

## Third Semester B.E. Degree Examination, June/July 2013

### Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting at least TWO questions from each part.**

#### PART - A

1. a. With neat figures, explain the construction and operational principle of an Uni Junction Transistor (UJT). (10 Marks)
- b. Find the values of resistors  $R_B$ ,  $R_C$ ,  $R_E$  and the transistor gain  $\beta$ , for the circuit shown in Fig. Q1 (b). Given that,  $I_B = 40 \mu\text{A}$ ,  $I_C = 4 \text{ mA}$ ,  $V_E = 2 \text{ V}$ ,  $V_{CE} = 12 \text{ V}$  and supply voltage  $V_{CC} = 15 \text{ V}$ . Assume that the transistor used in the circuit is a silicon transistor. (05 Marks)

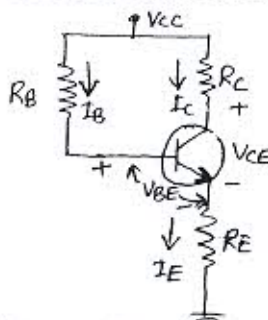


Fig. Q1 (b)

- c. Explain thermal runaway as referred to transistor. (05 Marks)
2. a. What are the differences between JFET's and MOSFET's? (05 Marks)
- b. With the help of neat figures, explain the construction and characteristics of N-channel depletion MOSFET. (10 Marks)
- c. Fig. Q2 (c) shows a biasing configuration using DE-MOSFET. Given that the saturation drain current is 8 mA and the pinch off voltage is  $-2 \text{ V}$ . Determine the value of gate-source voltage, drain current and the drain source voltage. (05 Marks)

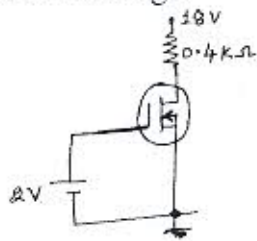


Fig. Q2 (c)

3. a. Define the following terms: i) Responsivity (R) ii) Noise equivalent power (NEP) iii) Detectivity iv) Quantum efficiency v) Response time. (05 Marks)
- b. What is photo transistor? Draw the schematic symbol of a phototransistor. Explain the V-I characteristics of photo-transistor. (05 Marks)
- c. Explain different modes of operation of an LCD display. (10 Marks)
4. a. Draw the generalized h-parameter model of a transistor based amplifier and derive the expression for: i) Current gain ii) Input impedance iii) Voltage gain iv) Output admittance. (10 Marks)
- b. With neat figure explain the operation of Darlington amplifier. (05 Marks)
- c. What are cascade amplifiers? What are the advantages offered by the cascade amplifiers? (05 Marks)

**PART - B**

- 5 a. What are the advantages of negative feedback? (05 Marks)
- b. Derive the relevant expressions to prove that input resistance increases and output resistance reduces in case of voltage-series feed back. (08 Marks)
- c. Refer to Fig. Q5 (c) of op-amp based inverting amplifier circuit. Identify the type of negative feedback. Determine the trans impedance gain, the input impedance and output impedance of the amplifier, given that transimpedance, input impedance and output impedance parameters of the op-amp are  $100 \text{ M}\Omega$ ,  $10 \text{ M}\Omega$  and  $100 \Omega$  respectively. (07 Marks)

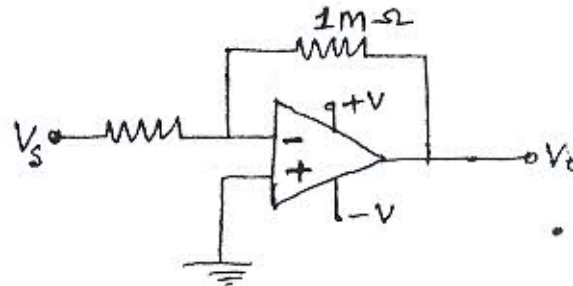


Fig. Q5 (c)

- 6 a. Explain the Bark hausen criterion as referred to oscillators. (05 Marks)
- b. With neat figure, explain the operation of voltage controlled oscillator. (07 Marks)
- c. With neat figure and relevant wave forms explain the operation of astable multivibrator using IC555 timer. (08 Marks)
- 7 a. Name the constituent parts of a basic linearly regulated power supply. Briefly describe the function of each of the constituent parts. (05 Marks)
- b. Define : i) load regulation ii) line regulation iii) ripple rejection factor with reference to regulated power supplies. (03 Marks)
- c. With neat figure, explain the working of a buck-regulator. (07 Marks)
- d. Refer to the three terminal regulator circuit of Fig. Q7 (d). Determine : i) Load current ii) Current through LM7812 iii) Current through external transistor iv) Power dissipated in LM7812. Take  $V_{BE}(Q1) = 0.7 \text{ V}$  (05 Marks)

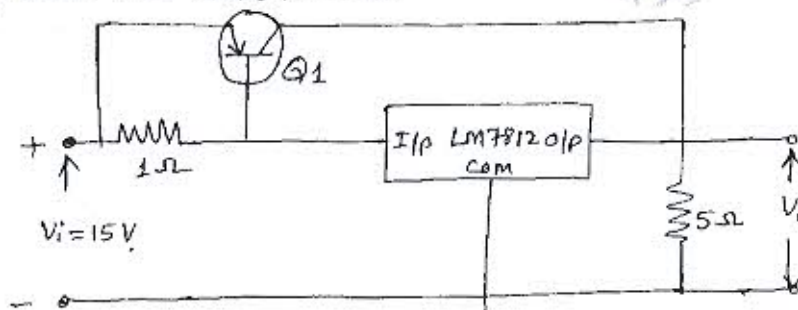


Fig. Q7 (d)

- 8 a. Define the following as referred to op-amp: i) CMRR ii) PSRR iii) Slew rate iv) Band width v) Open loop gain. (05 Marks)
- b. With neat figure, explain the operation of a peak detector circuit using op-amp. (07 Marks)
- c. With neat figure and relevant wave forms explain the working of relaxation oscillator circuit using op-amp. (08 Marks)

\*\*\*\*\*