USN

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 (Vi) in which zener diode as shown below conducts.
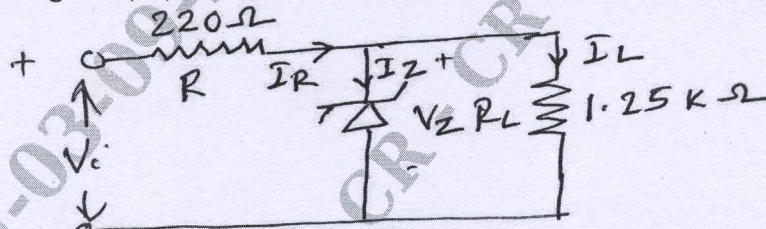
$V_Z = 20V$, $P_{Z(max)} = 1200 mV$

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 = 20Ω. By assuming V_f = 0.3V, calculate 'I_f' for i) r_d = 0   ii) r_d = 0.5Ω. **(06 Marks)**
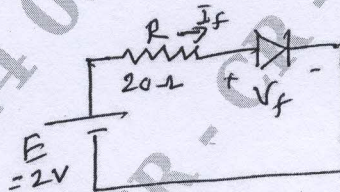

Fig.Q.2(c)

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)**

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 (Vo) voltage of the following op amp circuit. (06 Marks)
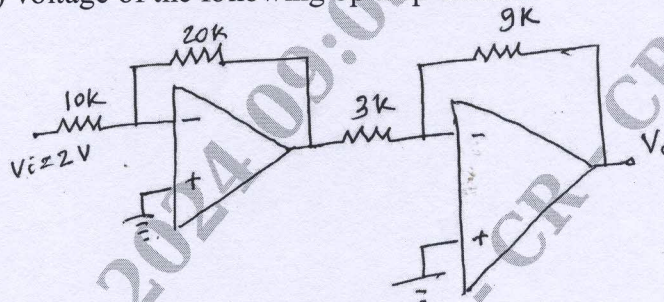

Fig.Q.5(c)

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
$V_0 = -(4V_1 + 6V_2 + 5V_3)$ (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) $(FA27E) = (?)_2 = (?)_8$ (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)

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