**BIRLA INDUSTRIAL & TECHNOLOGICAL MUSEUM**
(A unit of National Council of Science Museums)

**Written Test for recruitment of Technical Assistant 'A' (Electronics) at BITM, Kolkata**

**Date: 05.12.2022**

**Maximum Marks: 100**
**Time: 3 hours.**

Roll No: _____ Signature: _____

**General Instructions:**

1. All questions in **Section–A** are compulsory.
2. To answer objective type questions put a (√) mark on the correct answer in the question paper itself from the 3 alternatives given below against each question.
3. To change answer, put (X) on previous answer and (√) the fresh answer.
4. For answering Descriptive type questions in **Section–B & C**, use separate sheets to be provided by the office.
5. Smart phone/smart watch are to be put on switched off mode in the examination hall.

## Section - A

Please select the right Alternative: **(10 X 1) = 10**

1. Capacitors can store energy in the form of?
   a. Both Voltage and Current
   b. Only Current
   c. Only Voltage

2. If an Inductor is connected across an AC source, the current through the Inductor will:
   a. Lag
   b. Lead
   c. In phase with the voltage

3. A resonant circuit is used to selectively:
   a. Amplify band of frequencies
   b. Convert DC to AC
   c. Convert Analog signal to Digital

4. Peak Inverse Voltage is used in the specification of:
   a. An Amplifier
   b. A Diode
   c. An Oscillator

5. Feedback is essential for which among the following:
   a. Rectifier
   b. Oscillator
   c. Potential Divider

6. In a number system having Base '8', the Decimal Number 8 will be written as:

   a. 10

   b. 01

   c. 11

7. For an ideal operational amplifier, the output impedance needs to be:

   a. Very High

   b. Very Low

   c. Unstable

8. Which among the following Flip Flops suffers race-around condition?

   a. SR Flip Flop

   b. JK Master Slave Flip Flop

   c. Both the above

9. FM Signals theoretically have:

   a. No Side bands

   b. Only 2 Side bands

   c. An Infinite number of side bands

10. An Infrared Surveillance Camera can:

   a. Capture image only in darkness

   b. Capture image in both day light and darkness

   c. Capture image only when obstructed

## Section B

**Write short notes on any FOUR of the following:** (4 X 5) = 20

a. Impedance Matching

b. Features of Narrow band FM

c. Floating Gate Transistor

d. Circuit Diagram of a 2 bit Asynchronous Counter with timing diagram

e. Derive the expression of resonant frequency for an RLC series circuit in case of series resonance.

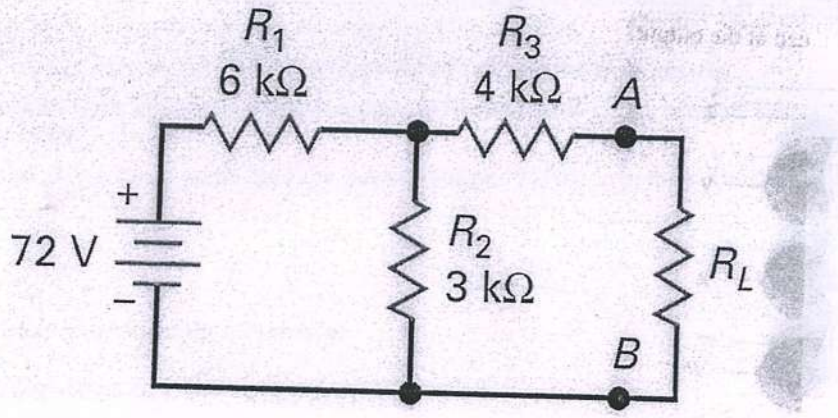
f. Advantages of Microcontroller over Microprocessor

## Section - C

**Answer any SEVEN of the following Questions:** **(7 X 10) = 70**

1. A current Source of 1 Ampere has an internal resistance of 0.99 Kilo Ohms. What will be the value of the Load Resistance so that 99% of the current flows through the Load Resistance only?

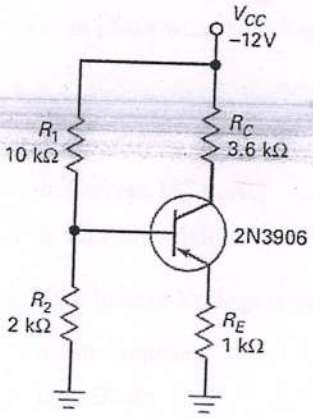
2. State Thevenin's Theorem. What is its significance? Calculate $R_{TH}$ and $V_{TH}$ across terminal A and B.



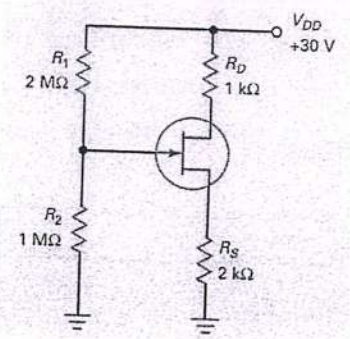

3. Draw Circuit Diagram of a Full Bridge Rectifier using pn junction Diodes **without Filters** and show that frequency of the rectified signal is twice the frequency of input signal.

4. Write down names of atleast 5 different types of Diodes and their applications other than rectification.

5. In the given circuit below, calculate the emitter voltage and current flowing through the resistor of 1 Kilo Ohms. Assume this to be an ideal Silicon Transistor.



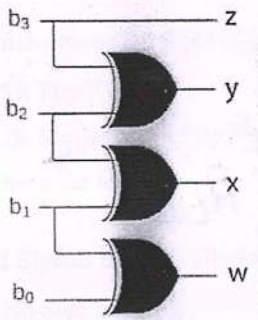

6. Draw the DC Load Line and locate Q point for the Voltage Divider Bias Circuit of the JFET considering an ideal case.



7. Derive the expression for modulation index in case of Amplitude Modulation in terms of Maximum and Minimum Amplitude of the Modulated signal. What would be the value of modulation index in case of ideal modulation?

8. Write down the differences between a Decoder and a De-multiplexer in terms of Number of I/O lines, usage, construction etc.

9. You are given a circuit like the one below. It has four inputs and four outputs. Please write a truth table for all possible input conditions along with corresponding outputs. Do you recognize the code that gets produced at the output?




10. Draw Circuit Diagram of a JK Master-Slave Flip Flop and draw Timing Diagram of the Circuit. Does the circuit produce Race-Around condition for any of the input Combination?

*****END OF QUESTION*****