Name: M. Mujtaba Imtiaz Class: 12th Roll No.

Subject: Physics Test No. Date:

| | A | B | C | D |
|---|---|---|---|---|
| 1 | ○ | ○ | ○ | ○ |
| 2 | ○ | ○ | ○ | ○ |
| 3 | ○ | ○ | ○ | ○ |
| 4 | ○ | ○ | ○ | ○ |
| 5 | ○ | ○ | ○ | ○ |
| 6 | ○ | ○ | ○ | ○ |
| 7 | ○ | ○ | ○ | ○ |
| 8 | ○ | ○ | ○ | ○ |
| 9 | ○ | ○ | ○ | ○ |
| 10 | ○ | ○ | ○ | ○ |
| 11 | ○ | ○ | ○ | ○ |
| 12 | ○ | ○ | ○ | ○ |
| 13 | ○ | ○ | ○ | ○ |
| 14 | ○ | ○ | ○ | ○ |
| 15 | ○ | ○ | ○ | ○ |
| 16 | ○ | ○ | ○ | ○ |
| 17 | ○ | ○ | ○ | ○ |
| 18 | ○ | ○ | ○ | ○ |
| 19 | ○ | ○ | ○ | ○ |
| 20 | ○ | ○ | ○ | ○ |

Marks Obtained

## Q1A:-

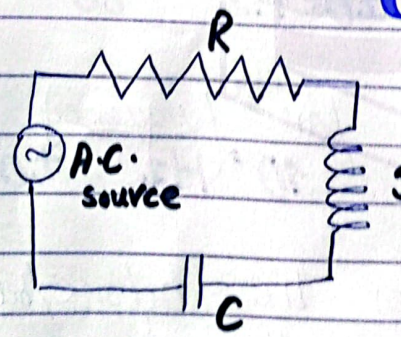
### (1)

The frequency f response of a capacitor C is very different than that of inductor I, when subjected to a source of A.C. voltage because f dependency is oppositie in C an I

As, in C $f \propto \frac{1}{X_C}$ in I $f \propto X_L$

so, in C f is inversely proportional to $X_C$ according to the formula $X_C = \frac{1}{2\pi fC}$ while, in I f is directly proportional to $X_L$ ($X_L = 2\pi fL$).

### (2)

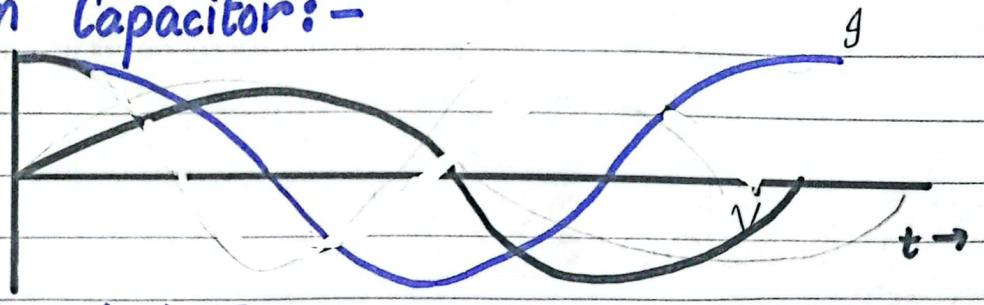



The frequency in RLC circuit at which $X_L = X_C$ is called **Resonance**.

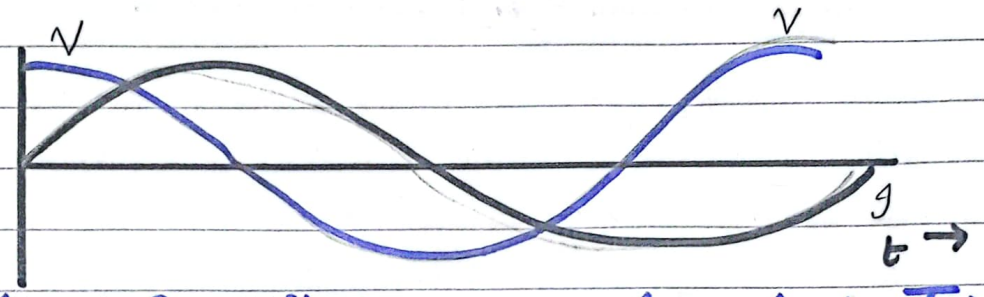
At resonance frequency, the current I and voltage V are both in-phase so, power factor ($\cos\theta = 0°$) is 1.

## (3)

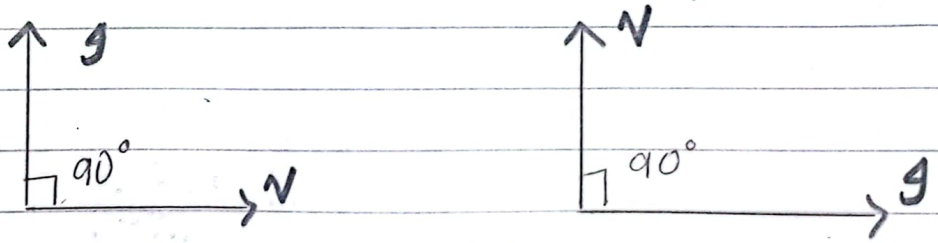
In Capacitor:-




In Inductor:-




In Capacitor ; In Inductor




## (4)

The tramission Range for **Amplitude Modulation** A.M. is $10^6$ Hz to $10^8$ Hz.

The transmission Range for Frequency Modulation F.M. is $10^8$ Hz to $10^{10}$ Hz.

Both of these ranges lie before/below visible spectrum range. It means that we can't see it.

## (5)

Information :—

I — It is actual content to be transferred.
II — It is of low-frequency.
III — It is the message like voice, music, speech etc.
IV — For example, when a persons speaks on a microphone.

Carrier :—

I — It is wave that is used to carry information on it.
II — It is of high-frquency.
III — It is the medium to transfer info.
IV — For example, a sinusoidal wave to carry info. with a frequency in the radio-wave or micro-wave range.

## (6)

A Choke Coil is basically a coil of thick copper wire wound closely in large no. of turns on a soft iron laminated core. It has small resistance and high inductance, so, very less power is dissipated in it.

It is used in A.C. circuit to limit value of current with very small wastage of power as compared to rheostat or resistance.

Inductance = L = $20 \times 10^{-3}$ H
resistance = R = $10\ \Omega$
voltage = V = 240 V
frequency = f = $\frac{180}{\pi}$ Hz

As, Power $P = I_{rms} V_{rms} \cos\theta$.
So, to find $I_{rms}$, firstly :-

$Z = V_{rms} / I_{rms}$

$I_{rms} = V_{rms} / Z$

So,

$Z = \sqrt{(R)^2 + (X_L)^2}$

So,

$Z = \sqrt{100 + 51.84}$

$Z = 12.32\ \Omega$

To find $I_{rms}$,

$I_{rms} = V_{rms} / Z$

$I_{rms} = 240 / 12.32$

$I_{rms} = 19.48$ A

"$X_L$"

To find $X_L$,

$X_L = \omega L$

$X_L = 2\pi f L$

$X_L = 2\pi (180/\pi)(20 \times 10^{-3})$

$X_L = 7.2\ \Omega$

To find $\theta$,

$\theta = \tan^{-1}\left(\frac{X_{L_s}}{R}\right) = \tan^{-1}\left(\frac{7.2}{10}\right)$

$\theta = \tan^{-1}(18/25)$

$\theta = 35.75°$

So,

$P = I_{rms} V_{rms} \cos\theta$

$P = 19.48 \times 240 \times \cos(35.75°)$

$P = 4675.2 \times (0.8116)$

$P = 3794.4$ W