Mettle

USN 1:7ELN15

First Semester B.E. Degree Examination, Dec.2017/Jan.2018
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 biased conditions, with the help of VI cbaracteristics curve. (06 Marks)

b. Derive the relation between a and p. Calculate Ic and IE for transistor that has ad $_s$ = 0.98 and 1B = 100 IAA. (06 Marks)

c. With a neat circuit diagram and waveforms, explain the working of centre-tap full wave rectifier and derive the e fficiency for the same. (08 Marks)

OR

2 a. With a neat diagram, explain the operation of PNP and NPN transistor. (08 Marks)

b. A half wave rectifier from a supply 230 V 50 Hz with step down transformer ratio 3:1 to a resistive load of 10 Kn. The diode forward resistance is 75 f2 and transformer secondary is 10 Q. Calculate the DC current, DC voltage, efficiency and ripple factor. (06 Marks)

c. With neat circuit diagrani, e lain• ,the common emitter circuit and sketch the input and output characteristics. (06 Marks)

Module-2

3 a. With a necessary equation and circuit, explain the bage-bias transistor circuits. (06 Marks)

b. Design an Adder using op-amp to give the output voltage ,

$$V_0 = —f2V_1 + 3V_2 + 5V_3 I$$ (06 Marks)

c. Derive the equations for output voltage for an inverting ariaplifier and an integrator. (08 Marks)

OR

4 a. Explain the characteristics of an ideal op-amp. Mention the application& (06 Marks)

b. Accurately analyze the voltage divider bias which has Vcc = 18 V, RI = 33 KK2, R2 = 12 Ka and RE = 1 KO. Determine VE VC, VCE, IC and Q point, when transistor h fe = 200. (08 Marks)

C. Write short notes on op-amp virtual ground concept. (06 Marks)

Module-3

5 a. Perform the following:

i) Convert (57345)10 — ( )16

ii) Subtract (28)10 — (19)10 using 2's complement method. (06 Marks)

b. Realize Y = AB + CD + E using NAND gate. (06 Marks)

c. Explain the full adder circuit with truth table. Realize the circuit for sum and carry using logic gates. (08 Marks)

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OR

6 a Perform the following:

i) Convert (FA27D)to = ( )2 —> = ( )8 = ( )to

ii) Subtract 10.0101 — 101.1110 using l's compliment method. (06 Marks)

b. y = A +AB+ ABC simplify and implement using logic gates and NOR gates. (06 Marks)

c. State and prove De Morgan's theorem using two variable. (08 Marks)

Module-4

7 a. Bring out differences between flip flops and latches. (04 Marks)

b. Explain SR flipflop with circuit diagram and truth table. (06 Marks)

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

OR

8 a. Explain the operation ofNAND gate latch with circuit and truth table. (10 Marks)

b. What is stepper motor? With a neat block diagram, explain the working principle of microcontroller based stepper motor control system. Marks)

Module-5

9 a. Define communication. With neat:block diagram, explain the elements of communication system. (06 Marks)

b. Derive an expression for amplitude modulation and draw the necessary waveforms. (08 Marks)

c. What is transducer? Compare the active and passive transducers. (06 Marks)

10 a. Bring out the difference between amplitude modulation and frequency modulation. (06 Marks)

b. If a FM wave represented by the equation V =10 sin(8x 10^8 + 4sin1000t) , calculate:

i) Carrier frequency ii). Modulating frequency

iii) Modulation index iv) Band width (06 Marks)

C. With necessary diagram andequations, explain thefollowing:

i) Piezo-electric transducer

ii) LVDT. (08 Marks)