ANALOG ELECTRONICS - I **Q. P. Code: 24888**

Duration: 3hours **Maximum Marks: 80**

N.B.: (1) Question **No. 1 is compulsory**.

(2) Solve any **three** questions from the **remaining five.**

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 Attempt any 5 questions [20]

a) Write down current equation of diode and explain significance of each parameter.

b) Calculate I_B, I_C and V_{CE} for the common emitter circuit shown in Fig. 1b

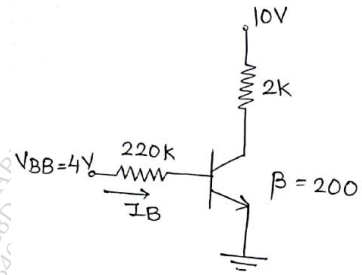

Fig. 1b

c) Explain effect of temperature on JFET and derive equation for zero temperature drift.

d) Compare CE, CB and CC configuration.

e) Draw small signal hybrid pi model of BJT including early effect.

f) Why LC oscillators are preferred for high frequency applications?

Q.2 a) Draw the output waveform for the clipper and clamper circuit shown in Fig 2a and 2b. [10]

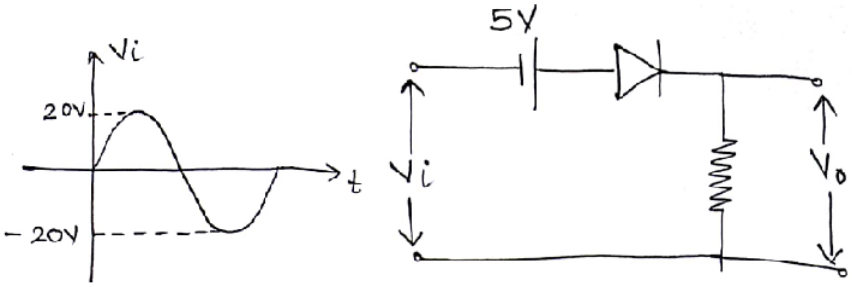

Fig. 2a

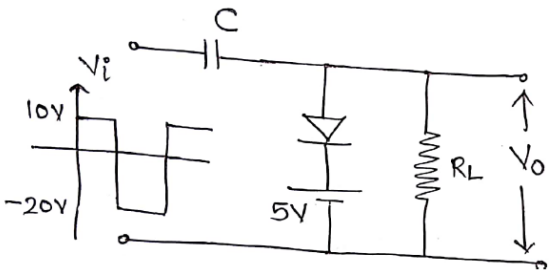

Fig. 2b

b) Derive the expression for frequency of oscillation for a transistorized (BJT) RC phase shift oscillator. [10]

Q.3 a) Find I_{CQ} and V_{CEQ} for the circuit shown in Fig 3a if $\beta = 100$. [10]

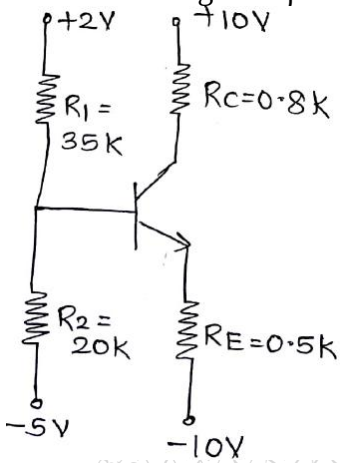

Fig. 3a

b) Explain the construction and characteristics of N-channel Enhancement MOSFET. Draw transfer and drain characteristics. [10]

Q.4 a) For the circuit shown in Fig, 4a, determine V_{GSQ} and V_{DSQ}. Also calculate voltage gain, input impedance and output impedance. [10]

$V_{TN} = 1V$, $K_N = 0.5\ mA/V^2$, $\lambda = 0.01V^{-1}$.

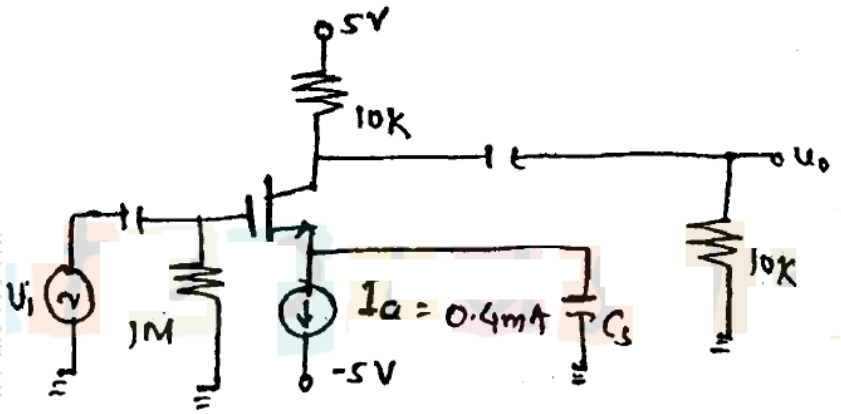

Fig.4a

b) Find I_{DQ}, V_{GSQ}, V_{DSQ} , V_D and V_S for the circuit shown in Fig 4b. [10]

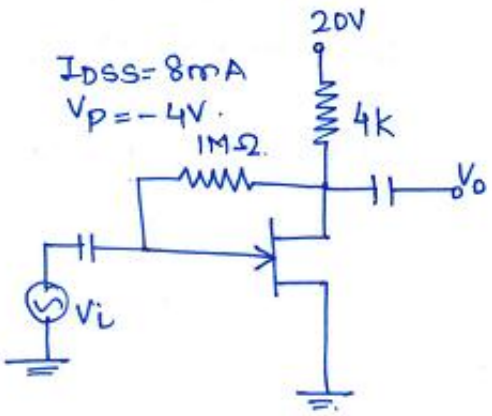

Fig. 4b

Q.5 a) For the circuit shown below in Fig.5b, the transistor parameters are $V_{BE\,(on)} = 0.7$ V, [10]
$\beta = 100$ and $V_A = \infty$. Determine Z_i, Z_o and A_V

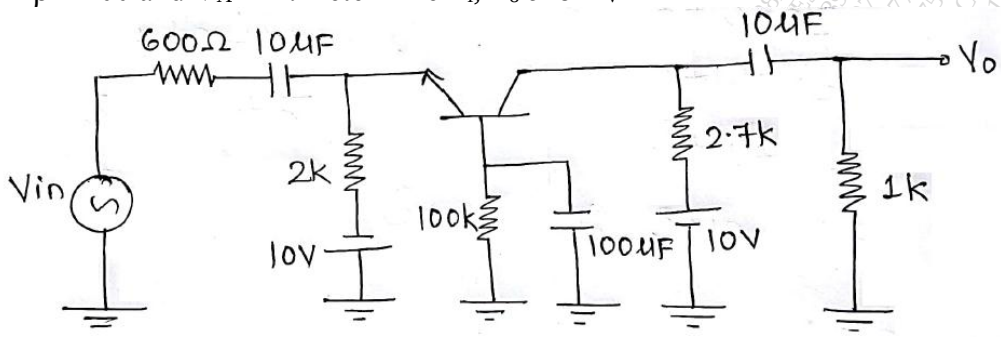

Fig. 5a

b) Draw and explain energy band diagram of MOS capacitor in accumulation, depletion and inversion region. [10]

Q.6 Short notes on: (Attempt any four) [20]

a) Construction and operation of varactor diode
b) Crystal oscillator
c) Transistor as a switch
d) Emitter follower.
e) Regions of operation of FET