

sem-III / Analog Electronics / INST / 09-12-15

QP Code : 5214

(3 Hours)

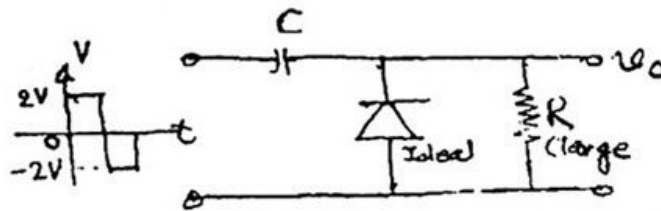
[Total Marks : 80

- N. B. :** (1) Question 1 is compulsory.
 (2) Attempt any four from remaining five questions.
 (3) All questions carry equal marks.
 (4) Assume suitable data wherever necessary.

1. Attempt any five :-

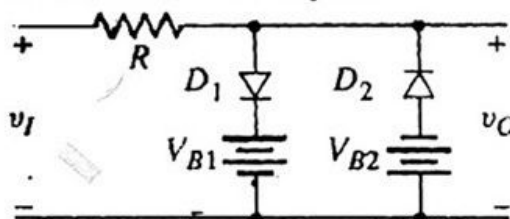
20

- (a) Calculate the CMRR (in dB) for the circuit measurements of $V_D = 1 \text{ mV}$, $V_{O-D} = 120 \text{ mV}$, and $V_{CM} = 1 \text{ mV}$, $V_{O-CM} = 20 \text{ } \mu\text{V}$.
 (b) For an op-amp having a slew rate of $SR = 2.4 \text{ V}/\mu\text{s}$, what is the time taken for output to change from -15 V to $+15 \text{ V}$.
 (c) Determine V_O for the following clamper circuit.



- (d) Given $I_{DSS} = 16 \text{ mA}$ and $V_p = -5 \text{ V}$, sketch the transfer characteristics using the data points. Determine the value of I_D at $V_{GS} = -3 \text{ V}$ from the curve, and compare it to the value determined using Shockley's equation.
 (e) Crossover distortion behavior is characteristic of Class A Power amplifier. State true or false with reason.
 (f) Compare class A, class B and class C power amplifier based on,
 (a) Output waveform for collector current
 (b) Linearity
 (c) Distortion
 (d) Efficiency

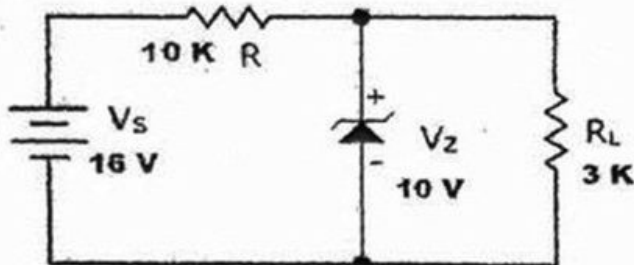
2. (a) Determine output voltage. Assume, $V_{B1} = 8 \text{ V}$, $V_{B2} = 6 \text{ V}$ and input to be sine wave of 20 V peak. 8



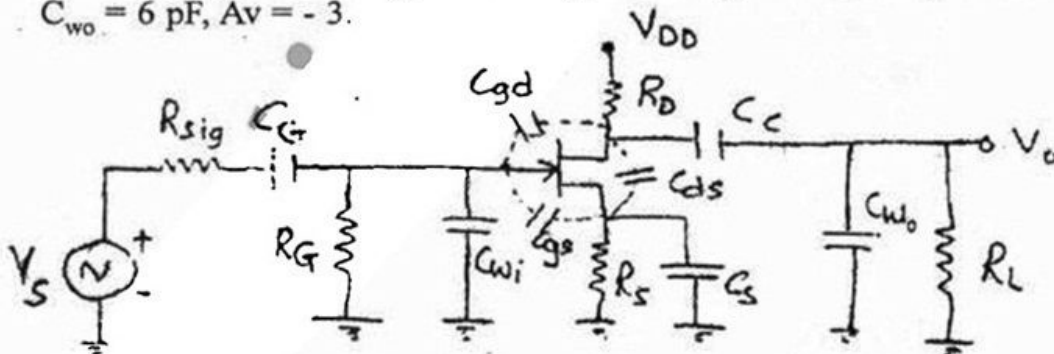
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- (b) For the Zener diode network, determine V_L , V_R , I_Z and P_Z . Consider supply voltage of 16 v, zener voltage of 10 V, series resistor of 10 K and load resistance of 3 K. 8



- (c) Explain working of bridge rectifier. 4
3. (a) Determine the levels of I_{CQ} and V_{CEQ} for the CE BJT amplifier with voltage-divider configuration. Consider $R_1 = 82 \text{ K}$, $R_2 = 22 \text{ K}$, $R_C = 5.6 \text{ K}$, $R_E = 1.2 \text{ K}$, $V_{CC} = 18 \text{ v}$ and $\beta = 50$. 8
- (b) Explain constructing and working of D-MOSFET. 8
- (c) What is harmonic distortion? Write the equation for total harmonic distortion. 4
4. (a) Determine the higher cut off frequencies for the given circuit diagram. 10
 Given: $C_G = 0.01 \mu\text{F}$, $C_C = 0.5 \mu\text{F}$, $C_S = 2 \mu\text{F}$, $R_{SIG} = 10 \text{ k}$, $R_G = 1 \text{ M}$, $R_D = 4.7 \text{ k}$, $R_S = 1 \text{ k}$, $R_L = 2.2 \text{ k}$, $I_{DSS} = 8 \text{ mA}$, $V_P = -4 \text{ V}$, $r_d = \infty$, $V_{DD} = 20 \text{ V}$, $C_{gs} = 2 \text{ pF}$, $C_{gs} = 4 \text{ pF}$, $C_{ds} = 0.5 \text{ pF}$, $C_{wi} = 5 \text{ pF}$, $C_{wo} = 6 \text{ pF}$, $A_v = -3$.



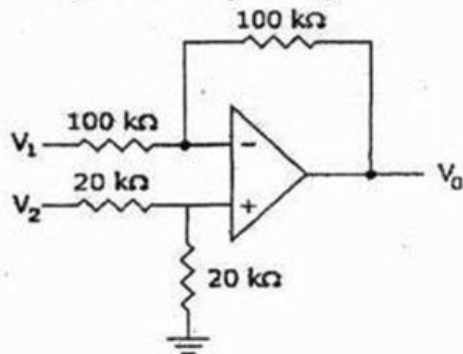
- (b) Derive equation for three Op Amp Instrumentation amplifier. Give advantages and applications of Instrumentation amplifier. 10
5. (a) Draw and explain a series voltage regulator. 10
- (b) Explain integrator using Op Amp. Draw its frequency response. State disadvantages of basic integrator and how it is overcome in practical integrator circuit. 10

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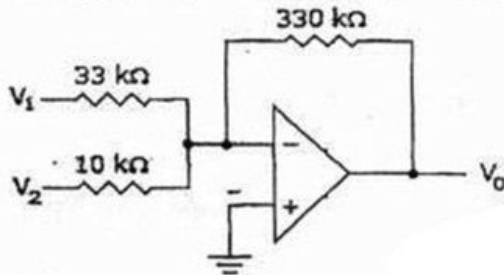
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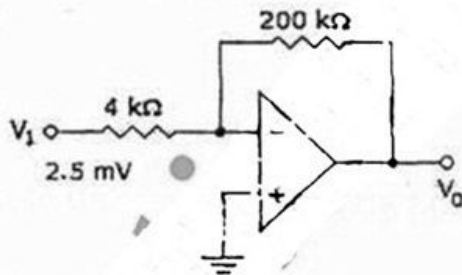
6. (a) Derive the expression for output voltage and hence determine the output voltage when $V_1 = -V_2 = 1$ V. 5



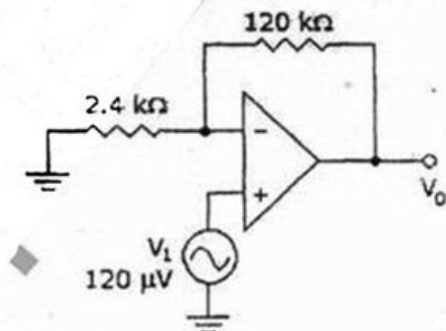
- (b) Derive the expression for output voltage and hence calculate the output voltage if $V_1 = -0.2$ V, $V_2 = 0.1$ V. 5



- (c) Derive the expression for output voltage and draw the output voltage for this circuit with a sinusoidal input of 2.5 mV. 5



- (d) Derive the expression for output voltage and draw the output voltage for this circuit with a sinusoidal input of 120 μV. 5



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Block 2, 3, 4

Course: S.E. (SEM - III) (REV-2012) (CBSGS) (INSTR. ENGG.) (PROG-T1723)

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Correction:

Read as:

N.B. (1)....

(2) Attempt any three from remaining five questions.

(3).....

(4).....

Instead of

N.B. (1)....

(2) Attempt any four from remaining five questions.

(3).....

(4).....

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