PHYSICS HSSC–II
SECTION – A (Marks 17)

Time allowed: 25 Minutes | Version Number | 1 | 8 | 3 | 6

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q.1 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) Which of the following is **the primary** source of electric current?
   A. Transformer
   B. Electric Generator
   C. AC Motor
   D. DC Motor

2) Electrostatics is the study of:
   A. Electric current
   B. Stationary charges
   C. Moving charges
   D. Magnetism

3) Which of the following is **NOT** the statement of electric flux?
   A. The effect of $\bar{E}$ & $\bar{A}$ parallel to each other
   B. The number of electric filed lines passing through a certain area
   C. The scalar product of $\bar{E}$ & $\bar{A}$
   D. The vector product of $\bar{E}$ & $\bar{A}$

4) The value of red colour in the colour code of carbon resistance is:
   A. 1   B. 2   C. 3   D. 4

5) Two nearby long parallel wires carrying current in the same direction will:
   A. Attract each other
   B. Repel each other
   C. Not affect each other
   D. Stop the current in each wire

6) In a resistor 'R' , power dissipated 'P' =
   A. $\dfrac{V}{R^2}$ B. $\dfrac{V^2}{R^2}$ C. $\dfrac{V^2}{R}$ D. $\dfrac{V}{R}$

7) The cross (x) symbols drawn on the page indicates that magnetic field is:
   A. Zero (No magnetic field)
   B. Parallel to page
   C. Into page
   D. Out of page

8) A device which converts electrical energy into mechanical energy is called:
   A. Generator   B. Motor   C. Transformer   D. Inductor

9) A phenomenon in which a changing current in one coil induces an emf in another coil is called:
   A. Amperes law   B. Motional emf   C. Self induction   D. Mutual induction

10) Root mean square value of current (I_{rms}) is:
   A. $\dfrac{I_o^2}{\sqrt{2}}$ B. $\dfrac{\sqrt{I_o}}{2}$ C. $\dfrac{I_o}{2}$ D. $\dfrac{I_o}{\sqrt{2}}$

11) The relation of Bulk modulus is:
   A. $\dfrac{F/A}{\Delta l/l}$ B. $\dfrac{F/A}{\Delta A/A}$ C. $\dfrac{F/A}{\Delta V/V}$ D. $\dfrac{F/A}{\tan\theta}$

12) The current gain (β) of a transistor is:
   A. $\dfrac{I_C}{I_B}$ B. $\dfrac{I_E}{I_B}$ C. $\dfrac{I_E}{I_C}$ D. $\dfrac{I_B}{I_C}$

13) is symbol of _____ gate.
   A. NAND   B. NOR   C. XOR   D. XNOR

14) The Boolean algebra for XOR gate is:
   A. $X = \overline{A+B}$ B. $X = \overline{A.B}$ C. $X = A\bar{B}+\bar{A}B$ D. $X = \overline{A\bar{B}+\bar{A}B}$

15) The relation $\lambda = \dfrac{h}{p}$ is:
   A. Uncertainty principle
   B. de-Broglie's relation
   C. Plank's law
   D. Compton effect

16) The energy required to completely remove an electron from the first Bohr orbit i.e the ionization energy is:
   A. $-1eV$ B. $-16.3eV$ C. $-1.6eV$ D. $-13.6eV$

17) The particles that do not experience strong nuclear force are:
   A. Hadrons   B. Photons   C. Leptons   D. Quarks

PHYSICS HSSC-II

Time allowed: 2:35 Hours   **Total Marks Sections B , C and D: 68**

NOTE: Answer any Seven parts each from Section 'B' and 'C' and any two questions from Section 'D' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21)
(Chapter 12 – 16)

Q. 2 **Answer any SEVEN parts. All questions carry equal marks.**   **(7 x 3 = 21)**

(i)   Define electric intensity and give its unit.

(ii)   What is the role of a material medium if it is placed between the plates of a capacitor?

(iii)   What are ohmic and non-ohmic devices?

(iv)   Write colour codes for carbon resistances in tabular form.

(v)   What is right hand rule in electromagnetism?

(vi)   Why should the voltmeter have very high resistance?

(vii)   What is the direction of the current through resistance "R" in the figure if switch 'S' is:
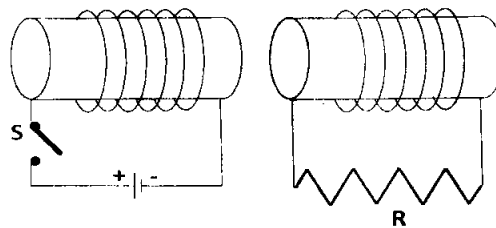
    a.   Closed

    b.   Opened

Fig Q.2 (vii)

(viii)   Show that ε and $\dfrac{\Delta\phi}{\Delta t}$ have the same units.

(ix)   Define choke. How can it be used?

(x)   A sinusoidal current has I_{rms} (effective) value of 10A. What is maximum or peak value?

SECTION – C (Marks 21)
(Chapter 17 – 21)

Q. 3 **Answer any SEVEN parts. All questions carry equal marks.**   **(7 x 3 = 21)**

(i)   What is meant by strain energy in deformed materials?

(ii)   The anode of a diode is 0.2 V positive with respect to cathode. Is it forward biased? Explain briefly.

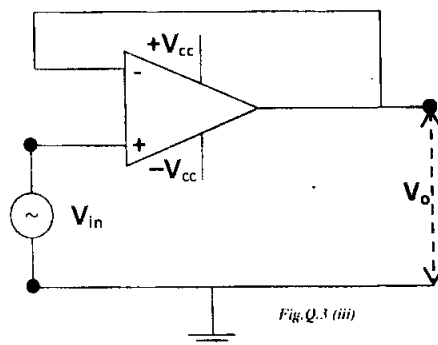(iii)   Find the gain of the circuit as shown in the figure:

Fig.Q.3 (iii)

(iv) Make Truth table and write Boolean algebraic expression for exclusive OR (XOR) gate.

(v) Define inertial frame of reference. What is non-inertial frame?

(vi) Find the mass 'm' of an object moving with speed 0.8c if the rest mass is 1 kg.

(vii) What are the characteristics of laser light by which it is distinguished from ordinary light?

(viii) What are the energies in eV of quanta of wavelength $\lambda = 400nm$?

(ix) Define radioactivity.

(x) A particle which produces more ionization is less penetrating. Why?

SECTION – D (Marks 26)

Note: **Attempt any TWO questions. All questions carry equal marks.** **(2 x 13 = 26)**

Q. 4 **a.** State and explain Ampere's law. Find field due to current carrying solenoid by applying

Ampere's law. **(3+3)**

b. The turns ratios of a step up transformer is 50. A current of 20 A is passed through its

primary coil at 220 Volts. Obtain the value of the voltage and current in the secondary coil,

assuming the transformer to be ideal one. **(04)**

c. How can colour bands for carbon resistances be interpreted? **(03)**

Q. 5 **a.** Define and explain Coulomb's law with the help of a figure. Find electric potential at a point due to

a point charge. **(3+3)**

b. Calculate the gain of non-inverting op-amplifier shown in the figure: **(05)**

Fig. Q.5 (b)
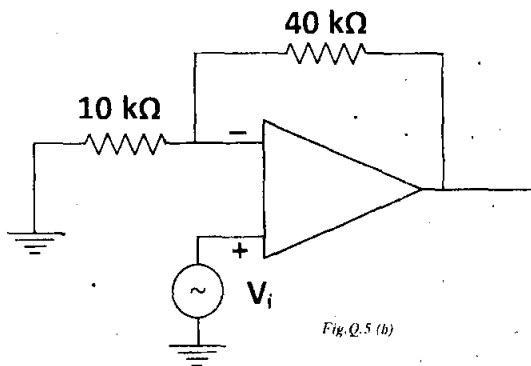
c. Briefly explain the concept of virtual ground. **(02)**

Q. 6 **a.** Discus and explain the production of LASER light with the help of figure. Explain laser action in

He-Ne laser. **(5+2)**

b. Discuss and explain nuclear reaction in the sun. **(04)**

c. Write postulates of special theory of relativity. **(02)**

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PHYSICS HSSC–II
SECTION – A (Marks 17)

Time allowed: 25 Minutes | Version Number | 1 | 8 | 4 | 1 |

Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) Muons, electrons and neutrinos are:

   A. Quarks   B. Photons   C. Leptons   D. Hadrons

2) Which of the following is NOT a source of electric current?

   A. Cell   B. Electric generator
   C. Electric motor   D. Thermocouple

3) The value of relative permittivity (ε_r) for air is:

   A. 0.006   B. 1   C. 1.006   D. 1.0006

4) The energy of photon of radio waves is about:

   A. $10^{-12}\,ev$ B. $10^{-10}\,ev$ C. $10^{-8}\,ev$ D. $10^{-6}\,ev$

5) Choose the correct relation for uncertainty principle:

   A. $\Delta x.\Delta p \approx \dfrac{\lambda}{h}$ B. $\Delta x.\Delta p \approx \dfrac{h}{\lambda}$ C. $\Delta x.\Delta p \approx h$ D. $\Delta x.\Delta p \approx \lambda$

6) In a transistor, the current gain (β) is:

   A. $\dfrac{I_E}{I_C}$ B. $\dfrac{I_E}{I_B}$ C. $\dfrac{I_C}{I_B}$ D. $\dfrac{I_B}{I_C}$

7) Which of the following is NOT the property of 'LASER'?

   A. Unidirectional   B. Multidirectional   C. Coherent   D. Monochromatic

8) 0.75 A current flows through an iron wire when a battery of 1.5 V is connected across its ends. Compute the resistance:

   A. 1Ω B. 2Ω C. 3Ω D. 4Ω

9) Root mean square value of voltage (V_{rms}) is:

   A. $\sqrt{\dfrac{V_o^2}{2}}$ B. $\dfrac{\sqrt{V_o}}{2}$ C. $\dfrac{V_o}{2}$ D. $\dfrac{V_o^2}{\sqrt{2}}$

10) A device that converts mechanical energy into electrical energy is called:

   A. Generator   B. Motor   C. Transformer   D. Inductor

11) By proper shunting, a galvanometer is converted into:

   A. Ammeter   B. Voltmeter   C. Avometer   D. Ohmmeter

12) The dots (.) drawn on the page indicates that magnetic field is:

   A. Out of page   B. Into page
   C. Parallel to page   D. Zero (No magnetic field)

13) "The algebraic sum of potential changes in a closed circuit is zero". The statement is of:

   A. Ampere's law   B. Faraday's law   C. Lenz's law   D. Kirchhoff's rule

14) The Young's modulus is:

   A. $\dfrac{F/A}{\Delta l/l}$ B. $\dfrac{F/A}{\Delta A/A}$ C. $\dfrac{F/A}{\Delta V/V}$ D. $\dfrac{F/A}{\tan\theta}$

15) ⫤⊳o—— is the symbol of _____ gate.

   A. OR   B. NOR   C. XOR   D. XNOR

16) The total number of pins on "IC741" of an operational amplifier is:

   A. 1   B. 2   C. 8   D. 12

17) _____ can be used in the process of holography.

   A. Ultraviolet light   B. Sunlight   C. X-rays   D. Laser

PHYSICS HSSC-II

Time allowed: 2:35 Hours ....Total Marks Sections B , C and D: 68

NOTE: Answer any Seven parts each from Section 'B' and 'C' and any two questions from Section 'D' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21)

(Chapter 12 – 16)

Q. 2   Answer any SEVEN parts. All questions carry equal marks.   (7 x 3 = 21)

(i)   What is capacitance of a capacitor? Define its unit.

(ii)   Can a step up transformer increase the power level?

(iii)   Define ECG. Show it graphically.

(iv)   Calculate the energy acquired by a particle carrying a charge 2e following through a potential difference of 3V.

(v)   Define colour code for carbon resistances. How is a zero ohm resistor indicated?

(vi)   Why does the resistance of a conductor rise with temperature?

(vii)   Does the induced emf always act to decrease the magnetic flux through a circuit? Briefly explain.

(viii) Why should the resistance of an ammeter be very low?

(ix)   In a transformer, there is no transfer of charge from the primary to the secondary. How is, then the power transferred?

(x)   At what frequency will an inductor of 1.0 H have a reactance of 500 Ω ?

SECTION – C (Marks 21)

(Chapter 17 – 21)

Q. 3   Answer any SEVEN parts. All questions carry equal marks.   (7 x 3 = 21)

(i)   What is meant by Hysterisis loss?

(ii)   The anode of a diode is 0.2 V positive with respect to its cathode. Is it forward biased? Briefly explain.

(iii)   Make Truth table and write Boolean algebraic expression for exclusive NOR (XNOR) gate.

(iv)   Distinguish between crystalline, amorphous and polymeric solids.

(v)   What are postulates of special theory of relativity? Explain briefly.

(vi)   A particle of mass 5mg moves with speed of $8ms^{-1}$. Calculate de-Broglie's wavelength.

(vii)   Find the speed of electron in the first Bohr orbit.

(viii) What are advantages of lasers over ordinary light?

(ix)   Why are heavy nuclei unstable?

(x)   How much energy is absorbed by a man of mass 80 kg who receives a lethal whole body equivalent dose of 400 rem in the form of low energy neutrons for which RBE factor is 10?

**Note:**   **Attempt any TWO questions. All questions carry equal marks.**   **(2 x 13 = 26)**

Q. 4   **a.**   State and explain Gauss's law. Apply Gauss's law to find the electric intensity due to an infinite

sheet of charge.   **(1+2+4)**

    b.   Find the current which flows in all the resistances of the circuit

as shown in the given figure.   **(04)**

Fig.Q4 (b)
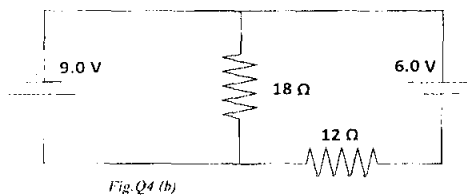
    c.   What is meant by A.M and F.M?   **(02)**

Q. 5   **a.**   State and explain operational amplifier. Calculate the gain of op-amp used as a non-inverting

amplifier.   **(1+2+4)**

    b.   Calculate the output of the op-amp circuit shown in the figure: **(04)**

Fig.Q.5 (b)
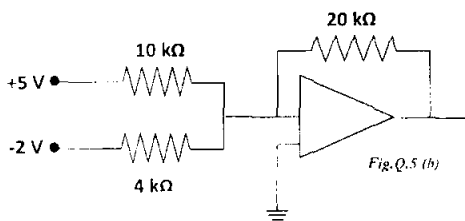
    c.   Is it possible to create a single electron form energy? Explain briefly.   **(02)**

Q. 6   **a.**   Describe photoelectric effect. Give explanation on the basis of quantum theory. Draw diagram

as well.   **(1+4+1)**

    b.   (i)   Why must a Geiger Muller tube for detecting α-particles have a very thin end window?   **(02)**

          (ii)   Why does a Geiger Muller tube for detecting γ-rays **not** need a window at all?   **(02)**

    c.   Explain why laser action could not occur without population inversion between atomic levels?   **(03)**

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