(Time: 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) Explain purpose of plotting frequency response of the amplifier. Sketch frequency response of RC coupled amplifier and Define low, mid and high frequency regions and Bandwidth.

B) Draw the circuit diagram of the MOSFET differential amplifier with active load and explain its operation.

C) Explain function of level shifter stage in OPAMP. Which circuit is used as level shifter in OPAMP.

D) Draw circuit diagram of Voltage to Current converter. State and explain one application of this circuit.

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) Determine unity gain bandwidth (f T) for the n channel MOSFET with parameters. **(10)**

Kn = 0.25 mA/square volts, V TN = 1.2 Volts, Cgd = 0.04 pf, Cgs = 0.2 pf, VGS = 3 Volts.

Q.3 A) Draw the circuit diagram of 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 positive and negative feedback. Draw the circuit of voltage series amplifier and explain its operation. **(10)**

Q.5 A) With neat circuit diagram explain one application each of astable and monostable multivibrator. **(10)**

B) Draw the circuit diagram and explain the operation of Zero crossing detector. **(10)**

Q.6 A) Draw and explain high frequency equivalent circuit of MOSFET amplifier. **(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) Differential mode gain
v) Power supply rejection ratio
