CBCS SCHEME

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18ELN14/24

First/Second Semester B.E. Degree Examination, June/July 2019
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. What is semiconductor diode? Explain the different equivalent circuits of diode. **(06 Marks)**

b. Explain the working of photodiode. **(05 Marks)**

c. With a neat circuit diagram and waveforms, explain the working of full wave bridge rectifier. Also derive V_{dc} and V_{rms} values for full wave rectifier. **(09 Marks)**

OR

2 a. A full wave rectifier uses 2 diodes having internal resistance of 20Ω each. The transformer rms secondary voltage from centre to each end is 50V. Find I_m, I_{dc}, I_{rms} and V_{dc} if the load is 980Ω **(06 Marks)**

b. Explain the functional block diagram of 78×× series voltage regulator. **(06 Marks)**

c. Explain how Zener diode can be used as a voltage regulator. Give detail mathematical analysis. **(08 Marks)**

Module-2

3 a. With a neat circuit diagram explain the working of CMOS inverter. **(06 Marks)**

b. For a N-channel JFFT if $I_{DSS} = 8mA$ and $V_p = -5V$, calculate I_D at $V_{as} = -3V$ and V_{as} at $I_D = 3mA$. **(05 Marks)**

c. Explain the construction, working and characteristics of N- channel JFET. **(09 Marks)**

OR

4 a. Explain the working of SCR using two transistor model. **(06 Marks)**

b. What is commutation in SCR? Explain two types of commutation. **(05 Marks)**

c. Explain the construction, working and characteristics of enhancement type MOSFET. **(09 Marks)**

Module-3

5 a. What is Op – AMP? List the characteristics of ideal Op – Amp. **(06 Marks)**

b. Explain how Op – Amp can be used as i) Integrator ii) Voltage Follower. **(08 Marks)**

c. Find the output of the Op – Amp circuit shown in Fig Q5(c) below

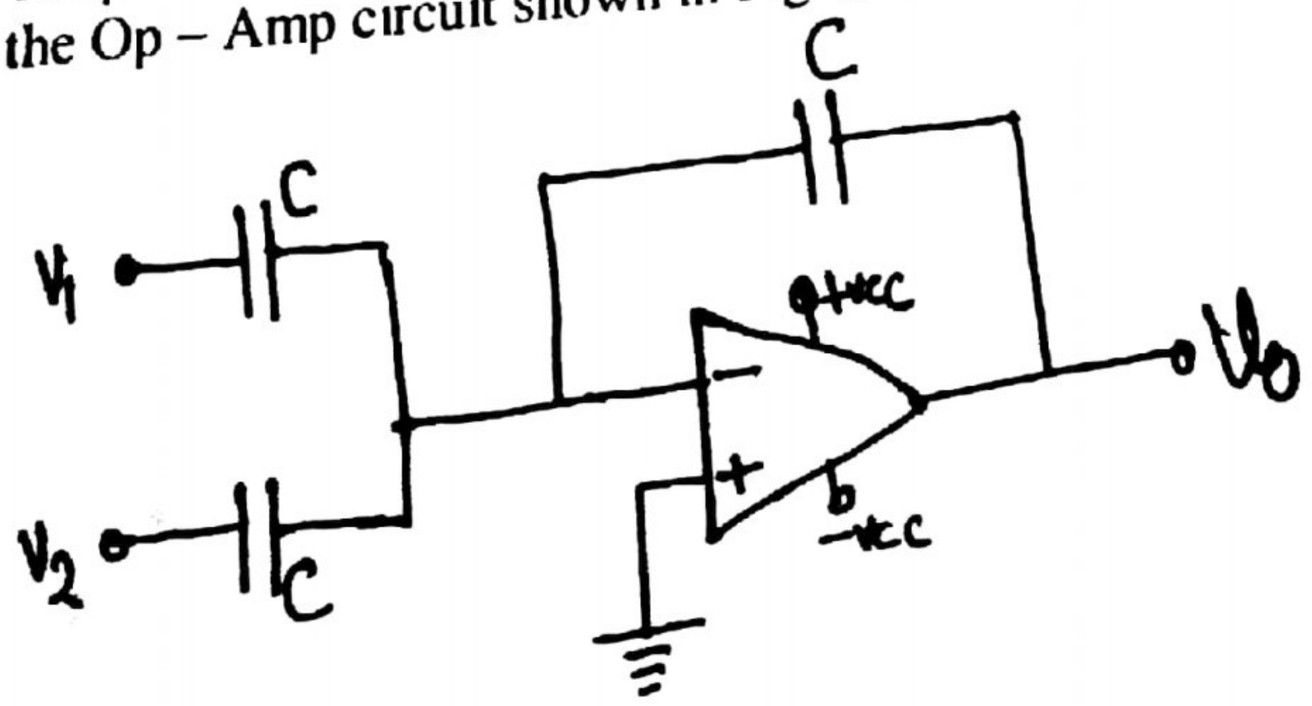

Fig Q5(c) **(06 Marks)**

OR

6 a. Explain the following terms with respect to Op – Amp
i) CMRR ii) Slew Rate iii) Output offset voltage iv) Supply voltage Rejection Ra... **(08 Marks)**

b. Design on Op Amp circuit to obtain output expression as $V_0 = -[V_1 + 3V_2 + 5V_3]$. **(06 Marks)**

c Explain how Op – Amp can be used as differentiator. **(06 Marks)**

Module-4

7 a. What is feedback amplifier? What are the properties of negative feedback amplifier? **(06 Marks)**

b. Explain how transistor can be used as an amplifier. **(06 Marks)**

c. With a neat circuit diagram and waveforms, explain the working of 555 timers as an oscillator. **(08 Marks)**

OR

8 a. Draw the block diagram of voltage series negative feedback amplifier and derive the expression for its voltage gain. **(06 Marks)**

b. Design a RC phase shift oscillator for a frequency of 1KHz. Draw the circuit diagram with designed values. **(06 Marks)**

c. With a neat circuit diagram, explain the working of Wein Bridge oscillator. **(08 Marks)**

Module-5

9 a. Perform the following :
i) Convert $(925.75)_{10}$ to base – 2 and base - 16
ii) Subtract from $(11011.11)_2$ from $(10101.11)_2$ using 2's compliment method. **(06 Marks)**

b. With a block diagram explain the working of 3-bit asynchronous counter. **(06 Marks)**

c. What is multiplexer? Implement 8:1 multiplexer using basic gates. **(08 Marks)**

OR

10 a. Simplify $S = A \oplus B \oplus C$ and realize using basic gates. **(05 Marks)**

b. What is flip-flop? Explain the operation of master slave JK flip flop. **(06 Marks)**

c. Implement full adder using two half adders. **(04 Marks)**

d. With a block diagram, explain the working of basic communication system. **(05 Marks)**

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CBCS Scheme

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First Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain the operation of PN junction diode under forward and reverse biased conditions. with the help of VI characteristics curve. **(06 Marks)**

b. Derive the relation between α and β. Calculate I_C and I_E for transistor that has $\alpha_{dc} = 0.98$ and $I_B = 100\ \mu A$. **(06 Marks)**

c. With a neat circuit diagram and waveforms, explain the working of centre-tap full wave rectifier and derive the efficiency for the same. **(08 Marks)**

OR

2 a. With a neat diagram, explain the operation of PNP and NPN transistor. **(08 Marks)**

b. A half wave rectifier from a supply 230 V 50 Hz with step down transformer ratio 3:1 to a resistive load of 10 KΩ. The diode forward resistance is 75 Ω and transformer secondary is 10 Ω. Calculate the DC current, DC voltage, efficiency and ripple factor. **(06 Marks)**

c. With neat circuit diagram, explain the common emitter circuit and sketch the input and output characteristics. **(06 Marks)**

Module-2

3 a. With a necessary equation and circuit, explain the base-bias transistor circuits. **(06 Marks)**

b. Design an Adder using op-amp to give the output voltage ,

$$V_0 = -[2V_1 + 3V_2 + 5V_3]$$ **(06 Marks)**

c. Derive the equations for output voltage for an inverting amplifier and an integrator. **(08 Marks)**

OR

4 a. Explain the characteristics of an ideal op-amp. Mention the applications. **(06 Marks)**

b. Accurately analyze the voltage divider bias which has V_{CC} = 18 V, R_1 = 33 KΩ, R_2 = 12 KΩ and R_E = 1 KΩ. Determine V_E V_C, V_{CE}, I_C and Q point, when transistor $h_{fe} = 200$. **(08 Marks)**

c. Write short notes on op-amp virtual ground concept. **(06 Marks)**

Module-3

5 a. Perform the following:

i) Convert $(57345)_{10} = (\quad)_{16}$

ii) Subtract $(28)_{10} - (19)_{10}$ using 2's complement method. **(06 Marks)**

b. Realize $Y = AB + CD + E$ using NAND gate. **(06 Marks)**

c. Explain the full adder circuit with truth table. Realize the circuit for sum and carry using logic gates. **(08 Marks)**

OR

6 a. Perform the following: (06 Marks)
   i) Convert $(FA27D)_{16} = (\quad)_2 \rightarrow = (\quad)_8 = (\quad)_{10}$ (06 Marks)
   ii) Subtract 10.0101 – 101.1110 using 1's compliment method. (08 Marks)

b. $Y = A + \bar{A}B + AB\bar{C}$ simplify and implement using logic gates and NOR gates. (04 Marks)

c. State and prove De Morgan's theorem using two variable. (06 Marks)

Module-4

7 a. Bring out differences between flip flops and latches. (06 Marks)
   b. Explain SR flipflop with circuit diagram and truth table. (10 Marks)
   c. With a neat block diagram explain the architecture of 8051 microcontroller. (10 Marks)

OR

8 a. Explain the operation of NAND gate latch with circuit and truth table. (10 Marks)
   b. What is stepper motor? With a neat block diagram, explain the working principle of microcontroller based stepper motor control system. (10 Marks)

Module-5

9 a. Define communication. With neat block diagram, explain the elements of communication system. (06 Marks)
   b. Derive an expression for amplitude modulation and draw the necessary waveforms. (08 Marks)
   c. What is transducer? Compare the active and passive transducers. (06 Marks)

OR

10 a. Bring out the difference between amplitude modulation and frequency modulation. (06 Marks)

   b. If a FM wave represented by the equation $V = 10\sin(8\times10^8 + 4\sin 1000t)$, calculate:
   i) Carrier frequency ii) Modulating frequency
   iii) Modulation index iv) Band width (06 Marks)

   c. With necessary diagram and equations, explain the following:
   i) Piezo-electric transducer
   ii) LVDT. (08 Marks)

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CBCS Scheme

15ELN15/25

First/Second Semester B.E. Degree Examination, June/July 2017

Basic Electronics

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain briefly the PN junction diode characteristics. **(06 Marks)**

b. Explain Zener diode voltage regulator circuit with no load and with load. **(06 Marks)**

c. Derive the relationship between α and β. Calculate the value of I_c for a transistor that has $\alpha = 0.98$ and $I_b = 200\ \mu A$. **(04 Marks)**

OR

2 a. Explain briefly the common emitter circuit and sketch the input and output characteristics. Also explain operating regions by indicating them on characteristics curve. **(06 Marks)**

b. With a neat circuit diagram and waveforms, explain the working of a half-wave rectifier. **(06 Marks)**

c. Explain briefly capacitor filter circuit. **(04 Marks)**

Module-2

3 a. What is a DC load line? Explain the voltage divider bias circuit. **(08 Marks)**

b. Mention and explain the characteristics of ideal operational amplifier. **(04 Marks)**

c. Derive the expression of integrator with circuit diagram. **(04 Marks)**

OR

4 a. With neat circuit and necessary equations, explain the voltage follower. **(06 Marks)**

b. Explain the base bias circuit. **(04 Marks)**

c. Explain briefly inverting and non-inverting operational amplifiers. **(06 Marks)**

Module-3

5 a. State and prove De-Morgan's theorem with truth table. **(06 Marks)**

b. Explain the basic gates AND, OR and NOT gates with truth tables. **(06 Marks)**

c. Explain the half-adder circuit. **(04 Marks)**

OR

6 a. Explain the full-adder circuit. **(06 Marks)**

b. Simplify the given Boolean equation $Y = (A + \overline{B})(CD + E)$ and realize using NAND gates only. **(04 Marks)**

c. Convert the following: **(06 Marks)**

i) $(49.5)_{10} = (\quad ? \quad)_{16}$

ii) $(1062.403)_8 = (\quad ? \quad)_{10}$

iii) $(642.71)_8 = (\quad ? \quad)_2$

Module-4

7 a. What is R-S flip-flop? Explain its circuit diagram, logic symbol and truth table. **(08 Marks)**

b. Explain the architecture of 8051 microcontroller in detail. **(08 Marks)**

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OR

8 a. Explain the gated R-S flip-flop and clocked R-S flip-flop. (08 Marks)

b. With the help of block diagram, explain the micro-controller based stepper motor control system. (08 Marks)

Module-5

9 a. Explain the construction of LVDT and its operation. (06 Marks)

b. Explain the frequency modulation with neat waveforms. (06 Marks)

c. Explain with diagram the AM detection (demodulation). (04 Marks)

OR

10 a. Explain the piezoelectric transducer and photoelectric transducer. (06 Marks)

b. Explain with block diagram elements of communication system. (06 Marks)

c. Compare AM and FM modulation. (04 Marks)

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18ELN14/24

Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER

1st/2nd Semester, B.E (CBCS 2018-19 Scheme)

Course: 18ELN14/24- BASIC ELECTRONICS – *Set no. 1*

Time: 3 Hours Max. Marks: 100

Note: (i) Answer Five full questions selecting any one full question from each Module.
(ii) Question on a topic of a Module may appear in either its 1st or/and 2nd question.

		Module-1	Marks
1	a	Explain the operation of p-n junction diode under forward and reverse biased condition	8
	b	Explain how Zener diode can be used as a voltage regulator	6
	c	A diode circuit shown below has E=1.5V, R = 10 ohm. By assuming V_f=0.7V, calculate I_f for i) $r_d = 0$ ii) $r_d = 0.25$ ohm	6

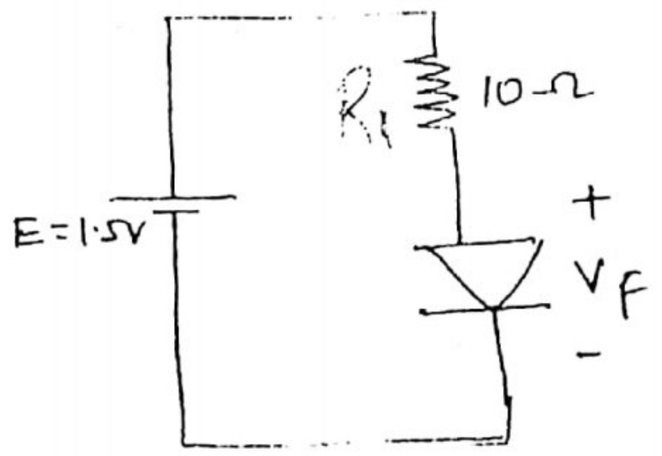
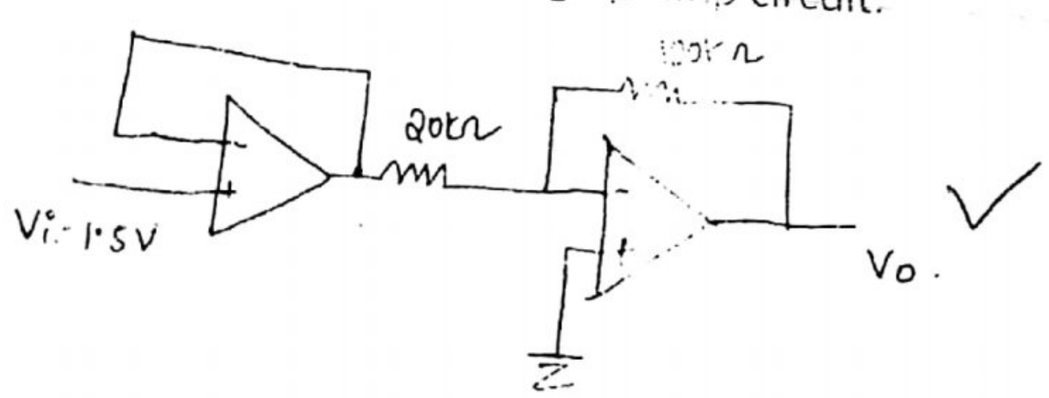


Fig.Q.1(c)

		OR	
2	a	With a neat circuit diagram and waveform, explain the working of half-wave rectifier and derive the expression for average load current.	8
	b	Explain briefly the operation of a capacitor filter circuit.	
	c	Explain the operation of 7805 fixed IC voltage regulator.	

		Module-2	

3	a	Explain the characteristics of N-channel E-MOSFET.	4
	b	For E-MOSFET, determine value of I_D, if $I_{D(ON)}$= 4mA, $V_{GS}(ON)$=6V, V_T=4V and V_{GS}=8V.	4
	c	Explain the construction and working of N-channel enhancement type MOSFET.	8
		OR	
4	a	Draw and explain the operations of SCR using 2-transistor equivalent circuit.	8
	b	Explain phase controlled application of SCR.	6
	c	Explain the operation of a CMOS inverter.	6
		Module-3	
5	a	For an op-amp (i) List the characteristics of an ideal op-amp and (ii) Draw the three input inverting summer circuit and derive an expression for its output voltage.	8
	b	Define the terms i) Slew rate ii) CMRR iii) Common mode gain A_c of op-amp	6
	c	Design an adder circuit using an op-amp to obtain an output voltage of V_o= -[$2V_1$+$3V_2$+$5V_3$]	6
		OR	
6	a	Draw the working of an inverting op-amp. Derive the expression for its voltage gain.	8
	b	With a neat diagram, explain how an op-amp can be used as a differentiator.	6
	c	Find the output V_o of following op-amp circuit.  Fig. Q.6(c)	6

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