

Department of Electrical Engineering, IIT Delhi  
Recruitment of Senior Laboratory Assistant

Date: 19-Jan-2020

Written test: 70 marks

**Answer all the twenty (20) questions below. Choose the correct answer. Each question carries equal marks.**

1. A resistor in the lab has colour marking of white-violet-black from left to right. The value of the resistance is

- [A] 6.7 Ohm
- [B] 9.7 kOhm
- [C] 97 Ohm
- [D] 67 Ohm

2. A ceramic capacitor has "103 500V" written on it. The value of the capacitance is

- [A] 10 mF
- [B] 0.1 mF
- [C] 1  $\mu$ F
- [D] 0.01  $\mu$ F

3. A single phase lagging load is connected to a single phase supply. The current and voltage are related as

- [A] Load current lags load voltage
- [B] Load voltage lags load current
- [C] Line voltage lags load voltage
- [D] Line current lags load current

4. A single phase 230V source is connected to a resistive load of 23 ohms. The power dissipated in the load is

- [A] 23 W
- [B] 5290 W
- [C] 2300 W
- [D] 230 W.

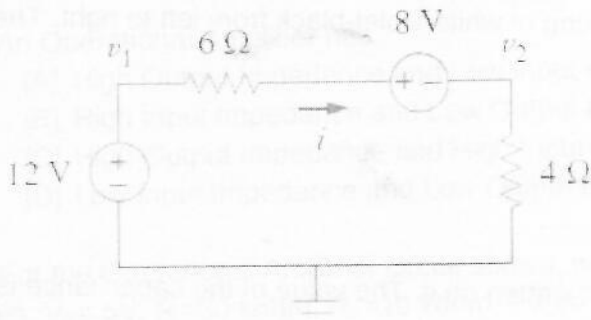
5. An AC coupled measurement with an oscilloscope loses the following information present in the input voltage waveform:

- [A] Low frequency components
- [B] High frequency components
- [C] There is no loss of any information
- [D] Intermediate frequencies determined by the bandwidth

6. In an oscilloscope with 1 MOhm input impedance, what is the usual gain of a 10x probe?

- [A]  $\frac{1}{2}$
- [B]  $\frac{1}{5}$
- [C]  $\frac{1}{50}$
- [D]  $\frac{1}{10}$

7. The value of the current  $i$  in the following circuit is



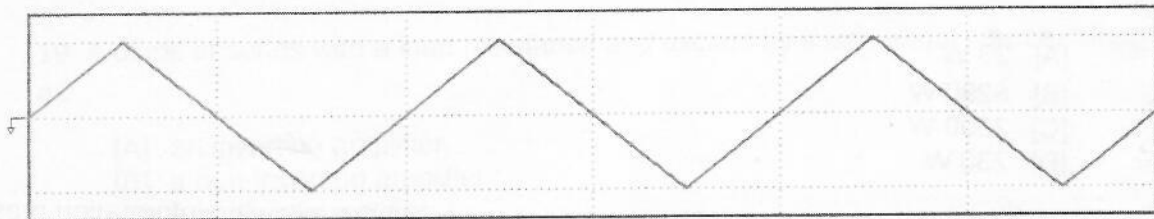
- [A] 2 A
- [B] 0.4 A
- [C] -0.4 A
- [D] -2 A

8. An RC circuit has  $R = 200$  Ohm and  $C = 10$ mF. The time constant of the circuit is

- [A] 2 s
- [B] 4 s
- [C] 0.25 s
- [D] 0.5 s

9. The frequency of the waveform (shown below) obtained from an oscilloscope, is

x-axis: 10us/div; y-axis: 2V/div

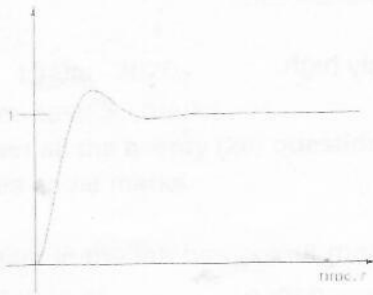


- [A] 100 kHz
- [B] 50 kHz
- [C] 25 kHz
- [D] 10 kHz

10. The peak-to-peak voltage recorded in the waveform shown in Q9 is:

- [A] 2 volts
- [B] 4 volts
- [C] 0.4 volts
- [D] 1 volt

11. The RLC circuit response shown in the following diagram is a/an



- [A] overdamped response.
- [B] critically damped response
- [C] underdamped response
- [D] none of the above.

12. Consider a series RLC circuit with  $R = 10 \text{ ohm}$ ,  $L = 1 \text{ mH}$  and  $C = 1\mu\text{F}$ . This is connected across a 10V DC battery. How much current flows through the circuit at steady state?

- [A] 1A
- [B] 1 mA
- [C] 1/3 mA
- [D] Zero

13. It is required to start a separately excited 220V DC motor in the lab. Which of the following statements is true?

- [A] The field circuit resistance should be high and the armature circuit resistance high
- [B] The field circuit resistance should be low and the armature circuit resistance high
- [C] The field circuit resistance should be high and the armature circuit resistance low
- [D] The field circuit resistance should be low and the armature circuit resistance low

14. Which loss is determined by short circuit test of a transformer?

- [A] Core loss
- [B] Eddy current loss
- [C] Hysteresis loss
- [D] Copper loss

15. A 220V, 10A DC generator needs to be loaded by using loading rheostats. Which of the following rheostats available in the lab can be chosen?

- [A] 5 ohm, 5 A
- [B] 10 ohm, 12 A
- [C] 50 ohm, 5 A
- [D] 50 ohm, 12 A

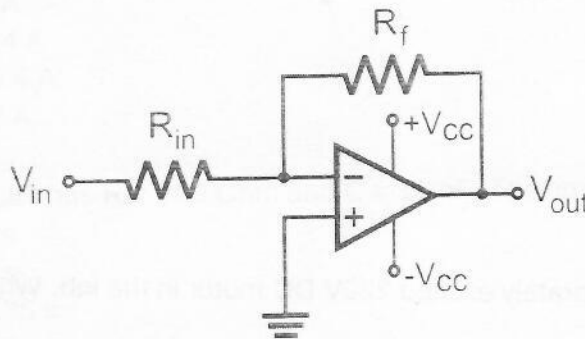
16. A constant DC voltage of magnitude 100V is applied for a long time to the input of a 2:1, 100V, 1kW transformer with 10 ohm connected at the secondary. Which of the following statements is true at steady state?

- [A] The primary current would be enormously high.
- [B] The primary current would be 15 A.
- [C] The primary current would be 10 A.
- [D] The primary current would be 0 A.

17. An Operational Amplifier has

- [A] High Output Impedance and Low Input Impedance
- [B] High Input Impedance and Low Output Impedance
- [C] High Output Impedance and High Input Impedance
- [D] Low Input Impedance and Low Output Impedance

18. For the Operational Amplifier circuit shown, what is the output voltage  $V_{out}$  magnitude?  
Given:  $V_{in} = 5V$ ,  $R_i = 30 \text{ kohm}$ ,  $R_f = 10 \text{ kohm}$ ,  $+V_{CC} = 12V$ ,  $-V_{CC} = -12V$ .



- [A] 15V
- [B] -15V
- [C] 12V
- [D] -12V

19. A diode in series with a load resistance and excited by a sinusoidal source, functions as

- [A] an inverting amplifier
- [B] a non-inverting amplifier
- [C] a half-wave rectifier
- [D] a full-wave rectifier

20. Let X and Y are the two inputs of an Exclusive-OR gate. The output of this gate is 1 if

- [A]  $X = 1, Y = 0$
- [B]  $X = 0, Y = 0$
- [C]  $X = 1, Y = 1$
- [D] None of the above

----- End of Question -----