

First/Second Semester B.E. Degree Examination, June/July 2013

Basic Electronics

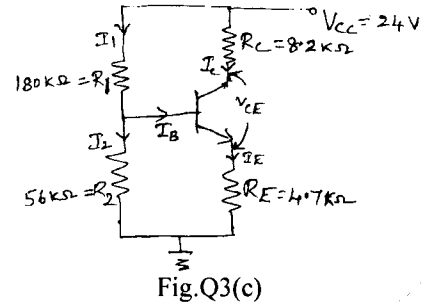
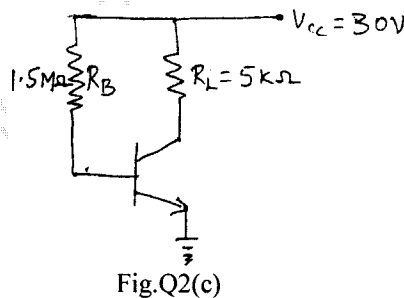
Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART - A

- 1 a. Choose the correct answers for the following : (04 Marks)
- Forward cut-in voltage of Silicon diode is
 A) 0.3 V B) 0.2 V C) 0.6 V D) 0.8 V
 - A Zener diode can be used as
 A) regulator B) rectifier C) amplifier D) oscillator
 - The ripple factor of half wave rectifier is _____. A) 0.48 B) 0.64 C) 0.81 D) 1.21
 - A semiconductor has _____ temperature coefficient of resistance.
 A) positive B) negative C) neutral D) none of these
- b. Explain the V-I characteristics of a Silicon diode. (04 Marks)
- c. Explain the circuit of full wave rectifier and show that ripple factor is 0.48. (06 Marks)
- d. Design a Zener diode voltage regulator to meet the following specifications:
 DC input voltage $V_i = 20$ V ; DC output voltage $V_o = 10$ V ; Load current $I_L = 20$ mA ;
 Minimum Zener current $I_{zmin} = 10$ mA ; Maximum Zener current $I_{zmax} = 100$ mA (06 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- A transistor has _____ PN junctions. A) one B) two C) three D) four
 - The value of ' α ' is equal to _____. A) < 1 B) > 1 C) 1 D) zero
 - In the active region of CE amplifier the base emitter junction is
 A) not biased B) reverse biased C) forward biased D) none of these
 - Common collector arrangement can be used for _____ application.
 A) high frequency B) audio frequency C) impedance matching D) none of these
- b. Explain the input, output and current gain characteristics of common base configuration and also explain the concept of punch through. (08 Marks)
- c. Define Q-point and DC load line. For the circuit shown in Fig.Q2(c), draw DC loadline and Mark Q-point. Assume $\beta = 100$, neglect V_{BE} . (08 Marks)



- 3 a. Choose the correct answers for the following : (04 Marks)
- The most commonly used transistor configuration is _____ circuit.
 A) CB B) CC C) CE D) BC
 - The best method of transistor bias is
 A) self bias B) feedback resistor C) base resistor D) none of these
 - Stabilization means making _____ independent of temperature variation or variation in transistor parameters.
 A) knee point B) operating point C) threshold point D) none of these
 - If the operating point changes it results in _____.
 A) thermal runaway B) unfaithful amplification C) faithful amplification D) punch through
- b. State the need for biasing and explain different types of biasing with relevant diagrams and equations. (08 Marks)
- c. Determine I_C , V_E , V_C and V_{CE} for the circuit shown in Fig.Q3(c), and assume $V_{BE} = 0.7$ V. (08 Marks)

- 4 a. Choose the correct answers for the following : (04 Marks)
- FET is _____ controlled device. A) current B) voltage C) bandwidth D) power
 - UJT has _____ junctions. A) one B) two C) three D) four
 - The anode of the SCR is always maintained at _____ potential with respect to cathode.
A) zero B) negative C) positive D) none of these
 - JFET is _____ transistor.
A) bipolar B) unipolar C) tripolar D) none of these
- b. Explain the basic principle of operation of SCR taking of the two transistor analogy. (08 Marks)
- c. Explain UJT as relaxation oscillator. (04 Marks)
- d. Explain the drain and transfer characteristics of n-channel JFET. (08 Marks)

PART – B

- 5 a. Choose the correct answers for the following : (04 Marks)
- The input and output voltages of single stage CE transistor amplifier are _____ out of phase.
A) 360° B) 90° C) 180° D) 45°
 - The negative voltage feedback _____ the gain of an amplifier.
A) decreases B) increases C) remains same as D) none
 - In phase shift oscillator, generally _____ RC stages are used.
A) one B) two C) three D) four
 - Oscillator employs _____ feedback.
A) negative B) positive C) both +ve and -ve D) none of these
- b. Explain two stage RC coupled amplifier with its frequency response. (08 Marks)
- c. Derive an equation for input and output impedance of voltage series negative feedback amplifier. (06 Marks)
- d. In RC phase shift oscillator $R = 5 \text{ k}\Omega$ and $C = 0.1 \text{ }\mu\text{F}$. Calculate frequency of oscillation. (02 Marks)
- 6 a. Choose the correct answers for the following : (04 Marks)
- The CMRR of an ideal OP-AMP is _____. A) finite B) infinite C) zero D) none of these
 - Slew rate of an OPAMP is given by _____. A) $\frac{dI_o}{dt}$ B) $\frac{dV_o}{dI_o}$ C) $\frac{dV_o}{dt}$ D) $\frac{dI_o}{dV_o}$
 - An ideal OP-AMP characteristics do not change with _____.
A) pressure B) power C) frequency D) temperature
 - The heart of CRO is _____. A) CRT B) electron gun C) deflecting plates D) screen
- b. List the ideal characteristics of an OP-AMP. (04 Marks)
- c. Draw the circuit of OPAMP as summer and derive an expression for output voltage. (06 Marks)
- d. Explain the block diagram of CRO. (06 Marks)
- 7 a. Choose the correct answers for the following : (04 Marks)
- If $m = 1$, the sidebands carry _____ % of AM wave power.
A) 33.3 B) 46.6 C) 81.1 D) 95.5
 - $(110101)_2 = (?)_{10}$ A) $(34)_{10}$ B) $(64)_{10}$ C) $(90)_{10}$ D) $(53)_{10}$
 - $(283)_{10} = (?)_8$ A) $(324)_8$ B) $(433)_8$ C) $(456)_8$ D) $(402)_8$
 - 2's complement of binary number 1011 is _____. A) 1100 B) 0101 C) 0110 D) 1010
- b. Derive an expression for the instantaneous value of an AM signal in terms of carrier and sideband frequencies. (08 Marks)
- c. A 15 kHz audio signal is used to frequency modulate a 100 MHz carrier causing a carrier deviation of 75 kHz. Determine modulation index. (02 Marks)
- d. i) Convert $(1024.625)_{10} = (?)_2$ ii) Convert $(ABCD)_{16} = (?)_2 = (?)_8$
iii) Subtract $(11101)_2$ from $(11010)_2$ using 2's complement method. (06 Marks)
- 8 a. Choose the correct answers for the following : (04 Marks)
- Absorption property states that $A + \overline{AB} =$ _____. A) $\overline{A} + B$ B) $\overline{B} + A$ C) A D) $A + B$
 - Idempotent property states that $A.A =$ _____. A) A B) 1 C) 0 D) \overline{A}
 - $AB + ABC + ABD =$ _____. A) ABC B) $A + B$ C) AB D) $A + D$
 - The output is high, when all the inputs are high, such gate is called
A) NOT gate B) AND gate C) NAND gate D) NOR gate
- b. Prove that $ABC + \overline{A}BC + A\overline{B}C = AB + AC$. (04 Marks)
- c. Realize full adder circuit using logic gates and write its truth table. (06 Marks)
- d. Simplify the following expression and implement using NAND gates only.
 $A = (A + (\overline{BC})(\overline{A} + B + \overline{C}))(A + \overline{B})$ (06 Marks)