

(3 Hours)

[Total Marks:80]

- N.B.**
- (1) Question no.1 is compulsory.
  - (2) Attempt any three questions from Question No. 2 to 6
  - (3) Make any suitable assumption wherever required.

- Q.1** Answer any four.
- (a) Give the working principle of Photodiode with its application 5M
  - (b) Explain the various bias compensation techniques in a BJT. 5M
  - (c) Determine the operating point parameters  $I_{CQ}$  and  $V_{CEQ}$  for the Fixed Bias circuit. 5M  
Assume  $\beta = 100$  and  $V_{BE} = 0.7V$ ,  $R_C = 3k\Omega$ ,  $R_B = 470K\Omega$ ,  $V_{CC} = 12V$ .
  - (d) Explain the Effect of negative feedback on voltage gain, input impedance, output impedance, and bandwidth. 5M
  - (e) State and Explain Barkhausen's criteria for sustained oscillations. 5M
- Q.2**
- (a) Analyze Voltage Shunt Negative feedback Amplifier with respect to Input Resistance, Output Resistance and Voltage gain. 10M
  - (b) Derive expression for voltage gain, input impedance and output impedance of a CS amplifier. 10M
- Q.3**
- (a) Draw FWR with C filter and describe the circuit operation with waveform. Compare the performance of C, L, LC filters 10M
  - (b) Explain the Colpitts Oscillator in detail with circuit diagram and equations. 10M
- Q.4**
- (a) Explain Crystal oscillator with the help of suitable diagram and waveforms. 10M
  - (b) Give the DC and AC analysis of Dual Input Unbalanced output differential Amplifier 10M
- Q.5**
- (a) Explain the Construction and Working of E-MOSFET with the help of its characteristics. 10M
  - (b) Explain various types of coupling and their effect on the performance of BJT. 10M
- Q.6** Write short note on following. (Any TWO) 20M
- (a) Zener Diode as voltage Regulator.
  - (b) Hartley Oscillator.
  - (c) re-model used in Transistor

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