

# CBCS SCHEME

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15ELN15/25

## First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019 Basic Electronics

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Draw and explain the V-I characteristics of a Silicon diode. (05 Marks)
- b. Find the value of the series resistance 'R<sub>s</sub>' required to drive a forward current of 1.25mA through a germanium diode from a 4.5V battery. Write the circuit diagram showing all the values. (04 Marks)
- c. With circuit diagram, explain the operation of center-tapped full wave rectifier. Draw input and output waveforms. (07 Marks)

OR

- 2 a. Design the Zener regulator for the following specifications. Output voltage = 5V, load current = 20mA, Zener voltage  $P_{Z(min)} = 500$  mW and input voltage =  $12V \pm 3V$ . (05 Marks)
- b. Draw CE circuit and sketch the input and output characteristics also explain the operating regions by indicating them on the characteristics curve. (08 Marks)
- c. Calculate the values of I<sub>C</sub> and I<sub>E</sub> for a BJT with  $\alpha = 0.97$  and I<sub>B</sub> = 50  $\mu$ A. Also determine the value of  $\beta_{dc}$ . (03 Marks)

### Module-2

- 3 a. Determine the operating point for a Silicon transistor biased by base bias method, for  $\beta = 100$ , R<sub>C</sub> = 2.5k $\Omega$ , R<sub>B</sub> = 500k $\Omega$  and V<sub>CC</sub> = 20V. Also draw the DC load line. (06 Marks)
- b. With a net circuit diagram. Explain the voltage divider bias circuit. (07 Marks)
- c. Compare base bias and voltage divider bias circuits. (03 Marks)

OR

- 4 a. List the characteristics of an ideal op-amp. (05 Marks)
- b. A non-inverting amplifier has input resistance of 10k $\Omega$  and feedback resistance of 60 k $\Omega$ ? With a load resistance of 47k $\Omega$ . Draw the circuit and calculate the output voltage, voltage gain, load current, when the input voltage is 1.5V. (06 Marks)
- c. Derive the expression for 3-input summing amplifier. (05 Marks)

**Module-3**

- 5 a. Compare analog and digital signal. (04 Marks)  
 b. Convert :  
 i)  $(1AD.EO)_{16} = (?)_{10} = (?)_8$   
 ii)  $(1101101)_2 = (?)_{10}$   
 iii)  $(69)_{10} = (?)_2$  (05 Marks)  
 c. Perform the subtraction :  
 i)  $(10010)_2$  and  $(1101)$  using 1's complement method  
 ii)  $(10010)_2$  and  $(01101)_2$  using 2's complement method. (07 Marks)

**OR**

- 6 a. State and prove DC – Morgan's theorems for 4 variables. (08 Marks)  
 b. Simplify the following expression and realize using basic gates :  
 $Y = A(\overline{ABC} + ABC)$  (04 Marks)  
 c. Realize half adder using only NAND gate. (04 Marks)

**Module-4**

- 7 a. Define flip-flop. Give the difference between a later and flip-flop. (04 Marks)  
 b. Explain the working of a NOR gate later. (06 Marks)  
 c. With diagram and truth table explain clocked RS – flip-flop. (06 Marks)

**OR**

- 8 a. List the important features of 8051 microcontroller. (03 Marks)  
 b. Explain the architecture of 8051 microcontroller. (07 Marks)  
 c. With block diagram, explain the micro-controller based stepper motor control system. (06 Marks)

**Module-5**

- 9 a. With a neat block diagram, explain the elements of communication system. (06 Marks)  
 b. A carrier of 1MHz, with 400W of its power is amplitude modulated with a sinusoidal signal of 2500Hz. The depth of modulation is 75%. Calculate the sideband frequencies, the band width, the power in the side bands and the total power in the modulated wave. (05 Marks)  
 c. Give the comparison between AM and FM. (05 Marks)

**OR**

- 10 a. What is a Transducer? Distinguish between active and passive transducer. (05 Marks)  
 b. A termistor has a material constant ' $\beta$ ' of  $2000^\circ \text{K}$ . If its resistance is  $100 \text{ k}\Omega$  at  $300^\circ \text{k}$  temperature, what will be the resistance at  $500^\circ \text{k}$ ? (04 Marks)  
 c. Explain the construction and the principle of operation of LVDT. Also list the advantages of LVDT. (07 Marks)

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