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

PAPER ID : 3034   Roll No. [   ]

B. Tech.

(SEM. II) THEORY EXAMINATION 2010-11

ELECTRONICS ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note : (1) Attempt **all** questions.

(2) Be precise in your answer. No second answer book will be provided.
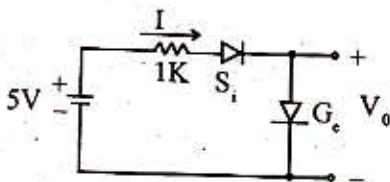
1. Attempt any **four** parts of the following :   (5×4=20)

   (a) On the basis of Energy band diagram explain Insulator, Metals and Semiconductors.

   (b) Explain Static and Dynamic Resistance of diode.

   (c) Describe the characteristics of ideal diode. Determine the on and off state of the device.

   (d) Define the terms conductivity, intrinsic concentration and energy gap of semiconductors.

   (e) Determine the voltage V_0 and I for the given configuration :

(f) Differentiate between :

(i) Donor and Acceptor impurities

(ii) Intrinsic and Extrinsic semiconductors..

2. Attempt any **two** parts of the following : $(10 \times 2 = 20)$

(a) Draw circuit diagrams to show two methods of producing a negative output voltage from a half wave rectifier. Explain briefly the circuit operations.

(b) (i) Explain the working of full-wave bridge rectifier and show that $PIV \geq V_m$.

(ii) What is clipper circuit ? Sketch the output voltage waveform for the circuit shown :
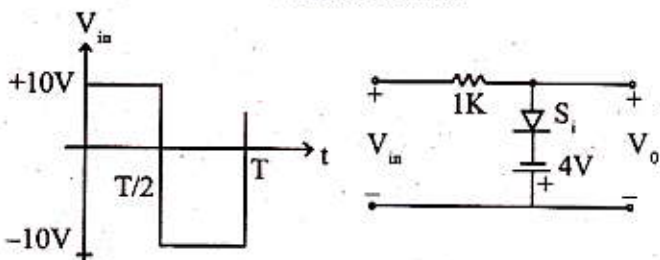
(c) (i) Discuss the different types of junction break-down that can occur in a reverse biased diode. Explain the shape of the break-down diode characteristics. What will be their thermal coefficient ?

(ii) Draw and explain the circuit operation of voltage Tripler circuit.

3. Attempt any **two** parts of the following : (10×2=20)

(a) (i) How must the two transistor junction be biased for proper transistor amplifier operation ? What is the source of leakage current in a transistor ?

(ii) Draw the output characteristics of a transistor in C_E configuration. Also indicate all the region of operation.

(b) Draw and describe the h-parameter equivalent circuit for a common emitter transistor amplifier. Show how the values of h-parameters are obtained from the common emitter input characteristic curves and common emitter output characteristic curves.

(c) (i) Draw the small signal equivalent circuit of a BJT and explain each component.

(ii) Sketch a emitter bias circuit using an npn transistor. Show all voltage polarities and current directions. Explain the operation of the circuit and write the equations for V_B, I_E, I_C and V_{CE}.

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

(a) Sketch the structure of a p-type channel depletion type MOSFET and explain its principle of operation with neat diagrams. Also sketch its V-I characteristics and circuit symbols for it.

(b) Describe the construction and operation of a JFET. How does it differ from a MOSFET ? Draw the equivalent circuit for a JFET amplifier and explain its biasing.

(c) (i) Define pinch-off voltage and its significance. Also mention the parameters that control the pinch-off voltage of a JFET.

(ii) In a JFET the drain current is changed by 0.25 mA when the gate-source voltage is changed by 0.125V, keeping drain source voltage constant. Calculate the transconductance of the given JFET.

5. Attempt any two parts of the following : (10×2=20)

(a) What is Karnaugh map ? Explain how it helps in simplifying a given Boolean expression. Draw K-map for four-number of variables. Minimise the given Boolean function using K-map. $F(w,x,y,z) = \Sigma\, m(1,0,4,7,9,11) + d(2,3,8,12)$.

(b) (i) Convert the following numbers as indicated :

$(1221.12)_2 = (\ )_7, (1221.12)_{10} = (\ )_{16}$.

(ii) Implement XNOR gate using universal gates.

(c) (i) Express $F = AB + A'C$ in Sum of the Products and also in Product of the Sums form.

(ii) What are the characteristics of an ideal operational amplifier ? Explain the working of an inverting amplifier with neat sketch.