F.E. Semester – II (RC 07-08) Examination, May/June 2018
BASIC ELECTRONICS ENGINEERING

Duration : 3 Hours

Total Marks : 100

Instructions *: 1) Attempt* ***any five*** *questions choosing at least* ***one*** *question from* ***each*** *Module.*
2) Draw ***neat****, labelled diagrams* ***wherever*** *necessary.*
3) ***All*** *symbols and abbreviations carry their usual meaning.*
4) Make ***suitable*** *assumptions when* ***necessary****.*

MODULE – I

1. a) Draw and explain the V-I characteristics of a silicon diode. Highlight the Forward-bias, Reverse-bias and No-bias regions on the graph. **6**

   b) Why are silicon diodes preferred over germanium diodes ? **2**

   c) Distinguish between avalanche and zener breakdown mechanisms in a semiconductor diode. **6**

   d) With neat diagrams explain the piecewise-linear and simplified equivalent circuits for a diode. **6**

2. a) i) Determine the value of V_0 for the following network (Fig. 1)

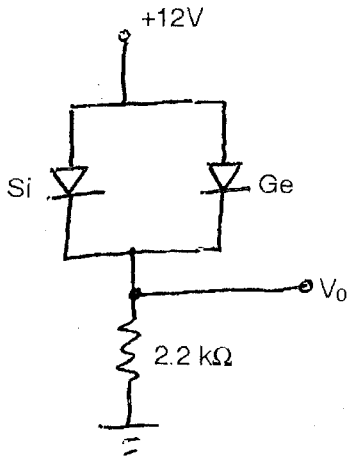
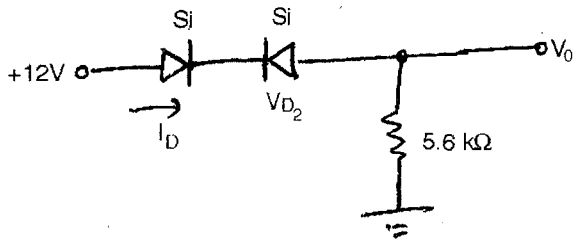


Fig. 1

ii) Determine I_D, V_{D_2} and V_0 for the following circuit (Fig. 2).



6

Fig. 2

b) With a neat circuit diagram and waveforms explain the working of a full-wave bridge rectifier. Also draw the output waveform if a C-filter is connected across the load. 8

c) For the following networks (Fig. 3) determine V_0 and draw the output waveform. 6

i)

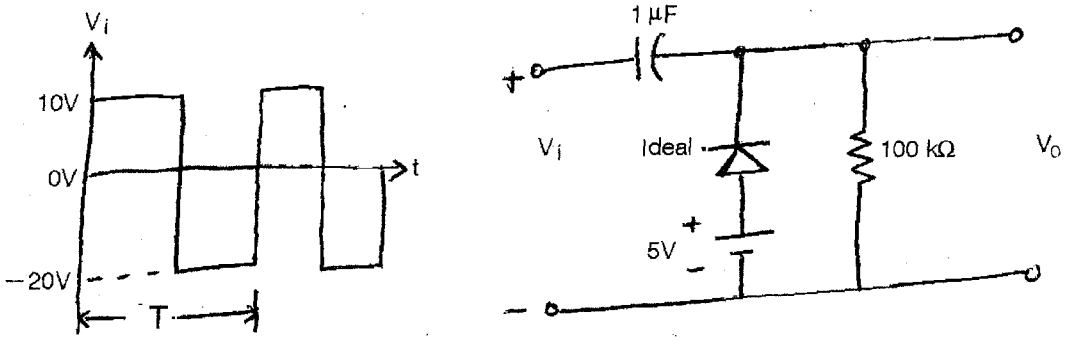


Fig. 3(a)

ii)

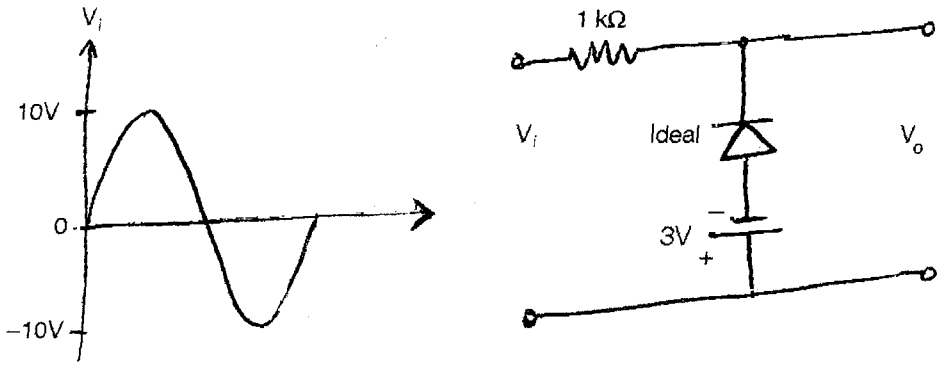


Fig. 3(b)

MODULE – II

3. a) Why is a transistor called a 'transistor' ? With a neat circuit-diagram, explain the amplifying action of a bipolar junction transistor. **6**

   b) With neat diagrams explain the common-emitter configuration of a bipolar junction transistor. Draw the collector and base characteristics (input and output characteristics). Explain the active, cut-off and saturation regions and highlight them on the graph. **8**

   c) Determine the following for the network given in Fig. 4

      a) I_{BQ} and I_{CQ}

      b) V_{CEQ}

      c) V_B and V_C

      d) V_{BC}. **6**

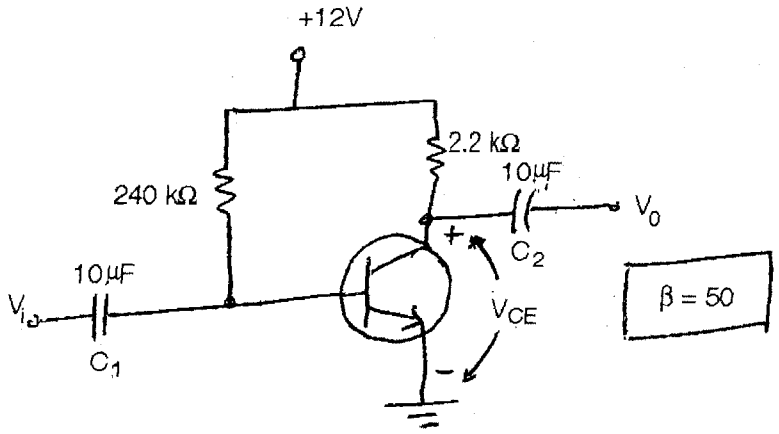


Fig. 4 Fixed bias circuit

4. a) Draw the circuit diagram of an emitter-stabilized biased BJT circuit and hence derive the expressions for I_B, R_i, V_{CE}, V_C and V_B. What is the advantage of this circuit over fixed bias circuit ? **7**

   b) Determine the dc bias voltage V_{CE} and the current I_C for the configuration shown in Fig. 5. **8**

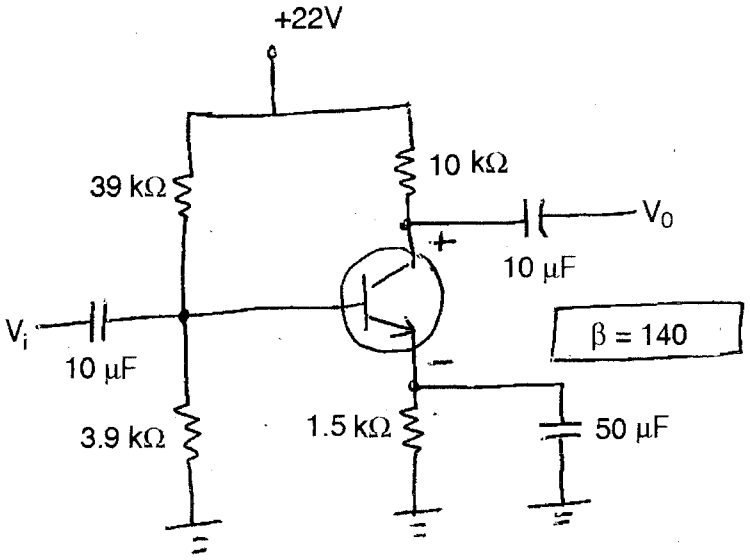


Fig. 5

   c) Explain the design and operation of a transistor as a switch. **5**

MODULE – III

5. a) Explain in detail the construction and operation of an n-channel JFET. Explain what you mean by pinch-off in a JFET. **8**

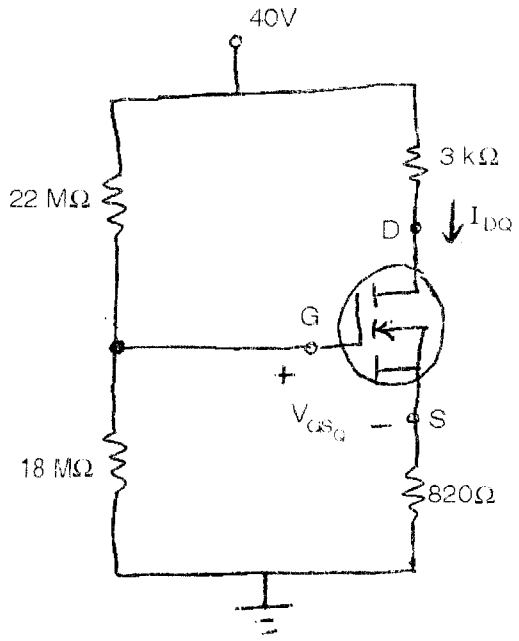
   b) Using the shorthand method, obtain the transfer curve for a JFET and sketch the transfer curve for a p-channel JFET with I_{DSS}= 4 mA and V_p = 3V. **6**

   c) Explain the construction and basic operation of a n-channel depletion type MOSFET. **6**

6. a) With neat circuit diagrams explain the analysis of a FET fixed bias circuit and obtain expressions for various voltages. **6**

   b) With a neat diagram explain the construction and working of CMOS. What are the advantages of CMOS ? **6**

c) Determine I_{DQ}, V_{GSQ} and V_{DS} for the network in Fig. 6. **8**



2N4351 (enhancement type)

V_{GS} (Th) = 5V

I_D (on) = 3 mA

at V_{GS} (on) = 10V

Fig. 6

MODULE – IV

7. a) Explain the grown-junction and diffusion methods to manufacture discrete transistors, with neat diagrams. **6**

   b) What is meant by the term monolithic integrated circuit ? List the steps in the fabrication of a monolithic IC wafer ? **6**

   c) Explain the op-amp operation in brief with differential input. **4**

   d) Explain the concept of "feedback" and draw the block diagram of a basic feedback amplifier. **4**

8. a) Explain the working of a reflective type field-effect LCD with a diagram. **6**

   b) Draw the general block diagram of a cathode ray oscilloscope (CRO) and explain the operation of a CRO. **6**

   c) Write short notes on (**any two**) : **8**

      i) IR emitters and applications

      ii) Solar cells

      iii) Silicon Controlled Rectifier (SCR).