CBCS SCHEME

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

18ELN14/24

First/Second Semester B.E. Degree Examination, Feb./Mar. 2022
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 bias conditions. **(06 Marks)**

b. A full wave bridge rectifier with an input of 100V (rms) feeds a load of 1KΩ, $V_T = 0.7V$.
i) If the diodes employed are silicon, what is the DC voltage across the load?
ii) Determine the PIV rating of each diode
iii) Determine the maximum current that each diode conducts and the diode power rating. **(06 Marks)**

c. Write a short note on :
i) Light emitting diode
ii) Photodiode
iii) Photo coupler. **(08 Marks)**

OR

2 a. What is Zener diode? With a neat circuit diagram, explain the operation of a voltage regulator. **(08 Marks)**

b. A silicon diode has $I_S = 10nA$ at 25°C. Calculate I_D for a forward bias of 0.6V. **(04 Marks)**

c. Define rectifier. Sketch a half wave rectifier with waveforms derive the following :
i) Average voltage
ii) Average current
iii) Efficiency
iv) Ripple factor. **(08 Marks)**

Module-2

3 a. Explain the construction and operation of N-channel JFET **(06 Marks)**

b. With a neat diagram, explain the operation of CMOS inverter. **(08 Marks)**

c. With a neat diagram, explain the VI characteristics of SCR. **(06 Marks)**

OR

4 a. Explain the characteristics of n-channel JFET. **(06 Marks)**

b. With a neat diagram, explain the characteristics of a enhancement type MOSFET (N-channel). **(08 Marks)**

c. With neat diagram, explain the two transistor model of an SCR. **(06 Marks)**

Module-3

5 a. For an op-amp :
i) List the characteristics of an ideal op-amp
ii) Draw the three input summing circuit (inverting amplifier) and drive the expression for its output voltage. **(08 Marks)**

b. Define the terms with respect to op-amp
i) Slew rate ii) CMRR iii) Common mode gain Acm or Ac of op-amp. **(06 Marks)**

c. Design an adder circuit using an op-amp to obtain the output voltage of $-(2V_1 + 3V_2 + 5V_3)$. **(06 Marks)**

OR

6 a. Draw the circuit of non-inverting op-amp. Derive the expression for its voltage gain. **(08 Marks)**

b. With a neat circuit diagrams, explain how an op-amp can be used as a :
i) differentiator ii) an integrator. **(06 Marks)**

c. Find the output V_0 for the following op-amp circuit.

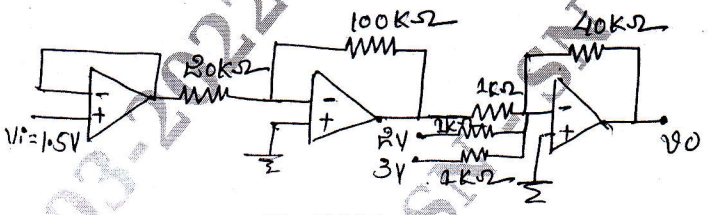

Fig.Q6(c) **(06 Marks)**

Module-4

7 a. What is an amplifier? Explain the operation of transistor amplifier circuit. **(08 Marks)**

b. Define feedback amplifier? With a necessary diagram and equation explain different types of feedback. **(12 Marks)**

OR

8 a. Briefly explain how a transistor is used as an electronic switch. **(06 Marks)**

b. Explain how 555 timer can be used as an oscillator. **(06 Marks)**

c. Define an oscillator? Derive the equation for Wein bridge oscillator. **(08 Marks)**

Module-5

9 a. Convert the following :

i) $(725.25)_{10} = (?)_2 = (?)_{16}$

ii) $(1111001111110001)_2 = (?)_{10} = (?)_{16}$. **(08 Marks)**

b. Simplify the following :

i) $AB + \overline{AC} + A\overline{B}C(AB + C)$

ii) $(A + \overline{B})(CD + E)$. **(06 Marks)**

c. Realize a full adder using 2-half adders. **(06 Marks)**

OR

10 a. What is multiplex? Explain the working of 4 : 1MUX. **(06 Marks)**

b. With the help of a logic diagram and truth table, explain the working of a clocked SR flip-flop. **(06 Marks)**

c. What is a shift register? Explain the working a 4-bit SISO shift register. **(08 Marks)**

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