

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,

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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

QUESTION BANK WITH ANSWERS FOR JEE – II EXAMS (AC cadre)**15) Write down types of motors?**

Ans: According the current there are two 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 be 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 1Ø AC motor & 3Ø AC motor?

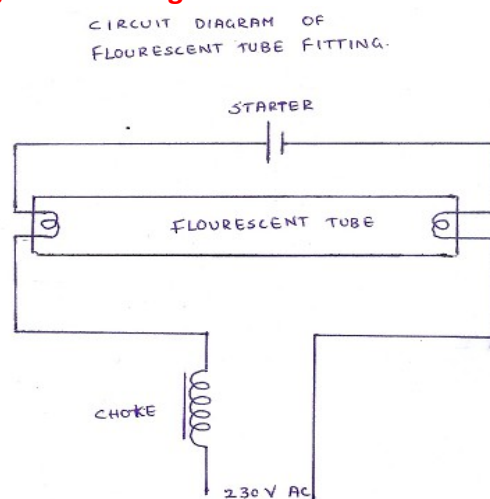
Ans: The direction of rotation of single-phase AC motor is changed by changing the capacitor connections from starting winding to running winding and vice versa. The direction of rotation of three-phase AC motor is changed by changing the phase sequence of three-phase supply.

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 moter 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.

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

QUESTION BANK WITH ANSWERS FOR JEE – II EXAMS (AC cadre)**(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.

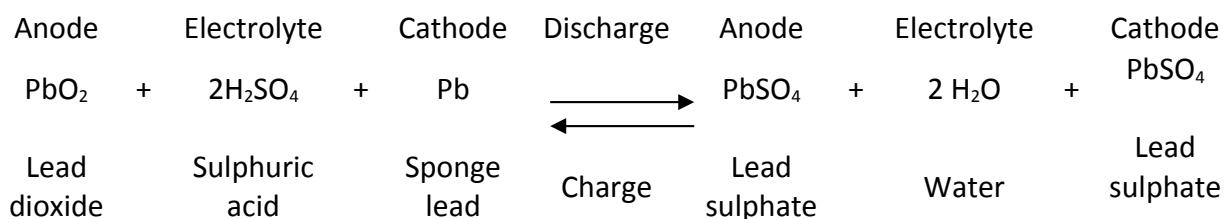
(e) What are the fundamental laws of Thermodynamics?

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	Available	Integrated in the power panel

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	board		
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

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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 hermitically 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.

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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?

Ans: There are four types of fires classified. They are

- | | | |
|--------|---|---|
| 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

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- 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?

Ans: Regulator settings:

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 proper operation
- Start the plant and check condenser motor, compressor motor, blower motor 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?

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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.

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- 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.