CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18ELN14/24**

First/Second Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. With a circuit diagram and waveform, explain the working of center tap full wave rectifier. Show that the efficiency of full wave rectifier = 81%. **(08 Marks)**

b. For the circuit shown in Fig. Q1 (b), find the currents and voltages in the circuit for $R_L = 450\ \Omega$. Assume $V_z = 10\,V$. **(08 Marks)**
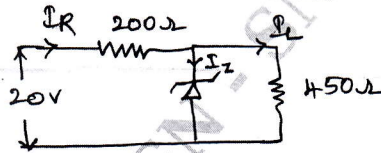

Fig. Q1 (b)

c. Explain the working of photo diode. **(04 Marks)**

OR

2 a. Explain the VI characteristics of PN junction diode (both forward and reverse). **(08 Marks)**

b. A half wave rectifier uses a diode whose internal resistance is 30 Ω to supply power to 1.1 KΩ load from 110 V (rms) source of supply. Calculate
(i) DC load voltage   (ii) DC load current   (iii) Percentage regulation **(06 Marks)**

c. Explain the working of Light emitting diode. **(06 Marks)**

Module-2

3 a. With a neat diagram, explain the construction and characteristics of n-channel JFET. **(10 Marks)**

b. With a neat diagram, explain the operation and characteristics of enhancement type n-channel MOSFET. **(10 Marks)**

OR

4 a. Explain the VI characteristics of SCR. **(10 Marks)**

b. Compare BJT and FET. **(05 Marks)**

c. Define Latching (I_L) and Holding current (I_H) with respect to SCR. **(05 Marks)**

Module-3

5 a. Write ideal characteristics of op-amp. **(08 Marks)**

b. Derive the output voltage for the following :
(i) Differentiator   (ii) Voltage follower **(08 Marks)**

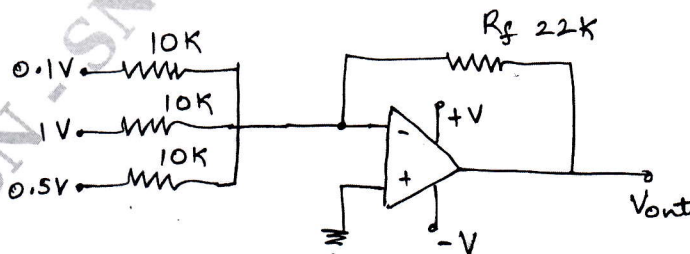c. Fig. Q5 (c) shows circuit of Summing amplifier. Determine the value of output voltage for this circuit. **(04 Marks)**

Fig. Q5 (c)

OR

6 a. Explain the following terms related to opamp (i) CMRR   (ii) Gain bandwidth product.
      (04 Marks)

   b. For a circuit shown in Fig. 6 (b), determine the output voltage V_{01} and V_{02}. Write function of each op amp.
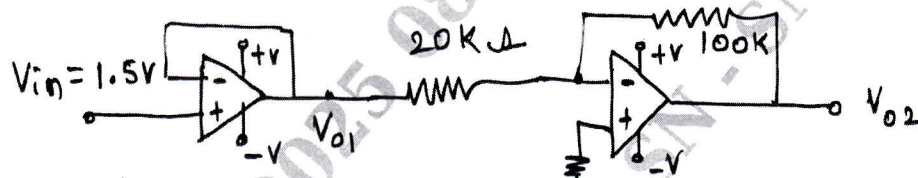   **(06 Marks)**

Fig. Q6 (b)

   c. Derive the output voltages of inverting amplifier and integrator.   **(10 Marks)**

Module-4

7 a. Explain the operation of BJT as amplifier.   **(06 Marks)**
   b. Explain Barkhausen's criteria for sustained oscillations.   **(06 Marks)**
   c. Explain the working of Astable multivibrator constructed using IC-555 timer.   **(08 Marks)**

OR

8 a. Define feedback amplifier. Mention the ways of connecting the feedback signal.   **(06 Marks)**
   b. Explain the operation of transistor switch circuit to switch ON/OFF an LED.   **(06 Marks)**
   c. Define an oscillator. With necessary equations, explain the working of Wein Bridge Oscillator.   **(08 Marks)**

Module-5

9 a. Perform the following :
      (i)   Convert $(398)_{10} = (?)_b = (?)_8 = (?)_{16}$
      (ii) Subtract $(1111)_2 - (1100)_2$ using 1's complement.   **(05 Marks)**
   b. Realize basic gates using NAND gate.   **(05 Marks)**
   c. Explain the working of 4 : 1 multiplexer.   **(05 Marks)**
   d. With a block diagram, explain communication system.   **(05 Marks)**

OR

10 a. Design full adder using three variables and implement it using two half adders.   **(08 Marks)**
   b. Simplify the following Boolean expression and implement using basic gates :
      (i) $y = \overline{a(b+c)} + \overline{a}b + \overline{c(a+b)}$
      (ii) $y = \overline{(A+B+C)}(A+B+C)$ **(06 Marks)**

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

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