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

DipIETE – ET/CS

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, 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. In a capacitor, the electric charge is stored in _____

   (A) dielectric   **(B)** metal plates
   (C) dielectric as well as metal plates **(D)** neither dielectric nor metal plates

b. When an alternating current flows through a resistance, then _____

   (A) current leads e.m.f   **(B)** current lags e.m.f
   (C) current & e.m.f are in phase **(D)** none of these

c. A delta circuit has each element of value $\dfrac{R}{2}$, then the equivalent elements of star circuit will be _____

   (A) 2R   **(B)** 6R
   (C) $\dfrac{3}{2}R$ **(D)** $\dfrac{R}{6}$

d. The speed of a dc motor is _____

   (A) always constant
   (B) directly proportional to back e.m.f
   (C) directly proportional to flux
   (D) inversely proportional to the product of back e.m.f and flux

e. 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) 200   **(B)** 800
   (C) 50   **(D)** 100

f. In the following atoms, which has four valence electrons in a valence shell
_____

   (A) Silicon   (B) Germanium
   (C) Both (A) and (B)   (D) None of these

g. For PN junction diode, the current in reverse bias may be _____

   (A) few amperes   (B) between 0.5 and 1A
   (C) few milli amperes   (D) few micro and nano amperes

h. If the RMS value of a half wave rectifier current is 10 A, then its value for full
wave rectification would be _____

   (A) 10A   (B) 14.14A
   (C) $(20/\pi)$A   (D) 20A

i. 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
   (D) low current and high voltage gain

j. The voltage gain of an amplifier is 100. On applying a negative feedback with β =
0.03, its voltage gain will reduce to _____

   (A) 25   (B) 5
   (C) 10   (D) 70

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

Q.2 a. State and explain Faraday's laws of electromagnetic induction. **(8)**

    b. Give comparison of electric and magnetic circuits on the basis of similarities and
        dissimilarities. **(8)**

Q.3 a. Give the relationship between the phase values and line values of current and
        voltage in Star connected circuits. Three 10Ω resistors are connected in a star
        connected circuit across 440 V, 3 - phase lines. Calculate the line and phase
        currents and the power taken from the mains. **(8)**

    b. Define the following A.C quantities:-
        (i)   R.M.S value of alternating current
        (ii) Instantaneous value of alternating current
        (iii) Average value or mean value of alternating current
        (iv) Amplitude **(8)**

Q.4   a.   Derive an expression for E.M.F equation of a D.C Generator.   **(8)**

b.   What are the different types of d.c. motors and give the applications each?   **(4)**

c.   A 250 V dc shunt motor takes 30 A current while running at full load. The resistance of motor armature and field winding are 0.1Ω and 200Ω respectively. Determine the back e.m.f generated in the motor, when it runs on full load.   **(4)**

Q.5   a.   Explain the principle of operation of three-phase induction motor.   **(8)**

b.   The secondary of a 750 KVA, 11000 / 400 V, 50 Hz transformer has 160 turns. Determine:
(i)   primary number of turns
(ii) primary and secondary full load current neglecting losses. If the area of cross section of the core is 100 cm^2, then
(iii) find the flux density in the core.   **(8)**

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

Q.6   a.   Explain the energy bands in solids. Also classify the materials based on the energy band diagram and explain briefly.   **(8)**

b.   What is zener diode? Explain its main features.   **(8)**

Q.7   a.   Explain Zener diode voltage regulation circuit with no load.   **(8)**

b.   What are clipping and clamping circuits? Explain any two functions of clipping circuits.   **(8)**

Q.8   a.   Give a table of comparison between CE and CB configuration with regard to the important parameters.   **(8)**

b.   What are the different methods of transistor biasing? Mention the steps that are taken to design the transistor biasing circuits.   **(8)**

Q.9   a.   List out the advantages of negative voltage feedback in amplifiers and explain any three of them.   **(8)**

b.   Draw the circuit of BJT Colpitts Oscillator and explain its operation.   **(8)**