

4E2109

Roll No. \_\_\_\_\_

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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.*

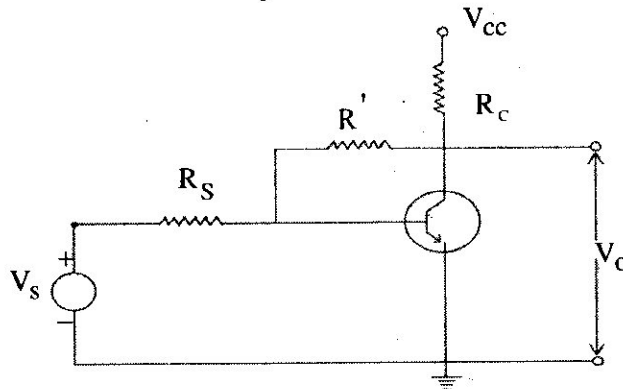
*Use of following supporting material is permitted during examination.*

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]



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[3560]

(b) List five characteristics of an amplifier which are modified by negative feedback.

Explain them in brief.

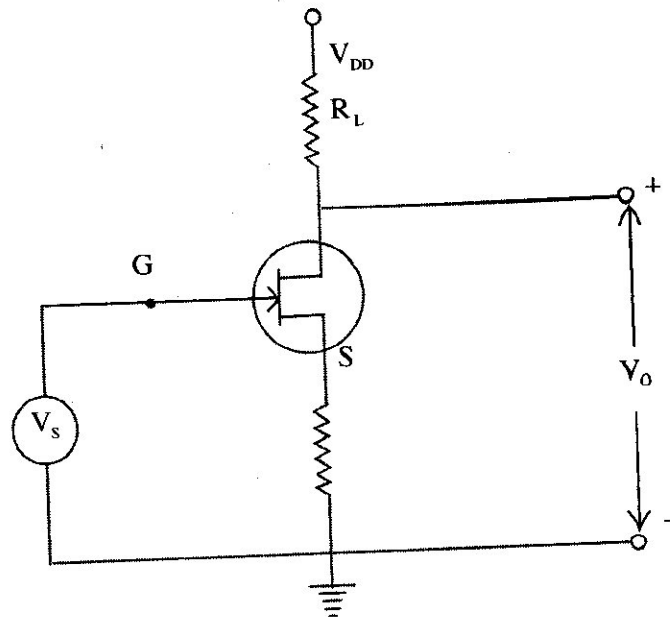
[8]

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.

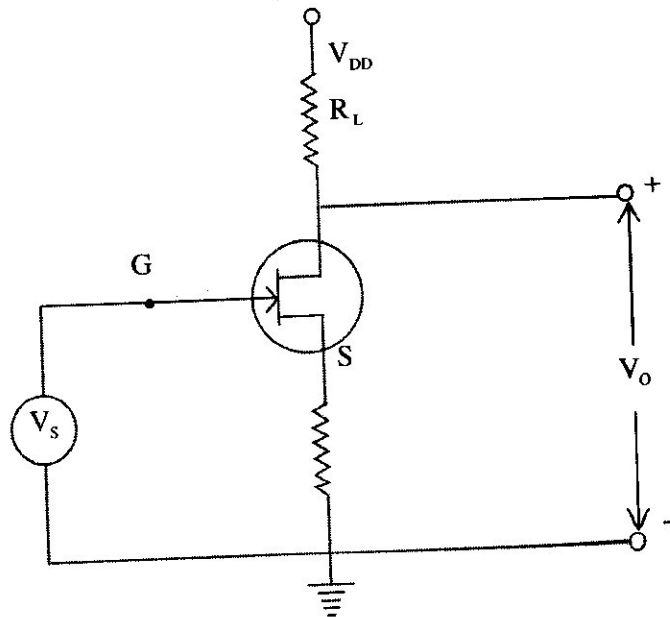
[6]

- (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]

## 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 KHz. JFET used has

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

(i) Capacitance in RC network.

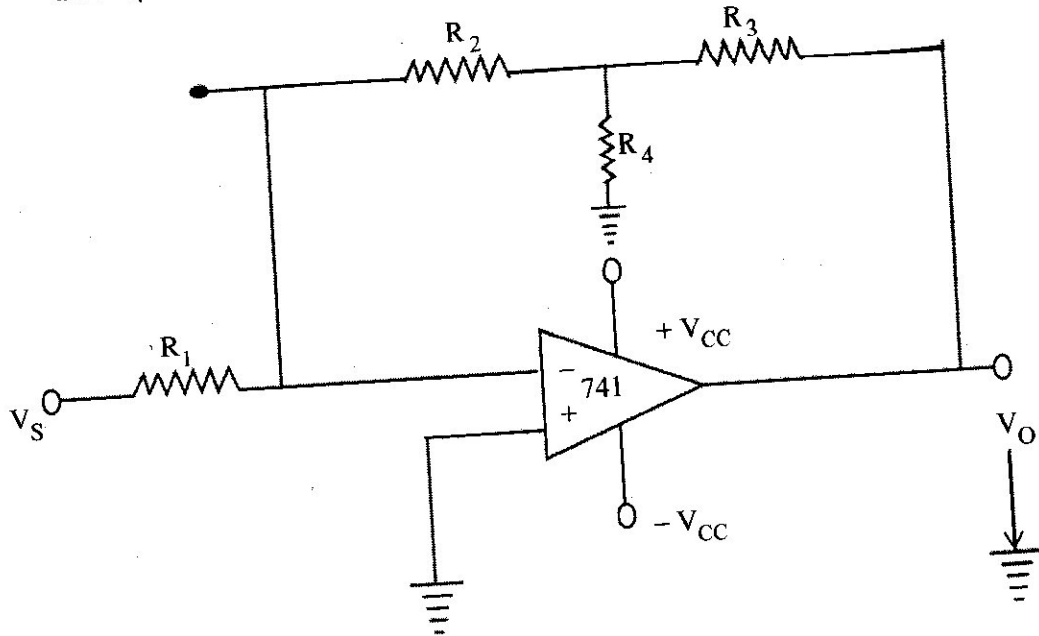
(ii) External load resistance  $R_D$ . [8]

(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  $R_1 = 5 \text{ K}\Omega$ ,  $R_2 = R_3 = 20 \text{ K}\Omega$  and  $R_4 = 1 \text{ K}\Omega$  [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]

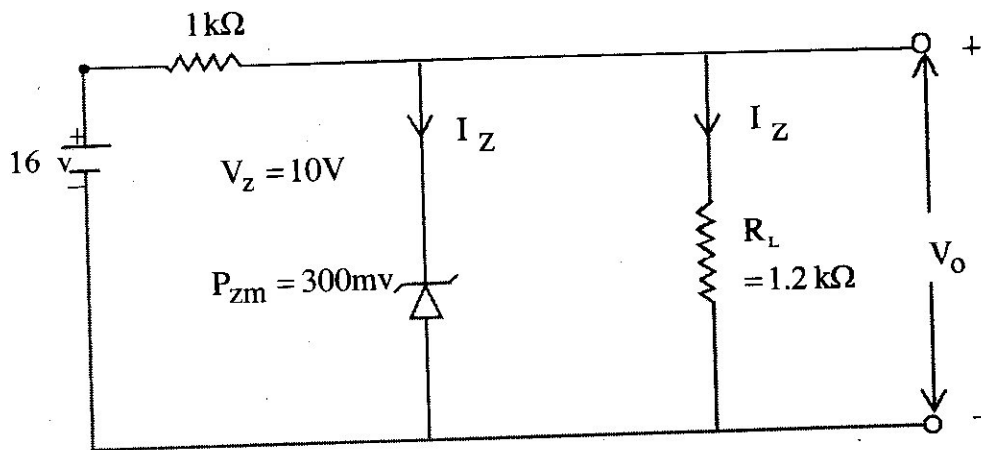
### UNIT-IV

- Q.4. (a) Explain a monostable multivibrator using Ic – 555 with functional block diagram of Ic. [8]
- (b) Connect Ic-555 as astable multivibrator with following particulars-  
 $R_A = R_B = 7.5 \text{ K}\Omega$  ,  $C = 0.1 \mu\text{F}$ ,  $V_{cc} = 5\text{V}$ . 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

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

(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  $V_s = 1.95 \sin 400t$  is applied to a power amplifier, the resultant current is

$$i_o = 12 \sin 400t + 1.2 \sin 800t + 0.9 \sin 1200t + 0.4 \sin 1600t$$

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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