6. a) Sketch and explain the frequency response RC coupled amplifier. 8 L2
   b) Explain the operation of Colpitt's oscillator with the help of circuit diagram and give expressions for frequency, gain and feedback factor. 6 L2
   c) Three amplifiers are connected in cascade. The voltage gain of first amplifier is 10, voltage gain of second amplifier is 20 and third amplifier has voltage gain of 50. Find (i) overall voltage gain in dB and (ii) the output voltage when the input voltage is 2V. 6 L4

Unit – IV

7. a) Draw the circuit of non-inverting amplifier using an op-amp and derive the expression for the output voltage. 8 L4
   b) Design an adder circuit using op-amp to obtain an output voltage given by $V_O = -2[0.1\ V_1 + 0.5\ V_2 + 2.0\ V_3]$. Choose $R_f = 10K\Omega$. 6 L6
   c) Draw the block diagram of communication system and explain the function of each state. 6 L2

8. a) With the help of neat block diagram, explain the function of each block of CRO. 8 L2
   b) Derive the output voltage of an op-amp differentiator with help of circuit diagram. 6 L4
   c) List the properties of practical op-amp. 6 L1

Unit – V

9. a) Convert the following
      (i) $(10101.1101)_2 = (?)_{10}$
      (ii) $(847.951)_{10} = (?)_8$
      (iii) $(CAD.BF)_{16} = (?)_{10}$
      (iv) $(7C9.ED)_{16} = (?)_8$ 8 L2
   b) Perform the following binary addition
      (i) 101110 + 11011
      (ii) 10001 + 11101 6 L3
   c) With the block diagram and truth table of half adder, give the expression for sum and carry and realize using basic gates. 6 L3

10. a) Perform the following subtraction using 2's complement method
      (i) $(26)_{10} - (75)_{10}$
      (ii) $(17)_{10} - (10)_{10}$ 8 L3
   b) Implement the following expressions using logic gates.
      (i) $Y=\overline{\overline{BC} + \overline{AD}(\overline{AB} + \overline{CD})}$
      (ii) $Y = (A+B\overline{C})(\overline{A}+B+\overline{C})$ 4
   c) Draw the block diagram and truth table of full adder, write the expressions for sum and carry and realize using basic gates. Implement the full adder using two half adders. 8

BT* Bloom's Taxonomy, L* Level

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester B.E. (Credit System) Degree Examinations

April - May 2018

17EC112 – BASIC ELECTRONICS

Duration: 3 Hours Max. Marks: 100

*Note: Answer **Five** full questions choosing **One** full question from **each Unit.***

			Marks	BT*
		Unit – I		
1.	a)	Sketch the forward and reverse V-I characteristics of Silicon and Germanium diodes, mark all the parameters on the characteristics and explain the parameters.	8	L*2
	b)	Draw the circuit diagram of half-wave rectifier and derive the ripple factor and efficiency of the half-wave rectifier.	8	L4
	c)	A full wave rectifier using two diodes supplies a load of 2 KΩ. The ac voltage applied to the diodes is 200-0-200 V. If a capacitor of value 500μF is connected across the load, find (i) ripple factor (ii) DC output voltage.	4	L3
2.	a)	Explain the operation of a full-wave bridge rectifier with the help of neat circuit and necessary waveforms. Also derive the expression for DC load voltage.	8	L2
	b)	Design Zener diode voltage regulator which has DC input voltage: 10V ± 20%, DC output voltage:5V, load current:20mA, I_{Zmin} = 5mA and I_{Zmax} = 80mA. Also draw the circuit diagram indicating all the values.	6	L6
	c)	Explain how the DC load line is constructed. Give the equations for drawing the DC load line of silicon diode connected in series with a DC supply voltage and a resistor R such that the diode is forward biased.	6	L4
		Unit – II		
3.	a)	With the help of neat circuit diagram, sketch and explain the input and output characteristics of common base configuration of NPN transistor and mark various regions of operation.	8	L2
	b)	The base bias circuit with V_{CC}=18V uses a transistor with V_{BE}=0.7V. The circuit is to have V_{CE}=9V and I_C=2mA. Determine the value of R_C, draw the DC load line and mark the Q – point.	6	L6
	c)	Draw the circuit for 180^0 phase control using an SCR. Briefly explain the circuit operation and draw the load voltage waveform.	6	L2
4.	a)	With the help of neat circuit diagram sketch and explain the input and output characteristics of common emitter configuration of NPN transistor and mark various regions of operation.	8	L2
	b)	For the base bias circuit, find I_B, I_C and V_{CE} if R_C=2.2KΩ, R_B=470KΩ, V_{CC}=18V, β=100, V_{BE}=0.7V. Draw the DC load line and mark the Q-point.	6	L4
	c)	Define α and β of the transistor and derive the expression for β in terms of α.	6	L3
		Unit – III		
5.	a)	Draw the circuit of single stage RC coupled amplifier, draw the output waveform of the same with respect to input waveform. Also explain each component in the circuit.	8	L2
	b)	Design the values of L_1 and L_2 for a Hartley oscillator if the frequency of oscillations is 25KHz and C=0.02μF. Assume 20% feedback.	6	L6
	c)	List the advantages of negative feedback.	6	L1

P.T.O.

Unit – V

a)	Convert the following :– (i) $(398.75)_{10} = (\ ?\ )_2$ and (ii) $(3509)_{10} = (\ ?\ )_{16}$	06	L3
b)	Using **2's complements** perform (i) $(10010)_2 - (10111)_2$ and (ii) $(11010)_2 - (1100)_2$	06	L4
c)	Show block diagram of **HALF ADDER** with inputs and outputs. Explain difference between the **HALF ADDER** and **FULL ADDER**. Write the **TRUTH TABLE** for **HALF ADDER**. Show the realization using. **Basic Gates.**	08	L3
a)	Draw the logic symbols of **2** input **Basic Gates**. Give their output expressions in terms of inputs and show their **TRUTH TABLES**.	06	L3
b)	Convert the following :– (i) $(7463)_8 = (\ ?\ )_2$ and (ii) $(\ 110111001.01\ )_2 = (\ ?\ )_{16}$	06	L4
c)	Show block diagram of **FULL ADDER** with inputs and outputs. Write the **TRUTH TABLE**. Show the realization of the same using **HALF ADDERS**.	08	L3

Bloom's Taxonomy, L* Level

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4. a) Draw circuit of **NPN** transistor in common emitter configuration. Sketch input and output characteristics. Show the different regions of operation and explain their relevance. 08

b) Show the circuit of Automatic Heater control using **SCR**. Explain the working of this circuit and also sketch waveform of voltage across the heater coil. 08

c) A germanium transistor having $\beta_{dc} = 100$ in **CE** configuration has a base current of **200 μA** .If collector circuit power supply is **30 volts** determine the value of collector Resistor R_c for the circuit to work with maximum symmetrical output swings as amplifier . 04

Unit – III

5. a) Sketch frequency response of **R–C** coupled amplifier. Mark lower cut – off and upper cut – off frequencies and Bandwidth on the same. Explain the reason for fall in gain for low and high frequencies. 08

b) With a block diagram, explain operation of a Series Voltage Negative feedback amplifier. Derive expression for closed loop voltage gain. 08

c) Three voltage amplifiers are cascaded. The first and second have **dB** gain of **20** and **40** respectively. The overall gain is **80 dB**. Calculate the **dB** gain of the third amplifier. 04

6. a) Draw the circuit of **R–C** phase shift oscillator and explain operation. Give the expression for output frequency. 06

b) With a block diagram, explain operation of a positive feedback voltage amplifier. Derive expression for closed loop gain. State Barkhausen criteria for an oscillator. 08

c) A Colpitts Oscillator has **L = 20 μH**, C_1 **= 0.01μF** and C_2 **= 0.001μF** . Calculate (i) output frequency (ii) feedback factor and (iii) minimum gain of amplifier for sustained oscillation . 06

Unit – IV

7. a) Draw circuit of inverting **OPAMP Integrator** and derive expression for output voltage. Sketch the output waveform along with input waveform, if input is a **sine wave.** 08

b) An inverting **OPAMP adder** has two inputs, **V1 = + 3** volts with series resistance, **R1 = 10 kΩ** and **V2 = – 6** volts with series resistance, **R2 = 30 kΩ.** Feedback resistance is **40 kΩ** and d.c power supply is **± 9 volts**. Determine output voltage for above inputs. What is the output voltage if input, **V1 =0 ?** 06

c) Explain **amplitude modulation in a communication system** with sketches of waveforms. 06

8. a) With a block diagram, explain the operation of a Cathode Ray Oscilloscope. 08

b) With a circuit diagram, derive expression for output voltage for an inverting **ADDER** having three inputs. 08

c) An inverting OPAMP amplifier has an input of **– 1 volt** and power supply is **± 12 volts** . If the feedback resistor, R_f **= 20 kΩ** (i) What value of input resistor is required to get an output of **+ 5 volts** ? (ii) If R_f is changed to **100 kΩ** and input resistor is that obtained for part (i), what will be the value of output voltage? 04

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First/Second Semester B.E. (Credit System) Degree Examinations

Make up/Supplementary Examinations – July 2018

17EC112 – BASIC ELECTRONICS

tion: 3 Hours | Max. Marks:100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

		Marks	BT
	Unit – I		
a)	Show circuit diagram of full wave diode rectifier using 2 diodes with resistive load and explain its operation. Sketch waveforms of input voltage and output current. Considering diodes to have conducting resistance, R_F, derive expressions for output average D C voltage and output RMS voltage.	10	L*3
b)	Sketch the reverse V- I characteristic of a Zener Diode. Mark important parameters on the same and explain their significance.	06	L2
c)	A Zener of **Vz = 6 volts** is used with a D C supply of **15 volts** in a loaded Zener voltage regulator. The resistance in series with the input is **200Ω.** Zener has **Iz min = 10 mA** and $P_{z\ max}$ **= 0.5 watt.** Calculate minimum value of load resistance.	04	L4
a)	Sketch forward and reverse V-I characteristics of germanium diode. Mark cut in voltage, dynamic resistance and reverse break over voltage. Define also above parameters.	08	L2
b)	Explain the purpose of a D C load line in analysis of diode circuit operating in forward bias from a D C supply with a series resistance. Write the equations for drawing the load line and explain. Show how the forward voltage across diode and current in diode is obtained.	08	L2
c)	A silicon diode having a conducting resistance, R_F **= 10 Ω** is connected in series with a load resistance, **RL = 200 Ω** across a D C supply of **20 volts.** Determine the value of current in the load resistance.	04	L4
	Unit – II		
a)	Define β_{dc} and α_{dc} for a transistor. Derive the expression for α_{dc} in terms of β_{dc} as well as β_{dc} in terms of α_{dc}. A transistor has a base current of **100 μA** and α_{dc} of **0.98**. Calculate the value of emitter current.	08	L4
b)	Draw the circuit of **NPN** transistor in common base configuration. Sketch family of input characteristics and output characteristics. Identify different regions of operation on output characteristics, and explain.	08	L2
c)	A silicon transistor in **CE** configuration has β_{dc} **= 50**. The collector circuit power supply is **20 volts**. Collector resistor R_c **= 500 Ω** and base bias resistor R_b = **100 kΩ.** Obtain the value of voltage across collector and emitter.	04	L4

5.	a)	With reference to an Op-Amp, define i) Common Mode Gain, A_C ii) Differential Gain, A_d iii) Common Mode Rejection Ratio, $CMRR$.	6	L1	4
	b)	For a depletion type MOSFET, $I_D = 4.5mA, V_{GS} = -2V$. Determine I_{DSS} if $V_P = -5V$ and if $V_P = -7V$.	4	L3	3
	c)	Discuss the construction, channel formation operation and characteristics of n-channel enhancement type MOSFET with relevant diagrams.	10	L2	3
6.	a)	Design an inverting summer circuit using an Op-Amp to give an output voltage of $V_o = -(3V_1 + 4V_2 + 5V_3)$ with the value of the feedback resistor as $R_f = 120k\Omega$. Draw the circuit diagram for the same.	5	L3	4
	b)	Show as how an Op-Amp can be operated as i) Non inverting amplifier ii) An Integrator	10	L2	4
	c)	An Op-Amp circuit has to work as an inverting amplifier. If the gain of the circuit is 61, with $R_1 = 1k\Omega$, find the value of the feedback resistor. Draw the circuit diagram for the same.	5	L3	4

Unit – III

7.	a)	Convert the following using number systems i) $(FA876)_{16} = (?)_2$ ii) $(1010111011110101)_2 = (?)_{16}$ iii) $(125)_{10} = (?)_2$ iv) $(101010101)_2 = (?)_{10}$	8	L3	5
	b)	Explain basic logic gates with symbol and truth table.	6	L2	5
	c)	Perform subtraction using 2's complement method. i) $(1111)_2 - (1011)_2$ ii) $25 - 13 = ?$	6	L3	5
8.	a)	Show the block diagram of half adder and full adder. Write the truth table and show the realization using basic gates.	8	L3	5
	b)	What is the objective of a multiplexer circuit. Show the implementation of an 8:1 multiplexer using basic gates.	6	L2	5
	c)	Simplify the Boolean expression and realize it using basic gates. i) $Y = ABC + A\bar{B}C + AB\bar{C}$ ii) $Y = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D$	6	L3	5

BT* Bloom's Taxonomy, L* Level; CO* Course Outcome; PO* Program Outcome

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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First Semester B.E. (Credit System) Degree Examinations

November - December 2018

18EC112 – BASIC ELECTRONICS

Duration: 3 Hours | Max. Marks: 100

Note: 1) Answer ***Five full*** *questions choosing* ***Two full*** *questions from* ***Unit – I*** *and* ***Unit – II each*** *and* ***One full*** *question from* ***Unit – III.***

2) *Missing data may be suitably assumed.*

		Marks	BT*	CO*	PO*
	Unit – I				
4	a) Explain the working of a Full Wave Rectifier using 4 diodes with neat circuit diagrams and input/output waveforms. Calculate V_{dc} and I_{dc} for a peak voltage of 50V with $R_L = 80\Omega$ assuming that the diodes are ideal.	10	L3	1	2
	b) Discuss with a neat circuit diagram as how a transistor can be used as a switch with an LED.	5	L2	2	1
4	c) An voltage series feedback amplifier has a constant amplifier gain without feedback as $A = 20$. The gain of the amplifier with feedback $A_f = 200$. Calculate the feedback network gain β. Draw the block diagram for the same.	5	L3	2	2
	a) Calculate α_{dc} and β_{dc} for $I_C = 1mA$ & $I_B = 25\mu A$. Determine the new base current to provide a collector current of $I_C = 5mA$.	4	L3	2	2
	b) With a neat diagram discuss the procedure of light emission in a p-n junction diode. Mention the applications.	6	L1	1	1
	c) With a neat circuit diagram of a single stage CE-RC coupled amplifier, explain the significance of each component in the circuit and depict the concept of phase reversal at the output for the given input signal.	10	L2	2	1
	a) An oscillator circuit has 2 capacitors of values $0.01\mu F$ and $0.001\mu F$ with an inductor of $5\,\mu H$ in its feedback circuit. Calculate the frequency of oscillations and also sketch the circuit diagram of appropriate oscillator.	6	L3	2	2
	b) State and explain Barkhausen's criteria for generating sustained oscillations with relevant diagrams.	8	L2	2	1
	c) A $24V, 600mW$ zener diode is used for providing a stabilized voltage to a variable load from a $32V$ power supply. Calculate i) the value of series resistance ii) the zener current when the load is 1200Ω. Write the appropriate circuit diagram for the same.	6	L2	1	2
	Unit – II				
4	a) Discuss the construction, operation and characteristics of n-channel depletion type MOSFET with relevant diagrams.	8	L2	3	1
	b) What is virtual ground concept? Briefly describe it with an example.	4	L2	4	1
	c) Describe as how CMOS circuit is used as an inverter in digital circuit applications.	8	L2	3	1

P.T.O.