Department of Electronics & Communication Engineering

(Faculty of Technology, Dharmsinh Desai University, Nadiad)

Academic Year: 2022 - 2023

TUTORIAL – 10

Subject : *PHYSICS (Module-5 & 6)*
Class : *B. Tech. Sem.II (EC/IT)*

Q.1 Select the most appropriate option.

(1) An oscillator always needs an amplifier with _____
(I) Negative feedback (II) Positive feedback (III) Both types of feedback
(IV) No feedback required

(2) The voltage that starts an oscillator is caused by _____
(I) Ripple from the power supply
(II) Thermal noise voltage in electronic component
(III) The input signal from a generator
(IV) Positive feedback

(3) For oscillations to start in a circuit, the loop gain must be greater than 1 when the phase shift around the loop is _____
(I) 90° (II) 180° (III) 270° (IV) 360°

(4) A D-MOSFET can operate in the _____
(I) Depletion-mode only (II) Enhancement-mode only
(III) Depletion-mode or enhancement-mode (IV) Low-impedance mode

(5) The voltage that turns on an Enhancement- MOSFET device is the _____
(I) Gate-source cutoff voltage (II) Pinchoff voltage
(III) Threshold voltage (IV) Knee voltage

(6) MOSFET is _____ controlled constant _____ source.
(I) current, current (II) voltage, current
(III) current, voltage (IV) voltage, voltage

Q.2 Do as Directed (Descriptive Answers, Examples etc)

(1) State the criteria(s) to build up the oscillations in the oscillator circuit.

(2) Draw the block diagram of oscillator and explain working of the same in brief.

(3) An n-channel D-MOSFET has the specifications $V_{GS(off)} = -2$ V and $I_{DSS} = 4$ mA. Given V_{GS} values of - 0.5 V, - 1.0 V, -1.5 V, + 0.5 V, + 1.0 V, and + 1.5 V, determine I_D .

(4) Calculate $R_{DS(ON)}$ for the E-MOSFET having $V_{DS(on)} = 0.25$ V and $I_{D(ON)} = 45$ mA.

(5) An E-MOSFET has $R_{DS(on)} = 2\ \Omega$ when $V_{GS(on)} = 3$ V and $I_{D(on)} = 500$ mA. If it is biased in the ohmic region, what is the voltage across it for each of these drain currents:
(a) $I_{D(sat)} = 25$ mA (b) $I_{D(sat)} = 50$ mA (c) $I_{D(sat)} = 100$ mA (d) $I_{D(sat)} = 200$