

# Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

## Third Semester B. Tech. (EE / CS / IT)

Winter – 2014

Course Code: ETU311

Course Name: Electronic Devices and Circuits

Time: 2 Hrs 30Min.

Max. Marks: 60

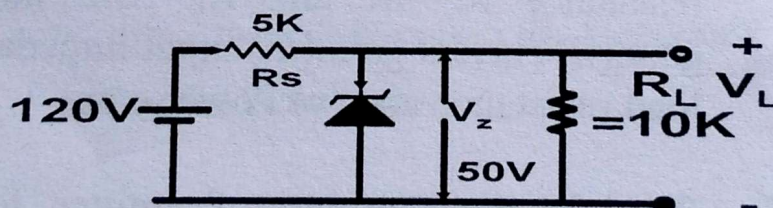
### Instructions to Candidate

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1 Solve the following questions.

12

- (a) For the circuit shown in figure, find  
(i) the output voltage, (ii) the voltage drop across  $R_s$ , (iii) the current through zener.



- (b) In half wave rectifier show that the maximum dc output power occurs when load resistance equals the forward resistance.
- (c) Explain the working of choke input filter and obtain expression for the output dc voltage for full wave rectification.

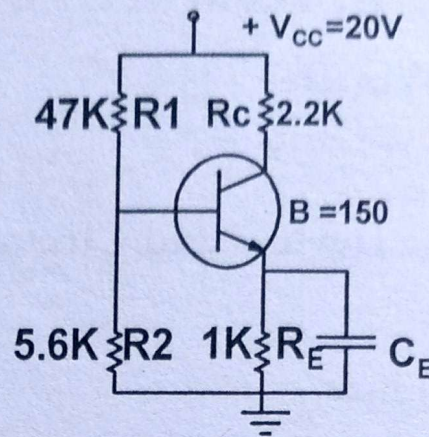


2

Solve any two from the following questions.

12

- (a) For a voltage divider biasing circuit shown in figure, find  $I_C$ ,  $V_{CE}$ ,  $I_B$ ,  $V_E$  and  $V_B$ .



- (b) Explain the need of stabilization for any bipolar junction transistor. List the types of stability factors.
- (c) Why is transistor biasing required? Describe different schemes of transistor biasing in CE-NPN transistor circuit. State their advantages.

3

Solve the following questions.

12

- (a) In C-E transistor amplifier when signal changes by 0.02V, the base current changes by  $10\ \mu\text{A}$  and collector current by 1mA. If the collector resistance  $R_C = 5\text{K}$  and  $R_L = 10\text{K}$ . Find (i) voltage gain, (ii) current gain, (iii) input impedance (iv) AC load resistance and (v) Power gain.
- (b) Explain the working of emitter follower and show how it performs the function of impedance transformation.
- (c) Draw the circuit diagram of R-C coupled amplifier. Explain the importance of each component. Draw and explain its frequency response.

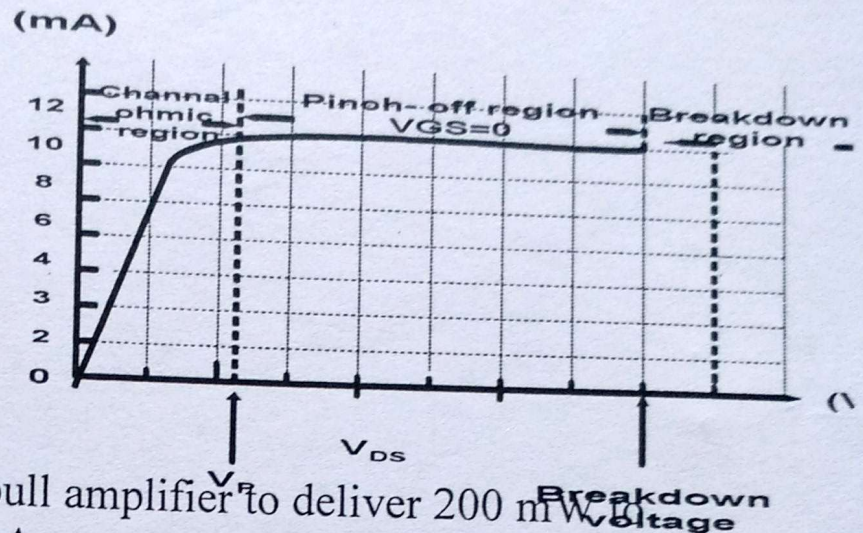


4

Solve any two from the following questions.

12

- (a) Figure shows the drain characteristics for n-channel JFET with  $V_{GS} = 0$ . Explain working of FET in each region and also explain important current and voltage levels.



- (b) Design a push pull amplifier to deliver 200 mW to a load of  $6 \Omega$ . Assume transformer efficiency to be 70% and  $V_{CC} = 12V$
- (c) Discuss the general characteristics of feedback amplifier in detail.

5

Solve any two from the following questions.

12

- (a) Explain the circuit of a UJT as a relaxation oscillator with provision for frequency adjustment and spike waveform.
- (b) Explain the difference between working of Millers sweep circuits and millers bootstraps sweep generator circuit.
- (c) Discuss the working of Self bias bistable multivibrator? What is the use of commutating capacitor?



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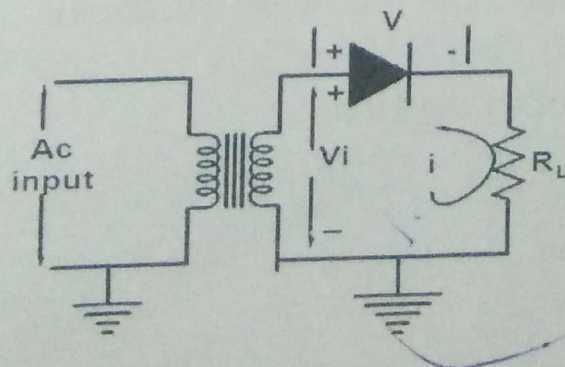
- 1) All questions are compulsory.
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**1**

**Solve the following questions.**

**12**

- (a) Derive an expression for ripple factor of a full wave rectifier with LC filter.
- (b) A diode whose internal resistance is  $20\ \Omega$  is to supply power to a  $1\text{K}\Omega$  load from a  $110\text{V(rms)}$  source of supply as shown in figure. Calculate (a) the peak load current, (b) the dc load current, (c) the ac load current, (d) the dc load voltage (e) the total input power to the circuit, and (f) the peak inverse voltage.





- (c) Define regulation. Explain the operation of a voltage series regulator and the advantages of this circuit over a zener diode regulator.

2 **Solve ANY TWO from the following questions.** 12

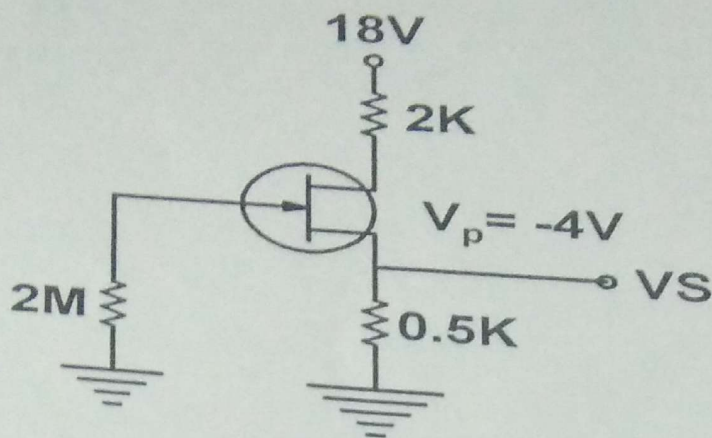
- (a) Compare the CB, CC and CE configurations of a transistor. For a CE configuration prove that  $I_c = \beta I_b + (\beta + 1) I_{co}$ .
- (b) What is mean by stabilization? Derive the three stability factors for bipolar junction transistor.
- (c) Discuss analysis of transistor amplifier using h-parameter in CE configuration.

3 **Solve ANY TWO the following questions.** 12

- (a) In C-E transistor amplifier when signal changes by 0.02V, the base current changes by  $10 \mu A$  and collector current by 1mA. If the collector resistance  $R_C = 5K$  and  $R_L = 10K$ . Find (i) voltage gain, (ii) current gain, (iii) input impedance (iv) AC load resistance and (v) Power gain.
- (b) Explain the working of Bootstrap emitter follower and show how it performs the function of impedance transformation.
- (c) Draw the circuit diagram of R-C coupled amplifier. Explain the importance of each component. Explain its frequency response.

4 **Solve the following questions.** 12

- (a) If  $V_s = 1.7 V$ , find  $I_D$ ,  $V_{GS}$ ,  $V_D$  and  $V_{DS}$ ,  $I_{DSS}$  for the following circuit:



(b) Design a push pull amplifier to deliver 200 mW to a load of  $6 \Omega$ . Assume transformer efficiency to be 70% and  $V_{cc}=12V$

(c) Explain the general characteristics of negative feedback amplifier in detail.

**Solve ANY TWO from the following questions. 12**

(a) Design and explain a UJT as a relaxation oscillator with provision for frequency adjustment and spike waveform.

(b) Distinguish between Hartley and colpitt's oscillator with at least six points.

(c) Write a short note on commutating capacitor. What are the other names of commutating capacitor?