CBCS SCHEME

USN | | | | | | | | | |

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

1 a. Draw and explain the V-I characteristics of a pn-junction diode. **(06 Marks)**

b. Draw the circuit of Bridge rectifier and explain its operation. Draw input and output waveforms. **(06 Marks)**

c. A transistor has $I_B = 100\,\mu A$ and $I_C = 2$ mA find (i) β of the transistor (ii) α of the transistor (iii) Emitter current I_E (iv) If I_B changes by +25 μA and I_C changes by +0.6 mA find the new values of β. **(04 Marks)**

OR

2 a. With circuit diagram, explain the operation of Half wave rectifier with capacitor filter and draw the wave forms. **(06 Marks)**

b. 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)**

c. Explain the principle operation of npn-transistor. **(06 Marks)**

Module-2

3 a. 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)**

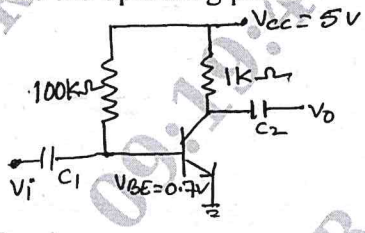

Fig. Q3 (a)

b. List the various ideal op-amp characteristics. **(04 Marks)**

c. Draw an inverting summer amplifier circuit and obtain an expression for the output voltage. **(06 Marks)**

OR

4 a. Define biasing of a transistor. Draw and explain the base bias transistor circuit. **(06 Marks)**

b. Draw the internal block diagram of op-amp and explain individual blocks. **(06 Marks)**

c. 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 $R_1 = 100$ KΩ and C = 1 μF. Find the output voltage. **(04 Marks)**

Module-3

5 a. (i) Convert $(725.25)_8$ to its decimal and binary equivalent.
(ii) Convert $[101010111100]_2 = (\,?\,)_8 = (\,?\,)_{16}$ **(04 Marks)**

b. Perform $(15)_{10} - (28)_{10}$ using 1^s and 2^s complement representation. **(04 Marks)**

c. Simplify the following Boolean function,

(i) $\overline{AB + \overline{AC} + A\bar{B}C(AB + C)}$

(ii) $\overline{A\bar{B} + ABC + A(B + A\bar{B})}$ **(04 Marks)**

d. Draw the logic diagram and truth table of Half adder using NAND gate. **(04 Marks)**

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-Morgon'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 latchs 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 comparision between FM and AM. **(04 Marks)**

b. FM signal is given by,

$$V(t) = 10\sin\left(8\times10^9 t + 4\sin 1500t\right)$$

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)**

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