

INTEGRAL COACH FACTORY :: CHENNAI 600038

Question paper for selection of Assistant Electrical Engineers
through Departmental Examination

Date : 11.11.2013

Time : 3 hours

Max. Marks : 150

NOTE: Answer any **THREE** questions from Part-A, **TWO** questions from Part-B and **ALL** 15 questions from Part-C.

PART-A

Marks : 3 x 30

Attempt any **THREE** questions. Each question carries 30 marks. If more than three questions are attempted, only the first three will be evaluated.

1. (a) Draw the schematic diagram of a Ring Main System for power distribution and explain its function. (12)
- (b) Compare the radial system of power distribution with Ring Main System giving the advantages and disadvantages of each system. (8)
- (c) What is the purpose of system earthing and equipment earthing. Explain how earth resistance of earth electrode is measured? (10)
2. (a) Explain the constructional features of a 4.5 KW brushless alternator used in train lighting system. (7)
- (b) Give a schematic diagram of 110 V dc train lighting system. (8)
- (c) What are the main components of an ERRU? Explain their function? (8)
- (d) What are the different train lighting systems currently in operation in Indian Railways? (7)
3. (a) Give the schematic diagram of the air-conditioning system of a 2- tier ac coach. Explain the function of various components of the system. (12)
- (b) What are the features/devices provided in the control panel to ensure safe operation of the air-conditioning system? (8)
- (c) What are the different types of air-conditioning units available for air-conditioning office buildings? Give their relative merits. (10)

4. (a) Give the power schematic diagram of the 3-phase MUTP phase-I or phase-II EMU rake and briefly explain the functioning of various parts. (14)
- (b) What are the different types of brakes provided in the MUTP 3-phase EMU rake? (8)
- (c) What is the role of AWS provided in AC EMU (8)
5. Write short notes on the following: (5 x 6)
- (a) Variable voltage, variable frequency drive for induction motors.
- (b) Vertical turbine pump.
- (c) VRLA batteries.
- (d) Green initiatives taken at ICF.
- (e) 2 x 650 Ah battery system for ac coach.

PART-B

Marks : 2 x 15

Answer any **TWO** questions. Each question carries 15 marks. If more than two questions are attempted, only the first two will be evaluated.

1. (a) Explain the incentive system in ICF. (8)
- (b) Explain in detail the procedure to be followed for imposing major penalty. (7)
2. Write short notes on the following: (3 x 5)
- (a) Workmen Compensation Act.
- (b) Retirement benefits for Railway employees.
- (c) HOER.
3. Write short notes on the following. (3 x 5)
- (a) Machinery & Plant proposal.
- (b) Workshop Manufacturing Suspense (WMS)
- (c) Work Register
4. (a) Explain the scheme of cash awards and incentives for encouraging the use of Hindi in Central Government offices.(10)
- (b) Name 3 states under each region A, B and C as per the OLIC Act. (5)

PART-C

Attempt **ALL 15** questions. Each question carries 2 marks. Write the answer in your answer book.

1. The efficiency of a transformer is usually in the range of
(a) 50-60% (b) 65-75% (c) 70-90% (d) 90-98%
2. During parallel operation of transformer incorrect polarity will result in
(a) Open circuit (b) dead short circuit (c) regeneration of power
(d) power factor will be different from that of the connected load
3. The back emf of a motor at the time of starting is
(a) Zero (b) maximum (c) minimum (d) optimum
4. Series motors have relatively
(a) Low starting torque (b) high starting torque
(c) medium starting torque (d) zero starting torque
5. Running the machine at no load is inadvisable for
(a) dc shunt motor (b) dc series motor
(c) induction motor (d) synchronous motor
6. The synchronous speed of a 12 pole 3-phase induction motor connected to 50 Hz. supply will be
(a) 500 rpm (b) 600 rpm (c) 700 rpm (d) 400 rpm
7. Which of the following has significant influence on the power factor of an Alternator?
(a) Excitation (b) Speed of alternator (c) HP of a prime mover (d) load
8. A synchronous motor operates only at the synchronous speed which is determined by the
(a) Back emf and flux (b) number of poles and the supply frequency
(c) supply voltage and synchronous impedance
(d) back emf and the supply frequency
9. A power factor of zero indicates
(a) Purely resistive element (b) purely reactive element
(c) both (a) and (b) (d) none of the above

10. Which of the following is true for a 3-phase delta connected circuit?
- (a) Line currents are equal to phase currents
 - (b) Line voltage is equal to phase voltage
 - (c) Line currents are 90 degrees apart
 - (d) Line voltage is 1.732 times the phase voltage
11. If the voltage applied to a heater is doubled, the power drawn is
- (a) doubled
 - (b) halved
 - (c) 4 times
 - (d) 1/4 times
12. A single phase ac supply produces
- (a) rotating field
 - (b) static field
 - (c) pulsating field
 - (d) none of the above
13. The efficiency of a transformer is maximum when
- (a) copper losses are minimum
 - (b) iron losses are minimum
 - (b) copper loss is equal to iron loss
 - (d) none of the above
14. A 2-pole 3-phase induction motor runs at 2910 rpm on a 50 Hz. Supply. The frequency of a Rotor emf is
- (a) zero
 - (b) 50 Hz.
 - (c) 1.5 Hz.
 - (d) 2.5 Hz.
15. Electrical energy generated by ICF every year through its wind mills is of the order of
- (a) 1 million units
 - (b) 50 million units
 - (c) 100 million units
 - (d) 20 million units
