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Question Paper Code : 90466

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

Third Semester

Biomedical Engineering

EC 8353 – ELECTRON DEVICES AND CIRCUITS

(Common to: Computer and Communication Engineering/Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/ Instrumentation and Control Engineering/Robotics and Automation)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. An ac voltage of peak value 20 V is connected in series with a silicon diode and load resistance of 400 Ω. If the forward resistance of the diode is 12Ω find the peak output voltage.

2. State the advantages of LED over incandescent lamps.

3. When V_{GS} of a JFET changes from –3.1V to –3V, the drain current changes from 1 mA to 1.3 mA. What is the value of transconductance?

4. An unijuncion transistor has 10V between the bases. If the intrinsic stand off ratio is 0.65, find the value of stand off voltage. What will be the peak-to-peak voltage if the forward voltage drop in the pn junction is 0.7V?

5. A transistor has the following ratings: $I_{c(max)}$ = 500 mA and β_{max} = 300. Find the maximum allowable value of I_B for the device.

6. State an application for CC amplifier. Justify the appropriate choice of CC amplifier for the specified application.

7. State any two advantages of FET over bipolar transistor.

8. State the difference between Power amplifier and Voltage amplifier.

9. State any two advantages of negative feedback.

10. State any two merits of crystal oscillators.

PART B — (5 × 13 = 65 marks)

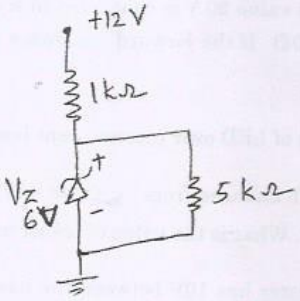
11. (a) (i) Explain the working of a bridge rectifier. (7)

(ii) A full-wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 20Ω. The transformer r.m.s secondary voltage from centre tap to each end of secondary is 50 V and load resistance is 980Ω. Find the mean load current and rms value of load current. (6)

Or

(b) (i) Explain the working of a zener regulater. (7)

(ii) Following is a basic zener diode circuit. What will be the circuit behavior if the zener is working properly shorted and open-circucited. (6)



12. (a) Explain the working of a depletion mode MOSFET. Discuss its characteristics. (7+6)

Or

(b) Explain the working of a UJT. Discuss its characteristics. (7+6)

13. (a) (i) Explain the working of a common emitter amplifier. Discuss the load line analysis of the transistor. (7)

(ii) In a CE transistor curcuit, collector load in $4k\Omega$ whereas quiescent current in 1 mA. What is the operating point if V_{cc}=10V? What will be the operating point if $R_C = 5k\Omega$? (6)

Or

(b) Explain the working of a source follower circuit. Explain its characteristics. (7+6)

14. (a) Explain the working of a differential amplifier. List four applications of differential amplifier. (7+6)

Or

(b) Explain the working of a single tuned amplifier. Discuss its frequency response. (7+6)

15. (a) Define Barkhausen criterion for oscillation. Discuss on the different types of feedback in Amplifiers. (5+8)

Or

(b) State the principle used for oscillation in crystal oscillator and describe its operation. (5+8)

PART C — (1 × 15 = 15 marks)

16. (a) (i) An amplifier has a voltage amplification A_v and a fraction m_v of its output is feedback in opposition to the input. If m_v= 0.1 and A_v = 100, find the percentage change in the gain if A_v falls 6 db due to aging. (7)

(ii) Explain the working of a Colpitts oscillator. (8)

Or

(b) (i) Explain the working of a Wein-bridge oscillator. (7)

(ii) A phase-shift oscillator uses 5pF capacitors. Find the value of R to produce a frequency of 800 kHz. (3)

(iii) Choose the inductor values in a Hartley oscillator so that $f = 1mHz$ and $m_v = 0.2$. Assume that 1 PF capacitors are available. (5)

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