Code: R7100407

R07

B. Tech I Year (R07) Supplementary Examinations, December 2012

ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE, CSE, EIE, IT, E.Con.E, ECC & CSS)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) An electron is moving perpendicular to magnetic field 'B'. Derive the expression for radius 'R' of the trajectory and period of rotation T.

(b) In a parallel place diode, the cathode and anode are spaced 5 mm apart and the anode is kept at 200 V d.c. with respect to cathode. Calculate the velocity and the distance travelled by an electron after a time of 0.5 ns, when:

(i) The initial velocity of an electron is zero, and

(ii) The initial velocity is $2 \text{ X } 10^6$ m/s in the direction towards the anode.

2 (a) Explain break down mechanisms in semiconductor diodes.

(b) Draw the basic structure of a varactor diode and explain its characteristics.

(c) Explain the temperature dependence of VI characteristics of PN junction diode.

3 (a) Explain half-wave rectifier and derive all parameters.

(b) An a.c. supply of 230 V is applied to a half-wave rectifier circuit through transformer of turns ration 5:1. Assume the diode is an ideal one. The load resistance is 300 Ω. Find:

(i) dc output voltage

(ii) PIV

(iii) maximum, and

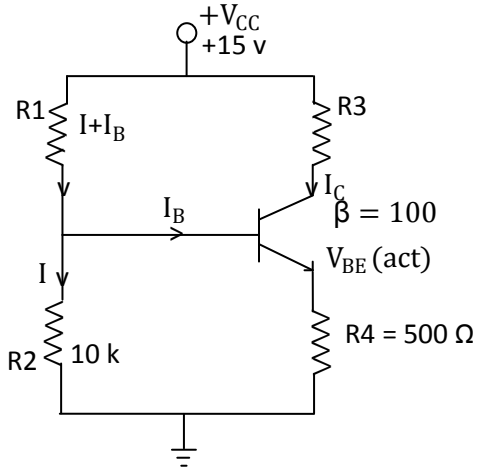
(iv) average values of power delivered to the load.

4 (a) Draw the circuit and explain the characteristics of BJT (input and output characteristics) in C.E. configuration.

(b) A transistor operating in CB configuration has $I_C = 2.98 \text{ mA}, I_E = 3.00 \text{ mA}$ and $I_{CO} = 0.01 \text{ mA}$. What current will flow in the collector circuit of the transistor when connected in CE configuration with base current of 30 μA.

5 (a) Mention the methods of transistor biasing. Explain voltage divider bias. Give its merits and demerits.

(b) In the circuit shown, if IC = 2 mA and VCE = 3 V, calculate R_1 and R_3.



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6 (a) Summarize salient features of characteristics of BJT operating in CE, CB, CC configurations in terms of Ai, Av, Ri, Ro.
(b) Draw the h-parameter circuit and its equivalent circuit in CB configuration.

7 (a) Discuss the effects of negative feedback on frequency response of an amplifier.
(b) An amplifier with an open loop voltage gain of 1000 delivers 10 W of power output at 10 % harmonic distortion when input is 10 mV. If 40 dB negative feedback is applied and output power is to remain at 10 W, determine required input signal Vs and second harmonic distortion with feedback.

8 (a) Draw the circuit diagram of a RC phase shift oscillator using BJT. Derive the expression for frequency of oscillations.
(b) Why RC oscillators are not suitable for high frequency applications.

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