

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

**Note:** Attempt five questions in all. Attempt one question each from Section A, B, C & D. Section E is compulsory. All parts of the question should be answered at one place.

**SECTION A**

1. a) Define Photodiode. Explain its principle of operation, working and characteristics. (5)
- b) What is the purpose of doping in Semiconductor? Classify Semiconductors on the basis of type of doping. (5)
2. a) Define PN junction diode. Discuss the formation of depletion region in PN junction diode. (5)
- b) What do you mean by rectifier efficiency and ripple factor? Derive expression for the same in case of half wave rectifier with its circuit diagram and waveforms. (5)

**SECTION B**

3. a) Draw and explain input and output characteristics of transistor in CE configuration. (5)
- b) Explain the construction and working of N channel JFET. (5)
4. a) Explain the different biasing schemes used for transistors. (5)
- b) Describe the construction, working and characteristics of N channel enhancement MOSFET. (5)

**SECTION C**

5. a) Discuss conditions of Oscillations. Also enumerate how oscillator is different from amplifier.
- b) Draw the circuit diagram of RC phase shift oscillator. Explain its operation by deriving expression for frequency of oscillation. (5)
6. a) Describe inverting Op-Amp with its circuit diagram. Derive an expression for its voltage gain. (5)
- b) Explain the role of feedback. Derive expression for output voltage in case of non inverting Op-Amp. (5)

**Section D**

7. a) Convert,  $(786.2)_8$  in binary, decimal and hexadecimal number calculate 2's compliment of  $(101101)_2$ . (5)
- b) State and prove DeMorgan's theorem. (5)
8. a) Define CRO. Discuss the role of CRT in CRO with the help of appropriate diagram. (5)
- b) How frequency and current is measured using CRO? (5)

**SECTION E**

9. a) Define valence band and conduction band.
- b) How zener breakdown is different from avalanche breakdown?
- c) What are the characteristics of semiconductor?
- d) Draw the circuit of  $\pi$  and LC filter.
- e) Explain the concept of base width modulation.
- f) Write expression of current for FET.
- g) Define virtual ground.
- h) What are the characteristics of an ideal Opamp?
- i) Which gates come under the category of universal gates?
- j) What are the applications of CRO? (10×2=20)