1.	a.	Count the number of branches and nodes in the circuit. If i_x= 3A and the 18 V source delivers 8A of current, what is the value of R_A? Use Ohm's law as well as KCL.	6
	b.	Reverse saturation current of Ge diode is 200uA at 27°C. If temperature is increased by 30°C find I_S and I_D for the bias voltage of 0.2V at new temperature. If it were Silicon diode what is the current at 27°C ideally.	6
	c.	Explain diode models with the help of equivalent circuits and V-I characteristics. Find Vo_1, and Vo_2 for the circuit shown considering practical diodes. $R_1 = 1\cdot2 k\Omega$, $R_2 = 3\cdot3 k\Omega$	8
2.	a.	Explain the operation of the circuit shown along with the required equivalent circuits and waveforms. Calculate the output DC level and the required PIV of each diode.	8
	b.	Draw the circuit diagram of a center tapped FWR with capacitor filter. If the filter capacitor is 120 uF and load current is 80mA calculate the % ripple of the output. The FWR is operating from 50Hz supply and develops a peak rectified voltage of 25V.	6
	c.	Design a Zener regulator that maintains V_0 at 10V for input voltage variation of 20V±10% and load current variation of 30mA ±20%. Given Izmin =2mA and Izmax=50mA. Draw the circuit indicating the values of all the components.	6
3.	a.	Simplify the Boolean expression Y=A(B+C(AB+AC)') showing the steps involved, also implement the simplified expression using 2 input NAND gates.	6
	b.	Write Sum and Carry expression for Full Adder and implement it using 4:1 Multiplexer. Draw the circuit considering Cin as Data line and A,B as select lines. Write the data line input to D0, D1, D2, D3	8

	c.	Starting from LSB load the data 1010 into SISO Shift register. Explain the operation using negative edge triggered D flip flop along with circuit, state table and timing diagrams.	6
4.	a.	Draw and explain the input and output characteristics of transistor in CE configuration. Mark all the regions of operation stating the biasing conditions for these regions.	8
	b.	Draw and explain the structure of the N channel E- MOSFET. Given $I_{D(ON)}$=3mA at $V_{GS(ON)}$ =10V for an enhancement type of MOSFET with V_T=3V. Find K and the drain current for V_{GS}= 8V indicating all the steps involved and formula used.	6
	c.	The input power to a device is 10,000 W at a voltage of 1000 V. The output power is 500 W, while the output impedance is 20Ω. Find the power and voltage gain in decibels.	6
5.	a.	Define and write ideal values along with the units of the following parameters of Operational Amplifier - i) CMRR, ii) GBW, iii) Slew rate.	6
	b.	Name any one open loop application of Op Amp. Explain this application in detail.	6
	c.	Identify the stages and find the output voltage at each stage. $V_{in} = 0.25V$ $V_i = 2V$ $V_2 = 0.5V.$	8