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## Question Paper Code : 70083

B.E./B.Tech DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022

Third Semester

Electrical and Electronics Engineering

EC 3301 – ELECTRON DEVICES AND CIRCUITS

(Regulations 2021)

Time : Three hours                                    Maximum : 100 marks

Answer ALL questions

PART A — (10 × 2 = 20 marks)

1. Differentiate Zener breakdown and avalanche breakdown?

2. Mention any two advantages of LED.

3. Defined early effect.

4. The transistor has $I_E$ 10 mA and $\alpha = 0.98$. Find the values of base and collector currents.

5. Compare JFET with BJT.

6. What is an emitter follower?

7. Write the role of Darlington pair.

8. Define a Common Mode Rejection Ratio for a differential amplifer (CMRR). What is the value of CMRR for ideal case?

9. State Barkhausen criterion for sustained oscillations.

10. What will happen to input and output impedance in voltage series feedback configuration?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the operation of PN junction under forward bias with its characteristics.                                               (7)

    (ii) Explain how Zener diode can act as a voltage regulator.        (6)

Or

    (b) What is meant by ripple factor in full wave Rectifier? Draw the Circuit of Full wave rectifier and brief the operation. Find the ripple factor.    (13)

12. (a) (i) Explain the drain and transfer characteristics of Enhancement type MOSFET. (6)

    (ii) Explain equivalent circuit and V-I characteristics of UJT. (7)

Or

(b) (i) Describe the operating principle of SCR with neat diagram. (6)

    (ii) List out the various types of DC biasing for BJT. Also explain the biasing circuit which gives excellent stabilization (7)

13. (a) Using low frequency h-parameter model, derive the expressions for voltage gain, current gain, input resistance and output admittance for a BJT amplifier in CE configuration. (13)

Or

(b) Derive the expression for gain of NMOS source follower along with small signal equivalent circuit. Also explain cascade NMOS amplifier. (13)

14. (a) Draw the circuit diagram and explain the working of a differential amplifier using FET. Derive the expression for different mode gain and common mode gain. (13)

Or

(b) Describe the working of class A and class C power amplifier in details with relevant diagrams. (13)

15. (a) (i) With neat diagram, explain Hartley Oscillator and derive the expression for frequency of oscillation. (7)

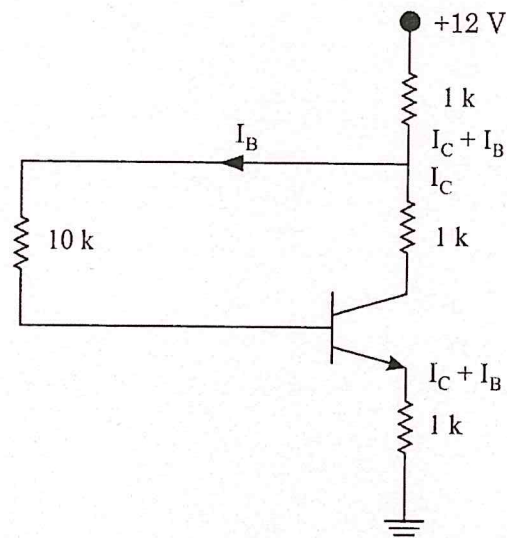    (ii) Discuss Colpitts Oscillator and obtain the expression for frequency of oscillation. (6)

Or

(b) With neat diagram explain the operation of following feedback amplifiers.

    (i) Voltage Series Feedback amplifier. (7)

    (ii) Current Shunt feedback amplifier. (6)

16.  (a)  A transistor having $\alpha = 0.99$ and VBE = 0.7V, is given in the circuit. Find the value of the collector current.                                    (15)



Or

(b)  In a centre-tap full wave rectifier the load resistance $R_L = 1k\,\Omega$. Each diode has a forward bias dynamic resistance to $10\,\Omega$. The voltage across half the secondary winding is 220sin314t. Find

(i)   the peak value of current

(ii)  the DC or average value of current

(iii) the rms value of current

(iv)  the ripple factor and

(v)   the rectification efficiency.                                        (15)

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