Federal Board

Annual 2010 HSSC-II

Section-A (Marks 17)

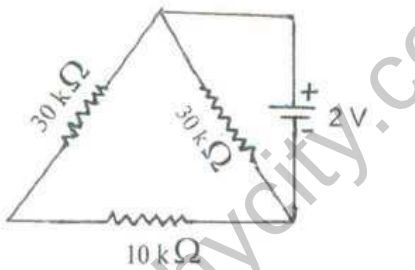
1 **Circle the correct option i.e. A / B / C / . Each part carries one mark.**

(i) A closed surface contains two equal and opposite charges. The net electric flux from the surface will be _____

A. Negative B. Positive

C. Infinite D. Zero

(ii) What will be the current in the circuit shown?



A. $\frac{1}{45}A$

B. $\frac{1}{10}A$

C. $\frac{1}{5}A$

D. $5A$

(iii) Watt-hour measures_____.

A. Current B. Electric energy

C. Power D. Voltage

(iv) According to Faraday's Law, emf induced in a circuit depends on_____

A. Maximum magnetic flux B. Rate of change of magnetic flux

C. Change in magnetic flux D. Initial magnetic flux

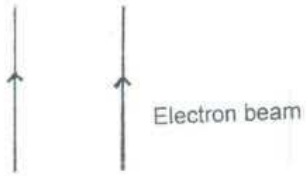
(v) An electron beam is moving parallel. The nature of force between them is _____

A. Attractive

B. Repulsive

C. Attractive or repulsive depends on the magnitude of velocity

D. None of these



(vi) In Compton scattering, the change in wavelength is maximum if_____

A. Angle of scattering is 90^{o} B. Angle of scattering is 60^{o}

C. Angle of scattering is 180^{o} D. Angle of scattering is Zero

(vii) Temperature coefficient of thermister is_____.

A. Always negative

B. Always positive

C. Changing form positive to negative and vice versa

D. May be positive or may be negative

(viii) If capacitance of LC circuit is made four times, then frequency of the circuit becomes_____

A. Twice B. One half

C. Four times D. None of these

(ix) A transformer steps down the voltage of 220V to 20V with the help of 20 turns on the secondary coil. What is the number of turns on the primary ?

A. 200 B. 220

C. 20 D. 22

(x) The colour of light emitted by a LED depends on_____ .

A. Its forward bias B. It reverse bias

C. The amount of forward current D. The type of semi conductor material used

(xi) The out put of a two inputs OR gate is 0 only when its _____.

A. Both inputs are 0 B. Either input is I

C. Both inputs are I D. Either input is 0

(xii) A 100 ohm resistor, a $0.1\mu F$ capacitor and a 0.1 Henry inductor are connected in parallel to a 100V supply. The resonant frequency is_____.

A. 1392Hz B. 1492Hz

C. 1592Hz D. None of these

(xiii) An electric force can deflect_____ .

A. Neutrons B. γ-rays

C. Both A and B D. None of these

(xiv) As per Bohr's atomic model, a minimum energy (in ev) required to remove an electron from the ground state of doubly ionized Li-atom is_____.

A. 1.51 ev B. 13.6 ev

C. 40.8 ev D. 122.4 ev

(xv) When the motor is at its maximum speed, the back emf will be _____ .

A. Maximum B. Zero

C. Intermediate values D. No back emf

(xvi) As mass number increases, which of the following does not change?

A. Mass B. Volume

C. Density D. Binding energy

(xvii) In Ge (Germanium) sample traces of Ga (Gallium) are added as impurity. The resulting sample would behave like_____.

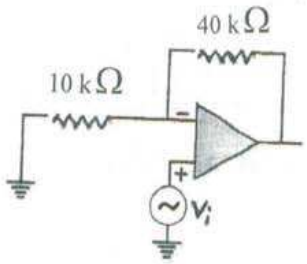
A. A conductor B. A P-type semiconductor

C. An N-type semiconductor D. An insulator

SECTION – B (Marks 42)

. 2 **Attempt any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)**

(i) Calculate the gain of non-inverting amplifier shown in figure.



(ii) Draw the symbolic circuit diagram for exclusive NOR (XNOR) gate.

(iii) Write down the heating effect of current.

(iv) State Ohm's law.

(v) A parallel plate capacitor of capacitance C is charged using a battery of emf V_0. After the capacitor is charged, the battery is removed and the distance between the capacitors is doubled. Find the new energy stored.

(vi) Show graphically the phase relationship between the current and the voltage across an inductor.

(vii) You are given a number of $2\mu F$ capacitors, each with a maximum working potential difference of $10V$. How would you construct capacitors of:

a. $1\mu F$ capacitance, suitable for use upto $20V$.

b. $2\mu F$ capacitance, suitable for use upto $20V$.

(viii) A source of light is placed at a distance of $0.1m$ from a photocell and cut-off potential (stopping potential) is found to be V_0. If the lamp is now placed at a distance of $2m$, what will be the cut-off potential.

(ix) Define Elastic limit.

(x) What is a photon?

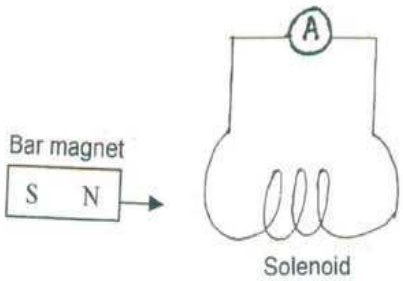
(xi) Why ordinary silicon diodes do not emit light?

(xii) When a magnet is pushed into the solenoid, the ammeter records a small current:

a. Explain why a current is produced.

b. State what is observed:

1. When the magnet is pulled out of the solenoid.
2. When the magnet is stationary inside the solenoid.



(xiii) Verify that an ohm times farad is equivalent to second.

(xiv) A dry battery can deliver $3000 J$ of energy to a small $2W$ electric motor before the battery is exhausted. For how many minutes does the motor run?

(xv) When base current is changed from $30\mu A$ to $80\mu A$, the collector current changes from $1 mA$ to $3.5 mA$. Find the current gain in CE configuration.

(xvi) The effects of radiation on the human body depend on the properties of the radiation. Explain why a source emitting α – particles inside the body is more dangerous than a source of the same activity emitting γ – rays inside the body.

(xvii) What do you understand by an equipotential surface in an electric field?

(xviii) A lamp is connected to the secondary coil of the transformer by long leads which have a resistance of 2.5 ohms. The power input to the primary coil is $40W$ and the transformer is 100% efficient. Calculate the potential drop across the resistance of the leads.

(xix) By assuming that a hydrogen atom consists of an electron of charge e^- orbiting a proton of charge e^+. Calculate the ratio of the electric force between the electron and proton to the gravitational force between them. (Mass of electron $m_e = 9.1\times10^{-31} kg$ mass of proton $m_p = 1.67\times10^{-27} kg$)

SECTION – C (Marks 26)

Note:- **Attempt any TWO questions.** (2 x 13 = 26)

Q. 3 a. Derive an expression for torque acting on a current carrying rectangular coil placed in a uniform magnetic field. 07

b. A coil of $0.1m\times0.1m$ and of 200 turns carrying a current $1.0 mA$ is placed in a uniform magnetic fields of $0.1T$. Calculate the maximum torque that acts on the coil. 06

Q. 4 a. What are isotopes? Explain mass spectrograph to demonstrate the existence of isotopes 2+6

b. Find the mass defect and the binding energy for tritium, if the atomic mass of tritium is $3.016049u$. 05

Q. 5 a. Define Impedance. 02

b. What do you understand by R-C and R-L series circuit? Calculate the impedance of both the circuits by drawing their impedance diagram. 07

c. A circuit has an inductance of $\frac{1}{\pi}H$ and resistant of 2000Ω. A $50 Hz$ A.C is supplied to it. Calculate the reactance and impedance offered by the circuit. 04