



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. – Electrical and Electronics Engineering

Semester End Examination; Dec - 2016/Jan - 2017

Analog Electronics Circuits

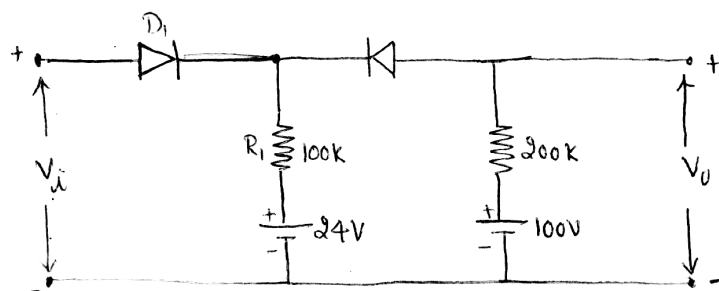
Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Sketch the output waveform over the input voltage waveform for the circuit shown, given that the input varies linearly from 0 to 150 V. Assuming Ideal diodes.



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- b. Design a universal bias circuit and obtain the expression for Base current, collector to Emitter voltage, collector to ground, Emitter to ground and Base to ground voltages.

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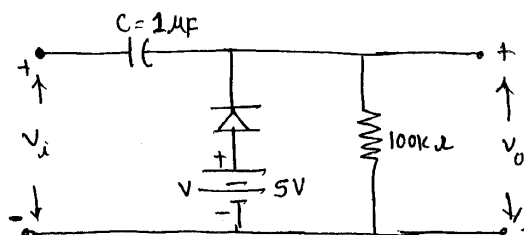
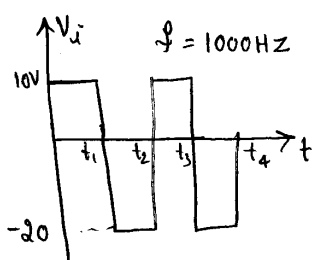
- c. What is the significance of operating point and DC load line on working of amplifiers?

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- 2 a. Derive an expression for gain and phase for a high frequency response of an Amplifier? Plot the same.

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- b. Determine output voltage V_o for the network shown, consider ideal diode.



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fig. 2.b

- c. Classify the Amplifier based on method of operation and inter stage coupling.

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UNIT - II

- 3 a. A transistor connected as a common emitter amplifier is driving a load of 10 k. It is supplied by a source of 1 k internal resistance. The hybrid parameters of the transistors used are $h_{ie} = 1100 \Omega$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 1/40k$. Find;

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- i) Current gain ii) Input impedance iii) Voltage gain iv) Output impedance.

- b. Explain the Wien bridge oscillator? Obtain frequency and condition for sustained operation. 6
- c. Design a phase shift oscillator using Transistor with gain $g_m = 5000 \mu S$, $r_d = 40 k\Omega$ and a feedback circuit value of $R = 10 k\Omega$. Select the value of capacitor C for oscillator operation at 1 kHz and for $A > 29$ to ensure oscillator action. Find R_L . 6
- 4 a. Derive h-parameter expression for common Emitter configuration from Hybrid equivalent model. 8
- b. Differentiate between RC-phase shift and Wein bridge oscillator. 6
- c. For a CE Amplifier Hybrid Model, obtain the expression for; 6
- i) Current gain ii) Voltage gain.

UNIT - III

- 5 a. With an expression, explain following characteristics of negative Feedback Amplifier; 10
- i) Sensitivity of transfer gain ii) Non-linear Distortion iii) Frequency Distortion.
- b. An Amplifier has a bandwidth of 200 kHz and a voltage gain of 1000
- i) What will be the new bandwidth and gain of 5% negative feedback introduced? 10
- ii) What is gain bandwidth product with and without feedback?
- iii) What should be the amount of feedback, if the bandwidth required 1 MHz?
- 6 a. Explain the effect of Negative feedback on input Resistance of; 10
- i) Voltage series feedback Amplifier ii) Current series feedback Amplifier.
- b. List the advantages of Negative Feedback. 5
- c. Derive an expression on Effect of Negative feedback on Bandwidth. 5

UNIT - IV

- 7 a. Explain with circuit diagram and waveform, the class B push-pull power Amplifier? Obtain the expression for Maximum conversion efficiency. 10
- b. A transformer-coupled class-A amplifiers drives a 16Ω load speaker through a 4:1 transformer with $V_{CC} = 36 V$, the circuit delivers 2 W to the load, Find; 10
- i) Power across the transformer primary ii) rms voltage across the load
- iii) rms voltage across the transformer primary iv) rms value of load current
- v) Conversion efficiency if the dc collector current is 150 mA.
- 8 a. Considering second order Non-Linearly, obtain an expression for magnitude of Harmonic distortion. 10
- b. A class B push pull power Amplifier with $V_{CC} = 25 V$ driving a 8Ω load, find, 10
- i) Maximum input power ii) Maximum output power
- iii) Maximum circuit efficiency iv) Maximum collector dissipation.

UNIT - V

- 9 a. A differential amplifier has input $V_1 = 10 \text{ mV}$ and $V_2 = 8 \text{ mV}$. If the differential gain is 60 dB and the CMRR is 80 dB, calculate the percentage error in the output voltage and error voltage. Also calculate the common-mode output voltage. 8
- b. With circuit and transfer characteristic, explain Non-inverting Schmitt trigger. 8
- c. A D/A convertger with binary weighted resistors has $R = 10 \text{ k}$. Determine the size of each step, if $R_F = 1.2 \text{ k}$ (Feedback resistor). What is the output voltage when input binary words is 1111? Assume $V_R = 5 \text{ V}$. 4
- 10 a. With circuit, input, control and output voltage waveform, explain SAMPLE and HOLD circuit. 10
- b. With circuit, explain R-2R ladder Digital to Analog converter and hence convert a binary word into its equivalent Analog word. 10

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