DEPARTMENT OF PHYSICS

RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

RathinamTechzone, Pollachi Road, Eachanari, Coimbatore – 641021

Syllabus for

B.Sc. Physics

(I & VI Semester) 2015– 2016 Batch Onwards

<u>Advanced Learners Course papers - applicable from 2015-2016 Batch</u>

Rathinam College of Arts & Science (Autonomous), Coimbatore-21.
Admitted in B.Sc. Physics s from the academic year 2015 -2016 batch

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Regulations 2015

RATHINAM COLLEGE OF ARTS & SCIENCE, COIMBATORE-21.
(AUTONOMOUS)
B.Sc. PHYSICS

SCHEME OF EXAMINATION: CBCS PATTERN

(WITH FOUR SEMESTER LANGUAGE PAPER)

(APPLICABLE TO STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2015 – 2016

BATCH)

Sem	Part	Type	Sub. Code	Subject & Paper	HRS per week	CIA	ESE	Max mark	Exam Hours	Credit
1	1	L-1	15BGE11T	Language-I	6	25	75	100	3	4
	2	E-1	15BGE12E	English-I	6	25	75	100	3	4
	3	C-1	15BPH13A	Core Paper I-Mechanics, Properties of Matter and sound	7	25	75	100	3	4
	3	CP-1	15BPH13P	Major Practical I	3	40	60	100	3	4
	3	AL-1	15BPH1AA	Allied I-Mathematics-I	6	25	75	100	3	3
	4	FCA	15BGE1FA	Environmental Studies*	2	-	50	50	3	2
2	1	L-2	15BGE21T	Language-II	6	25	75	100	3	4
	2	E-2	15BGE22E	English-II	6	25	75	100	3	4
	3	C-2	15BPH23A	Core Paper II-Heat and thermodynamics	7	25	75	100	3	4
	3	CP-2	15BPH23P	Major Practical II	3	40	60	100	3	4
	3	AL-2	15BPH2AB	Allied II-Mathematics-II	6	25	75	100	3	3
	4	FCB	15BGE2FB	Value Education – Human Rights *	2	-	50	50	3	2
3	1	L-3	15BGE31T	Language-III	6	25	75	100	3	4
	2	E-3	15BGE32E	English-III	6	25	75	100	3	4
	3	C-3	15BPH33A	Core Paper III – Optics	5	25	75	100	3	4
	3	CP-3	15BPH33P	Major Practical III	3	20	30	50	3	2
	3	AL-3	15BPH3AC	Allied III-Chemistry- I	5	20	55	75	3	4
	4	SB-1	15BPH3ZA	Skill Based Subject - Scientific facts in Physics-I	3	20	55	75	3	3
	4	OL	ALANG1	Tamil ** / Advanced Tamil ** (OR) Constitution Of India*/Communicative English-I *	2	-	50	50	3	2
	6	ALC -1	**ALC1**	Advanced Learner Course-I			100			#2

Approved in the UG – Physics BOS Meeting on 11-04-2017

Sem	Part	Type	Sub. Code	Subject & Paper	HRS per week	CIA	ESE	Max mark	Exam Hours	Credit
4	1	L-4	15BGE41T	Language-IV	5	25	75	100	3	4
	2	E-4	15BGE42E	English-IV	5	25	75	100	3	4
	3	C-4	15BPH43A	Core Paper IV – Electricity and Magnetism	5	25	75	100	3	4
	3	CP-4	15BPH43P	Major Practical IV	3	20	30	50	3	2
	3	AL-4	15BPH4AD	Allied –IV Chemistry Theory II	4	20	55	75	3	4
	3	ALP-2	15BPH4AP	Allied Chemistry practical	3	20	30	50	3	3
	4	SB-2	15BPH4ZB	Skill based Subject - Scientific facts in Physics-II	3	20	55	75	3	3
	4	OL	ALANG2	Tamil ** / Advanced Tamil ** (OR) Non-Major Elective - II General Awareness */Communicative English -II*	2		50	50	3	2
	5	EA	15BGE45A	Extension Activities @		-		-		
	6	ALC-2	**ALC2**	Advanced Learner Course-II			100			#2
5	3	C-5	15BPH53A	Core paper V - Mathematical physics	5	25	75	100	3	4
	3	C-6	15BPH53B	Core paper VI Electronics	5	25	75	100	3	4
	3	C-7	15BPH53C	Core paper VII Quantum Mechanics and Relativity	6	25	75	100	3	4
	3	C-8	15BPH53D	Core Paper VIII Digital electronics and Microprocessor	4	25	75	100	3	4
	3	CP-5	15BPH53P	Major Practical V - Electronics	3	20	30	50	3	2
	3	EL-1	ELE1	Elective –I	4	25	75	100	3	4
	4	SB-3	15BPH5ZC	Skill based Subject –MS office and Programming in C	3	20	55	75	3	3
	6	ALC-3	**ALC3**	Advanced Learner Course-III			100			#2

Approved in the UG – Physics BOS Meeting on 11-04-2017

Sem	Part	Type	Sub. Code	Subject & Paper	HRS per week	CIA	ESE	Max mark	Exam Hours	Credit
6	3	C-9	15BPH63A	Core paper IX - Atomic physics and spectroscopy	5	25	75	100	3	4
	3	C-10	15BPH63B	Core paper X - Solid state physics	5	25	75	100	3	4
	3	C-11	15BPH63C	Core paper XI - Nuclear physics	5	25	75	100	3	4
	3	CP-6	15BPH63P	Major Practical VI - Digital electronics and Micro Processor	3	20	30	50	3	2
	3	EL-2	ELE2	Elective –II	5	25	75	100	3	4
	3	EL-3	ELE3	Elective –III	4	25	75	100	3	3
	4	SB-4	15BPH6ZD	Skill based Subject – Internet of Things and Arduino	3	20	55	75	3	3
	6	ALC-4	ALC4	Advanced Learner Course-IV			100			#2
Total					**180**			**3500**		**140**

List of Elective Papers

Elective-I	15BPH5EA	A	Principles of communication system
	15BPH5EB	B	Energy Physics
	15BPH5EC	C	Atmospheric science
Elective-II	15BPH6EA	A	Nanoscience
	15BPH6EB	B	Fibre Optic Communication Systems
	15BPH6EC	C	Biophysics
Elective-III	15BPH6ED	A	Characterization of Nano Materials and its Applications
	15BPH6EE	B	Material science
	15BPH6EF	C	Geo physics

List of Advanced Learner Course

ALC-I	15BPH3LA	A	Photography
	15BPH3LB	B	Cell Phone servicing
ALC-II	15BPH4LA	A	Electrical wiring
	15BPH4LB	B	Videography
ALC-III	15BPH5LA	A	Applied Electronics
	15BPH5LB	B	Agriculture Physics
ALC-IV	15BPH6LA	A	Soil Physics
	15BPH6LB	B	Astrophysics

SEMESTER-I

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH13A	Mechanics, Properties Of Matter And Sound	7	-	-	4	C-1

Subject Description: This paper presents the principle of motion of rigid bodies, liquids and knowledge sound energy.

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

Objectives

To gain knowledge by the students in order to learn motion of bodies and sound waves acquire basic knowledge of mechanics, properties of matter and gravitation know how to apply the conservation of rotational motion

UNIT I

Conservation Law – Impulse – Impact – Direct and oblique impact – Final velocity and loss of kinetic energy –Motion of a particle in a vertical circle – friction – Laws of friction – angle of friction – resultant reaction – cone of friction – Equilibrium of a body on a rough inclined plane to the horizontal and when the inclination in greater than the angle of friction.

UNIT II Motion of rigid body

Moment of inertia

(M.I) – Parallel and perpendicular axes theorem – M.I. of rectangular Lamina and triangular lamina – M. I of a solid sphere about an axis through it C.G. – Compound pendulum – torque and angular momentum – Relation – Kinetic rotation – conservation of angular momentum

UNIT III

Gravitation: Kepler's Law of Planetary motion – Laws of gravitation – Boy's method for G –

Gravitational potential – Gravitational field at a point due to spherical shell – Variation of 'g' with latitude, altitude and depth.

Elasticity: Elastic modules – Poisson's ratio – relation between them – Expression for bending moment – determination of Young's modulus by uniform and non-uniform bending I section girders – Static Torsion – Expression for couple per unit twist – Torsional oscillation.

UNIT IV

Surface Tension: Definition and dimension of surface Tension – Excess of Pressure over a curved surface – Variation of S.T. with temperature – Jaeger's Experiment.

Viscosity: Definition – Rotation viscometer- viscosity of gases, Meyer's Modification of Poiseuille's formula – Rankine's method for viscosity of a gas.

UNIT V

Sound: Simple Harmonic vibration – Progressive waves – properties – Composition of two S.H.M. and beats – stationary waves – Properties Melde's Experiment for the frequency of electrically maintained tuning fork – Transverse and longitudinal modes – Ultrasonics – Properties and application.

Text Books

1. Brijlal and N. Subramaniam " Properties of Matter", Eurasia Publishing House Limited, 1993
2. Brijlal and N. Subramaniam "Text Book of Sound", Vikas Publishing, 1992.

Reference Books

1. Murugesan "Properties of matter", S. Chand and Co, 2015.
2. Sears Semansky and Ground University Physics "Mechanics", Pearson 2011.
3. Ghosh "Text books of Sound"
4. D.S. Mathur "Elements of Properties of Matter" S. Chand and Co, Edi 2014
5. D.S. Mathur and P.S.Hemne "Mechanics", S. Chand and Co, Edi 2015.

SEMESTER-I

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH13P	Major Practical I	-	-	3	4	CP-1

Any seven from the list

1. Young's modulus – non uniform bending –Pin and microscope.

2. Spectrometer-refractive index of a solid prism.

3. Young's modulus –uniform bending –Pin and microscope.

4. Air wedge –thickness of wire.

5. Torsional pendulum-Rigidity modulus.

6. Characteristics of a junction diode.

7. Viscosity by capillary flow method.

8. Refractive index of a prism- Stokes's formula- spectrometer.

9. Young's Modulus – Koenig's Method – Uniform bending

10. Moment of a magnet – Circular coil – Deflection magnetometer

SEMESTER-I

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BGE1FA	ENVIRONMENTAL STUDIES	2	-	-	2	FCA

UNIT I
Multi Displinary nature of environmental studies: Definition –Scope and importance- need for public awareness-natural recourses : introduction-renewable and non-renewable recourses-Forest Recourses-Water recourses-mineral recourses-food resources-land recourses-Role of an individual in conservation of natural resources.

UNIT II

Eco systems: Concept of an ecosystems-ecosystem degradation-Resource utilization-structure and functions of an ecosystem-Procedures , consumers and decomposers-energy flow in the ecosystem-food chains, food webs and ecological pyramids.

UNIT III

Environmental Pollution**:** Definition-Causes, effects and control measures – solid waste management-role of individual in pollution prevention- Disaster management- Floods-Earthquakes-cyclones-landslides.

UNIT IV

Social issues and the environment - From unsustainable development – urban problems related to energy – water conservation, rain water harvesting- watershed management – Resettlement and Rehabilitation of people, its problems and concerns

UNIT V

 Environment ethics – climate change – global warming – acid rain – ozone layer depletion – nuclear accidents – wasteland reclamation – consumerism and wasteland reclamation – environment protection act –(air , water, wildlife and forest) – public awareness.

Text Books
1. Environmental Studies- Erach Bharucha

REFERENCE BOOK:
2. Agarwal KC, 2001. Environmental Biology, Nidi Publishing Ltd.Bikaner
3. Down to Earth, Center for science and environment

SEMESTER-II

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH23A	Heat And Thermodynamics	7	-	-	4	C-2

Subject Description: This paper presents the principle of heat and Thermo dynamics.

Goal: To enable the students in order to learn the basic principles and concepts of Heat and Thermodynamics

Objectives

The aims is to provide the students to understand the principles of calorimetry understand the basic principle and laws of thermodynamics understand the concepts of entropy

UNIT I

Definitions – Newton's law of cooling – specific heat of a liquid Calendar and Barne's continuous flow method – two specific heats of a gas – specific heat of a gas by Joly's differential steam calorimeter – Regnault's method – Dulong and Petit's law – variation of specific heat ad atomic heat with temperature.

UNIT II

Transmission of heat : Conduction – Co-efficient of the thermal conductivity – Cylindrical flow of heat- Determination of thermal conductivity of rubber and bad conductor – Lee's disc method- Convection – Radiation- Black body –Wein's law –Rayleigh and Jean's law –Stefan' s law – Experimental Determination of Stefan's constant – Mathematical derivation of Stefan's law

UNIT III

Kinetic theory of gases: Maxwell's law of distribution of molecular velocities – Experimental verification – equilibrium speed distribution of velocities. Mean free path – transport phenomena – Diffusion – viscosity and thermal conduction of gases – van der Waals equation – relation between van der Waal's constant and critical constants.

UNIT IV

Laws of Thermodynamics: First law of thermodynamics – Isothermal and Adiabatic process – gas equation during an adiabatic process – Work done an adiabatic expansion of gas – equation of an adiabatic curve – isothermal processes – Determination of γ by Clement and Desorme's method – second law of thermodynamics – Carnot's engine- Working efficiency – Carnot's refrigerator – Carnot's Theorem.

UNIT V

Concept of entropy: Entropy Change in entropy in a reversible process and irreversible process – Temperature entropy diagram – Entropy of a perfect gas – increase of entropy in any irreversible process – Thermo dynamics functions – Maxwell's thermodynamics relations and applications – Joule – Kelvin effect (theory)- Clausius and Clapeyron equation.

Books for Study

1. Brijlal & N. Subramaniam "Heat & Thermodynamics", S.Chand &co 2006
2. Brijlal, N. Subramaniam and P.S.Hemne "Heat and Thermodynamics &Statistical Physics", S.Chand & co 2015.
3. R. Murugesan "Thermal Physics", I Edi, 2002
4. M. Narayanamurthi and N. Nagaratnam "Heat"

Reference Books

1. Zemansky and R.H. Dcltanann "Heat and Thermodynamics", 7th edition
2. D.S. Mathur "Heat and Thermodynamics", S. Chand & C o, Edi 2002.
3. Agarwal, Singhal, Sathyaprakash " Heat and Thermodynamics"
4. H.C. Saxena and Agarwal "Thermal Physics"

SEMESTER-II

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH23P	Major Practical II	-	-	3	4	CP-2

Any seven from the list

1. Velocity of sound and compressibility of liquid – Ultrasonic interferometer.

2. Thermal conductivity of a bad conductor – Lee's Disc method.

3. Band gap of a semiconductor.

4. Spectrometer – (i.d) Curve

5. Characteristics of Zener diode

6. Wavelength of mercury spectrum – spectrometer grating.

7. Field along the axis of a coil – Moment of a Magnet

8. Resonance Column – Velocity of Sound

9. Young's Modulus – Cantilever – Dynamic Method

10. (a) Particle size determination using Diode Laser
    (b) Determination of Laser parameters – Wavelength, and angle of divergence.
    (c) Determination of acceptance angle in an optical fiber.

SEMESTER-II

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BGE2FB	Value Education – Human Rights	2	-	-	2	FCB

UNIT – I:
  Aim of education and value education; Evolution of value oriented education; Concept of Human values; types of values. Self analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers.

UNIT – II:
  Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity. Social Values - Pity and probity, self control, universal brotherhood.Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith.

UNIT – III:
Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise. Modern Challenges of Adolescent Emotions and behavior; Sex and spirituality: Comparision and competition; positive and negative thoughts.

UNIT - IV :
Control of the mind through
a. Simplified physical exercise
b. Meditation – Objectives, types, effect on body, mind and soul
c. Activities:
(i) Moralisation of Desires
(ii) Neutralisation of Anger
(iii)Eradication of Worries
(iv) Benefits of Blessings

UNIT-V: Human Rights
    Concept of Human Rights – Indian and International Perspectives- Broad classification of Human Rights and Relevant Constitutional Provisions.- Human Rights of Women and Children- Institutions for Implementation- Violations and Redressel

TEXT BOOKS:
    1. International Bill of Human Rights, Amnesty International Publication, 1988.
REFERENCE BOOK:
  1. Human Rights, Questions and Answers, UNESCO, 1982

  2.   Maurice Cranston- What is Human Rights

SEMESTER-III

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH33A	Optics	5	-	-	4	C-3

Subject Description To study the optical instrument, objects in images, propagation of light, nature and behaviour of light, vibration of light laser and its application

Goal and objectives

To provide a good foundation in optics

To provide a knowledge of the behaviour of light

To inspire interest for the knowledge of concepts is physical and geometrical optics

UNIT 1 Geometrical Optics

Dispersion by a prism - Cauchy's dispersion formula - dispersive power- achromatism in prism - deviation without dispersion - dispersion without deviation - Aberrations - Spherical aberrations in lens - chromatic aberration - chromatic aberrations in a lens - circle of least confusion - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances- coma - Astigmatism.

UNIT 2 Interference

Fresnel's Biprism – Interference in thin films due to reflected light – Fringes due to wedge shaped thin film – Newton's rings - Theory – Refractive index of the Liquid – Michelson interferometer – Determination of a wave length of monochromatic light – difference in Wave length between two neighbouring spectral lines – Fabry Perot Interferometer.

UNIT 3 Diffraction

Fresnel's assumptions – rectilinear propagation of light – half period zone – Zone Plates – Action and Construction – comparison with a convex lens – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a Single slit – Double slit and n-slit - Diffraction grating – Resolving power & Dispersive power of Grating.

Unit 4 Polarization

Double Refraction – Huygen's explanation – optic axis in the plane of incidence, inclined and perpendicular to the crystal surface – production and detection of plane, circularly and elliptically polarized light –optical activity – Fresnel's explanation – Specific rotation – Half shade polarimeter.

Unit 5 Quantum Optics

Light quanta and their origin – Resonance radiation – Metastable states – Population Inverse – Optical pumping – Spontaneous and Stimulated emission – Einstein's coefficient – Ruby laser- He- Ne Laser - CO_2 laser – Resonant cavities –– Threshold condition for laser – MASER Introduction - Holography (Introduction) -Principle and construction -Reconstruction of Holography.

Books for study

1. Brijlal, M.N.Avadhanulu and N. Subrahmanyam, "A text book of optics", 4th edition, S. Chand & Co Publishers, New Delhi (2012)

2. K. Thyagarajan, Ajoy Ghatak," Lasers: Fundamentals and Applications" Springer Science & Business

   Media, (2010)

3. R.Murugesan,Er.Kiruthiga Sivaprsath" Modern physics", S.Chand & Company Ltd , New Delhi (2016).

Book for reference

   1. R.Murugesan," Optics and spectroscopy", S.Chand & Company Ltd , New Delhi (2003).

   2. Thiyagarajan "Optoelectronics"

SEMESTER-III

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH33P	Major Practical III	-	-	3	2	CP-3

Any seven from the list

1. Spectrometer-Dispersive power.

2. Carey foster's Bridge- Temperature coefficient

3. Rigidity Modulus - Static Torsion

4. Spectrometer-Hollow prism- Refractive index of liquid

5. Compound pendulum

6. Potentiometer -Low range ammeter calibration

7. Potentiometer -Low range Voltmeter calibration

8. Refractive index of a prism (i - i') – Spectrometer

9. Calibration of high range voltmeter – Potentiometer

10. Young's modulus - Cantilever Depression - Scale and telescope

SEMESTER-III

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH3AC	Chemistry - I	5	-	-	4	AL-3

Goal: To introduce the concepts which gives knowledge about industrial chemistry

Objective: On successful completion of this paper the students should gain the knowledge about Bonding, Dye, Fertilizers, industrial chemistry, Chromatography and Stereoisomerism

Unit I:

Chemical Bonding

1. Molecular orbital theory, bonding, antibonding and non-bonding orbitals. Molecular orbitals. MO configuration of H_2, N_2, O_2, F_2. Bond order. Diamagnetism and paramagnetism.
2. Diborane: Preparation and properties, structure, preparation and uses of $NaHB_4$, Borazole-Chemistry.
3. Interhalogen compounds: ICl, BrF_3, IF_3- Preparation, properties, hybridization and structure, shape. Basic properties of iodine.
4. sodium hydrosulphite, peracids of sulphur: preparation, properties and uses. Structure.

Unit II:

1. Industrial Chemistry

   Synthesis, properties and uses of silicones. Fuel gases: natural gas, water gas, semi water gas, carburetted water gas, producer gas, oil gas (manufacturing details not required)

2. fertilizers

   urea, ammonium sulphate, ammonium nitrate, potassium nitrate NPK fertilizer. Triple superphosphate. Pollution of air, water and soil-sources, remedies.

Unit III:

1. covalent bond: orbital overlap, hybridization, geometry of organic molecules-CH_4,C_2H_4,C_2H_2, C_6H_6. Inductive effect. Electrometic, mesomeric, hyperconjucative and steric effects. Effect in properties of compounds.
2. Stereoisomerism

   Optical isomerism: symmetry, elements of symmetry. Cause of optical activity, tartaric acid, Racemisation, Resolution. Geometric isomerism of maleic and fumaric acids. Keto-enol tautomerism in Acetoacetic esters.

Unit IV:

1. Terms: chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic effect, hypsochromic effect.
2. Dyes: azo and triphenylmethane dyes- Preapration one example.

Unit V:

1. Solutions

   Types. Liquid in Liquid. Raoult's law. Deviation from ideal behaviuor. Binary liquid mixtures. Fractional distillation.

2. Kinetics

   Rate, order, moleculality, pseudo first order, determination of order. Measurement of reaction. Effect of temperature on the rate. Energy of activation.

3. Chromatography

   Principle and application of column, paper and thin layer chomotograohy.

Text Book :

1. Dr.Veeraiyan "Allied chemistry –I&II"

Reference books:

1. Soni.P.L, "Text Book of Inorganic Chemistry", Sultan Chand &Sons.
2. Puri and Sharma, "Text book of Inorganic Chemistry", Vishal publishing
3. Soni.P.L., "Text Book of Organic Chemistry", Sultan Chand and Sons.
4. Jain.M.K, "Principles of Organic Chemistry", Vishal publishing Co.
5. Kundu and Jain, "Physical Chemistry", S. Chand.
6. Puri, Sharma and Pathania, "Text book of Physical Chemistry", Vishal Publishing co
7. B.K.Sharam, "Induatrial Chemistry"

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SEMESTER-III

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH3ZA	Scientific facts in Physics-I	3	-	-	3	SB-1

Subject Description: This paper presents the basic knowledge about scientific fact in physics
Goal: To enable the students in order to how basics of physics applied in day to day life
Objective
To gain knowledge about applications of the principles of physics

Unit I
What are cosmic rays? – Why holes in the ozone layer forms only above the poles and not in other areas? - How do CFCs damage the ozone layer? – What are solar winds? – How is age of Fossils determined? – How is the height of mountains measured? – Why are there two high tides each day? – How is depth of oceans measured? – Why is lava flowing out of a volcano hot? - What is ball lightning? - Why are rain clouds black? - What causes monsoons?
Unit II
 Why does rain fall as drops and sheets? – How do we measure rainfall? – What determines the size of rainbow? They obviously vary as shown by double rainbows. – How is quantity of water in dams and reservoirs measured? - Why does water appear white in a waterfall though it is colourless? – Why do water drops dance when poured on hot plate? – Why are water drops spherical? – What causes myopia? Can it be cured with the latest medical techniques? - How fast is the earth moving through space? – If eclipses occur when the sun, the moon, and the earth lie on a straight line, why do they not occur on every new moon and full moon day?- why should not the solar eclipse be viewed with naked eye? – Could you ever see an eclipse of the moon in daylight?
Unit III
How do we determine the atmosphere of stellar bodies? – Why do the sun and moon appear many times larger at the horizon? – Why do we always see only one side of the moon? – What is blue moon? – Inspite of being 400 times smaller how is the moon able to mask the sun? – Why does the moon look silvery at night? – With what material are Saturn's ring made of? - Why only star blink and not planets? - Why is it that the earliest sunrise and latest sunset don't coincide with longest day of the year? – Does the sun rotate? – Why are the orbits of the sun's planets arranged in a more or less flat plane? – Why does a refrigerator produce sounds periodically?
Unit IV
Can a fridge, left open in a closed room, be used to cool the room? - Why does it seem difficult to cycle up a steep hill than to push the bike up at the same speed? – Why does not the cycle travel backwards when we pedal it in the reverse direction? – Automatic wrist watches stop functioning if not worn even for a day. How does wearing them on our hand make them function? – How do microwave ovens cook food? – How does a pressure cooker work? – Why does milk boil and expand so rapidly at a low temperature though some quantity of water is present in it? – What is Richter scale? How is it used to measure the severity of earthquakes? – Why do electrical appliances draw more current during low voltage? - Why is the earthing pin in 3 pin electrical plugs bigger than the other two pins? - Electricity generating units based on coal and atomic power is known to use steam turbines. But in hydroelectric power stations water (from a dam) is made to directly rotate the turbine and generate power. How do they generate power from gas (fuels) fired stations? – What is static electricity? Why and how is it created? – Why is it that neutron have no charge?
Unit V
Why does an electric line tester glow? - Why does a high tension wire produce a humming sound? - Why does a bird not get electrocuted on sitting on a live wire? - Why are fan wings slightly curved? – When viewed under a tube light, why does a table fan appear to rotate backward and forwards? – can we reduce power consumption by running fans at slow speeds? – Why do we have sodium vapour lamp in the streets and not mercury vapour lamp? – How is white light split into seven colours when passed through a prism? – What is the role of chokes and starters in tube lights? Why do they make noise? – Why do street lights and head lights of vehicles look like stars when viewed through glass? – Will the life of fluorescent lamps decrease with frequent switching on and off? – Why is the shadow bigger than the object?
Text book:
1.   The Hindu speaks on scientific facts, Kasturi & Sons Ltd(2002).

SEMESTER-III

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH3LA	Photography	-	-	-	2	ALC -1

Objectives

To acquire knowledge about the parts and types of camera, sizes and types of films used and get trained in taking still photograph, developing and printing.

To understand the basic principles of enlarging and colour photography.

To acquire knowledge about digital photography.

UNIT – I   Camera

Basic parts of the camera, three important controls of the camera, types of camera-Box camera, simple miniature camera, Modern reflex camera-TLR and SLR cameras

UNIT – II Films-Sizes And Types

Black and White films, types of film, Film sizes and negatives, interchangeable lenses

UNIT – III Exposure and Pictorial Composition

Exposure for photographing in artificial light, depth of field ,depth of focus, exposure for taking photographs of moving subjects –shutter speed for moving objects-panning-practical hints for exposing

UNIT – IV Developing the Film

Basic principle in film developing-dish developing- tank developing-time and temperature control of developing.

UNIT – V Printing, Enlarging, Colour and Digital Photography

Contact printing-enlarging, techniques and practical hints on enlarging –primary and complementary colour- colour films-camera for colour photography – digital photography – choosing a digital camera – digital manipulation.

BOOK FOR STUDY

.   Course Material Prepared by department of physics, St. Joseph's College.

BOOK FOR REFERENCE

1.   O.P. Sharma, Practical photography
2.   Teach yourself Photography – Lee Forst – Hodder &Stoughton – U.K.

SEMESTER-III

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH3LB	Cell Phone Servicing	-	-	-	2	ALC -1

Objective:

To understand cell phone communication methods.

To know the parts of the cell phone.

To understand working of each blocks of cell phone.

To impart the knowledge of troubleshooting the cell phone.

To give practice of troubleshooting the cell phone.

UNIT – I : Fundamentals of CELL phone

Introduction to GSM/CDMA - Concepts of GSM/CDMA Cellular Technologies - Working of GSM - Information of Cell Sites & Base Station - Call Processing of a GSM – GPRS - Mobile Softwares (PC suite)

UNIT – II :   Chip level study

Chip Level Information of Mobile Phones(Tools & Components) - BGA - SMD - Air Gun - Soldering Station - Rework Station - Soldering lead - Soldering paste - De- Soldering wire - Identification of IC's - Assembling & Disassembling of mobile phones

UNIT – III :   Trouble shooting

Causes for various problems & Troubleshooting of Problems in a Mobile Phone - Network Problems - Display Problems - SIM Card Problems - Charging problems - Battery Problems - Software Unlocking - Software Flashing - IMEI information - Downloads of logos & Ring tones - Problems related to mobile phone hand sets -replacement of Various components ICS

UNIT - IV :   Practical 1

Disassembling the cell phone - Battery problems – display – Antenna problems – Network problems – SIM Card problems – SMD soldering.

UNIT – V :Practical 2

Software Unlocking – Software flashing – downloads of logos- Downloads of Ring tones – Hand set problems – Replacement of modules (display, mic, speaker, antenna, amplifier,etc)

BOOK FOR STUDY

Cell Phone Servicing, Prof B.Kanickairaj, Department of Physics, SJC.

SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH43A	Electricity And Magnetism	5	-	-	4	C-4

Subject Description: This paper presents the basic principle of charged body, when they are in rest and also under motion. This paper gives the knowledge regarding the electrical energy and magnetic energy.

Goal: To enable the students in order to learn the basic principles theory and concepts of electricity and magnetism.

Objective

To gain knowledge about the electrical energies in order to learn motion of charges acquire basic knowledge of magnetic properties know about the alternating current and its circuits get a depth of knowledge in electricity and magnetism

UNIT I Gauss theorem and its applications

Gauss theorem, application of Guass theorem - Electric intensity at a point immediately adjacent to a charged conductor - Energy stored in unit volume of an electric field

Capacitance and Capacitors

Spherical capacitor: Cylindrical capacitor, Force of attraction between charged plates of a capacitor – capacity of a parallel plate capacitor; effect of introducing a dielectric slab between the plates – Guard ring condenser - polarization in dielectric materials.

UNIT II

Helmholtz equation of varying current

Growth and decay of current in an inductive – resistive circuit – charging and discharging of a capacitor through a resistance – charging and discharging of capacitor through an inductance – oscillatory circuits- Force on a current carrying conductor – Theory of Ballistic Galvanometer- Moving coil Ballistic Galvanometer – Figure of merit of B.G. – Absolute capacitance of a capacitor.

UNIT III

Thermoelectricity: Seeback effect – laws of thermo e.m.f. - Peltier effect; Peltier Co-efficient-determination of Peltier co-efficient –   thermo dynamical consideration of Peltier effect – Thomson effect – Thomson Co-efficient – e.m.f generated in a thermocouple taking both Peltier effect and Thomson effect in the metals – Thermo electric power – Application of thermodynamics to Thermocouple – Thermoelectric diagrams and their uses.

UNIT IV

Magnetic Properties of materials

Electron theory of magnetism- dia, para, ferromagnetism and their properties - magnetic field B- magnetization M-magnetic field intensity H- magnetic susceptibility and magnetic permeability- magnetic materials and magnetization- magnetic hysteresis – area of the hysteresis loop; determination of susceptibility by Gouy's method – magnetic circuits – Hall effect – Experiment –Determination of Hall coefficient and hall voltage.

UNIT V

Alternating Current: EMF induced in a coil rotating in a magnetic field – AC circuits containing resistance, inductance and capacitance in series – series resonant circuit – acceptor circuit – voltage magnification –Q-factor – Parallel resonant circuit –Transformer.

ynamics of charged particles

Charged particles in uniform and constant electric field – Charged particles in an alternating electric field – Charged particles in a uniform and constant magnetic field – magnetic focusing – charged particles in combined electric and magnetic field when the fields are parallel and are in mutually perpendicular direction.

Books for Study

1. Brijlal and Subramaniam," Electricity and magnetism", Ratan Prakashan Mandir, New Delhi (2000).
2. R. Murugesan," Electricity and magnetism", S.Chand & Company Publishers, New Delhi (2004).

Book For reference

1. Fundamental of Electricity and Magnetism – B.D.Duggal and C.L. Chhabra

2. K.K. Tewari, "Electricity and magnetism with electronics", S.Chand & Company Publishers, New Delhi (2003)

3. D.S.Mathur, "Mechanics ",S.Chand & Company publishers, New Delhi (2003).

4. D.N. Vasudeva, "Fundamentals of Electricity and magnetism" McGraw Hill Publishers,Delhi (1998).

SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH43P	Major Practical IV	-	-	3	2	CP-4

Any seven from the list

1. Reduction factors of a Tangent Galvanometer - BG

2. Potentiometer - specific resistance of given coil

3. Newton's ring -Refractive index of a lens

4. Sonometer AC frequency

5. Comparison of viscosities

6. Moment of magnet Tan C position

7. Co-efficient of viscosity- Stoke's method

8. Comparison of Mutual Inductance – BG

9. Melde's Strings – Frequency of Vibrator.

10. Temperature co-efficient of resistance of a thermistor – Post office box.

SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH4AD	Chemistry - II	4	-	-	4	AL-4

Goal: To introduce the concepts which gives knowledge about industrial chemistry

Objective: On successful completion of this paper the students should gain the knowledge about Metals, Aromatic compounds, Heterocyclic , organic acids and electrochemistry.

Unit I:

1. Metals

    General methods of excitation of metals. Types of ores. Methods of ore dressing. Types of furnaces. Reduction methods, electrical methods, types of refining Van Arkel Zone refining. Extraction of U.

2. Coordination chemistry

    Nomenclature. Theories of Werner, Sidge Wick, Pauling, Chelation examples. Haemoglobin , Chloropyll. Applications in qualitative and quantitative analysis EDTA.

Unit II:

1. Aromatic compounds:

    Electrophilic substitution in benzene mechanism of nitration, halogenation, alkylation, acylation, sulphonation, Preparation, properties and structural education of naphathalene.

2. Heterocyclics:

    Preparation and properties of furan, thiophene, pyrrole and pyridine.

Unit III:

1. Amino Acids: Classification, preparation and properties, preparation of peptides. Classification of proteins by physical properties and by biological functions.
2. Carbohydartes: classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose. Glucose-fructose interconversion.

Unit IV: Energetics:

    Definition of first law thermodynamics. Types of sytems. Reversible, irreversible. Isothermal and adiabatic processes. Spontaneous processes, Joule-Thomson effect. Enthalpy, bond energy. Need for the second law. Carnot cycle and Carnot theorem. Entropy and its significance. Free energy change.

Unit V:

1. Electrochemistry:

    Kohlraush's law. Measurement of conductance. pH determination. Conductometric titrations. Hydrolysis of salts: pH and buffer in living systems. Galvanic cells, e.m.f. standard electrode potentials, reference electrodes. Electrochemical series, its applications. Pricnciples of electroplating. pH determination.

2. Phase Equilibria:

    Definition of terms in phase rule. Study of a simple eutectic system Pb-Ag.

Text Book :

1. Dr.Veeraiyan "Allied chemistry –I&II"

Reference books:

1. Soni.P.L, "Text Book of Inorganic Chemistry", Sultan Chand &Sons.
2. Puri and Sharma, "Text book of Inorganic Chemistry", Vishal publishing
3. Soni.P.L., "Text Book of Organic Chemistry", Sultan Chand and Sons.
4. Jain.M.K, "Principles of Organic Chemistry", Vishal publishing Co.
5. Kundu and Jain, "Physical Chemistry", S. Chand.
6. Puri, Sharma and Pathania, "Text book of Physical Chemistry", Vishal Publishing co
7. B.K.Sharam, "Induatrial Chemistry"

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SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH4AP	Allied Chemistry Practical	-	-	3	3	ALP-1

I. VOLUMETRIC ANALYSIS:
2. Estimation of sodium hydroxide using standard sodium carbonate.
3. Estimation of hydrochloric acid- standard oxalic acid.
4. Estimation of oxalic acid- standard sulphuric acid.
5. Estimation of ferrous sulphate- standard Mohr salt solution.
6. Estimation of oxalic acid- standard ferrous sulphate.
7. Estimation of potassium permanganate- standard sodium hydroxide.

II. ORGANIC ANALYSIS:
systematic analysis
1. Detection of Elements (N, S, Halogens).
2. To distinguish between aliphatic and Aromatic.
3. To distinguish between saturated and unsaturated.
4. Functional group tests for phenols, acids (mono and di), aromatic primary amine, amide, diamide, carbohydrate,
Functional groups characterized by confirmatory test.

SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH4ZB	Scientific facts in Physics-II	3	-	-	3	SB-2

Subject Description: This paper presents the basic knowledge about scientific fact in physics

Goal: To enable the students in order to how basics of physics applied in day to day life

Objective

To gain knowledge about applications of the principles of physics

Unit I

Why is it marked 6500K on fluorescent lamps (tube light)? - Why does the surface of the incandescent light bulbs become progressively greyer over time? – Is it true that gas filled lamps offer more light compared to ordinary filament bulb for the same power input? If yes how is it possible? – Tube lights do not give sharp shadow like filament bulbs. Why? – Why does the boiling point of a liquid increase with pressure? Also why does the former and latter cases respectively? - Why do tiny bubbles coalesce? Why do they move faster near the wall of the container and near one another? – How are permanent magnets made? - Why do metallic vessels lose their initial shine after use? – Why is t difficult to balance a stationary two wheeler? – How does the speed (of vehicles) measuring device used by the traffic police work? - How does a photocopier work? – Why is it difficult to photograph a TV picture? - what is red eye reduction and its function?

Unit II

Why do radios receive signals well only when kept in certain directions? – Is there any significance in using gravel on railway tracks? – How does audible sound pass through hard materials such as a wall   and be audible on the other side? – What does Dolby printed on sound system signify? –Why is it possible to hear noises from far away clearly on cool, damp air than in dry air? – Why do we not hear sound while sleeping or meditating? – Why does not sound travel in vacuum but light does? - Why does the flow of ink increases when pens are about to run out of ink? – Why do we need rods of different lengths to make a TV antenna? – How is it possible to transmit a number of channels through the same cable? - How does a thermostat work? – Why does water exhibit anomalous expansion when heated? Why does its volume decrease until 4 degrees centigrade and increase thereafter?

Unit III

While using a water heater coil, the water at the upper level becomes warmer sooner than the bottom level though we put the coil at the bottom. Why? -   What is global positioning system and how does it work? - How do hearing aids works? – Why does boiling milk overflow but boiling water does not? – What is the difference between hydrogen and an atom bomb? - While light from a candle illuminates a room, the gas (LPG) flames do not. At the same time the gas stoves help cook faster. Explain? – What is infrared spectroscopy and what is it used for? – Why does a steel ball pitch higher than a rubber ball? – How is information stored in audio and video tapes? – What is the origin of gravity? – What is brake horse power (BHP)? How is it different from the horse power? – Why does a spinning top reverse its direction of rotation towards the end? – When I switch on my TV audio is heard immediately but video comes only after some time. Why?

Unit IV

How can we measure the mass of a cometary nucleus? – How can scientists determine the temperature of a planets or stars? - What is the difference between a shooting star and a comet? – Why are all the planets in the universe spherical in shape? – What is the advantage of an electric locomotive over the steam on? How does an electric train work? – Why is the capacity of the refrigerator indicated in liters? How is it measured? – can we use a TV monitor for a computer monitor and the vice versa? - When a vehicle crosses the road some flickering may be noticed on the television screen. Why does the flickering occur? - How does remote control in TV work? - How is electricity produced from nuclear materials? - Why is the voltage of electric power always given in multiples of 11 such as 110V, 220V, 440V, 11kV? – How does a SIM card function in a cell phone? – How does an exhaust silencer work?

Unit V

How does the airbrake differ from the hydraulic? – Who is a ham? – What is plasma emission spectroscopy? – What is the science behind the swing of a cricket balls? - What is superconductivity? – What is magnetic levitation? How does it work? - What is fourth dimension? What does it explain? – Why does a diamond sparkle more than a glass imitation cut to the same shape? – How does a compact fluorescent lamps and bulbs? – Unlike fluorescent light why does sunlight produce sharper shadows? – Can we receive a mobile signal while travelling in an aeroplane? – How does an image change in 3-D hologram depending on angle of viewing? – How do touch screens works? – What is Polaroid sunglasses made of?

Text book:

1. The Hindu speaks on scientific facts, Kasturi & Sons Ltd (2002).
2. The Hindu speaks on scientific facts Volume II, Kasturi & Sons Ltd (2004).

SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH4LA	Videography	-	-	-	2	ALC -2

Objectives:
To study the different types of video cameras.
To understand the video editing softwares.

To provide practical training in basic operations of camera and video editing.

UNIT – I : Video Camera
Principle of Television - Colour composite Video signal - Colour Television systems(PAL, SECAM, NTSC) - Video camera: Pick up Device - Optical section - Charge Couple Device-CCD - Electronic Shutter - Handling highlight - HAD sensor - Advantages / limitation / resolution of CCD - Digital Signal processing in camera - Feature comparison in various Popular camera Models of Sony/Panasonic.

UNIT - II : Video Technique
Video camera accessories: Zoom lens - View Finder - Microphone - Battery - AC adapter - Camera cable - Care and handling of the Equipment - Functions and Controls of Video Camera: Power on/off - VTR on/off - Zoom control - Iris Control auto/ manual/ - Viewfinder - Earphone - Camera Connector - Video out - Video recording - corrections applied to video processing: Shading Corrections - Aperture Correction - Flare Correction - ABL - Gamma correction
- Chrome gamma/colour correction

UNIT – III :   Video Editing Softwares
Software overview (Windows Movie Maker, Adobe premier, Pinnacle Video Studio, Ulead Video Studio, Magix Video Studio) – Video capture and record – edit – Title - Audio – Create video file and Disk (DVD and Blue Ray)

UNIT – IV :   Video shooting
Functions of Video Camera- Video shooting (indoor and outdoor)

UNIT – V :   Video editing

Functions of Ulead Video studio -   video editing- creating a MPEG video file and DVD

BOOK FOR STUDY:
Videography by Prof.B.Kanickairaj,Department of physics, SJC,2011.

Rathinam College of Arts & Science (Autonomous), Coimbatore-21.
Admitted in B.Sc. Physics s from the academic year 2015 -2016 batch

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SEMESTER-IV

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH4LB	Electrical Wiring	-	-	-	2	ALC-2

Objectives:

To study the different electric parameters and types of power generation.

To understand the distribution symbols and electrical connections used in electrical wiring.

To provide practical training in basic aspects of electrical wiring.

UNIT – I: Electricity Generation

Fundamentals of electricity – Current, Volt, resistance – Ohm's law – Power, - Kilowatt hour – Watt meter – Electrical measurements – Electric power generation by Thermal, hydro, atomic and nuclear methods – Battery –Generators – Study of Generator.

UNIT – II: Electric Circuits and Distribution:

Symbols of electrical parameters –Importance Series, Parallel connections – Ac and DC – Conductors – Inductor, Conductors –Inductor, Capacitor and transformer – Distribution methods – single phase and three phase – Star and delta connections – Rules of electric connections – SWG –Motors – Study of motor and series and parallel circuits.

UNIT – III: Electrical Wiring – I

Tools – Methods of Joining conductors – House wiring methods – Glit, wood casing, Tough – Rubber sheathed conduit or PVC pipe – concealed. Switches – ceiling roze – lamp holders, sockets – Fuse base – Distribution box –Trip switches – Earth connection –Experimental study of house wiring.

UNIT – IV: Electrical Wiring – II

Main board preparation – Distribution – Cut – out preparation – Switch board preparation – Power factor –IEE regulations – Safety precautions – Testing the insulation –Experiment study of main, distribution and switch boards.

UNIT - V: Electrical Appliances

Tungsten - filament bulb lamp – tube light- mercury and sodium vapour lamp - emergency lamp - heater –iron box – table fan – ceiling fan – battery eliminator – electrical requirement to washing machine and refrigerator- procedure to rectify the electrical faults in electrical appliances.

BOOK FOR STUDY:

Electrical Wiring by Prof.B.Kanickairaj, Department of physics, SJC.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH53A	Core paper V - Mathematical physics	5	-	-	4	C-5

Subject Description:

This paper presents the fundamentals of matrices, vectors, errors, approximations and classical mechanics which will be used for studies solving problems during research work.

Objectives

To acquire knowledge and apply it to various physical problems

- To apply the develop the problem solving ability.
- To motivate the students to apply matrices or solving problems in spectroscopy, nuclear
- physics etc.,
- To apply vectors to non-linear dynamics

UNIT I Matrices

Introduction – special types of Matrices – Transpose of a Matrix –Conjugate of a Matrix – Conjugate Transpose of a Matrix – Symmetric and Anti symmetric – Hermitian and skew Hermitian – Orthogonal and Unitary Matrices - Singular and Non-Singular matrices - Trace of a Matrix - Inner Product – Properties

Unit II Vector

Directional derivatives and normal derivative - Gradient of a scalar field and its geometrical interpretation - Divergence and curl of a vector field - Vector identities and simple problems - Gauss' divergence theorem(Proof)- Deductions from Gauss' theorem

UNIT III Errors, Approximations and Extremum of Functions

Introduction to errors - classifications - accuracy of function methods - error in laboratory instruments and methods-utility of errors - Approximation and applications - Maxima and minima: Geometrical interpretation and physical application - two and more independent variables - Lagrangian multiplier.

UNIT IV Classical Mechanics – I

Constraints and Degrees of Freedom – Generalized co-ordinates – Generalized displacement , Velocity, Acceleration , Momentum, Force and Potential Energy – D'Alembert's Principle – Lagrangians equation from D'Alembert's principle – Application of Lagrange's equation of motion to linear harmonic oscillator, simple pendulum and compound pendulum.

UNIT V Classical Mechanics – II

Phase Space – Hamiltonian function – Hamiltonian Principle – Hamilton's canonical equations of motion- Physical significance of H – Applications of Hamiltonian equations of motion to simple pendulum, compound pendulum and linear harmonic oscillator.

Books for Study

1. B D Gupta, "Mathematical Physics", Vikas Publishing House Pvt Ltd., Noida, 2016.
2. B.S. Rajput, "Mathematical Physics" A Pragati Editions, 2015

Book for Reference

1. Gupta Kumar & Sharma, "Classical Mechanics"
2. Sathyaprakash, "Mathematical Physics with Classical Mechanics", Sultan & Sons Educational Publishing New Delhi, 2013.
3. G.Aruldhas, "Classical Mechanics", PHI Learning Pvt. Ltd., New Delhi, 2016.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH53B	Core paper VI Electronics	5	-	-	4	C-6

Subject Description:
   This paper presents the fundamentals of electronics and its applications

Objectives
- To enable the students to acquire the knowledge in electronics and to study the various electronics circuits.
- To motivate the students to apply the concepts of electronics in their day – to – day life.

UNIT I Diodes and Transistors
Classification of solids – types of diodes – characteristics of junction diode and Zener diode – transistors Application: half wave and full wave rectifier, Voltage doubler – PNP and NPN transistors – Characteristics of transistor: CB mode, CE mode, CC mode.

UNIT II Amplifiers
Classification of an amplifier – RC coupled voltage amplifier – Power amplifiers – Class A power amplifier – Transformer coupled class A power amplifier – Collector dissipation – push pull class B power amplifier – Feedback amplifier: feedback and related terms – block diagram of a feedback amplifier – Transfer gain of an amplifier with feedback – Emitter follower circuit

Oscillators
Introduction - Types of oscillators - Fundamental principle of oscillators - Concept of feedback oscillators - Hartley oscillators – Colpitts oscillators - Phase shift oscillators.

UNIT III Solid state switching circuits
Introduction - Collector leakage current – Saturation collector current – Switching transistors – Switching action of an transistor – Multivibrator – Types of multivibrator – Transistor Astable multivibrator – transistor mono stable multivibrator – transistor Bistable multivibrator.

UNIT IV Wave Shaping Circuits
Differentiating circuit – Integrating circuit – Clipping circuit: positive clipper – negative clipper - biased clipper – combination clipper – applications of clipper- Clamping Circuits: Positive clamper – negative clamper.

UNIT V Power Electronics
Introduction –SCR – Construction, Working and characteristics – Triac – Construction –Operations – Characteristics – Applications of Triac – Diac – Operations – Applications of Diac: Lamp dimmer, Heat control – Uni-junction transistor – Constructions – Operations – equivalent circuit of UJT – Characteristics of UJT - advantages of UJT – UJT relaxations Oscillator.

Book for Study
   1. D. Chattopadhyay, P C Rakshit, B.Saha, N.N. Purkait, "Foundations of Electronics", New
      Age International Publishers, New Delhi, 2015.
   2. V.K.Mehta, Rohit Mehta, " Principles of Electronics", S.Chand and company, New Delhi,
      2015.

Books for Reference
   1. Jacob Millman, Christos Halkias, Chetan D. Pouikh," Integrated Electronics Analog and Digital
      Criciuts and Systems", Tata Mc Graw Hill Education Pvt. Ltd., New Delhi, 2016.
   2. Dr. R.S. Sedha, "A Textbook of Applied Electronics", S.Chand and Company Pvt. Ltd., New Delhi,
      2016.
   3. Millman and Halkias "Electronics devises and Circuits", Tata McGraw Hill India, 2007

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH53C	Core paper VII Quantum Mechanics and Relativity	6	-	-	4	C-7

Subject Description: This paper presents the fundamentals of wave mechanics, Schrödinger's wave equation and its applications.

Objectives

* To acquire knowledge and apply it to various physical problems
* To enhance the problem solving ability.
* To motivate the students to apply Schrödinger's equation or solving problems in wave mechanics, nuclear physics etc.,

UNIT 1- Wave Properties of Matter

Introduction – Phase velocity and Group velocity – Analytical expression for a group of waves – Nature of De'Broglie relation – Derivation of the De'Broglie relation – Phase velocity of De'Broglie waves – Relation between the Phase velocity and the wavelength of De'Broglie wave– De'Broglie wavelength associated with a particle of mass M and kinetic energy – Verification of De'Broglie relation – Davission and Germer's experiments – G P Thomson's experiments.

UNIT 2 - Uncertainty Principle

Introduction – Heisenberg's Uncertainty Principle – Elementary proof between displacement and momentum – Energy and Time – Physical Significance – Illustration – Diffraction of electrons – Gamma ray microscope – Application – Non-existence of free electrons in the nucleus – Size and Energy in the ground state of Hydrogen atom

UNIT 3 - Schrödinger's Wave Equation

Introduction – Wave function for a free particle – Schrödinger's One dimensional wave equation – Time-dependent and Time independent – Physical interpretation – Eigen function – Eigen Value – Eigen equation – Operator for Momentum, Kinetic Energy and Total Energy – Postulates of Quantum Mechanics.

UNIT 4 – Applications of Quantum mechanics

Particle in a box – Particle in a rectangular three dimensional box – Simple Harmonic oscillator – Reflection at a step potential – transmission across a potential barrier: the Tunneling effect

UNIT 5 – Relativity

Introduction – Galilean Transformation equations – Ether Hypothesis – Michelson - Morley experiment – Explanation of the Negative results – Special theory of Relativity – Lorentz transformation equations – Length contraction – Time dilation – Addition of Velocities – Variation of Mass with velocity – Mass energy equivalence.

Books for Study:

1. Kamal Singh, S.P.Singh, "Elements of Quantum Mechanics", S. Chand and Company Pvt. Ltd., New Delhi, 2016.

2. R.Murugeshan. Er. Kiruthiga Siva Prasath, "Modern Physics", S.Chand and Company Pvt. Ltd., New Delhi, 2016.

Books for Reference:

1. Leonard, Schiff, Jayendra Bandhyopadhyay, "Quantum Mechanics", Mc Graw Hill Education (India) Pvt. Ltd., New Delhi, 2016.

2. Gupta, Kumar and Sharma, "Quantum Mechanics", Jai PRakash Nath publications, Meerut, 2017.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH53D	Core paper VII Digital electronics and Microprocessor	4	-	-	4	C-5

Subject Description

This paper presents basic principles of digital electronics. Students can acquire knowledge regarding number systems, arithmetic building blocks, memories and data processing circuits and Microprocessing.

Objectives

To give description for the students in order to

- Learn the logic circuits
- Acquire basic knowledge of binary addition
- Understand the action and application of counters
- Get a deep knowledge of various memories used in computer circuits

UNIT I

Number System, Binary Arithmetic and Binary Codes

Decimal , Binary , Octal , Hexadecimal number system – Conversion from one system to another system- Binary arithmetic operations-Representation of negative number-Binary subtraction using 1's and 2's compliment-weighted codes-non weighted codes-alpha numeric codes: ASCII code – EBCDIC - Parity : even parity and odd parity method of single bit error detection

UNIT II

Logic gate, Logic circuits, Boolean algebra and Karnaugh map

Basic Logic gates (NOT,OR,AND) – Universal building blocks (NAND and NOR gates) – EX-OR and EX-NOR gates- construction of basic gates using discrete components - Law of Boolean algebra- DeMorgan's theorems– Simplifications of Boolean expressions – Karnaugh maps - constructions – Simplification of Boolean expressions using Karnaugh maps.

UNIT III

Flip- flops and Counters

R-S flip flop – D flip flop- JK flip flop – Master slave J-K flip flop –Edge triggered flip flops. Asynchronous and synchronous counters - Ring counters- Modulus counters - Mod 3, Mod 5 and Decade counters.

UNIT IV

Arithmetic, Data processing circuits and Shift Register

Half and full adder – half and full subtractor – parallel binary adder and subtractor –Multiplexer- De-multiplexer-Encoder-Decoder-Serial in serial out shift register-Parallel in parallel out shift registers.

UNIT V

Basic concept – Organization of Microprocessor – Organization of 8085 – Data and Address bus addressing – The I/O devices – Registers in 8085 – Instruction types – Classification of Instruction – Addressing modes – Programming 8085 – The programming process – machine language programming – Assembly language Programming – The instruction format, Assembler directives, Constant in assembly programming – Language for writing algorithms – The Stack – Subroutines.

Books for study:

1. Albert Paul Malvino & Donald P Leach," Digital principles and applications", Tata McGraw Hill, New Delhi I(1999).

2. Floyd," Digital fundamentals", Tata McGraw Hill, New Delhi(1995).

3. Ramesh Gaonkar, " Microprocessor, Architecture, Programming and Applications with the 8085", Penram International Publishing (India) Pvt. Ltd., Mumbai, 2008.

Books for reference:

1. V.Vijayendaran," Introduction to Integrated electronics digital and Analog", S.Vishwanathan Printers and Publishers Pvt.Ltd (reprint 2011).

2. M.Morris Mano ,"Digital logic and computer design", Prentice-Hall of India Pvt.Ltd, NewDelhi (2006).

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SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH53P	Major Practical V – Electronics	-	-	3	2	C-5

List of experiments (any 8 experiments)

1. Construction and study of IC Regulated Power Supply

2. Voltage doubler

3. Characteristics of transistor- common base mode

4. Characteristics of transistor- common emitter mode

5. RC-Coupled Amplifier –Single Stage

6. Feedback Amplifier

7. Emitter Follower

8. Hartley Oscillator

9. Astable multivibrator using Transistor

10. Monostable multivibrator using Transistor

11. FET characteristics

12. UJT Characteristics

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SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH5EA	Principles of communication system	4	-	-	4	EL-1

Subject Description: This paper presents the fundamentals of Modulation, Demodulation of signals
Transmission Lines, Antennas, Radio and Cellular Communications, Fiber Optic Communications Television

Objectives

To enable the learners to understand

- Modulation, demodulation, transmission lines and antennas
- Radio, cellular, fibre optic, television and satellite communications

UNIT I   Modulation and Demodulation

Amplitude modulation- Theory of AM- modulation index – Single side band generation –Suppression of carrier-Frequency modulation–Expression for FM wave- PM definition-Comparative advantages and disadvantages of FM, PM and AM – Basic principles of demodulation-The diode detector - Ratio detector .

UNIT II Transmission Lines and Antennas

Line equations of transmission lines- Short circuited and open ended lines – Standing wave ratio-relation between SWR and reflection coefficient - Types of transmission lines - Properties of transmission lines - Mechanism of electromagnetic radiation from resonant circuit - Elementary dipole antenna-current and voltage distribution in a half-wave dipole antenna – Principle of radiation of a half-wave dipole antenna-directional pattern- Derivation of E and H in principle of radiation of half-wave.

UNIT III Radio and Cellular Communications

Classification of Radio Transmitters - AM radio transmitter stages – note on AM radio broadcast transmitters - Principle of super heterodyne receiver - Block diagram of the stages of super het - AM receiver - Block diagram of stages of a FM radio receiver – difference between AM and FM receivers – Cellular communications (Elementary ideas).

UNIT IV Fiber Optic Communications

Fiber cable construction - Fiber optic cable applications – Acceptance angle and numerical aperture – Propagation of light through an optical fiber (Single mode, Multimode, Step index, Graded index) – Fiber configuration (Single mode step index, Multimode step index and Multimode graded index fibers) - Light sources and detectors – Optical connectors and couplers – Transmitter for fiber optic communication – High performance circuit(LED digital transmitter) – Fiber optic receiver – High performance receiver – Repeaters – Fiber optic based modems : Transreceivers.

UNIT V Television

Principle of picture transmission and reception – gross structure of a television – Picture elements – Scanning, image continuity and persistence of vision – Horizontal and vertical blanking – TV camera tubes: Vidicon – The block diagram of a basic TV transmitter – Block diagram of a monochrome TV receiver and Color TV

Books for study:

1 . Deshpande N.D, Deshpande D.A and Rangole P.K ,"Communication Electronics", Tata McGraw Hill Publishers Ltd (1996).

2. Dr. Subir Kumar Sarkar, " Optical Fibres and Fibre optics Communication System", S.Chand and Company Pvt. Ltd., New Delhi, 2014.

3. A.M.Dhake, "Television and Video Engineering ", Tata Mc Graw Hill Education Pvt. Ltd., New Delhi, 2012.

Book for reference:

1. MGeorge Kennedy ," Electronic Communication Systems", Tata McGraw Hill Publishers Ltd, New Delhi (2008).

2. Sanjeeva Gupta ,"Electronics Communication Systems", Khanna Publications, Salem (1992).

3. Bernard Grob , "Basic Television and Video Systems", McGraw Hill, New York (1997).

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH5EB	Energy Physics	4	-	-	4	EL-1

Subject Description: This paper presents the fundamentals of electrical , optical , atomic and molecular, thermal and non conventional energies

Objectives

To enable the learners to understand

- The use of energy resources and their application in day – today life

UNIT-I ELECTRICAL ENERGY

Principle of production of A.C. – A.C generators – D.C generators – D.C Motors. Heat developed in current carrying conductor – Application of heating effect – Electric heater or stove – Electric radiation and Electric Iron – Electric welding and electric furnace – Carbon arc – Electric Lamp – Efficiency of a Lamp – Measurement of Electric Power.

UNIT – II OPTICAL ENERGY

Characteristics of Light – Light sources – LED, LASER – optical fibre – Light propagation through optical fibres: Basic optical laws used in optical fibres – Optical parameters of optical fibres: Acceptance angle and Numerical aperture – Types of optical fibres: Based on material, Number of modes and refractive index profile – Fibre optical communication system – Block Diagram – Source – Transmitter – Optical fibre – Receiver.

UNIT – III   ATOMIC AND MOLECULAR ENERGY

Degrees of freedom – Number of Degrees of Freedom of Mono, Di and Tri Atomic system – Maxwell's Law of equipartition of Energy – Molar Specific heat capacity at constant volume and constant pressure – Total Internal Energy and Ratio of Heat capacities in monoatomic gas, Diatomic gas, Non Linear and Linear type of Tri atomic gas molecular system - Gas and Vapour Distinction – Measurement of saturated and unsaturated vapour Pressure: Regnault's statistical method – Their characteristics – Graphical Illustration of Gas laws.

UNIT – IV   THERMAL ENERGY

Definition of Total thermal Energy density - Spectral Energy density – Spectral Emissive power – Emissivity – Emissive power – Absorptive power – Reflective power – Kirchoff's Law of radiation and its proof – verification of Kirchoff's Results: Ritche's Experiment.

Distribution of Energy in the thermal spectrum – Lummer and Pringsheim Experiment and its Results – Wien's Displacement Law and Radiation Law – Rayleigh Jean's Law Planck's Radiation Law – Deduction of Wien's Law and Rayleigh – Jean's Law from Planck's law.

Solar constant – Temperature of sun – Disappearing filament optical Pyrometer - Pyrheliometers: Angstrom Pyroheliometer – Water flow Pyroheliometer.

UNIT – V NON CONVENTIONAL ENERGY

SOLAR ENERGY: Solar radiation – Solar radiation outside the ear th's atmosphere Solar radiation at the earth's surface – Solar Thermal Energy – Solar Thermal devices and systems: Solar water heater – Sub components of solar water heater – Solar Cooker and its merits and demerits.

WIND ENERGY: Power in the wind – Types of wind energy systems –Horizontal axis wind Turbine – Vertical axis wind Turbine.

OCEAN ENERGY: Tidal Energy – Ocean Thermal Energy Conversion (OTEC) – Closed Cycle OTEC system – Open Cycle OTEC System.

Books for study:

1. Tasneem Abbasi, S.A. Abbasi, "Renewable Energy Sources Their impact on Global warming and Pollution", PHI Learning Pvt. Ltd., New Delhi, 2013.

2. D.P.Kothari, K.C. Singal, Rakesh Ranjan, " Renewable energy Sources and Emerging Technologies", PHI Learning Pvt. Ltd., New Delhi, 2016.

3. G. D. Rai, "Non- Conventional energy sources", Khanna Publishers, New Delhi, 2015.

Books for Reference

1. Brijlal and Subramaniam," Electricity and magnetism", Ratan Prakashan Mandir, New Delhi (2000).

2. Dr. Subir Kumar Sarkar, " Optical Fibres and Fibre optics Communication System", S.Chand and Company Pvt. Ltd., New Delhi, 2014

3. Brijlal, N. Subramaniam and P.S.Hemne "Heat and Thermodynamics &Statistical Physics", S.Chand & co 2015.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH5EC	Atmospheric science	4	-	-	4	EL-1

Subject Description: This paper presents the fundamentals of earth system, atmospheric thermodynamics, radiative transfer, atmospheric dynamics, and climate dynamics

Objectives

To enable the learners to understand

- The science behind the Atmosphere

Unit I

Introduction and Earth system - Atmosphere-A brief survey (Pressure, Temperature and Chemical composition) - (Vertical structure of the atmosphere) - The Earth system – Oceans - The Earth system – Marine biosphere - The Earth system – Hydrological cycle - The Earth system – Carbon cycle - The Earth system – Carbon in the oceans and Earth's crust

Unit II

Atmospheric Thermodynamics - Introduction - The hydrostatic equation - Hypsometric equation and pressure at sea level - Basic Thermodynamics - Concept of air parcel and dry adiabatic lapse rate - Potential temperature and problems - Skew-T ln-P chart - Lifting Condensation Level (LCL) - Saturated adiabatic and Pseudo-adiabatic processes - Saturated adiabatic lapse rate - Tutorial on using Skew-T ln-P chart - Normand's rule and static stability - Conditional and convective stability - Second law of Thermodynamics – Clausius - Clayperon equation

Unit III

Radiative transfer - Introduction- Quantitative description of radiation - Concept of Black body and Stefan-Boltzmann law - Radiative properties of non-black surfaces - Kirchoff's law - Physics of Absorption, Emission and Scattering in the atmosphere - Equation of Radiative Transfer (RTE) -Radiative cooling rates

Unit IV

Atmospheric Dynamics - An Introduction - Hydrostatic and Geostrophic approximations - Cyclostrophic approximation and Thermal winds – Atmospheric boundary layer **-** Surface energy balance and bulk aerodynamic formulae - Vertical structure

Unit V

Climate Dynamics - Introduction - Climate sensitivity and feedback - Transient and equilibrium response - Tutorial on climate dynamics

References:

1. J.M.Wallace and P.V.Hobbs," Atmospheric science – An Introductory Survey", 2nd Edition, Academic Press, London, 2006.
2. A.A.Tsonis, "An Introduction to Atmospheric Thermodynamics", 2nd Edition, Cambridge University Press, Cambridge, 2007.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH5ZC	Skill based Subject –MS office and Programming in C	3	-	-	3	SB-3

Subject Description This subject deals with MS office and the programming concepts of C language

Objectives

On successful completion of this subject the student should have to writing programming ability on scientific and mathematical problems

It is very useful to the students in many ways like their higher studies and research etc., because of its versatility.

Unit I MS-WORD

Word processing overview-creating and editing documents-formatting document-working with header and footnotes.

Creating report and news letter-creating table and merging document-creating web page-macros-keyboard shortcuts-menus-custom toolbars.

Unit II MS-EXCEL:

Spread sheet overview-creating worksheet-managing and analyzing complex worksheet-creating charts form template-sharing data between applications.

MS-POWERPOINT:

Basics-using text-adding visual elements-charts and tables-drawing- clip art-sounds-animation-apply time transitions to slides.

Unit III

Introduction – character sets – constants – keywords and identifiers – variables – variables – data types – declaration of variables –assigning values to variables – defining symbolic constants – Arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – special operators – arithmetic expression – evaluation of expression – precedence   of arithmetic operators – some computer problems – type conversion in expression – operator mathematical functions

Unit IV

Reading and writing character – formatted input an d output – decision making : IF statement : Simple IF – IF ELSE – Nesting of IF- ELSE - IF Ladder – Switch Statement– operator – go to statement – while – do - while – For loop – Jumps in loops – simple programs.

Unit V

Arrays : Introduction – One dimensional array – declaration of array – Initiating on two and multidimensional arrays – declaring and initializing string variables – reading strings from terminal – writing strings on the screen – Arithmetic operations on characters – simple programs.

Need for user defined functions – A multifunction program – RETURN values and their types – functions calls – category of functions – no arguments and no return values – simple programs.

Book for study

1. E. Balagurusamy, "Programming in ANSI C", 3 rd Edition
2. Joan Lambert, Curtis Frye,"Microsoft Office 2016 Step by Step", Microsoft Press, Washington, 2015.

Book for Reference

1. Ashok N. Kamthane ,"Programming in C", Pearson, First Indian Print 2004.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH5LA	Applied Electronics	-	-	-	2	ALC-3

Subject Description:
This paper presents the applications of electronics and its usage.

Objectives
- To enable the students to acquire the knowledge in electronics and to study the various electronics circuits.
- To motivate the students to apply the concepts of electronics in their day – to – day life.

Unit I Operational Amplifier fundamentals:
Characteristics – Op-Amp parameters - inverting amplifier-non-inverting amplifier - unity follower - summing amplifier- difference amplifier - Differentiator, integrator, comparator using OP-Amps.

Unit II Analog computation and wave form generation:
Solving simultaneous equations and second. order differential equations. Square wave generation (astable operation) and sine wave generation (Wien's Bridge oscillator).

Unit III Timer and applications:
Timer 555 - Internal block diagram and working - Applications of timer 555 - Schmitt trigger, Astable and Monostable operations.

Unit IV D/A and A/D converters
DIA converter - binary weighted resistor and R-2R ladder method - A/D converter - Flash - Counter type - Successive approximation techniques.

Unit V Semiconductor Memories
Basics - ROM, PROM, EPROM, EEPROM - RAM - Dynamic RAM - basic ROM cell - basic RAM cell (both using gates) - block diagram of 2Kx8 ROM and 2Kx8 RAM and different signals associated with these chips.

Books for Study
1. Jacob Millman, Christos Halkias, Chetan D. Pouikh," Integrated Electronics Analog and Digital Criciuts and Systems", Tata Mc Graw Hill Education Pvt. Ltd., New Delhi, 2016.

Books for References
1 . Dr. R.S. Sedha, "A Textbook of Applied Electronics", S.Chand and Company Pvt. Ltd., New Delhi, 2016.

SEMESTER-V

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH5LB	Agriculture Physics	-	-	-	2	ALC-3

Subject Description:

This paper presents the Fundamentals of soil physics, water physics, hygrometry, pumps and solar collector and their application.

Objectives
- To enable the students to acquire the knowledge of Physics in Agriculture.

Unit – I SOIL PHYSICS

Mechanical composition of soil – physical properties of soil, pore space, bulk density, particle density – classification – significance of clays – plasticity, shrinkage, flocculation and deflocculation – Soil structure – soil colour – Thermal properties of soil and soil temperatures – types of soil water – its retention, movement – viscosity, swelling – soil moisture losses – Elementary ideas of soil water conservation.

Unit – II WATER PHYSICS

Water qualities – Rain fall – Ground water – surface water pollution – instrumentation and sampling – water quality monitoring

Unit – III

Principle of production of A.C. – Average value of A.C. voltage or current – R.M.S. value of alternating voltage or current – power consumed in A.C. Circuits – kilo watt hour – A.C. generator – Three phase A.C. – Distribution of three phase A.C. Three phase four system – The choke- The transformer – Transmission of electric power over long distances.

Unit – IV HYGROMETRY

Absolute Humidity – Relative Humidity – Dew point, Daniell's Hygrometer, Regnault's hygrometer. Advantages of Regnault's hygrometer – wet and Dry and Bulb hygrometer
PUMPS

Water pumps – common pump – force pump – Fire engine, inflator (or) compression pump – pressure after n strokes – Exhaust pump (or) common air pump.

Unit – V Solar Collector and Applications

Solar Air heaters- Application of solar air heaters. Solar Drying with various driers – Heating and Drying of Agricultural products – Theory of solar drying – moisture content and its measurement – solar ponds – Application of solar ponds – Solar pumping – Solar pump system solar components – Turbine driven pump – Application of solar energy to agricultural crops

Books for Reference
1. H.O. Buckman and Brady, "Nature and properties of Soil"
2. L.D. Bavar, Walter H. Gardner and Silford R. Gardner, "Soil physics"
3. H. KohnKoe , "Soil physics"
4. John C. Rodda, Richard A. Downing, Frank M. Law, "Systematic Hydrology"

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH63A	Core paper IX - Atomic physics and spectroscopy	5	-	-	4	C-9

Subject Description

Analysis of positive rays, isotopes, atomic structures, models in various aspects, spectral lines subjected to magnetic fields, light inducing electron emission, x –rays and their diffraction.

Objectives

- To provide a detailed study of positive rays and atomic models.
- To learn the impact of magnetic fields on spectra and the behaviour of atom in various states
- To provide a knowledge on the application of photoelectric and x-rays.

Unit I Positive rays and particle properties of waves

Discovery – Properties – Positive ray analysis : Thomson's Parabola method – determination of mass – discovery of stable isotopes– Limitations – Dempster's mass spectrograph –Aston's mass spectrograph-mass defect and packing fraction – polarization of X –rays – scattering of X- rays (Thomson's formula)

UNIT II Structure of the Atom

The Bohr atom model – Basic postulates – Evidences in favour of Bohr's theory - Method of excitation of atoms – Critical Potentials - Experimental determination of critical potentials by Franck and Hertz's method - Sommerfeld's relativistic model– Vector atom model – Quantum numbers associated with Vector atom model – coupling schemes (LS, JJ coupling) – Pauli's exclusion principle – Periodic classification of elements

UNIT III Magneto Optical Properties of Spectrum

Magentic dipole moment due to orbital motion of the electron – Magnetic dipole moment due to spin – The Stern and Gerlach experiment – Optical spectra – Fine Structure of the sodium D line – Zeeman effect – Experiments – Lorentz classical theory – Expression for the Zeeman shift – Larmor's theorem – Quantum mechanical explanation o f the normal Zeeman effect – Anomalous Zeeman effect – Paschen – Back effect – Stark effect

UNIT IV Photoelectric Effect

Introduction – Richardson and Compton experiment: Relation between photoelectric current and retarding potentials – Relation between velocity of Photo electrons and the frequency of light –Experimental investigations on the photoelectric effect - Laws of Photoelectric emission – Failure of electromagnetic theory – Einstein's Photoelectric equation – Experimental verification Einstein's Photoelectric equation by Millikan's Experiments – Photo electric cells –Photo emission cell – Photo Voltaic cell – Photo conductive cell – Applications of Photo electric cell.

UNIT V Spectroscopy

UV Spectroscopy: Introduction – Quartz spectrograph for near UV region – Littrow spectrograph – Concave grating vacuum spectrograph – IR Spectroscopy: Introduction - Absorption spectroscopy – Block diagram of an absorption spectrometer – Double beam infrared spectrometer – Raman Spectroscopy: Raman Spectrometer – Classical theory of Raman Effect – Vibrational Raman spectra of diatomic molecules.

Book for Study:

1. R.Murugeshan. Er. Kiruthiga Siva Prasath, "Modern Physics", S.Chand and Company Pvt. Ltd., New Delhi, 2016.

Books for Reference

1. N.K. Sehgal , K.L. Chopra , D.L. Sehgal, " Modern physics", Sultan Chand And Sons, 2014.
2. Colin N Banwell and Elaine M. McCash, " Fundamentals of Molecular Spectroscopy", Mc Graw Hill Education Pvt. Ltd., New Delhi, 2016.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH63B	Core paper X - Solid state physics	5	-	-	4	C-10

Subject Description :

This paper presents the fundamentals of solids and its bond theory which will be used for studying solids and how they are formed.

Objectives

To acquire knowledge of

- Various bond theory and to know the method of forming different alloys, conducting materials.
- To motivate the students in order to apply the principles of bond theory in their research studies.

UNIT I Crystal Structures

Crystal Structures: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravais lattices – Miller indices – Elements of Symmetry – Structure of KCl and NaCl crystal – Atomic Packing – Atomic radius –-Lattice constant and density- Crystal structure (sc; hcp; fcc;bcc.)

UNIT II Crystal Diffraction

The diffraction of X-rays by simple lattice arrays of atoms – Bragg's law – Experimental methods in X-ray diffraction: Laue methods – Rotating crystal method – The powder photograph method – Bond theory of solids: ionic bond – covalent bond – metallic bond – van der Waals bond – hydrogen bond – comparision of five crystal types and the properties.

UNIT III Magnetic properties of materials

Magnetic properties of materials : Introduction – Distinction between magnetic materials – Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Quantum theory of paramagnetism - Ferromagentism – Weiss theory of Ferromagentism – Ferromagnetic – domain – domain wall – Ferrimagnetism– Paramagnetic cooling (Adiabatic demagnetization)

UNIT IV Free electron theory

Introduction – Free electron gas - Drude Lorentz theory – Electrical conductivity - Thermal conductivity – Wiedmann and Franz ratio – Sommerfeld model – Schottky effect – Hall effect – Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient.

UNIT V Dielectrics and superconductors

Dielectrics- Dielectric constant and displacement vector- Clausiss mossotti relation- Atomic or molecular polarizability – Types of polarizability - Super conductivity – Phenomena – magnetic properties – Super conductor – Meissner effect– Experimental facts – Isotopes effect – Thermodynamic effect – High temperature super conductor.

Books for Study:

1. Gupta, Kumar, "Solid state Physics", K. Nath & Co, Meerut, 2016-2017.

2. R.Murugeshan. Er. Kiruthiga Siva Prasath, "Modern Physics", S.Chand and Company Pvt. Ltd., New Delhi, 2016.

Books for Reference:

1. Charles Kittel, "Introduction to Solid State Physics", Artxel, Noida, 2015.

2. J.P.Srivastava, "Elements of solid state physics", PHI Learning Pvt. Ltd., New Delhi, 2016.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH63C	Core paper XI - Nuclear physics	5	-	-	4	C-11

Subject Description: This paper presents the fundamentals of formation of nucleus, composition of nucleus with their energy.

Objectives

To acquire knowledge and apply it to
- Study the structure of nucleus
- Know the formation of nucleus and their binding energy
- To motivate the students to analyze the energy released by the nucleus during the fission and fusion process.

Unit I - Introduction to the Nucleus

General properties of Nucleus (Size, Mass, Density, Charge, Spin, Angular momentum, Magnetic dipole moment) – Binding energy – BE/A and stability of Nucleus – Packing fraction – Nuclear stability – Nuclear forces – Definition – Properties – Meson theory – Model of Nuclear Structure – The Liquid Drop model – Semi-Empirical mass formula – The Shell model – Evidence for Shell model –The collective model.

Unit II- Detector and Particle Accelerators

Interaction between the energetic particles and matter : Heavy charged particles – Electrons – Gamma ray- Ionization chamber – Solid State detector: GM counter – Wilson Cloud chamber – Nuclear emulsion – Linear accelerators – Cyclotron – Betatron.

Unit III– Radioactivity

Natural Radioactivity – Alpha, Beta and Gamma rays– Properties – Determination of e/m of Alpha particles – Determination of Charge of Alpha particles – Determination of e/m of Beta particle – determination of Wavelength of Gamma rays (Dumond Spectrometer) – Origin of Gamma rays – Laws of Radioactivity – Soddy - Fajan's displacement law – Law of Radioactive disintegration – Half life period – Mean life period– Units of Radioactivity – Artificial Radioactivity –Application of radio isotopes.

Unit IV- Nuclear Fission and Fusion Reactions

Nuclear fission – Energy released in Fission – Bohr and Wheelers theory of Nuclear fission – Chain reaction: Multiplication factor – Critical size – Natural Uranium and chain reactions – Atom Bomb. Nuclear reactor – Nuclear fusion – Source of Stellar energy – Carbon Nitrogen cycle – Proton-Proton cycle – Hydrogen bomb – Controlled thermo nuclear reactions – Radioactive dating.

Unit V - Cosmic rays and Elementary particles

Cosmic rays – Origin of cosmic rays – Latitude effect – Azimuth effect – Altitude effect - Primary and Secondary Cosmic rays - Cascade theory of cosmic ray shower – Pair production and Annihilation – Van Allen Belts. Elementary particles – Introduction – particles and antiparticles – Antimatter – The fundamental interactions – The Quark model.

Book for Study:

1. R.Murugeshan. Er. Kiruthiga Siva Prasath, "Modern Physics", S.Chand and Company Pvt. Ltd., New Delhi, 2016.

Book for Reference:

1. D.C.Tayal, "Nuclear Physics", Himalaya Publishing House, Mumbai, 2017.

2. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, " Concepts of modern Physics", Mc Graw Hill Education (India) Pvt. Ltd., New Delhi, 2016.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH63P	Major Practical VI - Digital electronics and Micro Processor	-	-	3	2	CP-6

Any 6 from each section
SECTION – A

DIGITAL ELECTRONICS

1. Logic gates using IC – Verification of truth tables and DeMorgan's theorem

2. NOR and NAND gates – Universal building blocks

3. Half adder and Full adder

4. Half subtractor and Full subtractor

5. Analog to Digital convertor

6. Digital to Analog convertor.

7. Op-Amp LM741 as adder, subtractor and scalar.

8. Op-Amp LM741 as inverting and non inverting amplifier

SECTION – B

MICROPROCESSOR

1. 8085-ALP for 8 Bit addition, Subtraction

2. 8085-ALP for one's compliment, masking off most significant 4 bits and setting bits.

3. 8085-ALP for 8 Bit Multiplication and Division

4. 8085-ALP for finding the biggest element in the array and sum the element in the array

5. 8085-ALP to sort the array in descending order and ascending order

6. 8085-ALP to count the number of zeros, +ve, -ve number and square of a number

7. ALP- Matrix addition.

8. 8085-ALP for ASCII to decimal conversion, BCD to Hex conversion, Hex to Decimal conversion and Hex to binary form

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6EA	Nanoscience	5	-	-	4	ELE2

Subject Description:
This paper presents the fundamentals of formation of nanomaterials and their properties

Objectives
- To acquire knowledge about Nanoscience and Nano materials.

Unit I Systematic Development of materials
Introduction – Solid materials and their strength – perspective of length – Nanoscience and nanotechnology – Nanostructures in nature – Quantum structures – quantum confinement – Surface effects of Nanomaterials – prime materials – carbon nanostructures – oxides: Zinc oxide, magnesium oxide, Aluminum oxide, Manganese oxide, Nickel oxide, Lanthanum – manganese based oxide

Unit II Methods of generation of Nanomaterials : Physical approaches
Introduction – Nanomaterials synthesis – Physical approaches – arc discharge method – Laser ablation – Aerosol synthesis – inert gas condensation – High energy ball milling (mechanical alloying method) – Chemical Vapor deposition – plasma synthesis method – Electro deposition

Unit III Methods of generation of Nanomaterials : Chemical approaches
Chemical Approaches – Solvothermal synthesis – Hydrothermal synthesis – Reverse micellar emulsion method – Sol - gel synthesis – microwave method – sonochemical process – Co - precipitation

Unit IV Mechanical properties of Nanomaterial
Introduction – Mechanical behavior – Mechanical properties of Nanomaterials – Optical properties – Optical properties of Nanomaterials – Applications of optical properties of Nanomaterials

Unit V   Electrical and magnetic properties of Nanomaterial
Introduction – Electrical properties – Dielectric materials and properties – Magnetic properties – Magnetic properties of Nanomaterials – Superparamagnetism – Electrochemical properties – Chemical sensing properties

Books for Study:
1. M.A.Shah, Tokeer Ahmad, "Principles of Nanoscience and Nanotechnology", Narosa publishing House Pvt. Ltd., 2015.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6EB	Fibre Optic Communication Systems	5	-	-	4	ELE2

Subject Description :
This paper presents the fundamentals of Fibre optic and its applications in communications

Objective :
- To Facilitate the knowledge about optical fiber sources and transmission techniques
- To Enrich the idea of optical fiber networks.
- To Explore the trends of optical fiber measurement systems.

Unit I Fibre Classification
Propagation of light waves in an optical fibre – Acceptance angle and Acceptance cone of a fibre – Numerical Aperture (NA) – NA of a graded Index Fibre – Mode of propagation.
Fibres – classification – stepped index fibre – stepped index mono mode fibre – Graded index multimode fibre – Comparison of step and graded index fibres.

Unit II Fibre Fabrication And Cables
Classification of Techniques – External chemical vapour deposition – Characteristics – Internal chemical vapour deposition (1st method only) – Characteristics – Phasil system - Fibre cable construction – losses incurred during installation of cable – Testing of cables– cable selection criteria.

Unit III Fibre Losses And Dispersion In Optics
Attenuation in optic fibre– Rayleigh Scattering losses – Absorption losses – Bending losses – Radiation induced losses – Inherent defect losses – Core and Cladding losses.
Dispersion in an Optical Fibre – Inter-modal dispersion – Material Chromatic Dispersion – Dispersion Power penalty – Total Dispersion delay.

Unit IV Light Sources For Optical Fibres
LED – The process involved in LEDS – Structures of LED – Fibre – LED Coupling – Modulation bandwidth and Spectral Emission of LEDS.

Unit V Applications
Introduction – Video Link Satellite Link – Computer Link – Nuclear Reaction Link – Community Antenna Television – Switched Star CATV – Networking

Book for Study:
1. Dr. Subir Kumar Sarkar, " Optical Fibres and Fibre optics Communication System",
   S.Chand and Company Pvt. Ltd., New Delhi, 2014.

Book for Reference:
1. R.K.Puri and V.K.Babbar, "Optical Fibres and Fibre Optic Communication Systems"

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6EC	Biophysics	5	-	-	4	ELE2

Subject Description:

This paper presents the fundamentals of biomolecules and its studies.

Introduction:

- To Facilitate the knowledge about biomolecules
- To Explore the trends of optical techniques.

Unit I Structure of Biomolecules

Introduction - Atomic structure - Hydrogen atom - Bonds between atoms and molecules - secondary or weak bonds - Bond energy - Disulphate bonds – Peptide bond - Structure of Proteins - Molecular weight determination - Kinetic methods - Static methods - Structure of nucleic acids - DNA - RNA.

Unit II Kinetics Of Molecules I Diffusion: Factors affecting diffusion·- Simple diffusion – Fick's law of diffusion - Diffusion of electrolytes - Biological significance of diffusion
Osmosis: Osmosis - Osmotic pressure - Laws of osmosis - osmometry - osmotic pressure of electrolytes.
Filtration: Filtration - Passage of fluid though blood vessels - Formation of Urine- Dialysis Principle of dialysis in artificial kidney - kinds of dialysis.

Unit III   Kinetics of Molecules II

Adsorption: Adsorption - Factors affecting adsorption - Adsorption of ions by Solids and Liquids - adsorption of Gases by solids - Biological significance of adsorption.
Hydrotropy : Hydrotropy - Biological importance of hydrotropy.
Precipitation: Precipitation - Biological significance.
Colloids: Types of colloids - characteristics of colloids - stability of colloids - Gel - Emulsions - Techniques for the separation of colloids - Biological importance of colloids – Gibb's Donnan Equilibrium.

Unit IV Optical Techniques in Biological Studies

Characteristics of light- compound· microscope - Ultraviolet microscope - Electron microscope - Transmission electron microscope - Scanning Electron microscope - Monochromator - Light sensitive detectors- Spectrophotometer - Atomic absorption flame photometer - Electromagnetic radiation Spectroscopy - Ultraviolet, visible, infrared and fluorescent spectroscopy - Atomic absorption and emission spectroscopy - mass spectroscopy - Raman spectroscopy – x ray diffraction crystallography.

Unit V Bioelectricity and Radiation Biology

Membrane potential - Resting membrane potential - Action potential and nerve impulse conduction Rate of nerve impulse conduction- Recording of nerve impulses by C.R.O - Resting membrane potential -.J Injury potential- Monophasic and diphasic action potentials - Radioactivity - Natural radioactivity Artificial or induced radioactivity - Radioactive disintegration - units of Radioactivity.

BOOKS FOR STUDY

1. M.A. Subramanian, "BIOPHYSICS Principles and Techniques ", MJP Publishers - Chennai
2. Dr.S.Palanichamy & Dr.M.Shanmugavelu, "PRINCIPLES OF BIOPHYSICS", Palani Paramount Publications – Palani.

Rathinam College of Arts & Science (Autonomous), Coimbatore-21.
Admitted in B.Sc. Physics s from the academic year 2015 -2016 batch

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SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6ED	Characterization of Nano Materials and its Applications	4	-	-	3	ELE3

Subject Description: This paper presents the fundamental methods of formation of nanomaterials and their analysis studies.

Objectives
To acquire knowledge about Nanoscience and Nano materials.

Unit I Methods of sample preparation
Introduction – Chemical fixation technique – Cyro Fixation Technique – Dehydration – Embedding Biological samples Sectioning – Staining – Mechanical milling – Chemical etching – Ion etching – Conductive coating

Unit II Structure of Nanomaterials
Introduction – Structure of Nanomaterials – X - ray diffraction (XRD) – The Laue method – The rotating crystal method – The powder method – Determination of grain size/ crystallite size using X - ray line broadening studies (Scherrer's formula) – Determination of crystallite size distribution using X - ray line Shape analysis – X- ray diffraction pattern and analysis of some commercially important oxides – Small angle X- ray scattering

Unit III Electron microscopy
Introduction – Principles of electron microscopy – Scanning electron microscope (SEM) – Strength and limitations of Scanning electron microscopy – Energy dispersion X-ray Analysis (EDX) – Transmission Electron microscope (TEM) – Scanning Tunneling Microscope – Atomic Force microscope (AFM)

Unit IV Spectroscopy Techniques
Introduction – The regions of spectrum – Characterization of electromagnetic radiations – The quantization of energy – Absorption spectroscopy – Photoluminescence – Fourier transform infrared spectroscopy – Raman spectroscopy

Unit V Applications of Nanomaterials
Introduction – Nanomaterials in medicine – Longer - lasting medical implants – Nanomaterials in energy sector – Kinetic energy (KE) penetrators with enhanced lethality – High energy density batteries- Nanomaterials in catalysis – High - sensitivity sensors – Nanomaterials for water purification – Nanomaterials in food –Nanomaterials for the environment – Elimination of pollutants

Book for study:
1. M.A.Shah, Tokeer Ahmad, " Principles of Nanoscience and Nanotechnology", Narosa publishing House Pvt. Ltd., 2015.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6EE	Material science	4	-	-	3	ELE3

Subject Description:

This paper presents the fundamentals material structure

Objectives

- To acquire knowledge about defects and dislocations in the crystals.
- To acquire knowledge about Band models of semiconductor.
- To acquire knowledge about magnetic materials.

Unit I

Introduction and structure of materials, why study properties of materials - Structure of atoms - Quantum states-Atomic bonding in solids-binding energy-interatomic spacing - variation in bonding characteristics - Single crystals – polycrystalline - Non crystalline solids - Imperfection in solids – Vacancies – Interstitials - Geometry of dislocation - Schmid´s law - Surface imperfection - Importance of defects - Microscopic techniques - grain size distribution

Unit II

Solid solutions and alloys - Phase diagrams - Gibbs phase rule - Single component systems – Eutectic phase diagram – lever rule - Study of properties of phase diagrams - Phase transformation - Nucleation kinetics and growth

Unit III

Band model of semiconductors - carrier concentrations in intrinsic, extrinsic semiconductors – organic semiconductors - Fermi level - variation of conductivity, mobility with temperature – law of mass action - Application of diffusion in sintering, doping of semiconductors and surface hardening of metals.

Unit IV

Mechanical properties - Stress, Strain, Elastic properties – Deformation – elasticity – hardness - Optical properties - Light interaction with solids - Atomic, electronic interaction, non – radiative transition - refraction, reflection, Absorption, Transmission, Insulators, luminescence

Unit V

Magnetic properties - paramagnetism - ferromagnetism - domain theory - magnetic hysteresis, Weiss molecular field theory, Heisenberg's theory - magnetic anisotropy - domain walls - Exchange energy –antiferromagnetism

Books for study

1. C. Kittel,"Introduction to Solid State Physics", Wiley Eastern Ltd, 2005.

2. V. Raghavan, "Materials Science and Engineering: A First Course", Prentice Hall, 2006

3. Dr. M. Arumugam, "Material Science", Anuradha Publications, 2015.

Books for Reference

1. A.J. Dekker, "Solid State Physics", Macmillan & Co, 2000.

2. Michael Shur, "Physics of Semiconductor Devices", Prentice Hall of India, 1995.

3. Charles P Poole Jr., and Frank J. Ownes, Introduction to Nanotechnology, John Wiley Sons, Inc., 2003

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6EF	Geo physics	4	-	-	3	ELE3

Subject Description:
    This paper presents the fundamentals of geographic state of earth through physics.
Objectives
- To acquire knowledge about Seismology.
- To acquire knowledge about earth quakes.

Unit I Introduction and Seismology:
Introduction - Seismology: P waves, S waves, their velocities - Time distance curves and the location of epicenters - Effect of boundaries - Major discontinuities and resulting phase of seismic waves - Derivation of properties from the velocities

Unit II Surface Waves and Seismometry:
Surface waves: Rayleigh waves and Love waves - Study of earth by surface waves.
Seismometry: Horizontal seismograph and seismography equation – Strain seismograph

Unit III Earthquakes and Gravity:
Earthquakes: Focus, magnitude, frequency - Detection and prediction - Gravity: The potential (Laplace's equation and Poisson's equation) - Absolute and relative measurements of gravity - Hammond Faller method - Worden gravimeter.

Unit IV Geomagnetism and Internal structure of the Earth:
Geomagnetism: Fundamental equations - Measurements: method of Gauss, saturation induction magnetometers, proton precession magnetometers, alkali vapour magnetometers - Theories of earth's magnetism - Causes of the main field -Dynamo theories – Internal structure of the earth: The core Variation of mechanical properties with depth - Materials and equation of state of the interior of the earth.

Unit V Geochronology and Geothermal Physics:
Geochronology: Radioactivity of the earth - Radioactive dating of rocks and minerals Geological time scale - The age of the earth - Geothermal physics: Flow of heat to the surface of the earth - Sources of heat within the earth - Process of heat transport Internal temperature of the earth.

BOOKS FOR STUDY:
1. Garland, G.D., "Introduction to Geophysics", 11 Ed., WB Saunder Company, London, l 979.
2. Cook, A. H., "Physics of the Earth and Planets", I Ed., McMillan Press, London, 1973.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6ZD	Skill based Subject – Internet of Things and Arduino	3	-	-	3	SB-4

Subject Description:
    This paper presents the fundamentals Internet of things, Microcontroller and Arduino.

Objectives
- To acquire knowledge about Internet of things.
- To acquire knowledge about Microcontroller and Arduino.

Unit I Internet of things
Introduction to IoT – Definitions – Enabling technologies – open problems – future challenges – Applications IOT PROTOCOLS, IOT Communication Models, IOT Communication APIs, IOT Enabling Technologies

Unit II Microcontroller
Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

Unit III Interfacing Microcontroller
Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.

Unit IV Arduino
 Introduction – install the software – The integrated development environment (IDE) –operators – statements: IF, ELSE, WHILE, FOR – Arrays – library functions - Circuits and programs

Unit V Programming in Arduino
Programs using IF, ELSE, WHILE, FOR statements – programs using Arrays – Circuit and program: one button and an LED, two buttons and an LED, potentiometer, RGB LEDs, Simple note, music

Books for Study
1. Kenneth J. Ayala, Dhananjay V. Gadre, "The 8051 Microcontroller and Embedded systems using Assembly and C", Cengage Learning Pvt. Ltd., New Delhi. 2010.
2. Alan G. Smith," Introduction to Arduino", 2011.
3. Arshdeep Bahga & Vijay audisetti ,"Internet of Things: A Hand - on Approach", University Press.

SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6LA	Soil Physics	-	-	-	2	ALC4

Subject Description:
This paper presents the fundamentals of properties of soil.

Objectives
- To acquire knowledge about properties of soil.
- To acquire knowledge about texture of soil.

Unit I
Soil properties: Introduction Soil properties: Mass-volume relationship Soil properties: Soil texture

Unit II
Soil properties: Soil structure Soil moisture: Fluid properties - Energy state - Total water potential and components
Soil - water characteristic curves

Unit III
Water flow in soil: Saturated flow - Unsaturated flow

Unit IV
Composite Phenomena: Stress, strain, and strength - soil temperature and heat flow -Field water: Surface runoff

Unit V
Field water: Evaporation - Field water: Soil-water-plant relationship

Textbook:
1. Hillel. D, "Environmental Soil Physics*",* Elsevier, 1998.

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SEMESTER-VI

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
15BPH6LB	Astrophysics	-	-	-	2	ALC4

Subject Description:
   This paper presents the fundamentals of universe, galaxies, star and solar systems.
Objectives:

- To know about the sun, star and planetary motion
- To know about the astronomical instruments
- To know about the age and evaluation of earth

UNIT I Theories of the universe, galaxies and star clusters
Origin of the universe - the big bang theory - the steady state theory - the oscillating universe theory - Hubble's law
Galaxies : Types of galaxies - Milky Way - star clusters - globular clusters

UNIT II Solar System
Mass and stability of the sun of the sun - solar constant - temperature of the sun - source of solar
energy - solar wind - corona
Other members of the solar system : Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Moon - Bode's law

UNIT III   Age and evaluation of earth
Solar nebula theory – planetesimials theory – age of earth – radiative dating – exposure age of meteoroids – age of radiative elements – motion of the planets – evaluation of earth's atmosphere – formation of ozone layer – role of life in changing the earth's atmosphere

UNIT IV Distance and magnitude of stars
Magnitude and brightness - apparent magnitude of stars - absolute magnetic of stars - relation between apparent magnitude and absolute magnitude of stars - Luminosities of stars - measurement of stellar distance

UNIT V   Astronomical Instruments
Optical telescope – reflecting telescope – types of reflecting telescope – advantages – antenna requirements for solar observations – parapoloid reflection antenna – broad band antennas – dipole arrays

Books for study:
1. K.S.Krishnaswamy , "Astrophysics: A modern perspective", New Age International Pvt Ltd, New Delhi, 1st Edition (2002)
2. A.B.Bhattacharya, S.Joardar, R.Bhattacharya, "Astronomy and Astrophysics", Overseas Press 2010.

Books for reference:
1. B.Basu , "An introduction to Astrophysics", Hall of India Pvt Ltd (2001)
2. R.Murugeshan. Er. Kiruthiga Siva Prasath, "Modern Physics", S.Chand and Company Pvt. Ltd., New Delhi, 2016.

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