CBCS SCHEME

USN | | | | | | | | | | |

17ELN15/25

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.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. Explain the operation of PN junction diode under forward and reverse bias condition. **(07 Marks)**

b. Discuss the load and line regulations using zener diode with neat circuit diagrams and appropriate expressions. **(08 Marks)**

c. Design a 9V DC reference source consisting of a zener diode and series connected resistor to operate from a 24V supply. [$I_{ZT} = I_Z = 20$ mA]. **(05 Marks)**

OR

2 a. With a neat circuit diagram, explain the operation of centre tapped full wave rectifier. Draw input and output waveforms. **(07 Marks)**

b. Draw common emitter circuit, sketch input and output characteristics and explain three regions of operation. **(08 Marks)**

c. Derive the relationship between α and β. Find I_C and I_E for the transistor with $\alpha = 0.99$ and $I_B = 20\mu A$. **(05 Marks)**

Module-2

3 a. Precisely analyse the circuit of voltage divider bias. **(08 Marks)**

b. What is Op-Amp? List out the ideal and particle characteristics of Op-Amp. **(07 Marks)**

c. Calculate the output voltage of a summer. Given : $R_1 = 200k\Omega$, $R_2 = 250k\Omega$, $R_3 = 500k\Omega$. $R_f = 1M\Omega$, $V_1 = -2V$, $V_2 = -1V$ and $V_3 = +3V$. **(05 Marks)**

OR

4 a. Design a base bias circuit to have $V_{CE} = 5V$, $I_C = 5mA$. The supply voltage is 15V and transistor has $h_{fe} = 100$. **(07 Marks)**

b. Derive an expression for the voltage gain of inverting and Non-inverting amplifier. **(08 Marks)**

c. Analyse the circuit of an op-amp as an integrator. **(05 Marks)**

Module-3

5 a. Interpret the following :

i) $(48350)_{10} = (\quad)_{16} = (\quad)_8$

ii) $(FACE)_{16} = (\quad)_2 = (\quad)_8$

iii) $(847.951)_{10} = (\quad)_8$. **(06 Marks)**

b. Write the logical symbol, truth table and Boolean expressions of all the logic gates : (AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR). **(09 Marks)**

c. Realize EX –OR gate using NAND gates only. **(05 Marks)**

OR

6 a. Which are the universal gates? Realize basic gates using universal gates? **(07 Marks)**

b. Design a full adder using two half adder. Derive the necessary expressions. **(08 Marks)**

c. Perform the subtraction using 2's complement method :

i) $(11010)_2 - (10000)_2$

ii) $(11)_{10} - (15)_{10}$. **(05 Marks)**

Module-4

7 a. With diagram and truth table explain NAND gate latch. **(06 Marks)**

b. Explain the operation of 8051 microcontroller with neat block diagram. Mention the salient features. **(10 Marks)**

c. Distinguish between flip-flop and latch. List out the applications of flip-flop. **(04 Marks)**

OR

8 a. Explain the operation of clocked RS flip-flop. **(07 Marks)**

b. With a neat block diagram, explain microcontroller based stepper motor control system. **(07 Marks)**

c. With a diagram and truth table, explain NOR Gate Latch. **(06 Marks)**

Module-5

9 a. What is modulation? Explain the need for modulation. **(04 Marks)**

b. Derive the expression for frequency modulation with a neat waveforms. **(10 Marks)**

c. Explain the piezoelectric and photo electric transducers. **(06 Marks)**

OR

10 a. Discuss the comparison between AM and FM modulation. **(06 Marks)**

b. Explain the construction and principle of operation of LVDT. **(07 Marks)**

c. A carrier of 1MHz, with 400 Watt of its power is amplitude modulated with a sinusoidal signal of 2500 Hz. The depth of modulation 75%. Calculate the side band frequencies, the band width, the power in the side bands and the total power in the modulated wave. **(07 Marks)**

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