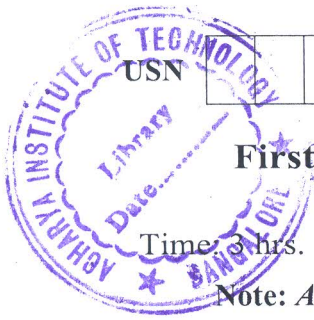


CBCS SCHEME

15ELN15/25



First/Second Semester B.E. Degree Examination, Jan./Feb.2021 Basic Electronics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- Draw and explain the V-I characteristics of a pn-junction diode. (06 Marks)
 - Draw the circuit of Bridge rectifier and explain its operation. Draw input and output waveforms. (06 Marks)
 - A transistor has $I_B = 100 \mu A$ and $I_C = 2 \text{ mA}$ find (i) β of the transistor (ii) α of the transistor (iii) Emitter current I_E (iv) If I_B changes by $+25 \mu A$ and I_C changes by $+0.6 \text{ mA}$ find the new values of β . (04 Marks)

OR

- With circuit diagram, explain the operation of Half wave rectifier with capacitor filter and draw the wave forms. (06 Marks)
 - A voltage regulator data sheet includes a load regulation of the regulator as 3 mV while its maximum load voltage is 15 V. Calculate its percentage load regulation. (04 Marks)
 - Explain the principle operation of npn-transistor. (06 Marks)

Module-2

- For the circuit diagram, shown in Fig. Q3 (a), a silicon transistor with $\beta = 50$ is used. Draw the d.c. loadline and determine the operating point. (06 Marks)

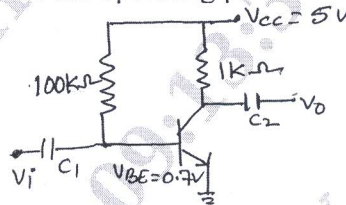


Fig. Q3 (a)

- List the various ideal op-amp characteristics. (04 Marks)
 - Draw an inverting summer amplifier circuit and obtain an expression for the output voltage. (06 Marks)

OR

- Define biasing of a transistor. Draw and explain the base bias transistor circuit. (06 Marks)
 - Draw the internal block diagram of op-amp and explain individual blocks. (06 Marks)
 - A sinusoidal signal with peak value of 6 mV and 2 kHz frequency is applied to the input of an ideal op-amp integrator with $R_1 = 100 \text{ K}\Omega$ and $C = 1 \mu F$. Find the output voltage. (04 Marks)

Module-3

- Convert $(725.25)_8$ to its decimal and binary equivalent. (04 Marks)
 - Convert $[101010111100]_2 = (?)_8 = (?)_{16}$ (04 Marks)
 - Perform $(15)_{10} - (28)_{10}$ using 1^s and 2^s complement representation. (04 Marks)
 - Simplify the following Boolean function,
 - $AB + \overline{AC} + \overline{ABC}(AB + C)$ (04 Marks)
 - $\overline{\overline{AB} + ABC + A(B + \overline{AB})}$ (04 Marks)
 - Draw the logic diagram and truth table of Half adder using NAND gate. (04 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.

OR

- 6 a. Convert : (i) $(284.65)_{10} = (?)_8 = (?)_{16}$ (ii) Perform $(28)_{10} - (19)_{10}$ using 2's complement representation. (04 Marks)
- b. State and prove De-Morgan's theorems. (04 Marks)
- c. Implement full adder using two half adders and one OR gate. Write the equations for sum and carry along with truth table. (08 Marks)

Module-4

- 7 a. Explain the working of NOR gate, latch with relevant circuit and truth table. (06 Marks)
- b. Explain the architecture of 8051 microcontroller. (10 Marks)

OR

- 8 a. List the difference between latches and flip-flops. (04 Marks)
- b. Explain the working of clocked RS Flip-Flop with suitable logic diagram and truth table, using NAND gate. (04 Marks)
- c. With a neat diagram, explain the operation of microcontroller based stepper motor control system. (08 Marks)

Module-5

- 9 a. What is amplitude modulation? Derive the expression for AM wave and draw the waveforms. (08 Marks)
- b. Explain the construction and principle operation of LVDT. (08 Marks)

OR

- 10 a. Give the comparison between FM and AM. (04 Marks)
- b. FM signal is given by,
 $V(t) = 10 \sin(8 \times 10^9 t + 4 \sin 1500t)$
 Find (i) Carrier frequency (ii) Modulation frequency
 (iii) Frequency deviation and (iv) Modulation index. (04 Marks)
- c. Define transducer. Compare active and passive transducers. (04 Marks)
- d. What is thermistor? Briefly explain the working of thermistor. (04 Marks)
