Question Paper Code : 326254

B.E./B.Tech. DEGREE EXAMINATIONS April/May 2024

Second Semester

Electronics and Communication Engineering

EC23231— ELECTRONIC DEVICES AND CIRCUITS

(Common to : Electronics Engineering (VLSI Design and Technology))

(Regulations 2023)

Time : Three Hours Maximum : 100 Marks

Answer ALL Questions

PART A — (10x2=20 Marks)

1. List the difference between Zener breakdown and avalanche breakdown.
2. Compare BJT and MOSFET.
3. State Miller's Theorem.
4. Calculate the transconductance of a MOSFET with parameters K =1.5 mA/V^2 and I_D=1.2 mA .
5. State the need of multistage amplifiers.
6. A parallel resonant circuit has an inductance if 150 μH and a capacitance of 100 pF. Find the resonant frequency.
7. Differentiate oscillator and amplifier.
8. What are the advantages of negative feedback?
9. List the features of power MOSFET.
10. What is Buck Boost DC – DC converter?

PART B — (5x13= 65 Marks)

11. (a) Discuss the operation of half wave rectifier and Derive the expressions for the following parameters of the half wave rectifier.
    i) DC current
    ii) RMS value of current
    iii) Efficiency
    iv) Ripple factor
    v) T.U.F

Or

(b) i) How Zener diode can be acts as a voltage regulator. (6)
ii) State the drain and transfer characteristics of Enhancement type MOSFET. (7)

12. (a) Deduce the expressions for finding the input impedance, output impedance, voltage gain and current gain of CE amplifier using hybrid model.

Or

(b) Draw the circuit diagram of a common source MOSFET amplifier. Derive the expression for its voltage gain, input resistance and output resistance.

13. (a) Summarize the common mode and differential mode analysis of differential amplifier and derive its CMRR.

Or

(b) Discuss the operation of capacitance coupled single tuned amplifier with its equivalent circuit and derive the equation for voltage gain.

14. (a) With a neat block diagram, explain the operation of following feedback amplifiers and deduce its input and output resistances.
i) Voltage series feedback amplifier. (7)
ii) Current shunt feedback amplifier. (6)

Or

(b) With neat circuit diagram, and state the working of Hartley oscillator. Derive an expression for frequency of oscillation.

15. (a) Draw the circuit of push pull class B power amplifier using transformers and explain the operation. Derive an expression for maximum efficiency.

Or

(b) Summarize the buck-boost design analysis with neat diagram.

PART C — (1x15=15 Marks)

16. (a) i) In colpitt's oscillator, the values of the inductors and capacitors in the tank circuit are L=40 mH, C_1 = 100 pF and C_2=500 pF.

1) Find the frequency of oscillation.
2) If the output voltage is 10 V , find the feedback voltage.
3) Find the minimum gain, if the frequency is changed by changing L alone.
4) Find the value of C1 for a gain of 10.
5) Also, find the new frequency of oscillation. (10)

ii) Compare LC oscillator and crystal oscillator.

Or

(b) i) Explain the operation and characteristics of UJT.
ii) Write short notes on Half wave rectifier.
