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Third Semester B.E. Degree Examination, June/July 2014
Electronic Circuits

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting
atleast TWO questions from each part.
2. Any missing data may be assumed suitably.**

PART – A

- 1 a. Draw a self bias circuit using BJT and derive the expressions for operating point. Mention its advantages and disadvantage. (08 Marks)
b. For the circuit shown in Fig.Q.1(b), determine the operating point. Given $\beta = 100$, $V_{BE} = 0.7V$. (04 Marks)

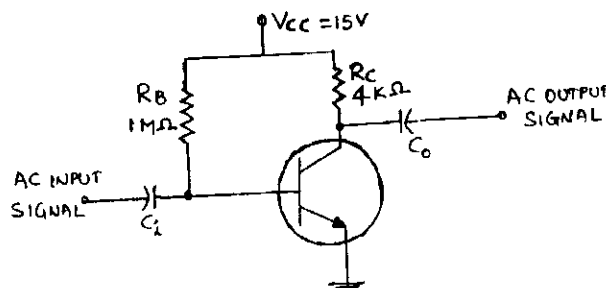


Fig.Q.1(b)

- c. Explain the construction and operating principle of uni junction transistor (UJT) with relevant sketches. (08 Marks)
- 2 a. Explain the construction, working and characteristics of N-channel E-MOSFET with neat sketches. (10 Marks)
b. Give a comparison between JFETs and MOSFETs (any four). (04 Marks)
c. Briefly discuss the basic operation of CMOS inverter with a neat diagram. Mention any two advantages. (06 Marks)
- 3 a. With a neat diagram, explain the working of a photo conductor. Show how resistance varies with illuminance. Draw any two application circuits. (10 Marks)
b. What is an optocoupler? Explain the parameters of optocoupler. (06 Marks)
c. A photodiode has a noise current of $1 \times 10^{-15} A$, responsivity of $0.5 A/W$, active area of $1mm^2$ and rise time of $3.5ns$. Determine its i) NEP; ii) Detectivity; iii) D^* ; iv) Quantum efficiency at $850nm$. (04 Marks)
- 4 a. Obtain the expression for current gain, input impedance, voltage gain and output admittance of a transistor amplifier using complete h-parameter model. (12 Marks)
b. Fig.Q.4(b) shows a Darlington amplifier. The two transistors Q_1 and Q_2 are identical and the h-parameters for both the transistors are $h_{ie} = 1K\Omega$, $h_{fe} = 100$ and $h_{oe} = 40 \times 10^{-6} mhos$. The values of voltages $V_{cc} = 15V$, $V_{BE1} = 0.7V$ and $V_{BE2} = 0.7V$. Determine the following:
i) Input impedance; ii) Output impedance; iii) Voltage gain; iv) Current gain. (08 Marks)

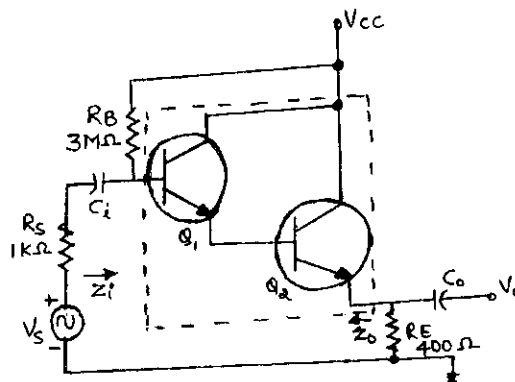


Fig.Q.4(b)

PART – B

- 5
 - a. Derive the expression for voltage gain, input resistance and output resistance in a voltage series feedback topology. (10 Marks)
 - b. List the advantages and disadvantages of negative feedback. (06 Marks)
 - c. Derive an expression for gain of an amplifier with feedback in terms of gain without feedback. (04 Marks)

- 6
 - a. Explain the operation of monostable multivibrator with a neat diagram. (08 Marks)
 - b. Explain RC low pass circuit and discuss the behaviour of this circuit towards step and pulse inputs. (08 Marks)
 - c. Write a note on Barkhausen criterion. (04 Marks)

- 7
 - a. Explain the operation of buck regulator with a neat diagram. (10 Marks)
 - b. Design a power transformer with a multi-output secondary and the following input/output specifications:
 - I. Primary voltage: 220V, 50Hz.
 - II. Secondary voltage: i) 12-0-12V at 100mA and ii) 5V at 1A.
 Assume $B = 60,000$ lines per square inch and an efficiency of 90%. (06 Marks)
 - c. Define load regulation and line regulation of regulated power supply. (04 Marks)

- 8
 - a. List and explain the performance parameters of operational amplifiers. (08 Marks)
 - b. Explain the working of comparator as zero crossing detectors. (06 Marks)
 - c. For the relaxation oscillator circuit shown in Fig.Q.8(c), determine the peak to peak amplitude and frequency of the square wave output given that saturation output voltage of the opamp is $\pm 12.5\text{V}$ at power supply voltages of $\pm 15\text{V}$. (06 Marks)

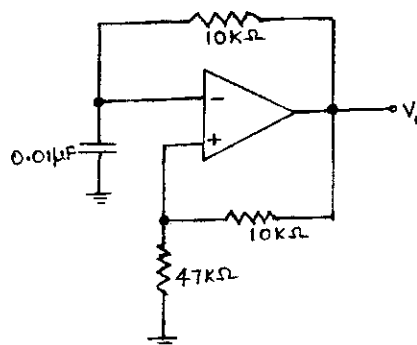


Fig.Q.8(c)

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