4E2109

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# 4E2109

## B. Tech. IV Sem. (Back) Exam., June/July-2014

## Electrical Engineering

## 4EE1 Power Electronics II

**Time: 3 Hours** **Maximum Marks: 80**

**Min. Passing Marks: 24**

***Instructions to Candidates:-***

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

*Units of quantities used/ calculated must be stated clearly.*

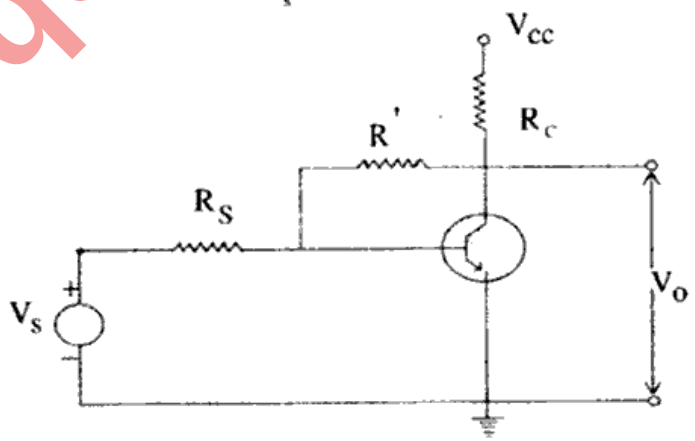
*Use of following supporting material is permitted during examination.*

1._____ 2._____

## UNIT-I

Q.1. (a) Identify the topology in the circuit. Prove that the voltage of the amplifier with feedback is given by $-\frac{R'}{R_s}$ [8]



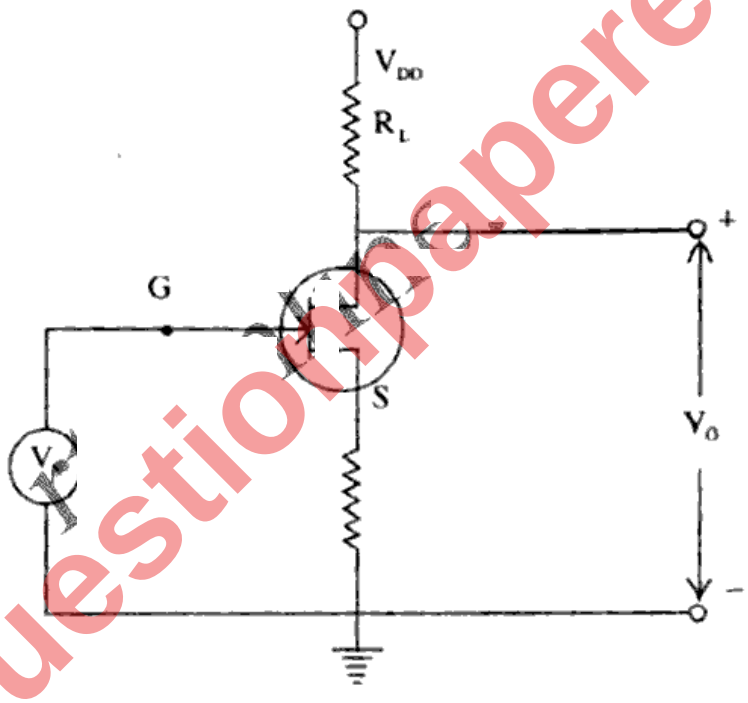


(b) List five characteristics of an amplifier which are modified by negative **feedback**. Explain them in brief. **[8]**

**OR**

Q.1. (a) Draw the equivalent circuit of the following amplifier and show that the output resistance with load resistance $R_L$ with feedback is - **[10]**

$$R'_{of} = \frac{R_L[r_d + (\mu + 1)R]}{r_d + R_L + (\mu + 1)R}$$




(b) Distinguish between voltage series and current series. Explain briefly with suitable circuit diagram. **[6]**

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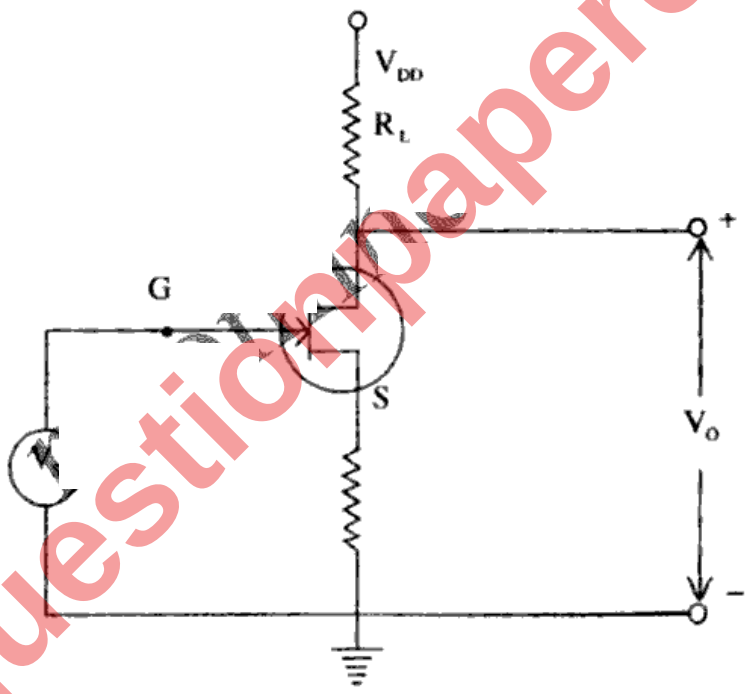


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## UNIT-II

Q.2. (a) Sketch the topology for a generalised resonant circuit oscillator, using impedance $Z_1 Z_2 Z_3$. At what frequency will the circuit oscillate? Under what conditions does the configuration reduces to Hartley Oscillator? [8]

(b) What is Schmitt triggering? Explain the working of a Schmitt trigger with the help of a neat circuit diagram and waveform. [8]

**OR**

Q.2. (a) Explain the Barkhausen criterion for sustained oscillation. An FET RC phase shift oscillator is required to oscillate at 1 $KH_Z$. JFET used has

$g_m$ = 5 mA/V and $r_d$ = 20k. If R = 10 k find the value of

(i) Capacitance in RC network.

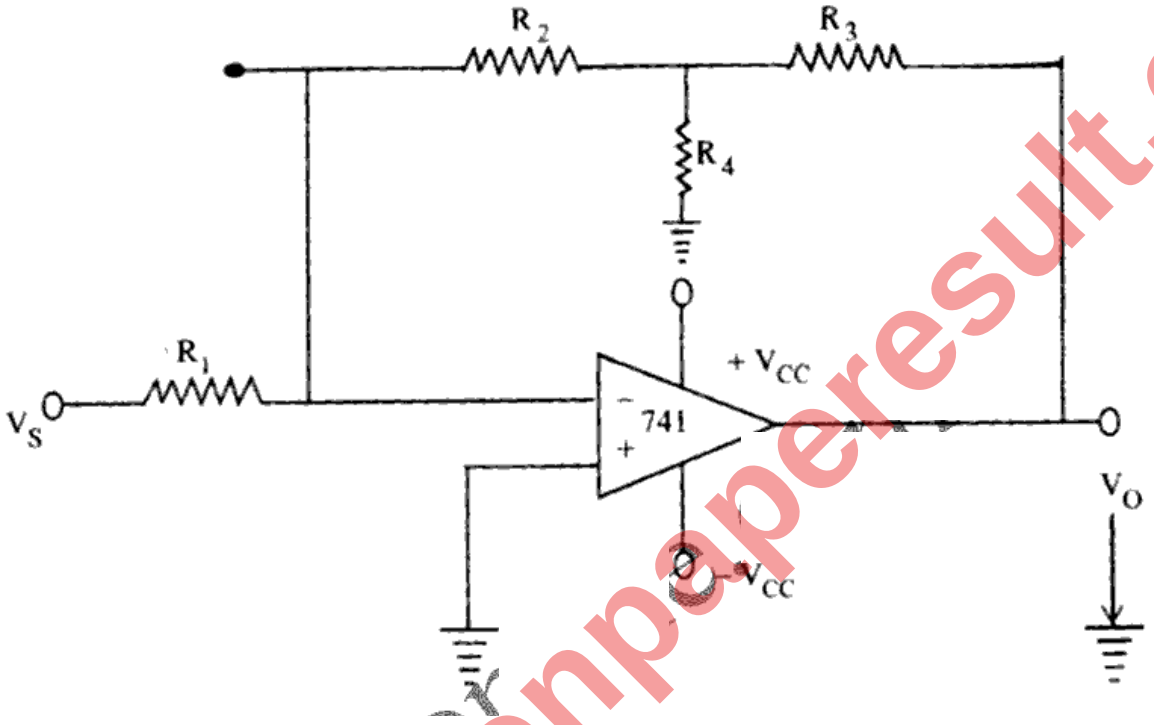
(ii) External load resistance $R_D$. [8]

(b) Normally, crystal controlled oscillator are not available beyond 10 mHz. Why? [4]

(c) Explain the working of BJT bistable multi vibrator. [4]

# UNIT-III

Q.3. (a) Find $V_o/V_s$ for the circuit in figure. Use $R_1 = 5\ K\Omega$, $R_2 = R_3 = 20K\Omega$ and $R_4 = 1\ K\Omega$ [8]




(b) Write short note on - [8]

(i) Logarithmic amplifier using op-amp

(ii) Differentiator

**OR**

Q.3. (a) Define following parameters in brief - [8]

(i) Slew Rate

(ii) CMRR

(iii) Input Offset Voltage

(iv) PSRR

(v) Input Offset current drift.

(b) Explain the operation of Integrator using op – amp and also draw input and output wave from. [8]

## UNIT-IV

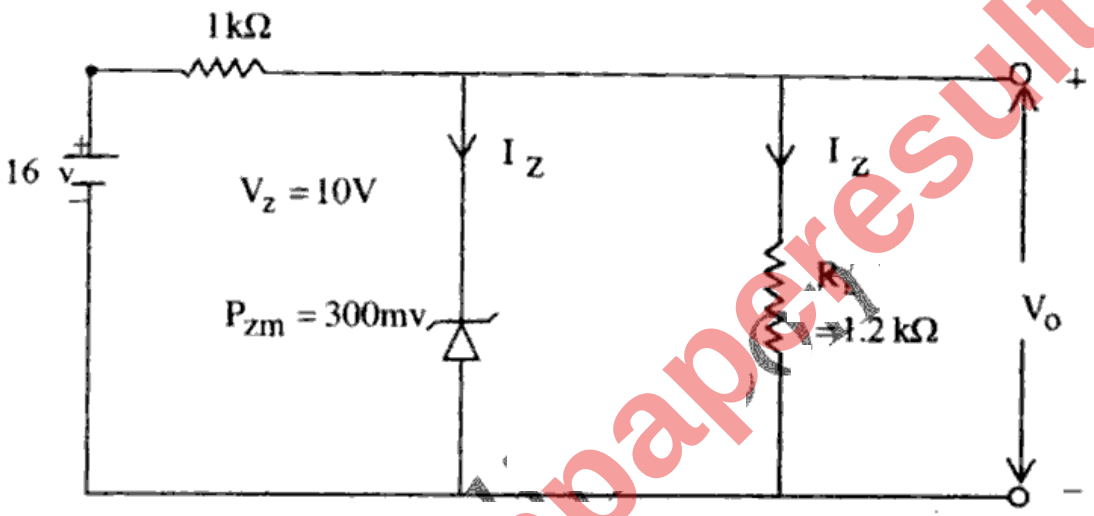
Q.4. (a) Explain a monostable multivibrator using Ic – 555 with functional block diagram of Ic. [8]

(b) Connect Ic-555 as astable multivilorator with following particulars- $R_A = R_B = 7.5\ K\Omega$ , $C = 0.1\mu F$, $V_{cc} = 5V$. Find output frequency. [8]

**OR**

Q.4. (a) Explain working of precision half wave and full wave rectifier using op-amp- 741. [8]

(b) For Zener circuit calculate $V_L$, $V_R$, $I_Z$, $P_Z$ [8]




## UNIT-V

Q.5. (a) In a class – B push pull amplifier, prove that

$$P_{cmax} = \frac{4}{\alpha^2} P_{max}$$ [8]

(b) What is meant by cross over distortion in class – B amplifier. Explain how it is overcome in class – AB operation? [4]

(c) Discuss the classification of amplifiers based on Function, Frequency, Conduction angle, Type of coupling and Load. [4]

**OR**

Q.5 (a) Draw the schematic circuit diagram of series fed class – A amplifier and explain its working. [8]

**(b)** A sinusoidal signal Vs = 1.95 sin400t is applied to a power amplifier, the resultant current is

$i_o$ = 12 Sin400t + 1.2 Sin800t + 0.9 Sin1200t + 0.4 Sin1600t

Calculate

(i) Total harmonic distortion.

(ii) The percentage increase in power because of distortion. [4]

(c) Show the classification of power amplifier using output characteristics load line and operating point. [4]

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