

CBCS SCHEME

18ELN14/24

USN

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First/Second Semester B.E. Degree Examination, June/July 2024 Basic Electronics

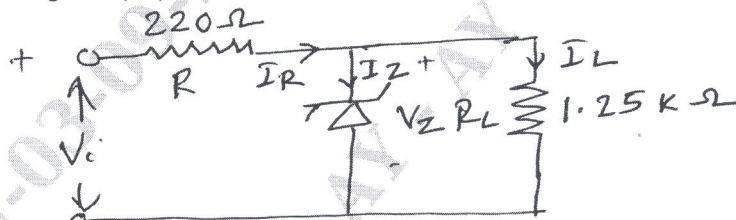
Time: 3 hrs.

Max. Marks: 100

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

Module-1

1. a. Illustrate the working of p-n junction diode under forward and reverse bias conditions with the help of circuit and V-I characteristics. (08 Marks)
- b. With neat circuit diagram and waveform explain the working of center-tap full wave rectifier and derive the expression for average load current. (08 Marks)
- c. Determine the range of (V_i) in which zener diode as shown below conducts.



$V_Z = 20V, P_{Z(max)} = 1200mW$
Fig.Q.1(c)

(04 Marks)

OR

2. a. Explain the operation of zener diode as a voltage regulator with load and without load by using necessary circuit diagram. (08 Marks)
- b. Illustrate the operation of Light Emitting Diode (LED) and photo coupler. (06 Marks)
- c. A diode circuit shown below has $E = 2V, R = 20\Omega$. By assuming $V_f = 0.3V$, calculate ' I_f ' for i) $r_d = 0$ ii) $r_d = 0.5\Omega$. (06 Marks)

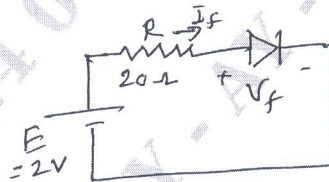


Fig.Q.2(c)

Module-2

3. a. Describe the differences between JFET and transistor. (06 Marks)
- b. A certain JFET has an I_{GSS} of $-2nA$ for $V_{GS} = -20V$. Determine the input resistance. (04 Marks)
- c. Explain the construction and operation of JFET with necessary diagram. (10 Marks)

OR

4. a. What is MOSFET? Explain D-MOSFET and E-MOSFET transfer characteristics. (08 Marks)
- b. Describe the operation of a CMOS inverter. (06 Marks)
- c. Illustrate with diagram the operations of SCR using 2-transistor equivalent circuit. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain the working of Opamp non-inverting amplifier and obtain the expression for its voltage gain. (08 Marks)
- b. Define the following terms:
- i) Common mode gain
 - ii) CMRR
 - iii) Slew rate. (06 Marks)
- c. Find the output (V_o) voltage of the following op amp circuit. (06 Marks)

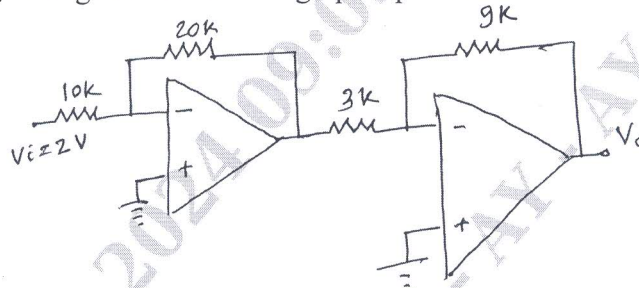


Fig.Q.5(c)

OR

- 6 a. Derive the output voltage for three input inverter summer circuit. (08 Marks)
- b. Explain the working of integrator and derive the expression for its output voltage. (06 Marks)
- c. Construct an adder circuit using op-amp to give the output voltage $V_o = -(4V_1 + 6V_2 + 5V_3)$ (06 Marks)

Module-4

- 7 a. Define amplifier. Explain with neat circuit diagram and necessary equation how the transistor acts as a amplifier. (08 Marks)
- b. Construct an electronic switch using transistor and explain its operation with necessary equation. (06 Marks)
- c. Explain the Barkhausen's criteria to build oscillations. (06 Marks)

OR

- 8 a. Define feedback amplifier. Derive the expression for voltage gain (A_f) for voltage series feedback amplifier with relevant diagram. (06 Marks)
- b. Illustrate the operation of RC phase shift oscillator with neat circuit diagram and relevant equation. (08 Marks)
- c. Explain with neat diagram the astable operation of IC555 timer. (06 Marks)

Module-5

- 9 a. Solve the following:
- i) $(7354)_{10} = (?)_{16} = (?)_2$
 - ii) $(FA27E)_{16} = (?)_2 = (?)_8$ (06 Marks)
- b. State and prove Demorgan's theorem using two variables. (08 Marks)
- c. Construct full adder using two half adders with relevant Boolean expressions. (06 Marks)

OR

- 10 a. What is decoder? Explain the working of 3:8 decoder with neat diagram. (06 Marks)
- b. Illustrate the working of a clocked SR flipflop with logic diagram and truth table. (08 Marks)
- c. Explain the GSM system with neat block diagram. (06 Marks)
