Code: DC02   Subject: FUNDAMENTALS OF ELECTRO...
Time: 3 Hours   Max. Marks: ...

DECEMBER 2010

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 half an hour of the commencement of the examination.**
- **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. Under normal operating voltage, the reverse current in a silicon diode is about

   (A) 10 mA.   **(B)** 1 μ A.
   (C) 1000 m A.   **(D)** none.

b. In full-wave rectification, if the input frequency is 50 Hz, then the output frequency will be

   (A) 50 Hz   **(B)** NONE
   (C) 100 Hz   **(D)** 75 Hz

c. The emitter of a transistor is doped

   (A) heavily   **(B)** lightly
   (C) moderately   **(D)** None

d. The silicon transistors are more widely used than germanium transistors because

   (A) they have smaller leakage current
   (B) they have smaller depletion layers
   (C) they have smaller heat dissipation
   (D) they have larger current carrying capacity

e. In the initial stage of a transistor amplifier, the zero signal collector current Ic

   (A) 0.5 mA   **(B)** 1.0 mA
   (C) 1.5 mA   **(D)** 2.0 mA

f. A biasing circuit has a stability factor of 40. If due to temperature change, Ico changes by 1μA then Ic will by

   (A) 20 μA   **(B)** 40 μA
   (C) 80 μA   **(D)** None

g. The lower or upper cut-off frequency is also known as

(A) half power frequency   (B) 3 db frequency
(C) both (A) and (B)   (D) None.

h. What is the result if the operating point changes?

(A) Thermal runaway   (B) Amplification
(C) Unfaithful   (D) None

i. Negative feedback in an amplifier

(A) Increases gain stability (B) decreases distortion
(C) Increases input impedance (D) all of these

j. A FET has three terminals namely, source drain and

(A) Grid   (B) substrate
(C) Ground   (D) Gate

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

Q. 2 a. With suitable diagram describe what is voltage and current source?   **(8)**

b. Discuss various types of capacitor and inductors.   **(8)**

Q.3 a. What are intrinsic and extrinsic semiconductor? Describe the effect of temperature on the conductivity of intrinsic semiconductor.   **(3+5)**

b. With the help of energy level diagram explain the differences between insulator, semiconductor and conductor.   **(8)**

Q.4 a. With the help of suitable diagram explain the V – I characteristics of p – n junction.   **(8)**

b. What are the differences between Avalanche breakdown and Zener breakdown?   **(8)**

Q.5 a. What are the three configurations of a transistor amplifier? Which configuration gives highest input impedance and no voltage gain? How alpha and beta are related to each other?   **(2+3+3)**

b. In a CB configuration, the current amplification factor is 0.97. If the emitter current is 1 mA, determine the value of base current. Also compare CB and CE configuration.   **(8)**

Q. 6 a. A single stage transistor amplifier has a voltage gain of 600 without feedback and 50 with feedback. Calculate the percentage of output which is fed back to the input.   **(8)**

b. Write in brief and give an example about the following:
   (i) Noise margin
   (ii) Fan in Fan out
   (iii) Propagation delay. **(8)**

Q. 7 a. With the help of suitable circuit diagram, explain the working of a single stage transistor amplifier. **(8)**

b. What is an oscillator? What are the essential parts of an oscillator? **(8)**

Q. 8 a. Discuss the steps for IC fabrication. **(8)**

b. What is CMRR? With the help of suitable circuit diagram explain working of op – amp as differentiator. **(2+6)**

Q. 9 a. Convert following binary numbers into hexadecimal numbers.
   (i) 1101 0110
   (ii) 1111 1001 **(8)**

b. Show that:
   (i) $AB + AC + B\overline{C} = AC + B\overline{C}$
   (ii) $(A + B)(\overline{A} + C) = AC + \overline{A}B$ **(8)**