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First/Second Semester B.E. Degree Examination, June 2012
Basic Electronics

Time: 3 hrs.

Max. Marks:100

Note:1. Answer FIVE full questions choosing at least TWO from each part.**2. Answer all objective type questions only on 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 your answers for the following : (04 Marks)**
- In full wave rectification, if the input frequency is 50 Hz, then output frequency is,
 A) 50 Hz B) 100 Hz
 C) 150 Hz D) None of these
 - The diodes which are designed with adequate power dissipation capabilities to operate in the break down region may be employed as _____ devices.
 A) Variable voltage B) Constant current
 C) Constant voltage D) Variable current
 - If the pn-junction is heavily doped, breakdown voltage will _____
 A) Decrease B) Increase
 C) Constant D) None of these
 - If the reverse voltage across the diode increases, the width of the depletion layer
 A) Decreases B) Remains constant
 C) Increases D) None of these
- b. Draw the VI-characteristics of a diode and explain with reference to the diode current equation. (08 Marks)**
- c. A full wave rectifier circuit uses a capacitor filter of 1000 μ F and provides a dc load current of 500 mA at 2% ripple. Calculate dc output voltage, peak rectified voltage, rms ripple voltage on the capacitor and % regulation. (08 Marks)**
- 2 a. Choose your answers for the following : (04 Marks)**
- In the saturation region, the base to collector junction is _____
 A) Reverse biased B) Forward biased
 C) Not biased D) None of these
 - The input resistance of a CE-mode transistor is much _____ than its output resistance.
 A) More B) Less
 C) Larger D) None of these
 - Common collector arrangement is generally used for _____
 A) Impedance matching B) Voltage amplification
 C) Current amplifier D) None of these
 - The collector current in a transistor is 5 mA. If $\beta = 140$ and the base current is 35 μ A, then the leakage current I_{CBO} is,
 A) 10 μ A B) 0.714 μ A
 C) 0.78 μ A D) 20 μ A
- b. For a silicon transistor $\alpha = 0.995$, emitter current is 10 mA and leakage current I_{CO} is 0.5 μ A. Find I_C , I_B , β and I_{CEO} . (06 Marks)**
- c. Draw the input and output characteristics of a transistor in CB – configuration, clearly indicate the various regions and explain it. (10 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, $42+8=50$, will be treated as malpractice.

- 3 a. Choose your answers for the following : (04 Marks)
- The process of making operating point independent of temperature changes or variations in transistor parameters is known as
 - Biassing
 - Stabilization
 - Thermal runaway
 - None of these
 - The intersection of the dc load line with given base current curve is the
 - h-point
 - D-point
 - Q-point
 - None of these
 - Lower stability factors imply lower variation in the _____ current.
 - Collector
 - Base
 - Emitter
 - Both base and emitter.
 - To forward bias the base to emitter junction, the minimum V_{BE} required is _____ for Si transistor.
 - 4V
 - 0.7V
 - 0.007V
 - None of these
- b. Define stability factor. Discuss the factors that cause instability of biasing circuits. (08 Marks)
- c. For the circuit shown in Fig. Q3 (c), determine I_C , V_E , V_C and V_{CE} . (08 Marks)

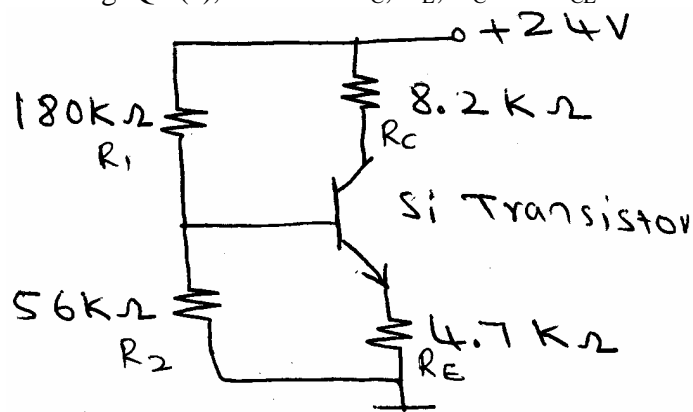


Fig. Q3 (c)

- 4 a. Choose your answers for the following : (04 Marks)
- FET is a _____ controlled device
 - Voltage
 - Current
 - Pulse
 - Power
 - The unit of transconductance g_m of an FET is _____
 - volts/ampere
 - volts
 - ampere/volts
 - None of these
 - Latching current in SCR is _____ holding current.
 - less than
 - more than
 - equal to
 - none of these
 - JFET has _____ input impedance.
 - high
 - low
 - very low
 - none of these
- b. Draw the two transistor equivalent of an SCR and explain working of SCR. (08 Marks)
- c. Draw the VI-characteristic and equivalent circuit of UJT. Explain how UJT can be used as a relaxation oscillator. (08 Marks)

PART – B

- 5 a.** Choose your answers for the following : **(04 Marks)**
- i) The magnitude voltage gain at half power frequencies of an RC-coupled amplifier is _____ times maximum voltage gain

A) 0.707	B) 7.07
C) 10	D) 17.06
 - ii) With negative feedback, output impedance of an voltage series feedback

A) Remains constant	B) Decreases
C) Increases	D) None of these
 - iii) Without bypass capacitor across R_E , the voltage gain

A) decreases	B) increases
C) constant	D) none of these
 - iv) The magnitude of product of open loop gain (A) and feedback factor (β) is less than one, then the output voltage _____ with frequency.

A) Remains constant	B) Decreases
C) Variable	D) None of these
- b.** A crystal has $L = 0.33 \text{ H}$, $C = 0.06 \text{ pF}$, $R = 5 \text{ K}\Omega$ and $C_m = 1 \text{ PF}$. Find
- i) Series resonant frequency
 - ii) Parallel resonant frequency **(06 Marks)**
- c.** Draw the frequency response of an RC-coupled amplifier and explain it. Mention its advantages and disadvantages **(10 Marks)**
- 6 a.** Choose your answers for the following : **(04 Marks)**
- i) If the different input signal is applied to the two inputs of op-amp, then mode is

A) Common	B) Mixed
C) Difference	D) None.
 - ii) If a sinusoidal voltage is applied to vertical deflection plates only, then we get _____ on the screen of the CRO.

A) Vertical line	B) Horizontal line
C) Both lines	D) None
 - iii) The unit of PSRR is _____

A) Volts	B) Amperes
C) $\mu\text{V/V}$	D) None
 - iv) Maximum rate of change of output voltage with time is called _____

A) CMRR	B) Slew rate
C) Over rate	D) None
- b.** Define the following terms with respect to op-amp:
- i) CMRR
 - ii) Input offset voltage
 - iii) Input offset current
 - iv) Input bias current **(08 Marks)**
- c.** Draw the three input non-inverting summer circuit using an op-amp and derive an expression for output voltage. **(08 Marks)**

7 a. Choose your answers for the following :

(04 Marks)

- i) $(ABC \cdot D)_{16} = (\text{_____})_{10}$
 A) 2748.8125
 C) 2640.2
 B) 2741.81
 D) 3641.25
- ii) $(934)_{10} = (\text{_____})_8$
 A) 1600
 C) 1641
 B) 1646
 D) 1644
- iii) $(11001.110)_2 = (\text{_____})_{10}$
 A) 24.75
 C) 40.26
 B) 20.75
 D) 25.75
- iv) 2's complement of $(10011)_2$ is _____
 A) 01101
 C) 01111
 B) 01110
 D) 11111
- b. Draw the block diagram of a superhetrodyne receiver and explain the functions of each block. **(08 Marks)**
- c. The total power content of an AM wave is 2.64 kW at a modulation factor of 80%. Determine the power content of,
 i) Carrier
 ii) Each side band **(04 Marks)**
- d. Subtract using 2's complement of [78-65]. **(04 Marks)**

8 a. Choose your answers for the following :

(04 Marks)

- i) The NAND-gate is AND-gate followed by _____
 A) OR gate
 B) EX-OR gate
 C) EX-NOR gate
 D) NOT gate
- ii) $A+(B+C) = (A+B)+C$ is _____ law.
 A) Associative
 B) Commutative
 C) Distributive
 D) None
- iii) $A + \overline{A}B =$ _____
 A) $A + \overline{A}$
 B) \overline{A}
 C) $A + B$
 D) None
- iv) The output is high, when both inputs are not equal, such a gate is called _____
 A) EX – OR gate
 B) NOT gate
 C) EX – NOR gate
 D) None
- b. Design a full adder circuit and realize, using two half adders. (08 Marks)
- c. Simplify the following Boolean expressions and implement using only NAND-gates:
- i) $y = \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + \overline{A}\overline{B}C + A\overline{C}$
- ii) $y = A(\overline{A}BC + A\overline{B}C)$ (08 Marks)

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