Code: DE52/DC52   Sub: FUNDAMENTALS OF ELECTRICAL & ELECT. ENGG.

DipIETE – ET/CS

Time: 3 Hours   **DECEMBER 2013**   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.   While comparing magnetic and electric circuits, the point of dissimilarity exists while considering

   (A) mmf and emf   **(B)** reluctance and resistance
   (C) flux and current flow   **(D)** permanence and conductance

b.   While calculating R_{th} in thevenin's theorem and Norton equivalent

   (A) only current sources are made dead
   (B) only voltage sources are made dead
   (C) all voltages & current sources are made dead
   (D) all independent sources are made dead

c.   The speed of a dc motor may be varied by varying

   (A) field current   **(B)** applied voltage
   (C) resistance in series with armature   **(D)** any of these

d.   A step up transformer increases

   (A) Power   **(B)** Power Factor
   (C) Voltage   **(D)** Frequency

e.   The difference between the synchronous speed and the actual speed of an induction motor is called _____.

   (A) Regulation   **(B)** Back lash
   (C) Slip   **(D)** Lag

f.   The forbidden energy gap in semi-conductors

   (A) is always Zero
   (B) lies just below the valance band
   (C) lies between the valance band and the conduction band
   (D) lies just above the conduction band

g.   In reverse biased P-N junction, the current through the junction is due to

   (A) Minority carriers   **(B)** Majority carriers
   (C) Both minority and majority carriers   **(D)** None of these

h.   The number of diodes needed for a bridge rectifier is

   (A) six   **(B)** four
   (C) two   **(D)** one

i.   Largest current flow in a bipolar transistor occurs

   (A) In emitter   **(B)** In base
   (C) In collector   **(D)** Through emitter – collector

j.   Oscillators employ

   (A) no feedback   **(B)** negative feedback
   **(C)** positive feedback   **(D)** either negative or positive feedback

---

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

Q.2   a.   List the properties possessed by the lines of magnetic flux.   **(6)**

   b.   A steel ring of 25 cm mean diameter and of circular section 3 cm in diameter has an air gap of 1.5 mm length. It is wound uniformly with 700 turns of wire carrying a current of 2 A. Calculate
   (i)   magnetomotive force   (ii)   flux density
   (iii) magnetic flux   (iv)   reluctance
   (v)   relative permeability of steel ring.
   Neglect magnetic leakage and assume that iron path takes about 35 percent of the total magnetomotive force.   **(10)**

Q.3   a.   State and explain Thevenin's theorem with example.   **(8)**

   b.   In the circuit shown in figure find the current drawn by the circuit, when it is connected across a 200V DC supply.   **(8)**
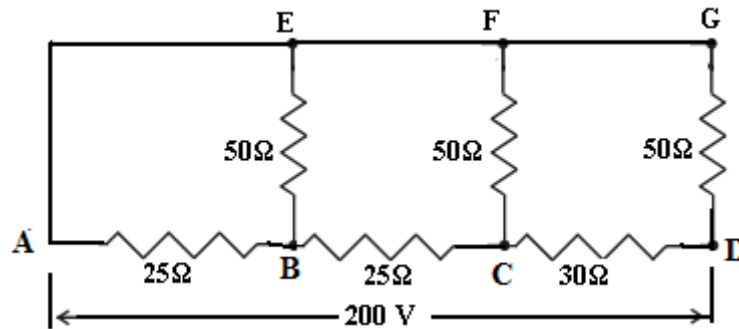
Q.4 a. Derive EMF equation of DC Generator. **(8)**

b. A 6-pole, lap wound armature has 840 conductors and flux per pole of 0.018 wb. Calculate the emf generated, when the machine is running at 600 rpm. **(8)**

Q.5 a. Derive the emf equation of a single phase transformer. What is the voltage transformation ratio? **(8)**

b. A single phase transformer has 350 primary and 1050 secondary turns. The net cross- sectional area of the core is 55cm^2. If the primary winding be connected to a 400V, 50 Hz single phase supply. Calculate:
(i) the maximum value of the flux density in the core
(ii) the voltage induced in the secondary winding. **(8)**

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

Q.6 a. Draw and explain AC equivalent circuits of a diode. **(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 $n = 8 \times 10^{13} / cm^3$. **(8)**

Q.7 a. Write a note on zener diode voltage regulator **(8)**

b. Explain series and shunt clipper circuits with diagram and waveforms. **(8)**

Q.8 a. How BJT works as a switching device? **(8)**

b. With the help of circuit diagrams, compare the base bias, collector-to-base bias and voltage-divider biasing circuits. **(8)**

Q.9 a. Explain half power points. **(8)**

b. What are the advantages of negative feedback on an amplifier? **(8)**