B.E. (Electrical Engineering (Electronics & Power)) Semester Third (C.B.S.)

Electronics Devices & Circuits

Paper - I

P. Pages : 3 **KNT/KW/16/7226**

Time : Three Hours * 0 9 0 9 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Draw and explain the V-I characteristics of a P-N junction diode. **6**

b) Given Si diode with forward voltage V=0.4V. Calculate the factor by which the current will be multiplied when the temperature is increased from 25ºC to 150ºC. **7**

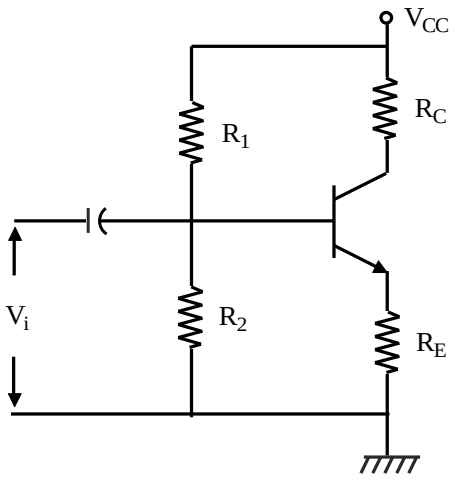
OR

2. a) Draw the circuit diagram of full wave (centre top) rectifier and explain its operation. Also draw the waveforms find efficiency ripple factor and voltage regulation. **10**

b) Write short notes on half wave voltage Doubler. **3**

3. a) Draw input and output characteristics of CB configuration and explain it in details. **6**

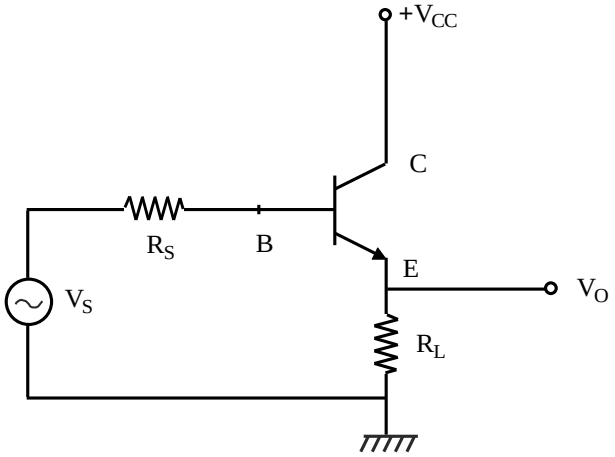
b) A silicon transistor with $\beta = 50$, $V_{BE(active)} = 0.7V$, $V_{CC} = 22.5V$ and $R_C = 5.6\,k$ is used in figure below. It is desired to establish a Q point at $V_{CE} = 12V$, $I_C = 1.5\,mA$ and stability factor $S \leq 3$. Find R_E, R_1 and R_2. **8**



OR

4. a) Define the h parameters for the transistor amplifier circuits. Derive the equation of A_i, A_v, R_i, R_o. **8**

b) Calculate the current gain A_i for emitter follower circuit with $R_L = 10\,k$ and $R_S = 1k$ given that $h_{ie} = 1.1\ k,\ h_{re} = 1,\ h_{fe} = -51,\ h_{oe} = 25\ \mu A/v$. **6**
Also calculate the input resistance R_i for the given circuit.



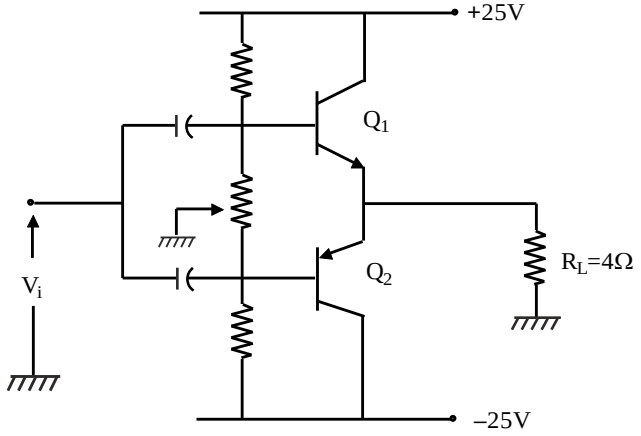
5. a) Explain the working of transformer coupled class B push pull power amplifier. What are the advantages of pull full configuration. **8**

b) A transistor supplies 0.85 watts to 4 kΩ load. The zero signal dc collector current is 31mA and dc collector current with signal is 34 mA. Determine the percentage second harmonic distortion. **6**

OR

6. a) What is cross over distortion in class B amplifier. How it can be eliminated explain it in details. **6**

b) For the circuit shown in figure. **8**
i) Calculate the dc power input, power delivered to the load and power dissipated per transistor when input single $V_i = 12V\,(rms)$.
ii) If the input signal in increased to provide maximum undistorted.
Output, calculate maximum output power and dissipation in each transistor.



7. a) Draw and explain the working of Wein Bridge oscillator. **7**

b) A crystal oscillator has the following parameters. **6**
L = 0.33 H, C = 0.065 pf, Cm = 1 pf and R = 5.5 k.
i) Find the series resonant frequency
ii) By what percent does the parallel resonant frequency exceeds the series resonant frequency
iii) Find the Q factor of the crystal.

OR

8. a) Draw mutual characteristics of JFET and show that , **6**

$$g_m = \frac{2}{|V_P|} \cdot \sqrt{I_{DSS} \cdot I_{DS}}$$

b) With the help of neat sketch, explain the working of JFET. What is pinchoff voltage ? **7**

9. a) Write short notes on simple current source. **6**

b) Draw the circuit of dual input balanced output differential amplifier and using ac and dc analysis, derive the equation for operating paint V_{CEQ} , I_{CQ} and differential gain. **7**

OR

10. a) Write short notes on level shifting techniques. **8**

b) Write short notes on current mirror. **5**

11. a) Write short notes of Alpha numeric codes. **8**

b) Draw the switch equivalent of 2 input NAND and NOR gate and explain. **5**

OR

12. a) State and prove De-Morgan's theorem. **5**

b) Define the following with one example. **8**
i) weighted codes
ii) non weighted codes
iii) self complementing codes
iv) straight binary codes

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