[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2123)

1318

B. Tech 1st Semester Examination

Basic Electronics (O.S.)

EC-1001

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from section A, B, C & D. Section-E is compulsory.

SECTION - A

1. (a) Draw and explain the working of bridge rectifier. Derive the equation for ripple frequency, and efficiency of the bridge rectifier. **(10)**

   (b) Determine the germanium p-n junction diode current for the forward bias voltage of 0.22 volts at room temperature 25°C, with reverse saturation current of 1 mA. **(10)**

2. (a) Explain the process of avalanche break down. How it is different than Zener break down? **(10)**

   (b) Describe the formation of depletion region in case of p-n junction diode with the help of energy band diagram. Derive the diode current equation. **(10)**

SECTION - B

3. (a) Draw small signal low frequency h- parameter model for CE configuration and derive equation for (i) Current gain Ai, (ii) Voltage gain Vi. **(10)**

(b) Explain the VI characteristic of UJT. Describe the intrinsic stand-off ratio and its significance in case of UJT. **(10)**

4. (a) Describe the operation of MOSFET, in (i) Enhancement mode, and (ii) Depletion mode. **(10)**

(b) Draw the equivalent circuit of JFET. Explain the working and V-I characteristic of JFET. **(10)**

SECTION - C

5. (a) With the help of suitable circuit diagram, explain the working of a RC coupled amplifier. Derive expression for voltage gain of the amplifier. **(10)**

(b) Explain the principle of negative and positive feed back for voltage series feed back amplifier. Derive the expression for voltage gain in each case. **(10)**

6. (a) Determine the d.c. bias current and voltage for the d.c. bias circuit shown in figure 1. Also determine the stability factor of the bias circuit. Assume VBE = 0.7 volts. **(10)**

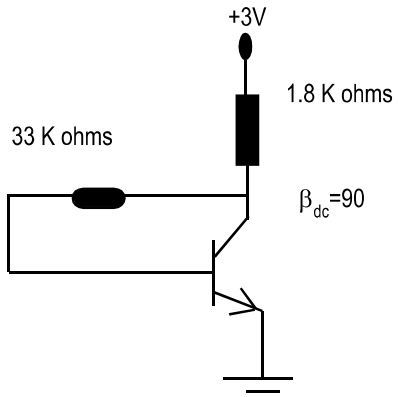

Figure 1

(b) Describe the effect of negative feed back on (i) Input resistance (ii) output resistance, and (iii) Bandwidth, in case of amplifier. **(10)**

SECTION - D

7. (a) Explain the working of photo transistor in details. **(10)**

   (b) Describe the use of op-amp as (i) Adder and (ii) Comparator. **(10)**

8. (a) Explain how capacitors and resistors are fabricated in IC. **(10)**

   (b) Draw the circuit diagram of op-amp in inverting and non-inverting configuration. Derive an expression of voltage gain for each case. **(10)**

SECTION - E

9. Attempt all parts:

   (a) What is the difference between AC and DC load line in case of transistors? What is the ideal position of operating point on a load line?

   (b) Draw small signal low frequency h- parameter model for common base amplifier.

   (c) Derive the equation for output resistance in case of negative feedback amplifier.

   (d) Draw and explain the frequency response of RC coupled amplifier.

   (e) Draw the integrator using op-amp, and derive the relationship between input and output.

   (f) Derive a relationship between α and γ in case of BJT's.

   (g) Draw the cross-section of depletion mode and enhancement mode n-channel MOSFET.

   (h) Describe diffusion and transition capacitance of p-n junction diode.

   (i) Describe the mechanism of Zener breakdown.

   (j) What is Fermi level? Draw the energy diagram for p and n type semiconductor, clearly showing the Fermi level.

   (2×10=20)