

CBCS SCHEME

15ELN15/25



First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 Basic Electronics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- What is Rectifier? Explain the operation of full wave rectifier, with neat circuit and waveform. (06 Marks)
 - Explain the operation of npn transistor. (04 Marks)
 - A half wave rectifier circuit is supplied from secondary transform voltage of 108.423V to a resistive load of 10K Ω . The diode forward resistance is 10 Ω . Calculate the maximum, average, RMS value of current, DC output voltage, efficiency of transformer. (06 Marks)

OR

- Explain the input and output characteristics of npn transistor in Common Base Mode. (06 Marks)
 - Draw the V-I characteristics of Si and Ge diode. (04 Marks)
 - Establish the relationship between α and β . Also calculate β , α and I_E of the transistor, when $I_B = 100\mu A$ and $I_C = 2mA$. Find new value of B when I_B changes by +25 μA and I_C by 0.6mA. (06 Marks)

Module-2

- Define the following and derive the expression for its output voltage
i) Differentiator ii) Integrator. (06 Marks)
 - List the ideal characteristics of Op - amp. (04 Marks)
 - Calculate the minimum and maximum values of I_C and V_{CE} for the voltage divider bias circuit when $h_{fc(max)} = 60$ and $h_{fc(min)} = 50$. For circuit $V_{CC} = 12V$, $R_1 = 10K$, $R_2 = 2K$, $R_E = 470\Omega$ and $R_C = 2K$. Assume Silicon transistor. (06 Marks)

OR

- For the circuit diagram shown in fig. Q4(a), Si transistor with $\beta = 50$ is used. Draw dc load line and determine the operating point. (08 Marks)

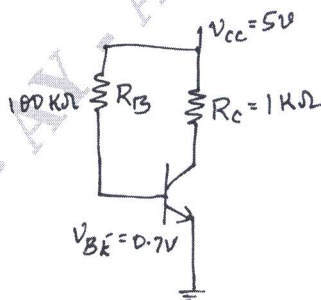


Fig.Q4(a)

- Draw inverting summing amplifier circuit and obtain an expression for the output voltage. (06 Marks)
- Find the gain and output voltage for a non - inverting amplifier using Op - amp when input voltage is i) 0.5V ii) -3V. (02 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.

Module-3

- 5 a. State and prove De Morgan's Theorem for 3-variables. (04 Marks)
 b. Realize the following expression using only NAND gates
 $f = (A + \overline{B} + C) (\overline{A} + B + C)$. (04 Marks)
 c. Explain full adder and implement full adder using two half adder and an OR gate. (08 Marks)

OR

- 6 a. Perform Binary subtraction using 1's and 2's complement method for the following :
 i) $15 - 13$ ii) $28 - 19$. (08 Marks)
 b. Convert the following : i) $(12.125)_{10} = (?)_2$ ii) $(10AB)_{16} = (?)_2$
 iii) $(101010111100)_2 = (?)_{16}$ iv) $(57.6)_8 = (?)_2$. (04 Marks)
 c. Realize OR and AND gates using only NAND gates and using only NOR gates. (04 Marks)

Module-4

- 7 a. Explain NOR gate latch. (04 Marks)
 b. With neat block diagram, explain the architecture of micro controller. (08 Marks)
 c. Explain the working of clocked RS flip flop. (04 Marks)

OR

- 8 a. List the difference between Microcontroller and Microprocessor. (04 Marks)
 b. With neat block diagram, explain the interfacing of stepper motor to 8051 microcontroller. (08 Marks)
 c. Explain NAND gate latch. (04 Marks)

Module-5

- 9 a. Explain the need for modulation. (04 Marks)
 b. An audio frequency signal $10 \sin 2\pi 500t$ is used to amplitude modulate a carrier of $50 \sin 2\pi 10^5$. Calculate i) Modulation index ii) Side band frequencies
 iii) Amplitude of each side band iv) Bandwidth required
 v) Total power delivered to the load 600Ω vi) Transmission efficiency. (06 Marks)
 c. Give the comparison between FM and AM. (06 Marks)

OR

- 10 a. Explain the working of Envelope detector. (04 Marks)
 b. Define Modulation index in terms of E_{\max} and E_{\min} . (06 Marks)
 c. Write short note on :
 i) Resistive transducer ii) Peltier effect iii) Seebeck effect. (06 Marks)

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