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10CS32

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.

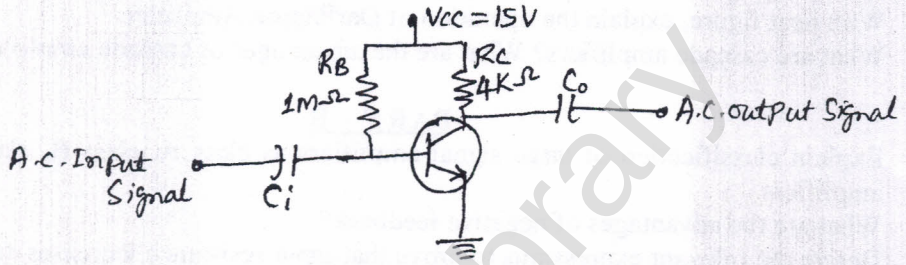

Fig.Q1(b) **(07 Marks)**

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 –2V. Determine the value of the gate source voltage, drain current and drain source voltage.

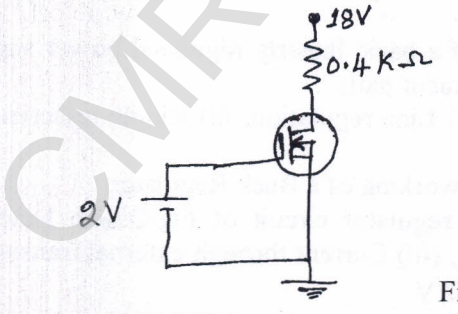

Fig.Q2(b) **(05 Marks)**

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 mm^2 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.

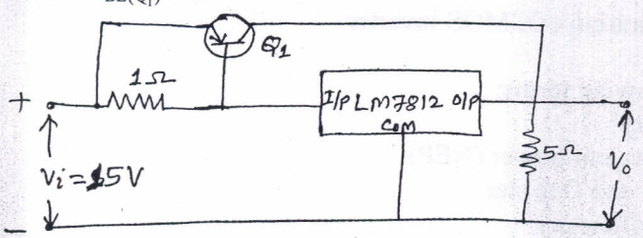

Fig.Q7(d) **(05 Marks)**

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)**

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