DipIETE – ET/CS (NEW SCHEME) – Code: DE52 / DC52

Subject: FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING

Time: 3 Hours **JUNE 2009** **Max. Marks: 100**

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.**
- **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. A 3-phase induction motor always runs at a speed:

(A) lower than synchronous speed
(B) higher than synchronous speed
(C) equal to synchronous speed
(D) which is constant

b. Efficiency of a transformer is of the order of:

(A) 20% **(B)** 45%
(C) 70% **(D)** 95%

c. Thevenin's theorem is applicable in:

(A) DC circuits only **(B)** AC circuits only
(C) both DC and AC circuits **(D)** none of the above

d. A capacitor stores energy in the form of:

(A) magnetic field **(B)** electrostatic field
(C) electromagnetic field **(D)** mechanical energy

e. The speed of a DC shunt motor cannot be varied by:

(A) changing only the armature resistance
(B) changing only the field resistance
(C) changing both the armature and the field resistances
(D) none of the above

f. If 1500 ohm resistor is not available, how can several 1000 ohm resistors be connected to get the same value

(A) three in parallel **(B)** three in series
(C) two in parallel **(D)** two in parallel one is series

g. Two sinusoidal currents are given by the equations $i_1 = 10\sin\left(\omega t + \frac{\pi}{3}\right)$ and $i_2 = 15\sin\left(\omega t - \frac{\pi}{4}\right)$. The phase difference between them is:

(A) 105 degrees **(B)** 85 degrees
(C) 60 degrees **(D)** 30 degrees

h. In a p-type semiconductor, the majority carriers are:
(A) holes **(B)** electrons
(C) both holes and electrons **(D)** neither electrons nor holes

i. A zener diode is mostly used in:
(A) amplifiers **(B)** oscillators
(C) rectifiers **(D)** voltage regulators

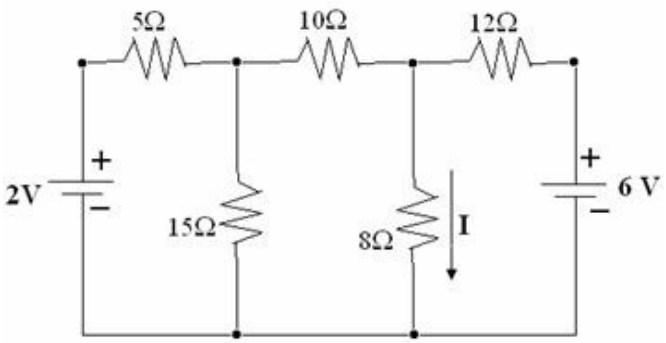
j. A smoother output is available from:
(A) a half-wave rectifier without filter
(B) a full-wave rectifier without filter
(C) a half-wave rectifier with LC filter
(D) a full-wave rectifier with LC filter

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

Q.2 a. State Coulomb's law of Electrostatics. Also, derive the equation for the force on current carrying conductor in magnetic field. **(2+6)**

b. What is meant by statically induced Emf? Explain self induced Emf and mutually induced Emf. **(2+6)**

Q.3 a. Solve the network given below for the current I by using Thevenin's theorem. **(8)**



b. Derive the relationship between line and phase quantities in a three-phase star connected network. **(8)**

Q.4 a. With the help of a neat labelled diagram, explain construction of a DC Machine. **(8)**

b. Draw the connection diagram of shunt and series DC motors and explain. **(8)**

Q.5 a. Draw a neat diagram of a shell type transformer. Derive the expression for the emf of a single-phase transformer. **(8)**

b. Explain how a rotating magnetic field is produced in a three-phase induction motor. **(8)**

Q.6 a. Differentiate between n-type and p-type semiconductors. **(8)**

b. Draw the characteristic curve of a p-n junction diode and explain. **(8)**

Q.7 a. Compare the performance and characteristics of CB, CC and CE amplifiers. **(4+4+4)**

b. Discuss why CC amplifiers are preferred for particular specific applications . **(4)**

Q.8 a. Discuss the effects of negative and positive feedback on amplifiers. **(10)**

b. Explain decibels and half-power points. **(3+3)**

Q.9 a. Draw and explain the circuit of a Zener Diode voltage regulator. **(8)**

b. Draw the circuit of a full wave rectifier and explain its working. **(8)**