70

RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree
Second Year – Semester I Examination- September/ October 2013

PHY 2103- ELECTRONICS

Answer any ***TWO*** questions TIME: 1 Hour

Use of a non-programmable calculator is permitted.

1. (a) Describe the operation of pnp transistor using suitable figure/figures.

   (b) How does a transistor biased for its normal operation?

   (c) What is quiescent point (Q-point) of a transistor? How do you determine it?

   (d) In a circuit of an npn transistor (Figure: 01),

   $V_{BB} = 6V$, $R_B = 250\,k\Omega$, $V_{CC} = 12\ V$, $R_C = 2.5\,k\Omega$, $V_{BE} = 0.7\ V$ and $\beta = 100$.

   Calculate I_E, I_B, I_C and V_{CB}. Identify the conditions under which the transistor is operating.

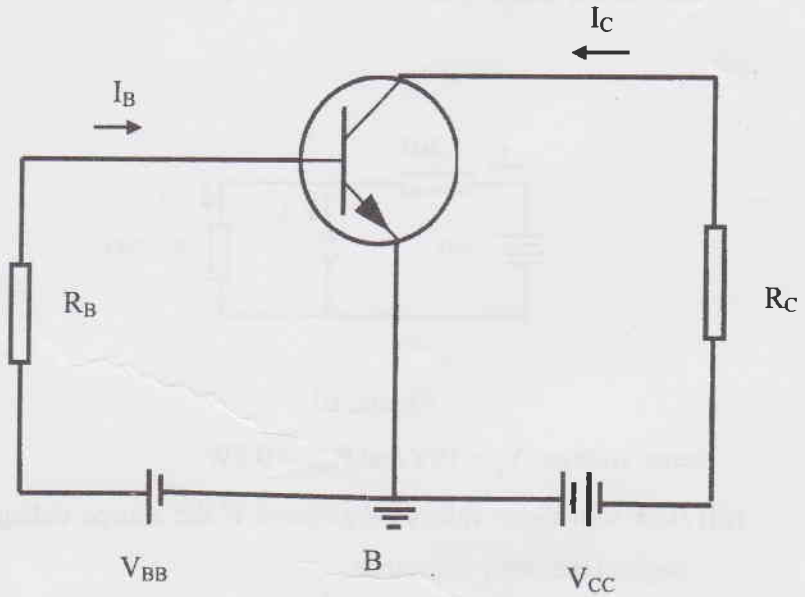

Figure: 01

2. (a) "In full wave rectification circuits, the combination of capacitor filter and inductor filter will have a fairly constant ripple characteristic at all loads". Explain briefly.

(b)

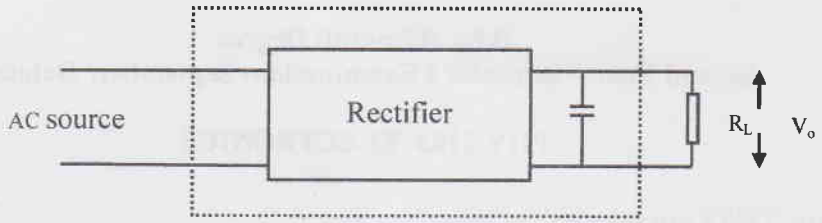

Figure: 02

D.C. power supply is used to supply a load whose resistance is R_L (Figure:02). Sketch the output waveform of the power supply if the rectifier is a

(i) half wave rectifier

(ii) full wave rectifier

What is the effect of load resistance R_L on the output waveform?

(c) (i) "Zener diodes are a special type of diodes." Explain briefly.

(ii) Calculate I, I_Z and I_L in the circuit of Figure: 03.

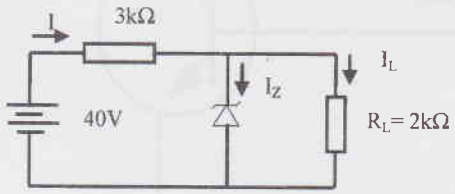

Figure: 03

zener voltage, $V_Z = 10V$ and $P_{max} = 0.5W$

(iii) How will these values be affected if the source voltage is increased to 70 V? Neglect the zener resistance.

3.

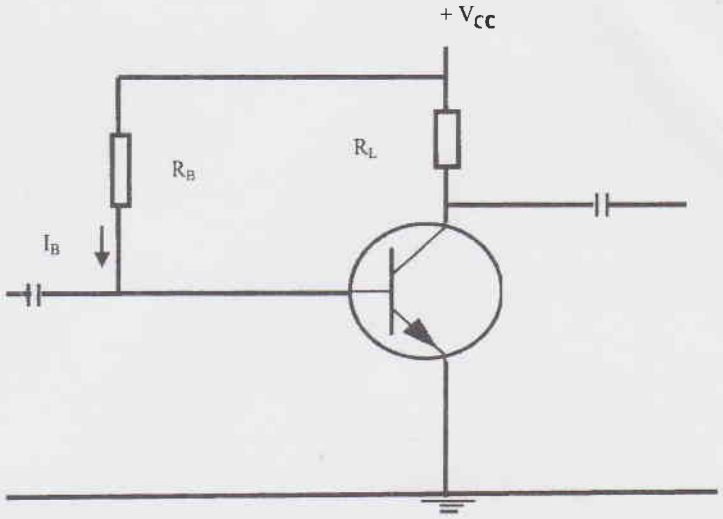

Figure:04

(a) A single stage common emitter amplifier is shown in Figure: 04.

$I_B = 11.3\mu A$ $V_{CC} = 12$ V, $R_L = 2.2\,k\Omega$, $V_{BE} = 0.7$ V

(i) What is the function of R_B?

(ii) Calculate R_B

(b) An input signal V_i is applied to the above circuit.

(i) Using two port network representation of a transistor, define h-parameters for the above transistor configuration.

(ii) Draw small signal a.c. equivalent circuit for the above circuit using h parameters.

(iii) How do you determine the h parameters for the above circuit?

(iv) Derive an expression for the current gain for the above circuit.