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Printed Pages : 7 TEC – 201

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

PAPER ID : 3034 Roll No.

B. Tech.

(SEM. II) EXAMINATION, 2006-07

ELECTRONICS ENGG.

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

Note : *Attempt **all** questions. All questions carry **equal** marks.*

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

(a) Describe the characteristics of ideal diode. Determine the ON and OFF state of the device.

(b) Draw the characteristics in foward and reverse bias and explain it.

(c) Show the energy levels diagram in insulators, semi-conductor and conductor materials.

(d) Differentiate between :

(i) Donor and acceptor impurities

(ii) Intrinsic and Extrinsic semiconductors.

(e) Explain the static and dynamic resistance in **p-n** junction diode. Determine the dc resistance levels for the diode of in following fig at

(i) $\mathbf{I_D = 2mA}$

(ii) $\mathbf{I_D = 20mA}$

(iii) $\mathbf{V_D = -10V}$

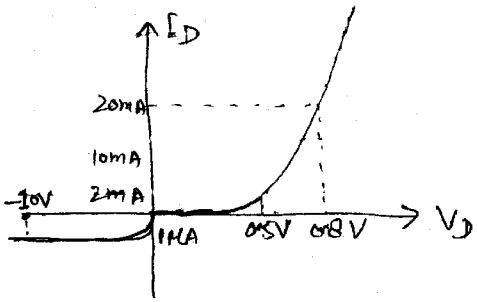

Fig. 1

(f) Describe how diffusion and Transtition Capacitance differ. Draw the characteristics of Transition and diffusion capacitance versus applied bias voltage.

2 Attempt any **four** parts of the following : **5×4=20**

(a) What is dc load line? Prove that the operating point should be in the middle of the dc load line.

(b) Draw the circuit diagram of a full wave rectifier using two diodes and calculate

(i) Idc

(ii) Irms

(iii) PIV rating of diode.

(c) Determine **I, V_1, V_2** and **V_o** for the series dc configuration of the following figure.

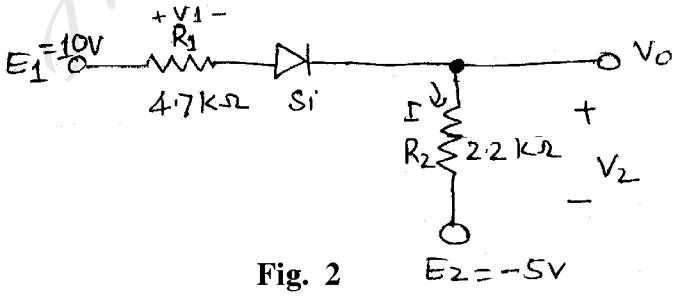

Fig. 2

(d) Sketch $\mathbf{V_o}$ for network shown in Fig.

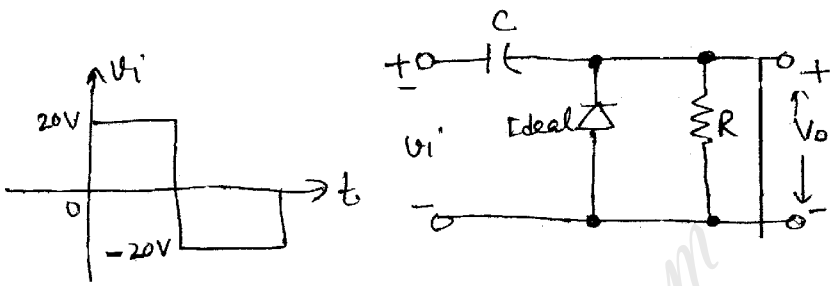

Fig. 3

(e) Determine $\mathbf{I_S}$, $\mathbf{I_L}$ and $\mathbf{I_Z}$.

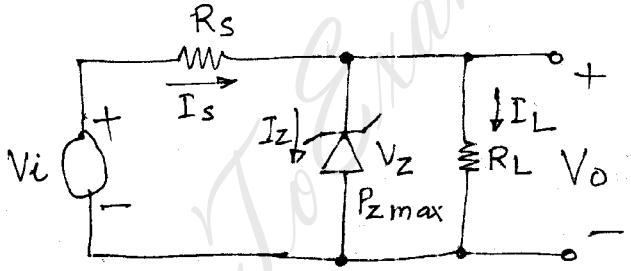

Fig. 4

(f) Sketch the output waveform.

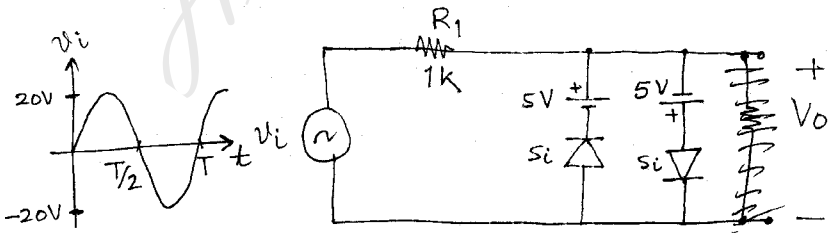

Fig. 5

3 Attempt any **four** parts of the following : **5+4=20**

(a) Explain why a transistor action can not be achieved by connecting two back-to-back diodes. In a transistor explain, why emitter region is heavily doped, base width is small and collector area is large?

(b) Determine the following for the voltage divider configuration

(i) $\mathbf{I_c}$ (ii) $\mathbf{V_E}$ (iii) $\mathbf{V_B}$ (iv) $\mathbf{V_C}$ (v) $\mathbf{R_I}$

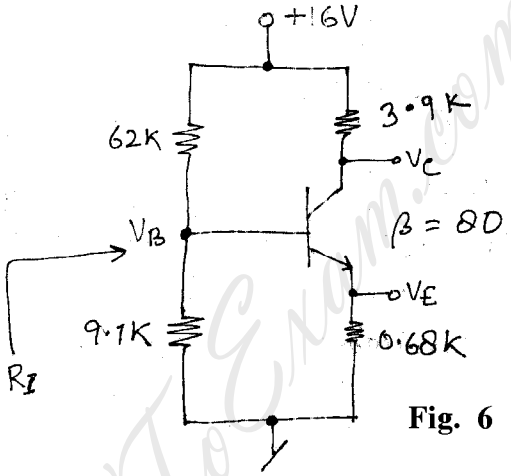

Fig. 6

(c) Differentiate **CB, CE** and **CC** circuits.

(d) Determine the resistor values for the following network for the indicated operating point and power supply voltage.

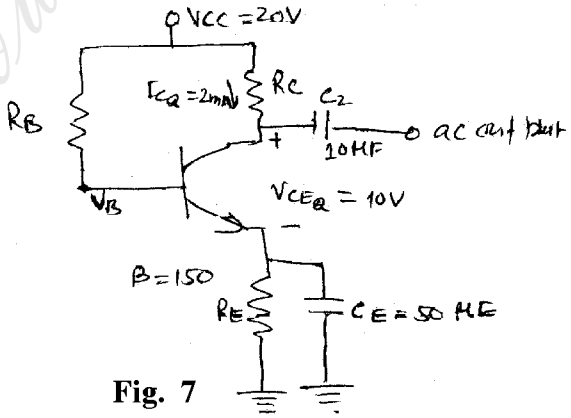

Fig. 7

(e) Determine $\mathbf{A_V}$, $\mathbf{A_i}$, $\mathbf{R_i}$ and $\mathbf{R_o}$ for the following circuit.

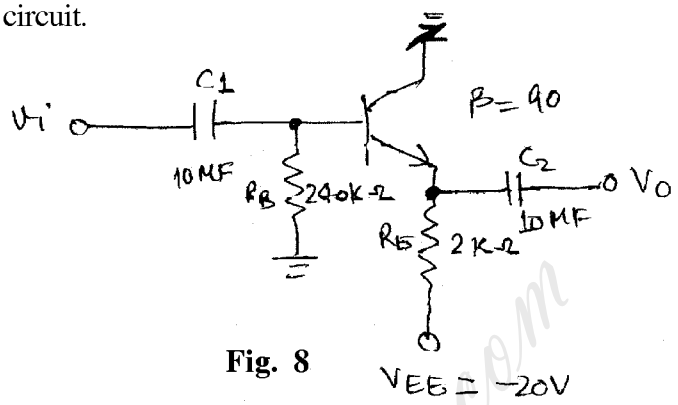

Fig. 8

(f) Determine the quiesent levels of $\mathbf{I_{c2}}$ and $\mathbf{V_{CEQ}}$ for the network

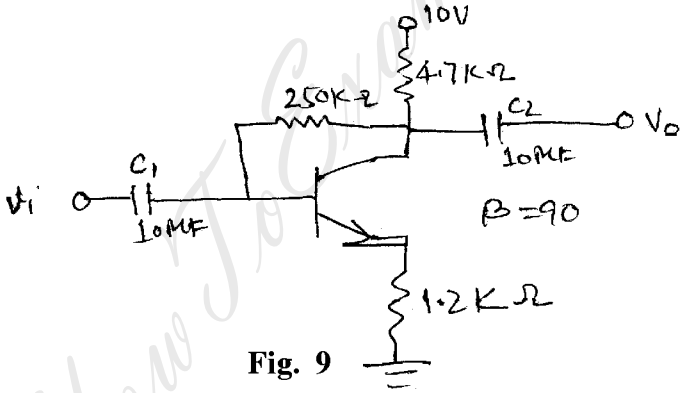

Fig. 9

4 Attempt any **two** parts of the following : **10×2=20**

(a) Draw the structure of a JFET and explain its principle of operation with neat diagrams. Also sketch its **V-I** characteristics. Define pinch-off voltage and mark it on the characteristics. Explain its importance.

(b) For the given measurement $\mathbf{V_s}$ **= 1.7V** for the network as shown in the figure determine.

(i) ID_Q
(ii) V_{GSQ}
(iii) I_{DSS}
(iv) V_D
(v) V_{DS}

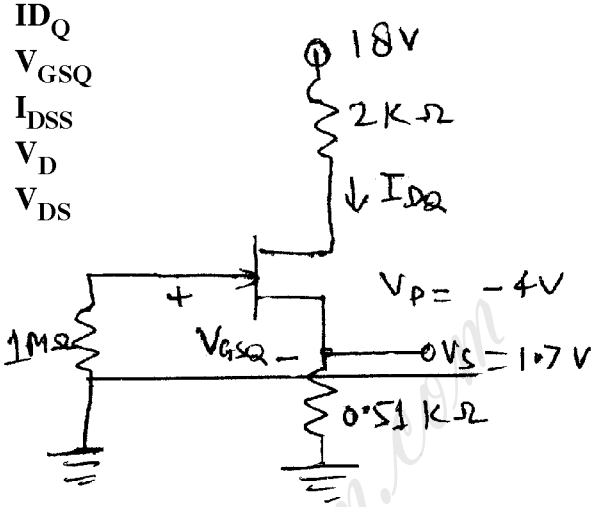

Fig. 10

(c) Describe briefly, the construction of a MOSFET in enhancement mode. Draw its characteristics. Draw the equivalent circuit of a MOSFET operating in enhancement mode.

5 Attempt any **two** parts of the following : **10×2=20**

(a) (i) Convert the following numbers

(a) $(6089.25)_{10} = (\quad)_8$
(b) $(A6B.F5)_{16} = (\quad)_2$
(c) $(375.37)_8 = (\quad)_2$

(ii) (1) $(A4F.EF)_{16} + (3FD.AB)_{16}$

(2) $(6488.43)_9 - (3837.78)_9$

(3) $(F\ A\ I\ 2.35)_{16} - (9\ BCD.EC)_{16}$

(iii) Simplify the following logic expression using Boolean algebra

(a) $f = AB + A(B+C) + B(B+C)$

(b) $f = A\bar{B}\bar{C}D + \bar{A}\bar{B}D + BC\bar{D} + \bar{A}B + B\bar{C}$

(b) (i) Simplify the following expression using K-map and implement the output using fundamental gates.

$$f(A,B,C,D) = \sum m(1,3,4,6,8,9,11,13,15) + \sum d(0,2,14)$$

(ii) Simplify the following expression using K-map

$$f(A,B,C,D) = \Pi M(0, 1, 3, 6, 7, 8, 9, 11, 13, 14, 15)$$

(c) (i) What are the properties of an ideal operational amplifier used in measurement and instrumentation system? Explain with the help of circuit diagrams how it is used as

(a) Adder (b) Subtractor
(c) Integrator (d) Differentiator

(ii) Calculate the output voltage of an OP-AMP summing amplifier for the following sets of voltages and resistors. Use Rf = 1M Ω in all cases.

(a) $V_1 = +1V \quad V_2 = +2V, V_3 = +3V$

$R_1 = 500\ K\Omega \quad R_2 = 1M\Omega \quad R_3 = 1M\Omega$

(b) $V_1 = -2V, V_2 = +3V, V_3 = +1V$

$R_1 = 200\ K\Omega, R_2 = 500\ K\Omega, \quad R_3 = 1M\Omega$
