

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

PAPER ID : 3033

Roll No.

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B.Tech.

FIRST SEMESTER EXAMINATION, 2006-07

ELECTRONICS ENGINEERING

Time : 3 Hours

Total Marks : 100

Note : (i) Attempt **ALL** questions.

(ii) All questions carry equal marks.

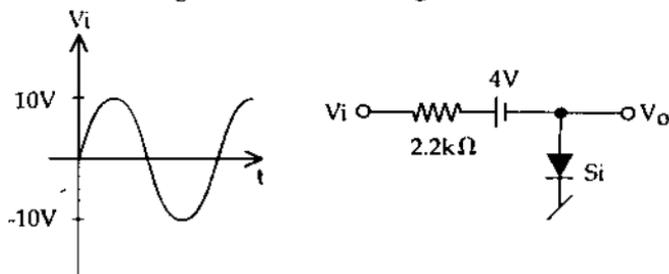
(iii) In case of numerical problems assume data wherever not provided.

(iv) Be precise in your answer.

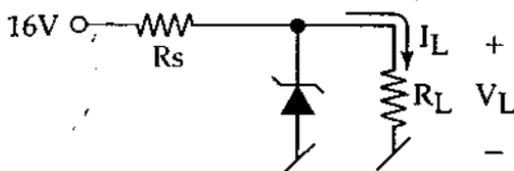
1. Attempt *any four* parts of the following : (5×4=20)

- Define an intrinsic material, a negative temperature coefficient, and covalent bonding. List three materials that have negative temperature coefficient.
- Differentiate among conductor, insulator and semiconductor using energy band concept. Also differentiate between n-type and p-type semiconductor materials.
- Explain the behaviour of p-n junction at no bias, reverse bias and forward bias. Sketch the v-i characteristics of p-n junction diode.
- Explain how you will determine the static resistance and dynamic resistance of p-n junction diode after defining both of them.

- (d) Sketch the V_o for the following circuit.



- (e) Calculate the values of R_s and R_L to maintain V_L at 12 V for I_L to vary from 0 to 200 mA. Also find V_z and P_{zmax} .



- (f) Explain the working of a voltage doubler with neat diagram.

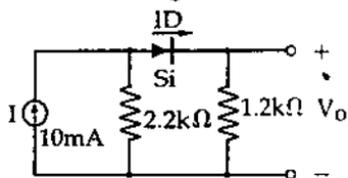
3. Attempt *any two* parts of the following : (10x2=20)

- (a) (i) What is the major difference between a bipolar and a unipolar device ?
 (ii) How must the two transistor junctions be biased for proper transistor amplifier operation ?
 (iii) Which of the transistor currents is always the largest ? Which is always the smallest ? Which two currents are relatively closed in magnitude ?
 (iv) In how many modes the BJT works ? Also explain the biasing pattern for each of them.
 (v) How many types of biasing are done on a BJT to work properly as an amplifier ? Which one is the best and why ?

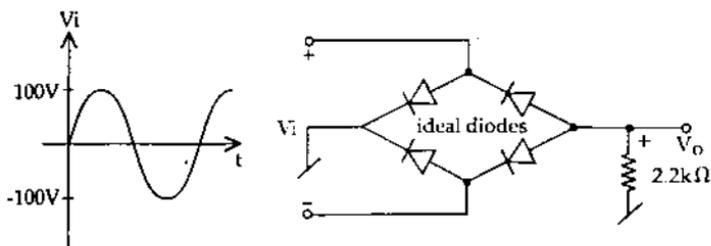
- (e) What do you understand by average current, repetitive peak current, non-repetitive current, peak-inverse voltage and reverse saturation current ?
- (f) What are the differences between diffusion and transition capacitance ? How will you represent the capacitive effect of a practical diode on an ideal diode ?

Attempt **any four** parts of the following : (5x4=20)

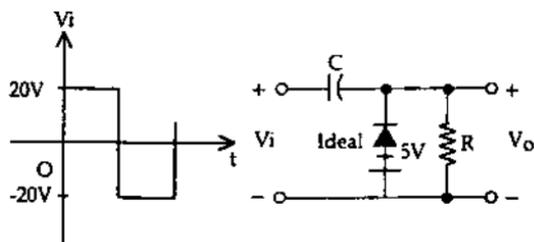
- (a) Calculate V_o and I_D for the following :



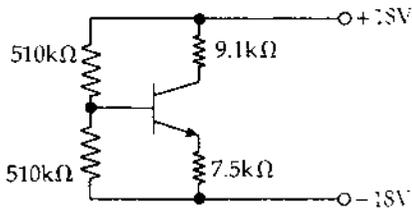
- (b) Determine V_o and required PIV rating of each of the diodes of the following circuit :



- (c) Determine V_o for the following circuit. Also name the configuration.



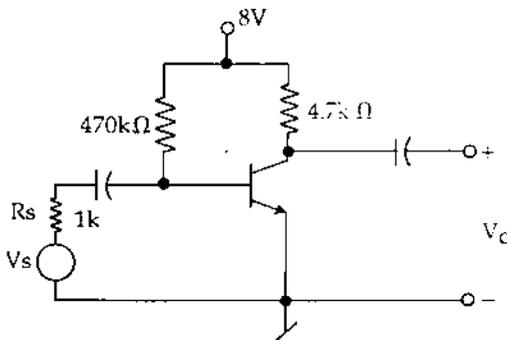
- (b) Calculate I_B , I_C , V_E and V_{CE} for the following circuit if $\beta = 130$.



- (c) Calculate the following using hybrid equivalent model for the following circuit where $h_{fc} = 110$

$$h_{oe} = 20 \frac{\mu A}{V}$$

- (i) Z_i
- (ii) Z_o
- (iii) A_v
- (iv) A_i

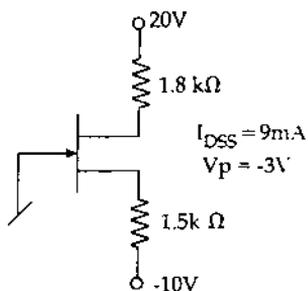


4. Attempt *any two* parts of the following : (10x2=20)

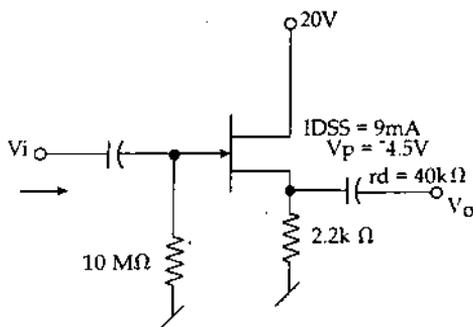
- (a) Explain the working of a JFET along with its construction with neat sketch. Also draw its transfer characteristic curve with explanation.

(b) Determine the following :

- (i) I_{DQ} , V_{GSQ}
- (ii) V_{DS}
- (iii) V_D
- (iv) V_S



(c) Calculate Z_p , Z_o and A_v for the following circuit :



5. Attempt *any four* parts of the following : (5x4=20)

(a) Convert the following bases :

(i) $(11011.011)_{10} \rightarrow ()_{16}$

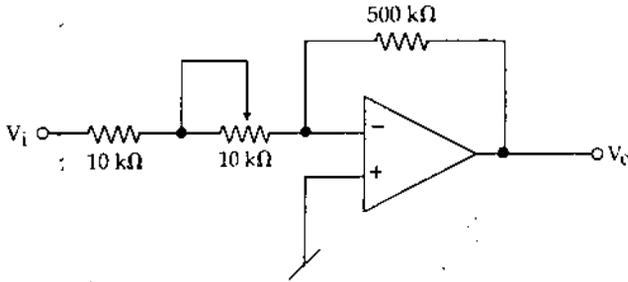
(ii) $(2AC9)_{16} \rightarrow ()_7$

(b) What are universal gates and why ?

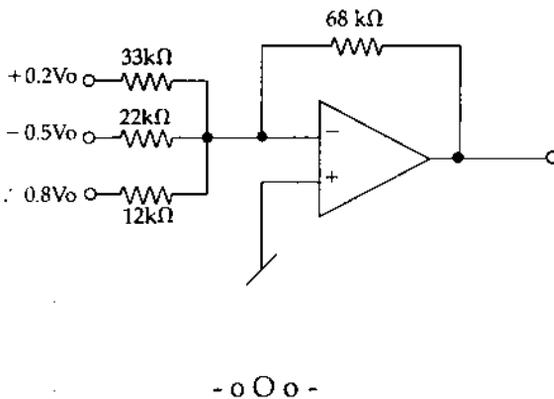
(c) Minimise the following using k-map.

$$f = \sum m(1, 2, 5, 7, 9, 15) + \phi \sum m(0, 3, 4, 6)$$

- (d) Enlist the ideal characteristics of an ideal operational amplifier. Also draw the circuit of a non-inverting amplifier.
- (e) What is the range of the voltage-gain adjustment in the following circuit ?



- (f) Find the output voltage of the following circuit.



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