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**Question Paper Code : 70086**

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

Third Semester

Electronics and Communication Engineering

**EC 3353 — ELECTRONIC DEVICES AND CIRCUITS**

(Common to : Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

**PART A — (10 × 2 = 20 marks)**

1. Draw the symbol of the following devices PN Diode, Zener Diode, LED and UJT.
2. A full-wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 20 ohm. The transformer R.M.S. secondary voltage from Centre tap to each end of secondary is 50 V and load resistance is 980 ohm. Evaluate: (a) The mean load current (b) The R.M.S. value of load current
3. An amplifier operating from  $\pm 3V$  provide a 2.2V peak sine wave across a 100 ohm load when provided with a 0.2V peak sine wave as an input from which 1.0mA current is drawn. The average current in each supply is measured to be 20mA. What is the amplifier efficiency?
4. Define current amplification factor.
5. Define CMRR. Give its ideal value.
6. Which type of connection is made for cascode amplifier?
7. What is feedback amplifier and give its types?
8. State Barkhausen criterion for sustained oscillation. What will happen to the oscillation if the magnitude of the loop gain is greater than unity?
9. Calculate  $V_{B2}$ . [Figure: class AB push-pull stage,  $V_{CC} = +20V$ ;  $R_1 = 1.2k\Omega$  from  $V_{CC}$  to the base of NPN  $Q_1$ , two series diodes from  $Q_1$  base down to the base of PNP  $Q_2$ ,  $R_2 = 1.2k\Omega$  from  $Q_2$  base to ground; AC input coupled to both bases through  $C_1$  and  $C_2$ ; joined emitters drive  $R_L = 50\Omega$  through  $C_3$ ;  $Q_1$  collector to  $V_{CC}$ ,  $Q_2$  collector to ground.]
10. What is DC-DC bidirectional converter?

**PART B — (5 × 13 = 65 marks)**

11. (a) Describe the Unijunction Transistors', working theory and ways in which they differ from BJTs.

Or

- (b) How is Zener diode used as voltage regulator? Explain the working principle of Zener voltage regulator.
12. (a) Derive the equations for voltage gain, current gain, input impedance and output admittance for a BJT using low frequency h-parameter model for (i) CE configuration (ii) CB configuration and (iii) CC configuration.
- Or
- (b) (i) Give the MOSFET small signal model. (6)  
(ii) Analyse Common Source Amplifier for finding voltage gain, Input and output Impedance. (7)
13. (a) An amplifier rated at 40W output is connected to a 10 ohm speaker.
- (i) Calculate the input power required for full power output if the power gain is 25 db. (7)
- (ii) Calculate the input voltage for rated output if the amplifier voltage gain is 40 db. (6)

Or

- (b) What is differential amplifier and explain the operation in common mode and differential mode.
14. (a) Classify the feedback amplifiers and explain. What will happen to gain, input impedance, output impedance, and bandwidth for an amplifier with current series feedback.

Or

- (b) Explain pierce crystal oscillator and derive the equation for oscillation.
15. (a) In an amplifier, the output power is 1.5 watts at 2 kHz and 0.3 watt at 20 Hz, while the input power is constant at 10 mW. Calculate by how many decibels gain at 20 Hz is below that at 2 kHz?

Or

- (b) What is boost converter and buck converter? How does a buck-boost circuit work?

**PART C — (1 × 15 = 15 marks)**

16. (a) What type of feedback is required in transistor to behave as an oscillator? Describe the working of Heartley Oscillator in detail. Find the expression for frequency of oscillator.

Or

- (b) Give the circuit of an RC coupled transistor amplifier. Explain the frequency Response characteristics curve of RC coupled amplifier. State the reason for the shape of the curve.
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