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Question Paper Code : 23444

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

Third Semester

Electronics and Communication Engineering

EC 2205 — ELECTRONIC CIRCUITS – I

(Common to Medical Electronics Engineering)

(Regulations 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Stability factor. Write the expression for stability factor.

2. Which type of bias is normally used in amplifier circuit? Why?

3. Define Common Mode Rejection Ratio.

4. Why do we go for Darlington pair? Draw a Darlington pair configuration.

5. What are the functions of coupling Capacitor?

6. For an amplifier, midband gain is 100 and lower cut off frequency is 1kHz. Find the gain of an amplifier at the frequency of 20 Hz.

7. Define conversion efficiency of a power amplifier.

8. What is cross over distortion?

9. What are the advantages of bridge rectifier circuit?

10. How are ripples minimized in the capacitor filters?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With relevant circuit diagram, explain the operation of voltage divider bias. Also discuss how it stabilizes against V_{BE} changes. (8)

(ii) Determine V_{CE} and I_C in the voltage-divider biased transistor circuit given in figure 1. Assume $\beta_{DC} = 100$ and $I_E = I_C$. (8)

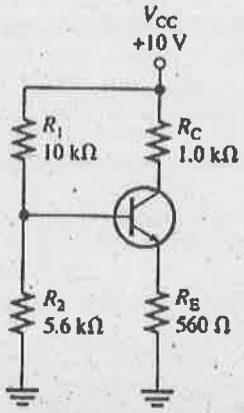

Fig 1

Or

(b) (i) Determine the Q-point values of Ic and V_{CE} for the circuit in figure 2. Assume V_{CE} = 8 V, R_B = 360 kΩ and Rc = 2 kΩ. Also construct the dc load line and plot the Q-point. (8)

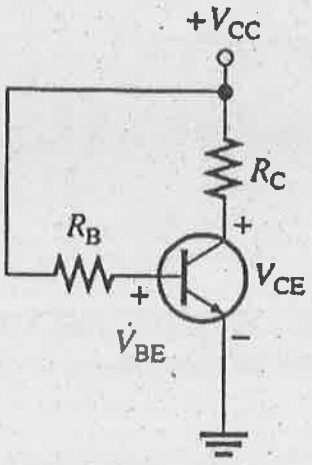

Fig 2

(ii) Explain the methods employed for Bias compensation and thermal stability of transistor circuits. (8)

12. (a) Draw the circuit diagram of a Common Emitter amplifier with voltage divider bias, coupling capacitor and by pass capacitor. With the help of small-signal equivalent circuit, obtain the expression for voltage gain, current gain, input and output impedance. (16)

Or

(b) (i) With relevant circuit diagrams, Explain the operation of various configurations of emitter coupled BJT differential amplifier. (8)

(ii) Estimate dc emitter current in each transistor of differential amplifier shown in figure 3. Calculate the dc voltage from each collector to ground? Also calculate the output voltage? (8)

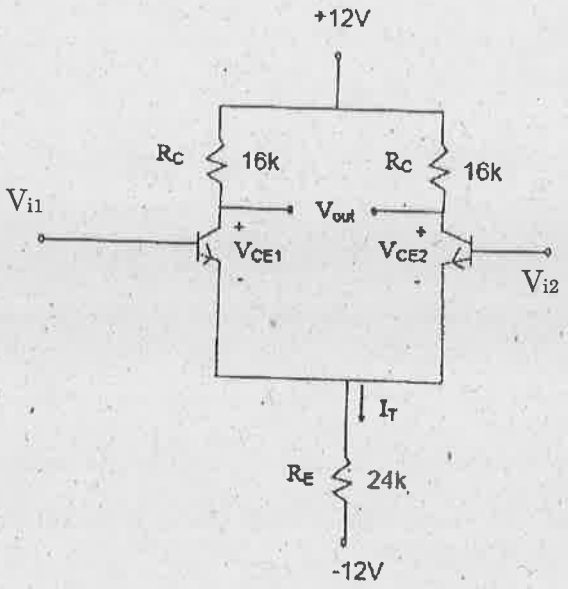

Fig 3

13. (a) Draw the hybrid-pi equivalent circuit of transistor in the common emitter configuration. Also obtain the expression for input conductance feedback conductance, base spread resistance, output conductance collector junction capacitance and base emitter capacitance. (16)

Or

(b) (i) Derive the expression for the overall lower and upper cut off frequencies of multistage amplifier. (8)

(ii) Short circuit CE current gain of transistor is 25 at a frequency of 2 MHz if f_β = 200 kHz. Calculate

(1) f_T

(2) h_{fe}

(3) Find $|A_i|$ at a frequency of 10 MHz and 100 MHz. (8)

14. (a) (i) With a relevant circuit diagrams, explain transformer coupled class A amplifier and also obtain its conversion efficiency. (10)

(ii) Explain the operation of Class C amplifier with relevant circuit diagram. (6)

Or

(b) (i) With a relevant circuit diagrams, explain class B push pull emitter follower and also obtain its conversion efficiency. (10)

(ii) The amplifier shown in the figure 4 is producing a peak sine wave output of 4 V. Determine the dc input power, ac output power and the efficiency. (6)

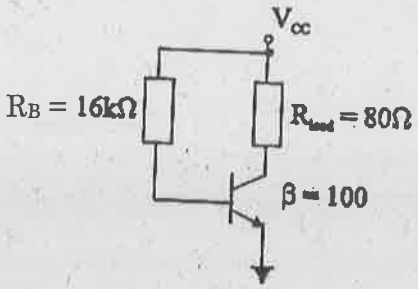

Fig 4

15. (a) (i) With relevant block diagram, explain the working of SMPS. (12)

(ii) Explain the working of Zener diode voltage regulator with the help of relevant diagram. (4)

Or

(b) (i) With relevant circuit diagram and waveforms explain the working of full bridge diode rectifier. Also obtain the expression for the average output voltage, rms voltage, average and rms load current, form factor, ripple factor, Transformer utilization factor and rectification efficiency. (12)

(ii) Design a LC filter for full wave rectifier to provide 10 V dc at 100 mA. The frequency of input voltage is 50 Hz along with maximum ripple of 2%. (4)