B.E.Third Semester (Electronics / Electronics Telecommunication / Communication Engineering) (C.B.S.)

Electronic Devices & Circuits

P. Pages : 4 **NKT/KS/17/7213/7218**

Time : Three Hours * 0 2 7 1 * 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) Explain the process of breakdown of a p-n junction diode due to. **6**

a) Avalanche effect.

b) Zener effect.

b) The reverse saturation current of a germanium diode is $100\,\mu A$ at room temperature of 27ºC. Calculate the current in forward biased condition, if forward bias voltage is 0.2V at room temperature. If temperature is increased by 20ºC, calculate the reverse saturation current and the forward current, for the same forward voltage at new temperature. **7**

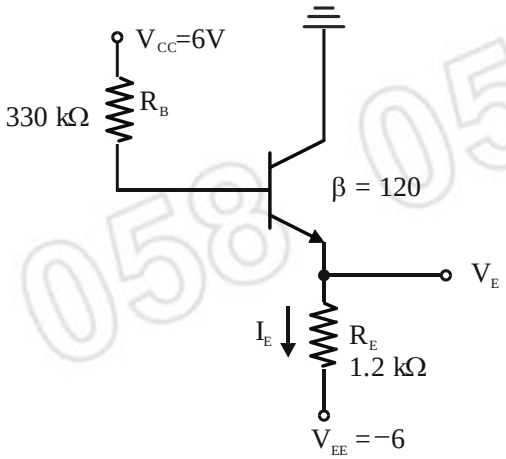
OR

2. a) A bridge rectifier with capacitor filter is fed from 230V to 50V step down transformer. If average d.c. current in load is 1A and capacitor filter of $1000\,\mu F$. Calculate load regulation and ripple factor. Assume power line frequency of 50Hz. Neglect diode forward resistance and d.c. resistance of secondary of transformer. **6**

b) What is the significance of ripple factor and efficiency in rectifier? Derive the expression for ripple factor of full wave rectifier. **7**

3. a) Draw and explain the input and output characteristics of a transistor in CE configuration. Indicate cut-off saturation and active regions. **6**

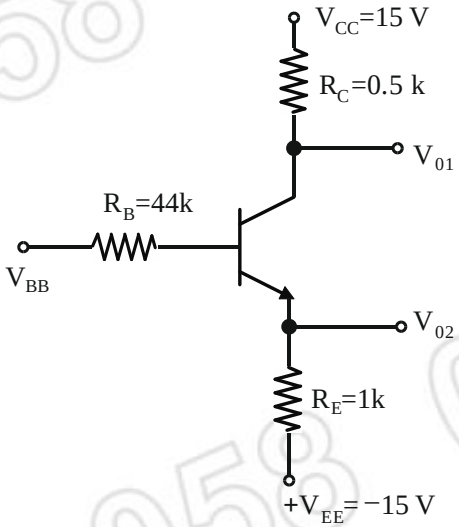
b) For the circuit shown in fig, determine I_E, V_E and V_{CE}. **7**



OR

4. a) What do you understand by bias stabilization and bias compensation? Why it is necessary in transistor amplifier. **6**

b) The circuit shown in fig. uses a transistor having β=100 and if $R_C = 0.5\,k\Omega$ and $V_{BB} = 0$ (i) determine V_{01} and V_{02} (ii) what new value of R_C makes $V_{01} = 0$? (iii) What new value of R_C makes $V_{02} = 0$? **7**



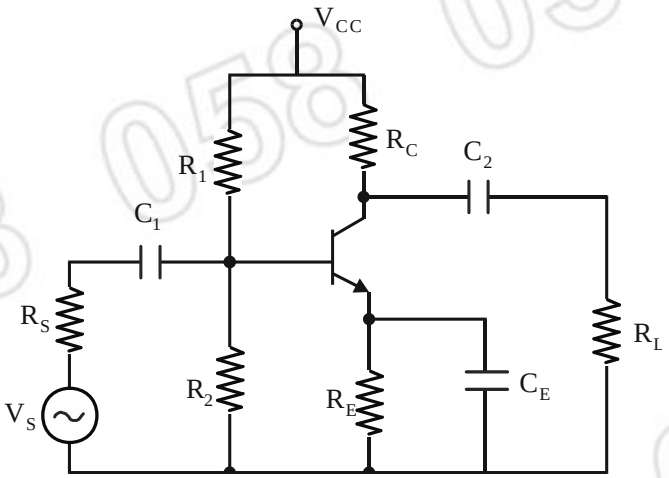
5. a) Write a short note on 'Miller's theorem'. **6**

b) Consider a single stage CE amplifier with **8**

$R_S = 1k\Omega,\ R_1 = 50\,k\Omega,\ R_2 = 2\,k\Omega,\ R_C = 1k\Omega,\ R_L = 1.2\,k\Omega,\ h_{ie} = 1.1k\Omega$

$h_{oe} = 25\mu A/V,\ h_{fe} = 50, h_{re} = 2 \cdot 5 \times 10^{-4}$ as shown in fig.

Find $A_i, R_i, A_v, A_{is}, A_{vs}$ and R_o.



OR

6. a) Explain the advantages of negative feedback over positive feedback. Also state disadvantages of negative feedback. **6**

b) An amplifier with open loop gain of 1000 delivers 10W of power output at 10% second harmonic distortion when input is 10mV. If 40 dB negative feedback is applied and output power is to remain at 10W, determine required input signal vs and second harmonic distortion with feedback. **8**

7. a) Explain the working of Wein Bridge oscillator. Derive the formula for the frequency of oscillations. **8**

b) A crystal has L = 0.33H, C=0.065 PF and $C_M = 1pF$ with $R = 5.5k\Omega$. Find. **5**

i) Series resonant frequency.
ii) Parallel resonant frequency.
iii) By what percentage does the parallel resonant frequency exceed the series resonant frequency?
iv) Find the Q factor of the crystal.

OR

8. a) Explain the working of transistorized a stable multivibrator with suitable waveforms. **6**

b) Draw neat sketch and explain the working of Wein Bridge oscillator. Also explain Barkhausen's criterion **7**

9. a) Prove that the maximum efficiency of a transformer coupled class A amplifier is 50%. **6**

b) Explain the working of complementary symmetry class B amplifier what are its advantages. **7**

OR

10. a) What is cross over distortion in amplifiers? How to eliminate it. **5**

b) A complementary symmetry class AB audio frequency amplifier uses two matched BJTs and dual power supply of $\pm 30V$ and feeds a common load of 8Ω. If the input voltage of this amplifier is 8V (rms), calculate: **8**

i) DC Power input.
ii) A. C. Power output.
iii) Maximum possible a.c. power output.
iv) Efficiency.
v) Power dissipation by both the transistors.

11. a) Explain the static drain and transfer characteristics of JFET. **6**

b) Explain how JFET acts as a voltage variable resistance. **3**

c) Prove that, for JFET. **5**

$$g_m = \frac{-2I_{DSS}}{V_P}\left(1-\frac{V_{GS}}{V_P}\right)$$

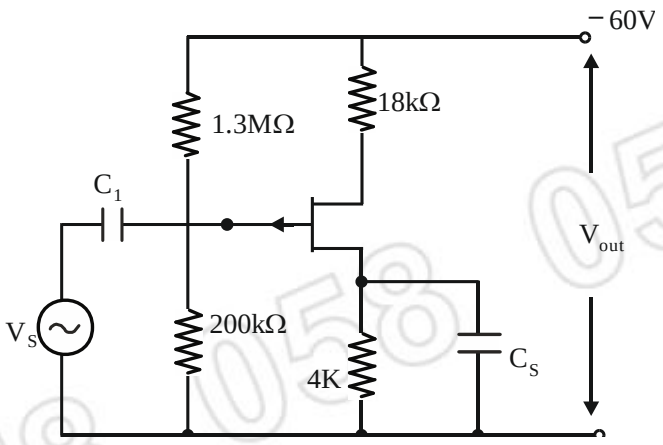
OR

12. a) Explain the working of n-channel depletion type MOSFET with suitable circuit diagram. **6**

b) For the circuit shown in figure, the FET has $V_P = 4V,\ I_{DSS} = 4mA$ calculate. **8**

i) I_{DSQ} ii) V_{GSQ}

iii) V_{DSQ}



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