



# C. ABDUL HAKEEM COLLEGE

Melvisharam, Vellore Dist- 632509, TN, India

Telephone : +91 4172 266487, 266987 | Fax : +91 4172 266587

Web : www.hakeemcollege.com

## SUBJECT LIST

Course B.Sc - Physics

Batch 2015-2016

Total Credits 140

S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P	M	Cr	Pt
<b>Semester - 1</b>				<b>Subject Count - 5</b>			<b>Total Credits - 20</b>						
1	E	Theory	Language	U15FTA101	Tamil - I	25	0	75	30	40	4	I	
2	E	Theory	Language	U15FUR101	Urdu - I	25	0	75	30	40	4	I	
3	E	Theory	English	U15FEN101	English - I	25	0	75	30	40	4	II	
4	E	Theory	Main	U15MPH101	Properties of Matter and Acoustics	25	0	75	30	40	6	III	
5	E	Theory	Allied	U15AMA101	Mathematics - I (Allied)	25	0	75	30	40	4	III	
6	E	Theory	Environmental Studies	U15CES101	Environmental Studies	10	0	40	16	20	2	IV	
<b>Semester - 2</b>				<b>Subject Count - 7</b>			<b>Total Credits - 25</b>						
1	E	Theory	Language	U15FTA201	Tamil - II	25	0	75	30	40	4	I	
2	E	Theory	Language	U15FUR201	Urdu - II	25	0	75	30	40	4	I	
3	E	Theory	English	U15FEN201	English - II	25	0	75	30	40	4	II	
4	E	Theory	Main	U15MPH201	Thermal Physics and Statistical Methods	25	0	75	30	40	5	III	
5	E	Practical	Main	U15MPHP21	Core Practical - I	40	0	60	24	30	3	III	
6	E	Theory	Allied	U15AMA201	Mathematics - II (Allied)	25	0	75	30	40	6	III	
7	E	Theory	Value Education	U15CVE201	Value Education	10	0	40	16	20	2	IV	
8	E	Theory	Soft Skills	U15CSS201	Soft Skills	10	0	40	16	20	1	IV	



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S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P M	Cr	Pt
<b>Semester - 3</b>					<b>Subject Count - 6</b>	<b>Total Credits - 20</b>						
1	E	Theory	Language	U15FUR301	Urdu - III	25	0	75	30	40	4	I
2	E	Theory	Language	U15FTA301	Tamil - III	25	0	75	30	40	4	I
3	E	Theory	English	U15FEN301	English - III	25	0	75	30	40	4	II
4	E	Theory	Main	U15MPH301	Electricity and Magnetism	25	0	75	30	40	3	III
5	E	Theory	Allied	U15ACH301	Chemistry - I (Allied)	15	0	60	24	30	4	III
6	E	Theory	Skill Based	U15SPH301	Electrical and Electronic Appliances (SBS - I)	15	0	60	24	30	3	IV
7	E	Theory	Non Major	U15NUR301	Functional Urdu - I (NME - I)	10	0	40	16	20	2	IV
8	E	Theory	Non Major	U15NHS301	Indian National Movement (NME - I)	10	0	40	16	20	2	IV
9	E	Theory	Non Major	U15NKS301	Services Marketing (NME - I)	10	0	40	16	20	2	IV
10	E	Theory	Non Major	U15NZL301	Poultry Farming (NME - I)	10	0	40	16	20	2	IV
11	E	Theory	Non Major	U15NCM301	Elements of Accountancy (NME - I)	10	0	40	16	20	2	IV
<b>Semester - 4</b>					<b>Subject Count - 8</b>	<b>Total Credits - 25</b>						
1	E	Theory	Language	U15FUR401	Urdu - IV	25	0	75	30	40	4	I
2	E	Theory	Language	U15FTA401	Tamil - IV	25	0	75	30	40	4	I
3	E	Theory	English	U15FEN401	English - IV	25	0	75	30	40	4	II
4	E	Theory	Main	U15MPH401	Mechanics	25	0	75	30	40	3	III
5	E	Theory	Allied	U15ACH401	Chemistry - II (Allied)	15	0	60	24	30	4	III
6	E	Practical	Skill Based	U15SPHP41	Skill Based Practical (SBS - II)	15	0	60	24	30	3	IV
7	E	Practical	Main	U15MPHP41	Core Practical - II	40	0	60	24	40	3	III
8	E	Practical	Allied	U15ACHP41	Allied Practical - Chemistry	10	0	40	16	20	2	III
9	E	Theory	Non Major	U15NUR401	Functional Urdu - II (NME - II)	10	0	40	16	20	2	IV
10	E	Theory	Non Major	U15NTA401	Basic Tamil - II (NME - II)	10	0	40	16	20	2	IV
11	E	Theory	Non Major	U15NHS401	Civil Services and Other Competitive Examinations (NME - II)	10	0	40	16	20	2	IV
12	E	Theory	Non Major	U15NKS401	Project Management (NME - II)	10	0	40	16	20	2	IV
13	E	Theory	Non Major	U15NMA401	Foundation Mathematics for Competitive Examinations (NME - II)	10	0	40	16	20	2	IV
14	E	Theory	Non Major	U15NCH401	Chemistry in Every Day Life (NME - II)	10	0	40	16	20	2	IV
15	E	Theory	Non Major	U15NZL401	Sericulture (NME - II)	10	0	40	16	20	2	IV
16	E	Theory	Non Major	U15NCM401	General Commercial Knowledge (NME - II)	10	0	40	16	20	2	IV



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**Total Credits** 140

S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P	M	Cr	Pt
<b>Semester - 5</b>				<b>Subject Count - 5</b>			<b>Total Credits - 21</b>						
1	E	Theory	Main	U15MPH501	Optics	25	0	75	30	40	5	III	
2	E	Theory	Main	U15MPH502	Atomic Physics and Spectroscopy	25	0	75	30	40	5	III	
3	E	Theory	Main	U15MPH503	Analog and Digital Electronics	25	0	75	30	40	5	III	
4	E	Theory	Elective	U15EPH501	Material Science (Elective - I)	25	0	75	30	40	3	III	
5	E	Theory	Skill Based	U15SPH501	Applied Electronics (SBS -III)	15	0	60	24	30	3	IV	
<b>Semester - 6</b>				<b>Subject Count - 9</b>			<b>Total Credits - 29</b>						
1	E	Theory	Main	U15MPH601	Nuclear Physics and Radiation Physics	25	0	75	30	40	4	III	
2	E	Theory	Main	U15MPH602	Relativity, Quantum Mechanics and Mathematical Physics	25	0	75	30	40	4	III	
3	E	Theory	Main	U15MPH603	Solid State Physics	25	0	75	30	40	5	III	
4	E	Theory	Elective	U15EPH601	Microprocessor and Microcontroller Applications (Elective - II)	25	0	75	30	40	3	III	
5	E	Theory	Elective	U15EPH602	Applied Physics (Elective - III)	25	0	75	30	40	3	III	
6	E	Project	Skill Based	U15SPHP61	Project (SBS - IV)	15	0	60	24	30	3	IV	
7	E	Practical	Main	U15MPHP61	Core Practical - III (General)	40	0	60	24	30	3	III	
8	E	Practical	Main	U15MPHP62	Core Practical - IV (Electronics)	40	0	60	24	30	3	III	
9	E	Theory	Extension Activities	U15CEA601	Extension Activities	0	0	50	20	20	1	V	

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the year 2015-2016

Year: I Year Subject Code : U15MPH101 Semester : I

Major-1 Title: **Properties of Matter and Acoustics**

Credits: 6 Max. Marks. 75

### **Objectives:**

- To study the basics of elasticity, viscosity and surface tension of materials and the various methods to determine their parameters experimentally.
- To study the concepts and properties of waves and oscillations.
- To learn the production of ultrasonic waves, the concepts of acoustics and their applications.

### **UNIT – I : ELASTICITY**

**18 Hours**

Hooke's law –Elastic moduli– Work done in stretching and twisting a wire – Twisting couple on a cylinder – Determination of Rigidity modulus by static torsion – Torsional pendulum with masses.

Bending of beams – Expression for bending moment – Cantilever – Expression for depression at the loaded end – Determination of Young's modulus by uniform bending (pin an microscope) – Determination of young's modulus by Koenig's method – Non-Uniform bending.

### **UNIT – II : FLUIDS**

**20 Hours**

Surface Tension: Molecular forces– Shape of liquid meniscus in capillary tube -surface energy– pressure difference across liquid surfaces - Excess of pressure — variation of surface tension with temperature – Jaegar's method.

Viscosity : Viscosity – Rate flow of liquid in a capillary tube – Poiseuille's formula – Determination of coefficient of viscosity of a liquid – Variations of a viscosity with temperature and pressure.

Physics of low pressure – production and measurement of low pressure – Rotary pump – Diffusion pump – Molecular pump – Detection of leakage.

### **UNIT – III : WAVES AND OSCILLATIONS**

**18 Hours**

Longitudinal and Transverse Waves - Velocity of Transverse waves of Stretched String - Energy and power of the travelling wave – Superposition of wave – Interference of wave - Standing waves and Resonance.

SHM – Free, damped, forced vibrations and resonance – Fourier's Theorem – Differential equation of SHM – Velocity, acceleration and energy in SHM

### **UNIT – IV : ULTRASONICS**

**17 Hours**

Ultrasonic waves – Production – Piezo electric crystal method – Magnetostriction Method – Properties – Detection – Attenuation – Diffraction – Acoustic Grating – Velocity of ultrosonics in liquids.

Sources of ultrasound – Application of ultrasonics – Medical, Industrial and Scientific – Non destructive testing (NDT) – Classification of ultrasonic testing – Pulse echo method – Clinical applications of different scans.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Unit – V: ACOUSTICS**

**17 Hours**

Intensity and loudness of sound – Decibels – Intensity levels – Musical notes – Musical scale.

Reverberation time and its measurement - Sabine's formula - Derivation- Absorption coefficient and its determination - Condition for good acoustical design of an auditorium - Noise and its measurement - Noise reduction - Sound insulation.

#### **Books for Study:**

1. Properties of Matter, Murugesan R, S Chand & Co. Pvt. Ltd., New Delhi, 1994.
2. Properties of Matter, Brij Lal & Subramaniam N, Eurasia Publishing Co., New Delhi, 1989.
3. Text book of Sound, Brij Lal & Subramaniam N, Vikas Publishing House, New Delhi, 1982.
4. Text book of Sound, M N Srinivasan, Himalaya Publications, 1991.
5. Waves and Oscillations - Subrahmanyam N. & Brij Lal, Vikas Publishing House Pvt. Ltd., New Delhi, 1994.

#### **Books for Reference:**

1. Fundamental of General Properties Of Matter, H.R Gulat, R.Chand And Co, 1977.
2. The Physics of Waves and Oscillations, N.K Bajaj, Tata Mcgraw-Hill, 1988.
3. Oscillations and Waves, Satya Prakash and Akash Saluja, Pragati Prakashan, 2002.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the year 2015-2016

Year: I Year Subject Code : U15MPH201 Semester : II

Major - 2 Title: **Thermal Physics and Statistical Methods**

Credits: 5 Max. Marks. 75

### **Objectives:**

- To study the nature and transmission of heat, thermometry, classical and quantum theory of radiation and the laws associated with them.
- To study the laws of thermodynamics and understand their applications.
- To understand the concepts of statistical thermodynamics and its applications.

### **UNIT I : TRANSMISSION OF HEAT**

**20 Hours**

Thermal conduction - Thermal conductivity of a good conductor - Theory – Determination by Forbes method - Thermal conductivity of a poor conductor - Theory -Determination by Lees disc method.

Wiedmann-Franz's law - Practical applications of conduction of heat - Black body radiation – Stefan- Boltzmann's law - Determination of Stefan's constant - Laboratory method- Distribution of energy in the spectrum of a black body – Planck's quantum theory of radiation.

### **UNIT II: THERMOETRY**

**18 Hours**

Concept of heat and temperature – Thermometry - Platinum resistance thermometers - Callendar and Griffith's bridge - Low and high temperature measurement -Temperature Sensors - Coupling with objects – Temperature reference points – Thermo resistive sensors – Thermo electric contact sensors.

### **UNIT III: FIRST LAW OF THERMODYNAMICS**

**18 Hours**

Thermal equilibrium - Zeroth law and the concept of temperature - Thermodynamic equilibrium, - Internal energy - External work - Quasistatic process - First law of thermodynamics - Application - Specific heats and their ratio - Isothermal and adiabatic changes in perfect and real gases - Internal combustion engines - Otto engine and Diesel engine - Working and efficiency.

### **UNIT IV: SECOND LAW OF THERMODYNAMICS**

**17 Hours**

Reversible and irreversible processes - Indicator diagram - Carnot's cycles - Efficiency - Carnot's theorem - Second law of thermodynamics – Different formulations and their equivalence - Clausius inequality – Entropy - Change of entropy in simple reversible and irreversible processes - Entropy and disorder - Equilibrium and entropy principle.

### **UNIT V: CLASSICAL STATISTICAL METHODS**

**17 Hours**

Phase space - Micro and Macro canonical ensembles - Different types of ensembles - Definition of Probability - Relation between entropy and probability - Degrees of Freedom - Classical Statistics - Group Velocity and Phase velocity - Maxwell-Boltzmann distribution law - Distribution of velocity - Derivation of Maxwell Boltzmann, Fermi Dirac and Bose Einstein statistics as the most probable distributions.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for study:**

1. Heat Thermodynamics and Statistical Physics, Brijlal and Subramaniam, S Chand & Co.
2. Heat and thermodynamics, J B Rajam, S Chand & Co., New Delhi.
3. Thermal Physics R Murugesan and Kiruthiga Sivaprasad, S Chand & Co., New Delhi.
4. Heat and Thermodynamics – H. P. Roy and A. B. Gupta, New Central Book Agency.
5. Fundamentals of Statistical and Thermal Physics, F. Reif, Mc Graw Hill.

### **Books for Reference:**

1. Heat and thermodynamics, D S Mathur, S Chand & Co., New Delhi
2. Elements of Statistical Mechanics, Gupta and Kumar, Pragati Prakashan, Meerut.
3. Statistical Mechanics, Sathya Prakash and J P Agarwal, Kedar Nath & Ram Nath & Co., Meerut.
4. Heat and thermodynamics, Zemansky and Ditman, Mc Graw Hill, Kugakusha.
5. Thermal Physics, S. Garg, R. M. Bansal, C. K. Ghosh (Tata Mc Graw Hill).
6. Statistical Physics, F. Mandle, ELBS.
7. Handbook of Modern Sensors: Physics, Designs, and Applications, Jacob Fraden, Fourth Edition, Springer, 2010.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the year 2017-2016

Year: II Year Subject Code : U15MPH301 Semester : III

Major-3 Title: **Electricity and Magnetism**

Credits: 3 Max. Marks. 75

**No. of hrs/wk : 3**

### **Objectives:**

- To study Static Electricity principles
- To understand the working of potentiometer and its uses.
- To understand the principle of electromagnetic induction and ac circuits
- To study the properties of magnetic materials.

### **UNIT – I : ELECTROSTATICS**

**9 Hours**

Gauss' Law — Electric Intensity – Electrostatic potential – Electric potential as line integral of electric field – Relation between electric potential and electric field in vector form – Poisson's and Laplace's equations – Capacitance – Capacitance of a parallel plate capacitor – Energy of a charged capacitor – Loss of energy due to sharing of charges – The quadrant electrometer – heterostatic and idiostatic uses.

### **UNIT – II : CURRENT ELECTRICITY**

**9 Hours**

Carey Foster bridge – Theory – Determination of temperature coefficient of resistance – Calibration of high range voltmeter using a potentiometer-moving coil Ballistic Galvanometer – Theory, working and advantages - Determination of absolute capacitance using B.G.

### **UNIT – III : ELECTRO MAGNETIC INDUCTION**

**9 Hours**

Faraday's laws of electromagnetic induction in vector form – Determination of self-inductance by Anderson's bridge method - Determination of absolute mutual inductance by BG-Ruhmkorff's induction coil and its working – Eddy Currents and its uses.

### **UNIT – IV : TRANSIENT CURRENT**

**9 Hours**

Growth and decay of charge in a LCR circuit – Growth and decay of current in a LCR circuit — Condition for the discharge to be oscillatory – Frequency of oscillation - Measurement of high resistance by leakage using B.G

### **UNIT – V: MAGNETISM**

**9 Hours**

Susceptibility, permeability – Intensity of magnetisation and the relation  $[B = \mu_0(H+I)]$  – Properties of dia, para and ferromagnetism- Langevin's theory of diamagnetism and para magnetism – Weiss theory of Ferromagnetism – Ferrimagnetism and anti-ferrimagnetism,.



## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for study :**

1. Electricity and Magnetism, Brijlal & Subrahmanyam, Ratan Prakashan Mandir Publishers -1995.
2. Fundamentals of Electricity and Magnetism, R.G.Mendiratta and B.K.Sawhney East - West Press (1976).
3. Electricity and Magnetism, Murugesan R, 8<sup>Th</sup> edition 2006, S.Chand & Co.

### **Books for reference:**

1. Advanced level physics, Nelkon and Parker Annold Publishers (sixth edition)
2. Electricity and Magnetism, A.S. Mahajan and A.A. Rangwala, Tata McGraw-Hill (1989)
3. Feynman lectures on physics, volume 2 Narosa Publishing House (1992)
4. Fundamental University Physics, Alonso and Finn Addison –Wesley Publishing Company( 1977)

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the year 2017-2016

Year: II Year Subject Code : U15SPH301 Semester : III

Skill Based-1 Title: **Electrical and Electronic Appliances (SBS - I)**

Credits: 3 Max. Marks. 60

**No. of hrs/wk : 3**

### Objectives:

- To study the different parameters of electric and electronic components and understand their different usages.
- To study the working mechanisms of different power supplies and home appliances.
- To learn the working mechanisms of radio communication systems and their applications.
- To learn the basics of computer hardware and their applications.

### UNIT – I

**9 Hours**

Basics of House wiring –Overloading – Earthing – Short circuiting –Circuit breaker & Fuses - Electrical switches and their types. Electrical bulbs – Fluorescent, CFL, LED Lamps– Fan - Grinder - Mixer – Water Heater.

### UNIT – II

**9 Hours**

Semiconductor diodes–Zener Diodes-Their characteristics - Regulated power supply, Zener diode voltage regulator (Series and Shunt type) - IC Voltage Regulators.

### UNIT – III

**9 Hours**

Radio communication - AM transmitters – FM transmitters – Superheterodyne receiver- (Block diagrams). Antennas: Resonance antennas and their characteristics –Dish Antenna – DTH system.

### UNIT – IV

**9 Hours**

Mobile communication Fundamentals - Transmission Techniques - Cellular Concept – Making a call – Fundamentals of Blue tooth, Wifi, Internet and Email

### UNIT – V

**9 Hours**

Personal computer – Hardware - Block diagram – Different input and output devices – Different memories – RAM, ROM, EPROM - Operating systems – Windows (Basics)

### Books for study and reference:

1. A text book in Electrical Technology, B. L. Theraja, S. Chand & Co. 2008.
2. A text book in Electrical Technology, A. K. Theraja, S. Chand & Co. 2008.
3. Electronic Communication Systems, George Kennedy, Tata McGraw-Hill Publishing Company Limited, 1991.
4. Mobile Communication Systems, Nithish Bansal, Nanda Printers and publishers, 2003
5. Computer System Architecture, M. Morris Mano Prentice Hall, 2007.

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the year 2017-2016

Year: II Year Subject Code : U15NPH301 Semester : III

Non Major-1 Title: **Renewable Energy Sources**

Credits: 2 Max. Marks. 40

### Objectives:

- To create an awareness among the students about renewable energy resources.
- To enable the students harvest energy from such resources to overcome the energy crisis.

### Unit - I: Conventional Energy Sources

**6 Hours**

The fossil fuels - commercial energy sources and their availability – various forms of energy –renewable and conventional energy system – comparison – Coal, oil and natural gas – applications– Merits and Demerits – fuel cells.

### Unit - II: Solar Energy

**6 Hours**

Renewable energy sources – solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – water desalination (block diagram) Photovoltaic generation– merits and demerits

### Unit - III: Biomass energy fundamentals

**6 Hours**

Biomass energy – classification – photosynthesis – Biomass conversion process

### Unit - IV: Biomass Utilization

**6 Hours**

Gobar gas plants – wood gasification – advantages & disadvantages of biomass as energy source

### Unit - V: Other forms of energy sources

**6 Hours**

Geothermal energy – wind energy – Ocean thermal energy conversion – energy from waves and tides (basic ideas)

### Books for Study:

1. Renewable energy sources and emerging Technologies, D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India pvt. Ltd., New Delhi (2008)
2. Non – Conventional Energy sources, G.D. Rai, Khanna Publishers, New Delhi, 1994.

### Book for Reference:

1. Renewable Energy sources and their environmental impact, S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi (2008).

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the year 2017-2016

Year: II Year Subject Code : U15MPH401 Semester : IV

Major -4 Title: **Mechanics**

Credits: 3 Max. Marks. 75

**No. of hrs/wk : 3**

### **Objectives:**

- To study the concepts of dynamics, hydrostatics and hydrodynamics and fluid mechanics.
- To study their applications in rockets and satellites.
- To learn the basic principles of Classical Mechanics.

### **UNIT – I : RIGID BODY DYNAMICS**

**9 Hours**

Rigid body – moment of inertia – radius of gyration – moment of inertia of a solid cylinder, cylindrical shell, solid sphere, spherical shell - Compound pendulum – theory – equivalent simple pendulum – reversibility of centres of suspension and oscillation.

### **UNIT–II: STATICS, HYDROSTATICS AND FLUID MECHANICS**

**9 Hours**

Concurrent Forces – Parallel Forces – Couple- Center of Gravity of a solid and hollow Tetrahedron - Centre of pressure – centre of pressure of a vertical rectangular lamina – vertical triangular lamina - Laws of floatation – meta centre – meta centric height of a ship – atmospheric pressure and its variation with altitude. Bernoullies theorem.

### **UNIT – III : ROCKETS AND SATELLITES**

**9 Hours**

Kepler's law – Newton's law of gravitation - Rockets and Satellites – Basic Principles of rocket motion – Rocket Equation, thrust and acceleration – Escape velocity - multistage rockets –propellant rockets and its types. Space shuttle - Orbital velocity – launching of a satellite - types of satellite orbits.

### **UNIT – IV : CLASSICAL MECHANICS I**

**9 Hours**

Mechanics for a system of particles – Constraint of motion - Generalised co-ordinates – Transformation equations – Configuration space – Principles of virtual work – D'Alembert's principle – Lagrange's equation – Applications of Lagrange's equation – Atwood's machine - Simple pendulum.

### **UNIT – V : CLASSICAL MECHANICS II**

**9 Hours**

Hamiltonian formulation of classical mechanics – Phase space – Hamiltonian function – Hamilton's canonical equations of motion –Physical significance of Hamiltonian function - Applications of Hamilton's equations of motion – Simple pendulum - Compound Pendulum.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for study:**

1. Mechanics and mathematical methods, R Murugesan, S Chand & Co. Ltd. 1999.
2. Dynamics, M.Narayanamurti and Nagarajan, National Publishing Company, 2002.
3. Mechanics, D S Mathur, S.Chand and Co.
4. Classical Mechanics, H.Goldstein, Narosa Publishing House,, New Delhi, 1985.

### **Books for Reference:**

1. Mechanics and Properties of Matter, C.L. Arora, S. Chand & Co.
2. Classical Mechanics, H.Goldstein,C.Pole and J.Scifko, Pearson Education Asia, 2004.
3. The Feynman Lectures on Physics, Volumes 1 & 1, R.P.Feynman, R.B.Leighton and M.Sands, Narosa Publishing House, 1998.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the year 2017-2016

Year: II Year Subject Code : U15NPH401 Semester : IV

Non Major -2 Title: **Basic Physics**

Credits: 2 Max. Marks. 40

### **Objectives:**

- To create an awareness among the students about the basics of physics in day to day life and its importance.

### **UNIT – I : MECHANICS**

**6 Hours**

Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing Machine.

### **UNIT – II : HEAT**

**6 Hours**

Variation of boiling point with pressure – Pressure cooker – Refrigerator – Air Conditioner – Principle and their capacities – Bernoulli Principle – Aero plane.

### **UNIT – III : SOUND AND OPTICS**

**6 Hours**

Sound waves – Doppler effect – Power of lens – Long sight and short sight – Microscope – Telescope – Binocular - Camera.

### **UNIT – IV : GEO PHYSICS AND MEDICAL PHYSICS**

**6 Hours**

Earthquake – Richter scale – thunder and lightning – Lightning arrestors – Cosmic showers – X-rays– Ultrasound scan – CT scan – MRI scan.

### **UNIT – V : SPACE SCIENCE AND COMMUNICATION**

**6 Hours**

Newton's law of gravitation – Weather forecasting and communication satellites – Indian Satellites– Electromagnetic spectrum – Radio Waves – AM and FM transmission and reception.

### **Books for study:**

1. The Learner's Series – Everyday Science – Published by INFINITY BOOKS, New Delhi.
2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai.

### **Books for study:**

1. Fundamentals of Physics, D. Halliday, R. Resnick and J. Walker, 6th Edition, Wiley, NY (2001).
2. Physics, Vols I, II, III , D. Halliday, R. Resnick and K.S. Krane, 4th Edition, Wiley, New York (1994).
3. The Feynmann Lectures on Physics Vols, I, II, III , R.P. Feynmann, R.B. Leighton & M. Sands, Narosa, New Delhi (1998).

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15MPH501 Semester : V

Major-5 Title: **Optics**

Credits: 5 Max. Marks. 75

**No. of hrs/wk : 6**

### **Objectives:**

- *To learn the principles which govern optics and fiber optics*
- *To learn and understand the various optical instruments and their usage*

### **UNIT – I : GEOMETRICAL OPTICS**

**18**

#### **Hours**

Spherical aberration in lenses – Methods of minimizing spherical aberration – Condition for minimum spherical aberration in the case of two lenses separated by a distance – Chromatic aberration in lenses – Condition for achromatism of two thin lenses (in contact and out of contact)– coma – astigmatism – Ramsden's and Huygen's eyepieces – Constant deviation spectrometer –Calculation of characteristic wave number of spectral lines.

### **UNIT – II : INTERFERENCE**

**18**

#### **Hours**

Theory of thin films – Air wedge – Determination of diameter of a thin wire by air wedge – Michelson's Interferometer – Theory – Applications – wave length, thickness of thin transparent material and resolution of spectral lines – Brewster's fringes – Refractive index of gases – Jamin's & Rayleigh's Interferometers.

### **UNIT – III : DIFFRACTION**

**18**

#### **Hours**

Fresnel's diffraction – Diffraction at circular aperture, straight edge and single slit – Plane diffraction grating – Theory and experiment to determine wavelength – normal incidence – oblique incidence – Fraunhofer's diffraction – Missing orders – Overlapping spectra - Rayleigh's criteria – Resolving power of telescope, prism, microscope and grating.

### **UNIT – IV : POLARIZATION**

**18**

#### **Hours**

Introduction to polarisation – Double refraction – Huygen's explanation of double refraction in uniaxial crystal – Dichroism – Polaroids and their uses - Plane, elliptically and circularly polarized light – Production and detection – Optical Activity – Fresnel's explanation of optical activity – Specific Rotatory Power – Determination using Laurent's Half Shade Polarimeter – Kerr effect and Faraday effect.

### **UNIT – V : NONLINEAR OPTICS**

**18**

#### **Hours**

Introduction – Harmonic generation – Optical Mixing – Self-Focussing – Momentum Mismatch – Second Harmonic Generation – Experimental Arrangement – Crystal Symmetry – Coherence Length – Index Matching Condition – Frequency Mixing (Sum and Difference frequency Generation – Parametric Amplification and Generation of Light.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for study:**

1. Optics by Subramaniam N & Brij Lal, S Chand & Co. Pvt. Ltd., New Delhi, 1990.
2. Optics by Khanna D R & Gulati H R, R Chand & Co. Pvt. Ltd., New Delhi, 1979.
3. Optics and Spectroscopy by Murugesn, S Chand & Co. Pvt. Ltd., New Delhi.

### **Books for Reference:**

1. Fundamentals of Optics by Jenkins Francis and White E Harvey, McGraw Hill Inc., New Delhi, 1976.
2. Optical Physics by Lipson. S G, Lipson H and Tannhauser D S, Cambridge University Press (1995).
3. Fundamental of Optics by Raj M G, Anmol Publications Pvt. Ltd., (1996), New Delhi.
4. Fundamentals of Physics, 6th Edition, by D Halliday, R Resnick and J Walker. Wiley NY 2001.
5. Physics, 4th Edition Vols I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley, Ny, 1994.
6. CRC Handbook of Physics & Chemistry, 80th Ed., CRS Press, Ny, 1999.
7. The Feynman Lectures on Physics, Vols. I, II and III by R P Feynman, R B Leighton and M Sands, Narosa, New Delhi 1998.
8. Fibre Optic Communication System, Govind P. Agarwal, John –Wiley & Sons



## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15MPH502 Semester : V

Major - 6 Title: **Atomic Physics and Spectroscopy**

Credits: 5 Max. Marks. 75

**No. of hrs/wk : 6**

### **Objectives:**

- *To learn the principles of atomic physics and the instruments used to learn it.*
- *To learn and understand the various optical phenomena and the fundamental facts regarding the various spectroscopic methods*

### **UNIT I : ATOMIC STRUCTURE**

**18 Hours**

Introduction – Rutherford's experiment on  $\alpha$ -scattering – Bohr atom model – Correspondence principle – Critical Potential – Frank & Hertz experiment – Vector atom model – Associated quantum numbers - Pauli's Exclusion Principle – Total Angular Momentum - L-S and J-J couplings - Bohr magnetron - Stern and Gerlach experiment

### **UNIT II: OPTICAL SPECTRA AND SPLITTING OF ENERGY LEVELS**

**18 Hours**

Spectral terms – Spectral notations – Selection rules – Hyperfine structure - Zeeman effect - Larmors theorem – Debye's explanation of normal Zeeman effect - Anomalous Zeeman effect - theoretical explanation. Lande's g factor and explanation of splitting of  $D_1$  and  $D_2$  lines of sodium - Paschen back effect - theory.

### **UNIT-III: MICROWAVE AND INFRARED SPECTROSCOPY**

**18 Hours**

Classification of Molecules - Interaction of Radiation with Rotating Molecules – Theory of Rotational Spectrum of Rigid Diatomic Molecule – Theory of vibration-rotation spectrum of Diatomic molecules – Energy of Diatomic molecule – Vibrating Diatomic molecule as a harmonic oscillator.

### **UNIT-IV: RAMAN SPECTROSCOPY**

**18 Hours**

Classical theory of Raman effects and its failure - Difference between IR and Raman spectra - Quantum theory of Raman effect - Molecular Polarizability - Pure rotational Raman spectra of linear molecules - Vibrational Raman spectra - Stokes and anti-Stokes lines and their intensity difference - rule of mutual exclusion.

### **UNIT V : ELECTRONIC SPECTROSCOPY OF MOLECULES & LASER PHYSICS 18 Hours**

Electronic spectra of Diatomic molecules - The Franck Condon Principle - Disassociation energy and disassociation products - Lasers: Population inversion - Laser pumping - Resonators - Vibrational modes of resonators - number of modes/unit volume - Open resonators - Control resonators - Q Factor - Threshold condition - Quantum yield - Pumping power - Neodymium laser - Nd:YAG laser.

### **Books for study:**

1. Modern physics by R Murugesan and Kiruthiga Sivaprasath, S Chand & Co., New Delhi - 2005.
2. Atomic and Nuclear physics by N Subramanian and Brij Lal, S Chand & Co. - 2000.
3. Molecular Structures & Spectroscopy by G Aruldas
4. Atomic physics by J B Rajam.
5. Spectroscopy by Gupta & Kumar
6. Spectroscopy by Banwell

### **Books for Reference:**

### **C. Abdul Hakeem College (Autonomous), Melvisharam.**

1. Atomic physics by A B Gupta and Dipak Ghosh Books and Allied Publishers.
2. Modern physics by J H Hamilton and Yang, McGraw Hill Publication 1996.
3. Concepts of Modern physics by A Beiser, Tata McGraw Hill, New Delhi 1997.
4. Physics of Atoms and Molecules, Bransden and Joachein 2<sup>nd</sup> Edition (Pearson 2011)
5. Introduction to Atomic Spectroscopy by H.E. White (McGraw Hill).

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15MPH503 Semester : V

Major- 7 Title: **Analog and Digital Electronics**

Credits: 5 Max. Marks. 75

**No. of hrs/wk : 6**

### **Objectives:**

- To learn the characteristics of semiconductor devices and IC's.
- To learn the applications of analog and digital circuits

### **UNIT I – SEMICONDUCTOR PHYSICS AND DEVICES** 18 Hours

Carrier concentration in intrinsic and extrinsic semiconductors – Variation of Fermi level with temperature in P&N type semiconductors – Bridge rectifier – Transistor characteristics (PNP - CE mode only) – Photodiode & Solar cell (Working) - LED (Working, characteristics and applications).

### **UNIT II – TRANSISTOR AMPLIFIERS (NPN – CE mode only)** 18 Hours

Single stage Transistor amplifier – R-C coupled transistor amplifier – frequency response – Emitter follower – h-parameter – Analysis of transistor amplifier using h-parameters – Expression for current gain, input impedance, voltage gain and output impedance.

### **UNIT III – TRANSISTOR OSCILLATORS** 18 Hours

Barkhausen criterion – Working of Hartley, Colpitts, phase shift and Wien bridge oscillators – Qualitative studies for frequency and condition for sustained oscillations in each case – Crystal oscillator.

### **UNIT IV – DIGITAL FUNDAMENTALS** 18 Hours

Binary number system – 1's complement – 2's complement – 2's complement arithmetic – hexadecimal number system – De Morgan's theorems – NAND & NOR as universal gates – Karnaugh map simplification (upto 4-variables) – SOP and POS solutions – Half adder – Full adder – Half subtractor – Full subtractor – 4-bit adder-subtractor – 4-to-1 multiplexer – 1-to-4 demultiplexer.

### **UNIT V – SEQUENTIAL CIRCUITS** 18 Hours

R-S Flip-Flop – Clocked R-S Flip-Flop – D Flip-Flop – J-K Flip-Flop – J-K Master-Slave Flip-Flop – 4-bit asynchronous counter – Modulus counters – 4-bit synchronous counter – MOD-3 and MOD-5 combination counters – BCD counter – cascaded counters.

### **Books for study and reference:**

1. Principles of Electronics by V.K.Mehta and Rohit Mehta, S.Chand & Co., New Delhi.
2. A Text Book of Applied Electronics by R.S.Sedha, S.Chand & Co., New Delhi.
3. Elements of Electronics by Bagde and S.P.Singh.
4. Electronic Principles by A.P.Malvino, McGraw Hill Book Company.
5. Digital Fundamentals by V.Vijayendiran, S.Viswanathan Publishers, Chennai.
6. Digital Principles and Applications by A.P.Malvino and D.P.Leach, Tata McGraw Hill, New Delhi.

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15EPH501 Semester : V

Elective - 1 Title: **Material Science (Elective - I)**

Credits: 3 Max. Marks. 75

**No. of hrs/wk : 3**

### Objectives:

- To learn and the various field which involves the concept of materials.
- To learn the basic application of material science and nanoscience in different filed.

### UNIT I: GROWTH TECHNIQUES OF MATERIALS 9 HOURS

Bulk growth – low temperature and high temperature solution growth. Thin film preparation- Physical vapour deposition (PVD) -Electron Beam evaporation – Spray Pyrolysis- Sol gel growth techniques.

### UNIT II: CHARACTERIZATION OF MATERIALS 9 HOURS

Structural: Determination of NaCl Structure by x-ray diffraction (XRD) –Construction and working of scanning electron microscope (SEM).

Optical: Principle, construction and working of UVspectrometer – determination of absorption of light by NaCl crystal.

Electrical: Hall effect – construction and working – determination of charge carrier.

### Unit III: NANOMATERIALS 9 HOURS

Definition of Nanoscale system – Electron confinement in 3D, 2D, 1D and 0D - Size effect - Surface to volume ratio - distinction between Nanomaterials and bulk materials in terms of energy band.

Properties of Nanomaterials: Physical, electrical, optical and magnetic properties.

### Unit V: SYNTHESIS AND APLICATION 9 HOURS

Synthesis of Nanomaterials: plasma arcing – chemical vapour deposition of semiconductor nanomaterial – electro-deposition – ball milling.

Applications of Nanomaterials: material technology – information technology – biomedical.

### UNIT V – NEW MATERIALS 9 HOURS

Metallic glasses – Fiber reinforced plastics - Fiber reinforced metals – Bio materials – Ceramics – Cermets – High temperatures materials - SMART materials.

Space programme structural materials and their properties - pressure vessels materials – lubrication materials.

### Book for study

1. Materials science and engineering- V Edn- V Raghavan( PHI)
2. Introduction to Materials science and engineering – Ralls Cartney and Wolf ( Wiley)
3. Introduction to Nanoscience & Nanotechnology by K. K. Chattopadhyay and A. N. Banerjee, Publisher: PHI Learning and Private Limited
4. Nanotechnology, Rakesh Rathi, S Chand & Company, New Delhi.
5. Nanoparticle Technology Handbook – M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama (Eds.), Elsevier 2007
6. Encyclopaedia of Materials Characterization, Surfaces, Interfaces, Thin Films, Eds. Brundle, Evans and Wilson, Butterworth – Heinmann, 1992
7. Springer Handbook of nanotechnology, Bharat Bhushan (Ed.), Springer-Verlag, Berlin, 2004
8. Nano Science and Technology, VS Muraleedharan and A Subramania, Ane Books Pvt. Ltd, New delhi.
9. M.A Wahab, Solid state physics- Narosa publications – 2006
10. M.Arumugam - Material Science – Anuradha publications – 2008
11. S.K. Hayra Choudhury, Materials Science and Processes – 1991.
12. CM Sri Vastava, C & C.Srinivasan, Science of Engineering materials

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15SPH501 Semester : V

Skill Based -3 Title: **Applied Electronics (SBS -III)**

Credits: 3 Max. Marks. 60

**No. of hrs/wk :3**

### **Objectives :**

- *To learn and understand the various field of electronic, which involves the physics concepts*
- *To learn the basics applications of physics in different special electronic devices and instruments*

### **UNIT I: SPECIAL SEMICONDUCTOR DEVICES**

**9 Hours**

FET – working, characteristics & parameters – FET as amplifier – Construction of Depletion and enhancement MOSFETs – UJT & SCR – working & characteristics – SCR as full wave rectifier.

### **UNIT II: OPERATIONAL AMPLIFIERS**

**9 Hours**

Op-amp – characteristics of ideal OP-AMP – expression for voltage gain of inverting and non-inverting amplifiers – voltage follower – summing amplifier – differentiator and integrator – astable multivibrator – Wien bridge oscillator.

### **UNIT III: 555 TIMER AND D/A, A/D CONVERTERS**

**9 Hours**

555 timer block diagram – monostable and astable operations – weighted resistor D/A converter – R-2R ladder D/A converter – parallel A/D converter – successive approximation A/D converter.

### **UNIT IV: TRANSDUCERS**

**9 Hours**

Classification of transducers – Thermistor - Piezoelectric, Photoelectric, Hall Effect, Magnetostrictive Transducers - Semiconductor Transducers - Electro-Optic Transducers - Shaft angle Encoder - Digital Transducers – Biosensors: components, types and features of biosensors.

### **UNIT V: ELECTRONICS INSTRUMENTATION**

**9 Hours**

Principle, block diagram and working of Digital Multimeter - Physiological transducers to measure blood pressure, body temperature – sources of bio-electric potentials – resting potential, action potential, bio potential electrodes – principle, block diagram and operation of ECG recorder.

### **TEXT BOOKS:-**

1. Garland, G.D., Introduction to Geophysics 11 Ed., WB Saunder Company, London, 1979
2. Cook, A. H., Physics of the Earth and Planets I Ed. , McMillan Press, London, 1973.
3. Sawhney A K / A course in Electrical and Electronics Measurements and Instrumentation / Dhanpat Rai & Co., Delhi / 2003.
4. Transducers and Instrumentation by D. V. S. Murthy, Prentice Hall of India Pvt. Ltd.
5. Bioinstrumentation / L Veerakumari / MJP Publishers
6. Dr. Rajendra Prasad, Electronic Measurements and Instrumentation, Khanna Publications.
7. S. Ramabhadran, Electronic Measurements and Instrumentation, Khanna Publications.

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15MPH601 Semester : VI

Major-8 Title: **Nuclear Physics and Radiation Physics**

Credits: 4 Max. Marks. 75

**No. of hrs/wk : 5**

### **Objectives:**

- *To learn about radio activity and its has got industrial, medical, research applications etc.*
- *To learn about Elementary particle and hence the basis of High Energy Particle Physics.*

### **UNIT – I : NUCLEAR STRUCTURE**

General properties of nucleus- binding energy- packing fraction - Theories of nuclear composition - proton and electron hypothesis - proton – neutron hypothesis - nuclear forces – meson theory of nuclear forces. Liquid drop model – Bethe – Weizsacker's mass formula – application to alpha decay – Shell model – evidences – theory of energy level diagram – spin orbit interaction – magic numbers – nuclear stability – the Collective model.

### **UNIT – II : NUCLEAR DECAY**

Alpha, Beta and Gamma Rays - properties – range of alpha particles – Geiger – Nuttall experiment– Gamow's theory of alpha decay - Beta ray spectra – origin – neutrino theory of beta decay – K-electron capture – origin of gamma rays - nuclear isomerism - Radioactive disintegration- Soddy-Fajan's displacement law – law of successive disintegration – transient and secular equilibrium - units of radioactivity.

### **UNIT – III : NEUTRON, PARTICLE ACCELERATORS AND DETECTORS**

Neutrons - discovery- properties – classification – radioactive sources - slow neutron sources- Types of accelerators - Linear accelerator - Cyclotron - Synchrocyclotron - Betatron - Electron synchrotron - Proton synchrotron (Bevatron) - Detection Methods - GM counter - Ionization chamber - Scintillation counter- Bubble chamber.

### **UNIT – IV : NUCLEAR FISSION AND FUSION**

Characteristics of nuclear fission - Fission cross section - Energy in fission - Bohr-Wheeler's theory of nuclear fission - Fission reactors - pressurized heavy water reactor - fast breeder reactor – Nuclear fusion - proton –proton cycle – carbon - nitrogen cycle - Thermo nuclear reactions – Controlled fusion reactions – Lawson criterion - Radiation hazards - control of radiation hazards - biological effects of radiation – Applications of radioactive radiations.

### **UNIT – V : ELEMENTARY PARTICLES**

Classification of fundamental forces - Elementary particles: Baryons, Mesons, Leptons - Strange particles – Anti-nucleons - Conservation laws : Baryonic, leptonic, strangeness and isospin charges - quantum numbers - Invariance under time reversal (T), charge conjugation (C) and parity (P) – TCP theorem - Parity non-conservation – Basic ideas about quarks and their types.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for study:**

1. Modern physics by R Murugesan & Kiruthiga, Sivaprasath S Chand & Co. (2006).
2. Nuclear Physics S N Ghoshal – S Chand & Co. Edition 2003.
3. Nuclear Physics D G Tayal – Himalayan Publishing House.
4. Nuclear Physics – J B Rajam, S Chand Publishing Co.

### **Books for reference:**

1. Introduction to Modern Physics by Rich Meyer, Kennard, Coop Tata McGraw Hill Publishing Co.
2. Atomic and nuclear physics by Littlefeld & Thorley.
3. Nuclear Physics – Irving Keplan
4. Elements of Nucler Physics – M L Pandya & R P S Yadav Kedar Nath Ram Nath (2000).

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15MPH602 Semester : VI

Major - 9 Title: **Relativity, Quantum Mechanics and Mathematical Physics**

Credits: 4 Max. Marks. 75

**No. of hrs/wk : 5**

### Objectives:

- To learn the basics of relativity, quantum mechanics & mathematical physics
- To learn the basics application of mathematics in physics

### UNIT – I : RELATIVITY

**15 Hours**

Frames of reference – Michelson – Morley experiment – Significance of negative result – postulates of special theory of relativity – Lorentz transformation equations – Length contraction – Time dilation – Relativity of simultaneity – Law of addition of velocities – variation of mass with velocity – relativistic kinetic energy equations – postulates of general theory of relativity – gravitational red shift.

### UNIT – II : WAVE MECHANICS

**15 Hours**

Matter waves – de Broglie wavelength – wave velocity and group velocity – Heisenberg's Uncertainty principle – proof of Uncertainty principle for one dimensional wave packet – Postulates of wave mechanics – properties of wave functions – operator formalism – eigen functions – eigen values – expectation values.

### UNIT – III : SCHRODINGER EQUATIONS AND ITS APPLICATIONS

**15 Hours**

Schrodinger equation – time dependent and time independent – application of Schrodinger equations – linear harmonic oscillator – zero point energy – particle in a one dimensional box – barrier penetration and tunnelling effect – rigid rotator – hydrogen atom.

### UNIT – IV : MATHEMATICAL PHYSICS

**15 Hours**

Gauss divergence theorem – Stokes theorem – Greens theorem – applications of vectors to hydrodynamics. Orthogonal curvilinear coordinates – spherical polar coordinates – differential operators in terms of orthogonal curvilinear coordinates – expressions for gradient, div, curl and  $\nabla^2$  in Cartesian coordinate.

### UNIT – V : SPECIAL FUNCTIONS

**15 Hours**

Beta and gamma functions – problems – relation between beta and gamma functions – Bessel's differential equations – Legendre's differential equations – Hermite's differential equations – Laguerre's differential equations – series solutions – Dirac delta functions - properties.

### Books for study:

1. Quantum Mechanics by V. Devanathan, Narosa, Chennai, 2005.
2. Modern Physics by R Murugesan, Kiruthiga, Sivaprasath S Chand & Co. (2007).
3. Quantum Mechanics by V K Thangappan, Wiley Eastern.
4. A Text Book of Quantum Mechanics by P M Mathews and Venkatesan, McGraw Hill.
5. Mathematical Physical by Sathya Prakash.
6. Mechanics and Mathematical Methods by Murugesan, S Chand Publishing & Co.

### Books for reference:

1. Mathematical Physics by B D Gupta.
2. Quantum Mechanics by Ghatak and Loganathan, McMillan.
3. Basic Quantum Mechanics by A Ghatak, McMillan India (2002).



## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15MPH603 Semester : VI

Major- 10 Title: **Solid State Physics**

Credits: 5 Max. Marks. 75

**No. of hrs/wk : 5**

### **Objectives:**

- *To learn the basic principles of Physics applied to study of solids, the relationship between the structure and property.*

### **UNIT I: CRYSTALLOGRAPHY**

**12 Hours**

Lattice Point and Space Lattice - Basis and crystal structure, unit cells and lattice Parameters, Atomic Packing - Crystal systems, Bravais space lattices-metallic crystal structure , sodium chloride, diamond, zinc sulphide, hexagonal and closed packed structure, directions, planes and Miller indices

### **UNIT II: FREE ELECTRON THEORY AND BAND THEORY OF SOLIDS 12 Hours**

Free Electron theory in one dimension - Formation of Energy Bands - Bloch Theorem (Statement) - Kronig Penney Model – Brillouin Zones (qualitative) – Effective Mass - Carriers in Solids - Metals, Insulators and Semiconductors (Intrinsic) - Band Structure - Intrinsic and Extrinsic Semiconductors

### **UNIT III: BONDING AND CRYSTAL PROPERTIES**

**12 Hours**

Types of Bonding in Crystals - Ionic, Valence, Metallic, van der Waal's and Hydrogen Bonding Optical properties of solids - Specific heat capacity of solids - Dulong and Pettit's law - Einstein's and Debye's theory - Explanation for the Occurrence of Superconductivity - General Properties of Superconductors - Types of Superconductors - Meissner effect.

### **UNIT IV: X-RAY DIFFRACTION AND CRYSTAL DEFECTS**

**12 Hours**

Diffraction of X-Rays by Crystals - Bragg's Law in one Dimension - Experimental methods in X-Ray Diffraction - Laue Method, Rotating Crystal Method, Powder Photograph Method - von Laue's equations - Point Defects - Line Defects - Surface Defects - Volume Defects - Effects of crystal imperfections.

### **UNIT V: DIELECTRICS AND MAGNETIC PROPERTIES**

**12 Hours**

Review of Basic Equations - Dielectric Constant - Dipole Moment - Polarizability-Clausius-Mosotti Relation- Ferroelectricity - Classification of Magnetic Materials - Different types of Magnetic materials - Classical Theory of Diamagnetism (Langevin's Theory) - Langevin's Theory of Paramagnetism - Weiss Theory of Paramagnetism.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for Study:**

1. Solid State Physics by Gupta and Kumar
2. Modern Physics by R Murugesan and Kiruthiga Sivaprasath, S. Chand & company Ltd Edition 2007
3. Material Science by M. Arumguarn, Anuradha Publishers.
4. Material Science and Engineering by V.Raghavan, PHI
5. Solid State Physics by S.O. Pillai
6. Introduction to Solids by Azaroff, TMH.
7. Concepts of Modern Physics by Beiser, Tata Mc.Graw Hill, 5th Edition, 1997.

### **Books for Reference:**

1. Introduction to Solid State Physics by Kittel, Wiley and Sons
2. Solid State Physics A J Dekker
3. Solid State Physics, P.K. Palanisamy, Scitech publications
4. Solid State Physics, P.K. Puri, V.K. Babber, S. Chand and company, Delhi

## C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15EPH601 Semester : VI

Elective - 2 Title: **Microprocessor and Microcontroller Applications  
(Elective - II)**

Credits: 3 Max. Marks. 75

**No. of hrs/wk : 3**

### **Objectives :**

- *To learn and understand the architecture, programming, interfacing and applications of MSP430 microcontroller*

### **UNIT I: – ARCHITECTURE**

9 Hours

Introduction to Microprocessors and Microcontrollers – RISC & CISC CPU Architectures – Harvard & Von-Neumann CPU architectures.

16-bit Microcontrollers – MSP430 RISC CPU architecture – Compiler friendly features – Instruction set – Clock system, Memory subsystem, bus-architecture – Different families in MSP430 (2xx, 4xx, 5xx, 6xx) – Key differentiating factors between families – Pin-out diagram & I/O port pins and their functions.

### **UNIT II: – PROGRAMMING**

9 Hours

Data transfer, arithmetic, logical and branching instructions – The Assembly language and 'C' programming for MSP430 microcontrollers – Routines using Assembly – Embedded 'C' essentials.

Simple assembly language programs for hexadecimal addition, subtraction, multiplication, division and picking largest/smallest data in an array.

Introduction to Code Composer Studio – Using CCS for Assembly, C, Assembly+C projects.

### **UNIT III: I/O PORTS, INTERFACING AND LOW-POWER FEATURES**

9 Hours

Digital I/O – I/O ports programming using C and assembly – Multiplexing scheme of the MSP430 pins.

Concepts of stack and subroutines – Instructions related to stack and subroutines – Interrupts – Hardware and software interrupts – Maskable and Non-maskable interrupts – Interrupt programming in Assembly and 'C'.

Low-power features of MSP430 – Clock system – Low-power modes – Clock request feature – Low-power programming and Interrupts.

### **UNIT IV: ON-CHIP PERIPHERALS AND COMMUNICATION**

9 Hours

On-chip peripherals – Watchdog Timer – Comparator – Op-Amp – Basic Timer – Real Time Clock (RTC)– ADC& DAC – DMA – LCD – USCI – Low-power RF capabilities.

Communication using MSP430 – USCI features and modes – Simple communication programming using C and Assembly – Interfacing to PC.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **UNIT V: INTERFACING AND EMBEDDED SYSTEMS**

9 Hours

Interfacing LED, external LCD using SPI, External memory – Seven segment LED modules interfacing – Watch (RTC).

Applications of MSP430 – Data acquisition system – Wired Sensor network.

Introduction to embedded systems – Architecture of embedded system – Classifications and Applications of embedded systems.

### **BOOK FOR REFERENCE**

1. John Davies , "MSP430 Microcontroller Basics", Elsevier, 2008.
2. MSP430 Teaching CD-ROM, Texas Instruments, 2008 (can be requested <http://www.uniti.in> )
3. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.
4. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press
5. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
6. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
7. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Physics effective from the Batch 2015-2016

Year: III Year Subject Code : U15EPH602 Semester : VI

Elective - 3 Title: **Applied Physics (Elective - III)**

Credits: 3 Max. Marks. 75

**No. of hrs/wk : 3**

### **Objectives:**

- To learn and understand the various field, which involves the basics physics concepts
- To learn the application of physics in different fields and their important

### **UNIT I – NON-DESTRUCTIVE TESTING (NDT)**

**9 HOURS**

Introduction - Defects in materials - NDT Methods - Visual Inspection - Liquid Penetration Testing - Magnetic Particle Testing (MPT) - Eddy Current Testing (ECT) - Radiographic Testing Methods – Applications, advantages and limitations.

### **UNIT II – ASTROPHYSICS**

**9 HOURS**

Origin of the universe - the big bang theory - the steady state theory - Hubble's law - major constituents of the universe - Solar System - Planets - laws of motion of planets - inner planets - outer planets - Stars - Birth of a star - Death of a star - Chandrasekhar limit - white dwarfs - Neutron stars

### **UNIT III – FIBER OPTICS**

**9 HOURS**

Principles and propagation of light through optical fiber - basic characteristics of optical fiber - acceptance angle - numerical aperture - classification of fibers - step index and graded index fibers - single mode and multi mode fibers - losses in fibers – absorption, scattering and bending losses. Fiber optic communication system (Block diagram only).

### **UNIT IV – GEOPHYSICS**

**9 HOURS**

Introduction - Seismology: P waves, S waves, their velocities - Time distance curves and the location of epicentres - Effect of boundaries - Major discontinuities and resulting phase of seismic waves

### **UNIT V – ENERGY PHYSICS**

**9 HOURS**

Conventional and Non-conventional energy sources- solar energy -The Characteristics of sun - Solar constant - Physical principles of the conversion of solar radiation into Heat - Flat-Plate collectors – Collector Energy losses- Solar air heaters – Concentrating collectors – focusing and non- focusing concentrators -Advantages and disadvantages of concentrating collectors over flat-plate collectors

### **Book for study**

1. Mani P. Engineering Physics I, Dhanam Publications, 2011.
2. Optics and Spectroscopy by R Murugashan, Kiruthiga Sivaprasad, S. Chand 2014.
3. Introduction to Fiber optics by K. Thyagarajan and Ajoy Ghatak, Cambridge University Press, 1999.
4. Practical Non-Destructive Testing by Baldevraj, T. Jayakumar, M. Thanvasimuthu, Narosa Publishing House, Chennai, 2002.
5. Garland, G.D., Introduction to Geophysics 11 Ed., WB Saunder Company, London, 1979
6. Solar Energy Utilisation, G .D. Rai, Khanna Publications, New Delhi, 1982.
7. Non – Conventional Energy sources, G.D. Rai, Khanna Publishers, New Delhi, 1994.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Mathematics & Chemistry effective from the year 2015-2016

Year: I Year Subject Code : U15APH101 Semester : I

Allied-1 Title: **Physics - I (Allied)**

Credits: 4 Max. Marks. 60

### **Objectives:**

- To learn concise ideas about basic physics and their applications in day to day life.

### **UNIT – I: PROPERTIES OF MATTER**

**14 Hours**

Elasticity- Hooke's law - Relationship between three moduli of elasticity (qualitative) – stress -strain diagram – Poisson's ratio – Factors affecting elasticity – Bending moment – Depression of a cantilever – determination of Young's modulus by non-uniform bending.

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula – Comparison of viscosities of two liquids by graduated burette method.

Surface Tension: Surface Tension – Excess of pressure inside a curved surface – Synclastic system – Surface Tension and interfacial surface tension by the method of drops.

### **UNIT – II: THERMAL PHYSICS**

**10 Hours**

Modes of heat transfer- thermal conductivity- Specific heat -Newton's law of cooling - Emissivity and Emissive Power - J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion.

Super conductors. Type I and II – Meisner Effect–Applications of super conductors – SQUID – Magnetic levitation.

### **UNIT – III: ELECTRICITY AND MAGNETISM**

**12 Hours**

Electricity: Potentiometer – Principle – Calibration of low range voltmeter - Measurement of internal resistance of cell – Measurement of an unknown resistance- Capacitance of a conductor - Capacitance of spherical and parallel plate capacitor – Energy of a charge capacitor - Loss of energy due to sharing of charges

Magnetism : Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of oscillation

### **UNIT –IV: ACOUSTICS AND ULTRASONICS**

**12 Hours**

Classification of Sound - decibel - Weber–Fechner law – Sabine's formula – Absorption Coefficient and its determination –Factors affecting acoustics of buildings and their remedies.

Production of ultrasonics by piezoelectric method - Acoustic grating –Pulse echo system through transmission and reflection modes - Medical applications - Sonogram

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### **UNIT –V: OPTICS**

**12 Hours**

Interference - Air wedge - Determination of diameter of a thin wire by air wedge – Diffraction- Plane diffraction grating - Introduction to polarization - Double refraction - Huygens explanation of double refraction in uniaxial crystal.

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) - Fibre Optical Communication system (Block diagram)

#### **Books for Study:**

1. Allied Physics, R. Murugesan, S. Chand & Co., First Edition (2005).
2. Allied Physics, Dr. K. Thangaraj, Dr. D. Jayaraman, Popular Book Depot, Chennai.
3. Engineering Physics, Arumugam M, Anuradha publishers, 2010.
4. Engineering Physics, Gaur R.K and Gupta S.L, Dhanpat Rai publishers, 2009.
5. Engineering Physics, Mani Naidu S, Second Edition, PEARSON Publishing, 2011.

#### **Books for Reference:**

1. University Physics, Searls and Zemansky, 2009
2. Engineering Physics, I Mani P. Dhanam Publications, 2011.
3. Engineering Physics, Marikani A. PHI Learning Pvt., India, 2009.
4. Engineering Physics, Rajagopal K. PHI, New Delhi, 2011.
5. Engineering Physics I, Senthilkumar G, VRB Publishers, 2011.
6. Elements of Properties of Matter, D.S. Mathur, S. Chand & Co. (1999).
7. Heat and Thermodynamics, N. Brijlal and Subramaniam, S. Chand & Co.

## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

Syllabus for B.Sc., Mathematics & Chemistry effective from the year 2015-2016

Year: I Year Subject Code : U15APH201 Semester : II

Allied-2 Title: **Physics - II (Allied)**

Credits: 4 Max. Marks. 60

### **Objectives:**

- To learn concise ideas in modern physics and their development.

### **UNIT-I: ATOMIC AND QUANTUM PHYSICS**

**12 Hours**

Atom model - vector Atom model- electron spin and special quantization - quantum numbers - Pauli's exclusion principle.

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davisson and Germer's Experiment – G.P.Thomson's Experiment.

### **UNIT-II: CONDUCTING MATERIALS**

**12 Hours**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory.

Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Carrier concentration in metals.

### **UNIT- III: SEMICONDUCTING MATERIALS**

**12 Hours**

Intrinsic semiconductor – Carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – Electrical conductivity – Band gap determination.- n-type and p-type semiconductor (qualitative studies).

### **UNIT-IV: CRYSTALLOGRAPHY**

**12 Hours**

Distinction between crystalline and amorphous solids - Crystal lattice: Basis , Primitive and Unit cell - Number of lattice points per unit cell -Seven Classes of Crystals - Bravais lattices - Miller indices.

Crystal structure (sc, hcp, fcc & bcc) - Diamond Structure- Atomic Packing - Atomic radius - Lattice constant and density.

### **UNIT-V: ELECTRONICS**

**12 Hours**

Zener diode – Characteristics – Voltage regulation using zener diode – LED – uses of LED. Digital electronics: AND, OR, NOT, NAND and NOR gates – NAND and NOR as universal building blocks. Fabrication of integrated circuit by monolithic technology – Advantages and limitations of an integrated circuit – LSI, MSI and VLSI.



## **C. Abdul Hakeem College (Autonomous), Melvisharam.**

### **Books for Study:**

1. Materials Science, Arumugam M, Anuradha publishers, 2010
2. Solid State Physics, Pillai S.O, New Age International(P) Ltd., publishers, 2009
3. Allied Physics, R. Murugesan, S. Chand & Co. First Edition (2005).
4. Modern Physics, R. Murugesan, S. Chand & Co. (2004).

### **Books for Reference:**

1. Materials Science, Palanisamy P.K, Scitech Publishers, 2011
2. Engineering Physics II, Senthilkumar G. VRB Publishers, 2011
3. Engineering Physics II , Mani P.. Dhanam Publications, 2011
4. Engineering Physics, Marikani A, PHI Learning Pvt., India, 2009
5. Allied Physics, Dr. K. Thangaraj & Dr. D. Jayaraman, Popular Book Depot, Chennai.
6. Electronic Principles and Applications, A.B. Bhattacharya, New Central Book Agency, Calcutta.
7. Introduction to Solid State Physics, C. Kittel, 5th Edition Wiley Eastern Ltd