Profs. N. Sabah
R. Chedid
L. Chaar
I. Mougharbel

FACULTY OF ENGINEERING
& ARCHITECTURE

FALL TERM 20

Name:.....
Major:.....
Instructor.....

NOV , 20

TEST ID 2000

(ELEG 310) ELECTRIC CIRCUITS

CLOSED BOOK (1 ½ HRS)

Programmable Calculators are not allowed
Provide your answers on the computer's card only
Return the computer's card attached to the question sheet
Mark with a pencil your name and your ID-No
Use pencil for marking your answers
When using eraser, be sure that you have erased well

!!! PENALTY IS 6 TO 1 !!!

Profs. N. Sabah
R. Chedid
L. Chaar
I. Mougharbel

FACULTY OF ENGINEERING
& ARCHITECTURE

FALL TERM 20

Name:.....
Major:.....
Instructor.....

NOV , 20

TEST ID 2000

(ELEG 310) ELECTRIC CIRCUITS

CLOSED BOOK (1 ½ HRS)

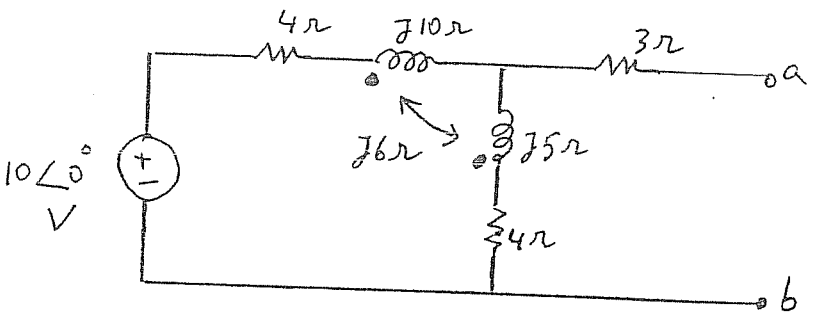
Programmable Calculators are not allowed
Provide your answers on the computer's card only
Return the computer's card attached to the question sheet
Mark with a pencil your name and your ID-No
Use pencil for marking your answers
When using eraser, be sure that you have erased well

!!! PENALTY IS 6 TO 1 !!!

1. An impedance Z1= (4+j4) Ω is connected in parallel with an impedance Z2= (12+j6) Ω. If the input reactive power is 1000 VAR (lagging), what is the total active (average) power ?

A. 1210 W
B. 3025 W
C. 826.39 W
D. 1150 W
E. None of the above

2. In the circuit shown below, find the Thevenin equivalent circuit as seen from terminals a-b.

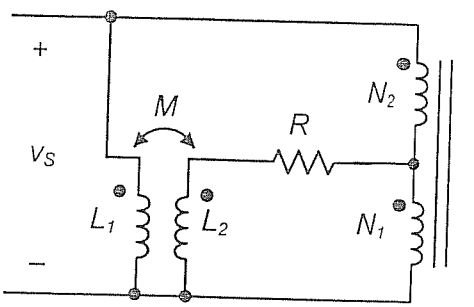


A. V_{Thev}= 4.82< 34.60, V, Z_{Thev}= 8.62<40.38 Ω
B. V_{Thev}= 48.2<-34.60, V, Z_{Thev}= 86.2<48.79 Ω
C. V_{Thev}= 5<-34.60, V, Z_{Thev}= 8.1<48.79 Ω
D. V_{Thev}= 4.82<-34.60, V, Z_{Thev}= 8.62<48.79 Ω
E. None of the above

3. The conjugate of the complex power delivered by a current source is 200 – *j*200 VA. If the source current is $\frac{10}{\sqrt{2}}\angle 45°$ A peak, determine the rms voltage across the source.

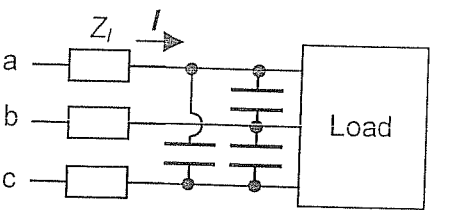
A. 40 V rms
B. *j*40 V rms
C. 80 V rms
D. –*j*40 V rms
E. None of the above

4. In the figure shown, $v_S = 10\cos 100\pi t$ V rms, $L_1 = 120$ mH, $L_2 = 30$ mH, $R = 100$ ohms, $N_1 = 500$ turns, and $N_2 = 1500$ turns. Determine the coupling coefficient so that no current flows in the 100 ohm resistor.



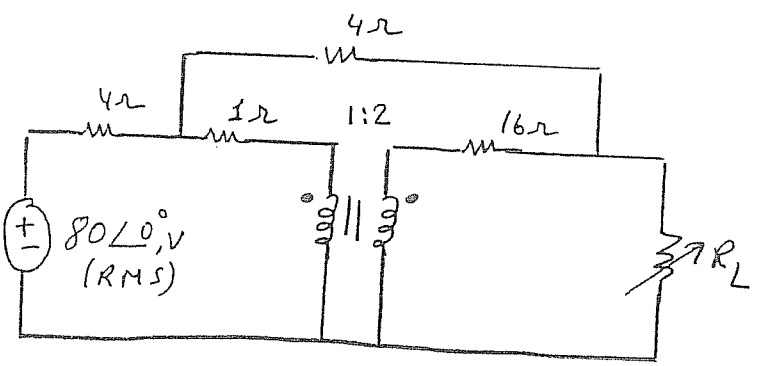
A. 0.4
B. 0.5
C. 0.6
D. 0.8
E. None of the above

5. Given a balanced three-phase system in which the load consumes 50 kW at 0.8 p.f. lagging. The line impedance $Z_l = 0.5 + j\,0.5\ \Omega$. Capacitors are connected at the load terminals so that the p.f. at the supply terminals abc is unity. If the line current I is 100 A rms, determine the rms line voltage at the load terminals. (Answers are rounded to three significant figures.)



A. 579 V rms
B. 367 V rms
C. 301 V rms
D. 262 V rms
E. None of the above

6. Find the maximum average power given that R_L is adjusted for maximum power transfer.



A. 300 W
B. 800 W
C. 200 W
D. 25 W
E. None of the above

7. A three-phase line has an impedance of $(0.1 + j\ 0.8)\ \Omega/\phi$, the line feeds two-balance three- phase load connected in parallel. The first load absorbs a total of 540 kW and 720 kVAR. The second load is Y connected and has an impedance of $20 - j\ 6.67\ \Omega/\phi$, the line-to-neutral voltage at the load is 4 kV_{rms}. Find the line voltage at the source.

A. 6990.63 V
B. 6973.6 V
C. 6987.47 V
D. 6951.82 V
E. None of the above

8. Consider a source Vs supplying the primary of a transformer. The secondary is connected to a purely capacitive load Zc. The primary impedance is Z1, the secondary impedance is Z2, and the mutual impedance between primary and secondary is Zm. Calculate the currents I1 at primary and I2 at secondary.

Given: Vs = 300 <0° V, Z1=j3600 Ω, Z2=j2500 Ω, Zm=j1200 Ω, Zc= -j1800

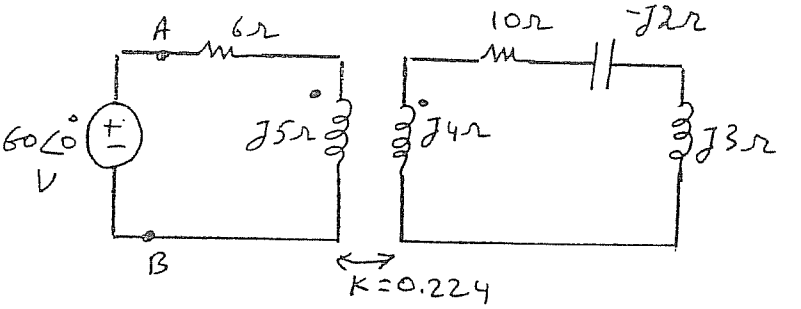
A. I1= 132 <+90° mA, I2=333<-90° mA
B. I1= 132 <0° mA, I2=333<+180° mA
C. I1= 280 <-90° mA, I2=560<+90° mA
D. I1= 280 <0° mA, I2=560<+180° mA
E. None of the above

9. A 3 phase source of voltage is supplying simultaneously two kinds of load. The first one is a 3 phase Y connected inductive load with a power factor of 0.8, and the second one is a 3 phase Δ connected purely capacitive load. The system is perfectly balanced and the voltage between phase A and neutral is considered as reference. The rms phase current in the inductive load is I_L, and the rms phase current in the capacitive load is I_C.

If I_L=10A, I_C=8A, calculate the power factor of the total load and say if it is leading or lagging.

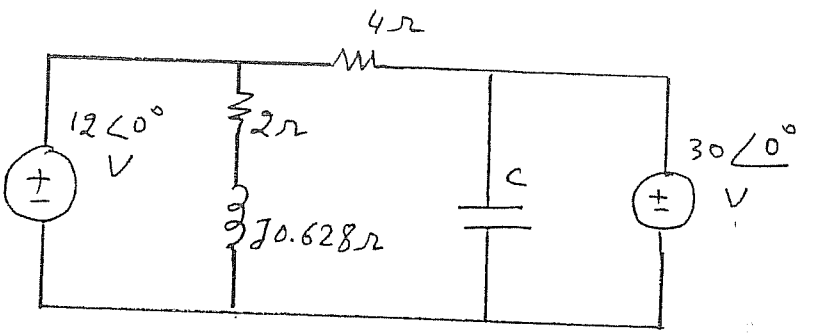
A. 0.97 lagging
B. 0.89 lagging
C. 0.97 leading
D. 0.89 leading
E. None of the above

10. Find the input impedance Z_{AB} in the circuit shown below.



A. 6.1 +J 5 Ω
B. 3.8 + j 9.2 Ω
C. 6 + j 5. 896 Ω
D. 8.3 + j 4.7 Ω
E. None of the above

11. Determine the value of C in the circuit shown if C takes 5 VAR. The operating frequency is 50 Hz.



A. 12.63 μF
B. 14.74 μF
C. 17.68 μF
D. 3 μF
E. None of the above