

AMIETE – ET (Current Scheme)

Time: 3 Hours

June 2019

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. Relationship between magneto motive force (mmf) and flux will be
 (A) Flux = mmf (B) Flux = 1/mmf
 (C) Flux = mmf/reluctance (D) Flux = mmf*reluctance
- b. For an ideal transformer,
 (A) Voltage regulation=20% (B) Efficiency=0 %
 (C) Copper loss= core loss (D) Winding resistance= 0
- c. When load impedance is transformed to the primary side,
 (A) Turns ratio² * load impedance (B) Turns ratio³ * load impedance
 (C) Turns ratio / load impedance (D) Turns ratio * load impedance
- d. If a conductor of length l moves at a linear speed v in a magnetic field B, the induced voltage in the conductor is
 (A) Bl/v (B) Bv/l
 (C) lv/B (D) Blv
- e. Distribution factor is given as,
 (A) Phasor sum of coil voltages * arithmetic sum of coil voltages
 (B) Phasor sum of coil voltages/ arithmetic sum of coil voltages
 (C) Arithmetic sum of coil voltages/phasor sum of coil voltages
 (D) Arithmetic sum of coil voltages+ phasor sum of coil voltages
- f. Slip for induction generator will be,
 (A) 0 (B) Positive
 (C) Negative (D) 1

- g. Capacitor start capacitor run motor will
 (A) Not improve power factor (B) Make power factor zero
 (C) Improve power factor (D) Make slip negative
- h. Starters will
 (A) Reduce running current (B) Increase voltage
 (C) Reduce starting current (D) Decrease voltage
- i. A three phase, 50 Hz, 6-pole induction motor runs at 940 r.p.m. Find the slip
 (A) 0.06 (B) 0.6
 (C) 0.006 (D) 6
- j. Which of the following is pollution free?
 (A) Thermal power plant (B) Solar power plant
 (C) Nuclear power plant (D) None of these

Answer any FIVE Questions out of EIGHT Questions.

Each question carries 16 marks.

- Q.2** In the magnetic circuit of Fig.1 the relative permeability of the ferromagnetic material is 1200. Neglect magnetic leakage and fringing. All dimensions are in centimetres, and the magnetic material has a square cross-sectional area. Determine the air gap flux, the air gap flux density, and the magnetic field intensity in the air gap. (16)

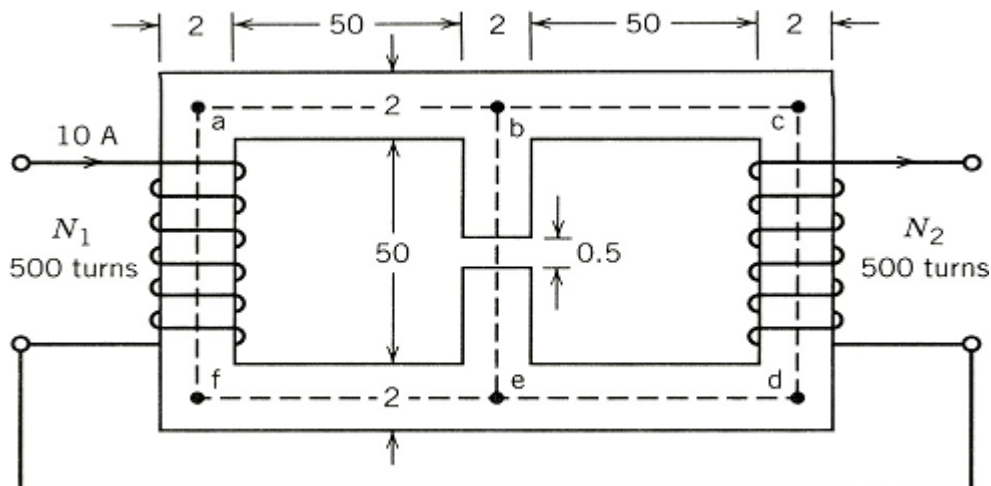


Figure 1 Magnetic circuit

- Q.3** a. A single phase transformer working at unity power factor has an efficiency of 90 % at both half load and at the full load of 500 W. Determine the efficiency at 75 % load and maximum efficiency. (8)

- b. Explain with neat diagram how emf is induced in secondary winding of a transformer? (8)
- Q.4** a. Derive and explain N-T, N-I, T-I characteristics of DC shunt motor. (8)
- b. A 6- pole dc machine armature has 36 slots 2 coil-sides/slot, 8 turns/coil and is wave wound. The pole shoe is 18 cm long and the mean air-gap diameter is 25cm. The average flux density over one pole pitch is 0.8T. Find the gross torque and mechanical power output when the machine is operating as a motor at 1200 rpm with an armature input current of 10A. (8)
- Q.5** a. The stator of a 3 ϕ machine has nine slots per pole and carries a balanced three-phase, double layer winding. The coils are short-pitched and the coil pitch is 7/9; that is, each coil spans seven slots. Determine the winding factor. (8)
- b. Explain the working and construction of synchlonous motots. (8)
- Q.6** a. Explain the various speed control methods of three phase induction motor. (8)
- b. A 4-pole, 50Hz, 3-phase induction motor when running in full load devlops a useful torque of 100 Nm while the rotor rmf is observed to make 120 cycles/min. It is know that the torque lost on account of friction and core loss is 7 Nm. Calcuete
(a) Shaft power output
(b) Rotor copper loss,
(c) Motor input, and
(d) Motor efficiency
The total core loss is given as 700W. (8)
- Q.7** a. Explain the working principle of shaded pole motors. (8)
- b. Explain the construction and principle of operation of Hysteresis motor. (8)
- Q.8** a. Draw and explain the working of hydro power plant with neat diagram. (16)
- Q.9** a. Explain various energy storage systems. (8)
- b. Explain the advantages of transmitting voltage at higher voltages. (8)