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| Annexure No. | 22 C |
| SCAA Dated | 29.02.2008 |

BHARATHIAR UNIVERSITY, COIMBATORE
ALLIED PHYSICS PAPER FOR B. Sc MATHS / CHEMISTRY
2007-2008 BATH AND ONWARDS

ALLIED PHYSICS PAPER I

No.of Credit Hours: 4 per week

Subject Description:

This paper presents the basic principles of mechanics, heat and sound.

This paper gives the Knowledge of depth for students regarding the motion of the particles, liquids and the propagation of heat and sound waves.

Goal:

To enable the students in order to learn the basic principles, theory and concepts of mechanics, heat and sound.

Objectives

To give the description for the students in order to

Learn motion of rigid bodies.

Acquire basic knowledge of heat energy.

Know about the propagation of sound waves.

Get a depth of knowledge of physics in day today life.

UNIT- I

Gravitation: Newton's law of Gravitation-Determination of G by Boy's method-mass and density of earth – acceleration due to gravity- Determination of g by compound pendulum.

Elasticity: Basic concepts – bending of beams – depression of cantilever-Determination of Y by uniform and non- uniform bending method- Torsion in a wire-Determination of rigidity modulus by torsional pendulum.

UNIT II

Heat and thermodynamics : Vanderwaal's equation of state-critical constants of a gas-derivation of critical constants in terms of Vanderwaal's constants – Joule – Thomson – effect – Theory of J-K effect – liquefaction of gases – Dewar's method and K-Onnes method.- properties of liquid Helium I and II.

Sound: Doppler effect – derivation and applications – determination of frequency of alternating current by Sonometer – Ultrasonics – production, properties and applications

UNIT III

Solar Physics: - solar constant – measurement of solar radiations by Pyroheliometer and Pyranometer – general applications of solar energy – flat–plate collector - box type cooker - solar water heaters – solar photo – voltaic cells – general applications of solar cells.

UNIT IV

Electricity: Conversion of Galvanometer into Ammeter and voltmeter – figure of merit of a galvanometer – Ballistic Galvanometer – theory and charge of sensitiveness – measurement of capacitance – measurement of Themo EMF and resistance by potentiometer – applications of electromagnetic induction - Transformers – theory, energy loss and applications

UNIT V

Magnetism : Basic concepts of magnetic materials – magnetic properties of Dia, Para and Ferro magnetic materials – Area of (B-H) loop – electric and magnetic circuits – Curie temperature – applications of Ferrites in computer memory

Books for references:

1. Properties of matter and sound – Brijlal subramaniam
2. Properties of matter and sound – R. Murugesan
3. Solar Energy utilization – G.D. Ravi
4. Solar Energy Utilization – Sukhatme
5. Heat and Thermodynamics -- Brijlal subramaniam
6. Heat and Thermodynamics – Narayanamurthi and Nagarathinam
7. Sound -- Brijlal subramaniam
8. Sound – R.L. Seihgal
9. Electricity and magnetism — R. Murugesan
10. Electricity and magnetism — Narayanamurthi and Nagarathinam
11. Electricity and magnetism -- Brijlal subramaniam

ALLIED PHYSICS PAPER FOR B.Sc MATHS / CHEMISTRY 2007-2008 BATH AND ONWARDS

ALLIED PHYSICS PAPER II

No.of Credit Hours: 4 per week

Subject Description:

This paper presents the basic principles of mechanics, heat and sound.

This paper gives the Knowledge of depth for students regarding the motion of the particles, liquids and the propagation of heat and sound waves.

Goal:To enable the students in order to learn the basic principles, theory and concepts of mechanics, heat and sound.

Objectives

To give the description for the students in order to

Learn motion of rigid bodies.

Acquire basic knowledge of heat energy.

Know about the propagation of sound waves.

Get a depth of knowledge of physics in day today life.

UNIT- I

Modern physics: Photo electric effect – Einstein's photo electric equation – verification of Einstein's photo electric equation by Millican's experiment – photo electric cells – applications

Wave mechanics: De Broglie matter waves – characteristics and calculation of De Broglie wave length – Experimental study of De Broglie matter wave by G.P.Thomson experiment.

UNIT- II

Nuclear physics : characteristics of nuclear forces – nuclear structure by liquid drop model – Binding energy – mass defect – particle accelerators – cyclotron and betatron – artificial transmutations by α – particles - nuclear Fission and nuclear Fusion – elementary particles – Leptons, Mesons and Baryons

UNIT III

Laser physics: Purity of spectral lines – Coherence length and time – spontaneous and induced emissions – population inversion – meta stable state – conditions for laser actions – Ruby laser – Helium – neon laser – applications of lasers – Raman effect – Raman shift – stokes and anti stokes lines – Laser Raman Spectrometer.

UNIT IV

Semiconductor physics: Volt – Ampere Characteristics of P-N junction Diode – Zener diode – applications of Zener diodes - Volt – Ampere Characteristics of FET, UJT and SCR – Principles of LED and LCD – Frequency Modulation and Amplitude modulation – basic principles of antennas – block diagram of Superhetrodyne receiver – block diagram of monochrome TV receiver – basic principles and applications of RADAR.

UNIT V

Integrated Electronics: Steps in fabrication of Monolithic IC's – General applications of IC's – operational amplifiers as an adder and subtractor.

Digital Electronics: Analog and digital computers – organization of digital computers – number systems – conversion of binary into decimal – conversion of decimal to binary – binary addition and subtraction – Basic logic gates – NAND and NOR as an universal logic gates – Demorgan's theorems – Boolean algebra – applications of Demorgan's theorems – Half adder and full adder circuits.

BOOKS FOR REFERENCE

1. Modern physics – R. Murugesan
2. Engineering physics – Gaur & Gupta
3. Engineering physics – M. Arumugam
4. Laser Physics – Thiagarajan
5. Principles of Electronics – V.K. Metha
6. Basic Electronics – B.L. Theraja
7. Fundamentals of digital computers – Bartee
8. Digital principles and Applications – Malvino & Leech

**ALLIED PHYSICS PRACTICALS
FOR B.SC (MATHS/CHEMISTRY)
2007-2008 BATCH AND ONWARDS**

LIST OF EXPERIMENTS (ANY 12 EXPERIMENTS ONLY)

1. Acceleration due to gravity-Compound pendulum method
2. Moment of inertia – Torsional pendulum method
3. Young's modulus - Uniform bending - Optic lever method
4. Young's modulus - Non-uniform bending - Pin and microscope
5. Rigidity modulus – Static torsion method.
6. Frequency of A.C - Sonometer
7. Thermal conductivity - Lee's disc method.
8. Refractive index of a solid prism - Spectrometer
9. Refractive index of a liquid prism – Spectrometer
10. (i-d) curve - solid prism - Spectrometer
11. Wavelengths of spectral lines – Grating - Normal incidence - Spectrometer
12. Wavelength of spectral lines – Grating - Minimum deviation - Spectrometer
13. Radius of curvature of lens - Newton's rings method.
14. Viscosity of highly viscous liquid - Stoke's method.
15. Surface tension - Drop weight method
16. Low range voltmeter calibration - Potentiometer
17. Low range ammeter calibration - Potentiometer
18. Construction of IC regulated power supply
19. Characteristics of Pn Junction diode
20. Characteristics of Zener diode
21. Construction of Hartley oscillator
22. Construction of Colpitt's oscillator
23. Verification of truth tables of logic gates

BHARATHIAR UNIVERSITY – COIMBATORE- 641 046
Model Question Paper
ALLIED PHYSICS – paper- I
(Mechanics, Heat, Sound, Solar, Electricity & Magnetism)

Time : Three Hours

Maximum : 75 marks
(15x1=15)

SECTION – A

Answer All Questions
 Choose the Correct Answer

1. According to Newton's law of gravitation, the force of attraction between any two bodies is
 - a) Inversely proportional to the product of their masses.
 - b) directly proportional to the product of their masses.
 - c) equal to the product of their masses
 - d) equal to the sum of their masses.

2. The value of **G** by Boy's method was

| | |
|--|--|
| a) $6.6576 \times 10^{-11} \text{ Nm}^2 \text{ Kg}^{-2}$ | b) $6.6576 \times 10^{-11} \text{ Nm}^2 \text{ Kg}^{-3}$ |
| c) $6.6056 \times 10^{-11} \text{ Nm}^2 \text{ Kg}^{-2}$ | d) $6.6576 \times 10^{-12} \text{ Nm}^2 \text{ Kg}^{-2}$ |

3. For a beam of rectangular cross section, moment of inertia **I_g** is

| | |
|--------------|-------------|
| a) bd^3 | b) $bd^3/6$ |
| c) $bd^3/12$ | d) $bd^3/4$ |

4. Period of a Torsional pendulum **T** is

| | |
|---------------------|-------------------------------|
| a) $2\pi\sqrt{I/c}$ | b) $2\pi\sqrt{I/c}$ |
| c) $2\pi\sqrt{c/I}$ | d) $\frac{1}{2}\pi\sqrt{I/c}$ |

- 5) The Critical Temperature is given by

| | |
|--------------|--------------|
| a) $3b$ | b) $a/27b^2$ |
| c) $8a/27Rb$ | d) $8/3$ |

- 6) Linde's process can be used to liquefy

| | |
|-------------|-------------|
| a) Oxygen | b) Air |
| c) Ethylene | d) Nitrogen |

- 7) The unit of solar constant is

| | |
|----------------------------------|----------------------------------|
| a) $\text{Js}^{-1}\text{m}^{-2}$ | b) Jsm^{-2} |
| c) $\text{Js}^{-1}\text{m}^{-1}$ | d) $\text{Js}^{-2}\text{m}^{-2}$ |

- 8) The device used to measure the solar radiation is called

| | |
|---------------------|-------------------|
| a) Pyranometer | b) Pyroheliometer |
| c) Solar collectors | d) Solar cells |

- 9) The first solar cooker was developed by

| | |
|-------------|----------|
| a) Angstrom | b) Abbot |
| c) Eppley | d) Ghosh |

- 10) Figure of merit of a ballistic Galvanometer is related to
 a) Current
 b) Voltage
 c) Resistance
 d) Inductance
- 11) The Thermo emf produced by Copper – Constantan couple is of the order of
 a) microvolts
 b) millivolts
 c) volts
 d) centivolts
12. Transformer is based on
 a) self inductance
 b) Resonance circuits
 c) mutual induction
 d) Transistor action
13. Bismuth is an example of
 a) Diamagnetic
 b) Paramagnetic
 c) Ferromagnetic
 d) Ferrimagnetic
- 14) Area of B-H curve is an indication of
 a) Energy loss/cycle
 b) magnetism lost
 c) Magnetism gained
 d) magnetic induction
- 15) The reluctance in a magnetic circuit is proportional to
 a) l
 b) l/a
 c) a/l
 d) $1/\mu$

SECTION – B**(5x4=20)**

- 16) (a) Define Newton's law of gravitation and also mention the value of gravitational constant
 (or)
 (b) Define Neutral axis. Explain bending couple and internal bending moment.
- 17 (a) How can you differentiate temperature of inversion and critical temperature.
 (or)
 (b) Write the important properties of ultrasonic waves.
- 18 (a) Describe the working of Angstrom pyroheliometer.
 (or)
 (b) What are the general applications of solar energy.
- 19) (a) Briefly explain the charge sensitiveness of a ballistic galvanometer and state its unit.
 (or)
 (b) Explain thermo emf and thermo electric power.
20. (a) What do you understand by electric circuits and magnetic circuits
 (or)
 (b) Outline the properties of Diamagnetic materials.

SECTION :C**(5X8=40)**

21. (a) With a Neat Sketch, how can you determine the value of acceleration due to gravity g by using Boy's method.

(or)

- (b) How will you determine the rigidity modulus of the material of the wire by using torsional oscillation method.
22. (a) Define critical constants. How will you obtain the values of critical constants in terms of van der Waals' constants.
(or)
(b) How can you produce ultrasonic waves by using the principle of piezoelectric effect and mention some of the important applications of ultrasonic waves.
23. (a) With a neat diagram, explain the construction and working of a solar flat plate collector. Mention some of its advantages and disadvantages.
(or)
(b) Explain the principle, construction and operation of a solar photovoltaic cell with a suitable sketch.
24. (a) Describe the method of measuring Thermo emf by potentiometer.
(or)
(b) Describe with necessary theory, the construction and action of a transformer.
25. (a) Compare the magnetic properties of dia, para and ferro magnetic materials in detail.
(or)
(b) Calculate the work done in taking a unit volume of a magnetic material through a complete cycle of magnetization.

Model Question Paper
Allied Physics – paper – II
(modern physics, Laser physics, Electronics & digital electronics)

Time : 3 hours

Marks : 75 marks

Section – A

(15x1=15)

Answer All Questions

Choose the correct Answer

1. When the intensity of incident radiation increases, the photo electric current

| | |
|---------------------|---------------------------|
| a) decreases | b) increases |
| c) remains the same | d) depends on temperature |
2. The deBroglie wavelength of a particle with momentum 'p' is

| | |
|----------|----------|
| a) h/p | b) c/p |
| c) p/h | d) c/h |
3. G.P. Thomson's experiment verified

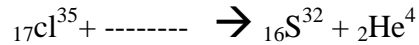
| | |
|---------------------------|----------------------------------|
| a) wave nature of protons | b) wave nature of electron |
| c) wave nature of neutron | d) laws of Photo Electric effect |
4. Liquid drop model was proposed by

| | |
|---------------------|---------------|
| a) Bohr and Wheeler | b) Sommerfeld |
| c) Becquerel | d) Yukawa |

5. Nucleon refers to the

- a) nucleus
b) proton
c) neutron
d) both (b) and (c)

6. Complete the following nuclear reaction



- a) ${}_1\text{H}^1$
b) ${}_1\text{H}^2$
b) ${}_0\text{n}^1$
d) ${}_2\text{He}^4$

7. In population inversion,

- a) number of atoms in the ground state is more
b) number of atoms in the Excited stated is more
c) number of atoms same in both states.
d) number of atoms are different in both states

8. Stokes lines have a wavelength

- a) greater than that of the parent line.
b) less than that of the parent line
c) equal to that of the parent line
d) equal to zero.

9. Helium – Neon laser is a _____ level laser

- a) two
b) three
c) four
d) five

10. Light emitting diodes are made up of

- a) Silicon
b) Gallium Arsenide
c) Germanium
d) Carbon

11. Zener diode is used as a

- a) rectifier
b) filter
c) voltage regulator
d) amplifier

12. The frequency deviation in frequency modulation is directly proportional to

- a) E_m
b) f_{\min}
c) W_m
d) E_c

13. Monolithic Ic's are fabricated within

- a) soft stone
b) Single stone
c) silicon layer
d) Ceramic base

14. According to the law of Boolean algebra, (1+1) equals

- a) 0
b) 1
c) 0 (or) 1
d) None of these

15. The only function of a NOT gate is to

- a) stop signal
b) recomplement a signal
c) invert an input signal
d) magnify an input signal

SECTION-B

(5x4=20)

16. (a) How does a photoemissive cell works?
(or)
(b) Derive the expression for deBroglie wavelength
17. (a) What are Nuclear forces. Mention their important properties.
(or)
(b) Explain the Artificial transmutation by α - particles
18. (a) Explain spatial and temporal coherence
(or)
(b) Describe the conditions for laser action.
19. (a) Give the principle of antennas.
(or)
(b) What are the important applications of RADAR
20. (a) What do you mean by an Integrated circuits? Write some of its advantages.
(or)
(b) Describe the working of a half adder with suitable circuit diagram

SECTION – C

(5x8=40)

21. (a) Describe Millikan's experimental verification of photo electric laws.
(or)
(b) Explain how the wave nature of matter is verified by G.P. Thomson's experiment.
22. (a) With a Neat sketch, explain the construction and working of a betatron.
(or)
(b) Write an essay on elementary particles.
23. (a) Describe with suitable diagram the working of the He-Ne Laser.
(or)
(b) Explain the elementary theory of Raman effect.
24. (a) Explain with a circuit, the characteristics of zener diode and also its function in the construction of voltage regulator.
(or)
(b) Explain with a block diagram, the different stages of a superheterodyne receiver.
25. (a) Describe the various steps involved in the fabrication of Integrated Circuits.
(or)
(b) State and prove DeMorgan's theorems.