

YASHWANTRAO CHAVAN COLLEGE OF SCIENCE, KARAD

Department of Physics

B. Sc. III

Paper XII: Digital & Analog Circuits and Instrumentation

Question Bank

Unit-I

1. Digital Electronics

1. Give logic symbol and truth table of OR, AND, NAND and NOR gates.
2. Why NOR gate is called universal gate?
3. Give logic symbol and truth table of NOR, NAND, XOR and XNOR gates.
4. State and prove De-Morgan's theorems.
5. Explain R-S flip-flop using NAND/NOR gates.
6. Explains construction and working of J-K flip-flop.
7. Explain half adder circuit.
8. Explain full adder circuit.

2. Transistor Amplifier

1. Explain DC and AC equivalent circuit for Common Emitter amplifier.
2. Explain the frequency response curve of an amplifier. What is the effect of negative feedback on gain response curve?
3. Explain the operation of a common emitter transistor amplifier with neat diagram.
4. Explain how will you draw DC load line on the output characteristics of a transistor?

3. Sinusoidal Oscillator

1. Explain theory of feedback oscillator. Discuss different cases
2. What is an oscillator? Explain the difference between amplifier and oscillator.
3. Explain positive and negative feedback in amplifier and state its advantages
4. Explain different types of waveforms in oscillator
5. With suitable diagram, explain the nature of oscillations for tank circuit and expression for frequency
6. With a neat diagram explain the action/working of Hartley oscillator

7. With a neat diagram explain the action of Colpitt's oscillator
8. With a neat diagram explain the circuit operation of phase-shift oscillator
9. With a neat diagram explain the circuit operation of crystal oscillator

Unit-II

1. Operational Amplifier

1. With a neat diagram explain the working of differential amplifier.
2. Explain with neat diagram different types of differential amplifier.
3. Differentiate between normal amplifier and differential amplifier.
4. Explain the term—(a) Common-mode gain (b) Differential gain (c) CMRR.
5. Explain block diagram of operational amplifier.
6. State and explain op-amp parameters
7. Explain with neat diagram use of Op-Amp as differentiator.
8. Explain with neat diagram use of Op-Amp as inverting amplifier
9. Explain with neat diagram use of Op-Amp as non-inverting amplifier.
10. Explain with neat diagram use of Op-Amp as an adder circuit.
11. Explain with neat diagram use of Op-Amp as subtractor.

2. Timer IC555

1. Draw a block diagram of IC-555 and explain function of each block in it.
2. Give the pin configuration of IC-555 and explain the function of each pin.
3. Explain working of IC 555 as mono-stable multi-vibrator with a neat diagram and obtain expression for pulse width.
4. Explain working of IC 555 as astable multi-vibrator with a neat diagram and obtain expression for frequency. Draw different waveforms of this multi-vibrator.
5. Explain working of IC 555 as bistable multi-vibrator with a neat diagram. Draw different waveforms of this multi-vibrator.
6. Draw a block diagram of IC-555.
7. Give pin configuration of IC-555.

8. Draw a circuit diagram for astable multi-vibrator using IC-555.
9. Draw a circuit diagram IC555 bi-stable multi-vibrator.
10. Derive expression for pulse width of mono-stable multi-vibrator

3. CRO

1. Explain the working principle of CRO. Draw a neat block diagram of CRO and explain the functions of each block.
2. Give the construction of CRT and explain the functions of various components.
3. Explain in brief any three uses of CRO.
4. What are Lissajous figures? How are they produced?
5. Explain how frequency of wave form is measured using direct method?
6. Explain how frequency of waveform is measured using indirect method (Lissajous figure method)?