

DiplETE – ET/CS (Current & New Scheme)

Time: 3 Hours

June 2018

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, selecting at least TWO questions from each part. 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. Synchronous speed N_s of the rotating magnetic field produced in the stator of 3-phase induction motor is

(A) $N_s = \frac{120P^2}{f^2}$

(B) $N_s = \frac{120f^2}{P^2}$

(C) $N_s = \frac{120f}{P}$

(D) $N_s = \frac{120P}{f}$

- b. A 5 V dc is applied to a series L-R circuit, the value of $X_L=3$ Ohms and $R=4$ Ohms, a steady current of amps flows into it.

(A) 5/3 A

(B) 0 A

(C) 1 A

(D) 5/4 A

- c. An amplifier has a voltage gain of 20V and a current gain of 5A, the power gain of the amplifier will be _____

(A) 20 dB

(B) 100 dB

(C) 40 dB

(D) 80 dB

- d. Which of the following is majority charge carrier in N –type semiconductors

(A) Holes

(B) Electrons

(C) Both holes & electrons

(D) None of these

- e. One of the common applications of Zener diode is a _____.

(A) emitter follower

(B) clipper

(C) rectifier

(D) simple voltage reference source

- f. A transformer having 100 turns of primary side is applied with 200V a.c. In order to get 400 V a.c. on secondary side, the number of turns on the secondary side must be _____

(A) 100

(B) 50

(C) 200

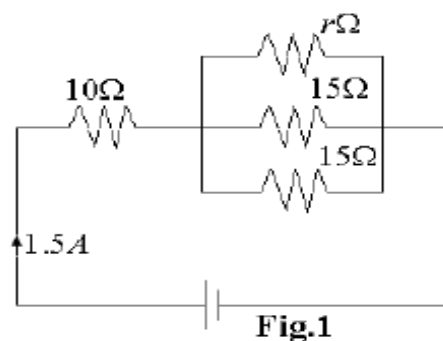
(D) 800

- g. Common emitter transistor configuration has _____
- (A) high current gain and high voltage gain
 (B) low current gain and low voltage gain
 (C) high current gain and low voltage gain
 (D) low current and high voltage gain
- h. The difference between the synchronous speed and the actual speed of an induction motor is called _____.
- (A) Slip (B) Regulation
 (C) Backlash (D) Lag
- i. Kirchoff's laws are applicable to _____
- (A) dc circuits
 (B) circuits with sinusoidal excitation only
 (C) dc circuits and circuits with sinusoidal excitation
 (D) circuits with any excitation
- j. A 3- Phase slip ring induction motor has
- (A) short circuited rotor (B) double cage rotor
 (C) wound rotor (D) all of these

PART A

Answer at least TWO questions. Each question carries 16 marks.

- Q.2 a. State and explain Lenz's law and Faraday's law of electromagnetic induction. (8)
- b. What is meant by Self Induced EMF and derive an expression for the coefficient of self induction (8)
- Q.3 a. For the circuit shown in Fig.1 calculate the value of resistance ' r ' when the total current taken by the network is 1.5 A. (8)



- b. With the help of suitable example state and explain Thevenin's theorem. (8)

- Q4. a. What is the basic difference between dc motor and dc generator and explain the characteristic curves of a DC series motor with the help of diagram.. (8)
- b. A single Pole DC motor has armature winding resistance $R_a = 0.3$ ohm and shunt field resistance $R_h = 100$ ohm, when motor connected with 400 volt supply draws 40 Amp current and runs at 1000 RPM. Calculate the resistance that must be inserted in armature circuit to reduce speed up to 800 RPM. Assume torque is constant. (8)
- Q5. a. Draw and explain the phasor diagram of a transformer on load, at a lagging power factor. (8)
- b. Explain the principle of working and operation of three-phase induction motor.(8)

PART B

Answer at least TWO questions. Each question carries 16 marks.

- Q.6 a. What is meant by doping? Explain donor doping with neat diagram. (8)
- b. A cylindrically shaped section of n-type silicon has a 1 mm length and 0.1 mm^2 cross-sectional area. Calculate its conductivity and resistance
- (i) when it is purely intrinsic material
- (ii) when it has a free electron density of $n = 8 \times 10^{13} / \text{cm}^3$. (8)
- Q.7 a. Draw the circuit diagram of a full wave rectifier using two diode and center-tapped transformer and explain its operation with the help of necessary wave form. (8)
- b. Draw the circuit diagram of a clamper. Explain its operation. (8)
- Q.8 a. Explain the working of a direct coupled switching device using BJT. (8)
- b. Compare the performance and characteristics of CB, CC and CE amplifiers. (8)
- Q.9 a. Draw circuit diagram and explain working of the Phase Shift Oscillator (8)
- b. Discuss the concept of negative feedback in amplifiers and explain its effect on operational bandwidth of the amplifier. (8)