



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

**PAPER ID : 3301**

Roll No.

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## B.Tech

### (SEM I) ODD SEMESTER THEORY EXAMINATION 2009-10 ELECTRONICS ENGINEERING

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt all questions.

## SECTION - A

- 1 Attempt all parts of this question. All parts of this  $2 \times 10 = 20$  question carry equal marks. This question contains TEN objective/Fill in the blank type/True False type questions :
- When PN-junction is biased in the forward direction \_\_\_\_\_ in each region are injected into the other region.
  - In a centre-tap full-wave rectifier,  $V_m$  is the peak voltage between the centre-tap and one end of the secondary. The PIV of the non-conducting diode is \_\_\_\_\_ when the filter is not connected.
  - Which of the following statement is best suited for a Zener diode ?
    - It is rectifier diode.
    - It works in the forward bias region.
    - It is a constant voltage device.
    - It is mostly used in clipping circuit.



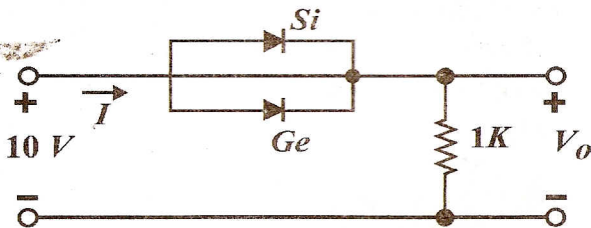
- (iv) An ordinary transistor is called 'bipolar junction transistor' because it has two poles: one positive and other negative. (True/False)
- (v) A common emitter transistor amplifier has a gain of 150. The output voltage is measured as 2V AC, the input voltage will be \_\_\_\_\_.
- (vi) The operation of a JFET involves :
- a flow of minority carriers.
  - A flow of majority carriers.
  - Recombination.
  - Negative resistance.
- (vii) An ideal operational amplifier is used to make an inverting amplifier. There are two input terminals of the operational amplifier and are at the same potential because :
- the two inputs are directly short circuited internally.
  - the input resistance of the operational amplifier is infinity.
  - the open loop gain of the operational amplifier is infinity.
  - all the above except option (a).
- (viii) The  $\alpha$  and  $\beta$  of a transistor are 0.99 and 99 respectively. If its  $I_{CBO}$  is 0.1 A, then its  $I_{CEO}$  will be \_\_\_\_\_.
- (ix) A basic meter can be converted in to an ohmmeter by connecting :
- a variable resistance in series.
  - a battery in series.
  - Both (a) and (b)
  - None of the above .
- (x) (i)  $A + A'B =$
- (ii)  $A.(A' + B) =$



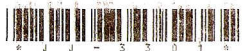
## SECTION - B

Attempt any **three** parts of this question. All parts  $10 \times 3 = 30$  of this question carry equal marks :

- (a) (i) Differentiate between static and dynamic resistance of a diode. 2
- (ii) Explain the two break down mechanisms of a reverse bias diode. 4
- (iii) Determine  $V_o$  and  $I$  for the following circuit. 4



- (b) (i) Which of the transistor currents is always the largest? Which one is the smallest? Which two are relatively close in magnitude? 5
- (ii) Draw the small signal equivalent circuit of a BJT and explain each component. 5
- (c) Define the following : 10
- (1) Drain to source saturation current of JFET.
  - (2) Pinch off voltage of JFET.
  - (3) Voltage controlled resistance of JFET.
  - (4) Virtual ground in an op-amp.
  - (5) Voltage gain of a non-inverting amplifier.



(d) (i) Prove the following identity : 5

$$(x_1 + x_2) \cdot (x'_1 \cdot x'_3 + x_3) \cdot (x'_2 \cdot x_1 \cdot x_3)' = x'_1 \cdot x_2$$

(ii) Define : 5

- (1) Canonical form
- (2) Standard form
- (3) Sum of the products
- (4) Product of the sums
- (5) Don't care terms.

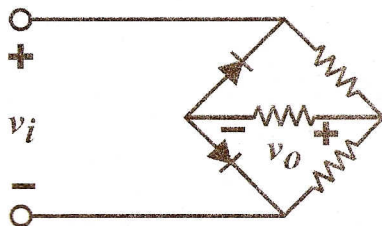
(e) Explain, how do we measure the voltage, current 10  
and the phase of a wave form using the CRO ?

### SECTION - C

**Note :** Attempt all questions. 10×5=50  
All questions carry equal marks.

3 Attempt any **two** parts of the following :

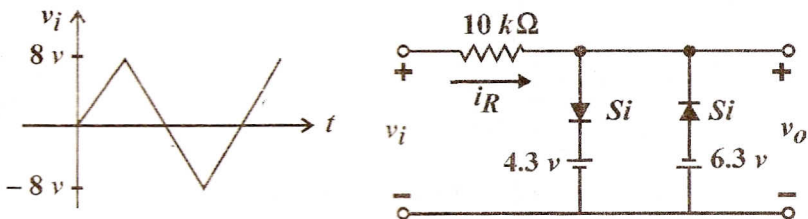
(a) Sketch  $v_o$  for the following circuit and determine the dc value of output voltage. Input to the circuit is 100 V peak to peak sine wave :



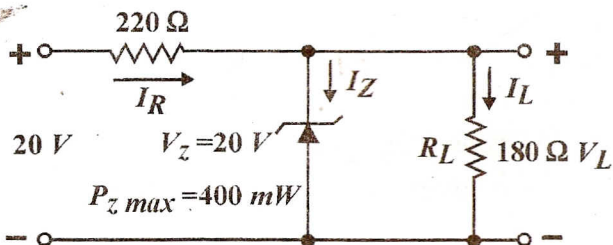
Diodes are ideal. All resistances are  $2.2 \text{ k}\Omega$



(b) Sketch  $i_R$  and  $v_o$  for the following circuit :

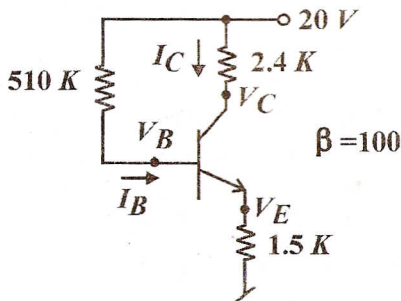


(c) Determine  $V_L$ ,  $I_L$ ,  $I_Z$  and  $I_R$  for the following circuit.

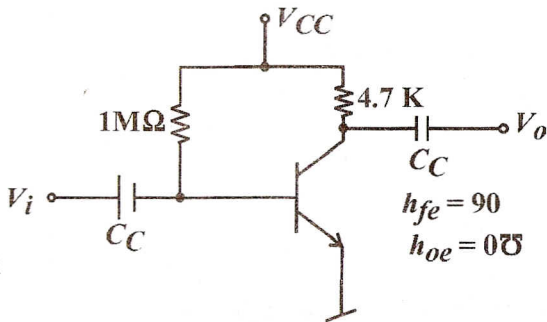


4 Attempt any **one** of the following :

(a) Determine  $I_C$ ,  $V_E$ ,  $V_B$ ,  $V_C$  and  $I_B$  for the following circuit

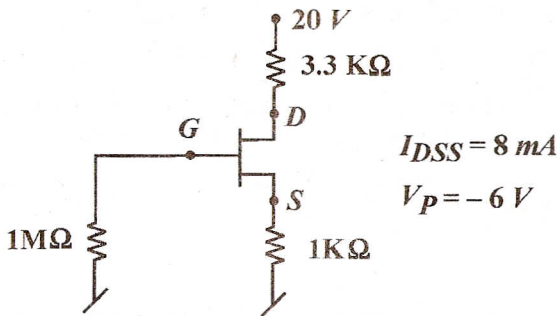


- (b) Determine  $V_{CC}$  for the following circuit if the voltage gain  $A_V = -200$ .



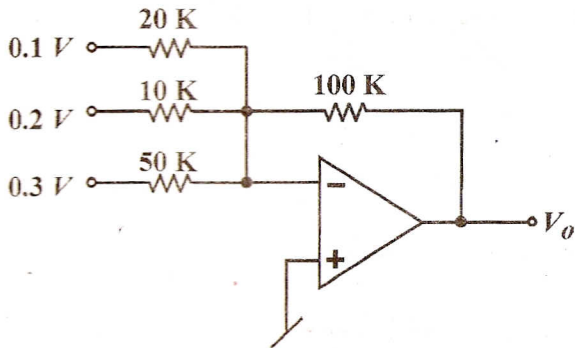
5 Attempt any **one** of the following :

- (a) Determine  $V_{GS}$ ,  $I_D$ ,  $V_{DS}$ ,  $V_D$ ,  $V_G$  and  $V_S$  for the following circuit :



- (b) (i) Enlist the characteristics of an ideal operational amplifier (op-amp). 3
- (ii) Draw the circuit of a subtractor using op-amp and explain its working. 3
- (iii) Determine the  $V_O$  for the following circuit : 4





6 Attempt any **two** of the following :

(a) Convert the following numbers :

$$(2CCD)_{16} = ( \quad )_8 = ( \quad )_5$$

$$(7841)_9 = ( \quad )_{10} = ( \quad )_4 = ( \quad )_2$$

(b) Realize the following expression using Ex-OR/Ex-NOR gates and basic gates if required

$$f(A, B, C, D) = A'BC' + A'B'C + AC'D + ACD'$$

(c) Minimize the given function using K-map and convert the minimized function into POS form

$$f(A, B, C, D) = \sum (1, 3, 5, 7, 9, 10, 12, 13)$$

7 Attempt any one part of the following :

(a) Explain the working of digital voltmeter with help of a block diagram.

(b) Explain the working of CRO with the help of a block diagram.

