(3 Hours) **[Total Marks: 80]**

N.B.: (1) Question No. 1 is **Compulsory**.
(2) Attempt any **three** questions out of the remaining **five**.
(3) Each question carries 20 marks and sub-question carry equal marks.
(4) Assume suitable data if required.

Q.1 Solve any **Four** from the following --- (20)
A) Describe the miller effect and miller capacitance.
B) Draw the circuit diagram of the MOSFET differential amplifier with active load and explain its operation.
C) Derive expression of voltage gain for Inverting amplifier.
D) Draw circuit diagram of current to voltage converter and explain its operation.
E) Draw block diagram and explain the operation of Switching regulator.

Q.2 A) Draw the circuit diagram of basic MOSFET amplifier. Derive the equations to plot DC transfer characteristics. Sketch its DC transfer characteristics. (10)
B) For an n channel MOSFET,the parameters are:Kn = 0.2 milliampere /Square volts, V_{TN} = 1 Volts,Cgd = 0.2 microfarad,Cgs = 0.25 picofarad.The device is biased at I_{DQ} = 0.4 milliampere.Determine the unity gain frequency. (10)

Q.3 A)Draw the circuit diagram of 3 Input averaging amplifier using OPAMP and derive the expression of its output voltage. (10)
B)Design RC phase shift oscillator for f = 200 Hz. (10)

Q.4 A)Draw internal block diagram of IC 555 and explain its operation. List specifications of IC 555 (10)
B) Compare voltage series,voltage shunt,current series and current shunt feedback Amplifiers (10)

Q.5A)With neat circuit diagram and waveforms ,explain operation of astable multivibrator using IC 555. (10)
B)State and explain operation and applications of zero crossing detector. (10)

Q6. A) Draw circuit diagram and explain the operation of two stage MOSFET amplifier. Sketch its frequency response . (10)
B) Define following parameters of OPAMP and state is ideal and practical value for IC 741. (10)
i)Input offset current.
i)CMRR .
iii)Slew rate.
iv)Output Resistance
v)Input bias current.

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