

AMIETE – ET

Time: 3 Hours

JUNE 2014

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. The energy stored in an inductor is given by

(A) $\frac{1}{2}LI^2$ Joules

(B) $\frac{1}{2} I L^2$ Joules

(C) $L I^2$ Joules

(D) None of these

b. Keeping flux density constant, the iron loss of certain transformer at half of the rated voltage is measured as 400 W. Then the iron loss at rated voltage will be

(A) 800 W

(B) 200 W

(C) 400 W

(D) 1600 W

c. If the field current of a d.c. generator is increased, then its emf output:

(A) Increases indefinitely

(B) Increases till the winding burns

(C) Increases till the magnetic saturation takes place

(D) First increases and starts decreasing

d. The span for a full-pitch coil-wound for 6-pole alternator is _____ (mechanical)

(A) 45°

(B) 60°

(C) 90°

(D) 180°

e. In a 50 Hz, three phase induction motor, the frequency of the rotor current is about _____ when slip is 4%.

(A) 50 Hz

(B) 10 Hz

(C) 2 Hz

(D) Zero

- f. The direction of rotation of an ordinary shaded pole single- phase induction motor
- (A) can be reversed by reversing the supply terminal connections to the stator winding
 - (B) cannot be reversed
 - (C) can be reversed by open-circuiting the shading rings
 - (D) can be reversed by short- circuiting the shading rings
- g. In a capacitor-start capacitor-run motor the two capacitors
- (A) have similar construction
 - (B) are of different types
 - (C) have equal capacitance
 - (D) are disconnected when the motor attains full speed
- h. Which of the following power plant has least running cost per KWH or KWh.
- (A) Diesel power plant
 - (B) Nuclear power plant
 - (C) Thermal power plant
 - (D) Hydro-electric power plant
- i. The moderator used in fast breeder reactor is
- (A) Heavy water
 - (B) Graphite
 - (C) Ordinary water
 - (D) Any of these
- j. Load shedding is possible through
- (A) Voltage reduction
 - (B) Frequency reduction
 - (C) Switching off the loads
 - (D) Any of these

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

- Q.2** a. Discuss energy stored in the linear magnetic systems. (8)
- b. A small piece of metal wire is dragged across the gap between the pole pieces of a magnet in 0.5 second. The magnetic flux between the pole pieces is known to be 8×10^{-4} wb. Estimate the emf induced in the wire. (8)
- Q.3** a. Explain the efficiency of a transformer. Deduce the condition for maximum efficiency and maximum efficiency of transformer. (8)
- b. Calculate the voltage regulation of a transformer in which the resistive drop is 10% of the output voltage and the reactive drop is 5% of the output voltage, when the power factor is 0.8 lagging? (8)
- Q.4** a. Explain two methods of speed control of DC Shunt motors. (8)

- b. A 50 KW, 230V DC Shunt motor takes a current of 14.5 A at no load when running at 1640 r.p.m. The armature and field resistance are 0.15Ω and 120Ω respectively. Estimate the motor efficiency when the motor is drawing 215 A. What would be the maximum efficiency of the motor and the load current at which it would occur? (8)
- Q.5** a. Explain how can you determine the value of synchronous reactance of a synchronous machine experimentally. (8)
- b. Draw and explain V-curves for synchronous machines? (8)
- Q.6** a. Explain how a rotating magnetic field is produced in a three-phase induction motor. (8)
- b. A 6.6 KV, 20-pole, 50Hz, 3-Phase star connected induction motor has a rotor resistance of 0.12Ω and a standstill reactance of 1.12Ω . The motor has a speed of 292.5 rpm at full load. Calculate:
(i) Slip at maximum torque
(ii) The ratio of maximum to full load torque. Neglect stator impedance. (8)
- Q.7** a. Explain working and discuss the Torque-slip characteristics for a two value capacitor motor. (8)
- b. Write short notes on (8)
- (i) Reluctance motor
(ii) Hysteresis motor
- Q.8** a. Draw block diagram of Nuclear power plant and write function of each block. (8)
- b. Write short note on the following:
(i) Bio fuels
(ii) Geothermal Energy (8)
- Q.9** a. Explain the constructional features and working of fuel cells. (8)
- b. What are the advantages and limitations of HVDC transmission system? (8)