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14ELN15/25

First/Second Semester B.E. Degree Examination, Dec.2015 / Jan.2016

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 a silicon diode. **(08 Marks)**

b. What is a rectifier? With a neat circuit diagram and waveforms, explain the working of full wave rectifier. **(08 Marks)**

c. A full wave rectifier with a load of 1 KΩ. The ac voltage applied to the diode is 200-0-200 V, if diode resistance is neglected. Calculate:
i) Average dc current; ii) Average dc voltage. **(04 Marks)**

2 a. Draw and explain the input and output characteristics of common emitter configuration. **(08 Marks)**

b. Explain full wave rectifier with capacitor filter with necessary waveforms. **(07 Marks)**

c. In common emitter transistor circuit if $\beta = 100$ and $I_B = 50\ \mu A$, compute the values of I_C, I_E and α. **(05 Marks)**

Module – 2

3 a. With a neat circuit diagram, explain the voltage divider bias circuit by giving its exact analysis. **(08 Marks)**

b. For the base bias circuit for npn transistor, find I_B, I_C and V_{CE} if $R_C = 2.2$ KΩ, $R_B = 470$ KΩ, $V_{CC} = 18$ V, $h_{fe} = 100$. Draw the dc load line and Q point. **(08 Marks)**

c. What is op-amp? List the ideal characteristics of an op-amp. **(04 Marks)**

4 a. Define for an op-amp (i) CMRR, (ii) Slew rate, (iii) PSRR. **(06 Marks)**

b. Show how an op-amp can be used as integrator. Derive an expression for its output. **(06 Marks)**

c. For the circuit shown in Fig.Q4(c). Calculate the output voltage.

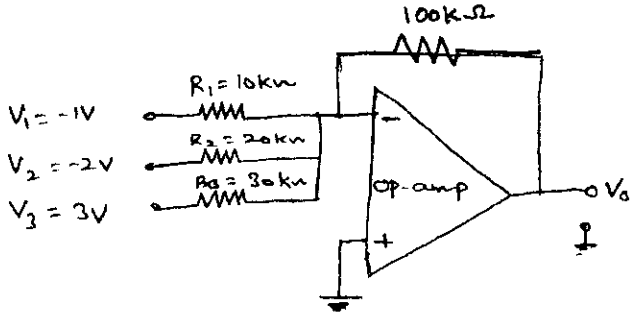

Fig.Q4(c) **(04 Marks)**

d. What is voltage follower? Explain. **(04 Marks)**

Module – 3

5 a. Convert :
i) $(35.45)_{10} = (\ \ )_2$
ii) $(475.25)_8 = (\ \ )_{10}$
iii) $(3FD)_{16} = (\ \ )_2$ **(06 Marks)**

b. State and prove Demorgan's theorems. **(06 Marks)**

c. Show that:

i) $A\overline{B}C + B + B\overline{D} + AB\overline{D} + \overline{A}C = B + C$

ii) $\overline{\overline{AB} + \overline{A} + AB} = 0$

iii) $AB + A(B + C) + B(B + C) = B + AC$ **(06 Marks)**

d. What are universal gates? **(02 Marks)**

6 a. Realize two input EX-OR gate using only NAND gates. **(05 Marks)**

b. Design full adder and implement it. **(07 Marks)**

c. Subtract $(111001)_2$ from $(101011)_2$ using 2's complement method. **(04 Marks)**

d. Realize OR gate using diodes and explain. **(04 Marks)**

Module – 4

7 a. Define flip flop. Explain R-S flip flop. **(05 Marks)**

b. With neat block diagram, explain architecture of 8085 microprocessor. **(10 Marks)**

c. List the difference between microprocessor and microcontroller. **(05 Marks)**

8 a. What is transducer? Distinguish between active and passive transducer. **(05 Marks)**

b. With a neat sketch, explain construction and working of LVDT. **(07 Marks)**

c. Explain the working of photo voltaic transducer. **(08 Marks)**

Module – 5

9 a. What is modulation? What is the need of modulation? **(05 Marks)**

b. A 500 W, 1 MHz carrier is amplitude modulated with a sinusoidal signal of 1 kHz. The depth of modulation is 60%. Calculate the bandwidth, power in the sidebands and the total power transmitted. **(07 Marks)**

c. Define AM. Draw the AM signal and its spectrum. Derive the necessary expressions for AM. **(08 Marks)**

10 a. With a block diagram, explain typical cellular mobile unit. **(05 Marks)**

b. What is ISDN? Explain services of ISDN. **(06 Marks)**

c. Explain advantages and applications of optical fibers. **(05 Marks)**

d. Give the comparison between AM and FM. **(04 Marks)**

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