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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

$\overline{X}\,\overline{Y}\,\overline{Z} + \overline{X}\,\overline{Y}\,\overline{Z} + \overline{X}\,\overline{Y} + X\,\overline{Y}$ **(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)**

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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