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

**PAPER ID : 3033** Roll No. | | | | | | | | | | |

## 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 : **(5x4=20)**

(a) Define an intrinsic material, a negative temperature coefficient, and covalent bonding. List three materials that have negative temperature coefficient.

(b) Differentiate among conductor, insulator and semiconductor using energy band concept. Also differentiate between n-type and p-type semiconductor materials.

(c) 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.

(d) Explain how you will determine the static resistance and dynamic resistance of p-n junction diode after defining both of them.

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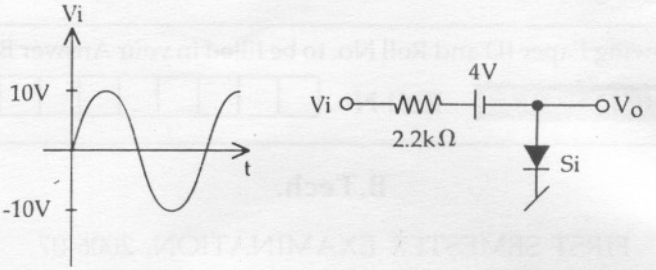
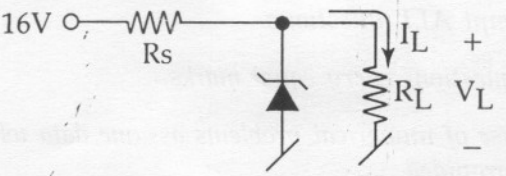
(d) Sketch the $V_o$ for the following circuit.




(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.

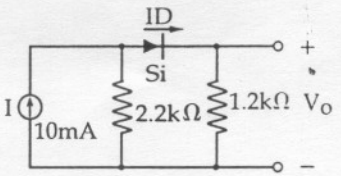
(v) How many types of biasing are done on a BJT to work properly as an amplifier ? Which one is the best and why ?

(e) What do you understand by average current, repetitive peak current, non-repetitive current, peak-inverse voltage and reverse saturation current ?

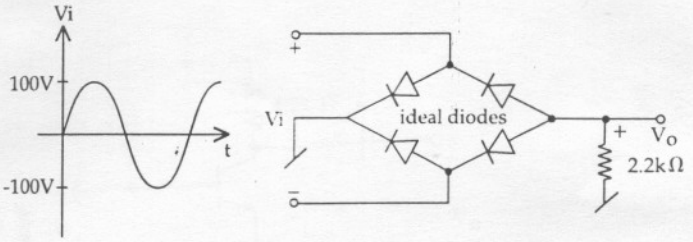
(f) What are the differences between diffusion and transition capacitance ? How will you represent the capacitive effect of a practical diode on an ideal iode ?

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

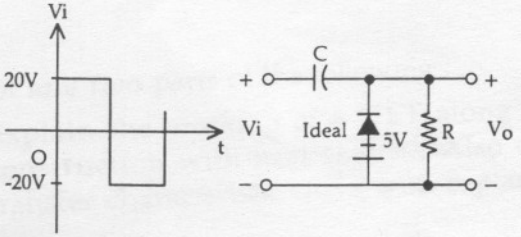
(a) Calculate $V_o$ and ID for the following :



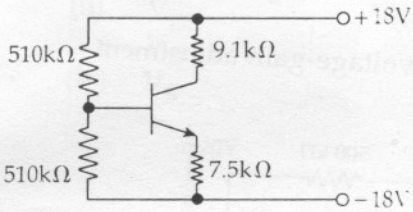

(b) Determine $V_o$ and required PIV rating of each of the diodes of the following circuit :




(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 hfc = 110

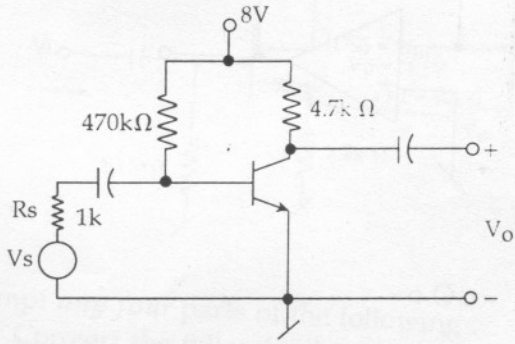
$hoe = 20 \frac{\mu A}{V}$.

(i) Zi

(ii) Zo

(iii) Av

(iv) Ai




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.

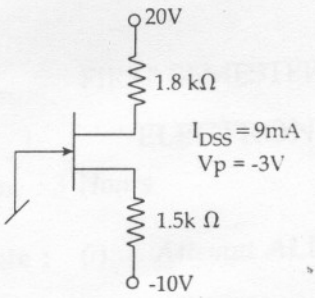
(b) Determine the following :

(i) $I_{DQ}$, $V_{GSQ}$

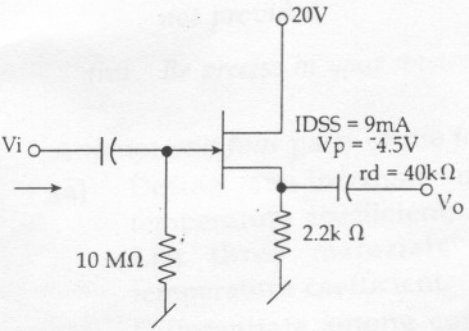
(ii) $V_{DS}$

(iii) $V_D$

(iv) $V_S$




(c) Calculate $Z_i$, $Z_o$ 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) $(2AC9)_{16} \rightarrow (\ )_7$

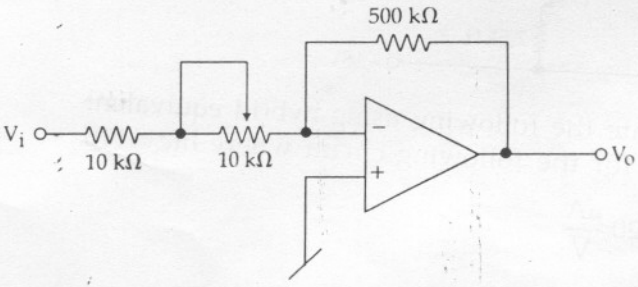
(b) What are universal gates and why ?

(c) Minimise the following using k-map.

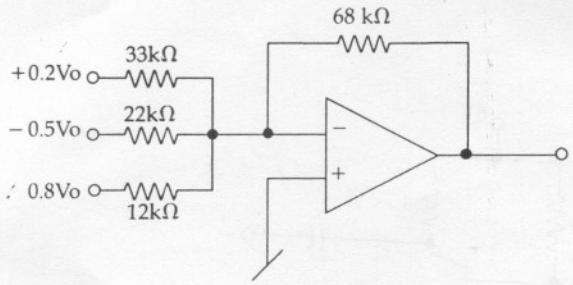
$f = \Sigma m\,(1,2,5,7,9,15) + \phi\,\Sigma m\,(0,3,4,6)$

(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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