CBCS Scheme

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

15ELN15

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

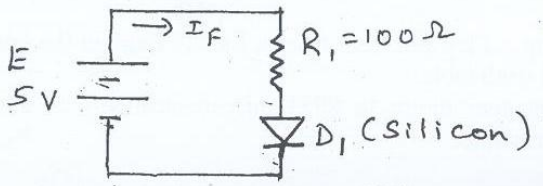
Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. For the circuit shown in fig.Q1(a) draw the DC load line and locate Q – pt. **(04 Marks)**

Fig.Q1(a)



b. What is the need for capacitor filter? For a Half – Wave Rectifier, explain the operation of C – filter. **(06 Marks)**

c. Considering npn transistor in common emitter configuration, explain how it acts as voltage amplifier. **(06 Marks)**

OR

2 a. Explain the working of a Bridge Full – Wave Rectifier, with a neat circuit diagram and waveforms. **(06 Marks)**

b. Discuss the load and line regulation using zener diode with neat circuit diagram and appropriate expressions. **(06 Marks)**

c. Calculate the values of I_C and I_E for a BJT with $\alpha_{dc} = 0.97$ and $I_B = 50\ \mu A$. Determine β_{dc}. **(04 Marks)**

Module-2

3 a. Precisely analyse the circuit of voltage divider bias and hence determine the V_C and V_{CE}. Mention the advantages of voltage divider bias. **(10 Marks)**

b. Derive an equation for output voltage for a non – inverting Op – amp. Find the gain of amplifier if $R_F = 10K\Omega$ and $R_1 = 1K\Omega$. **(06 Marks)**

OR

4 a. A base bias circuit with a 12V supply uses a transistor with $h_{FE} = 70$. Design the circuit so that $I_C = 2mA$ and $V_{CE} = 9V$ (Assume $R_E = 0$). **(06 Marks)**

b. Explain the working of Op – amp as integrator. **(05 Marks)**

c. Derive the expression of 3 input summing amplifiers. **(05 Marks)**

Module-3

5 a. Convert the following : i) $172.625_{(10)} = (\quad)_2$ ii) $(ABCD.72)_{16} = (\quad)_8$
iii) $(1\,0\,1\,1\,1\,1\,0\,1\,.\,0\,1\,0\,1)_2 = (\quad)_{10}$. **(06 Marks)**

b. Perform the following operations using 1's and 2's compliment technique
i) $(56)_{10} - (79)_{10}$ ii) $(23)_{10} - (18)_{10}$. **(06 Marks)**

c. State and prove de Morgan's theorem using truth table for 2 variables. **(04 Marks)**

OR

6 a. Explain full adder circuit with truth table. Realise the circuit for sum and carry using basic gates. Also write the diagram showing FA using two half adders. **(06 Marks)**

b. Simplify and realize the following expressions using only NAND and NOR.

i) $Y = (A + \overline{B})(B + C)(\overline{C} + \overline{B})$ ii) $Y = AB + AC + BD + CD$. **(10 Marks)**

Module-4

7 a. Explain the operation of NOR Latch with symbol, circuit and truth table. **(06 Marks)**

b. With a neat block diagram, explain the architecture of 8051 microcontroller. **(10 Marks)**

OR

8 a. How is Flip – Flop different from a Latch? Explain the gated RS Flip – Flop with symbol, circuit and truth table. **(08 Marks)**

b. Interface stepper motor to 8051 microcontroller with a neat block diagram. Explain its working principle. **(08 Marks)**

Module-5

9 a. Explain Amplitude Modulation with relevant waveforms. Derive the equation for instantaneous value of modulated signal in volts and define modulation index. **(08 Marks)**

b. Define the term transducer. Mention any four characteristics a transducer should posess. **(02 Marks)**

c. Briefly explain the working of thermistor. Mention its applications. **(06 Marks)**

OR

10 a. Explain the frequency modulation with necessary waveforms. Bring out the difference between AM and FM. **(08 Marks)**

b. Explain construction and the principle of operation of LVDT. **(08 Marks)**

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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.

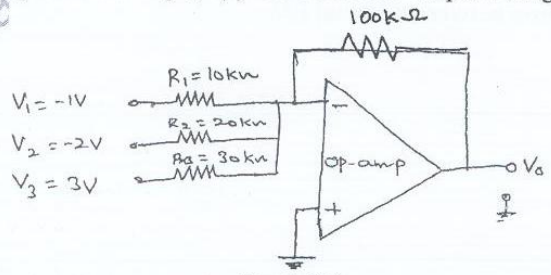

Fig.Q4(c) **(04 Marks)**

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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