Version No.			

ROLL NUMBER						

Answer Sheet No._____

Sign. of Candidate _____

Sign. of Invigilator _____

PHYSICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

(1) Two charges q_1 and q_2 are placed in vacuum at a distance d and force between them is F. If a medium of relative permittivity 4 is introduced between them then new force will be:

A. $\frac{F}{4}$ ◯ B. $\frac{F}{2}$ ◯

C. 2F ◯ D. 4F ◯

(2) Three capacitors of 4μF each are connected in such a way that net capacitance of their combination is 6μF. It is possible if:

A. All the three in series ◯
B. All the three in parallel ◯
C. Two in series and one in parallel ◯
D. Two in parallel and one in series ◯

(3) Slope of I-V graph of a resistor is numerically equal to:

A. Conductivity ◯ B. Conductance ◯
C. Resistance ◯ D. Resistivity ◯

(4) Which one of the following is correct for an open circuit?

A. $V_t = 0$ ◯ B. $V_t < E$ ◯
C. $V_t = E$ ◯ D. $V_t = E - Ir$ ◯

(5) Magnetic flux will be maximum when:

A. Magnetic field is perpendicular to the plane area ◯
B. Magnetic field lies parallel to the plane area ◯
C. Area is held at an angle of 45^o ◯
D. Magnetic flux density is perpendicular to area vector of the surface ◯

(6) A proton is moving along the axis of a solenoid carrying a current. The magnetic force on proton will be:

A. Radially inward ◯ B. Radially outward ◯
C. Zero ◯ D. Parallel to axis of solenoid ◯

(7) A steady current is passing through a coil, magnitude of self- induced emf in it, will be:

A. zero ◯ B. maximum ◯

C. $\varepsilon = L\frac{\Delta I}{\Delta t}$ ◯ D. $\varepsilon = -L\frac{\Delta I}{\Delta t}$ ◯

(8) At high frequency in a capacitive circuit, the current will be:

A. Large ◯ B. Small ◯

C. Zero ◯ D. Infinite ◯

(9) The peak value of A.C source is 20 A, its rms value will be:

A. 14.1 A ◯ B. 10 A ◯

C. 20 A ◯ D. 28.2 A ◯

(10) The materials in which disordered structure of liquid is frozen are:

A. Amorphous ◯ B. Crystalline ◯

C. Polycrystalline ◯ D. Quartz ◯

(11) The temperature below which the resistivity of a superconductor falls to zero is called:

A. Absolute temperature ◯ B. Kelvin temperature ◯

C. Limiting temperature ◯ D. Critical temperature ◯

(12) In a half wave rectifier, the diode conducts:

A. Only positive half of input cycle ◯

B. Only negative half of input cycle ◯

C. Both halves of input cycle ◯

D. Any one half of input cycle ◯

(13) The maximum kinetic energy of emitted photoelectrons, from different metal surfaces, depends upon:

A. Intensity of incident light only ◯

B. Frequency of the incident light only ◯

C. Nature of metal surface ◯

D. Both frequency of incident light and nature of metal surface ◯

(14) The rest mass of photon is:

A. Infinite ◯ B. Zero ◯

C. 1.6×10^{-27} kg ◯ D. 3×10^{8} kg ◯

(15) The type of spectra produced by atoms is:

A. Continuous spectra ◯ B. Band spectra ◯

C. Line spectra ◯ D. Braking radiation spectra ◯

(16) Strong nuclear force exists between:

A. Hadrons ◯ B. Photons ◯

B. Leptons ◯ D. Muons ◯

(17) The half-life of a radioactive element which has only $\frac{1}{32}$ of its original mass left after elapsed of 60 days is:

A. 30 days ◯ B. 20 days ◯

C. 15 days ◯ D. 12 days ◯

Federal Board HSSC-II Examination
Physics Model Question Paper
(Curriculum 2006)

Time allowed: 2.35 hour Total Marks: 68

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted/given spaces.

SECTION – B (Marks 42)

Q.2 Attempt all parts from the following. All parts carry equal marks. (14×3=42)

i. Define electron volt (eV). Derive its relation with SI unit of energy?

OR

Under what condition electric flux is (a) maximum (b) minimum?

ii. Compare the effects of temperature increase on resistivity of thermistor and copper wire.

OR

Differentiate 'curie temperature' and 'critical temperature'?

iii. Galvanometer can be converted into ammeter and voltmeter by connecting resistance with it. What are basic differences in their construction from galvanometer?

OR

What will be the change in atomic number and atomic mass of an element X_z^A, when two alpha particles are emitted from its nucleus?

iv. A rectangular coil of 100 turns and area 500 x 10^{-4} m2 carrying 2 A current is placed in a uniform magnetic field of 10T. Find the maximum torque applying on the coil.

OR

A 2cm diameter ring is moved out of uniform magnetic field of 10T in 0.1s. What is magnitude of induce emf in the ring if normal to ring is parallel to magnetic field at all the time?

v. Define the mutual-inductance of two coils. Write its formula. Also define its SI unit.

OR

What is hysteresis loss?

vi. Why are induction heaters more efficient than conventional gas heaters?

OR

How does stator help rotor to rotate in AC motor?

vii. What is power dissipation value in capacitor and inductor in AC circuits? Elaborate your answer

OR

A 220V, 50Hz A.C. supply is applied to series combination of a 2.5Ω, 6mH inductor and a 6.5μF capacitor. Calculate (i) reactance of inductor (ii) reactance ofcapacitor (iii) impedance of circuit.

viii. What are brittle and ductile materials? Draw a stress strain curve to differentiate between brittle and ductile materials.

OR

What is meant by extrinsic semiconductors? Also write names of its types.

ix. Differentiate between conductor and semiconductor in terms of energy band theory.

OR

Why the base region is made thin in a transistor?

x. What is N-type semiconductors and P- typesemiconductors? Also draw their schematic diagrams. Also mention majority and minority charge carriers in them.

OR

For a common base configuration of npn transistor, collector current is greater than base current. Why?

xi. A beam of orange light and a beam of green light have same energies. Which of these light beams contains greater number of photons?

OR

Under what condition Compton shift in wavelength is maximum? Elaborate your answer.

xii. What is the de-Broglie wave-length of an electron with 1200keV kinetic energy?

OR

What is the wavelength of the second line of Paschen series? Calculate it.

xiii. Name basic forces of nature. Briefly compare electromagnetic force and gravitational force.

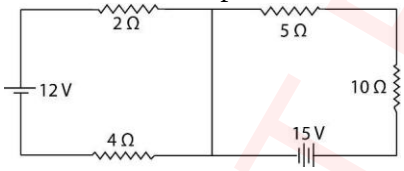
OR

Write the postulates of Einstein's special theory of relativity.

xiv. Find the Binding energy of α particle. (Mass of proton = 1.007276 u; Mass ofneutron = 1.008665 u; Mass of α particle = 4.002603 u).

OR

Find the current in each loop of the circuit given below:



SECTION – C (Marks 26)

Note: Attempt all questions. Marks of each question are given within brackets. (26)

Q.3 Define electric potential. Find an expression for electric potential energy and electric potential. (1+3+3)

OR

Using the Bohr's atomic model, show that energy of the orbit in H-atom is quantized.

Q.4 What is Wheatstone bridge? Derive its formula under balancing condition? (1+2+4)

OR

State Ampere's law. Derive formula for the magnetic field inside the current carrying solenoid using this law. (1+1+1+4)

Q.5 What is AC generator? How is an AC generator used to produce an alternating current? Explain with the help of graph between instantaneous emf and time. (1+3+2)

OR

What is RLC series resonance circuit? Draw its impedance diagram? List its properties. (1+1+4)

Q.6 What is photoelectric effect? What were its main features which could not be explained by classical physics? Derive photoelectric effect equation using Einstein photon theory. (1+2+3)

OR

What is mass spectrograph? Show that radius of circular path of isotopes dependsupon its mass. (1+5)

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PHYSICS HSSC-II
Student Learning Outcomes Alignment Chart
(Curriculum 2006)

SECTION-A

Q.1

(1) State Coulomb's law and explain that force between two-point charges is reduced in a medium other than free space using Coulomb's law.
(2) Solve problems using formula for capacitors in series and in parallel.
(3) State Ohm's law. Define resistivity and explain its dependence upon temperature. Define conductance and conductivity of conductor.
(4) Explain the internal resistance of sources and its consequences for external circuits.
(5) Describe the concept of magnetic flux (Φ_B) as scalar product of magnetic field (B) and area (A) using the relation $\Phi_B = \mathbf{B}.\mathbf{A}$
(6) Explain that a force may act on a charged particle in a uniform magnetic field.
(7) Define mutual inductance (M) and self-inductance (L), and their unit henry.
(8) Explain the flow of A.C through resistors, capacitors and inductors.
(9) Describe the terms time period, frequency, instantaneous peak value and root mean square value of an alternating current and voltage.
(10) Distinguish between the structure of crystalline, glassy, amorphous and polymeric solids.
(11) Become familiar with the behaviour of superconductors and their potential uses.
(12) Define rectification and describe the use of diodes for half and full wave rectifications.
(13) Identify data sources, gather, process and present information to summarize the use of the photoelectric effect in solar cells & photocells
(14) Elaborate the particle nature of electromagnetic radiation.
(15) Describe and explain the origin of different types of optical spectra.
(16) Describe the key features and components of the standard model of matter including hadrons, leptons and quarks.
(17) Describe the term half-life and solve problems using the equation $\lambda=0.693/T_{1/2}$

SECTION-B

Q.2

i. Define and become familiar with the use of electron volt.

OR

Define and explain electric flux.

ii. Define resistivity and explain its dependence upon temperature. State the characteristics of a thermistor and its use to measure low temperatures.

OR

• Become familiar with the behaviour of superconductors and their potential uses.
• Explain the Curie point.

iii. Explain how a given galvanometer can be converted into a voltmeter or ammeter of a specified range.

OR

Describe that an element may change into another element when radioactivity occurs.

iv. Predict the turning effect on a current carrying coil in a magnetic field and use this principle to understand the construction and working of a galvanometer.

OR

Apply Faraday's law of electromagnetic induction and Lenz's law to solve problems.

v. Define mutual inductance (M) and self-inductance (L), and their unit henry.

OR

Describe hysteresis loss.

vi. Analyze and present information to explain how induction heating is used in furnaces to provide oxygen free heating environment.

OR

Describe the main features of an A.C electric motor and the role of each feature.

vii. Solve the problems using the formulae of A.C Power.

OR

Apply the knowledge to calculate the reactances of capacitors and inductors

viii. Become familiar of ultimate tensile stress, elastic deformation and plastic deformation ofa material. Demonstrate knowledge of the force-extension graphs for typical ductile, brittle and polymeric materials.

OR

Distinguish between intrinsic and extrinsic semiconductors

ix. Classify insulators, conductors, semiconductors on the basis of energy bands.

OR

Distinguish PNP & NPN transistors.

x. Distinguish between P & N type substances.

OR

Describe the operations of transistors.

xi. Solve problems and analyze information using: $E = hf$ and $c = f\lambda$

OR

Describe Compton effect qualitatively.

xii. Describe the confirmation of de Broglie's proposal by Davisson and Germer experiment in which the diffraction of electrons by the surface layers of a crystal lattice was observed. Describe the impact of de Broglie's proposal that any kind of particle has both wave and particle properties.

OR

Solve problems and analyze information using. $1/\lambda = RH\,[1/p^2 - 1/n^2]$.

xiii. Describe the basic forces of nature.

OR

Describe the significance of Einstein's assumption of the constancy of the speed of light. • identify that if c is constant then space and time become relative.

xiv. Define the terms unified mass scale, mass defect and calculate binding energy using Einstein 's equation

OR

Apply Kirchhoff's second law as conservation of energy to solve problem.

SECTION-C

Q.3 Define electric potential at a point in terms of the work done in bringing unit positive charge from infinity to that point. Define the unit of potential derive an expression for electric potential at a point due to a point charge.

OR

Explain hydrogen atom in terms of energy levels on the basis of Bohr Model.

Q.4 Describe what is a Wheatstone bridge and how it is used to find unknown resistance.

OR

State Ampere's law. Apply Ampere's law to find magnetic flux density around a wire and inside a solenoid.

Q.5 Describe the main components of an A.C generator and explain how it works.

OR

Explain resonance in an A.C circuit and carry out calculations using the resonant frequency formulae.

Q.6 Describe the phenomenon of photoelectric effect.

OR

Explain the use of mass spectrograph to demonstrate the existence of isotopes and to measure their relative abundance.

PHYSICS HSSC-II
Table of Specifications

Topics	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15	Unit 16	Unit 17	Unit 18	Unit 19	Unit 20	Marks	% age
Knowledge based	Q(3)7	1(iii)1	1(vi)1 Q(4)7 OR	2(v)3	1(viii)1 2(vi)3OR	1(xi)1 2(viii)3 2(v)3OR	1(xii)1 2(viii)3 OR	1(xiii)1 2(xi)3 2(xi)3OR 2(xiii)3 OR	1(xv)1	2(xiii)3	48	31 %
Understanding based	2(i)3 2(i)3 OR	1(iv)1 2(ii)3 Q(4)7	1(vii)1 2(iii)3 1(v)1	Q(5)6 2(vi)3	2(vii)3 Q(5)6OR	1(x)1 2(ix)3 2(ii)3OR	2(x)3 2(x)3OR 2(ix)3OR	1(xiv)1 Q(6)6	Q(3)7OR	1(xvi)1 Q(6)6OR 2(iii)3OR	80	52 %
Application based	1(i)1 1(ii)1	2(xiv)3 OR	2(iv)3	2(iv)3 OR	1(ix)1 2(vii)3 OR				2(xii)3 2(xii)3	1(xvii)1 2(xiv)3	25	17 %
Total marks	15	15	16	15	17	14	13	17	14	17	**153**	100%

KEY:

1(1)(01)

Question No (Part No.) Allocated Marks

Note: (i) The policy of FBISE for knowledge based questions, understanding based questions and application based questions is approximately as follows:

a) 30% knowledge based.
b) 50% understanding based.
c) 20% application based.

(ii) The total marks specified for each unit/content in the table of specification is only related to this model question paper.

(iii) The level of difficulty of the paper is approximately as follows:

a) 40% easy
b) 40% moderate
c) 20% difficult

Section A: 17
Section B: 28x3= 84
Section C: =52
Total = 125+28=153