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. How much charge passes in 2 minutes through a junction which has a steady current of 5A?

A. 10 coulomb ◯ B. 300 coulomb ◯
C. 600 coulomb ◯ D. 50 coulomb ◯

2. The current through a circuit, in which emf of a cell ε = 120V and internal resistance r = 0.01Ω is connected with load R= 1000Ω, is:

A. 100 mA ◯ B. 50 mA ◯
C. 120 mA ◯ D. 150 mA ◯

3. Find the electric potential (in volts) at the center of line joining the two charges +5μC and -5μC. The charges are placed at a distance of 10cm.

A. $9x10^{-3}V$ ◯ B. $1.8x\ 10^{-2}V$ ◯
C. 0 V ◯ D. Infinite ◯

4. How many electrons on a body will be established by a charge of one coulomb?

A. 10 Electrons ◯ B. 1.6×10^{-19} Electrons ◯
C. 6.25×10^{18} Electrons ◯ D. 6.25×10^{21} Electrons ◯

5. A capacitor acts like a perfect insulator for:

A. Direct current ◯ B. Alternating current ◯
C. Magnetic field ◯ D. Electric field ◯

6. The electrical energy converted into heat energy is given by the expression:

A. IRt ◯ B. I^2Rt ◯
C. VI^2t ◯ D. I^2R ◯

7. A straight current carrying conductor experiences maximum magnetic force in a uniform magnetic field when it is placed _____ to the field.

A. Parallel ◯ B. Perpendicular ◯
C. At an angle 180^0 ◯ D. Inclined ◯

8. The S.I unit of Magnetic flux is:

A. NmA^{-1} ◯ B. $NA^{-1}m^{-1}$ ◯

C. Nm^2 ◯ D. Vm ◯

9. The unit "henry" is used for:

A. Self inductance (c) B. Mutual induction ◯

C. Self induction ◯ D. Induced emf ◯

10. One meter long rod is moving at 30^0 through a magnetic field of 1T. If the velocity of the rod in the magnetic field is $1ms^{-1}$ then induced emf across the rod will be:

A. 0.5 V ◯ B. 0.6 V ◯

C. 1V ◯ D. 0.2 V ◯

11. Phase relationship between alternating voltage (V) and alternating current (I) through an inductor is:

A. 'I' leads 'V' by 90^0 ◯ B. Both 'V' and 'I' are in phase ◯

C. 'I' lags behind 'V' by 90^0 ◯ D. 'V' and 'I' are out of phase by 180^0 ◯

12. The conductivity of good conductors is:

A. 10^4 to $10^7(\Omega m)^{-1}$ ◯ B. 10^{-8} to $10^{-4}(\Omega m)^{-1}$ ◯

C. 10^{10} to $10^{-20}(\Omega m)^{-1}$ ◯ D. 10^{-6} to $10^{6}(\Omega m)^{-1}$ ◯

13. The materials whose resistivity become zero below a certain temperature (critical temperature Tc) are called:

A. Conductors ◯ B. Semi-conductors ◯

C. Super conductors ◯ D. Hybrid conductors ◯

14. Electromagnetic radiations transport energy equal to:

A. $\frac{1}{2}mv^2$ ◯ B. $\frac{P}{c}$ ◯

C. $\frac{hf}{c}$ ◯ D. hf ◯

15. If speed 'v' of an observer is added to the speed of light 'c', the resultant speed will be equal to:

A. v+c ◯ B. v-c ◯

C. c ◯ D. v ◯

16. Strong nuclear force exists between:

A. Hadrons ◯ B. Photons ◯

C. Leptons ◯ D. Muons ◯

17. The amount of energy equivalent to 1 a.m.u. is:

A. 9.315 MeV ◯ B. 93.15 MeV ◯

C. 931.5 MeV ◯ D. 0.931 MeV ◯

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

Time allowed: 2.35 hours | Total Marks: 68

Note: Answer any fourteen parts from Section 'B' and attempt any two questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q.2 Attempt any **FOURTEEN** parts. All parts carry equal marks. (14 × 3 = 42)

i. Why do we not use water as a dielectric material for capacitor even though it has very high value of relative permittivity?

ii. What is the effect of medium on the electrostatic force between two charges?

iii. Why does no current pass through the galvanometer in a balanced wheat-stone bridge although the two keys in the circuit are closed?

iv. Explain why does the terminal potential difference of a battery decrease, when current drawn from it is increased?

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

vi. Why is cyclotron not suitable to accelerate neutron?

vii. How is the mutual inductance of a pair of coils affected when the separation between the coils and the number of turns of each coil is increased?

viii. Calculate the potential difference between the wings of a jet plane induced by its motion normal to the Earth's magnetic field. The total span of wings is 50m and speed is 600ms^{-1}. (Earth's magnetic field is 0.3 gauss.)

ix. Define mutual-inductance and self-inductance and their unit henry.

x. What will be the net power loss through a pure capacitor or inductor?

xi. High temperature super conductors are required in MRI machines, why?

xii. The forbidden energy gap of silicon is 1.1eV. What does it mean?

xiii. Explain why is common emitter configuration widely used in amplifier circuits?

xiv. In Photoelectric effect, why do all emitted electrons not possess the K.E of maximum value?

xv. When is Compton shift maximum?

xvi. Show that de-Broglie wave length is: $\lambda = \frac{h}{\sqrt{2mVe}}$

xvii. What is population inversion?

xviii. If you swallowed an alpha particle and a beta particle which would be more dangerous to you?

xix. Differentiate between hadrons and leptons.

xx. A long straight wire is bent into a circular loop of radius 0.05m. If an ammeter shows 2A current flowing through this closed loop then compute the magnetic field around it**?**

SECTION – C (Marks 26)

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

Q.3 a. Distinguish between intrinsic and extrinsic semiconductor material? How can P-type and N-type semiconductors be made by using doping? **(2+2+2)**

b. Briefly explain an electric polarization. **(3)**

c. A heating coil has resistance of 20 Ω. It is designed to operate on 220 V. What electrical energy in joules is supplied to the heater in 10 s? **(4)**

Q.4 a. How is an AC generator used to produce an alternating current? Explain with the help of graph between instantaneous emf and time. **(6)**

b. A simple AC generator consists of N=10 turns coil of area A=1200cm^2 which rotates at a constant frequency f = 60Hz in a uniform magnetic field B = 0.40 T. Find the peak e.m.f generated by it. **(3)**

c. How fast must a proton move in a magnetic field 2.5 x 10^{-3} T such that the magnetic force is equal to its weight? **(4)**

Q.5 a. i. How is solid state detector better than other radiation detectors? **(4)**

ii. How can nuclear reactor initiate a controlled fission reaction? **(3)**

b. Derive the expression for energy of an electron revolving in the orbit of Hydrogen atom. Show that the total energy of an electron in different orbits is quantized. **(3+3)**

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PHYSICS HSSC-II
MODEL QUESTION PAPER SLOs
(Curriculum 2006)

SECTION-A

Q.1 Choose the correct answer A/B/C/D by filling the relevant bubble for each question. (17)

1. Describe the concept of steady current.
2. Explain the internal resistance of sources and its consequences for external circuit.
3. Solve the problems involving the use of expression $E=1/4\pi\varepsilon_o\, q/_r^2$
4. Describe the concept of steady current.
5. Describe the function of capacitors in simple circuit.
6. Describe the conditions for maximum power transfer.
7. Explain that a force act on a current carrying conductor placed in a magnetic field.
8. Describe the concept of magnetic flux as a scalar product of magnetic field (B) and area (A).
9. Define mutual inductance and self inductance and their unit henry.
10. Explain what is meant by motional emf. Compute the P.D. across its ends.
11. Construct phasor diagrams and carry out calculations on circuits including resistive and reactive components in series.
12. Classify insulators, conductors, semiconductors on the basis of energy bands.
13. Become familiar with the behaviour of superconductors and their potential uses.
14. Explain the particle model of light in terms of photons with particular energy and frequency.
15. Explain qualitatively and quantitatively the consequence of special relativity in relation to: – the relativity of simultaneity
16. Describe the key features and components of the standard model of matter including hadrons, leptons and quarks.
17. Define the terms unified mass scale, mass defect and calculate binding energy using Einstein's equation.

SECTION-B

Q.2 Attempt FOURTEN parts from following. (3x14= 42)

i. Explain polarization of a dielectric of a capacitor.
ii. 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.
iii. Describe what is a Wheatstone bridge and how it is used to find unknown resistance.
iv. Explain the internal resistance of sources and its consequences for external circuits.
v. 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.
vi. Explain that a force may act on a charged particle in a uniform magnetic field.
vii. Define mutual inductance (M) and self-inductance (L), and their unit henry.
viii. Explain what is meant by motional emf. Given a rod or wire moving through a magnetic field in a simple way, compute the potential difference across its ends.
ix. Define mutual inductance (M) and self-inductance (L), and their unit henry.
x. Explain the flow of A.C through resistors, capacitors and inductors.

xi. Become familiar with the behaviour of superconductors and their potential uses.
xii. Describe the idea about energy bands in solids.
xiii. Explain the use of transistors as a switch and an amplifier.
xiv. Describe the phenomenon of photoelectric effect.
xv. Describe Compton effect qualitatively.
xvi. 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.
xvii. Explain the terms spontaneous emission, stimulated emission, meta stable states, population inversion and laser action.
xviii. Describe the interaction of nuclear radiation with matter.
xix. Describe the key features and components of the standard model of matter including hadrons, leptons and quarks.
xx. Explain that a force might act on a current-carrying conductor placed in a magnetic field.

SECTION-C (2x13=26)

Note: Attempt any TWO questions. All questions carry equal marks.

Q.3 a. Distinguish between intrinsic and extrinsic semiconductors. • Distinguish between P & N type substances.
b. Explain polarization of dielectric of a capacitor.
c. Describe the conditions for maximum power transfer.

Q.4 a. Describe the main components of an A.C generator and explain how it works.
b. Describe the main components of an A.C generator and explain how it works.
c. Explain that a force may act on a charged particle in a uniform magnetic field.

Q.5 a. i. Describe the use of Geiger Muller counter and solid state detectors to detect the radiations.
ii. Describe the function of various components of a nuclear reactor.
b. Show an understanding of the existence of discrete electron energy levels in isolated atoms (e.g. atomic hydrogen) and deduce how this leads to spectral lines. Explain hydrogen atom in terms of energy levels on the basis of Bohr Model.

PHYSICS HSSC-II

Table of specification

Assessment Objectives	Unit 11:	Unit 12:	Unit 13:	Unit 14:	Unit 15:	Unit 16:	Unit 17:	Unit 18:	Unit 19:	Unit 20:	Total marks	Percentage
Knowledge based	1(5)1 2(2)3	1(6)1 3(b)3	1(8)1	1(9)1	2(9)3	1(12)1 1(13)1 2(12)3	3(a)6		2(17)3	1(16)1 1(17)1 5(a)(i)4	33	28.4%
Understanding based	1(1,2,3,4)4 2(1)3	2(4)3	1(7)1 2(5)3 2(20)3 3(c)4 4(c)4	1(10)1 4(a)6 4(b)3	2(10)3		2(13)3	1(14,15)2 2(14)3 2(15)3	5(b)6	2(19)3 5(a)(ii)3	61	52.6%
Application based		2(3)3	2(6)3	2(8)3 2(7)3	1(11)1	2(11)3		2(16)3		2(18)3	22	19%
Total marks	11	10	19	17	7	8	9	11	9	15	116	100%

KEY:

1(1)(01)

Question No (Part No.) (Allocated Marks)