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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.

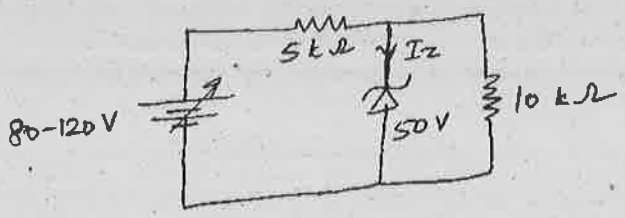
9. The overall gain of a multistage amplifier is 140. When negative voltage feedback is applied the gain is reduced to 17.5. Find the fraction of the output that is feedback to the input.

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 — ($5 \times 13 = 65$ 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.

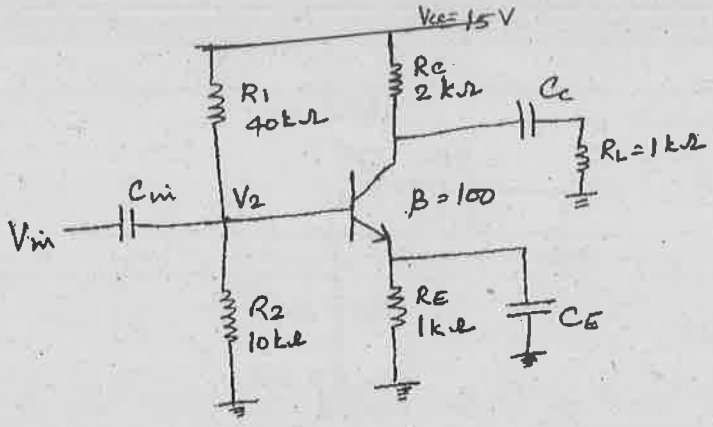
Or

(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)

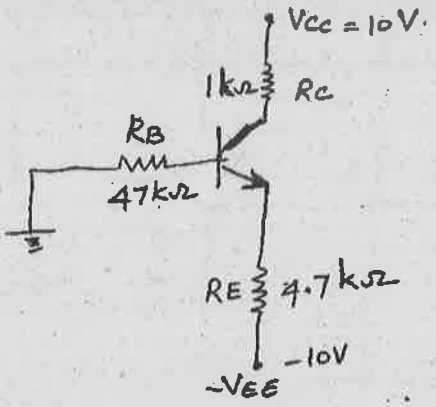
Or

(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)

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)