

Third Semester B.E. Degree Examination, June/July 2017

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. What is UJT? With the help of relevant diagram, explain the construction and operational principle of a UJT. (08 Marks)
- b. For the fixed biased circuit of Fig.Q1(b), determine the operating point (given that $\beta = 100$, $V_{BE} = 0.7$ V). Also draw the load line for the circuit.

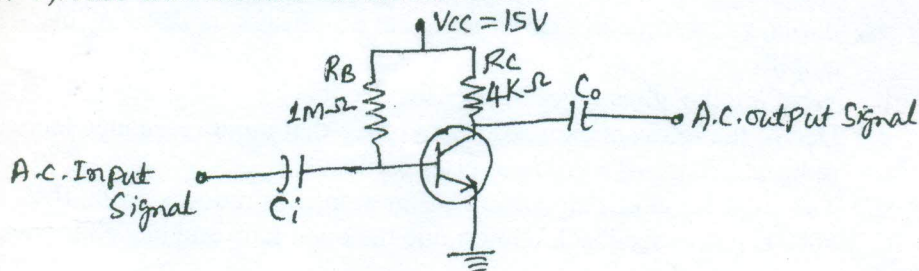


Fig.Q1(b)

(07 Marks)

- c. Explain thermal runaway as referred to transistor. (05 Marks)
- 2 a. With the help of neat diagrams, explain the construction and characteristics of N-channel depletion MOSFET. (10 Marks)
- b. Fig.Q2(b) shows a biasing configuration using DE-MOSFET, given that the saturation drain current is 8 mA and the pinch off voltage is -2 V. Determine the value of the gate source voltage, drain current and drain source voltage.

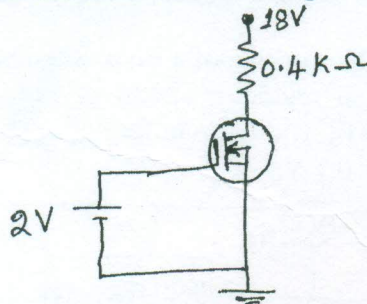


Fig.Q2(b)

(05 Marks)

- c. Explain the operation of CMOS inverter. (05 Marks)
- 3 a. Define the following terms:
 i) Responsivity
 ii) Noise equivalent power (NEP)
 iii) Detectivity and Dee star
 iv) Quantum efficiency
 v) Response time (05 Marks)
- b. What is a photo transistor? Draw the schematic symbol of a photo transistor. Explain its V-I characteristics. (05 Marks)



- c. A photodiode has a noise current of 1 fA, responsivity figure of 0.5 A/W, active area of 1 mm² and rise time of 3.5 ns. Determine its:
 - i) NEP
 - ii) Detectivity
 - iii) D*
 - iv) Quantum efficiency at 850 nm. (05 Marks)
- d. What are opto couplers? Explain the important characteristic parameters of opto couplers. (05 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 of cascade amplifiers? (05 Marks)

PART - B

- 5 a. Explain classification of large signal amplifiers as class A, class B, class C and class AB amplifiers. (04 Marks)
- b. What are the advantages of negative feedback? (04 Marks)
- c. Derive the relevant expressions to prove that input resistance increases and output resistance reduces in case of a voltage series feedback. (08 Marks)
- d. The total harmonic distortion of an amplifier reduces from 10% to 1% on introduction of 10% negative feedback. Determine the open loop and closed loop gain values. (04 Marks)
- 6 a. Explain the Barkhausen criterion as referred to oscillators. (05 Marks)
- b. With a neat diagram, explain the operation of voltage controlled Hartley oscillator. (07 Marks)
- c. With a neat circuit and relevant waveforms, explain the operation of monostable multi-vibrator using IC 555 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. (03 Marks)
- b. Define: i) Load regulation; ii) Line regulation, iii) Ripple rejection factor with reference to regulated power supplies. (04 Marks)
- c. With neat figure, explain the working of a Buck Regulator. (08 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 $V_{BE(Q_1)} = 0.7 V$.

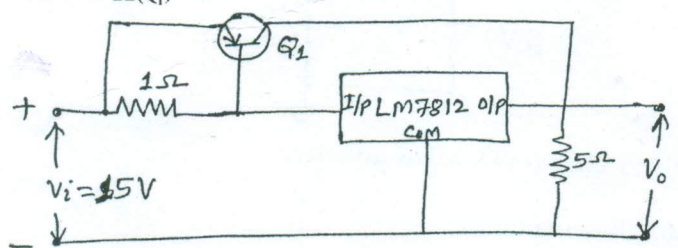


Fig.Q7(d) (05 Marks)

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