

g. A switching voltage regulator can be of the following type:

- (A) step-down (B) step-up
(C) inverting (D) none of these

h. A UJT contains

- (A) four pn junctions (B) three pn junctions
(C) two pn junctions (D) one pn junction

i. The foundation on which an IC is built is called

- (A) an insulator. (B) a base.
(C) a wafer. (D) a plate.

j. X-ray tubes make use of

- (A) Thermionic emission. (B) Secondary emission.
(C) High field emission. (D) Photoelectric emission.

Answer any FIVE Questions out of EIGHT Questions.

Each question carries 16 marks.

Q.2 a. Why colour coding system is used to indicate the value of a resistor? What is the role of a capacitor in an electronic circuit? Write a brief note on paper capacitors. (8)

b. Illustrate and explain the V-I characteristic of a practical current source. Comment on the equivalence between voltage source and current source. (6)

c. A dc source of strength 6 volts is driving a load whose resistance varies from two to twenty ohms. Compute the variation in terminal voltage for the source as a percentage. Take the source resistance as two ohms. (2)

Q.3 a. What is a semiconductor? Give its important properties. Briefly explain the energy band diagram for a semiconductor. (10)

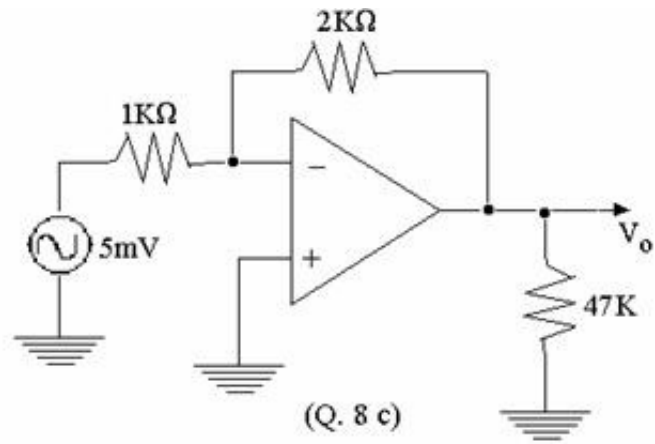
b. Define the following as applied to a PN-junction:

- (i) Depletion region (ii) Width of the barrier
(iii) Barrier voltage (iv) Height of the barrier

Support your answer with neat illustrations.

(6)

- Q.4** a. A centre-tap full-wave rectifier is supplying to a load of one kilo-ohm. If the voltage across half the secondary winding of the input transformer is $220 \sin \omega t$, calculate the following:
- (i) the peak value of current (ii) the r.m.s. value of current
 - (iii) the average value of the current (iv) the ripple factor
 - (v) the efficiency of rectification
- For the diodes used assume each having their forward resistance is 10 ohms. **(10)**
- b. A half-wave rectifier has a peak output voltage of 12.2V at 50 hertz and feeds a resistive load of 100 ohms. Determine the value of the shunt capacitor to give one percent ripple factor and the dc voltage output. **(6)**
- Q.5** a. What do you mean by a voltage regulator? Distinguish between a linear regulator and a switching regulator. Draw the circuit of a simple emitter-follower regulator and briefly explain. **(12)**
- b. What are the unique features of IC voltage regulators? **(4)**
- Q.6** a. How are BJTs classified? Draw the circuit symbol for each type. What are the advantages of transistors over electron tubes? **(8)**
- b. A transistor has an alpha dc of 0.98 and a collector leakage current of one microampere. If the emitter current is one milliampere, find the magnitude of the collector and the base currents. **(4)**
- c. Give a table of comparison between CE and CB configurations with regard to the important parameters. **(4)**
- Q.7** a. How does an FET differ from the conventional junction transistor? In the structure of an N-channel JFET, why the N-type bar is called a channel? Give the structure of a P-channel JFET. What is the difference between a JFET and a MOSFET? **(9)**
- b. Write a brief note on DIAC. **(7)**
- Q.8** a. What is an OPAMP? Why is it called so? Briefly explain the following for an OPAMP
- (i) Input offset voltage (ii) Input bias current
 - (iii) CMRR **(9)**
- b. Give the circuit of a popular inverting voltage amplifier using an OPAMP and derive the equation for the closed loop gain of the amplifier. **(4)**
- c. For the circuit shown calculate the following:
- (i) the closed loop voltage gain.
 - (ii) the feedback fraction and
 - (iii) the closed-loop input impedance seen by the a.c. source. **(3)**



- Q.9** a. Briefly explain the following methods of electron emission:
- (i) Secondary emission
 - (ii) Photoelectric emission
- (6)
- b. Briefly describe the two types of etching commonly used in IC fabrication.
- (6)
- c. Write a note on varactor.
- (4)