CBCS SCHEME

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18MT35

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
Analog and Digital Electronics

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain the operation of P-N junction diode under.
i) Reverse bias condition ii) Forward bias condition. **(06 Marks)**

b. Explain double ended shunt clippers with neat diagram and waveforms. **(06 Marks)**

c. Explain with neat diagram and frequency response, the working of RC coupled BJT amplifier. **(08 Marks)**

OR

2 a. Explain first order low pass Butter worth filter and derive the gain and phase angle equations. **(08 Marks)**

b. Design a second order low pass filter for a cut-off frequency of 100Hz and draw the circuit diagram. **(06 Marks)**

c. Explain the operation of wide band pass filter. **(06 Marks)**

Module-2

3 a. Compare RC phase shift oscillator with wein bridge oscillator. **(06 Marks)**

b. Using a 741 op-amp with a supply of ±12V, design a RC phase shift oscillator to generate a sinusoidal output of $f_0 = 100Hz$. **(06 Marks)**

c. Explain the working of wein bridge oscillator with the help of circuit diagram, waveforms and equations. **(08 Marks)**

OR

4 a. With a neat circuit diagram and waveforms, explain the operation of inverting Schmitt trigger circuit. **(08 Marks)**

b. Design the capacitor coupled zero crossing detector using op-amp 741 having $I_{B(max)} = 500nA$ and minimum signal frequency in 500Hz. The supply voltages are ±12V. **(08 Marks)**

c. Write a note on voltage level detector. **(04 Marks)**

Module-3

5 a. Explain the functions of each pin in 555 timer. **(10 Marks)**

b. With a neat diagram and waveforms explain working of monostable multivibrator and also derive the expression for pulse width. **(10 Marks)**

OR

6 a. Explain how an Astable multivibrator can be used as square wave generator with necessary circuit and waveforms. **(06 Marks)**

b. Compare monostable multivibrator and astable multivibrator. **(06 Marks)**

c. Design the astable multivibrator using 555 for a frequency of 1kHz and duty cycle of 70% use C = 0.1μF. **(08 Marks)**

Module-4

7 a. Reduce the following functions using K-map technique:
   i) $G = f(A, B, C, D) = \pi M(0, 2, 3, 8, 9, 12, 13, 15)$
   ii) $P = f(r, s, t, u) = \sum(1, 3, 4, 6, 9, 11, 12, 14)$. **(08 Marks)**

b. Design full adder using two half address. **(06 Marks)**

c. Implement the following Boolean function using 4:1 Mux
   $f(A, B, C, D) = \sum m(0, 1, 2, 4, 6, 9, 12, 14)$. **(06 Marks)**

OR

8 a. Draw the circuit for 3 to 8 line decoder and explain. **(08 Marks)**

b. Realize the following Boolean expression using the 3:8 decoder:
   $F_1(A, B, C) = \sum m(1, 2, 3, 4)$
   $F_2(A, B, C) = \sum m(3, 5, 7)$. **(04 Marks)**

c. With a neat diagram, explain the octal to binary encoder. **(08 Marks)**

Module-5

9 a. Explain the working of JK flip-flop. Write its truth table, state diagram and excitation table. **(10 Marks)**

b. Draw the logic truth table and timing diagram of positive edge triggered D – flip flop. **(10 Marks)**

OR

10 a. Explain 3-bit synchronous binary counter. **(10 Marks)**

b. Differentiate between combinational circuit and sequential circuit. **(05 Marks)**

c. Differentiate between asynchronous counters and synchronous counters. **(05 Marks)**

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