

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2019 - 20 Examination

Semester: 3
Subject Code: 203107201
Subject Name: Electronic Devices

Date: 25/11/2019
Time: 2:00pm to 4:30pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1. Two terminal MOS structure is analogous with
 1. Resistor
 2. Inductor
 3. Capacitor
 4. None of above
2. The gate of a D-MOSFET in enhancement mode is _____ bias.
 1. reverse
 2. forward
 3. reverse as well as forward
 4. None of the above
3. A common base configuration in BJT is analogous to common _____ configuration of a JFET
 1. Gate
 2. Drain
 3. Source
 4. None of above
4. A MESFET is called as _____ FET
 1. Many Semiconductor
 2. Metal Semiconductor
 3. Metal Oxide Semiconductor
 4. Insulated Gate
5. What is the maximum efficiency of a class A circuit with a transformer coupled connection?
 1. 90 %
 2. 78.5 %
 3. 50 %
 4. 25 %
6. The oscillators must
 1. Not have any feedback
 2. Have the positive feedback
 3. Have the negative feedback
 4. Have negative and positive feedbacks
7. Class _____ amplifiers are normally operated in a push-pull configuration in order to produce an output that is a replica of the input.
 1. A
 2. B
 3. AB
 4. C
8. In oscillator circuits the energy feedback to its input terminal from output is
 1. Always in phase with the input signal
 2. 270° out of phase with the input signal
 3. 180° out of phase with the input signal
 4. 90° out of phase with the input signal
9. The gain of an ideal oscillator is
 1. Unity
 2. Zero
 3. Infinity
 4. None of above
10. Ebers-Moll model of transistor is also known as
 1. T Model
 2. H Model
 3. Π Model
 4. None of above
11. Write the drain current equation for JFET.
12. What would be loop gain phase shift value in order to have sustained oscillation in sinusoidal oscillator?
13. Draw the Symbol : P Channel E – MOSFET
14. Draw the Symbol : P Channel D – MOSFET
15. Draw the Symbol : P Channel JFET

Q.2 Answer the following questions. (Attempt any three) **(15)**

- A) Draw the AC equivalent circuit for E-MOSFET. What is the value of constant 'k' in E-MOSFET when $V_{GS(ON)} = 8\text{ V}$, $I_{D(ON)} = 10\text{ mA}$, $V_{GS(TH)} = 2\text{ V}$.
- B) What do you mean by transistor model? Draw Ebers – Moll model. Also derive the input impedance at base using this model.
- C) Explain the construction and operation of solar cell.

D) Calculate the effective resistance seen looking into primary of a 15:1 transformer connected to a $8\ \Omega$ load. Also find what transformer turns ratio is required to match a $16\ \Omega$ speaker load so that effective load resistance seen at the primary is $10K\ \Omega$?

Q.3 A) Derive the differential equation governing a functional relationship of carrier concentration with time and distance. (07)

B) List different operating regions observed in MOS structure under externally applied electric voltage. Explain the accumulation region with cross-sectional view of MOS structure and energy band diagram (08)

OR

B) Draw the VDB circuit for N-channel D-MOSFET. List the steps to find the Q-points. (08)

Q.4 A) Explain the sustained oscillation criteria. (07)

OR

A) Draw the VDB circuit for Enhancement type MOSFET. Also find Z_i , Z_o and A_v . (07)

B) Give types Of Negative Feedback Connections & draw their Block diagrams. (08)