CBCS Scheme

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17ELN15

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, **(06 Marks)**

$$V_0 = -[2V_1 + 3V_2 + 5V_3]$$

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 $(57345)_{10} = (\quad)_{16}$ **(06 Marks)**

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

b. Realize $Y = AB + CD + E$ using NAND gate.

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

b. $Y = A + AB + AB\overline{C}$ simplify and implement using logic gates and NOR gates. **(06 Marks)**

c. State and prove De Morgan's theorem using two variable. **(08 Marks)**

Module-4

7 a. Bring out differences between flip flops and latches. **(04 Marks)**

b. Explain SR flipflop with circuit diagram and truth table. **(06 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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