B.E.(with Credits)-Regular-Semester 2012-Information Technology Sem III

IT 303 - Basic Electronics

P. Pages : 4 **GUG/W/16/3771**

Time : Three Hours * 3 6 2 1 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Explain with neat circuit diagram how the Zener diode used as a regulator. **6**

b) In the figure shown. fig 1(b), if Vin = 25V, R_1 = 1 KΩ, Vz = 9 V. Find power dissipated by Zener when, **6**

i) $R_L = 1K\Omega$ ii) $R_L = 10K\Omega$

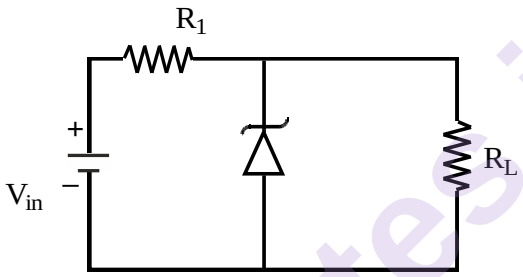


Fig. 1 (b)

c) Write difference between Normal diode and Zener diode explain with the help of their chara. **4**

OR

2. a) Draw and explain circuit of center tapped full wave rectifier circuit & derive expression for I_{rms}, I_{dc}, η, TUF, PIV of each diode. **8**

b) State and prove clamping circuit theorem. **4**

c) For the circuit shown in fig. Q. 2 (c) sinusoidal signal Vi = 50 sin ωt is applied as input the diodes are ideal. Plot transfer characteristics. **4**

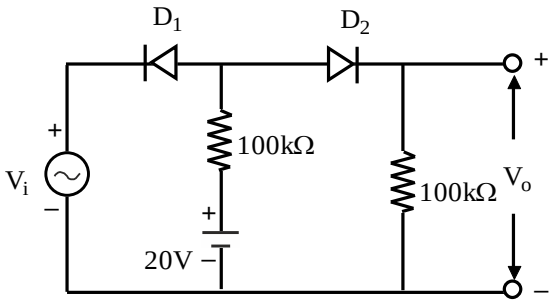
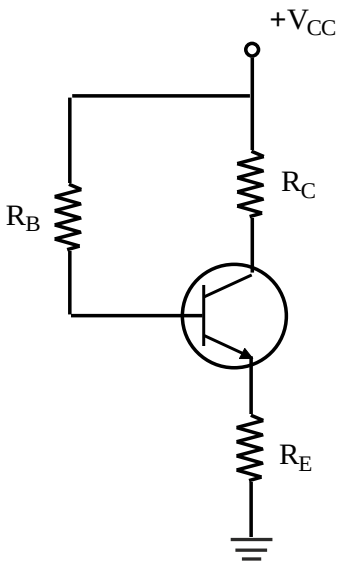


Fig Q. 2 (c)

3. a) For the transistor circuit shown in fig. below, V_{CC} = 10V, R_C = 2 KΩ, R_B = 100 KΩ & R_E = 1.5 KΩ. Determine the transistor current. Show that transistor is in saturation if β_{dc} = 100. **8**



$V_{CE(sat)} = 0.2V$

$V_{BE(sat)} = 0.7V$

b) What is reach through in transistor. **2**

c) Explain input and output characteristics of C B configuration of transistor. Mention different operating regions of transistor on characteristics. **6**

OR

4. a) Explain the principle of operation of emitter bias arrangement. Derive the expression for S & state how stability factor can be improved. **8**

b) Explain in detail Drain characteristics and transfer characteristics of n – channel JFET. For an n – channel JFET, V_P = -5V, I_{DSS} = 8 mA & V_{as} = -2.5 V. Determine **8**

i) I_D

ii) g_{mo}

iii) g_m

5. a) Explain why oscillator needs positive feedback? **4**

b) Explain the operation and working of wien bridge oscillator also derive the necessary equation for oscillation. **10**

c) Explain Barkhausen's criterion of oscillator. **2**

OR

6. a) Draw and explain circuit of class – B push - pull power amplifier. Obtain expression for its conversion efficiency. **8**

b) Design single ended transformer coupled class – A power amplifier shown in fig. Q. 6 (b) to deliver a power of 150 mW of audio power into a load of 3Ω. The quiescent base current is adjusted so that $V_m = V_{cc}$. The supply voltage V_{cc} = 18 V. The collector dissipation should not exceed 250 mW. **8**

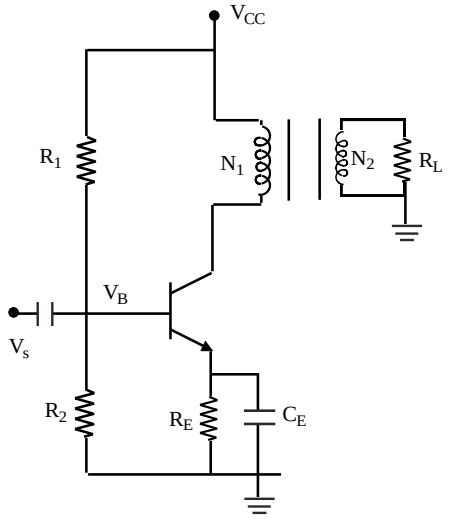


Fig. Q. 6 (b) Transformer – coupled amplifier

7. a) Explain with suitable diagrams and equation the following parameters of op – amp. **8**
i) Input offset voltage ii) Input offset current
iii) CMRR iv) Slew rate

b) Explain the concept of "Virtual Ground" for op – amps and derive expression, for closed loop gain of inverting configuration of op – amp. **4**

c) An op – amp has a differential gain of 80 dB and CMRR of 95 dB. If V_1 = 2 µV & V_2 = 1.6 µV. Then calculate differential and common mode output values (V_0). **4**

OR

8. a) Describe working of Schmitt trigger with neat circuit diagram. Determine values of R_1 and R_2. The supply voltages are ± 15 V & range of hysteresis is 5V. **8**

b) Explain working of a monostable multivibrator using an op – amp. Derive expression for its pulse width & Draw the waveforms. **8**

9. a) Using mesh analysis, obtain current through 10 V battery for circuit shown in fig. **8**

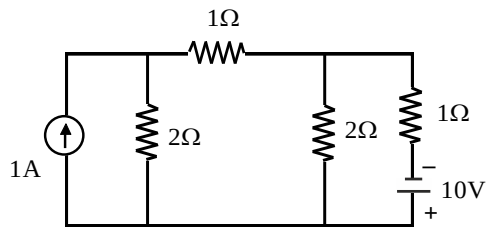


Fig. Q. 9 (a)

b) In the network, find nodal voltages by node voltage analysis method. **8**

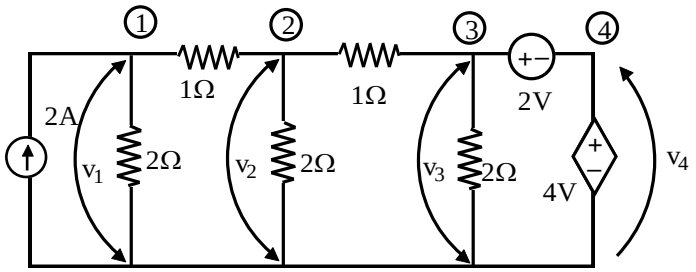


Fig Q. 9 (b)

OR

10. a) Find current in 10 Ω resistor in circuit of fig. shown below using thevenins theorem. What is the power loss in that resistor? **8**

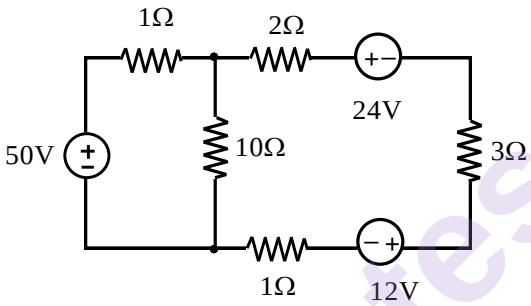


Fig Q. 10 (a)

b) What is amount of maximum power transfer to R in the circuit shown below **8**

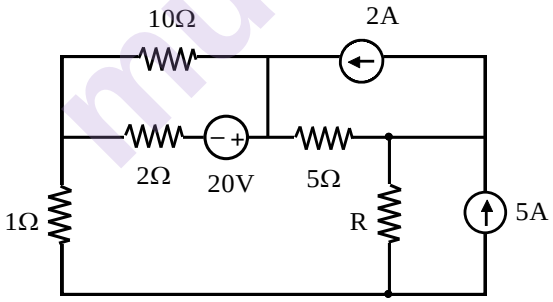


Fig Q. 10 (b)

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