

# MID TERM EXAMINATION

**B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)**

II Semester, May, 2023

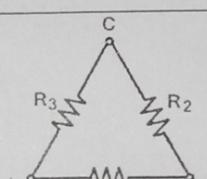
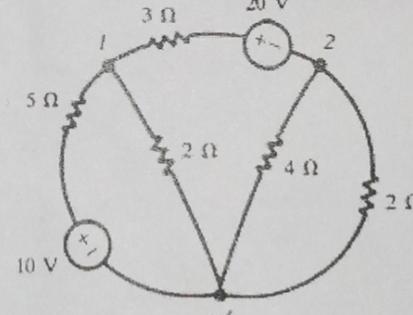
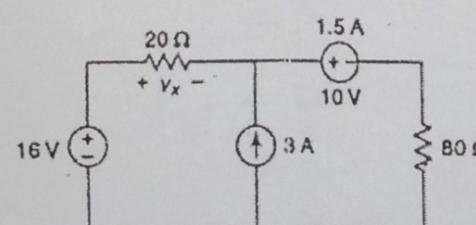
Paper Code: ES-108

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 $R=50 \Omega$ , $X_L=100 \Omega$ , $X_C=25 \Omega$ .	2	2
1 (c)	Find the equivalent star connection of Fig.1, where $R_1=R_2=R_3=5 \Omega$ .	2	1
	 <b>Fig. 1</b>		
1(d)	Find the value of voltage at node 1 and 2 using nodal analysis (Fig.2).	2	1
	 <b>Fig. 2</b>		
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).	6	1
	 <b>Fig. 3</b>		
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

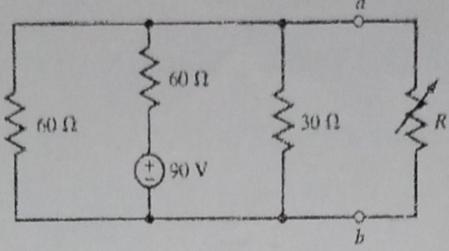


Fig.4

- 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 (a) What is resonance in series RLC circuit? Derive the expression of resonant frequency, Q factor and bandwidth for the same.

- 4 (b) Find the average value and rms value for the following

i) Full wave rectified sine wave (Fig.5)

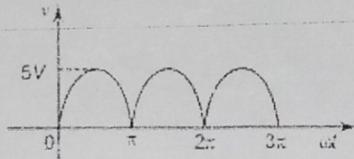


Fig.5

ii)  $v=60.53 \sin 300t$

4 2

6 2

4 2

# Class Test

Subj :- ELECTRICAL SCIENCE

Sem - II

Time -  $1\frac{1}{2}$  Hrs

Max Marks - 30

Code :- ES-108

Note :- Q.1 is compulsory. Attempt any 2 from the rest.

Q.1(a) ✓ why the transformer rating is in KVA? [10]

(b) ✓ why a rotating field system used in preference to a stationary field?

(c) ✓ state the advantage of 3- $\phi$  system over 1- $\phi$  system.

(d) ✓ what is back emf?

Q.2 (a) ✓ what are the different types of speed control systems in a DC shunt motor? Explain any one. [5]

(b) Define the 'slip' of 3- $\phi$  induction motor. Give some industrial uses of 3- $\phi$  induction motor

Q.3 (a) Explain short-circuit and open-ckt test in [5]

a transformer.

(b) Describe construction and principle of operation [5] of a PMMC instrument with the help of fig.

Q.4 (a) A 1- $\phi$  transformer for 2000/400 V at no-load has [5]  
 $R_1 = 5.5 \Omega$ ,  $X_1 = 12 \Omega$ ,  $R_2 = 0.2 \Omega$ ,  $X_2 = 0.45 \Omega$ . Rated secondary current is 25 Amp. Determine the secondary terminal voltage at full load, 0.8 p.f. power factor lagging.

(b) A dc shunt motor runs at 600 rpm taking 60A from [5] 230V supply. with armature and field resistances  $0.2 \Omega$  &  $115 \Omega$  resp. Find the speed when the current through armature is 30 A.