MID TERM EXAMINATION

B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)

II Semester, May, 2023

Paper Code: ES-108   Subject: Electrical Science

Time: 1½ Hrs.   Max. Marks: 30

Note: Attempt Q. No. 1 which is compulsory and any two more questions from remaining.

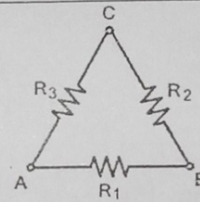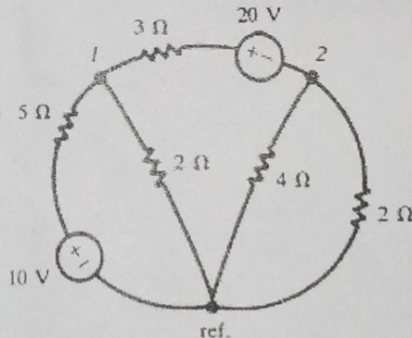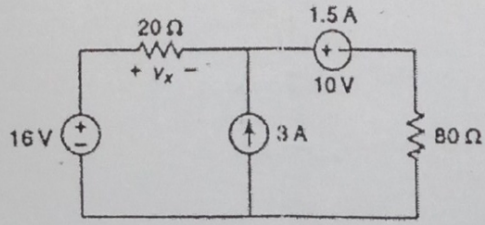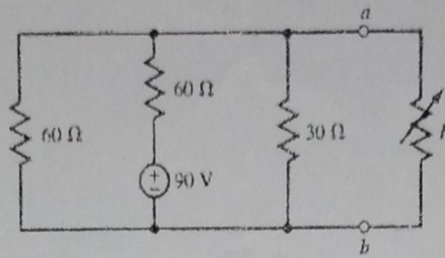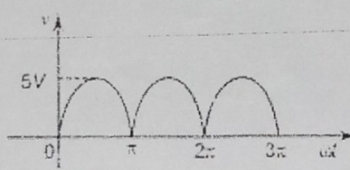| Q. No.	Question	Max. Marks	CO(s)
1 (a)	Differentiate between: i) Linear and Nonlinear elements ii) Active and Passive elements	2	1
1 (b)	Determine the power factor of a series RLC circuit with R= 50 Ω, X_L=100 Ω, X_c=25 Ω.	2	2
1 (c)	Find the equivalent star connection of Fig.1, where R_1=R_2=R_3=5 Ω. Fig.1	2	1
1(d)	Find the value of voltage at node 1 and 2 using nodal analysis (Fig.2). Fig. 2	2	1
1 (e)	Define real power, reactive power, complex power and power factor.	2	2
2 (a)	Find the value of voltage v_x using superposition theorem (Fig.3). Fig. 3	6	1
2(b)	State the Thevenin's theorem with example.	4	1
3 (a)	Find the maximum power that the active network to the left of terminals ab can deliver to the adjustable resistor R in Fig. 4.	6	1

Fig.4

3 (b)	A resistor and a capacitor are connected in series with a variable inductor. When the circuit is connected to a 240 V, 50Hz supply the maximum current obtained by varying the inductance is 0.5 A. At this the voltage across the capacitor is 250 V. Determine the values of resistance, capacitance and inductance.	4	2
4 (a)	What is resonance in series RLC circuit? Derive the expression of resonant frequency, Q factor and bandwidth for the same.	6	2
4 (b)	Find the average value and rms value for the following i) Full wave rectified sine wave (Fig.5)	4	2

Fig.5

ii)   v=60.53 sin 300t