B.Tech. 2nd Semester Quiz-I Examination
Basic Electronics Engineering
Code: AV 121

FM: 20   Time 1 Hr
   Date of Exam: May 06, 2022

Section-I (Diode and Transistors): 12 Marks

Part A

1. Define DC and AC resistance of a p-n junction diode. Using the expression for diode current, show that at room temperature ac resistance,
$$R_{ac} = 26mv/I.$$
(2 mark)

2. Draw the circuit diagram of a FW rectifier circuit and plot its transfer characteristic curve considering ideal and simplified diode model. Obtain the value/expression for ripple factor and rectification efficiency for the circuit.   (2marks)

3. For the following transistor circuit, determine V_{CE}. Given, EBJ has forward bias voltage drop of 0.7 V and $\beta = 75$.   (2marks)
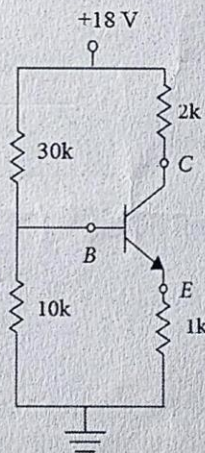
Part B (MCQs, Each question carry 1-mark)

4. i) The depletion region of a p-n junction is depleted of
   a. atoms
   b. mobile charges
   c. immobile charges
   d. velocity of the carriers

   ii) If the load resistance increases in a zener regulator, the zener current
   a. remains same
   b. increases
   c. decreases
   d. equals the V_s/R_s

   iii) The ripple factor of a bridge rectifier circuit is,
   a. 0.482
   b. 0.812
   c. 1.11
   d. 1.21

   iv. Leakage current in CE configuration of a transistor is

a. very high

b. very small

c. normal

d. not present

v. The common base current gain of a transistor is given by 0.99. The common emitter current gain is given by,

a. 99

b. 100

c. 49

d. 50

vi. The dc load line of a transistor circuit

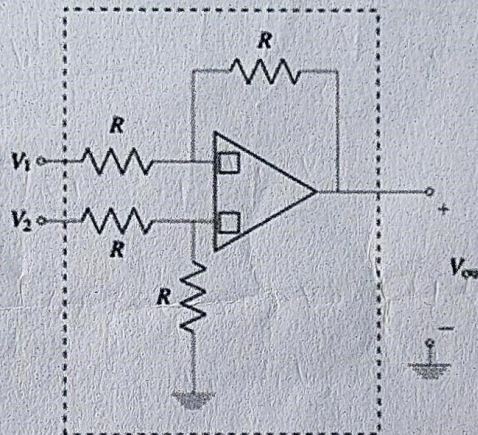a. has –ve slope

b. has +ve slope

c. is a curved line

d. relates I_B and I_C

Section-II (Operational Amplifier): 8 Marks

Part A

5. Label the '+' and '–' terminals of the op-amp above so that it is in negative feedback.

(1 mark)

6. For the above circuit now Assuming that the op-amp is in negative feedback, *find* Vout in terms of R, V1, and V2. Show your all work.

(1 marks)

7. For the circuit below

a. For the ideal op amp circuit given below determine the voltage gain Av=Vout/Vin.

b. Determine the range of Vin so that the output of the op-amp stays in the linear range.

The circuit parameters are R1= 5k ohm , R2=25k ohm, R3=5 k ohm and R4=5 k ohm.

(2 marks)
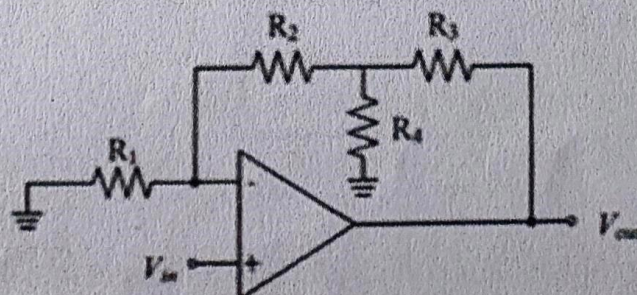
Part B

Choose one correct answer (each question is of one mark)

8. An ideal operational amplifier has

    a. infinite output impedance   c. infinite bandwidth
    b. zero input impedance   d. All of the above

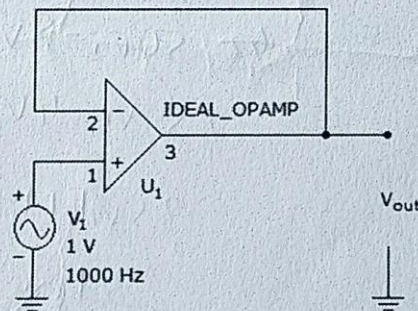9. If ground is applied to the (+) terminal of an inverting op-amp, the (−) terminal will:

    a. not need an input resistor   c. have high reverse current
    b. be virtual ground   d. not invert the signal

10. What is the output voltage
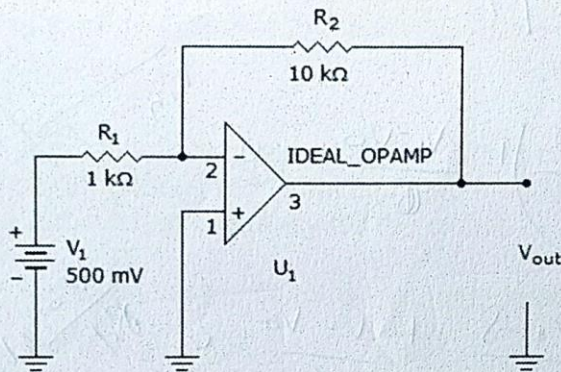
    a. 15 V   c. -5V
    b. 5V   d. -15V

11. What is the output waveform

    a. Sine wave   c. +15 V
    b. Square wave   d. -15 V