

GBCS SCHEME



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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 $1K\Omega$, $V_T = 0.7V$.
- If the diodes employed are silicon, what is the DC voltage across the load?
 - Determine the PIV rating of each diode
 - Determine the maximum current that each diode conducts and the diode power rating. (06 Marks)
- c. Write a short note on :
- Light emitting diode
 - Photodiode
 - 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 $25^\circ C$. 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 :
- Average voltage
 - Average current
 - Efficiency
 - 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 :
- List the characteristics of an ideal op-amp
 - 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
- Slew rate
 - CMRR
 - Common mode gain A_{cm} or A_c 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 : (06 Marks)
 - i) differentiator ii) an integrator.
- c. Find the output V_0 for the following op-amp circuit.

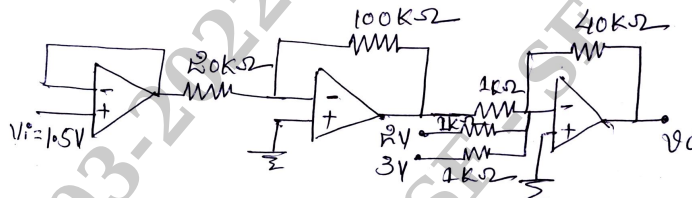


Fig.Q6(c) (06 Marks)

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 : (08 Marks)
 - i) $(725.25)_{10} = (?)_2 = (?)_{16}$
 - ii) $(111100111110001)_2 = (?)_{10} = (?)_{16}$.
- b. Simplify the following : (06 Marks)
 - i) $AB + \bar{A}C + A\bar{B}C(AB + C)$
 - ii) $(A + \bar{B})(CD + E)$.
- 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)
