16007(J)   J-16

B. Tech 2nd Semester Examination

Fundamentals of Electronics Engineering (CBS)

EC-101

Time : 3 Hours   **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from section A, B, C & D. Section E is compulsory.

SECTION - A

1. (a) Describe NPN photo-transistor. Draw and discuss its V-I characteristics.   (6)

    (b) Draw and explain the working of full wave centre tap rectifier. Derive the equation for ripple factor and its rectification efficiency.   (6)

2. (a) A specimen of silicon is 0.2 mm long and has a cross section of 0.2 × 0.2 mm. One volt impressed across the bar results in a current of 0.8 mA. Assuming that the current is due to electrons, calculate (a) concentration of free electrons and (b) drift velocity.   (6)

    (b) Explain Zener diode as voltage regulator and derive the question of maximum power or wattage relation of Zener diode.   (6)

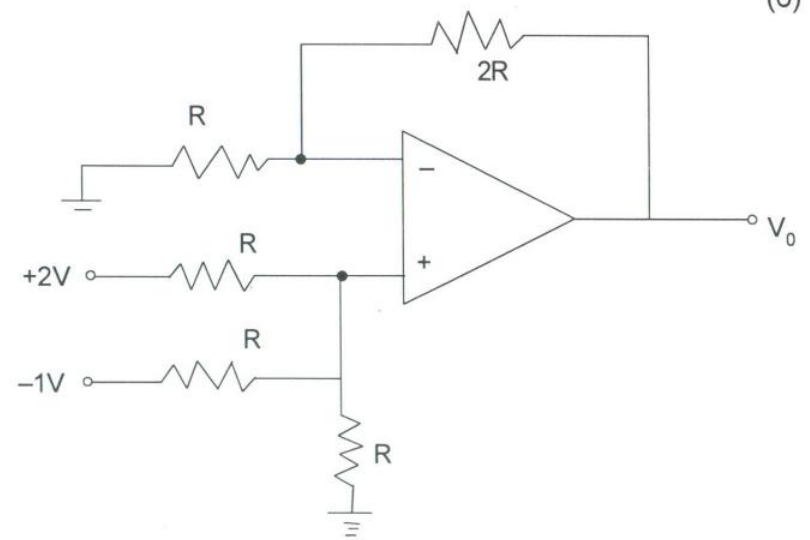### SECTION - B

3. (a) Compare CB, CE and CC configuration. Explain which configuration is preferred in amplifiers with proper justification and equations.   (6)
[P.T.O.]

    (b) Explain the detailed operation of N-channel depletion type MOSFET and draw its V-I characteristic and transfer characteristic.   (6)

4. (a) Explain detailed operation of CE configuration and derive equations of DC load line and show it on characteristics.   (6)

    (b) What are the different biasing schemes used for JFET? Explain the self-bias with necessary equations.   (6)

SECTION - C

5. (a) Explain schematic block diagram of the basic op-amp. Explain the significance of virtual ground in basic inverting amplifier. How would you explain its existence?   (6)

    (b) Draw the circuit diagram of RC phase shift oscillator and explain its operation by deriving expression for frequency of oscillation.   (6)

6. (a) Below figure shows non inverting op-amp summer with $V_1 = 2V$ and $V_2 = -1V$. Calculate the output voltage V_0.   (6)

(b) Explain the principle of working of Wein Bridge Oscillator. Explain why negative feedback in addition to the usual positive feedback is employed in Wein Bridge Oscillator.

(6)

SECTION - D

7. (a) What is half subtractor? How it is realized using logic gates? Design a full subtractor circuit using NAND gate.

(6)

(b) Describe the block diagram of Cathode Ray Oscilloscope (CRO) and explain its working. (6)

8. (a) Show that:

(i) $(A + B)(A' + C) = AC + A'B$

(ii) Prove the following identity:

$(A + B)(A' + C)(A + B') = AC$ (6)

(b) Explain the unknown frequency and phase measure using Lissajous Pattern in CRO. (6)

SECTION - E

9. Attempt All Parts.

(i) Show that the ripple factor of a full wave rectifier is 0.482.

(ii) Why is open loop op-amp configuration not used in linear application?

(iii) What do you understand by the term, "thermal instability"?

(iv) Discuss the effect of coupling capacitor C_c on the performance of transistor amplifier.

(v) State and prove De-Morgan's theorem.

(vi) What is meant by CMRR and slew rate in op-amp?

(2×6=12)