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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 43401 Roll No.

B. Tech. Examination, 2024-25

(Odd Semester)

BASIC ELECTRONICS ENGINEERING

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : $8 \times 1 = 8$

   (a) What are acceptor and donor impurities?

   (b) What is the effect of temperature on the reverse current of a P-N-junction?

   (c) What do you mean by ripple factor?

   (d) The value of α for a transistor is 0.950. Find the value of β.

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(e) Why BJT transistor is called current controlled device?

(f) What is pinch-off voltage in a JFET?

(g) What are the characteristic of an ideal op-amp?

(h) Define I_{CBO}.

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) Describe the conditions established by forward and reverse-bias conditions on a PN-junction diode and how the resulting current is affected?

(b) A full wave bridge rectifier with 220V, 50 Hz sinusoidal input and turns ratio of 5 : 1 has a load resistance of 500 Ω. Diode forward resistance is 20 Ω. Determine :

(i) Mean or average load current

(ii) Rectification efficiency

(iii) Ripple factor

(c) Explain the basic construction and principle of operation of BJT.

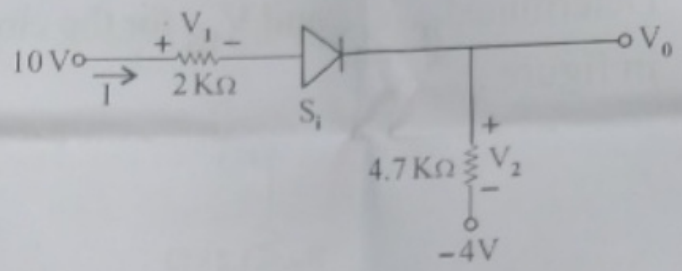
(d) Perform the following subtraction using 1's and 2's - complement method :

$$(42)_{10} - (32)_{10}$$

SECTION – C

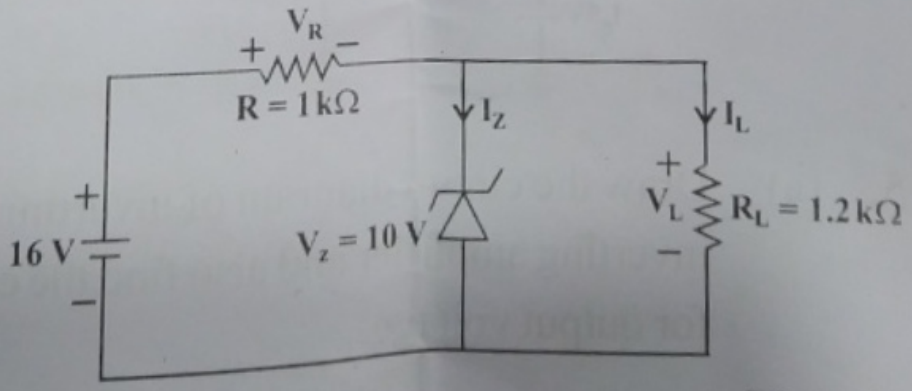
Note :– Attempt all questions. Attempt any two parts from each questions. $8 \times 5 = 40$

3. (a) Determine I, V_1, V_2 and V_0 for the circuit shown in figure :



(b) Explain the working of centre-tapped full wave rectifier with neat circuit diagram and output waveform.

(c) Explain the zener breakdown mechanism for the following circuit, find V_L, V_R, I_Z and I_L :



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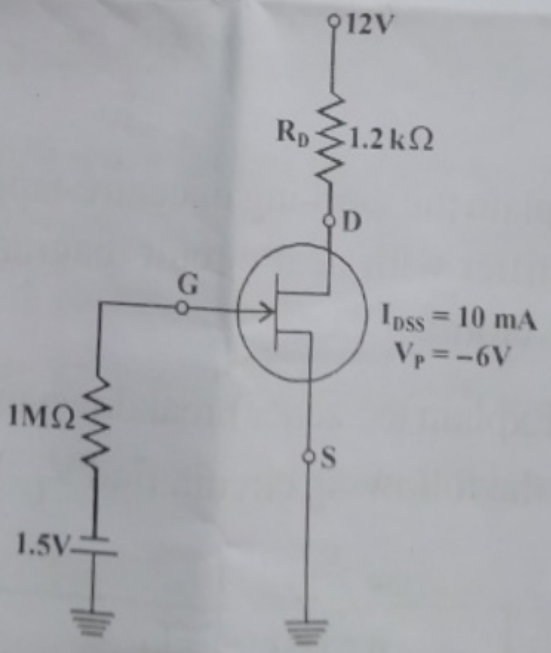
4. (a) Explain the input and output characteristic of a transistor in CB configuration. Also derive the relationship between α and β.

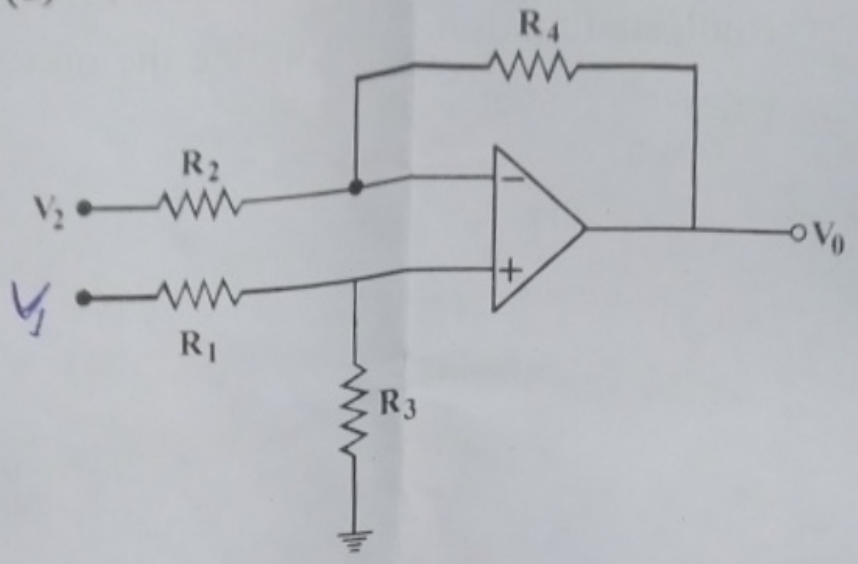
(b) For a transistor in common emitter configuration, the reverse leakage current is 21 μA, whereas when the same transistor is connected in common-base configuration it reduces to 1.1 μA. Calculate values α and β of the transistor.

(c) Determine I_D, V_{GS} and V_{DS} for the circuit shown in figure :



5. (a) Draw the circuit diagram of inverting and non-inverting amplifier and also find the expression for output voltage.

(b) Find the output voltage V_0 :



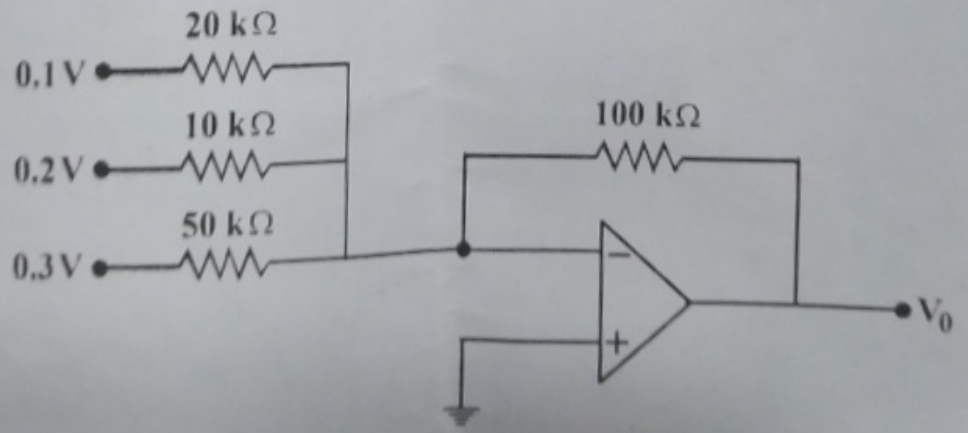
(c) Simplify the following Boolean expression :

(i) $A\bar{B}+\bar{A}B+\bar{A}\bar{B}+AB$

(ii) $A\bar{B}C+\bar{A}BC+ABC$

6. (a) Draw the equivalent circuit of OR, AND, XOR and XNOR gates using NAND gates only.

(b) Find the output voltage V_0 :



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(c) Explain the term SOP and POS related to Boolean function. Also define the universal gates.

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