(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   5M
       impedance, and bandwidth.

   (e)   State and Explain Barkhausen's criteria for sustained oscillations.   5M

Q.2   **(a)**   Analyze Voltage Shunt Negative feedback Amplifier with respect to Input   10M
       Resistance, Output Resistance and Voltage gain.

   (b)   Derive expression for voltage gain, input impedance and output impedance of a   10M
       CS amplifier.

Q.3   **(a)**   Draw FWR with C filter and describe the circuit operation with waveform.   10M
       Compare the performance of C, L, LC filters

   (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   10M
       Amplifier

Q.5   **(a)**   Explain the Construction and Working of E-MOSFET with the help of its   10M
       characteristics.

   (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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