressure is called Refrigerator. On mixing of refrigerant into the water ice starts freezing, especially ice freezes on the expansion valve.

25) How do you identify a defective HRC fuse?

Ans. A HRC fuse in good condition connected on both sides with positive & negative probe terminals of multi meter in continuity mode gives a beep sound.

26) What is the difference between SG TL coaches and LHB TL coaches?

Ans:

Sl.No	Item description	SG TL Coach	LHB TL Coach
1	Coach load distribution	From Roof junction Box	Power panel
2	Fuse distribution board	Available	Integrated in the power panel
3	Fans	DC fans	AC fans (2.5 KVA 110 V Dc/AC inverters- 2 no's)
4	Pantry car	Single alternator, single set of battery	Two alternators, Double set of Battery

27) (a) What is meant by specific heat?

Ans: The heat required to raise the temperature of unit mass of a substance by unit degree as compared to that required by water is the specific heat of that substance.

(b) What is meant by sensible heat?

Ans. It is that heat which when applied to a body, results in a rise of its temperature. It is the heat which is sensed by a thermometer.

(c) What is meant by latent heat?

Ans. It is that heat which when applied merely changes the state of substance, whether solid, liquid or, gas, without causing any change in its temperature.

(d) What is difference between dry bulb and Wet bulb?

Ans. Dry bulb is the temperature of air as measured by an ordinary thermometer whereas wet bulb temperature is the temperature measured by an ordinary thermometer, whose glass bulb is covered by a thin cotton sleeve soaked in water.

(e) What is difference between humidity and relative humidity

Ans. Humidity is the amount of water vapour present in the air whereas Relative Humidity is the ratio of the actual amount of water vapour contained to the maximum amount required for saturation and is expressed as a percentage.

28) Why a false ceiling is specified for air conditioning rooms. Is it necessary and what benefit does it confer?

Ans By providing false ceiling the height of the room is lowered so less heat gain due to conduction due to lesser area of side walls. and also heat gain due to solar radiation is reduced. For false ceiling, thermal insulating material is used so that the transfer of heat is reduced from outside to inside of AC room.

29) What will happen if the AC plant capacity is insufficient for load?

Ans. If the AC plant is insufficient for the load the desired temperature will not be attained in the room. The AC plant will run continuously under vapor pressure rises considerably overloading the compressor. The condensation of the refrigerant will not takes place in the condenser.

30) What are the safety items to be inspected on battery?

Ans: Safety items to be checked on battery are full complements of battery box fixing bolts and its tightness, observation of its bottom plate and side plates for damage, full tightness of cell packing, proper securement of anti theft arrangement and battery box cover, full tightness of inter cell connections with double fasteners, correct size of battery fuse, elimination of earth leakage and maintenance of correct polarity, e.t.c,

31) What are the safety items to be inspected on Rotary Junction Box?

Ans: Safety items to be checked on rotary junction box are full tightness of all terminals connections, provision of correct size of HRC fuses, maintaining correct polarity of incoming and outgoing cables, avoiding earthing and shorting of cables.

32) What are the safety items to be inspected on wiring?

Ans: Safety items to be checked on wiring are securing of wiring through cleats with trough

casing, provision of correct size of fuses in wiring circuits, elimination of lower size cables, provision of PVC bushes when ever wires passing through metal parts, eliminations of temporary wiring, avoiding of earthing and shorting of cables etc.

33) What is the purpose of OHP used in RMPU coaches?

Ans: It is overheating protection bimetallic switch for heaters, two OHPs are provided for one RMPU. The purpose is to trip the heater circuit when the temperature of the heater exceeds 200°C.

34) Describe how a domestic refrigerator operates?

Ans: Domestic Refrigerator operates on the vapor compression system having hermetically sealed compressor mounted at the base of the cabinet. Refrigerant used is R-22 or 134A. Expansion valve used is capillary tube. The evaporator piping is fastened round and brazed to the freezer box. The condenser tube is placed over a single metal sheet for dissipation of heat. The top space is freezer unit and the rest of the cabinet interior gets cooled by convection currents of air set up by freezer unit. The compressor unit starts and stops automatically under the control of an adjustable thermostat which in turn operates a relay.

35) What is to be done against a complaint, that plant is not cooling the room sufficiently?

Ans: Check the HP and LP pressures of the plant. Check for frosting of the evaporator. If the pressures are lower than normal, Charge the gas. In case of high HP, check for the proper working of condenser cooling system. Check for the blockage of the expansion valve. Check the condition of the Mercury thermostats and automatic triggering circuit.

36) What is the necessity to provide Electronic Thermostats in AC coaches?

Ans: Presently mercury-in-glass thermostats are being used on AC coaches to control the temperature inside the compartment. Due to advancement of technology in solid state devices and air conditioning equipment, firms to repute are not manufacturing the reliable and accurate conventional type mercury in glass thermostats. To provide reliable and comfortable services to the passengers it is considered essential to provide accurate and reliable solid state temperature controller in the AC coaches.

37) What is the purpose of oil pressure cutout (22) provided in the control panel of under slung AC coach?

Ans: Oil pressure cut out switch (22) protects the compressor against lubrication failure either due to lesser oil pump failure or blocking of oil piping and acts in conjunction with thermal cut-out (21) to shut down the compressor only if the low oil pressure persists.

38) What is the purpose of low pressure cutout (19) provided in the control panel of under slung AC coach?

Ans: Low pressure cut-out (19) is a pressure switch to protect against working of compressor with low suction pressure due to loss of refrigerant gas or other reasons. This switch has been connected by means of copper piping to the suction header of the compressor.

39) What is the purpose of high pressure cutout (20) provided in the control panel of under slung AC coach?

Ans: High pressure cut-out (20) a pressure switch to shut down the compressor when compressor discharge pressure is too high. This switch has been connected to the compressor discharge header by means of copper piping.

40) What is the purpose of Time delay relays (56) and (57) provided in the control panel of under slung AC coach?

Ans: Controls the closing of contactor (13) and (13a) with a preset time, so that the starting resistances are bypassed in steps causing a smooth acceleration of the compressor motor.

41) What is fire and how it occurs?

Ans: Fire is the combination of Material, Temperature and Oxygen. When the above three substances comes into contact in sufficient quantity, combustion takes place followed by flame and smoke which is called Fire.

42) How many types of fires? How to operate a fire extinguisher and how many types of fire extinguishers are there?

A type	:	General fires such as solid materials, cotton, wood etc.,
B type	:	Oil fires such as Liquid materials, oil, grease etc.
C type	:	Chemical fires such as fires in gasses
D type	:	Electrical fires such as metallic, electrical etc.,

- Isolate the coach electrically
- Electrically switch off the load
- Removal of the battery fuse

- Removal of alternator belt
- Extinguish the fire with CTC/CO2 type fire extinguishers

There are four types of fire extinguishers, they are:

- A class Soda ash cartridges, water buckets, chemical foam, Halon gasses etc.,
- B class: Chemical foam, Dry powder, carbon dioxide Halon gas
- C class: Dry chemical powder, carbon dioxide, Halon gas
- D class: Halon gas, Dry chemical powder, carbon dioxide.

43) Explain Regulators settings for various capacities?

S.No	Capacity	Setting
1	25 KW	126V +/- 0.5V DC Super fast trains 127V +/- 0.5V DC Exp/Mail trains 128V +/- 0.5V DC-Passenger trains
2	18 KW	129V DC-Exp/Mail trains 131V DC-Passenger trains
3	4.5 KW	124V (121+/- 0.5 V for VRLA) Super fast trains 124V (123+/- 0.5 V for VRLA) DC-Exp/Mail trains 127V (124+/- 0.5 V for VRLA)DC-Passenger trains

44) Give the distance between Axle pulley and Wheel hub of the TL/AC axle pulley.

Ans:

S.No	Capacity	Distance between Axle pulley and Wheel hub
1	25 KW	225mm
2	18 KW	240mm
3	4.5 KW	145mm

45) Explain the procedure for adjustment of engine speed after starting the engine in EOG power car?

Ans: Watch the frequency meter. Adjust the speed by 'RISE' or 'LOWER' push buttons until the frequency meter reads 50 Hz. Here, the speed of the Engine is controlled by controlling the fuel flow into the Engine by means of a throttle motor.

46) What is the procedure for final testing and commissioning of a new AC plant package system?

Ans:

- Visual inspection of the coach proper fitment of equipments
- Ensure the refrigerant pipes are properly clamped
- Suction pipe for proper lagging
- Check control panel and ensure that proper fuses are provided
- Check contactors, relay and switches for correct sequential operations
- Ensure the time delay in operation of contactors feeding compressors
- Check heaters for correct operation
- Check hooter for roper operation
- Start the plant and check condenser motor, compressor motor, blower moor for any abnormalities
- Check the current drawn by the motors and compare with its rated current.

47) What are the refrigerants generally used in Air conditioning system. What are the required properties of refrigerant?

Ans: Refrigerant – 12 and 22 are used in under slung conventional AC Coaches. And RMPU AC Coaches respectively.

Recently Railways has introduced use of R-134 A environment friendly refrigerant and some of the RMPU coaches have been converted into R-134 A refrigerant. REQUIRED PROPERTIES:

- (a) The refrigerant shall be non poisonous, non inflammable, non corrosive and non irritating.
- (b) It shall have no harmful effect on the taste, colour or aroma of food and drinking water.
- (c) It shall have low boiling point
- (d) It shall have high latent heat of vaporization
- (e) It shall have low volume per kg. When in gaseous state
- (f) It shall have high coefficient of performance
- (g) Easy detection of refrigerant leakage
- (h) It shall be cheap and readily available in the market.

48) What are the AC system presently being used in coaches and mention the feature of each type and where they are used?

Ans: Two types of AC system are being used Viz., RMPU fitted AC Coaches and Under slung conventional AC Coaches. Both these coaches employed Vapour compression system for refrigeration.

RMPU: 1) This is hermitically sealed system with no fittings or openings and used 3-phase AC Motors. Hence less maintenance

2) Uses Refrigerant R-22 apply 3 kgs.

3) The package is mounted on the roof thus dirt or dust collection in condensers negligible, No chance of damage due to the flash floods, cattle run or flying ballast. UNDERSLUNG: The compressor used is open type which can be easily be attended in case of repairs. The compressor motor and compressor are both separate units. Defective motor will not have any effect on the compressor. The system is easy to understand because of provision of pressure gauges. The refrigerant used is R12 approximately 15 kgs.

49) Explain briefly about diesel alternator set of EOG Power car?

Ans: 2 x 500 KVA, 750 Volts, 3 phase, 50Hz Diesel Alternator sets are provided in each Power Car. The main equipments for the DA sets are Alternator, Power and Control Panel, Radiator & Ventilator fan control panel, 290 AH-24 volts battery charger, change over switch, side panel filter etc., The DA set of the Power Car are controlled by Electronic Governor with 1301 control panel. The microprocessor based controller provided the digital voltage regulation, Engine speed governing, remote start/stop control, Engine protection, Engine parameters display and alternator parameter display.

50) Explain in brief about smoke detector provided in EOG power cars?

Ans:

This is another new feature of the high capacity power car. Each coach kit has the following equipments: -

- i) A two channel control unit with visual indicators for level of smoke, a built-in piezo buzzer and an external socket for connect on of hooters.
- ii) Two smoke detection units-One unit is located in the power control panel itself and the second unit is located in the Engine room above the starter battery. These detectors are connected to the two channels through four core cables-One detector to channel-1 and the other one to channel-2.
- iii) Two hooters – One is located in the crew compartment and the other in the guards' compartment.

The system works on 230 volts AC. Provision is there for working the System on 6 volts DC fed from a motor cycle type battery. The detector detects the smoke emanated either due to short circuit/overheating of the Electrical cables or due to other reasons.

V. ESSAY TYPE QUESTIONS:

1) **What action has to be taken when a compressor is not working?** Ans: (a)

Compressor-1/ 2 over load red indication LED glowing

- (i) Ensure both the condenser motors are working. If not follow the instructions for rectification of condenser motors problem.
- (ii) Check the working condition of RSW5. If it is not working, bypass it. If supply not available, check the continuity of wire No. 48 at outgoing terminal of RSW5 from C2, C3 contactors.
- (iii) Check over load relays (OL-4, OL-5). If
 - (a) They are in tripped condition, check the over load setting (10-14 A) and reset it.
 - (b) OL-4 and OL-5 are found defective; bypass them by shorting 52 with 54 and 63 with 65.
Note: Before bypassing OL-4 and OL-5, ensure 3-ph supply is available at T10, T11, T12 for CP1 and T13, T14, T15 for CP2 terminals of compressors to avoid single phasing and measure the load taken by the compressors in each phase.
- (iv) Check MCB-4 & MCB-5 and ensure supply voltage of 415V AC, 3- ph at outgoing terminals of MCB-4 (352, 353 and 354) of CP-1 and MCB-5 (355, 356, 357) of CP-2. If found defective, bypass it.
- (v) Check the incoming terminals of contactor (C4) (331, 332, 333) of CP-1, contactor (C5) (334, 335, 336) of CP -2 and outgoing terminals of contactor (C4) (310,311,312) of CP-1, contactor (C5) (313, 314, 315) of CP2 respectively. If found defective, bypass the contactors.

(b) HP1 or HP2 red LED glowing

- (i) Check the working condition of the condenser motors as per the procedure.
- (ii) Check the condition of HP1/HP2 cutout switch. If tripped, reset it manually. (Setting 415 PSI)

(c) LP1 or LP2 red LED glowing

- (i) Check the load of respective compressors with clip on meter. If current drawn is less than 6.5 Amps, replenish gas where ever possible.
- (ii) Ensure that return air filters are clean.
- (iii) Check and ensure that all the grills are in open condition.
- (iv) Check the direction of rotation of blower as per the procedure.
- (v) Check LP1 or LP2. If defective, bypass by shorting 29, 31 for LP1 and 35, 37 for LP2.

2) (a) **How do you provide through feeding DC – DC for an AC coach?** Ans:

POWER PANEL TO/FROM AC CONTROL PANEL (U/S TYPE)

- (i) Switch OFF AC plants before extending TC from DC Power Panel to DC Power Panel.
- (ii) Remove 250A Inverter +VE, -VE fuses in the power panel for one of the inverter supply.
- (iii) Extend the DC supply from (2514 or 2513) terminals of power panel of healthy/defective coach to terminals of (B +VE, B -VE) control panel of defective/healthy coach with 2 core 35 sq. mm copper cable as shown in the figures.
- (iv) After ensuring through feeding connections, re-insert the 250A fuses of the inverters in both the healthy and defective coaches.
- (v) Remove the battery fuse of the defective coach.
- (vi) Switch on AC plant by balancing the load on both coaches to avoid over loading of healthy coach Alternators and batteries.

(b) How do you provide through feeding AC – AC for an AC coach? Ans: **THREE**

PHASE AC FEED EXTENSION PROCEDURE - PANEL TO PANEL

- (i) When Inverter is not working due to low battery voltage, extend the TC from the adjacent coach AC control panel
- (ii) Switch off the AC plants and inverters in healthy and failed coaches before extending TC.
- (iii) Disconnect the existing incoming supply cables in AC control panel of the defective coach at terminal block before RSW1 (TB, TY, TR).
- (iv) Extend 3-ph AC supply with 3 core 16 sq.mm copper cable from the AC control panel of healthy coach (TB, TY, TR) to AC control panel of failed coach (TB, TY, TR)
- (v) Check the control supply. If it is taken from sine wave output of inverter, remove the same and extend supply from 2-phase of the bus bar (358, 359) to incoming terminal of MCB-8.
- (vi) After ensuring the connections, switch on the inverter in the healthy coach and check the availability of 3-ph supply as well as control supply in the control panel of failed coach.
- (vii) Switch on blower in the defective coach and check the direction of rotation of blower.
- (viii) If shows air loss indication, interchange any two phase wire in the terminal block (TY, TB and TR).
- (ix) To avoid over loading of inverter, switch on AC plants of both coaches either with one compressor in each AC plant of defective and healthy coach or two compressors in any one AC plant of defective/ healthy coach.

3) How do you provide E.F.T to a TL coach?

Ans: The detailed procedure of emergency feed extension is given as under

(a) Action to be taken in healthy coach

- (i) The availability of power supply in the emergency feed terminal should be ensured.
- (ii) Only one dark coach should be extended feed supply from one healthy coach.
- (iii) Before connecting, the polarity of healthy coach as well as dark coach shall be checked.
- (iv) L-II circuit of the healthy coach shall be switched off before connecting supply to dark coach.
- (v) The rotary switch of (socket paralleling main) SPM-I and II shall be kept in ON position.

(b) Action to be taken in defective coach and feed extension

- (i) L-II and fan circuit of the dark coach shall be switched off before connecting supply from healthy coach.
- (ii) The rotary switch of (socket paralleling main) SPM-I and II shall be kept in ON position.
- (iii) The L-I circuit is having essential/emergency lighting circuit. This includes all lavatory lights 50% of compartment lights, and night lights in all types of IInd class coaches.
- (iv) Remove (+ve) fuse from battery box and (-ve) main fuse from junction box to disconnect the power supply to/from battery.
- (v) The earth fault shall be checked up with the help of testing lamp. If earth fault is there then feed extension should not be done.
- (vi) The feeding shall be given to L-I circuit only of the dark coach from healthy coach.
- (vii) The defective coach shall be attended and cable should be removed at the first available opportunity by TL staff.
- (viii) The size of the cables for the feed extension shall be of 16 sq.mm PVC Aluminum / 2.5 sq.mm elastomeric / 2.5 sq.mm e-beam copper cables.
- (ix) The length of the wire for feed extension shall be 2x1.5 meter (for both terminals). The length of the cable shall not be more than 1.5 meter.
- (x) Both ends of the cable shall be provided with suitable size of lug.
- (xi) The cable shall be secured tightly by the screws or bolts, nuts and plain washer. The proper tightness of the connections should be ensured.

4) Answer any two of the following:

a) How do you provide emergency feed for an alternator (both RMPU & U/S coach)?

Ans:

- (i) Before extending the separate excitation or providing emergency feed, ensure continuity of the alternator field wires with multi meter.
- (ii) Remove the existing field wires (F +VE, F -VE) at RRU/ ERRU terminal block.
- (iii) Remove field fuses in the RRU/ ERRU.
- (iv) Extend 9 cell connections (18V supply) from battery as follow.
 - Connect the wire from first cell positive terminal to alternator field +VE terminal duly providing switch control in between at main door handle, for switching OFF the separate excitation while stabling.
 - Connect 9th cell -VE terminal to alternator field -VE terminal.

b) What action has to be taken when AC, lights & fans are not working in AC coach?

Ans:

- (i) Ensure the position of RSW1 in Alternator-I/ Alternator-II/battery position. If it is found defective, bypass it.
- (ii) Check the battery fuses. If blown out, replace it.
- (iii) Check the inter-cell connectors of battery for open circuit.
- (iv) Check the battery fuse bases for tightness.
- (v) Check the continuity of Battery +VE, -VE cables in the power panel extending from the under-gear junction box.
- (vi) Check the working of inverters for AC & AC fans to work properly.

c) What action has to be taken when WRA is not working?

Ans:

- (i) Check for availability of 3-ph supply at inverter selector RSW3. If supply not available on output side of RSW3, bypass it.
- (ii) Check the incoming (4151, 4152, 4153) and outgoing (4157, 4158, 4159) terminals of MCCB and ensure availability of 3-phase supply. If found defective bypass it.
- (iii) Check for availability of 3-ph supply at inverter selector RSW7. If supply not available on output side, bypass it.
- (iv) If MCB trips again due to internal fault of the motor, change the position of RSW7 to the another motor.

5) What action has to be taken when an inverter is tripping when AC plants is switched ON?

- (i) Switch off all MCBs of blower, condensers, compressors, heaters in the control panel (MCB-1 to MCB-6).
- (ii) Switch 'ON' the inverter again. If the inverter is working on off load, Switch 'ON' the AC plant equipment MCB's one after other.
- (iii) Switch 'ON' blower MCB-1. If inverter not tripped, switch 'ON' condenser motor-1 MCB-2.
- (iv) If inverter not tripped, switch 'ON' condenser motor-2 MCB-3.
- (v) If inverter not tripped, switch 'ON' compressor-1 MCB-4.
- (vi) If inverter not tripped, switch 'ON' compressor-2 MCB-5.
- (vii) Switch OFF faulty equipment MCB on which the inverter trips.

(b) Inverter Tripped on 'OFF LOAD'

- (i) Check for fault indication in the inverter panel.
- (ii) Check for short circuit/earthing of power cables between Inverter output and AC control panel terminals.
- (iii) If no fault is found, then give message to next major station for necessary attention.

(c) Inverter Tripping on Stabling

- (i) Check the individual cell condition. Isolate/ bypass the defective cells.

- (ii) Check the input DC voltage at inverter. It should not be less than 90V to avoid input under voltage fault.
- (iii) Even now if the voltage is not improved, provide TC from the adjacent coach AC-AC supply or DC-DC supply depending upon the condition as per procedure.

6) What are the items to be checked during trip maintenance to avoid fire in coaches?

Ans:

- i. Ensure correct size of cables are provided for different circuits
- ii. Ensure availability of cleats for cables
- iii. Ensure availability of fire retardant PVC grommets wherever cables pass through holes, slits, apertures, etc.,
- iv. Ensure that cables are terminated in junction boxes, terminal boards, etc., with properly crimped lugs.

- v. Ensure cables are not having any intermediate joints and terminated at junction boxes, terminal boards.
- vi. Ensure proper locking and securing arrangements for doors and covers of control/ power panels.
- vii. Ensure no coach leaves primary maintenance depot with earth leakages.
- viii. Always use the insulating fire retardant low tension (FRLT) tape.
- ix. The IR values of the equipments should not be less than 2MΩ for 110V & 230V when measured with 500V megger and not less than 3MΩ for 415V when measured with 1000V megger.
- x. Ensure proper rating of HRC fuses and MCB's.
- xi. Ensure vane relays of RMPU's must in working condition
- xii. Ensure OHPs of Heaters in RMPU must in working condition
- xiii. Ensure OVP's in working condition
- xiv. Ensure fans, lights, etc., be connected to supply by proper connectors.

7) Explain the special drive launched recently to avoid fire in AC & TL coaches and earlier fire fitness certificate items?

Ans: **Earlier format of fire fitness certificate:**

Sl. No.	Train No	Coach No	+ve Leakage	-ve Leakage	Heating symptoms at junction box	Tightening of loose connections	Condition of HRC fuses	FNE of Cells	Condition of OVP in RRUS	Working of Vane Relays	Working of Over Load Relays	Condition of fire Extinguishers Detectors Condition of Earth Leakage
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New format of fire prevention certificate:

AC coaches:

Sl. No.	Date	Train No.	Coach No.	Working condition of Vane Relay	Working condition of OHP	Earth Leakage	Condition of rewirable fuse	Working condition of OVP	Working condition of Thermostat
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TL Coaches:

Sl.	Date	Train	Coach
No.		No.	No.

Earth Leakage	Loose connection	Rewire able fuse	Incorrect rated fuse	FDB	OVP	EFT
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8) What are the duties of escorting mechanics? Ans: **DUTIES OF AC COACH MECHANIC**

MECHANIC

- i. Should be available in the coach one hour before schedule departure of the train.
- ii. Check logbook of the coach for any entry by the maintenance staff and act accordingly.
- iii. Check the condition of V-belts in stable condition. It should be 6+6 from the primary depot.
- iv. Check OFF load battery voltage. It should be 118V.
- v. Record all parameters of the equipment in the logbook.
- vi. Check whether the coach is pre-cooled or not. If not, pre-cooling should be done after placement of the train and pre-cooling should be removed 10 minutes before departure of the train.
- vii. Switch OFF one of the AC plant before removing pre-cooling cable from external supply.
- viii. Check all the grills inside the coach. These should be in open condition.
- ix. Check all lights, emergency lights, fans, night lamps, reading lamps & mobile charging sockets.
- x. Attend complaint of passengers, if any.
- xi. Should do temporary connection in TL coach also, if required.

9) What are the duties of attendants (Technical & commercial duties)?

Ans: As per railway board letter No. 2006/TG-V/12/1 dated: 21/01/2009.

(A) DUTIES OF AC COACH ATTENDANT (Technical Duties)

- (i) To appear in prescribed uniform and have his badge fixed on it so as to easily identify by the passengers.
- (ii) To be present well before the schedule departure of the train.
- (iii) To check that all internal electrical fittings in the coach provided for the comfort and safety of passengers are intact and in working order.
- (iv) To monitor electrical/mechanical defects developing in the coach and call maintenance staff for attending whenever necessary.
- (v) To assist the AC coach in charge in pre-cooling the coach well before commencement of the journey.
- (vi) To take reading of pressure at panel board, discharge pressure of refrigerant and oil pressure of compressor and voltage, current of the alternators and battery etc., from time to time and make entries in the log book and inform AC coach incharge incase of any abnormalities in the readings.
- (vii) To assist the AC coach incharge in the rectification of minor faults in the AC coach equipment enroute.
- (viii) To remain with the AC coach when it is detached in enroute during sick marking till the coach is attached, made fit & move thereafter either base depot or any other terminal from where it is to be put back in service.
- (ix) To attend training course as and when deputed by the administration.
- (x) To carry out other duties such as cleaning electroplated fittings and assisting AC mechanics in maintenance of AC coach when spare at headquarters.
- (xi) To carry out such other duties as may be assigned to him from time to time by ACCI/TTE.

(B) INSTRUCTIONS FOR AC ESCORTING STAFF (Commercial Duties)

- (i) To appear in prescribed uniform and have his badge fixed on it so as to easily identify by the passengers.
- (ii) To carry out such other duties as may be assigned to him from time to time by ACCI/TTE.

- (iii) To check tickets of passengers when they first enter the coach to occupy berths/seats, if TTE/Conductor is not available to exercise the checks. He should not allow any person without proper tickets to supervision/direction of the conductor of the coach.
- (iv) To accommodate passengers joining enroute under the supervision/direction of the conductor of the coach.
- (v) To distribute bedrolls to the passengers.

10) What are the latest modifications recommended by RDSO in AC coaches?

Ans: Latest modifications recommended for AC coaches are given below:

- (i) Standardization of Pre-cooling plug & socket in all SG AC coaches.
- (ii) Conversion of air-conditioning system of under slung type AC coaches from R-12 to R-134 refrigerant.
- (iii) Checking for Emergency Light Unit.
- (iv) To prevent corrosion in the liquid receiver of AC coaches.
- (v) Modification of connecting between 18 KW brushless alternator terminals and junction box terminals of AC coaches.
- (vi) Modification Sheet to prevent fire hazard in canvas duct in under slung type AC coaches.
- (vii) Provision of extension for feeding power supply to an unhealthy AC coach fitted with RMPU from the adjacent AC coach.
- (viii) Provision of modified terminal board assembly in 4.5/18/25 kW alternators.
- (ix) Provision of vane relay in the blower motor circuit of AC coaches.
- (x) Modification to housing assembly of return and fresh air filter provided in RMPU.
- (xi) Modification for 25 kVA on board type inverter of M/s Siemens make for RMPU of AC coaches confirming to RDSO specification No. SPEC/E-20/04 (Rev. '3').
- (xii) Provision for individual fuses in the AC control panel for individual condenser fan.
- (xiii) To ensure working of RMPUs in the event of failure of one condenser fan motor.

11) What is the difference between SG AC coaches and LHB AC coaches?

Ans:

Sl.No	Item description	SG AC Coach	LHB AC Coach
1	Air condition system Control	Electronic Thermostat	Micro processor
2	Power panels	NPP and PP side panels	Integrated switch board cabin
3	Control circuit Voltage	110 V Ac, control transformer 415/110 V AC	110 V Dc , 110/110 V DC-Dc converter
4	No of Sensors	Only two Nos temperature sensors	Six temperature sensors
5	Humidity control	Not available	Available
6	Solenoid coils	Not available	(i)Two Nos bypass solenoids (ii)four Nos control pressure switches
7	Temperature setting	Fixed setting	Set point generator with 7 points fine control
8	Measuring Gauges	No pressure measuring gauge available	All four units transducer based LP&HP measuring facility available
9	Motor protection	Only provided MCB	MPCB provided for all motors
10	Lighting Control	Individual switch control	Control from Panel through contactors & individual control
11	Heater Thermal protection	OHP only available	OHP & ESTI (Fusible link protection at 130 °C) are available

12	Access for Blower HP & LP Cut-outs etc	Access from inside the coach	Only Access from roof.
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13	Fresh Air/Return control	Not available	Flapper Motor control available
14	Fresh Air Filters/Return Air Filters	provided under the roof in corridor.	Provided on roof instead of providing in corridor.
15	Fans	AC / DC Fans provided	Fans not provided in these AC Coaches.
16	Berth Indications	Available on night light dooms.	Not Available.
17	Corridor Lights	Fluorescent and CFL	Fluorescent
18	Night Lights	Screw type / CFL	LED provided in gangway FT's
19	Mirror Lights	Screw type / CFL	NIL
20	No of Berths	FAC-18/22, ACCW-46/48, ACCN-64	FAC-24, ACCW-52, ACCN-72
21	Mobile charging	100 VA inverter/ Distribution/Tr.	Distribution transformer
22	Vane relay	Available	Not available
23	Blower Motor	1.5HP,1420 rpm without thermal protection inside motor	1.5HP,1420 rpm with Embedded thermal protection inside motor
24	Condenser Motor	1HP,900 rpm without thermal protection inside motor	1HP,1400 rpm with Embedded thermal protection inside motor
25	Cables junction box	Ordinary Terminal board connection	Harting connector

12) What are the advantages and additional features provided in LHB coaches?

- Ans: Air conditioning control system is of microprocessor based.
- (i) Power panels are of Integrated Switch Board Cabinet type.
 - (ii) There are six temperature sensors are available for sensing the temperature.
 - (iii) Humidity control is available in LHB coaches.
 - (iv) Two no's of bypass solenoids and four no's of control pressure switches are available.
 - (v) Set point generators with 7 points fine control are available.
 - (vi) MPCB provided for all motors.
 - (vii) OHP & ESTI (Fusible link protection at 130 °C) are available.
 - (viii) Blower motors of capacity 1.5HP, 1420 rpm with embedded thermal protection inside motors are available.
 - (ix) Condenser motors of capacity 1HP, 1400 rpm with embedded thermal protection inside motors are available.
 - (x) Two alternators and double set of batteries are available.

13) What are the refrigerant control devices used in AC system and explain the functions?

Ans: Mainly three types of refrigerant control devices are in use.

Thermostatic expansion valve: - This valve operates by sensing the temperature of the suction side after the evaporator. The valve opens more when the heat load is high and closes when the heat load is low. This is accomplished by a sensing bulb of the TEV clamped on the suction side.

Automatic expansion valve:- This valve is also called as Constant pressure expansion valve. It is a spring loaded valve by which it maintains a constant pressure in the evaporator. If the heat load is high, the valve opens more due to increase in pressure of the evaporator and vice versa.

Capillary tube:- the capillary tube consists of a very small diameter and the length depended upon the size of the system This tube is usually soldered to the suction line between the condenser and the evaporator to effect the necessary heat exchange. This tube acts as a constant throttle on the refrigerant, and due to its length and small diameter, offer sufficient resistance to the flow of refrigerant to build up a head pressure of an amount needed to produce condensation of gas.

Apart from the three main types of refrigerant control devices mentioned above, Hand expansion valve and Float valves are also available.

14) Write short notes on (a) Refrigerator (b) Water cooler (c) Window type AC units (d) Air filter in AC system (e) Evaporator in refrigerator system (f) Dry and wet bulb temperature (g) Condenser and (h) Sealed compressor of AC unit?

Ans:

a) Refrigerator: - Refrigerators operate on the Vapour compression system having hermetically sealed compressor mounted at the base of the cabinet. Refrigerant used is R-22 or 134A. Expansion valve used is capillary tube. The evaporator piping is fastened round and brazed to the freezer box. The condenser tube is placed over a single metal sheet for dissipation of heat. The top space is freezer unit and the rest of the cabinet interior gets cooled by convection currents of air set up by freezer unit.

b) Water cooler: - Water cooler is a machine working on refrigeration system for cooling water for drinking purpose. The refrigeration system is same which is utilized in air-conditioning, refrigerators, etc. Generally two types of water coolers are used i.e., Instantaneous water coolers and storage type water coolers. In addition to the above two types there are also storage-cum-instantaneous type also. The drinking water having temperature between 10°C to 13°C is preferred.

c) Window type AC units: - These are completely self contained units, with the compressor, condenser, evaporator, refrigerant piping and air filter, all assembled in a very compact assembly. The window units are usually of ½ to 2 tons capacity and fitted with 230 volts motor. The refrigerant is controlled with the capillary system. The unit is so designed that it can be mounted on the window with small bracket from outside.

d) Air filter in AC system: - Air filters are used to maintain cleanliness / dustproof. There are mainly two types of air filters. Viz., Return air filter is to remove any dust present in AC room/Coach and fresh air filter is used to filter fresh air for dust etc.,

e) Evaporator in refrigerator system:-This constitutes the cooling unit, in which the liquid refrigerant under low pressure evaporates and in doing so, it takes away its quota of latent heat, there by cooling the medium surrounding the cooling coil.

f) Dry and Wet bulb temperature:- Dry bulb temperature is the temperature of air as measured by an ordinary thermometer.

Wet bulb temperature is the temperature of air as measured by an ordinary thermometer, whose glass bulb is covered by a thin cotton sleeve soaked in water.

g) Condenser:-It is intended for cooling the hot gas and liquefying it under pressure. It may be air cooled or water cooled

h) Sealed compressor of AC unit:- The motor and the compressor unit is housed in one casing and completely sealed. The suction and discharge piping is brazed as no valves are used, the chances of leakage is eliminated.

15) What are major differences in equipment and operation of Air conditioning system under slung and RMPU equipped coaches?

Ans:

S. No	RMPU	UNDER SLUNG
1	Compressor Motor, Condenser motors,	DC Motors are used which works

	Blower motors are 3-phase AC Induction Motors	on 110 V DC
2	Sealed type compressor is used	Compressor is open type
3	Uses 4 compressors per coach. Hence Capacity can be varied from 25 to 100%	Uses only 2 compressors per coach. Hence capacity can be varied from 50 to 100%
4	The compressor condenser evaporator and motors are all assembled in one package unit and situated on the roof.	The compressors condensers and its motors are sunder slung
5	Requires inverter for running the AC plant	Do not requires inverters
6	Uses refrigerant R-22, approximately 3 Kg/plant	Uses R-12 approximately 15 Kg per plant
7	Hermitically sealed system and hence No pressure gauges, Valves etc.,	Service valves and pressure gauges and hand set of valves are used
8	Uses all 3-phase AC Contactors and relays	Use of DC Contactors
9	The expansion device used is Thermostatic expansion valve	Capillary tube is used
10	WRA is used	WRA is not required as water tank itself is situated on roof.
11	The plant can be pre cooled by connecting direct 3-phase supply from outside source with the help of change over switch.	The pre cooling of AC Coach is done by using pre cooling transformer-rectifier unit

16) Explain the Refrigeration system?

Ans: The refrigeration system consists of 4 basic major components and refrigerant.

Compressor, Condenser, Expansion device and evaporator. The refrigerant system depends for its action on latent heat principle and expansion principle. The refrigerant in gas form is sucked into the suction side of the compressor and compressed to high pressure. From the compressor, the gas goes through a condenser which removes the sensible heat generate in the gas due to compression as well as, the latent heat and the gas liquefies. The liquid gas passing through an expansion valve into the evaporator is expanded to gas absorbing the latent heat in the process, thus cooling the cooling coil. The gas having taken up its latent heat in properly designed cooling coil is now dry and is again sucked into the compressor to continue on another cycle.

or

REFRIGERATION CYCLE

Refrigerants are heat-carrying medium, which during their cycle in the refrigerant system absorb heat at a low temperature level and discard the heat so absorbed at a higher level. The refrigerants common used are R-12, R-22, R-134a.

The refrigerant have boiling points much below ordinary room temperature, so they exists as gas and are only held in the liquid state by keeping them under pressure.

Refrigeration can be produced by allowing a liquid refrigerant from high pressure vessel to pass and boil inside a coil or evaporator. The latent heat needed for the boiling is taken from the surrounding space of the evaporator, thereby cooling the space. After passing from evaporator, the refrigerant is reclaimed with the help of compressor. The compressor compressed the vapour to the pressure corresponding to a saturation temperature, higher than the temperature of naturally available air or water. The compressor also circulates the refrigerant through the system.

The refrigeration cycle thus comprise of:

- Absorption of heat by the evaporation of a liquid refrigerant in the evaporator at a controlled lower pressure.
- Raising the pressure of the low pressure vapour coming from the evaporator by the use of the compressor.

- Removal of heat from the high vapour in the condenser so as to liquidity or condense the vapour and
- By the use of the throttling device, reducing the pressure of high pressure liquid (from the condenser) to the level of pressure needed in the evaporator.

17) What are the items to be checked in under gear of a SG AC coach (RMPU)?

Ans:

- Existence of Alternators safety chains with original bolts and split pins.
- Alternator suspension hanger pin with cotter pin.
- Alternator Suspension pin with nylon bushes.
- Alternator pulley with nut and split pins.
- Proper alignment of Axle pulley and Alternator pulley.
- Tap the Axle pulley with hammer and judge the tightness by sound.
- Check suspension of battery box for signs of any cracks, corrosion, rusting and take remedial action immediately.
- Check cracks of all the suspended equipments like Pre cooling transformer, regulators, WRA
- All V- Belts are intact without any twisting. Tension should be felt by striking it slightly. Belt in correct tension will respond 'alive' and 'spring back'.
- Proper fitment of tension mechanism by maintaining 50mm gap between bracket and free end bush collar.
- Proper tightness of terminal connections with cleat and clamp, proper securing of wiring, etc.
- Check for availability of grommets for all incoming and outgoing cables.

18) What are the advantages of VRLA batteries over conventional flooded batteries?

Ans:

S. No	Conventional flooded batteries	VRLA batteries
1	Regular maintenance involving topping up with distilled water is required.	No periodic topping is required.
2	There is a possibility of ground currents due to electrolyte spillage.	No electrolyte spillage due to dry leak proof construction.
3	There is a possibility of shedding of active material due to vibration in service.	Shedding of active material is minimized as highly compressible glass mat separators are used.
4	These batteries are mounted vertically hence the gravitational force is high.	These batteries are mounted horizontally hence the gravitational force is low.

5	Post corrosion is usually observed due to the acid mist.	No post corrosion since there is no acid mist.
6	Cracking and rebounding of sealing compound is common	Cell covers and jars are hermetically heat sealed.
7	The self discharge rate is up to 4% of capacity per week	The self discharge rate is 0.5 to 1.0% of capacity per week
8	Transit damages are high because of brittle rubber containers	VRLA batteries are housed in steel trays which can withstand drops and shocks during transit.
9	The average discharge voltage is 1.90 V per cell	The average discharge voltage is 1.95 V per cell
10	Separate battery charge room and charging	These batteries are factory charged and

at site is required.

commissioning is immediate.

19) What are the advantages of conventional flooded batteries over VRLA batteries?

Ans:

S. No	VRLA batteries	Conventional flooded batteries
1	These are costly	These are cheaper
2	These cells are sensitive for charging	These are robust for charging
3	These are very sensitive to over voltage / current	These are not so sensitive to varying voltages/ currents
4	Open circuit/ reversal of cell is frequently observed in enroute	Open circuit of cell in a battery is very rare
5	Costly and fine tuned battery chargers are required	Ordinary charger will serve the purpose
6	Correct regulator settings are to be maintained	Little variation in voltage setting will not affect the batteries performance
7	Ripple content should be less than 2%	Ripple content may be allowed up to 15%

20) Procedure to maintain correct tension of new 'V' belts on bogie transform mounted alternator of AC Coaches and non AC coaches?

Ans:

- a) Provide alternator on the bogie.
- b) Provide axle pulley on the wheel.
- c) Provide 'V' belt of matching set between grade 48 & 52 on wheel axle, on which, the axle pulley is provided.
- d) After lowering and completion of buffer head adjustment of bogie, provide 'V' belts over alternator towards the axle pulley.
- e) After completion of provision of V belt, remove the split pin check nut and fixing nut of free end side tension rod spring tightening collar nut.
- f) Free the check nut and fixing nut of U clamp side of tension rod.
- g) Now insert the tension rod assembly between the bogie supporting bracket and eye (leg) of the alternator.
- h) Provide bolt for 'U' clamp of tension rod and eye of the alternator.
- i) Then slowly tighten the fixing nut (U clamp side) unit tension indicator match with the spring collar. This will give the correct tension of the V belt.
- j) Then provide fixing nut, check nut and split pin leaving a gap of 75 mm for AC coaches and 55 mm non AC coaches at free end side of tensioning for mechanism.
- k) Then observe the tension of belt.

21) (a) Explain the precautions to be taken before starting the engine?

Ans: **Precautions before starting the engine:**

- a) Before starting the engine, ensure that necessary quantity of lubricating oil, fuel Oil and cooling water have all been filled. Also ensure that all switches are in 'OFF' position and all fuses are in good condition.
- b) Switch ON the D.C. control supply switch, which will light the D.C. 'ON' indicating lamp.
- c) Switch ON the Starter Motor isolation switch which connects D.C. supply from Starter battery to the starter motor circuit.
- d) Press the test buttons TS-1, 2 and 3 to check the condition of the fault indication Lamps. When these buttons are pressed, those indicating lamps which do not glow should be replaced by healthy bulbs. Similarly healthy condition of 'FAULT' lamp can be checked by pressing the alarm isolation push button switch. Now switch OFF again the fault lamp. Engine stop/reset press button will have to be pressed before starting the engine.

(b) Explain the sequence of operation to start the engine?

Ans: Press the Engine Start push button of an Engine selected for duration, until the Engine attains the full speed. Following circuit functions are carried out:-

- a) First N/C contact of the start push button opens the LOP (Low Oil Pressure relay) circuit. It is a positive interlock that ensures the Engine does not stop for want of lube oil pressure build up at the moment of starting. Second N/C contact opens the Engine starting circuit of the other plant. This is an interlock to prevent simultaneous starting of two Engines. Third N/C contact de-energizes the BIC which disconnects BCH from supplying to starter battery during starting.
- b) One of its N/O contacts energizes FSRD (Time Delay Relay for Starter Solenoid) and FSS (Fuel Start Solenoid) and the other N/O contact energizes SC (Solenoid Coil) of the starting motor for cranking the Engine. When the engine attains full speed, the start push button should be released.
- c) The instant contacts FSR of FSRD maintain the supply for FSRD and FSS. The N/C contacts of the start button and one of the relay contacts of FSRD keep the starter motor circuit open to prevent the accidental restart by means of start push button. Another N/C delay contact of FSRD keeps the LOP circuit closed. Once the Engine starts, the lube oil pressure developed, opens the oil pressure switch ICLOP (Internal Combustion Engine Low Oil Pressure) which keeps the LOP de-energized as long as there is sufficient pressure of lube oil.

22) **(a) Explain the procedure of plant selection?** Ans:

Keep the plant selector for switch as desired

- a) **Plant 'A' only:** This is done by switching on ACB-1 manually. If it is desired to feed both feeder 1 and 2 from plant 'A', bus coupler contactor can be energized by pressing bus coupler 'ON' push button. Paralleling of alternators is prevented by the following mechanism. There are two N/C contacts (one each from each ACB), in parallel, in the bus coupler contactor circuit is closed through the N/C contact of ACB-2. Suppose in this situation, the ACB-2 is manually closed. This will result in the opening of the normally closed contact of ACB-2, which in turn will cut off the supply to the bus coupler contactor close coil, thereby resulting in opening of the bus coupler contactor.
- b) **Plant 'B' only:** This is done by switching on ACB-2 manually. It is desired to feed both feeder 1 and 2 from plant 'B' bus coupler 'ON' push button. Paralleling of alternators is prevented by the mechanism as already indicated above.
- c) **Plants 'A' and 'B':** Both ACBs can be closed simultaneously but in this condition the bus coupler cannot be energized by because the auxiliary N/C contacts of the two ACBs in the bus coupler close coil circuit will be open. Hence plant 'A' will feed only feeder 1 and plant 'B' will feed feeder 2.

(b) Explain the procedure for feeder Selection?

Ans:

- a. Operate "Power Supply ON" Set rotary, switch "DC-ISO A" on to position ON (IR)
- b. Lamp DC-ON on panel II lights up (IR)
- c. Set rotary switch "plant selection switch" to position "4 = plant A"
- d. S2K9, S2K11 pulls in
- e. S2K8, S1K10 do not pull in
- f. Close manually ACB 1
- g. Transformer-1 gets supply
- h. Switch ON the Radiator and Exhaust fans in the engine room
- i. Push key "Safety loop B on"
- j. Push key "Feeder B on"
- k. Contactors S2K13 and S2K3 pull in
- l. Lamps S2H2 and S2S16H1 light up
- m. Switch feeder B off

- n. After a moment push key Feeder B ON
 - o. Push key “bus coupler”
 - p. S2K11, S2K2 pull in
- Same procedure can be adopted for the other feeder and plant.

23) What are the protective devices provided in EOG power cars?

Ans:

- a. **High water temperature - “ICHT”**
The high water temperature switch is mounted on the Engine and senses the temperature of water in the cooling jacket of the Engine. Once the ICHT closes, water is set at 95°C for putting off the Engine.
- b. **Over speed of engine**
Over speed switch ICOS mounted on the Engine senses the over speed when the Engine governor fails.
- c. **Low lube oil pressure**
The lube oil pressure switch mounted on the Engine senses the lube oil pressure.
- d. **Alternator protection**
The alternators are protected by individual Air circuit breakers (ACBs), with the following protective trips
 - i. **Alternator overload**
This protection is inbuilt in the ACB. The ACB has an integrated solid state relay which incorporates the following protections.
i) Short circuit ii) IDMT & Overload iii) Earth fault
Whenever the overload condition is sensed, the IDMT relay picks supply to the alternator fault relay (AFR).
 - ii. **Under voltage**
When the voltage of the alternator falls below the set value of 687 volts, ACB is tripped.
- e. **Earth leakage**
Core balance transformer operated earth leakage device E/L detects any earth fault caused either in the alternator windings or in the cables from the alternator to the control panel up to the core balance transformer.
- f. **Short circuit**
This results in the instantaneous tripping of the ACB when the set value of the current is sensed.
- g. **Feeder protection**
The two individual feeders are also protected by individual contactors, with the following protective trips.
 - i. **Earth leakage**
Core balance transformer operated earth leakage device. EL detects any earth fault caused in the feeder cables after the feeder contactor.
 - ii. **Feeder overload**
C.Y. operated bimetallic over load relay senses the overload in the feeders and N/O contacts of feeder fault relay (FFR) opens the feeder contactor circuit and thus the faulty feeder is isolated.

VI. OFFICIAL LANGUAGE ACT AND RULES:

A. Objective

1. In terms of Article 343 (1) of the Constitution of India _____ Language in _____ Script shall be the Official language of the Union. (**Hindi, Devanagari**)

- 2 Article 343(2) of the Constitution of India empowers to authorize use of Hindi and _____ numerals in addition English (**International form of Indian numerals**).
- 3 The Official Language Act was passed in _____ (**Yr. 1963**)
- 4 According to Official Language Rules, India is divided into _____ regions and they are _____, _____ and _____ (**3 A, B and C**)
- 5 States that come under Region are Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Rajasthan, Uttar Pradesh, New Delhi. (A)
- 6 The States that come under Region _____ are Gujarat, Maharashtra, Punjab, Andaman Nicobar, Chandigarh (B)
- States Other than mentioned under the categories A and B, come under Region Non-Hindi speaking states come under _____ Region. (**C**)
- 8 Target for Originating Correspondence from C to A, B and C Regions _____% (**55%**).
- 9 A cash Award of Rs. _____ is given under Railway Minister's Rajbhasha Shield (**7000/-**).
- 10 Communications from Central Government Offices to the States, Offices and persons in _____ Region shall be in Hindi, and if it is in English, a Hindi translation shall accompany. (**A**)
- 11 Communications from Central Govt. Offices to States or Offices in _____ Region shall be in Hindi, and if it is in English, Hindi translation shall accompany (**A**).
- 12 Communications from Central Govt. Offices to persons in Region B shall be in ____ (**Hindi**)
- 13 Communications from Central Government Offices to States or Persons in Region C shall be in _____ (**Hindi/English**)
- 14 Communications between Central Government Offices _____ between one Ministry or Department and another may be in _____ (**Hindi/English**).
- 15 Communications between Central Government Offices _____ between one Ministry or Department and attached/subordinate offices in Region A may be in _____ depending on number of persons having another may be in ____ (**Hindi**)
- 16 Communications between Central Govt. Offices in Region A shall be in ____ (**Hindi**)
- 17 Communications between Central Govt. Offices in Region B or C may be in _____ (Hindi or English)
- 18 Translations of such communication shall be provided along with the communication where it is addressed to Offices in _____ (**C region**)
- 19 Representations may be submitted by an employee in _____ (**Hindi**).
- 20 Representations, when made/signed in Hindi shall be replied to in _____ (**Hindi**)
- 21 Notings in Central Government Offices may be made by an employee in _____ and no _____ be required to furnish a translation of it. (Hindi only, **translation**)
- 22 If an employee has working knowledge of Hindi, he will not ask for English translation of a Hindi document, unless it is of _____ nature. (**Technical**)
- 23 Manuals, Codes, Forms, Notices etc. shall be printed or cyclostyled in _____ form (**Hindi/English diglot form**).
- 24 The forms and heading on registers shall be in _____ (**bilingual form**)
- 25 All name plates, sign boards, letter heads, inscriptions on envelopes and other stationery etc. shall be in _____ (**Bilingual form**).
- 26 Responsibility for compliance of the Official Language Rules shall be that of (**Administrative Head/Head of the Office**).
- 27 Andhra Pradesh and Kerala states come under _____ Region (**C**)

B. Questions and Answers

Q.1. Why is Hindi divas celebrated and When? Or What is importance of Hindi Divas?

Ans: 14th September is celebrated as Hindi Day because the Constituent Assembly of India had adopted in Devanagari Script as the Official Language of the Union on 14th September 1949.

Q.2 Ans

What are Documents to be issued in Hindi-English bilingual form under Section 3(3) of OL Act, 1963?

The following documents have to be issued in Hindi-English bilingual form simultaneously

- (i) Resolutions, general orders, Rules, Notifications, Administrative reports or other reports or Press communiqués.
- (ii) Administrative and other Reports and Official Papers lay before a House or the Houses of the Parliament.
- (iii) Contracts and agreements executed and licenses permits, notices and forms tender issued.

Q.3 How many members are in parliamentary Committee of Official Language and how they are elected?

Ans The Committee consists of thirty members, out of them twenty members shall be from the House of the People (LOK SABHA) and ten shall be from the council of states (RAJYA SABHA).

They are elected respectively by the members of the house of people and the members of the Council of States in accordance with the system of proportional representation by means of the single transferable vote system.

Q.4 What are provision of OL Act, 1963 that are not applicable to Jammu and Kashmir?

Ans: The provisions of section 6 and section 7 shall not apply to the state of Jammu and Kashmir.

Q.5 What do you mean by proficiency in Hindi?

Ans: A Government servant who have studied SSLC/SSC/Matric or equivalent in Hindi Medium.

or Studied Hindi as an optional subject in Inter or Degree or at higher level. Passed SSC/Matric with Hindi as language with minimum pass marks.

Q.6 What do you mean by working knowledge in Hindi?

Ans: A Govt. employee who have studied Hindi as a Second Language/Third Language in SSLC/SSC/Matric or equivalent or Inter/Degree or Passed Hindi Pragya examination or prescribed Hindi Dept. Exam (i.e. Prabodh or Praveen)

Q.7 Who is responsible for use of Hindi or English for issuance of documents comes under Section 3(3)?

Ans: Both Hindi and English shall be used for all documents referred to in sub section (3) of section 3 of OL Act. 1963 and it shall be the responsibility of persons signing such documents to ensure that such documents are made, executed or issued both Hindi and English.

Q.8 Can any Govt. servant write notes etc. in Hindi only?

Ans: Yes, As per Rule No.8 of OL Rules, 1976, an employee may record a note or minute on a file in Hindi or in English without being himself required to furnish a translation there of in the other language.

Q.9 Who is responsible to implement the Hindi in Govt. Offices?

Ans: It shall be the responsibility of the administrative head of each Central Govt. Office to implement official language Hindi in their offices.

VII. ESTABLISHMENT, STORES & GENERAL QUESTIONS

A) Objective:

Ranker Section – B Question Bank – General (Common to all Trades)

Each question carries one mark.

- 1) Chief Electrical Engineer is the Electrical head of the South Central Railway.
- 2) The full form of CESE is Chief Electrical Service Engineer
- 3) Inventory can be in the form of Raw materials, supplies, in process goods .
- 4) In computer terminology, LAN stands for Local area network.
- 5) I.R.S stands for Indian Railway standard.
- 6) 21 languages are recognized by the eighth schedule
- 7) On passing of which examination conducted by the Hindi Training Scheme, Personal pay will be given Pragya.
- 8) Metal Token pass issued to Officers.
- 9) Maternity leave can be granted for a maximum period of 180 Days.
- 10) Maximum LHAP that can be granted at one time 24 Months.
- 11) RDSO stands for Research, Design and Standards Organisation.
- 12) RDSO located at Lucknow.
- 13) An employee can be deemed suspended, if he is detained in custody for more than 48 hrs reviewed
- 14) According to D and AR, commission means UPSC.
- 15) Railway Board located at New Delhi
- 16) Women employees having two minor children may be granted child care leave for a maximum period of 730 days during their entire service.
- 17) Rejected saleable scrap should be sent to Scrap Depot, Lallaguda.
- 18) Dismissal is a more serious punishment.
- 19) PHOD stands for Principle Head of the department.
- 20) Extraordinary leave can be granted in combination with other leaves except CL.
- 21) PHOD of the Electrical Department CEE.
- 22) During Hospital leave full salary is granted for a period of 120 days.
- 23) During Special Disability leave full salary is granted for a period of 120 days.
- 24) Head quarters of South Central Railway is located at Secunderabad.
- 25) SCR stands for South Central Railway.
- 26) Following leaves can be granted in combination LAP+LHAP+ Commuted leave.
- 27) For donation of blood one day Special Casual Leave.
- 28) Decode COFMOW Central Organisation for Modernization of Workshops.
- 29) Compulsory retirement is a Major penalty.
- 30) ISO stands for Institute of Science and Ocean studies.
- 31) EMS stands for Environmental Management system.
- 32) ISO 9000 Series deals with QMS.
- 33) ISO 14000 Series deals with EMS.
- 34) S1302A indent will be generated, when the value of material is more than Rs. 10,000/-.
- 35) With holding of the Privilege Passes or Privilege ticket order or both is a Minor penalty.
- 36) Rs. 2800/- is the grade pay of Technician –I
- 37) Paternity leave can be granted for a maximum period of 15 days.
- 38) Periodicity for checking the fire extinguisher 3 months.
- 39) The term CCA stands for city compensatory allowance.
- 40) Leave cannot be claimed as a matter of right.

- 41) The leave sanctioning authority may refuse or revoke of any kind of leave.
- 42) The leave sanctioning authority cannot alter the kind of leave due and applied for.
- 43) LAP can be accumulated up to maxim of 300 days.
- 44) Commuted leave not exceeding half the amount of half pay leave due can be taken on medical certificate.
- 45) Leave not due during the entire service is limited to maximum of 360 days.
- 46) The duration of maternity leave is for 135 days.

- 47) ISO 9000 Series deals with QMS
- 48) ISO 14000 Series deals with EMS
- 49) ISO 18001 Series deals with OHSAS
- 50) If attempts are made to make an instrument very sensitive, quality is likely to be impaired is precision.
- 51) In computer terminology, ID address is computer address
- 52) In computer terminology, IP stands for Internet protocol
- 53) In computer terminology, ORACLE is a Database.
- 54) Hospital leave can be granted for a maximum period of 28 months.
- 55) In computer terminology, LAN stands for local area network .
- 56) In computer terminology, HTTP is an Protocol.
- 57) I.R.S stands for Indian Railway standard.
- 58) In computer terminology, IDE is related to HDD.
- 59) How many languages are recognized by the eighth schedule 21.
- 60) In computer terminology, Modem is a Analog to Digital / Digital to Analog converter.
- 61) Rail wheel factory located at Yelahanka, Bangalore.
- 62) In computer terminology, ISP is a service provider.
- 63) In computer terminology, MB stands for mega bytes.
- 64) In computer terminology, NTFS is a file system.
- 65) In computer terminology, One kilo byte is equal to 1024 bites.
- 66) In computer terminology, 80386 Processor is a 32 bit microprocessor chip used in personal computers.
- 67) In computer terminology, Gateway in computers A device that connects dissimilar networks.
- 68) Leave not due shall not be granted in case of leave preparatory.
- 69) LHAP can be converted in half period of leave on an average pay on medical grounds is called commuted leave..
- 70) Action to eliminate the cause of a detected non conformity is Corrective action.
- 71) Meeting of PREM committee at Railway board, zonal Railway and Divisional Railway level will a quarter.
- 72) RWF stands for Rail wheel factory.
- 73) In computer terminology, ISP stands for Internet service provide.
- 74) Gear tooth vernier is used to measure pitch line thickness of gear.
- 75) Accuracy is agreement of the result of a measurement with the true value of the measure quantity.
- 76) Acronym of LHB Linke Hoffman Bosch.
- 77) In computer terminology, AGP stands for Advanced graphics port.
- 78) An abbreviation made up of the first letters of a series of words is called acronym.
- 79) In computer terminology, Bluetooth is a communication device.
- 80) Censure is a Minor penalty C.
- 81) House rent allowance for 'X' classified cities is 30% of basic pay.
- 82) House rent allowance for 'Y' classified cities is 20% of basic pay.
- 83) House rent allowance for 'Z' classified cities is 10% of basic pay.
- 84) For the purpose of HRA Hyderabad is 'X' classified city.
- 85) For the purpose of HRA Warangal is 'Y' classified city.
- 86) For the purpose of HRA Tirupathi is 'Z' classified city.
- 87) In computer terminology, a CD-R drive that can read CDs.

- 88) In computer terminology, a CD drive that can read, write, and the rewrite CDs CD-RW drive.
- 89) In computer terminology, A high-capacity disc that uses optical technology to store data in a form that can be read but not written over CD-ROM.
- 90) A non railway official can assist 3 D and AR cases at most.
- 91) A photo electric device in which the resistance of the metal changes directly proportional to the light striking on it, is called photo conductive cell.
- 92) A tooth paste tube can be produced by hollow backward extrusion.
- 93) In Electronics terminology, DTS is related to sound system.
- 94) In computer terminology, DVD stands for Digital versatile disk.
- 95) Email address uses @ symbol.
- 96) For P.N.M. meeting's agenda should be submitted by the union for discussion¹ before 2 days in advance of Schedule date of meeting.
- 97) CAMTECH located at Gwalior.
- 98) Errors which are regularly repetitive in nature are systematic errors.
- 99) In computer terminology, DOS stands for disk operating system.
- 100) Expand the term CAMTECH centre for advanced maintenance technology.
- 101) In computer terminology, DNS stands for domain name system.
- 102) In computer terminology, CPU stands for central processing uni
- 103) D and AR formed in the year 1968.
- 104) In computer terminology, data transmission is measured in bits/s.
- 105) Optical flats are made of quartz.
- 106) 3000/- will be given for festival advance.
- 107) 3000/- will be given for Cycle advance.
- 108) In computer terminology, key board is the input device of PC.
- 109) In computer terminology, CPU is the out put device of PC.
- 110) With holding of privilege pass for 10 years is minor penalty
- 111) With holding of the Privilege Passes or Privilege ticket order or both is a... Minor penalty ...
- 112) In Computer terminology, RED HAT is related to LINUX
- 113) Reduction to lower stage in time scale of pay by one stage for a period exceeding three year is a major
- 114) Reduction to lower stage in time scale of pay by one stage for a period not exceeding three year is a minor penalty
- 115) In computer terminology, RAM stands for random access memory
- 116) The D and A rules are derived from 309.article of Indian constitution.
- 117) Festival advance can be recovered in ...10.....equal instalments.
- 118) PEASD stands for Passenger emergency alarm signal device
- 119) PEAV stands for Passenger Emergency alarm valve
- 120) On motor cycle advance, interest can be recovered
- 121) Dy.CMM/M&E/LGD can recouped the stock items value up to Two Lakhs through local purchase
- 122) TRD stands for Traction distribution
- 123) UPS stands for uninterruptible power supply
- 124) A railway servant shall be permitted to encash leave on average pay upto 10 days
- 125) For availing encashment leave ...30.....days of leave on average pay should be available to employee's credit after taking into account the period of encashment as well as leave availed of.

- 126) The total leave so encashed on average pay during the entire career shall not exceed ...
60.....days
- 127) Expand RELHS Retired Railway Employees Liberalised Health scheme
- 128) How many berths available in AC two tier coach 48
- 129) What is RSP rolling stock programme.
- 130) How many clauses are there in ISO 9001:2000(E) quality system 8
- 131) What is the **maximum** speed of Duranto Express 160 Kmph
- 132) The number of slip gauges in a set are 103
- 133) The retired railway servant can hold not more than seven D and AR cases in his hand to act as defence helper.

B) QUESTION & ANSWERS :

Q.1 What is Honorarium?

Ans: Honorarium is a remuneration for work performed which is occasional or intermittent in character and either so laborious or of such special merit on to justify a special reward.

Q.2 What is substantive Pay?

Ans: Substantive pay means the pay other than special pay, personal pay or emoluments classified as pay by the President under Rule 1303(iii) to which Railway Servant is entitled on account of post to which he has been appointed substantively or by reasons of his substantive position in a cadre.

Q.3 What is meaning of "Officiating"?

Ans: Officiating Means the Railway Servant officiate in a post where he performs the duties of a post on which any other person holds a lien or when a competent authority appoints him to officiate in a vacant post on which no other railway servant holds lien.

Q.4 What is LDCE?

Ans: Limited Departmental Competitive Examination. In Civil, Electrical, Mechanical, S&T Dep. 25% of Vacancies are filled by this minimum pass Marks are 60%.

Q.5 What is Dearness Allowance?

Ans: Dearness Allowance is in the nature of compensation for Established increase in the cost of living and comprised of Dearness Allowance, Additional Dearness Allowance and Dearness Pay as the Government may from time to time decide.

Q.6 Which are the allowances are exempted from the income tax?

- Ans:
1. Sumptuary Allowance and uniform Allowance
 2. Death cum Retirement gratuity received by Government Servant their families.
 3. Gratuity received by an employee
 4. Any payment in commutation of pension.
 5. Amount by way of encashment of unutilized earned leave.
 6. Any some received under life insurance policy.

Q.7 Elaborate Vigilance Organization and what is Central Vigilance Commission Act 2003?

Ans: Vigilance implies a state of being watchful or on the alert. There is a Chief Vigilance commission for all Central Government Ministries and departments. Indian Railway had set up a Vigilance unit under a under Control of Sr.,Dy. ,GM on Zonal Railways. CVC ACT, 2003 Mandates - the Central Vigilance Commission to enquire or cause an enquiry into complaints against public servants wherein allegations of corruption are involved. The commission can cause an enquiry through the Chief Vigilance Officer of the Organization concerned or CBI or any other anti-corruption investigating agency under the Government of India.

Q.8 What is Arbitration?

Ans: Arbitration is a device for setting up difference between the Railway Administration and contractor by intervention of third person without the help of Court of Laws. Under the procedure the contractor may call for arbitration after 90 days of his presentation of final claim on disputed matter. There would be two Arbitration and also umpire over them. Arbitrators are appointed by General Manager.

Q.9 What are the objectives of PREM?

Ans: The broad objectives of PREM are :

1. evaluate the functioning of the Railways and exchange date and ideas on way and means of improving the efficiency and viability of the enterprise
2. to facilitate effective and meaningful participation of the Railway employees in the management process.
3. to discuss and identify the measures for improving the quality of service in the rail passengers and safety operations.

Q.10 What is Trade Union Act 1926?

Ans: The Act provides for Registration of Trade Unions. It clarifies privileges of Registered Trade Unions and Rules.

Q.11 What is a tribunal and purpose of CAT.?

Ans: It is a forum appointed by a statute having powers to all adjudicate on the matter falling within its jurisdiction. The Central Government has Established. Administrative tribunals with effective from Nov. 1st 1985.

Purpose: Speedy and inexpensive adjudication or trial of disputes or complaints regarding recruitment and conditions of service of Central Government employees.

Q.12 What is workmen's compensation act 1923 and its features?

Ans: It provides for Payment of compensation to workers in case of accidents involving injuries to them or to their dependents in case of death. The Act also provides for a machinery to deal with claims of the workers.

Important features:

1. Pay limit which was Rs.1000 hitherto) for a person in Schedule II to be a "Workman" has been removed. So now such a person shall be covered by this Act irrespective of his pay limit.
2. The amount of compensation will now be related to a 'relevant factor' has been given in Schedule IV.
3. ½ monthly payment will now be 25% of monthly wages.

4. Amount spent on medical treatment shall not be deemed as a payment or allowance received by worker
5. A new and more comprehensive Schedule III of Occupational diseases' has been given.

Q.13 What are the objectives and applicability of factories act 1948?

Ans: The Act lays down the obligation of the occupier of a factory in the matter of cleanliness of the premises, disposal of wastes and effluents, maintenance of proper ventilation and temperature, prevention of overcrowding, provision of cool drinking water, latrines and urinals, fencing of machinery, maintenance of machines in safe condition, precautionary measures against fire hazard, provision of washing facilities, fixing of weekly holidays and payment of overtime allowance, prevention of accidents etc. The factories Act applied to all Railway Workshops and production units, but does not extend to Loco sheds and carriage and Wagon Depots which have been specially exempted.

Q.14 What are the objectives and applicability of payment of wages act 1936?

Ans: This Act Aims securing prompt and regular payment of wages with out any arbitration. Deductions to certain clause of person employed in Industrial Establishment including Railway either directly or through a sub – Contractor by a person full filling agreement with Railways and Employing or having employed twenty or more person are any day of proceeding 12 months.

Q.15 What is the classification of workers under HOER?

Ans: (i) Continuous: An employment is continuous except when it is “Excluded” or declared to be “Intensive” or “Essentially Intermittent”.

(ii) Intensive: An employment is intensive when declared to be so on grounds that it is of a strenuous nature involving continued mental or physical strain or hard manual labour with little or no periods of relaxation.

(iii) Essentially intermittent: An employment is essentially intermittent. When it is declared to be so on grounds that daily hours of duty normally include periods of inaction aggregating to six hours or more including at least one such period of not less than one hour or two such periods of not less than half an hour each during which the employee may be on duty but is not called upon to display either physical activity or sustained attention.

Q.16 What is the railway conduct rule 1966

Ans: The conduct rules which were revised as a result of recommendation of Shanthanam Committee and other prescribed the standard of conduct expected of every Railway servant and members of their family. All orders / instructions issued by Supervisors from time to time must be obeyed.

Q.17 What are the principles for natural justice?

Ans: Principle of natural justice are the principles which lay down and elaborate the reasonable opportunity which should be given to the charged employee.

Principles:

1. The hearing must be impartial.
2. Reasonable opportunity should be given to defend the case.

3. Reasons for decisions should be made known to the accused.
4. The charges should be intimated in advance.
5. Justice should not only be done, it should also appear to have been done.

Q.18 Describe appointing authority ?

Ans Appointing Authority in relation to a Railway Servant means –

(a) the authority to make appointment to the service of which the railway servant is, for the time being a member or to be grade or the service in which the Railway servant is, for the time being included or

(b) the authority empowered to make appointments to the post which the Railway servant for the time being holds. Or

(c) The authority which appointed the Railway servant to such service, grade or post, as the case may be or

(d) where, the Railway servant having been a permanent member of any other service or having substantively held any other permanent post, has been in continuous employment under the Ministry of Railways, the authority which appointed him to that service or to any grade in that service or to that post, whichever authority is the highest authority.

Q.19 Describe disciplinary authority ?

- Ans:
- (a) In relation to the imposition of a penalty on a Railway servant, the authority competent, to impose on him penalty is as per schedule in normal course and in case of imposing major penalties such authority would be Appointing Authority.
 - (b) In relation to Rule 9 (Major Penalty) and clauses (a) and (b) of sub rule (1) of Rule 11 (Minor Penalty) in the case of any Gazetted Officer, an authority competent to impose any of the penalties specified in Rules 6.
 - (c) In relation to Rule 9 in the case of any non-gazetted Railway servant, an authority competent to impose major penalties specified in Rule 6.

An authority, who can impose any penalty under D&A rules, may impose a minor penalty.

For initiating a disciplinary proceeding, an authority who is competent to impose a minor penalty, may issue the charge sheet. But as soon as he comes to know that based on the Inquiry (the punishment required to be imposed is not within his competence, he should forward the case to the competent authority.

Q.20 Define suspension under DA & R ?

Ans: Suspension is not a penalty.

(1) An employee may be placed under suspension –

(i) When a disciplinary proceeding is contemplated or pending against him or

(ii) When engaged in activities prejudicial to the interest of the State, or

(iii) When a criminal case is pending investigation, inquiry or trial..

(2) An employee shall be deemed to have been suspended:-

(i) If he remains in police custody for exceeding 48 hours.

(ii) If he is convicted for an offence and sentenced to imprisonment for a period exceeding 48 hours and is not forthwith dismissed removed or compulsorily retired.

Q.21 Define deemed suspension under DA & R ?

Ans: When a penalty of dismissal, removal or compulsory retirement, imposed on an employee under suspension, is set aside on appeal or revision and the case is remitted for further inquiry or action, the order of his suspension shall be deemed to have continued in force from the date of the original order of dismissal etc.

Q.22 Describe subsistence allowance?

Ans: Subsistence Allowance is allowance granted to employee under suspension equal the leave salary an half average pay and allowance admissible on such pay.

Q.23 Mention any four types of minor penalties?

Ans: Minor: (i) Censure
(ii) Withholding of promotion for specified period.
(iii) Recovery from pay of the whole or part of any pecuniary loss caused to the Rly. Adm. by his negligence etc.
(a) Withholding of passes or PTOs or both
(b) Reduction to lower stage in time scale for not more than 3 yrs. Without cumulative effect and not affecting adversely his retirement dues.
(iv) Withholding of increments (with or without cumulative effect).

Q.24 Mention any four types of major penalties?

Major: (1) Reduction to a lower stage
(2) Reduction to a lower time-scale, grade, post or service
(3) Compulsory Retirement
(4) Removal
(5) Dismissal.

Q.25 What is ex-party enquiry?

Ans: When charged employee refuses to participate the despite repeated sittings, but not when he is submitting Medical Certificate of sickness Ex-partee inquiry is conducted.

Q.26 What is the period of availability of privilege passes?

- a) Single Journey pass – 3 months from the date of issue
- b) Return Journey pass – 4 months from the date of issue
- c) Settlement Pass – 1 year from Retirement
- d) Kit Wagon Pass – 1 month from issue.

Q.27 What is the meaning of “Family” in view of passes?

- Ans:
- (i) Wife/Husband whether earning or not.
 - (ii) Son under 21 years when wholly dependent
 - (iii) Unmarried daughters of any age – earning or not
 - (iv) Widowed daughters when wholly dependent (“Wholly dependent” is one whose monthly income from all sources including pension/pension equivalent does not exceed Rs.3000/- to rs.3500/- p.m. plus appropriate dearness relief as sanctioned from time to time or 15% of pay whichever is more.
 - (v) Step-sons, unmarried step-daughters.
- Age limit will not apply to bonafide students and invalid children,.

Q.28 Mention any 8 types of passes. ?

- Ans
- 1. Privilege Pass
 - 2. Resident Card Pass
 - 3. Duty Pass
 - 4. Post Retirement Passes
 - 5. Special Passes
 - 6. Kit Passes or Transfer/Retirement
 - 7. School Pass
 - 8. Platinum Pass.

Q.29 What is encashment of leave?

- Ans: Those retiring after 30-09-77 were able to draw cash equivalent of leave salary on average pay to the extent of LAP at their credit at the time of their retirement subject to maximum of 300 days LAP
- For Group C & D Employees during service eligible Encashment of leave average pay upto 10 days at the time of availing passes/PTOs for a maximum period of 60 days in their entire service.

Q.30 What is the procedure for sanction of commuted leave?

Ans: Reconversion or commutation of one type of leave into another retrospectively may be considered if the sick and fit certificates are from the Authorized Railway Medical Attendant. LHAPs may be committed to LAP by surrendering 2 days LHAP for one day of LAP without any limit in case of an medical grounds.

Q.31 Define Maternity Leave?

Ans: It is a full pay leave, Female Government Servant with less than 2 Serving Children may be granted Maternity leave by an authority competent to grant leave for period of 135 days from the date of its commencement.

Total period of Maternity leave on account of mis-carriage/abortion should be restricted to 45 days in the entire service of Female Railway servant..

Q.32 Give any six General leave rules?

Ans: General:

- a) Leave cannot be claimed by the employee as a matter of right. The right to grant or refuse leave vests in the authority competent to sanction leave.
- b) The leave usually commences on the day charge is handed over and ends on the day the charge is taken over again.
- c) Leave sanctioning authority cannot alter the kind of leave due and applied for except at the written request of the employee.
- d) Leave already availed may be converted into another kind of leave on employee's request retrospectively but not after retirement.
- e) Leave cannot be sanctioned for more than 5 years.
- f) Combination of holidays proceeding or in continuation of leave is permitted. In case of medical certificate of sickness, the holidays will be part of sickness leave.
- g) The employee is not permitted to take up any employment during the period of leave.

Q.33 What is LHAP?

Ans: At the rate of 20 days per year. No restriction on accumulation. It can be availed on medical certificate or otherwise. It may be commuted to LAP by surrendering 2 days LHAP for one day of LAP without any limit in case of on medical grounds and upto 180 days in entire service in other cases. However, if any employee does not return to duty after commuted LHAP is over, it shall be reconverted to LHAP. Teachers will not earn LHAP after 11-12-84.

Q.34 Describe any six kinds of leave?

Ans: 1. LAP (Leave Average Pay)

2. LHAP (Leave Half Average Pay)
3. CL (Casual Leave)
4. ML (Maternity Leave)
5. SDL (Special Disability Leave)
6. S L (Study Leave)

Q.35 What is Restricted Holiday?

Ans: Restricted Holidays are optional Holidays. Two Restricted Holidays are to be selected by each employee working in administrative office from the list circulated for this purpose. The office opens on these days.

Q.36 What is productivity-linked Bonus?

Ans: Productivity Linked Bonus is a Bonus based on the productivity of the Railway during the year. The year 1977 – 100 is the base year entitling to a Bonus of 25 days and any excess or decrease over it by 2250 million Revenue Tonne KM will less bonus. If the productivity falls below Index 90 then no Bonus shall payable for that year.

Q.37 What is Incentive bonus?

Ans: If an employee does not withdraw any amount from his Provident Fund Account (including Voluntary Provident Fund) for a period of three continuous years. He is granted additional 1% incentive bonus as interest after adding up his interest for the third year.

Q.38 What is PF?

Ans PF is Provident Fund. Every employee contributes 8 ½% of his monthly pay to his Provident Fund Account which is maintained in the Accounts Department. This amount to recovered from his pay Bill. Each Provident Fund Account is allotted a Specified number.

Q.39 What is Local Purchase?

Ans: The local Purchase need of stock and Non-stock items arises (a) to meet the emergencies (b) to maintain operation efficiency (c) to procure items of small value which have not been stocked as per policy of Railways and (d) when supplies are not received against contracts and stores are required immediately.

Q.40 Describe the PL Number under the Material Management?

Ans The stores items have been codified in an eight metric structure under an “Integrated Data Processing Technique for materials and Stores”. The code number of an item (XX XX XXXX) is described as follows: First two digits indicate the group as per revised classification. Next two digits indicate the sub-group in which the item is listed. Last four digits indicate the serial number of all item – the last digit of the four represents the check digit calculated on MODULUS ii METHOD.

Q.41 What is the ABC Method of material Management?

Ans ABC Analysis: To have EFFECTIVE CONTROL, THE Railway Board have classified the stores and fixed ceilings as under: A. 1. Category: Annual usage value – above Rs.5 lakhs A. 2 Category: All items having annual usage value between Rs.50,000 and 5 lakhs - Stock not

to exceed three months requirement.

B.1 Category: All items having annual usage of Rs.25,000 & above but below Rs.50,000 – Stock not to exceed six months requirement.

B 2. Category: All items having annual usage value of Rs.10,000 and above, but below Rs.25,000/- - Stock not to exceed six months requirements.

C Category: All items having annual usage of value of below Rs.10,000 – Stock not to exceed 12 months requirement.

D Category: All items which not moved more than one or two years. ---

Q.42 Under what condition should a PAC is issued.?

Ans: Proprietary Article Certificate is issued to Purchase the material if (a) No other make/brand will be suitable (b) This is the only firm who is manufacturing/stocking this item and (c) A similar article is not manufactured/sold by any other firm which could be used in lieu.

Q.43 What is Limited Tender?

Ans: Purchase through advertised tender is time consuming process and therefore, when the purchase value is less than Rs.3 lakhs or if the item is urgently required, we invite tenders from a limited number of firms. These firms are normally our approved suppliers, but in certain cases, limited tenders can be invited from unregistered firms also with the approval of the competent authority

Q.44 How to procure the stock items?

Ans: Stock items are purchased through COS/SC calling for tenders by Limited and Open tenders.

Q.45 How to revise the AAC of stock items?

Ans: AAC of the stock items are made once in a year. The same is vetted by accounts and sanctioned by ADRM. The items which are obsolete has to be deleted the items which are low value as to be deleted and procured through imprest. To increase the items of AAC justification should be given for increased in the AAC of the item.

Q.46 What is the Special Indent and when it should be used?

Ans: The special indent is used when item is not an imprest item for the consignee as special account and also the full quantity of the item is not supplied against P.D. (Periodical demand) and balance quantity will be drawn against special indent.

Q.47 What is the procedure for making the non-stock item into stock item?

Ans: The Non-stock item which is used frequently by the user department such items are to be converted into stock items. The stock items are procured by stores department and stock at various depots. The whole procedure for converting from NS to Stock item is done by SAF. The NS item is sent to stores depot for certification of stocking of the item and Associate Finance vetting is done and forwarded to HQrs. For onward transmission to COS Office for stocking and purchase. .

Q.48 What is Zero based Budgeting?

Ans ZBB is that all the financial requirements of a Budget unit are analyzed, evaluated and justified annually and not just the increased or additional requirements. It is evaluation

and prioritization of all programmes at different levels of efforts.

Q.49 What is the procedure for indent T & P items?

Ans: Non-Stock Indent has to be placed for procurement of T&P Item. Indent Rate up to 10,000/- should be approved by JAG Officer. Indent Rate more than Rs.10,000/- approval should be taken from ADRM / SAG for procurement of T&P items.
