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SE-8069

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

May / June – 2011

Basic Electronics

(New Course)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 2 (SEM. - 3) (ECC/EL/CO/IT/IC)**

Name of the Subject :

☛ **BASIC ELECTRONICS (NEW COURSE)**

☛ Subject Code No. : **8 0 6 9** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

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.
(6) Draw the fig. whenever needed.

SECTION - I

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

(i) The electrons in the _____band are responsible for the flow of current.

(a) Conduction

(b) Forbidden

(c) Valence

(ii) The _____ impurity is called as a donor impurity.

(a) trivalent

(b) tetravalent

(c) pentavalent

(iii) In a transistor _____ region is very lightly doped and very thin.

(a) Collector

(b) Emitter

(c) Base

(iv) The forward current through p-n junction diode flows due to _____ carriers.

(a) majority

(b) minority

(v) The relationship between I_{CEO} and I_{CBO} is _____.

(a) $I_{CEO} = (1+\beta)\ I_{CBO}$

(b) $I_{CBO} = (1+\beta)\ I_{CEO}$

(c) $I_{CEO} = (\beta-1)\ I_{CBO}$

(vi) The _____ diode can be used as light detector.

(a) LED

(b) Photo

(c) Solarcell

(vii) The _____ diode shows a Negative Resistance characteristics.

(a) Zener

(b) Varactor

(c) Tunnel

(viii) The transition capacitance is _____ proportional to the width of depletion region.

(a) directly

(b) inversely

(ix) The relation between α and β is _____.

(a) $\beta = \frac{\alpha}{1+\alpha}$

(b) $\beta = \frac{1+\alpha}{\alpha}$

(c) $\beta = \frac{\alpha}{1-\alpha}$

(x) In CB configuration with emitter open, the collector is equal to _____.

(a) I_B

(b) I_{CEO}

(c) I_{CBO}

(xi) Define : Mobility

(xii) The cut - in voltage for Si p-n junction diode is _____ volt.

(a) 0.3

(b) 0.7

(c) 0.1

(b) (i) A bar of n-type Si has length of 4 cm and circular cross section of 10 mm^2. When it is subjected to a voltage of 1 V applied across its length, the current flowing through it is 5mA. **6**

Calculate :

(a) Concentration of free electrons

(b) Drift velocity of electrons.

Assume : Charge on one electron. as 1.6×10^{-19}C.

Mobility of free e^- as 1300 cm^2/V-s.

(ii) Explain Hall effect. State the application of it. **4**

2 (a) Explain the Energy Band Theory of crystals. **6**

OR

(a) Explain the Half Wave Rectifier and derive the following parameters : **6**

(i) $I_{L,dc}$

(ii) $V_{L,dc}$

(iii) Ripple Factor.

(b) Explain the full wave center tap rectifier and derive the following parameters. **5**

(i) $I_{L,dc}$

(ii) $V_{L,dc}$

(c) Consider a step graded Ge P-N junction. It has $N_D = 10^3 N_A$ and N_A corresponds to 1 atom per 10^8 Ge atoms. Calculate junction potential V_j at room temperature of 21°C **4**

Assume : Mi = 2.5 – 10^{13} per cm^3

Atom density of Ge = 4.4 x 10^{22} atoms/cm^3.

3 Write short notes : (any **three**) **15**

(a) Zener effect and Avalanche effect

(b) Operation of p-n-p transistor in active region

(c) Diode switching times

(d) Conductivity modulation

(e) Transistor current components.

SECTION - II

4 Answer the short questions : (any **ten**) **20**

(i) Why biasing is necessary in BJT amplifier ?

(ii) Voltage gain of the first stage of amplifier is 20 and voltage gain of second stage of amplifier is 40. The overall voltage gain is _____.

(iii) The y-axis intersection point of d.c. load line is _____.

(iv) The main advantages of cascade amplifier.

(v) In the pinch-off region I_D mostly depend on

(a) V_{GS}

(b) V_{DS}

(c) V_{DD}

(vi) For faithful amplification Q point is selected at

(a) nearer to ohmic region

(b) midway of the local line

(c) near the pinch off volt

(vii) List the important parameters of JFET.

(viii) List the benefits of h-parameter.

(ix) Draw the block diagram of regulated power supply with waveforms.

(x) Define VVR and VDR.

(xi) Define pinch-off voltage

(xii) Sketch the symbol of n-channel and P-channel enhancement type MOSFET.

(xiii) Write comparison of JFET and MOSFET.

5 (a) For the circuit shown in figure (i) determine the I_{BQ}, I_{CQ} and V_{CEQ}. 7

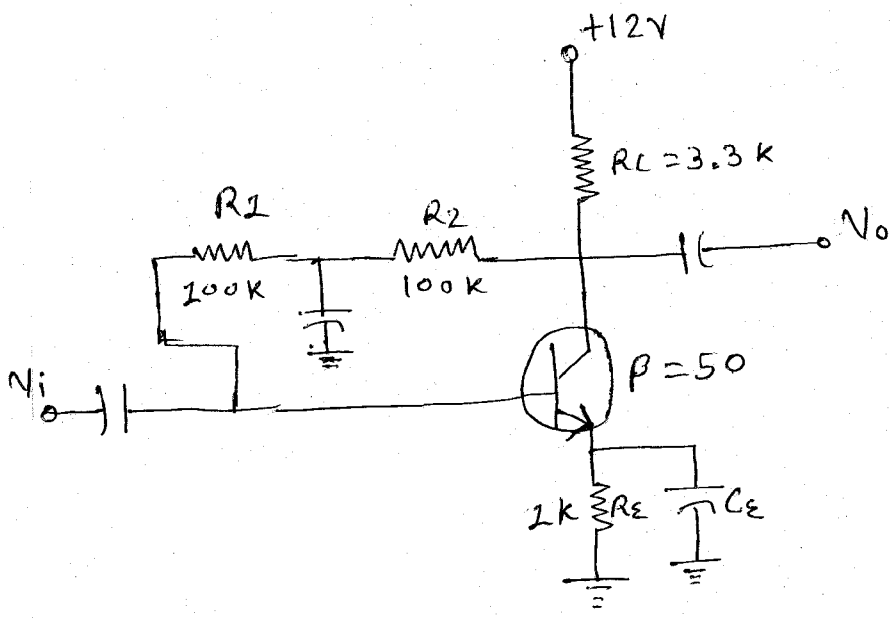

Fig.1

(b) Describe briefly the construction and working of n-channel JFET. Draw the transfer curve and write its important features with applications. 8

OR

5 (a) For circuit shown in figure (ii) below having $\beta = 99$. Calculate I_E, I_B, I_C, V_E and V_C. **7**

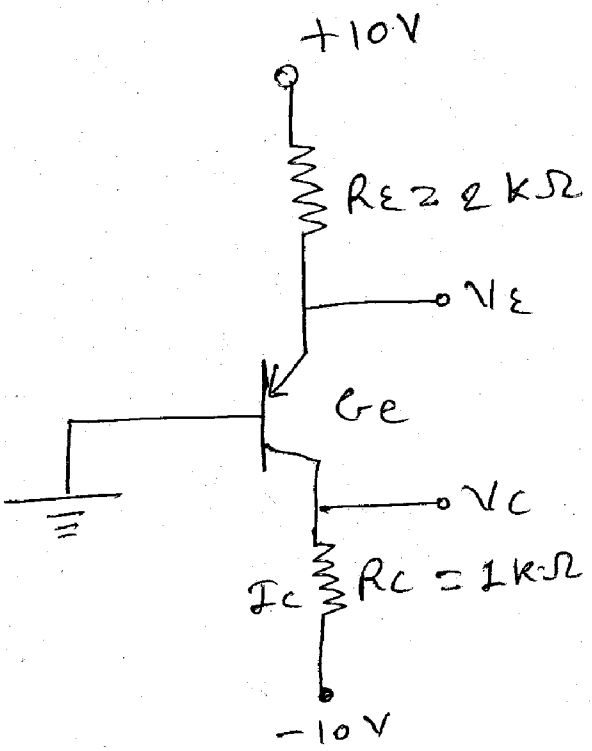

Fig. (ii)

(b) Describe briefly the construction and working of n-channel MOSFET in enhancement mode. Sketch its characteristics and transfer curve. **8**

6 Write short notes : (any **three**) **15**

(i) Push pull class B amplifier.

(ii) Compare series regulator and shunt regulator.

(iii) Fixed bias circuit

(iv) Miller's theorem

(v) Thermister compensation.
