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14ELN15/25

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017

Basic Electronics

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting ONE full question from each module.

Module – 1

- 1 a. Draw and explain the V-I characteristics of Si and Ge P-N junction diode. (06 Marks)
- b. Draw and explain the negative voltage clamping circuit. (06 Marks)
- c. The input to a half wave rectifier is given through a 10:1 transformer from a supply given by $230 \sin 314t$ V. If $R_f = 50\Omega$ and $R_L = 500\Omega$. Determine DC load voltage, RMS load voltage, Rectification efficiency, DC power delivered to the load. (08 Marks)
- 2 a. With a neat circuit diagram and waveform, explain the working of full wave bridge rectifier. (07 Marks)
- b. Find I_c and I_E for a transistor, given that $\alpha_{dc} = 0.96$ and $I_B = 110\mu A$. Also calculate the β_{dc} of the transistor. (05 Marks)
- c. Draw the common emitter circuit and sketch the output characteristics, explain the operating regions by indicating them on the characteristic curve. (08 Marks)

Module – 2

- 3 a. A fixed bias circuit has $V_{cc} = 10V$, $R_B = 220K\Omega$, $R_c = 1.2K\Omega$ and $\beta = 50$. Draw DC load line and mark Q-point. (06 Marks)
- b. Explain the circuit operation and analysis of voltage divider bias. (08 Marks)
- c. Write the ideal characteristics of an operational amplifier. (06 Marks)
- 4 a. Design a inverting summing circuit with feedback $R_f = 100K\Omega$ using an OP-Amp to generate the output $V_o = -(3V_1 + 4V_2 + 5V_3)$ (06 Marks)
- b. Draw an inverting and non-inverting amplifier using a OP-Amp and derive an expression for its output voltage. (06 Marks)
- c. Show with a circuit diagram, how an OP-Amp can be used as difference/subtractor amplifier. (08 Marks)

Module – 3

- 5 a. Convert :
 - i) $(1010101)_2 = (?)_{10} = (?)_8$
 - ii) $(ABCD)_{16} = (?)_2 = (?)_8$ (05 Marks)
- b. Subtract $(111001)_2$ from $(101011)_2$ using 2's complement method. (05 Marks)
- c. State and prove De-Morgan's theorem. (05 Marks)
- d. Simplify and realize using basic gates

$$\overline{X}\overline{Y}\overline{Z} + \overline{X}\overline{Y}Z + \overline{X}Y\overline{Z} + X\overline{Y}$$
 (05 Marks)
- 6 a. Simplify and realize the following using NAND gates only $A\overline{B}\overline{C} + \overline{A}\overline{B}\overline{C} + \overline{A}\overline{B} + \overline{A}\overline{C}$. (05 Marks)
- b. Define full adder, implement full adder using two half adders and write the equations for sum and carry. (05 Marks)
- c. Implement EX-OR gate using only NOR gates. (05 Marks)
- d. Realize the following using only NAND gates

$$Y = (A + \overline{B} + C) \cdot (\overline{A} + B + C)$$
 (05 Marks)

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

Module – 4

- 7 a. Explain the working of clocked RS flip-flop. (08 Marks)
b. Explain the architectural features of 8085. (04 Marks)
c. Describe the block diagram of 8051 with neat diagram. (08 Marks)
- 8 a. Explain Flag register of 8051 microcontroller. (05 Marks)
b. Give the comparison between Active and Passive transducer. (05 Marks)
c. Explain the principle of operation of Resistance Temperature Detector (RTD). (05 Marks)
d. Explain the construction of a Linear Variable Differential Transducer (LVDT). (05 Marks)

Module – 5

- 9 a. Derive an expression for modulation index in AM. (06 Marks)
b. A 15KHz audio signal is used to frequency modulate a 100MHz carrier, causing deviation of 75KHz. Determine modulation index and Bandwidth of the FM signal. (04 Marks)
c. Give the comparison between FM and AM. (05 Marks)
d. Explain the block diagram of ISDN. (05 Marks)
- 10 a. Draw and explain the block diagram of optical fiber communication system. (06 Marks)
b. Explain the basic principle of operation of mobile phones. (06 Marks)
c. An audio frequency signal $10\sin 2\pi \times 500t$ is used to amplitude modulate a carrier of $50\sin 2\pi \times 10^5$. Calculate modulation index, sideband frequencies, Amplitude of each sideband frequency, bandwidth required. (08 Marks)

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