

NON-MAJOR ELECTIVE
(Offered to other Major students only)

PHYSICS IN DAILY LIFE

Unit I

Motion: Velocity, acceleration, momentum – inertia - force - laws of motion. Newton’s law of gravitation - acceleration due to gravity- mass and weight, weightlessness.

Unit II

Properties of Matter: Different phases of matter - surface tension, viscosity- capillary rise- Heat, temperature-different temperature scales: degree Celsius, Fahrenheit and Kelvin- transverse and longitudinal waves, sound waves.

Unit III

Light & lenses: Reflection, refraction, diffraction, interference, scattering (elementary ideas only) – blue color of sky, twinkling of stars. Mirage –rainbow

Concave and convex lenses – focal length, power of a lens, refractive index-defects of the eye – myopia, hypermetropia, presbyopia and astigmatism and their correction by lens.

Unit IV

Electricity: Voltage and current, Ohms law. Electric power (EB Bill), calculation of energy requirement of electric appliances – transformer, generator.

Magnetism: Electromagnetic induction-super conductivity-Meissner effect-Maglev train.

Unit V

Our Universe: Galaxies- Stars, Planets & satellites – solar system, lunar and solar eclipses - black holes. Artificial satellites: Geo stationary and Polar satellites.

Books for study:

1. Elements of Properties of Matter, D.S Mathur, S .Chand & Co. (2010).
2. Fundamentals of Physics with Applications by Arthur Beiser
3. Optics by Ajay Ghatak, Tata McGraw-Hill publishing Co. Ltd., New Delhi (1998).
4. Electricity and Magnetism, A S Mahajan, A ARangwala, McGraw Hill, NewDelhi (2017).
5. An Introduction to Astrophysics, Baidyanath Basu, Tanuka Chattopadhyay, sudhindra Nath Biswas, Second Edition(2010), PHI Learning Private Limited.

Books for reference:

1. Mechanics (in SI units) - (Berkley Physics course-volume 1), Charles Kittel, Walter D knight etc, Tata McGraw Hill publication, 2017,second edition
2. Fundamental of General Properties of Matter, H.R Gulati, R Chand and Co, Fifth edition (1977).
3. A Text book of Optics by Subrahmanyam N., BrijLal and M. N. Avadhanulu,

- S. Chand & Co., New Delhi (2006).
4. An Introduction to AstroPhysics, Baidyanath Basu, Tanuka Chattopadhyay, Sudhindra Nath Biswas, Second Edition(2010), PHI Learning Private Limited.
 5. Physics of the universe, Hewish. A, CSIR publication, New Delhi, 1992.

PHYSICS OF EVERYDAY LIFE (INTERDISCIPLINARY)

Unit – I

Art of Estimation and Fermi Problems: The Fermi Rule-Guesstimation Techniques-Fermi problems in real life(Number of Popcorn venders in Tamilnadu, Delhi, India; how many people in your town own red coloured car etc)

Unit –II

Understanding your Electric Bill: Basics of electricity- Ohms law, power consumption, Joule heating-saving electricity-ways to minimize power consumption.

Unit – III

Your Car, Refrigerator and Microwave oven: Concept of temperature& electromagnetic waves - Conversion of Work into Heat vice versa-Heat Engines- Carnot's Cycle, Carnot engine & efficiency- Refrigerator-magnetron-design of microwave ovens.

Unit – IV

Physics of digital memory devices: Photoelectric effect-recording of audio and video- Operating principles of magnetic hard disk drive-Charge coupled device (CCD)- principle of CCD camera.

Unit – V

Mobile communication and Global Positioning System (GPS): Wire and wire-less communication- Common cellular networks components-Protocols. Fundamentals of GSM & CDMA Network, GSM & CDMA Frequency Band. GPS: Operating principles of GPS- Accuracy and errors in GPS navigation.

Text Books:

1. Fundamentals of Physics by D. Halliday, R. Resnick, J. Walker, John Wiley & Sons
2. Mobile Cellular Telecommunications: Analog and Digital Systems by William C. Y. Lee; Tata McGraw Hill Publication.
3. Wireless Communications: Principles and Practice by Theodore S. Rappaport; Pearson / PHI Publication.

References:

1. Wireless Communications and Networks: 3G and Beyond by ItiSahaMisra; Tata McGraw Hill Publication
2. Wireless and Digital Communications by Dr. KamiloFeher; PHI Publication.
3. H. Labiod, H. A33, C. De Santis: WI-FI, BLUETOOTH , ZIGBEE and WIMAXSpringer-2007.

COMPLEMENTARY PHYSICS – 1 (Science Students other than Physics)

Unit -I

Elasticity: Stress- strain- Hooke's law- Elastic moduli- bending of beams-static torsion-torsion pendulum – cantilever (AFM), uniform and non-uniform bending, I section girder.

Unit -II

Properties of Matter: Surface tension - Molecular theory of surface tension - surface energy - excess pressure in a liquid drop, factors affecting surface tension – applications -Streamline and turbulent flow - Coefficient of viscosity - Brownian motion – Viscosity of gases.

Unit -III

Electricity: Voltage and current, Ohms law. Electric power (EB Bill) – transformer - generator.

Magnetism :Electromagnetic induction-super conductivity-Meissner effect-Maglev train

Unit – V

Mobile communication and Global Positioning System (GPS): Wire and wire-less communication- Common cellular networks components-Protocols. Fundamentals of GSM & CDMA Network, GSM & CDMA Frequency Band. GPS: Operating principles of GPS- Accuracy and errors in GPS navigation.

Unit V

Our Universe: Galaxies- Stars, Planets & satellites – solar system, lunar and solar eclipses - black holes. Artificial satellites: Geo stationary and Polar satellites.

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1. Elements of Properties of Matter, D.S Mathur, S .Chand & Co. (2010).
2. Fundamentals of Physics with Applications by Arthur Beiser
3. Electricity and Magnetism, A S Mahajan, A ARangwala, McGraw Hill, NewDelhi (2017).
4. Mobile Cellular Telecommunications: Analog and Digital Systems by William C. Y. Lee; Tata McGraw Hill Publication.
5. Wireless Communications: Principles and Practice by Theodore S. Rappaport;Pearson / PHI Publication.
6. An Introduction to Astrophysics,BaidyanathBasu,TanukaChattopadhyay,sudhindraNath Biswas, Second Edition(2010), PHI Learning Private Limited.

Books for reference:

1. Mechanics (in SI units) - (Berkley Physics course-volume 1), Charles Kittel, Walter D knight etc, second editionTata McGraw Hill publication, 2017.
2. Fundamentals of General Properties of Matter, H.R Gulati, R Chand and Co, Fifth edition (1977).

4. Electricity and Magnetism, E M. Purcell, David Morin (3rd Edition) , Cambridge university press.
3. Wireless and Digital Communications by Dr. KamiloFeher; PHI Publication.
4. An Introduction to AstroPhysics, BaidyanathBasu,TanukaChattopadhyay,sudhindraNath Biswas, Second Edition(2010), PHI Learning Private Limited.
5. Physics of the universe, Hewish. A, CSIR publication, New Delhi, 1992.

COMPLEMENTARY PHYSICS – II (Arts Students)

Unit – I

Physics in Earth's Atmosphere: Sun, Earth's atmosphere- Pressure, temperature and density, Pascal's Law and Archimedes' Principle-Coriolis acceleration and weather systems, Rayleigh scattering-Red sunset-dispersion of light - Rainbow.

Unit – II

Physics in Human Body: The eyes as an optical instrument, Vision defects, Rayleigh criterion and resolving power, Sound waves and hearing, Sound intensity, Decibel scale.

Unit – III

Physics in Sports: The sweet spot, Dynamics of rotating objects, Running, Jumping and pole vaulting, Motion of a spinning ball, Continuity and Bernoulli equations, Banana shot: Magnus force, Turbulence and drag.

Unit – IV

Physics in Technology: Microwave ovens-Global Positioning System, CCDs, Lasers, Displays, Optical recording, CD, DVD Player-Electric motors - Telescope, Microscope, LCD Projector etc.

Unit - V

Our Universe: Galaxies- types of stars - constellations - Planets, – solar system, Sun-Earth-moon- faces of moon, lunar and solar eclipses – Mars-black holes. Artificial satellites: Geo stationary and Polar satellites.

Text Book

1. University Physics by F. W. Sears, M. Zemansky, R. A. Freedman, and H. D. Young, Pearson Education
2. Fundamentals of Physics by D. Halliday, R. Resnick, J. Walker, John Wiley & Sons.
3. An introduction to Astrophysics, BaidyanathBasu, , second printing, prentice - Hall of India Private limited, New Delhi, 2001.
4. An Introduction to AstroPhysics,BaidyanathBasu,TanukaChattopadhyay,sudhindraNath Biswas, Second Edition(2010), PHI Learning Private Limited.

Books for Reference:

1. Astrophysics a modern perspective,K.S. Krishnasamy, , Reprint, New Age International (p) Ltd, New Delhi, 2002.
2. Astronomy, S. Kumaravelu,Janki calendar corporation, Sivakasi, 1993.
3. Physics of the universe, Hewish. A, CSIR publication, New Delhi, 1992.
4. Modern Astrophysics, B.W. Carroll & D.A. Ostlie, Addison-Wesley Publishing Co.
5. Introductory Astronomy and Astrophysics M. Zeilik and S.A. Gregory, 4 th Edition, Saunders College Publishing.