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17ELN15/25

First/Second Semester B.E. Degree Examination, Jan./Feb. 2023
Basic Electronics

Time: 3 hrs. Max. Marks: 100

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

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-1

1 a. Explain the operation of pn junction diode under forward and reverse bias condition. **(07 Marks)**

b. A sinusoidal wave of $v = 600 \sin 314t$ is applied to a halfwave rectifier. The $R_L = 2\ K\Omega$ and $R_F = 60\ \Omega$, find: (i) I_{dc} (ii) I_{rms} (iii) V_{dc} (iv) Efficiency η **(05 Marks)**

c. Draw common emitter circuit. Sketch the input and output characteristics and briefly explain the three regions of operation. **(08 Marks)**

OR

2 a. With neat circuit diagram and waveforms, explain the working of full wave bridge rectifier. **(08 Marks)**

b. Explain how Zener diode can be used as voltage regulator. **(07 Marks)**

c. Obtain the relationship between α_{dc} and β_{dc}. Calculate I_C, I_E and β_{dc} for a transistor that has $\alpha_{dc} = 0.9$ and $I_B = 50\ \mu A$. **(05 Marks)**

Module-2

3 a. With neat circuit diagram, explain the operation of base bias circuit with necessary equations. **(08 Marks)**

b. What is op-amp? List the characteristics of an ideal op-amp. **(06 Marks)**

c. For the circuit shown in Fig.Q3(c), find the output voltage V_0.

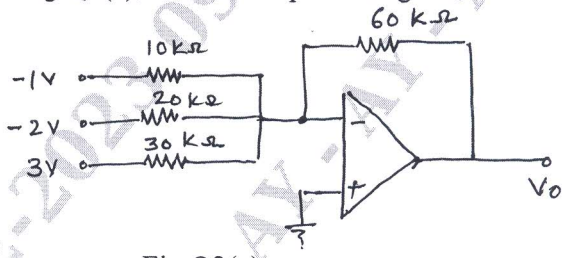

Fig.Q3(c) **(06 Marks)**

OR

4 a. In the circuit shown in Fig.Q4(a), a silicon transistor with $V_{BE} = 0.7$ V, $\beta = 50$ is used. Draw the DC load line and mark Q point.

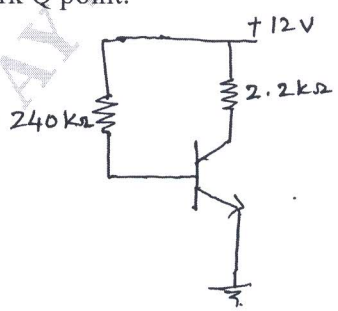

Fig.Q4(a) **(07 Marks)**

b. Explain how op-amp can be used as an integrator. Derive the expression for output voltage. **(07 Marks)**

c. Draw and write output voltage expression for following circuits using op-amp:
(i) Inverting amplifier (ii) Voltage follower (iii) Differentiator **(06 Marks)**

Module-3

5 a. Perform the following:
(i) $(37)_{10} = (?)_2 = (?)_8$
(ii) $(10110101001.101101)_2 = (?)_{16} = (?)_{10}$ **(08 Marks)**

b. Subtract $(101011)_2$ from $(111001)_2$ using 1's and 2's complements. **(06 Marks)**

c. Simplify and realize using basic gates $Y = \overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$. **(06 Marks)**

OR

6 a. State and prove De Morgan's theorems. **(06 Marks)**

b. Simplify the following Boolean functions:
(i) $Y = B(A + C) + C$ (ii) $Y = (A + B)\,BC + A$ **(06 Marks)**

c. Realize full adder circuit. Write truth table and expression for sum and carry. **(08 Marks)**

Module-4

7 a. Explain the working of NAND Gate latch using logic diagram and truth table. **(06 Marks)**

b. Explain the working of RS flip-flop using logic diagram and truth table. **(06 Marks)**

c. With block diagram, explain the architecture of 8051 Microcontroller. **(08 Marks)**

OR

8 a. Explain the working of clocked RS flip-flop using logic diagram and truth table. **(07 Marks)**

b. Define microcontrollers. Write their important applications. **(05 Marks)**

c. With block diagram, explain microcontroller based stepper motor control system. **(08 Marks)**

Module-5

9 a. Explain the block diagram of basic communication system. **(06 Marks)**

b. Define amplitude modulation. Derive the mathematical expression for AM signal. **(08 Marks)**

c. Explain the construction and the principle of operation of LVDT. **(06 Marks)**

OR

10 a. Explain the need for modulation. **(06 Marks)**

b. Explain the principle of operation of piezoelectric transducer. **(08 Marks)**

c. Write a short note on photoelectric transducers. **(06 Marks)**

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