

S.No. : 674

NEC 4201

No. of Printed Pages : 05

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

PAPER ID : 43402

Roll
No.

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B. Tech. Examination 2023-24

(Even 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 is doping?
- (b) Draw the energy band diagram of insulator.
- (c) What is effect of doping on depletion width in pn junction diode?
- (d) What is value of β , if $\alpha = 0.95$?
- (e) Write down the Shockley's equation for JFET.

[P. T. O.]

(f) Draw the circuit diagram of voltage follower.

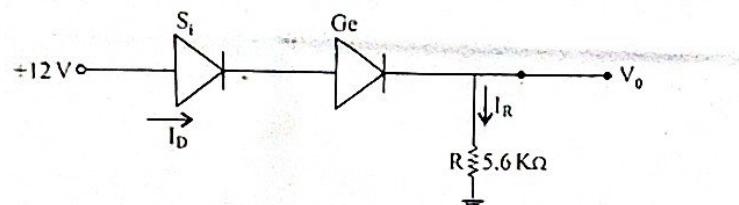
(g) Write down the truth table of NAND gate.

(h) What is 2's complement of $(1001101)_2$.

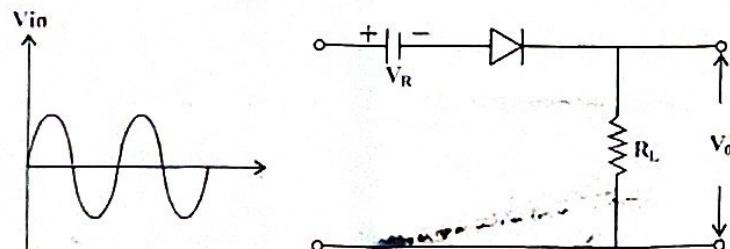
SECTION-B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Explain working of PN-junction diode in reverse biased condition. Determine V_0 and I_D for the following figure :



(b) What do you mean by clipper circuit? Find the output waveform of the following clipper circuit :



(c) Sketch and explain the input and output characteristics of transistor in CE configuration.

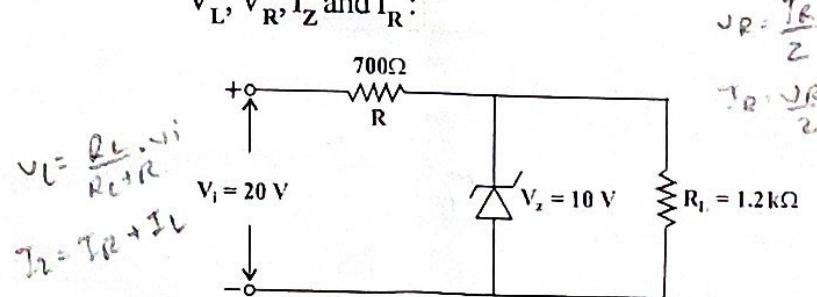
(d) Perform the following conversion :

- $(53.60)_{10}$ into binary.
- $(10110)_2$ into decimal.
- $(3C5.B)_{16}$ into octal.
- $(325)_8$ into hexadecimal.

SECTION-C

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

3. (a) Explain Zener breakdown mechanism in reverse biased diode. For the network shown determine V_L , V_R , I_Z and I_R :



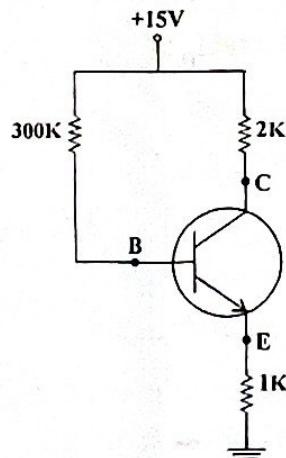
(b) Explain the working and output waveform of full wave bridge rectifier.

(c) In a centre tapped full wave rectifier, the rms half secondary voltage is 9V. Assuming ideal diodes and load resistance $R_L = 1\text{K}\Omega$, find :

- I_{dc}
- I_{rms}
- Ripple factor
- Efficiency

4. (a) Explain the construction and working of npn transistor.

(b) For the following circuit, calculate I_B , I_C , V_{CE} , V_C , V_E , V_B and V_{BC} . Assume $\beta = 100$ and $V_{BE} = 0.7\text{V}$.



(c) Explain the construction and working of n-channel JFET.

5. (a) Define CMRR of an op-amp. Determine the output voltage of an op-amp for the input voltages of $300\text{ }\mu\text{V}$ and $240\text{ }\mu\text{V}$. The differential gain of the amplifier is 5000 and the value of the CMRR is 10^5 .

(b) Determine V_0 for the following circuit :

(c) Express the Boolean function $F = A + B' C$ in SOP form.

6. (a) Explain the formation of depletion layer in PN-junction diode.

(b) Draw the drain and transfer characteristics of p-channel JFET.

(c) Perform $(11101)_2 - (11001)_2$, using 1's and 2's complement.