ASTROPHYSICS

Non Major Elective: I — Semester: III
Course Code: 18UPH3NME1 — Max. Marks : 100
Hours / Week: 2 — Internal Marks : 25
Credit: 2 — External Marks : 75

Objective:

- To study about origin of universe and its expansion
- To know about the nature of stars, earth and moon
- To study the application of telescope related to the space

Unit I: Universe

Contribution of Chinese, Indian and Islamic civilization to astronomy - Nobel prize to astronomers - Difference among astrology, astronomy and astrophysics - Origin of universe – Age of universe – Expansion of universe –Cosmic background radiation - Cosmic inflation – Formation of first galaxies and stars – String theory – Size of universe – Black holes – Dark energy – Different types of galaxies – Milky way – Nebula – Fate of the universe.

Unit II: Stars

Reason for the shining of star – Composition of stars – Shape of star – Number of stars in the galaxy – Measurement of stars luminosities – Measurement of star distance – Light years – Determination of mass of the stars – Size of the stars – Age of the stars – Evolution of stars – Supernova – Binary stars (double stars) – Constellation.

Unit III: Solar system

Formation of solar system – Age of Sun – Sun's future – Future of earth when the sun dies – Sun spots – Mass of the sun – Solar wind – Flight time of light from Sun to Earth – Brown dwarf – Pluto no longer a planet – comets.

Unit IV: Earth and Moon

Size of the earth – Measurement of mass of earth – Age of earth – Origin of water on the earth – Origin of oxygen in our atmosphere – Reasoning of seasons – Green house effect - Origin of moon – Dark areas on the moon – Lack of atmosphere in moon – waning / waxing of moon.

Unit V: Telescope

Difference between reflecting and refracting telescopes – Common optical telescope configuration – Measurement of the performance of a telescope – Shape and construction of telescope mirrors – Schmidt telescope – Resolving power of telescope – Atmosphere degradation of telescope image – Advantages of observation from space – Working of radio telescope – Working of gamma ray telescope.

Books for Study

1. Mikhali Ya Marov, The Fundamentals of Modern Astrophysics, Springer, New York, 2015 (Unit I-V).
2. Pierre-Yves Bely, Carol Christian and Jean-Rene Roy, Question and Answer Guide to Astronomy,
Cambridge University Press, First South Indian Edition, 2010 (Unit I-V).

Books for References

1. K.D. Abhyankar, Astrophysics Stars and Galaxies, Universities Press, India, 2001.
2. Wolfgang Kundt, Astrophysics, Springer, New York, 2nd Edition, 2005.

MEDICAL PHYSICS

Non Major Elective: II — Semester: IV
Course Code: 18UPH4NME2 — Max. Marks : 100
Hours / Week: 2 — Internal Marks : 25
Credit: 2 — External Marks : 75

Objectives:

- To acquire knowledge about Human Mechanics
- To study the structure and functions of eye and ear
- To bring out the basic ideas of laser and ultrasonics in medicine

Unit I: Human Mechanics

Introductory anatomy: Muscles and Skelton – Forces and levers – Solving lever problems – Vertebral column - Standing, Bending and Lifting – Walking and running – Energy expenditure – Energy income.

Unit II: The Eye and Ear

The eye and vision – Structure and function of the eye – Response system – Social implications of colour perception – The optical system - The optical defect and their corrections – The ear and hearing – Structure and function of ear – The transmission and measurement of sound – The ear response – Defect of hearing.

Unit III: Instrumentation and Electrical Signals

System – Transducers – Display devices transmission methods – Computer – Electrical signals – Biopotentials – The cardiovascular system – Electro cardiography – Other electrical potential measurements – Electrical theraphy.

Unit IV: Pressure and Optics

Measuring Pressure – Blood pressure – Invasive Measurements – Optics: Fibre optics – Endoscopy –Laser: Principle, Properties, General applications – Laser in Surgery.

Unit V: Ultrasonics Medicine and Diagnostic Devices

Generation and detection of ultrasound – Ultrasound in the body – Scanning and imaging – Doppler methods – Physiological effects of ultrasound - Development in ultrasound – X-rays: The nature of X-radiation – Interaction of X-rays equipment – Use of X-rays in diagnosis – Radiotherapy.

Books for Study

1. Martin Hollins, Medical Physics, Nelson Thomsom Ltd, Second edition, 2001 (Unit I-V).

Books for Reference

1. B.H. Brown,R.H. Smallwood, D.C. Barber, P.V. Lawford, D.R. Hose, Medical Physics and Biomedical Engineering, New York , 1999.
2. Applied Laser Medicine, Hans Peter Berlien Gerhard J. Muller,2003.
3. Peter Hoskins, Kevin Martin and Abigail Thrush, Diagnostic Ultrasound Physics and Equipment, Cambridge University, 2010.

DESKTOP PUBLISHING

Skill based elective: I — Semester: IV
Course Code: 18UPH4SBE1 — Max. Marks : 100
Hours / Week: 2 — Internal Marks : 25
Credit: 2 — External Marks : 75

Objectives:

- To have a basic understanding about MS office to work with documents
- To know about the photoshop to make the text effects
- To study about the printing and publishing formats

Unit I: MS office & Multimedia

Working with documents - Opening and saving files, Editing text documents - Formatting documents - Header and footer - Creating tables - Inserting clip arts - Tools.

Multimedia: Introduction to multimedia - Color models - Multimedia presentation - Images, pictures, text, animation, audio, video.

Unit II: Photoshop

Introduction to Photoshop – The File menu - The tools - Drawing lines & shapes - Inserting picture and shapes - filling colors - Text effects, working with layers, filters.

Unit III: Corel Draw

Corel draw – Menus and tools - Drawing – lines, shapes – Inserting pictures (objects, tables, templates) - Inserting symbols & Clip arts.

Unit IV: Page Maker

Page maker - Basics menus & tools - Guides & rulers - Drawing tools - Fills & outlines - Working with - text, paragraphs, graphics, tables.

Unit V: Printing and Publishing

Introduction - Letterpress printing – lithography - offset printing - machines for letterpress - screen printing -printing materials - Page setting, character & paragraph formatting.

Books for Study

1. Prabhat K Andleigh Kiran Thakrar, Multimedia systems design, Prentice Hall of India, New Delhi,
2005 (Unit I).
2. MS-Office and Internet by Alexis Leon (Unit I).
3. Comdex Multimedia and Web Design Course Kit, Vikas Gupta & Kogent Solutions Inc. Dream Tech.
Press, 2008 (Unit II & III).
4.Carolyn M Connally, Pagemaker 7, Dream Tech, New Delhi, 2005 (Unit IV).
5. G. S. Jolly, Book Publishing Management, Har Anand Pub., New Delhi, 2009 (Unit V).

Books for References

1. Judith Jeffcoate, Multimedia in Practice: Technology and Practice, Pearson Education, 2007.
2. Steve Romaniello, Photoshop 6, Steve Romaniello, BPB Pub. New Delhi, 2001.

ROLE OF COMPUTER IN PHYSICS

Skill based elective: II — Semester: V
Course Code: 18UPH5SBE2 — Max. Marks : 100
Hours / Week: 2 — Internal Marks : 25
Credit: 2 — External Marks : 75

Objectives:

- To have a basic idea about the internet and its use in doing scientific research
- To prepare a presentation in power point by including pictures, chart, sound and so on
- To get a knowledge about the softwares used for interpreting the results

Unit I: Internet and Research

Introduction to Internet - Browsers – sending and receiving email – file downloading and uploading – difference between Intranet and Internet – Online journals, e-books - Scientific research – Aim and motivation - Principles and ethics – Identification of research problem – Performing Experiments - Data Collection.

Unit II: Origin Lab

Introduction - Graphing: Graph types – Column & Bar & Pie graph – Line and Symbol plot – Histogram & stacked histogram – 2D, 3D graph, Curve Fit: Linear Fit – Nonlinear curve fit, Peak Analysis: Baseline correction, Peak finding, Peak fitting.

Unit III: MS Office for data analysis

MS – Excel - Spreadsheet – workbook window – Formatting Cells / Worksheet –Working with Formula, Function and Charts – Linear fit – performing arithmetic operations - Filtering data and Plotting graphs.

MS-PowerPoint presentation - Presenting Scientific results: Creating a new slide – Formatting text and slide, working with slide show – Insert files, picture, textbox, sounds, Chart and Object – Different slide views.

Unit IV: MATLAB

Basics of MATLAB – Matrices and Vectors – Matrix and Array operation: Arithmetic, Relational, Logical, Elementary math functions – Saving and loading data: Importing data file, Plotting Simple Graph (basic theory only) – Applications: Solving a linear system, Curve Fitting: Polynomial curve fitting (Straight line fit only) – Graphics (introduction only).

Unit V: Software packages

LabVIEW: Basics and Virtual Instrumentations, Applications – Basics of SHELXL: Introduction and its application in crystal structure refinement, ICDD (JCPDS) - Basics and its uses in X-ray diffraction analysis. Application Software and Libraries: GAUSSIAN, MATHEMATICA, GNUPLOT, LATEX (Basics only).

Books for Study

1. Rajammal Devadas, Handbook of Methodology of Research, R.M.M. Vidyalaya Press, 1976 (Unit I).
2. MS-Office and Internet by Alexis Leon (Unit I & III).
3. Origin 8 User Guide, WWW. Originlab.com, 1st Edition (Unit II).
4. Ruthra Prathap, Getting Started with MATLAB, Oxford University Press, 2002 (Unit IV).
5. LabVIEW User Manual, National Instruments, April Edition, 2003 (Unit V).
6. http://www.gaussian.com/g_tech/gv5ref/basics.htm (Unit V).

Books for References

1. V. Rajaraman and C. Siva Ram Murthy, Parallel Computers—Architecture and Programming, Prentice, Hall of India.
2. William H. Press, Saul A. Teukolsky, William Vetterling, and Brian P. Flannery, Numerical Recipes: The Art of Scientific Computing, Cambridge University Press, 2007.
3. Computer Basics – V.Rajaraman – PHI

ELECTRICAL APPLIANCES-II

Skill based elective: III — Semester: V
Course Code: 18UPH5SBE3 — Max. Marks : 100
Hours / Week: 2 — Internal Marks : 25
Credit: 2 — External Marks : 75

Objectives:

- To have an idea about the safety precautions when installing
- To know about the different tools needed for installation and repair
- To study about the different kinds of circuit

Unit I: Safety Precautions

Individual safety precautions – Electrical safety precautions – Gas safety precautions – Chemical safety precautions – Appliance and air conditioner safety – Operating safety – Installation safety precautions – Grounding of appliances – Checking appliance and air conditioner voltage.

Unit II: Tools needed for installation and Repair

Safety precautions when handling tools – Screwdrivers – Nut drivers – Wrenches – Hammers – Prying tools – Pliers – Cutting tools – Power tools – Speciality tools – Test meters – Advantages of digital meters.

Unit III: Electricity

Electrical wiring – What is a circuit – Circuit components – Kinds of circuit: Series, Parallel, Series-Parallel – Types of shorts in a circuit – Strip circuits – Types of electric circuit – Theory of current flow – Ohm's law – Wiring diagram symbols – Terminal codes.

Unit IV: Electronics

Electronic controls – Low-voltage board – High voltage relay board – Three-board electronic control system – Troubleshooting circuits – Two board electronic control system – Motor board electronic control system – Resistors – Resistance color bands – Thermistor – Diodes – Tesiting a diode – Bridge rectifier – Triac – Testing a triac – Transistor – Integrated circuits and circuit boards – LED multiple segment displays.

Unit V: Electronic parts

Electronic components – Electrostatic discharge – Testing printed circuit boards – Integrated circuit chip – Resistors – Sensors – Temperature detectors – Thermistor – Thermocouple – Resistance temperature detector – Thermopile – Transducer – Inverter board – Piezoelectric ignitor.

Book for Study

1. Eric Kleinert, Troubleshooting and Repairing Major Appliances, MC Graw Hill, USA, 3rd Edition, 2013.

Book for References

1. D.C. Tayal, Principles of Electronics, Himalaya Publishing House Pvt. Ltd., 2011.