F.E. (Semester – II) (RC 2007-08) Examination, Nov./Dec. 2018
BASIC ELECTRONICS ENGINEERING

Duration : 3 Hours

Total Marks : 100

Instructions : 1) Attempt **any five** questions choosing at least **one** 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) Differentiate between transition and diffusion capacitance in a p-n junction diode.   4

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

   d) Explain the avalanche-breakdown mechanism in a p-n junction diode.   4

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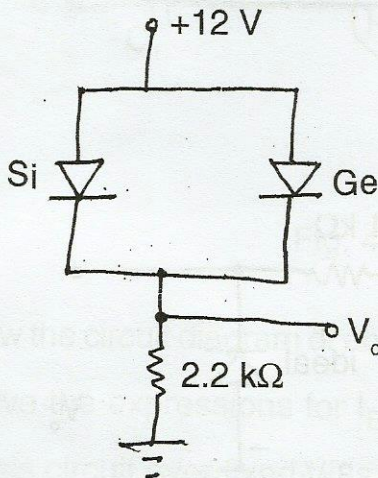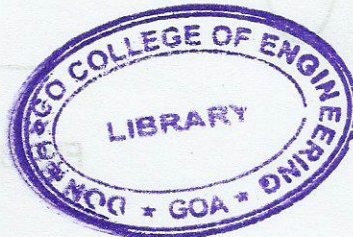

Fig. 1

P.T.O.

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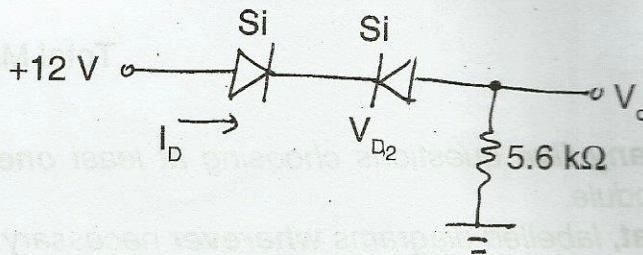

Fig. 2

6

b) With a neat circuit diagram and waveforms explain the operation of a full-wave center-tap rectifier. Also draw the output waveform if a C-filter is connected across the load. What is the PIV of each diode ?

8

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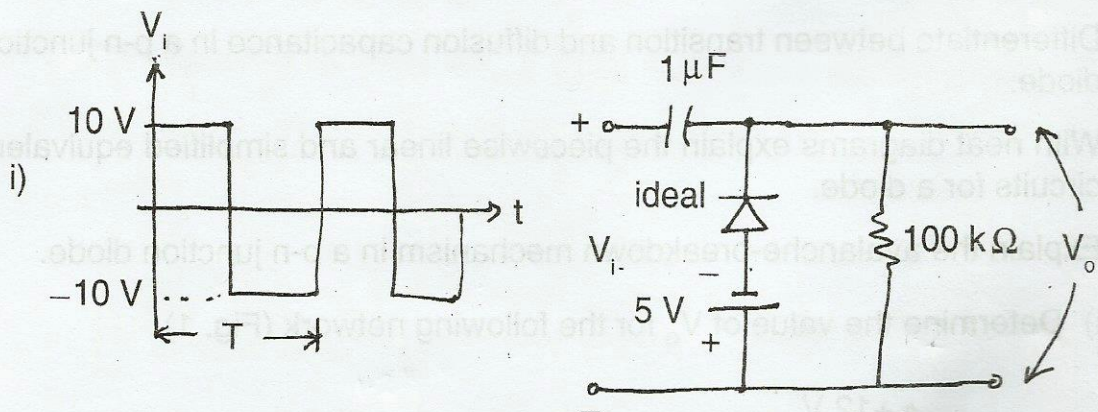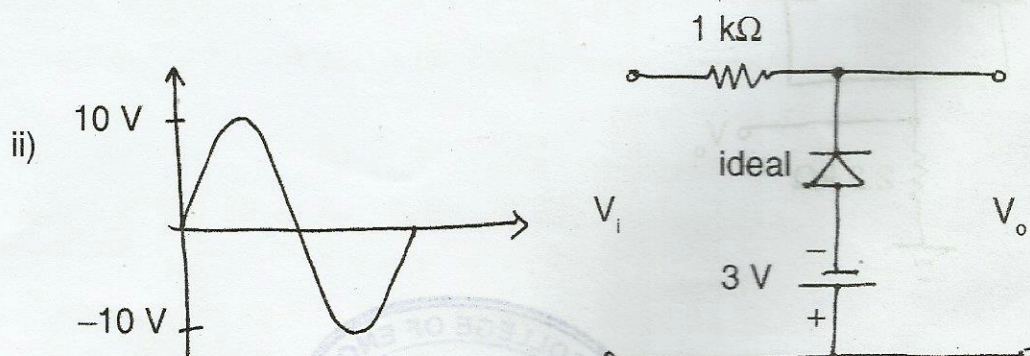
6

Fig 3 a)

Fig. 3b)

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 (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.

   6

   a) I_{BQ} and I_{CQ}
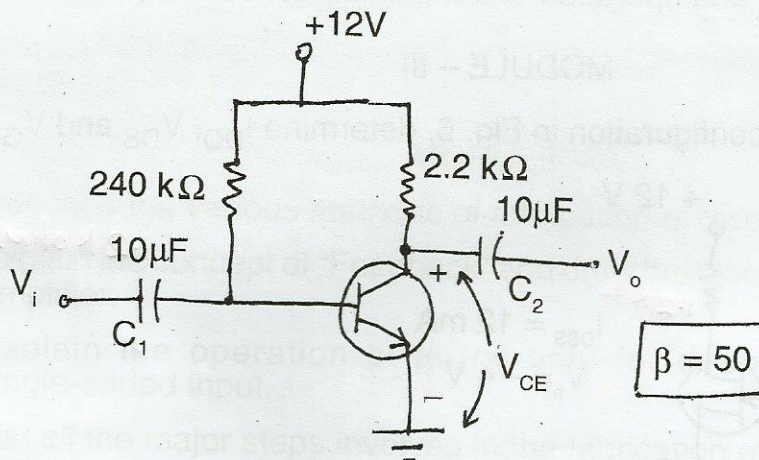
   b) V_{CEQ}

   c) V_B and V_C

   d) V_{BC}

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

+ 22 V

39 kΩ

10 kΩ

V_o

10 µF

V_i

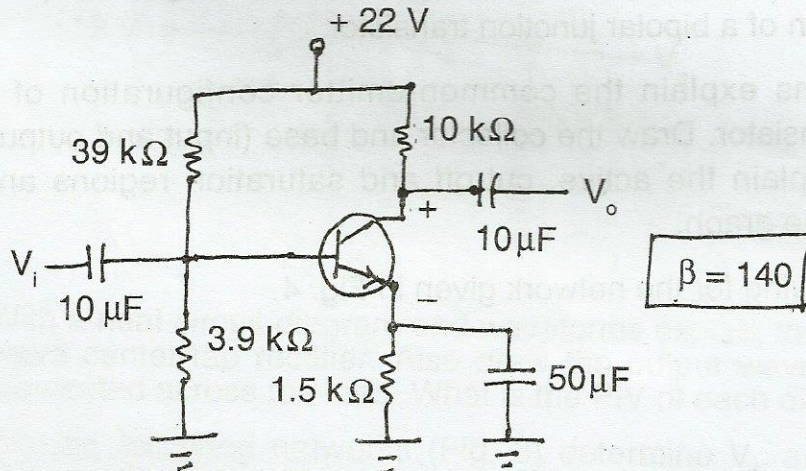10 µF

β = 140

3.9 kΩ

1.5 kΩ

50 µF

Fig. 5

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

MODULE – III

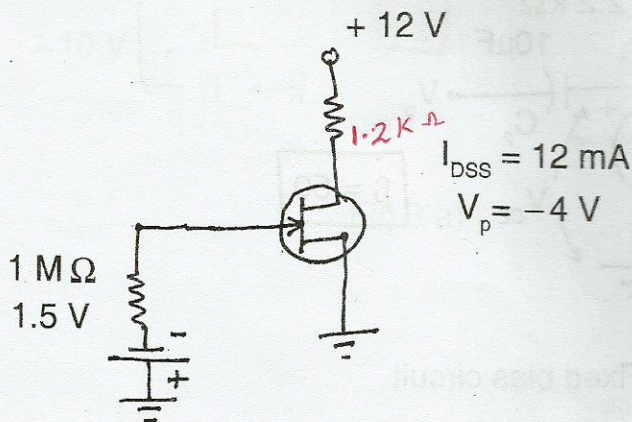5. a) For the fixed bias configuration in Fig. 6, determine I_{DQ}, V_{DS} and V_{GSQ}.   6

+ 12 V

1.2 kΩ

I_{DSS} = 12 mA

V_p = – 4 V

1 MΩ
1.5 V

Fig. 6

b) Explain the construction and operation of an n-channel depletion type MOSFET. Also draw output and transfer characteristics of the same.   8

c) With the help of a neat diagram and set of equations explain the self-bias circuit of a JFET.   6
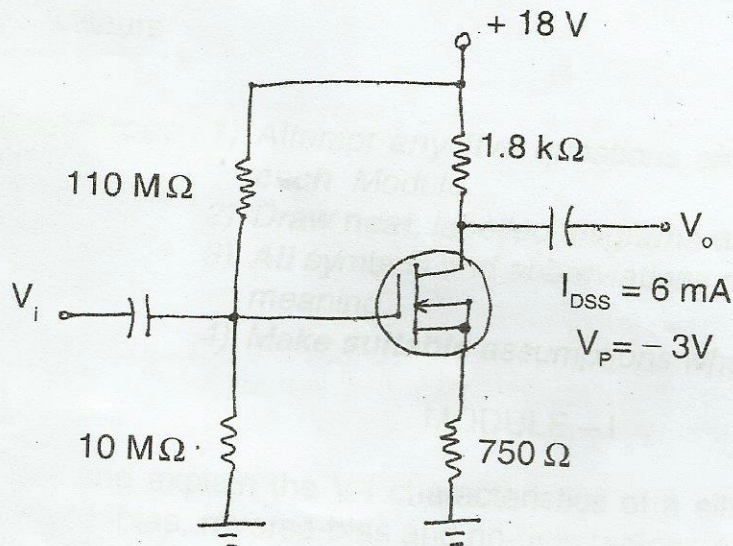
6. a) Determine I_{DQ}, V_{GSQ} and V_{DS} for the network shown below : (Fig. 7)   8

+ 18 V

1.8 kΩ

110 MΩ

V_i

V_o

$I_{DSS} = 6$ mA

$V_P = -3V$

10 MΩ

750 Ω

b) Write a short note on CMOS as an inverter.   6

c) Explain the construction and working of p-channel enhancement-type MOSFET.   6

MODULE – IV

7. a) Describe the various methods of fabrication of discrete diodes.   6

b) Explain the concept of "Feedback" and draw the block diagram of a feedback amplifier.   4

c) Explain the operation of an op-amp for double-ended output with single-ended input.   6

d) List all the major steps involved in the fabrication of a monolithic IC wafer.   4

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

b) Draw the symbol for an SCR and explain its working with a diagram.   6

c) Write short notes on (any two) :

   i) Photodiodes and applications

   ii) Solar cells and applications

   iii) IR emitters and applications.

   8