

# CBCS SCHEME

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15MT35

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024

## Analog and Digital Electronics

Time: 3 hrs.

Max. Marks : 80

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

### Module-1

- Explain the V-I characteristics of an Ideal diode, silicon diode, Germanium diode and zener diode. (08 Marks)
  - Explain junction diode models with necessary equivalent circuits. (08 Marks)

OR

- Explain, with diagrams, how a pn-junction diode can be used as a switch. (06 Marks)
  - Explain how the capacitor filter reduces the ripple in rectifier circuit. (06 Marks)
  - The input voltage of centre tapped full wave rectifier is 10V(rms). The sum of the dc resistance of the transformer winding and forward dc resistance of the diode is  $R_s = 0.2\Omega$ , the load resistance  $R_L = 10\Omega$  and forward diode drop  $V_D = 0.7V$ ,  
Find:
    - Peak load current
    - DC load current.
    - Individual diode dc current.
    - DC output voltage.
    - PIV. (04 Marks)

### Module-2

- Explain first order low pass Butterworth filter and derive the gain and phase angle equations. (08 Marks)
  - Design a wide band pass filter with  $f_L = 200\text{Hz}$ ,  $f_H = 1\text{KHz}$ ,
    - passband gain = 4
    - draw the frequency response of the filter
    - calculate the value of Q for the filter. (08 Marks)

OR

- Explain second order high pass Butterworth filter with necessary circuit diagram and equations. (04 Marks)
  - Design Wein bridge oscillator for the Fig.Q4(b) below so that  $f_0 = 965\text{Hz}$ . (04 Marks)

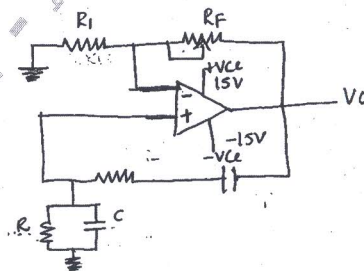


Fig.Q4(b)

- State Backhausen criterion for sustained oscillations and explain phase shift oscillator with necessary circuit and equations. (08 Marks)



**Module-3**

- 5 a. Explain op-amp as a basic comparator and mention characteristics of a comparator. (08 Marks)  
b. Explain inverting Schmitt trigger with circuit, waveforms and necessary equations for LTP, UTP and hysteresis. (08 Marks)

**OR**

- 6 a. Explain 555 timer operation with block diagram and 8 pins. (Pinout diagram) (08 Marks)  
b. Describe an Astable multivibrator with circuit using 555 timer IC, waveforms and necessary equations. (08 Marks)

**Module-4**

- 7 a. Draw Rs latch with NAND and NOR gate circuit. (04 Marks)  
b. Explain clocked master-slave JK flip-flop with necessary logic circuit. (06 Marks)  
c. Explain bi-directional shift register with parallel load. (06 Marks)

**OR**

- 8 a. Explain 3-bit synchronous – Binary up-down counter. (08 Marks)  
b. Explain how read and write information transfer takes place in magnetic core-memory. (08 Marks)

**Module-5**

- 9 a. What is multiplexer? Realize 4 : 1 multiplexer using basic gates and write its truth table. (08 Marks)  
b. Explain the operation of R-2R DAC. And also derive the expression of output voltage. (08 Marks)

**OR**

- 10 a. What is decoder? Realize 2 to 4 line decoder using basic gates and write its truth table. (08 Marks)  
b. Explain the operation of a successive approximation ADC. (08 Marks)

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