Q. 1 **A sinusoidal current has rms value of 10A. What is the maximum or peak value?**

Ans. $I_{rms} = I_o / \sqrt{2}$

or $I_o = \sqrt{2}\ I_{rms}$

$= \sqrt{2} \times 10 = 14.14$ A

Q. 2 **Name the device that will (a) permit flow of direct current but oppose the flow of alternating current. (b) permit flow of alternating current but not the direct current.**

Ans. a) i) Inductor permits flow of direct current but oppose the flow of alternating current due to its inductive reactance. As $X_L = 2\ \pi\ f\ L$, for D.C, f = 0 hence $X_L = 2\ \pi\ (0)\ L = 0$ Hence inductive reactance for d.c. becomes zero.

b) Capacitor permits flow of alternating current but not the direct current. As $X_C = 1/2\ \pi\ f\ L$, for D.C, f = 0 hence $X_C = \infty$ for direct current.

Q. 3 **How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?**

Ans. The lamp will reach maximum brilliance for 100 times in one second. In an a.c. cycle, the current becomes maximum twice, once for +ve half and once for –ve half cycle of 50 Hz a.c. source .

Therefore $2f = 2 \times 50 = 100$ times /second

Q. 4 **A circuit contains an iron-cored inductor, a switch and a D.C. source arranged in series. The switch is closed and after an interval reopened. Explain why a spark jumps across the switch contacts?**

Ans. When switch is closed the current increases from zero to maximum and when switch is reopened then current decreases to zero from maximum. So when the switch is reopend then current is maximum due to which a spark jumps across the switch.

Q. 5 **How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor?**

Ans. a) for inductor: f = 2f

$X'_L = 2\pi\ f\ L = 2\pi * 2f\ L = 2 * 2\pi fL = 2X_L$

The inductive reactance will become double.

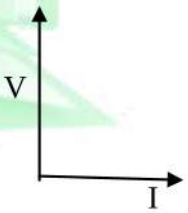
b) for capacitor: f = 2f

$X'_C = 1 / 2\pi fC = 1 / 2\pi * 2f\ C = ½ \times 1 / 2\pi fC = ½\ X_C$

The capacitive reactance becomes half.

Q. 6 **In a R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.**

Ans. In R-L circuit, the current lags behind the voltage by 90^o or $\pi /2$



Q. 7 **A choke coil placed in series with an electric lamp in an A.C. circuit causes the lamp to become dim. Why is it so? A variable capacitor added in series in this circuit may be adjusted until the lamp glows with normal brilliance. Explain, how this is possible?**

Ans. Lamp becomes dim due to large inductive reactance to the flow of current which decreases the current. With the addition of variable capacitor, the reactance of capacitor $X_C = 1/ \omega C$ will be adjusted in a way that electrical resonance occurs and it becomes equal to the inductive reactance $X_L = \omega L$. Since X_C and X_L beahve oppositley as a function of frequency so they cancel each other effect. The impedance of the circuit becomes minimum hence maximum current flows through it due to which lamp start glowing with nornal brilliance.

Q. 8 **Explain the conditions under which electromagnetic waves are produced from a sourc.**

Ans. Electromagnetic waves are generated when electric or magnetic flux is changing through a certain region of space. This can be done by oscillating electrical charges. The oscillation can be produced by LC circuit or waving the conductor in space or by continuously reversing the polarity of attached voltage source.

Q. 9 **How the reception of a particular radio station is selected on your radio set?**

Ans. The formula for the resonance frequency is given by

$$f_r = 1/(2\pi\sqrt{LC})$$

We continuously change the value of variable capacitor provided in the oscillator circuit (LC circuit) of our radio set with the help of a knob which changes frequency of this circuit. When this frequency matches the frequency of radio station then resonance takes place and that particular radio station is selected on our radio set.

Q.10 **What is meant by A.M. and F.M.?**

Ans. **A.M. means Amplitude Modulation**: This is the type of modulation in which amplitude of the carrier waves is increased or dimnished as the amplitue of modulating signal increases or decreases but the frequency of the carrier waves is kept constant. The A.M. transmission frequencies ranges from 540 kHz to 1600 kHz. These are long range waves and less effected by the obstacles like hills and large buildings. Their quality of signal is not good.

F.M. means Frequency Modulation: This is the type of modulation in which frequency of the carrier waves is increased or diminished as the modulating signal amplitude increases or decreases but the amplitude of the carrier waves remains constant. The F.M. transmission frequencies has range from 88 MHz to 108 MHz. Frequency modulated radio waves are less effected by the electrical interference, that is why their signal quality is good. These are short range waves.