

DiplETE – ET (OLD SCHEME)

Code: DE06
Time: 3 Hours

Subject: BASIC ELECTRONICS
Max. Marks: 100

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 best alternative in the following: (2x10)

- a. Which of the following components is used to couple alternating voltage from one circuit to another circuit?
- (A) Capacitor (B) Inductor
(C) Resistor (D) Diode.
- b. For electron emission, which of the following is employed?
- (A) Semiconductors (B) Insulators
(C) Metals (D) None of these
- c. The IC package that is most widely used is.
- (A) Plastic DIL package (B) Metal can package
(C) Ceramic package (D) None
- d. Voltage gain of a practical op-amp is of the order of
- (A) 10^2 (B) 10
(C) 1 (D) 10^5
- e. If the differential and common-mode gains of a differential amplifier are 100 and 0.4 respectively, then the CMRR will be
- (A) 10. (B) 25.
(C) 94.5. (D) 250.
- f. Voltage follower is a special case of
- (A) inverting amplifier (B) non-inverting amplifier
(C) differential amplifier (D) can be any of these
- g. The minimum on-state current required to keep the SCR in conducting state without any gate drive is called.
- (A) holding current (B) on-state current
(C) surge current (D) latching current

- h. In the pinch-off region, FET behaves as a
 (A) constant voltage source (B) ordinary resistor
 (C) constant current source (D) diode
- i. Which transistor configuration is used for impedance matching?
 (A) CC (B) CE
 (C) CB (D) all of these
- j. Which of the following property is true for an ordinary transistor?
 (A) It is bipolar (B) Base is heavily doped
 (C) It is a voltage controlled device (D) None of these

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

- Q.2** a. State and explain the Thevenin's theorem and Thevenin's equivalent circuit. (10)
- b. What do you understand by an ideal voltage source? Under what condition, a practical voltage source is considered to be a good voltage source? (6)
- Q.3** a. Distinguish between the following (8)
 (i) Intrinsic and Extrinsic Semiconductor.
 (ii) Drift and Diffusion current.
- b. Explain zener and avalanche breakdown in semiconductors (8)
- Q.4** a. Explain the working of a half-wave rectifier and derive the values of (4)
 (i) DC current (3)
 (ii) RMS current (3)
 (iii) Ripple factor (3)
 (iv) Efficiency. (3)
- Q.5** a. Define α and β of a transistor. Also derive the relationship between them. (8)
- b. Why CE configuration of transistor is mostly used in amplifier circuits? Also give reason why CC configuration is seldom used? (4)
- c. A transistor has α_{dc} of 0.98 and collector leakage current I_{co} of $1\mu A$. Calculate the collector and the base current when $I_E = 1mA$. (4)
- Q.6** a. Explain the basic structure and working of a p-channel JFET. (10)
- b. How does a MOSFET differ from JFET? (6)

- Q.7** a. Explain the term 'work function' in connection with electron emission. (6)
- b. What is secondary emission? On what factors does the number of emitted electrons depend? (4)
- c. Write a short note on LCD & LED. (6)
- Q.8** a. An inverting op-amp has $R_f = 100\text{k}\Omega$ and $R_1 = 2\text{ k}\Omega$. Find the voltage gain of the amplifier. Also find the amplifier input resistance, input current and the output voltage if the input voltage is 0.1V. Assume op-amp to be ideal (8)
- b. Explain the working of an op-amp as an integrator circuit. (8)
- Q.9.** a. How are integrated circuits classified on the basis of the fabrication technique used? (6)
- b. What do you understand by 'photolithographic process'? (6)
- c. Explain the term 'substrate' as applicable to monolithic IC. (4)