



**UH-8069**

**B. E. II (Sem. III) (ECC/EL/CO/IT/IC) Examination**

**May / June – 2012**

**Basic Electronics**

*(As Per New Syllabus)*

Time : 3 Hours]

[Total Marks :

**Instructions :**

(1)

नीचे दशांशों में निशानीवाणी विगतो उत्तरवखी पर अवश्य लखवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. 2 (Sem. 3) (ECC/EL/CO/IT/IC)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Basic Electronics (New Syllabus)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="8"/> <input type="text" value="0"/> <input type="text" value="6"/> <input type="text" value="9"/>	Section No. {1, 2,.....} : <input type="text" value="NIL"/>
Student's Signature	

- (2) Attempt all questions.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data whenever necessary.
- (5) Programmable calculators are not allowed.

1 (a) Answer the following questions : (any ten) 10

(i) The relation between drift velocity ( $v$ ) mobility ( $\mu$ ) and electric field  $E$  is \_\_\_\_\_

(a)  $v = \frac{\mu}{E}$

(b)  $v = \mu E$

(c)  $\mu = \frac{E}{v}$

(ii) Define : Electric Field intensity

(iii) The electrons in the \_\_\_\_\_ band are responsible for the flow of current

(a) Conduction band

(b) Forbidden band

(c) Valence band

(iv) For certain transistor  $\alpha_{dc} = 0.98$  and  $I_E = 6\text{mA}$ .

Calculate  $I_C$  and  $I_B$ .

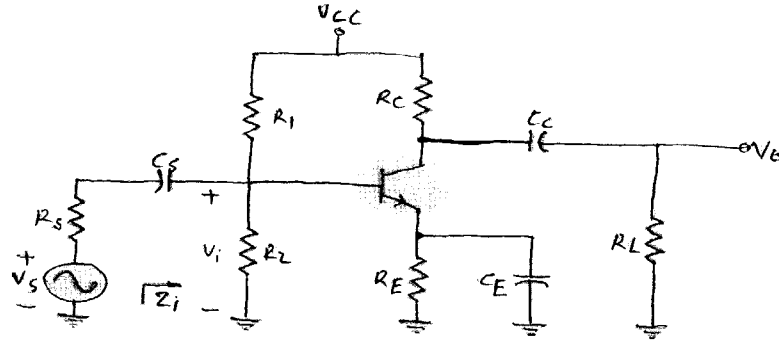
- (v) The peak inverse voltage of each diode in a full wave bridge rectifier is \_\_\_\_\_
- $v_m/2$
  - $2V_m$
  - $V_m$
- (vi) In a transistor \_\_\_\_\_ region is very lightly doped and very thin
- Collector
  - Base
  - Emitter
- (vii) The \_\_\_\_\_ impurity is called as a donor impurity.
- Pentavalent
  - trivalent
- (viii) The relation between  $I_{CEO}$  and  $I_{CBO}$  is \_\_\_\_\_
- $I_{CBO} = (1 + \beta) I_{CEO}$
  - $I_{CEO} = (1 + \beta) I_{CBO}$
  - $I_{CBO} = \beta I_{CEO}$
- (ix) State the Mass Action Law.
- (x) The transition capacitance is \_\_\_\_\_ proportional to the width of depletion region.
- directly
  - inversely
- (xi) Typically the value of  $\beta_{dc}$  is
- 50 to 100
  - 500 to 1000
  - more than 1000
- (xii) Transistor is operated as an amplifier in \_\_\_\_\_ region.
- Cut-off
  - Saturation
  - Active
- (b) (i) Derive the expression for current density and conductivity for metal bar of length L and cross section area of A. 5
- (ii) Explain the hall-effect. State the application of it and derive the expression for Hall voltage. 5

- 2 (a) Explain the half wave Rectifier and derive the following parameters : 5
- (i)  $I_{\text{lirms}}$   
(ii)  $V_{\text{lirms}}$   
(iii)  $P_{\text{Lidc}}$
- (b) Draw and explain the input and output characteristic of CE configuration of transistor. 5
- (c) Prove that the resistivity of intrinsic Ge is  $45 \Omega \text{ cm}$ . 5  
Given for Ge at room temperature.  
 $n_i = 2.5 \times 10^{13} / \text{cm}^3$   
 $\mu_p = 1800 \text{ cm}^2/\text{V-s}$   
 $\mu_n = 3800 \text{ cm}^2/\text{V-s}$   
Charge of e-,  $q = 1.6 \times 10^{-19} \text{ C}$
- OR**
- (c) The voltage across a si diode at room temperature of  $300^\circ\text{K}$  is 0.71 volt when 2.5 mA current flowing through it. If the voltage increase to 0.8 volt, calculate the new diode current.
- 3 Write short notes : (any three) 15
- (i) Zener effect and Avalanche effect.  
(ii) Forward and Reverse characteristic of p-n junction diode.  
(iii) Rectifier with different filters.  
(iv) Tunnel diode  
(v) Transistor current components.
- 4 Attempt followings : 20
- (i) Write down difference between BJT and MOSFET.  
(ii) Explain Miller's theorem.  
(iii) Explain static and dynamic load line.  
(iv) Explain diode compensation technique for VBE.  
(v) Define following terms :  
(a) Pinch-off voltage  
(b) Transconductance – gm  
(vi) Sketch the CMOS inverter and explain its operation.  
(vii) Define Input regulation factor, Output resistance and Temperature coefficient for a voltage regulator.  
(viii) Explain two methods of decreasing the value of Sv for series voltage regulator.  
(ix) Define inter modulation distortion.  
(x) Explain in short about conversion efficiency.

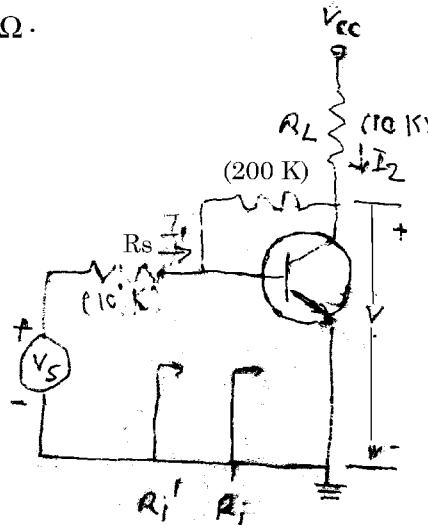
5 Attempt the followings : 8

- (i) Determine the lower cut off frequency for the network of given fig. using the following parameter and sketch the frequency response using Bode plot.

$$C_s = 10 \mu F, C_E = 20 \mu F, C_c = 1 \mu F, R_s = 1 K \Omega, R_1 = 40 K \Omega, R_2 = 10 K \Omega, R_E = 2 K \Omega, R_C = 4 K \Omega, R_L = 2.2 K \Omega, \beta = 100, r_o = \infty \Omega, V_{CC} = 20 V.$$



- (ii) For the amplifier shown in fig. calculate  $R_i, R_i', A_v, A_{v_s}$ , and  $A_i = -12/11$  for the given parameter  $h_{11}=h_i=1.1 K \Omega, h_{12}=h_r=2.5 \times 10^{-4}, h_{21}=h_f=50, h_{22}=h_o=24 \mu A/V, 1/h_o=40 k \Omega$ .



OR

Find out hre in terms of CB h parameter.

6 Write shortnotes : (any three) 15

- (i) Higher Harmonic generator
- (ii) Common Source amplifier at High frequency.
- (iii) Series Voltage regulator
- (iv) Bias compensation
- (v) Push-pull amplifier.