VAVUNIYA CAMPUS OF THE UNIVERSITY OF JAFFNA

First Examination in Information and Communication

Technology - 2014

Second Semester – February / March 2016

ICT 1223 Basic Electronics and Digital Logic Design

Answer Five Questions only

Time: Three hours

Q1. (a) (i) Differentiate between intrinsic and extrinsic semiconductors? [25%]

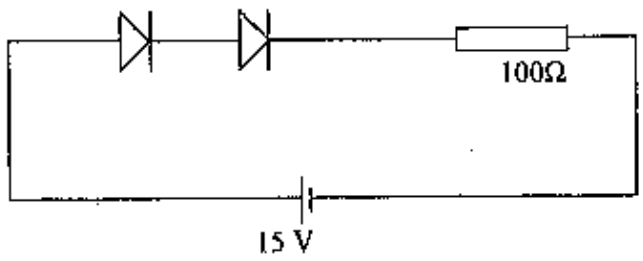
(ii) Explain the formation of depletion region and barrier potential of a p–n junction. [25%]

(b) (i) List the advantages of using fiber optic cable compare to copper cable in the communication sector. [25%]

(ii) Name the major electronic devices needed in fiber optic communication and discus briefly how the communication is done. [25%]

Q2. (a) Sketch and explain the forward and reverse characteristic of a diode. [30%]

(b) Figure shows a series circuit containing resistor of 100Ω and two silicon diodes. The knee voltage of the silicon diodes is 0.7 V.



(i) Find the current through the circuit.

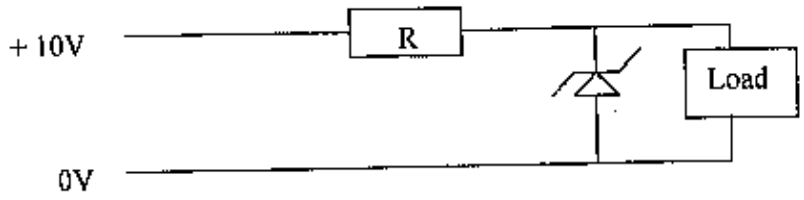
(ii) What is the potential drop across the 100Ω resistor? [30%]

(b) Explain the differences between alternating current and direct current. Hence name three equipments works with direct current. [10%]

(d) Draw a half – wave rectifier circuit and explain the action briefly. Explain the disadvantages in using half – wave rectifier. [30%]

Q3. (a) Explain the characteristic of a Zener diode and its use. [20%]

b) Figure shows a regulated voltage supply circuit. It produces a stabilized output of 8 V from a nominal 10 V supply. The current passing through load is 100mA. The current through the diode is 10 mA.



(i) Name the type of diode used in this circuit.

(ii) In which bias direction is the diode is connected?

(iii) What voltage rating should be chosen for the diode?

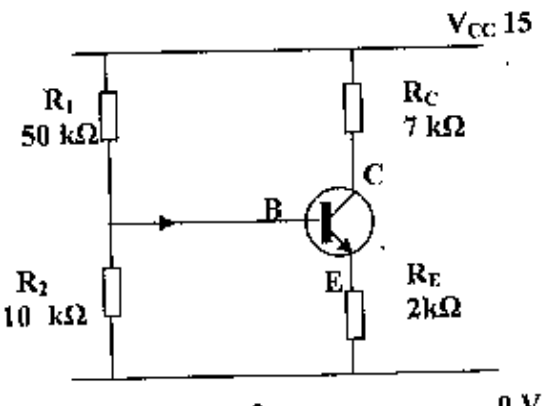
(iv) Calculate the ideal value of the resistor R.

(v) If input voltage rises to 14 V, calculate the current through R at this voltage using the value of R obtain from part (iv) [80%]

Q4. (a) What do you mean by transistor biasing? [20%]

(b) Explain the Transfer characteristics of a transistor in common emitter configuration. (Using I_c Vs I_B curve) [20%]

(c) Compute the base, emitter and collector voltages for the voltage divider bias npn transistor circuit shown in the figure. (V_{BE} =0.7 V) [60%]



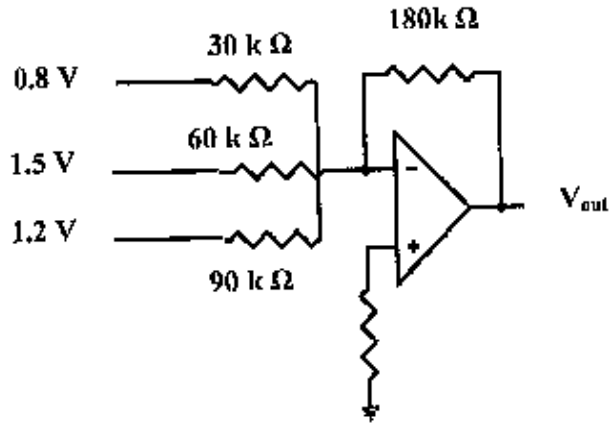
Q5. (a) List the advantages of using integrated circuits (ICs) compared to discrete circuits. [20%]

(b) What is meant by open – loop gain of an op – amp? [10%]

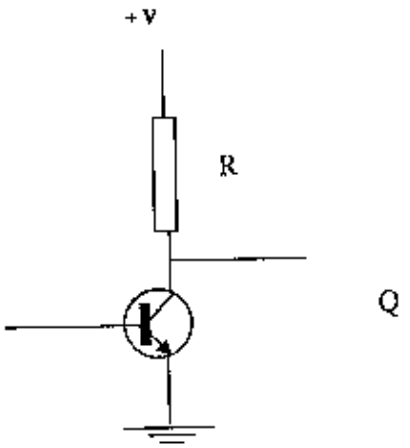
(c) What arrangements in an op – amp can control the gain? [10%]

(d) Illustrate the transfer characteristic of an operational amplifier. [20%]

(e) Find the output voltage (V_o) for the summing op – amp shown in the circuit. [40%]



Q6. (a) A logic gate circuit diagram is given bellow. If A is the input and Q is the out put then complete the truth table.



(i) Name the type of the logic gate.

(ii) Draw and label the symbol for this logic gate. [30%]

(b) A simple audible warning system for a motorcar is activated ($W = 1$) when the engine is running ($E = 1$) and either the oil pressure is too low ($P = 0$) or the alternator is not charging ($C = 0$). To implement this warning system, draw a logic circuit using NOT and NAND gates. [70%]

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