

AMIETE – ET (Current Scheme)

Time: 3 Hours

December 2016

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. A transformer operates at its maximum efficiency at any load when,

(A) Copper losses are minimum	(B) iron losses are minimum
(C) Copper loss is equal to iron loss	(D) all the losses are minimum

- b. An induction motor having 8 poles runs at 727.5 rpm. If the supply frequency is 50 Hz, the emf in the rotor will have a frequency of

(A) 1.5 Hz	(B) 48.5 Hz
(C) 5.15Hz	(D) 75Hz

- c. A voltmeter gives 120 oscillations per minute when connected to rotor of an induction motor. The supply frequency given to stator is 50 Hz. The slip of the motor is

(A) 2%	(B) 4%
(C) 5%	(D) 25%

- d. To improve the efficiency of thermal power plant _____ is placed between boiler and turbine

(A) ash handling point	(B) air preheater
(C) economizer	(D) superheater

- e. In which power plant, the thermal efficiency is quite low?

(A) Diesel power plant	(B) Steam power plant.
(C) Hydro power plant	(D) Nuclear power plant

- f. Materials which lack permanent magnetic dipoles are called

(A) dia-magnetic	(B) ferro-magnetic
(C) semi-magnetic	(D) None of these

- g. Which of the following is the ferroelectric material?

(A) Rochelle salt.	(B) Potassium dihydrogen phosphate
(C) Barium titanate	(D) All of these

- h. Internal resistance of a battery cell increases with
 (A) increases in concentration of electrolyte.
 (B) increase in distance between two electrodes.
 (C) increases in area of the plates inside the electrolyte.
 (D) increase in size of the electrodes
- i. Unit of electro - chemical equivalent of the substance of electrolyte is
 (A) Kg - Coulomb. (B) Kg / Coulomb.
 (C) Coulomb / Kg (D) Kg / °C
- j. Pure metal generally have
 (A) high conductivity and low temperature coefficient.
 (B) high conductivity and large temperature coefficient.
 (C) low conductivity and zero temperature coefficient.
 (D) low conductivity and high temperature coefficient.

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. On a 200 KVA, 2500/250V, 50Hz single-phase transformer, the following test data were obtained:
 O.C. test: 250V, 1.4A, 105W, LV side.
 S.C. test: 104V, 8A, 320W, HV side.
 Obtain the equivalent circuit parameters as referred to H.V. side and referred to L.V. side. (8)
- b. What are the losses taking place in transformer? Explain them briefly. (8)
- Q.3** a. A 4-Pole shunt machine running at 1500 rpm has an armature with 90 slots having 6 conductors per slot. The flux per pole is 6×10^{-2} wb. Determine the induced emf as a dc generator, if the coils are lap connected. If the current per conductor is 100 amperes, determine the electrical power output. (8)
- b. Explain the term back emf when applied to dc motor. Briefly explain the role of back emf in starting and running of dc motor. (8)
- Q.4** a. A 3-phase delta connected 440V, 50 Hz, 4-pole induction motor has a rotor standstill emf per phase of 130Volts. If motor is running at 1440 rpm. Calculate for this speed, (8)
 (i) The Slip
 (ii) The frequency of rotor induced emf
 (iii) The value of running rotor-induced emf per phase and
 (iv) stator to rotor turn ratio.
- b. Show the relation $P_g : P_m : P_{cr} :: 1 : (1-s) : s$ for a three phase induction motor, where P_g is rotor input or air gap power, P_m is mechanical power developed, P_{cr} is rotor Cu loss and s is rotor slip. (8)

- Q.5** a. Explain principle of operation of a 3-phase synchronous motor. Why these motors do not have self-starting torque? (8)
- b. What is the effect of change of excitation at constant load in synchronous motor on its power factor? Write the applications of 3-phase synchronous motor. (8)
- Q.6** a. What are the various types of single – phase induction motor based on their starting principle? Explain briefly with their industrial applications. (8)
- b. Explain the construction and working of shaded pole motor. (8)
- Q.7** a. The core material of the transformer shown in Fig. 1 has the relative permeability of 4000. The center limb is required to carry a flux of 0.01 Wb. Find the current needed for the exciting coil. (8)

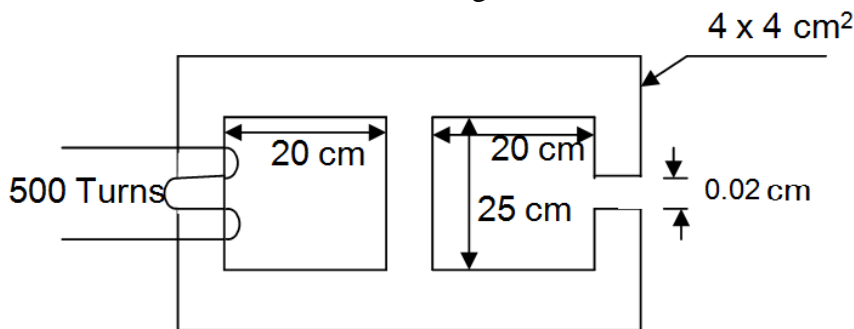


Fig. 1

- b. Explain the following terms: (4×2)
- (i) Magnetic leakage
 - (ii) Magnetic fringing
 - (iii) Eddy current loss
 - (iv) Hysteresis loss (explain with B-H curve)
- Q.8** a. Explain with the help of schematic diagram, how the electricity is produced in thermal power plant? (8)
- b. Explain briefly (4×2)
- (i) MHD power generation
 - (ii) Tidal wind power
 - (iii) Solar power
 - (iv) Geothermal power
- Q.9** a. Explain the following systems of distribution: (4+4)
- (i) Radial system
 - (ii) Ring main system
- b. Write short notes on the followings (4+4)
- (i) Distribution transformers
 - (ii) 3-wire DC distribution system