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INTEGRAL COACH FACTORY::CHENNAI-38

Question paper for selection of Assistant Electrical Engineers through
Departmental Examination.

Date: 05-09-08

Time: 3 hours
Max. Marks: 150

NOTE: 1) Answer any THREE questions from Part A, TWO questions from Part B and any 15 questions from Part C.

2) Part C should be answered in Question Paper itself. Each question carries 2 marks.

Part A

Marks: 3 x 30

1. (a) Draw the power and auxiliary schematic diagram of the AC DC EMU with Siemens Electrics. (15)
(b) Describe the comparative function of each component when the coach is under 25 kv AC OHE and 1500 V DC OHE (10)
© What are the advantages of 3 Ph. AC DC EMUs over conventional AC EMUs? (5)
2. (a) Explain the EOG type of train lighting and air-conditioning system with a schematic diagram. (10)
(b) What is HOG system of train lighting & air-conditioning? Explain its basic features. (5)
© Explain the air-conditioning system being adopted in the latest version of Rajasthan Tourism coaches. Give the ratings of the major components and draw the schematic of the system. (15)
3. what do you understand by Energy Conservation ? What are the features of the Indian Electricity Act 2003 with reference to Energy conservation ? (10)
(b) What measures have been taken at ICF for energy conservation? What is the annual consumption of energy of ICF and explain the tariff structure applicable to ICF? (10)
(c) What do you understand by Green Energy? Explain the various features of wind mill generation. What is the capacity of the wind mill plant planned for ICF and how will it benefit ICF? (10)

4. (a) Explain the power and auxiliary circuit of 1400 hp DEMU with a neat schematic diagram and give the rating of main equipments. (15)

(b) What are the functions of the following equipments in DETCs – (10)

- (i) Electronic Governor
- (ii) Rotating diode assembly in traction alternator
- (iii) Auxiliary alternator
- (iv) Hydraulically operated lifting and swiveling platform
- (v) Pneumatic compressor.

(c) What are the advantages of 3 Ph. AC motors over DC motors for traction application? (5)

5. Write short notes on any four of the following: (4 x 7.5)

- (i) 25 kVA Brushless alternator
- (ii) Electronic Regulator cum Rectifier Unit
- (iii) Valve regulated Lead Acid Batteries
- (iv) Initial charging of Lead Acid Batteries
- (v) Code of Prevention of Fire in coaches
- (vi) Various types of pumps used for water supply system and the maintenance problems in pumps.

6. (a) Draw the lay-out of the sub-station for feeding the 25 kV Single Phase AC supply and 1500 V DC supply for the testing of AC DC EMUs & explain the function of the various components along with the ratings. (15)

(b) What are the safety precautions to be followed in the commissioning shed for going on to the roof of the EMUs/coaches placed in the commissioning shed? (10)

(c) Describe the LED based emergency lighting adopted in the coaches. (5)

7. Write short notes on any three of the following: (3 x 10)

- (i) The schedules of maintenance of Diesel Generating sets used as a stand-by power supply in ICF.
- (ii) Typical lay-out of any sub-station feeding a set of shops in the Shell Division.
- (iii) Problems in the maintenance of power supply system of the shops and various measures adopted to improve the reliability. Explain the various types of circuit breakers used in the sub-stations in ICF.
- (iv) Carbon trading
- (v) Preventive maintenance schedule for the pumps

Part B

1) What are the steps to be followed for serving a major penalty charge sheet? List the punishments that can be given under minor penalty and major penalty charge sheets. (15)

2) Write short notes on any TWO of the following: (2 x 7.5)

- (i) Workmen's Compensation Act
- (ii) Factories Act
- (iii) Staff Council
- (iv) Official Language Implementation Policy

3) (a) Name the three states under each region A, B & C as per OLIC Act. What are the level of correspondences should be made in Rajbasha within the states coming under category "C" ? (10)

(b) Name three examinations relating to proficiency in Rajbasha. (5)

4) Explain any three of the following. (3 x 5)

- (i) Various stages of estimates
- (ii) Plant & Machinery programme
- (iii) WMS
- (iv) Incentive scheme in ICF
- (v) Various types of tenders
- (vi) Budget

Part C

Attempt any 15 questions: Each question carries 2 marks. Tick only one option. If more than one option is ticked, no marks will be given. In case, over attempt of the question is done, first 15 will be evaluated.

- 1) As per IE rules, the frequency of power supply should be within
(a) ± 0 (b) ± 3 (c) ± 5 (d) ± 10
- 2) Maximum permissible resistance of earth system at a large power station is ohm
(a) 0.5, (b) 1.0 (c) 8.0 (d) 10.0
- 3) Effective capacitance of two 32 MFD capacitor in parallel is MFD
(a) 16, (b) 32, (c) 64 (d) 48
- 4) belongs to the same family of semi-conductor devices as GTO & SCR
(a) Capacitor, (b) Inductor, (c) Diode, (d) IGBT
- 5) The traction motor used in AC DC EMU is
(a) Single Ph. AC (b) DC (c) 3 Ph. AC Synchronous (d) 3 Ph. AC asynchronous
- 6) Which of the following is a eco-friendly refrigerant?
(a) R-12, (b) R-22, (c) R-407, (d) None of these
- 7) The resistance of the semi-conductor will with increase in temperature.
(a) increases, (b) decreases, (c) remains constant, (d) none of these.
- 8) The field effect transistors have conductivity with
(a) both holes & electrons, (b) only holes, (c) only electrons, (d) either electron or holes

9) A 500 hp, 3 Ph. 440 V, 50 Hz, 6 pole Inductor Motor runs at 950 rpm on full load. Then the slip is %.

- (a) 0.5, (b) 5, (c) 10, (d) 50.

10) If the voltage applied to a heater is doubled, the power drawn is

- (a) doubled, (b) halved, (c) 4 times, (d) $\frac{1}{4}$.

11) The period of sinusoidal wave of 50 Hz is seconds

- (a) 50, (b) 100, (c) 0.02, (d) none of these.

12) The resistance of a 4 kW heating element which draws 10 Amp. Current

- (a) 100 ohms, (b) 40 ohms (c) 10 ohms (d) none of these

13) 3 Ph. Induction motor shall if fuse of one of the phases blows

- (a) stop, (b) run in the opposite direction, (c) keep running, (d) none of these.

14) If a dc input voltage is given to the transformer primary winding, the transformer will

- (a) convert the dc into ac, (b) no output on the secondary side, (c) the transformer will get burnt, (d) none of these.

15) Pure inductors of 5 mH when connected to 230 V, 50 Hz supply will consume

- (a) 115 kVA power, (b) 5 kVA power (c) 0 power, (d) none of these.

16) Synchronous speed of 4 Pole, 50 Hz, 400 V Induction Motor is rpm

- (a) 1000, (b) 1500 (c) 3000 (d) none of these

17) What method of speed control is used in AC EMU traction motors?
(a) Series-parallel combination of motors (b) Armature resistance,
(c) Slip Control, (d) Tap Changer control.

18) A Single Phase AC supply produces field
(a) Rotating, (b) Static, (c) Pulsating, (d) none of these.