

This question paper contains 4+1 printed pages]

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S. No. of Question Paper : 6452

Unique Paper Code : 251303

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Name of the Paper : ELHT-302 : Analog Electronics—I

Name of the Course : B.Sc. (Hons.) Electronics

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

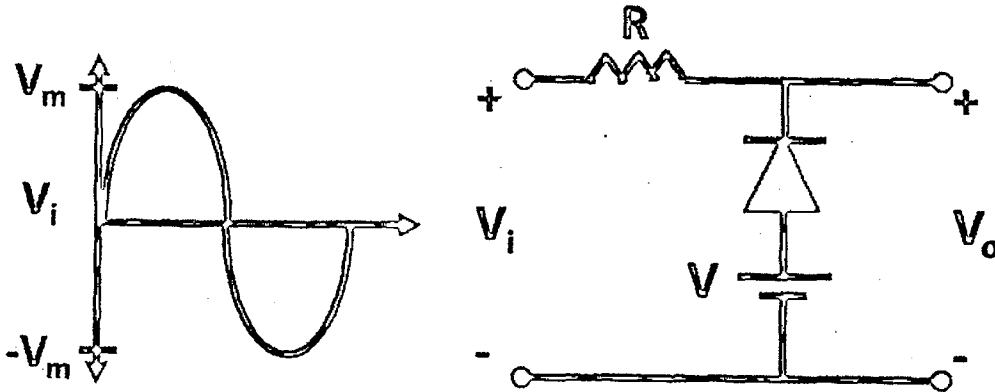
Question No. 1 is compulsory.

Use of scientific Calculator is allowed.

1. (a) Explain the Static and Dynamic resistance of diode. 3
- (b) Which configuration: common base or common emitter is suitable for high frequency applications and why? 3
- (c) What are the necessary conditions for oscillations? 3
- (d) Define current amplification factor β for common emitter transistor configuration. Establish a relation between α and β . 3
- (e) What is the role of coupling capacitor and by-pass capacitor in a common emitter BJT amplifier? 3

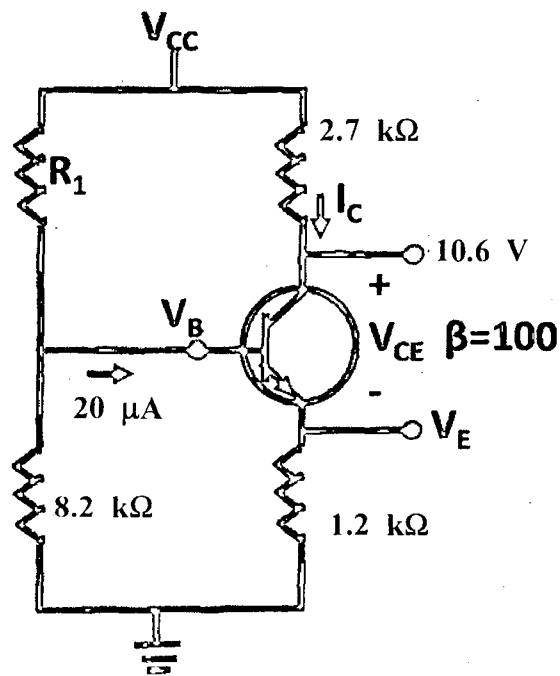
P.T.O.

2. (a) Sketch the output waveform for the given circuit for $V = V_m/3$. 4



- (b) Sketch the characteristics of Zener diode and explain its working as voltage regulator. 5
- (c) What are the clamping circuits? Explain positive, negative and biased clamper. 6
3. (a) Discuss the hybrid parameter model of common emitter BJT amplifier. Find the expressions for current gain, voltage gain, input impedance and output impedance. 6
- (b) Explain the gain response with frequency for a two-stage RC coupled common emitter BJT amplifier. 7
- (c) What are the requirements for biasing a transistor amplifier circuit? 2
4. (a) Explain the working of Class A power amplifier circuit and find its efficiency. How can its efficiency be increased? 7

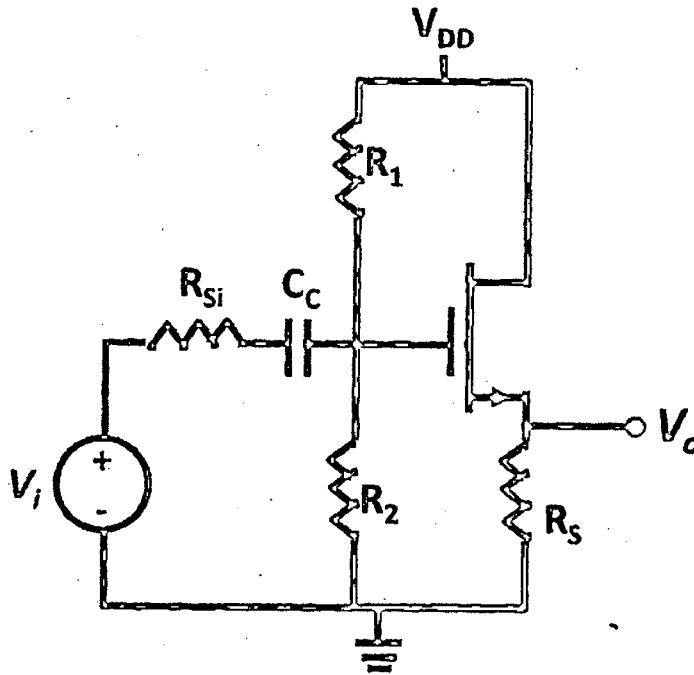
- (b) Find the overall efficiency of Class B power amplifier when $V_{CC} = 20 \text{ V}$ and $V_{CEmin} = 2.5 \text{ V}$. 3
- (c) For the voltage divider bias configuration of given circuit find : 5
- (i) I_C
- (ii) V_E
- (iii) V_{CC}
- (iv) V_{CE}
- (v) V_B and R_1 .



5. (a) Explain the characteristics of amplifier with voltage series feedback circuit. Also discuss the effect of introduction of feedback in the circuit. 7
- (b) Discuss the effect of negative feedback on the noise and bandwidth of the amplifier circuit. 4
- (c) Calculate the closed loop gain for the negative feedback amplifier when open loop amplifier gain $A_V = 20000$ and $\beta = 1/100$. Also calculate the closed loop gain when A_V is increased by 50%. 4
6. (a) Explain the working of a RC phase shift oscillator and derive an expression for its cutoff frequency. 8
- (b) Calculate the frequency of the Colpitt's oscillator if the feedback network has $C_1 = C_2 = 0.001\mu\text{F}$ and $L = 5 \text{ mH}$. What is the minimum value of g_m if $h_{ic} = 1 \text{ k}\Omega$. 5
- (c) Give the electrical equivalent circuit for a crystal oscillator. 2
7. (a) Compute the expressions of small signal voltage gain, input impedance and output impedance of common-drain amplifier. 6
- (b) Determine the small signal voltage gain, input impedance and output impedance of common-drain amplifier with specifications : $V_{DD} = 12 \text{ V}$, $R_1 = 162 \text{ k}\Omega$,

$R_2 = 463 \text{ k}\Omega$, $R_{Si} = 4 \text{ k}\Omega$ and $R_S = 0.75 \text{ k}\Omega$. Transistor parameters are $V_{Tn} = 1.5 \text{ V}$, $K_n = 4 \text{ mA/V}^2$ and $\lambda = 0.01 \text{ V}^{-1}$.

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- (c) Compare the characteristics of Common Source, Common Drain and Common Gate Amplifier configurations.

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