Reg. No. :

**Question Paper Code : 80113**



B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

10-5-19 AN

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 Engineering)

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the peak output voltage of a half wave rectifier, if the diode has $V_F = 0.7V$ and the ac input is 22 V.

2. List few applications of lacer diode.

3. FET has lower thermal noise than BJT — Justify.

4. What is meant by latching in SCR?

5. An NPN common emitter amplifier circuit has the following parameters. $h_{fe} = 50$, $h_{ie} = 1k\,\Omega$ and $R_C = 3.3k\,\Omega$. Find the voltage gain of the amplifier.

6. State the need for coupling capacitor in a transistor amplifier.

7. Determine the input impedance of a differential amplifier (emitter coupled) with $R_B = 3.9k\Omega$ and $Z_B = 2.4k\Omega$.

8. A single tuned amplifier provides a bandwidth of 10kHz at a frequency of 1MHz. Find the circuit Q.

9. What is the condition required for satisfactory operation of a negative feedback amplifier?

10. An oscillator operating at 1 MHz has a stability of 1 in $10^4$. What will be the minimum value of frequency generated?

PART B — (5 × 13 = 65 marks)

11. (a) Outline the charge carrier diffusion phenomenon across a PN junction. Explain the effect of forward and reverse biasing on the depletion region. (13)

Or

(b) Explain the principle and operation of Light Emitting Diode (LED) with necessary expressions for current densities and efficiency of light generation. (13)

12. (a) (i) Brief about the operation of an N channel depletion type MOSFET with a neat diagram. (5)

(ii) Enumerate the characteristics of N channel depletion MOSFET with suitable graphs. (8)

Or

(b) Outline the structure of a SCR and explain its operation. Also illustrate its V- I characteristics. (13)

13. (a) (i) Draw the circuit of a CE amplifier with DC sources eliminated and deduce the small signal model for amplifier operation. (8)

(ii) Illustrate the steps involved in analyzing a BJT amplifier circuit using small signal model. (5)

Or

(b) (i) Explain the high frequency MOSFET model under CS configuration and its simplified equivalent circuit. (5)

(ii) Derive an expression for MOSFET unity gain frequency ($f_T$) (8)

14. (a) (i) With a neat circuit, outline the operation of a basic BJT differential pair configuration, under common mode input signal. (8)

(ii) Deduce expressions for Emitter currents in a differential amplifier under large signal operation. (5)

Or

(b) Illustrate the behavior of a MOSFET based amplifier circuit with tuned load. Also deduce expressions for voltage gain at centre frequency, Q and bandwidth. (13)

15. (a) With proper mathematical derivations, Prove that bandwidth increases and output resistance reduces in a negative feedback amplifier. Assume a series shunt feedback scheme. (13)

Or

(b) Outline the principle of LC tuned oscillators. With a neat circuit diagram deduce the necessary condition for oscillation and expression for oscillation frequency in the case of Colpitt's oscillator. (13)



PART C — (1 × 15 = 15 marks)

16. (a) An electronic load requires a constant 6.8 V DC for operation. However the supply voltage available is 10 V±1V. The load resistance is 2 KΩ. Design a simple shunt circuit with appropriate components to maintain the load voltage of 6.8V. Choose a proper device and justify your choice, by indicating its characteristics The circuit diagram for the entire operation should also be provided. (15)

Or

(b) Provide a circuit that can amplify AM Radio signals at 800 KHz. The signals occupy a bandwidth of 10 kHz and should be provided a gain of 100. Justify the choice of the circuit and explain the operation of the circuit. (15)

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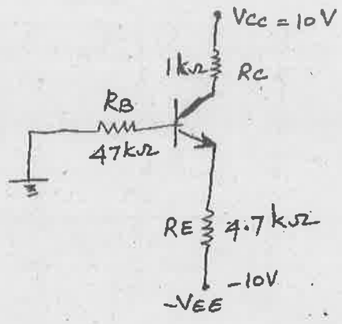
PART C — (1 × 15 = 15 marks)

16. (a) Find the Q point of the transistor shown below. Also draw the d.c load line. Give $\beta = 100$ and $V_{BE} = 0.7$ V.




Or

(b) (i) Explain the self-biasing of a JFET. (6)

(ii) In a self-bias n-channel JFET, the operating point is to be set at $I_D = 1.5$ mA and $V_{DS} = 10$ V. The parameters are $I_{DSS} = 5$ mA and $V_{GS(off)} = -2$ V. Find the values of $R_S$ and $R_D$ if $V_{DD} = 20$ V. (9)





Reg. No. : | | | | | | | | | | | | |

**Question Paper Code : 25074**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Third Semester

Electrical and Electronics Engineering

EC 8353 — ELECTRON DEVICES AND CIRCUITS

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

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. An a.c voltage of peak value 20 V is connected in series with a silicon diode and load resistance of 500 Ω. If the forward resistance of diode is 10 Ω find the peak current through the diode.

2. State two disadvantages of half wave rectifier.

3. State any two differences between JFET and BJT.

4. When $V_{GS}$ of a JFET changes from –3.1 V to –3 V, the drain current changed from 1 mA to 1.3 mA. Find the value of transconductance.

5. For a certain D–MOSFET, $I_{DSS} = 10$ mA and $V_{GS(off)} = -8$ V. Check if it is an – *n* channel or *p* channel device? Justify your answer.

6. State the phase relationships between input /output currents and phase relationships between input / output voltages of various transistor configurations.

7. A multistage amplifier employs five stages each of which has a power gain of 30. What is the total gain of the amplifier in db?

8. Define differential mode signals of a differential amplifier.

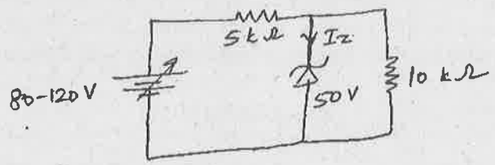
9. The overall gain of a multistage amplifier is 140. When negative voltage feedback is applied the gain is reduced to 17.5. Find the fraction of the output that is feedback to the input.

10. In a phase shift oscillator, $R_1 = R_2 = R_3 = 1\ M\Omega$ and $C_1 = C_2 = C_3 = 68$ pF. At what frequency does the circuit oscillate?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the working of Zener diode as voltage regulator. (7)

(ii) For the following circuit, find the maximum and minimum values of Zener diode current. (6)




Or

(b) (i) Explain the working of a bridge rectifier. (6)

(ii) In a bridge rectifier circuit, input supply is 230 V, 50 Hz. Primary to secondary turns ratio is 4 : 1, load resistance is 200 Ω. The diodes are ideal. Find dc output voltage, PIV and output signal frequency. (7)

12. (a) A germanium transistor is to be operated at zero signal $I_C = 1$ mA. If the collector supply voltage $V_{CC} = 12$ V, what is the value of $R_B$ in the base resistor method? Assume $\beta = 100$. If another transistor of same batch with $\beta = 50$ is used, what will be new value of zero signal $I_C$ for same $R_B$? Comment on the results.

Or

(b) (i) Discuss the characteristics of UJT. (7)

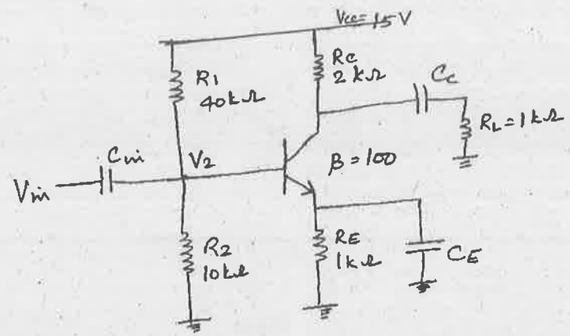
(ii) The intrinsic stand-off ratio for a UJT is 0.6. If the inter base resistance is 10 kΩ, what are the value of $R_{B1}$ and $R_{B2}$? (4)

(iii) State two applications of UJT. (2)





13. (a) For the circuit shown below, find (i) dc bias levels (ii) dc voltages across the capacitors (iii) ac emitter resistance (iv) voltage gain and (v) state of the transistor.




Or

(b) Explain the working of a *n*-channel depletion MOSFET. Discuss its transfer characteristics.

14. (a) (i) A parallel resonant circuit has a capacitor of 250 pF in one branch and inductance of 1.2 mH and a resistance of 10 Ω in the parallel branch. Find (1) resonant frequency (2) impedance of the circuit at resonance (3) Q-factor of the circuit. (6)

(ii) Draw the frequency response of an ideal and a practical tuned amplifier and discuss their characteristics. (7)

Or

(b) (i) Compare voltage and power, amplifiers. (6)

(ii) Explain the working of a single ended input differential amplifier. (7)

15. (a) (i) A 1 mH inductor is available. Find the capacitor values of a Colpitts oscillator so that $f = 1$ MHz and feedback fraction = 0.25. (5)

(ii) Explain the working of phase shift oscillator. (8)

Or

(b) (i) An amplifier in required with a voltage gain of 100 which does not vary by more that 1%. If it is to use negative feedback with a basic amplifier the voltage gain of which can vary by 20%, find the minimum voltage gain required and the feedback factor. (6)

(ii) Discuss the advantages of negative feedback in amplifiers. (7)

7/11/19 FN

Reg. No. : | | | | | | | | | | | | |

**Question Paper Code : 90176**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Third Semester

Biomedical Engineering

EC8353 – 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 Engineering)

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Why the depletion layer is very thin in zener diode ?
2. What is a rectifier and mention its types ?
3. How a FET is used as a voltage variable resistor ?
4. What is meant by "thermal runaway" in a transistor and how it can be avoided ?
5. Mention the significance of coupling and bypass capacitor on bandwidth of amplifiers.
6. State Miller's theorem.
7. A tuned circuit has a resonant frequency of 1600 kHz and a bandwidth of 10 kHz. Calculate the value of the Q factor.
8. What is the impact of crossover distortion in an amplifier ?
9. Which type of feedback circuit increases gain of an amplifier ?
10. Draw the equivalent circuit of Crystal oscillator.

PART – B (5×13=65 Marks)

11. a) i) Draw and explain the VI characteristics of PN junction diode. (5)

ii) Derive the expression of the space charge or transition capacitance of PN diode under reverse bias with neat diagram. (8)

(OR)

b) With neat sketches, explain the operation of a Half Wave rectifier circuit and also derive the expression for Transformer Utilization Factor (TUF), Peak Inverse Voltage (PIV) and efficiency.

12. a) i) With neat sketches, explain the input and output characteristics of an Emitter Follower. (6)

ii) Enumerate the selection of Q point for transistor bias circuit and discuss the limitations on the output voltage swing. (7)

(OR)

b) Describe the construction and working of UJT with its equivalent circuit and VI characteristics.

13. a) Explain about CC amplifier and derive the expression for h parameters of the same. Also derive the expression for gain, input impedance and output impedance of CC amplifier.

(OR)

b) Explain about CS amplifier and derive the expression for gain, input impedance and output impedance and also draw its small signal equivalent circuit.

14. a) Draw the circuit of emitter coupled BJT differential amplifier and derive the expressions for differential gain, common mode gain and CMRR.

(OR)

b) If Class C Tuned amplifier has $R_L = 6k\Omega$ and required tank circuit Q = 80. Estimate the values of L and C of the tank circuit. Assume $V_{CC} = 20$ V, resonant frequency as 5 MHz and worst case power dissipation as 20 mW.



15. a) With a neat block diagram, explain the operation of following feedback amplifiers.

i) Voltage series feedback amplifier (6)

ii) Current shunt feedback amplifier (7)

(OR)

b) With neat diagram, examine the Wein bridge oscillator and derive an expression for frequency of oscillation.

PART – C (1×15=15 Marks)

16. a) i) In a Colpitts oscillator, $C_1 = C_2 = C$ and $L = 100\times10^{-6}$ H. The frequency of oscillation is 500 kHz. Determine the value of C. (5)

ii) In Colpitts oscillator, the desired frequency is 500 kHz. Estimate the value of L by assuming C = 1000 pF. (5)

iii) A 1 mH inductor is available. Choose the capacitor values in a Colpitts oscillator so that f = 1 MHz and feedback factor is 0.25. (5)

(OR)

b) For a CB amplifier driven by voltage source of internal resistance $R_s = 1.2$ KΩ. The load impedance is $R_L = 1k\Omega$. The h parameters are $h_{ib} = 22\Omega$, $h_{cb} = 3\times10^{-4}$, $h_{fb} = -0.98$ and $h_{ob} = 0.5$A/V. Estimate the current gain Ai, Input impedance Ri, voltage gain Av, overall current gain Ais, overall voltage gain Avs and output impedance Zo.