

Code: DE52/DC52
DE102/DC102

Sub: FUNDAMENTALS OF
ELECTRICAL & ELECT. ENGG.

DiplETE – ET/CS (Current & New 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, 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. Which of the following relation is incorrect
 - (A) $\text{MMF} = \text{Flux} \times \text{Reluctance}$
 - (B) $\text{MMF} = \text{Number of turns in coil} \times \text{current in coil}$
 - (C) $\text{Flux} \times \text{Density} = \text{Permeability} \times \text{Magnetic field strength}$
 - (D) $\text{MMF} = \text{Permeability} \times \text{Magnetic field strength}$
- b. The direction of force acting on current carrying conductor in magnetic field is determine by
 - (A) Fleming's left hand rule
 - (B) Fleming's right hand rule
 - (C) Lenz's law
 - (D) Faraday's law
- c. What is R_{th} in network shown in Fig.1

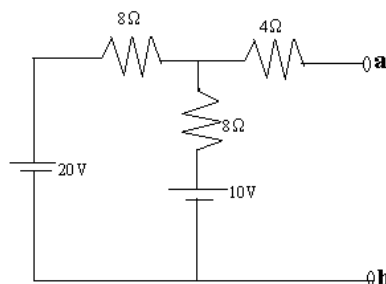


Fig.1

- (A) 8Ω
 - (B) 4Ω
 - (C) 6Ω
 - (D) 20Ω
- d. RMS value of half rectified sinusoidal emf is
 - (A) E_m
 - (B) $E_m/2$
 - (C) $E_m/\sqrt{2}$
 - (D) None of these
 - e. The Yoke of dc motor is made by
 - (A) Cast Iron
 - (B) CRGO steel
 - (C) Copper
 - (D) Aluminium

**Code: DE52/DC52
DE102/DC102**

**Sub: FUNDAMENTALS OF
ELECTRICAL & ELECT. ENGG.**

- f. Slip of 3 phase Induction motor at starting is
 (A) $s = 0$ (B) $s = 1$
 (C) $0 < s < 1$ (D) None of these
- g. Which of the following is majority charge carrier in N –type semiconductors
 (A) Electrons (B) Holes
 (C) Both electrons & holes (D) None of these
- h. Peak inverse voltage across diode in Half wave rectifier is
 (A) $2 V_m$ (B) $V_m/2$
 (C) V_m (D) $4 V_m$
- i. In a transistor large current gain $\alpha = 0.99$ so small current gain (β) is
 (A) 0.99 (B) 100
 (C) 99 (D) 101
- j. In Phase shift oscillator feedback network contains _____ R-C branches
 (A) One (B) Two
 (C) Three (D) Four

PART A

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

- Q.2** a. Compare electric and magnetic circuits. (8)
- b. A magnetic circular ring of diameter 0.2 meter has cross-sectional area of 0.1 meter² & relative permeability 1000. An excitation coil of 500 turns is wound over this ring. (8)
 (i) Calculate reluctance of ring
 (ii) MMF to established flux density of 1 T in this ring
 (iii) Current in ring to established flux density of part(ii)
 (iv) Magnetic flux in ring
- Q.3** a. State & explain superposition theorem with suitable example. (8)
- b. Three impedances having per phase impedance $Z_p = (3+j4)$ ohm are connected in star. This three phase load is connected across 400 volt supply, calculate: (8)
 (i) Phase voltage
 (ii) Phase current
 (iii) Line current
 (iv) Power consumed by load
- Q.4** a. Derive torque equation of DC motor. (8)
- b. A Pole DC shunt motor has armature winding resistance $R_a = 0.3$ ohm and shunt field resistance ($R_{sh} = 100\Omega$) When motor connected with 400 volt supply, draws 40 Amp current and running at 1000 RPM. Calculate resistance must be inserted in armature circuit to reduce speed up to 800 RPM. Assume torque is constant. (8)

**Code: DE52/DC52
DE102/DC102**

**Sub: FUNDAMENTALS OF
ELECTRICAL & ELECT. ENGG.**

- Q.5** a. Discuss rotating magnetic field and principle of operation of three phase induction motor. (8)
- b. Magnetic core of 1 – ϕ transformer is made by CRGO silicon steel ($\mu_r = 4000$). Its mean length is 0.8 meter & area of cross- section is 0.2 meter². (8)
- (i) Calculate Reluctance of core.
- (ii) What is current in primary winding (which has 500 turns) to set flux density of 2 Tesla in the core
- (iii) Calculate emf induced in primary winding. Assume supply frequency 50Hz.
- (iv) Calculate number of turns & emf induced in secondary winding if transformation ratio is 2.

PART B

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

- Q.6** a. Compare N-Type & P-Type Extrinsic semiconductors. (8)
- b. Draw V-I characteristic of P-N Junction diode and explain working of diode in forward and reverse bias. (8)
- Q.7** a. With the help of schematic, explain working of full wave (bridge) rectifier and draw wave forms also. (8)
- b. Calculate series resistance R_s in Voltage regulator circuit shown in Fig.2. Here zener diode current is 2A. (8)

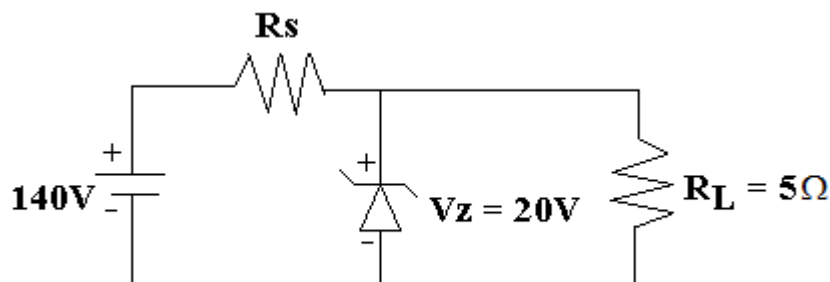


Fig.2

- Q.8** a. Explain input & output V-I characteristics of transistor in CE configuration. (8)
- b. With the help of circuit diagram, explain working of voltage divider bias and comments on thermal stability of this circuit. (8)
- Q.9** Draw circuit diagram & explain working of the following: (16)
- (i) Two stage CE amplifier
- (ii) Phase shift oscillator