

AMIETE – ET (Current Scheme)

Time: 3 Hours

JUNE 2015

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. If a current increases from zero to one ampere in 0.1 seconds in a coil of inductance 5 mH, the magnitude of the induced emf will be
- (A) 0.005V (B) 0.5V
(C) 0.05V (D) 5V
- b. A bar magnet is released from rest along the axis of a very long vertical copper tube, after some time the magnet.....
- (A) will stop in the tube
(B) will move at almost constant speed
(C) will move with an accelerating
(D) will oscillate
- c. The core of the transformer is made of
- (A) Annealed copper
(B) Silicon steel
(C) Seasoned wood
(D) Aluminium
- d. If the full- load iron loss of a transformer is 100W at maximum efficiency, what will be its copper loss at half the load?
- (A) 100W (B) 50W
(C) 25W (D) none of these
- e. The number of parallel paths is the armature winding of a four-pole wave connected dc machine having 36 coil-sides is
- (A) 28 (B) 14
(C) 4 (D) 2

- f. A dc series motor should always be started with load because
- (A) at no – load it will rotate at dangerously high speed
 - (B) at no – load it will not develop high starting torque
 - (C) it cannot start without load
 - (D) it draws a small amount of current at no-load
- g. A 4-pole, 1200 rpm alternator will generate emf at a frequency of
- (A) 60 Hz
 - (B) 50Hz
 - (C) 40Hz
 - (D) 25Hz
- h. In a 50Hz, three phase induction motor running at 4% slip, the frequency of rotor current is about
- (A) 50 Hz
 - (B) 10 Hz
 - (C) 2 Hz
 - (D) Zero
- i. The motor used in a ceiling fan is
- (A) split-phase motor
 - (B) capacitor start motor
 - (C) shaded pole motor
 - (D) AC series motor
- j. Total installed electric power generation capacity of India is
- (A) 220000MW
 - (B) 1,20000MW
 - (C) 22000MW
 - (D) 36000MW

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

- Q.2** a. What is meant by hysteresis? Explain the terms retentivity and coercivity. **(8)**
- b. A mild steel ring having a cross-sectional area of 500 mm^2 and a mean circumference of 400 mm has a coil of 200 turns wound uniformly around it. Calculate:
- (i) The reluctance of the ring
 - (ii) The current required to produce a flux of $800 \mu\text{wb}$ in the ring. Assume the relative permeability of mild steel to be 380. **(8)**
- Q.3** a. Explain how various losses in a transformer can be found from practical tests without actually loading the transformer. **(8)**
- b. A 10 – kVA, 200V/400V, 50 Hz, single-phase transformer gives the following test results:
- Open-circuit test (HT windings open-circuited): 200V, 1.3A, 120W
 - Short- circuit test (LT winding short-circuited): 22V, 30A, 200W

Calculate

- (i) the magnetising current and the current corresponding to core loss at normal voltage and frequency
- (ii) the parameters of equivalent circuit as related to LT winding. (8)

Q.4 a. Draw the power flow diagram for a dc motor and explain it. (8)

- b. A 6-Pole, lap –connected armature with 864 conductors dc motor takes an armature current of 110A at 480V, the armature circuit has a resistance of 0.2Ω . The flux per pole is 0.05Wb. Calculate:
- (i) The speed and
 - (ii) The gross torque developed by the armature. (8)

Q.5 a. Explain the effect of change in excitation of a synchronous motor on

- (i) its armature current
- (ii) its power factor (8)

- b. State the advantages of having rotating field system rather than a rotating armature system in a synchronous machine. (8)

Q.6 a. Prove that the frequency of the rotor induced emf in an induction motor is slip times the stator supply frequency. (8)

- b. A three-phase, 6-pole, 50Hz induction motor develops maximum torque at a speed of 940 rpm. If the rotor resistance per phase is 0.1Ω , determine the stand still rotor reactance. (8)

Q.7 Write short notes on any TWO: (8×2)

- (i) Shaded pole motor
- (ii) Hysteresis motor
- (iii) Universal motor

Q.8 a. With the help of a neat diagram explain the functions of various components of a coal fired generating station. (8)

- b. With the help of a neat diagram explain the layout for a storage type hydro power plant. (8)

Q.9 Write short notes on the following: (8×2)

- (i) HVDC Transmission
- (ii) Energy Storage