UCPHD20 – Mathematical Methods and Classical Mechanics

Year: II	Course Code:	Title of the Course:	Course Type:	Course Category:	H/W	Credits	Marks
Sem: III	UCPHD20	Mathematical Methods and Classical Mechanics	Theory	Core	6	5	100

Course Objectives

1. To introduce the students the basic methods of applied mathematics to solve the physical problems that arises in conventional physics such ad electricity and magnetism, classical and quantum mechanics and spectroscopy.
2. To make the students acquire the mathematical skills in solving the basic numerical problems.
3. To demonstrate knowledge and understanding of following fundamental concepts in dynamics of system of particle, motion of rigid body.
4. To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulations of classical mechanics.

Course Outcomes (CO)

The learners will be able to

1. Learn about gradients, divergence and curl in orthogonal curvilinear and their typical applications in physics
2. Learn about special type of matrices that are relevant in physics and get introduced to special functions like gamma function, beta function, delta function, dirac delta function, Bessel functions and their recurrence relations
3. Analyse statistical data using measures of central tendency, dispersion. Learn the methods of skewness like Karl-Pearson coefficient, Bowleys coefficient
4. Learn about the mechanics of moving particles and the constraints. The measure of position of moving particle and the parameters required to describe the state ofsystem. Lagrange's equation deals with position, momentum and total energy of system in motion
5. Learn about Hamiltonian functions and differences between Lagrangian and Hamiltonian. It deals with various physical applications

CO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	H	H	M	H	H
CO2	M	L	H	M	H	L
CO3	L	M	L	M	M	H
CO4	M	H	H	H	L	L
CO5	L	M	M	M	H	H

CO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	H	M	M	H
CO2	H	M	M	H	H	L
CO3	M	H	H	L	M	H
CO4	H	M	H	M	L	H
CO5	M	H	H	M	H	L

(Low - L, Medium – M, High - H)

Course Syllabus

Unit I: Vector algebra and Matrices   (14 hours)

1.1 Gradient of a scalar field – Physical Interpretation - Line, surface and volume integrals (K1, K2)

1.2 Divergence and curl of vector function and its physical significance (K3, K4)

1.3 Gauss divergence theorem - Application of vector to hydrodynamics- heat flow in solids- gravitation and electromagnetic field(K4)

1.4 Introduction to matrices - Review of algebraic operations of matrices - Properties of matrix multiplication (K3)

1.5 Eigen value - Eigen vectors(K4)

1.6 Characteristics equation of matrix – Cayley Hamilton's theorem - Diagonalization of matrices(K4)

Unit II: Special function   (14 hours)

2.1 Beta function - Symmetry property of beta function– Evaluation of beta function (K1, K2, K3)

2.2 Gamma function - Evaluation of gamma function (K1, K2, K3)

2.3 Legendre's differential equation and Legendre's functions (K4)

2.4 Generating functions of Legendre's polynomial (K2)

2.5 Orthogonal properties of Legendre's polynomials - Recurrence formulae (K4)

2.6 Recurrence formulae - Bessel's differential equation(K4)

Unit III: Statistics   (14 hours)

3.1 Introduction to statistics - Measures of central tendency (K1, K2)

3.2 Measure of arithmetic mean, median, mode (K1, K3)

3.3 Measure of dispersion, Range, Quartile deviation, mean deviation and standard deviation (K2, K3, K4)

3.4 Measure of skewness - Karl Pearson's coefficient of skewness (K4)

3.5 Bowley's coefficient of skewness (K4)

3.6 Distribution models - binomial, Poisson and normal distribution (K4)

Unit IV: Classical Mechanics I   (14 hours)

4.1 Mechanics for a system of particles - constraints – Holonomic and non-Holonomic constraints(K1)

4.2 Degrees of freedom - Generalized coordinates (K2)

4.3 Principle of virtual work(K1, K2)

4.4 D'Alembertz principle - Lagrange's equation from D'Alembertz principle- Lagrange's equation for system containing dissipative forces (K3, K4)

4.5 Applications of Lagrange's equation –Spherical pendulum - simple pendulum, - compound pendulum (K4)

4.6 Central force - Equation of motion and first integrals (K4)

Unit V: Classical Mechanics II   (14 hours)

5.1 Phase –Space (K1)

5.2 Hamiltonian function – Hamilton's equation – Physical significance of Hamiltonian function (K2, K3)

5.3 Applications of Hamiltonian equations – Simple pendulum, compound Pendulum (K4)

5.4 Poisson's bracket - Properties of Poisson's bracket (K3,K4)

5.5 Relation between Lagrange and Poisson bracket (K4)

5.6 Application of Lagrangian and Hamiltonian for a charged particle (K4)

Books for Study:

1. Sathya Prakash - Mathematical Physics – S.Chand & Sons, Reprint 2006.
2. P.N. Arora, Sumeet Arora – Comprehensive Statistical Methods – S. Chand Publication, 2012.
3. Guptha Kumar - Classical Mechanics – Pragathi Prakashan, 2008.
4. J Medhi - Statistical Methods: An Introductory Text - New age International Publications, 2013.
5. N G Das – Statistical Methods- McGraw-Hill Companies, 2018.

Reference Books:

1. B.D.Gupta – Mathematical Physics, 3rd Edition – Vikas Publishing House Pvt. Ltd., 2007.
2. B.S.Rajput – Mathematical Physics – Pragati Prakashan Publication, 2005.
3. H.K.Dass – Mathematical Physics - S.Chand and Co. Ltd., 2007.
4. Herbert Goldstein – Classical mechanics – Narosa Publications, 2001.
5. H.K.Dass -Statistical mechanics - S.Chand and Co. Ltd., 2014.

UEPHE20 – Elective III A: MICROPROCESSOR 8085

Year: III	Course Code: UEPHE20	Title of the Course: Elective III A: Microprocessor 8085	Course Type: Theory	Course Category: Core	H/W 4	Credits 5	Marks 100
Sem: VI							

Course Objectives

1. To provide a basic knowledge about computer language in binary system
2. To understand the fundamental concepts of conversion of binary into decimal and hexa decimal systemS
3. To have a knowledge about basics logic gates and Flip flops
4. To familiarize with the concepts of Registers and multiplexers
5. To give a knowledge about the basics of ROM and RAM
6. To understand the concept of microprocessor bus structure and architecture of 8085.

Course Outcomes (CO)

The learners will be able to

1 Develop an ability to convert from binary into decimal and hexa decimal system
2 Provide a clear internal behavior of a basic logic gates
3 Explain the principles of registers and the block diagram of multiplexers
4 Provide a comprehensive understanding about the usage of ROM and RAM and make the students to differentiate the working process of ROM and RAM.
5 Enable the learners to get an in-depth knowledge in microprocessor and how to execute an instruction using processor.

CO	PO					
	1	2	3	4	5	6
CO1	M	H	H	L	H	H
CO2	M	M	H	M	H	L
CO3	L	M	M	M	H	H
CO4	M	H	H	H	M	L
CO5	L	M	H	M	H	H

CO	PSO					
	1	2	3	4	5	6
CO1	M	H	L	M	H	L
CO2	H	M	L	L	M	H
CO3	M	H	L	M	H	M
CO4	H	M	M	H	L	H
CO5	H	L	M	M	H	L

(Low- L, Medium - M, High - H)

Course Syllabus

Unit I: Digital Fundamentals and Architecture of 8085   (14 hours)

  1.1 Binary and Hexa decimal system – Representation of negative numbers (K1,K3)
  1.2 Binary coded decimal and basic logic gates – High impedance state (K2,K3)
  1.3 D flip flop and D latches – Registers– Multiplexers and Demultiplexers (K2,K3,K4)
  1.4 ROM and RAM – Microprocessor as CPU –Input and output unit (K2,K3,K4)
  1.5 System and Bus structure – Execution of an instruction (K2,K3,K4)
  1.6 Block diagram of Architecture of 8085 – Internal Registe – Flag -ALU.(K3,K4)

Unit II: Instruction Sets of 8085   (14 hours)

  2.1 Machine language and assembly language (K3,K4)
  2.2 Programmer's model of 8085 (K4)
  2.3 Data transfer instructions I – Arithmetic, logic and special instructions (K2,K3,K4)
  2.4 Assembly language to Hex code – Data transfer instruction II (K2,K3,K4)
  2.5 Branch instructions – Stack and stack related instructions (K3,K4)
  2.6 I/O and Machine control instructions - 8085 Addressing modes (K2,K4)

Unit III: 8085 Instruction Timings   (14 hours)

  3.1 Introduction on 8085 instruction timings (K2,K3,K4)
  3.2 Memory read cycle (K3,K4)
  3.3 Memory Write cycle (K3,K4)
  3.4 Wait states – Halt state (K2)
  3.5 Timing diagrams for some instructions (MOV, MVI, LXI, STA, DCX)
  3.6 Delay calculations. (K3,K4)

Unit IV: Memory and I/O Interface   (14 hours)
  4.1 Memory interface basics (K1,K2)
  4.2 Demultiplexing address/data bus (K1,K3)
  4.3 Generating control signals – ROM / EPROM interface (2K X 8 EPROM, 4K X 8 ROM) (K1, K3)
  4.4 RAM interface (2K X 8 RAM interface, 2K X 8 RAM interface using Decoders) (K1, K4)
  4.5 IN instruction and its timing diagram – Out instruction and its timing diagram (K2,K3)
  4.6 Memory mapped I/O –difference between Memory Mapped I/O and I/O Mapped I/O (K3,K4)

Unit V: Interrupts (14 hours)

5.1 Introduction – INTR and INTA – RST 5.5, RST 6.5, RST 7.5 AND TRAP (K1,K3,K4)

5.2 Triggering levels – Priority levels (K2,K3,K4)

5.3 Programmable Peripheral Interface 8255(K4)

5.4 Simple programs- code conversion- 8 bit addition, subtraction (K3,K4)

5.5 Multiplication and division (K3,K4)

5.6 Arranging number in ascending and descending orders. (K3,K4)

Book for Study:

1. V.Vijayendran – Fundamentals of Microprocessor 8085 – Edition 2006

Books for Reference:

1. Ramesh Gaonkar – Microprocessor Architecture, Programming and Applications with 8085 – Penram International Publishing Private Limited.
2. Malvino – An Introduction to Microprocessor – Tata McGraw Hill Publication, 3rd Edition.
3. B. Ram – Fundamentals of Microprocessor and Microcomputer – Dhanpat Raj Publisher.
4. Ajit Pal – Microprocessor Principle and Applications – Tata McGraw Hill Publication.

USPHAn20 - SKILL BASED ELECTIVE: EVERYDAY PHYSICS

Year/ Semester 2020	Course Code	Title of The Course	Course Type	Course Category	H/ W	Credits	Marks
SEM: I/II	USPHAn20	Everyday Physics	Theory	SBE	2	-	60

Course Objectives

1. To make students aware of the concepts of Physics involved in day-to-day life.

2. To impart knowledge on basics of Electricity.

3. To learn safety precautions in handling electrical appliances.

4. To study the principles domestic electric appliances.

Course Outcomes (CO):

1. Appraise the importance of Physics in daily life.

2. Apply the knowledge to identify the components used in direct current machines

3. Describe the difference between alternating current and direct current.

4. Explain Electrical safety measurements

5. Examine the working of basic household appliances

CO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	M	M	H	H	L
CO2	M	H	L	L	M	H
CO3	H	L	H	H	M	L
CO4	M	L	H	M	M	L
CO5	M	M	H	M	L	H

(Low - L, Medium – M, High - H)

Unit I: Laws of motion

1.1 Velocity – Acceleration – Force (K1,K2)

1.2 Momentum - Law of Conservation Momentum (K1,K2)

1.3 Newton's Law's of Motion (K3,K4)

1.4 Construction and Working of Aero planes (K3,K4)

1.5 Jet Planes – Rockets (K2,K3)

1.6 Relative Velocity - Apparent change in the velocity when trains move in the same and Opposite Directions. (K2,K3)

Unit II: Circular motion

2.1 Circular Motion - Centripetal Force and its Applications (K3,K4)

2.2 Centrifugal Force (K1.K2)

2.3 Motion of a Cyclist along a Circular Path and Reason for Bending (K3,K4)

2.4 Centrifuge and its Applications (K3,K4)

2.5 Escape velocity – Orbital velocity – Parking orbits (K2,K3)

Unit III: Semi-conductors

3.1 Energy – Law of Conservation Energy (K2,K3)

3.2 Basic concepts of atom- atomic number – mass number - isotopes - Nuclear Fission (K3,K4)

3.3 Chain reaction - Nuclear fusion (K2,K3)

3.4 Reactions Taking Place in Sun And Stars – Carbon nitrogen cycle – Proton – Proton cycle (K3,K4)

3.5 Semi conductors – doping – P-type n-type – semi conductor diode (K2,K3)

3.6 Light Emitting Diode (LED) and its Application - Seven segment display.(K3,K4)

Unit IV: Electricity

4.1 Current – Voltage – Ohm's law (K1,K2)

4.2 Photo Electric Effect (K2)

4.3 Principle, Construction and Working of Solar Cell (K3,K4)

4.4 Description and working of Emergency Lamp (K3,K4)

4.5 Sodium Vapour Lamp - Mercury Vapour Lamp. (K3,K4)

Unit V: House Wiring Accessories

5.1 House Wiring Accessories - Switches –Types of Switches (K1,K3,K4)

5.2 Lamp Holders – Types of Lamp Holders (K3,K4)

5.3 Ceiling Roses - Socket Outlets (K2)

5.4 Plugs – Wires and Cables (K1,K2)

5.5 Types of Wiring System (Tree And Distribution System) (K3,K4)

5.6 Supply of Electricity to Homes – Fuse – Earthing (K3,K4)

Books for Study and Reference:

1. M Arul Thalapathi - Basic and Applied Electronics – Com teck Publishers, 2005.

2. Dr. Prem Kumar – Basic Electrical and Electronics Engineering – Anuradha Publications, 2016.

3. Brijilal & Subramaniyam.N. - Properties of Matter, 1st Edition - Vikas Publication House, New Delhi, 2001.

4. R.Murugeshan – Modern Physics – S.Chand Publication – Reprint 2007.

USPHB320 - SKILL-BASED ELECTIVE: ELECTRICAL APPLIANCES - I

Year/ Semester 2020-2021	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: III	USPHB320	Skill-Based Elective: Electrical Appliances - I	Theory	-	2	-	60

Course Objectives

1. To give introduction to different electrical appliances.
2. To make the students of other discipline to understand the day-to–day applications of Physics.
3. To make the students apply the concepts of Physics and its application in electrical appliances.

Course Outcomes (CO)

1. Learn the effect of electric current and Safety precautions to be taken when working with electricity.
2. To Study the colour code for insulation wires
3. Study about supply of electricity to homes.
4. Study about different types of lamps and the behaviour of Lamps in series and lamps in parallel connection.
5. Study the construction and working of domestic appliances.

CO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	M	M	H	H	L
CO2	M	M	H	H	M	H
CO3	H	M	L	H	M	L
CO4	M	H	H	M	M	M
CO5	M	L	H	M	H	L

(Low - L, Medium – M, High - H)

Unit I: Electric Current

1.1 Effects of electric current (K1,K2)
1.2 Safety precautions to be taken when working with electricity (K1,K2)
1.3 Causes of fire on electrical appliances (K1,K2)
1.4 Precautions and remedial measures (K1,K2)
1.5 Fuse (K1,K2)
1.6 Earthing (K2,K3)

Unit II: AC and DC

2.1 AC and DC (K1,K2,K3)
2.2 Single phase and three phase connections (K3,K4)
2.3 RMS and peak values (K2,K3)
2.4 Star and delta connection, overloading (K3,K4)
2.5 Earthing and short circuiting (K2,K3)
2.6 Colour code for insulation wires (K1,K2)

Unit III: Electrical Accessories

3.1   House Wiring Accessories (K1,K2)
3.2   Switches, Types of Switches and circuit breaker (K1,K2,K3)
3.3   Lamp Holders, Types of Lamp Holders (K1,K2,K3)
3.4 Ceiling Roses, Socket Outlets, Plugs (K2,K3)
3.5   Wires and Cables (K1,K2)
3.6   Types of Wiring System (Tree And Distribution System)- Supply of Electricity to Homes (K3,K4)

Unit IV: Lamps

4.1 Light effect (K1)
4.2 Working of electric bulb (K1,K2)
4.3 Carbon Arc lamps (K1,K2)
4.3 SodiumVapour lamp (K1,K2,K4)
4.4 MercuryVapour lamp (K1,K2,K4)
4.5 Grouping of lamps: Lamps in series and lamps in parallel (K1,K3)

Unit V: Domestic appliances

5.1 Construction and working of domestic appliances (K1)
5.2 Electric iron box (K2,K3,K4)
5.3 Immersion heater (K2,K3)
5.4 Electric stove (K2,K3,K4)
5.5 Washing machine (K2,K3)
5.6 Air conditioner (K2,K3)

Books for Study and Reference:

1. Dr.P.Mani – A Textbook of Engineering Physics – Dhanam Publications, Chennai, 2011.
2. M.L.Anwani – Basic Electrical Engineering – DhanpatRai and Co., NaiSarak, Delhi, 2009.

USPHC420 - SKILL-BASED ELECTIVE: ELECTRICAL APPLIANCES - II

Year/ Semester 2020-2021	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: IV	USPHC420	Skill-Based Elective: Electrical Appliances - II	Theory	-	2	-	60

Course Objectives

1. To give introduction to different electrical appliances.
2. To make the students of other discipline to understand the day-to–day applications of Physics.
3. To make the students apply the concepts of Physics and its application in electrical appliances.

Course Outcomes (CO)

1. Learn the importance of passive components and charges.
2. To Study the behaviour of resistance and capacitance
3. Study the applications of electric and magnetic fields.
4. Study the behaviour electrical appliances like inverter, UPS and lamps.
5. Study the construction, working and applications of domestic appliances.

CO	PO					
	1	2	3	4	5	6
CO1	M	M	L	H	H	H
CO2	M	M	H	H	M	L
CO3	H	M	L	H	M	H
CO4	M	H	H	M	M	M
CO5	H	L	H	M	L	H

(Low - L, Medium – M, High - H)

Unit I: Passive Components and Charges

1.1 Resistance (K1,K2)
1.2 Resistors in series and in parallel (K3,K4)
1.3 Capacitance (K1,K2)
1.4 Capacitors in series and in parallel (K3,K4)
1.5 Electrical Charge (K1,K2)
1.6 Current – Electrical Potential (K1,K2,K3)

Unit II: Electric Circuit

2.1 Ohm's law (K1,K2)
2.2 Galvanometer, Ammeter (K1,K2)
2.3 Voltmeter and Multimeter (K1,K2)
2.4 Analog and Digital (K2)
2.5 Electrical Energy - Power – Watt – kWh (K3,K4)
2.6 Consumption and electrical power (K2)

Unit III: Electricity and Magnetism

3.1 Electromagnetic Induction (K1,K2)
3.2 Self induction and Mutual inducation (K3,K4)
3.3 Electromagnets (K1,K2)
3.4 Chokes (K1,K2)
3.5 Transformers (K3,K4)
3.6 Applications - Electric bell (K3,K4)

Unit IV: Electrical Appliance

4.1 Inverter – UPS (K1,K2)
4.2 Generator and Motor (K1,K2,K3,K4)
4.3 Different types of windings (K1,K2)
4.4 Fluorescent lamps (K3,K4)
4.5 Street Lighting – Flood lighting (K1,K2,K3)
4.6 Electrical Fans (K1,K2)

Unit V :Domestic Appliances

5.1 Wet Grinder – Mixer (K1,K2)
5.2 Stabilizer – Refrigerator (K1,K2,K3,K4)
5.3 Electromagnetic waves (K1,K2)
5.4 Applications – Microwave oven (K2,K3)
5.5 Television (K1,K2,K3)
5.6 Wi-Fi- Modem – LCD (K1,K2,K3)

Books for study:

1. Theraja B.L. Basic Electronics – S.Chand and Co. Pvt. Ltd., 2000.
2. A K Theraja- A text book in Electrical Technology- S chand& Co, 2014
3. Sedha R.S. – Text book of Applied Electronics -S.Chand and Co. Pvt. Ltd., 2000.

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: VI	USPHD520	Skill Based Elective: Physics For Competitive Examinations	Theory	Elective	2	-	60

Learning Objectives

1. To make the students familiar with problems in Physics.
2. To prepare the students for various Entrance examinations.
3. To know the various applications of physics.
4. To summarize important topics in physics.

Course Outcomes (CO)

The learners will be able to

1. To know the basic laws in Physics and its applications
2. To learn the principle of optics and study the light experiments like Newton's ring and Air wedge.
3. To study and evaluate the problems in Electricity and magnetism.
4. To give an extended knowledge in atomic physics and nuclear physics to solve the problems.
5. To know the application of semiconductor materials in various electronic circuits.

CO	PO					
	1	2	3	4	5	6
CO1	M	L	M	H	M	H
CO2	L	M	L	H	M	H
CO3	H	M	H	L	M	H
CO4	M	H	H	M	H	M
CO5	M	M	L	M	H	H

(Low - L, Medium – M, High - H)

Unit I: Mechanics and Waves

1.1 Newton's laws of motion and its application Conservative forces and frictional forces -Centrifugal and Coriolis forces (K1,K2,K3,K4)

1.2 Kepler's laws – Escape velocity and artificial satellite - Gravitational Law and field. (K1,K2)

1.3 Motion under a central force - Moments of Inertia and products of Inertia - Principal moments and axes (K2,K3)

1.4 Rigid body motion, fixed axis rotations - Bernoulli's theorem – Elasticity (K3,K4)

1.5 Waves and Simple Harmonic motion – Lissajous figures- Damped and Undamped oscillators (K1,K2,K3,K4)

1.6 Wave equation -Resonance – Doppler effect in sound- Ultrasonics and applications. (K1,K3,K4)

Unit II: Light

2.1 Thick lens formulae - power of a lens - Fermat's Principle – Rayleigh criterion. (K1,K2)

2.2 Resolving power of a prism and grating - Conditions for constructive and destructive interferences. (K3,K4)

2.3 Newton's rings - Calculation of radius of curvature – Air wedge – Calculation of bandwidth. (K2,K3)

2.4 Fresnel and Fraunhofer diffraction (K3,K4)

2.5 Linear, circular and elliptic polarization - double refraction and optical rotation (K1,K2,K3)

2.6 Specific rotatory power of an optically active substance (K3,K4)

Unit III: Electricity and Magnetism

3.1 Electric Charge - Coulomb law – Gauss law – Electric potential (K3,K4)
3.2 Capacitors – Energy stored in a capacitor–Dielectric and polarization (K2,K3)
3.3 Ampere's law - BiotSavart law – Faraday's laws of electromagnetic induction (K1,K2)
3.4 Self-inductance – Mutual inductance – Alternating currents. (K3,K4)
3.5 Growth and decay of current and charge in LR circuit – RC circuit – LCR circuit. (K3,K4)
3.6 Magnetic permeability and susceptibility, Dia, para and ferromagnetism, Measurement of susceptibility, Hysteresis loop. (K1,K2)

Unit IV: Atomic and Nuclear Physics

4.1 Atomic physics: X-ray spectrum – Compton Effect (K1,K2)

4.2 Compton wavelength Photoelectric effect (K2,K3,K4)

4.3 Calculation of DeBroglie wavelength of electrons (K2,K3,K4)

4.4 Wave velocity and group velocity for DeBroglie waves (K3,K4)

4.5 Uncertainty principle - Pauli Exclusion Principle (,K3,K4)

4.6 Mass defect - Binding energy – Radioactive disintegration law – half life – Q value of nuclear reactions – Nuclear fission and fusion (K1,K2,K3,K4)

Unit V: Electronics

5.1 Semiconductors - Rectifiers (K2)

5.2 Zener diode as voltage regulator (K2,K3,K4)

5.3 Transistor as an Amplifiers – Relation between α and β (K3,K4)

5.4 Feedback amplifier – Oscillators (K1,K2)

5.5 Amplitude and frequency modulation (K2,K3)

5.6 OR, AND, NOR and NAND gates – OP amps (K3,K4)

Books for Study:

1. D S Mathur – Mechanics – S. Chand Publication, 2001.

2. Brijlal Subramaniyam - Properties of Matter (Unit I) – Eurasia Publication House Pvt. Ltd., 2001

3 Nelkan and Parker – Advanced Level Physics – Heinemann Longmann Education International Publication, 1995. (Unit II)

4. C.L Arora - Simplified Course in B.Sc Physics – S.Chand, 1999. (Unit III)

5.   S.L.Kakani – Objective Physics – S.Chand and co. Ltd., New Delhi, 2001. (Unit IV)

6.   R.S.Sedha – Basic Electronics – S.Chand Publications, New Delhi, 2006 (Unit V)

7.   Dr.N.K.Nayyar - Unique Quintessence of physics – Unique Publishers, 2010.

Books for Reference:

1.   Dr.Surekha Singh – UGC CSIR/NET/JRF/SLET – UpkarPrakashan Publishers.

2.   Karen Cummings, Priscilla Laws, Edward Redish, Patrick Cooney - Understanding Physics, 6th Edition – Wiley Student Education, 2005.

3.   The Pearson Guide to Objective Physics – S.Chand Publishing House, 2007.

4.   Sathya Prakash Arya – Objective Physics – MTG Books Publishers, 2007.

5.   S.L.Kakani - Objective Physics, 10th Edition - S.Chand Publishing House, 2007.

6.   K.C.Jain, C.LArora – Numerical Problems in Physics - S.Chand Publishing House, 2005

USPHE620 – SKILL BASED ELECTIVE: MOBILE COMMUNICATION

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: VI	USPHE620	Mobile Communication	Theory	SBE	2	-	60

Course Objectives

1. To make the students acquire knowledge about mobile phones.
2. To have the basic understanding of working of cell phones.
3. To know the various applications radio propagation.
4. To understand the multiple access techniques in communication.

Course Outcomes (CO)

The learners will be able to

1. To know the basics generations of mobile communication
2. To learn the cellular concept and techniques
3. To study the mobile radio propagation and concepts of diffraction, scattering and interference.
4. To attain knowledge in cell coverage for signal and traffic.
5. To understand the concepts of multiple access techniques.

CO	PO					
	1	2	3	4	5	6
CO1	M	M	L	M	H	H
CO2	M	L	H	M	M	H
CO3	L	M	L	H	M	H
CO4	M	H	M	H	L	L
CO5	L	M	M	M	L	H

(Low - L, Medium – M, High - H)

Unit I: Introduction to Cellular Mobile Communication

1.1 Zero generation - push to talk (K1,K2)

1.2 First generation – Advanced mobile phone system (K2,K3)

1.3 Second generation – Advantages and disadvantages (K3,K4)

1.4 Third generation (K1,K2,K3)

1.5 Fourth generation (K3,K4)

Unit II: Cellular Concept

2.1 Frequency Reuse concept (K1,K2)

2.2 Channel Assignment (K1,K2)

2.3 Handoff technique (K2,K3)

2.4 Trunking and Grade of service (K3,K4)

2.5 Cell splitting – Cell sectoring (K2,K3)

Unit III: Mobile Radio Propagation

3.1 Free Space propagation model (K1,K2)

3.2 Fraunhofer region (K1,K2)

3.3 Properties of Radio waves (K3,K4)

3.4 Concept of Reflection (K1)

3.5 Concept of Diffraction (K3,K4)

3.6 Scattering – Interference (K3,K4)

Unit IV: Cell coverage for Signal and Traffic

4.1 Introduction - Cell coverage for Signal and Traffic (K3,K4)

4.2 Propagation in near in distance (K2,K3)

4.3 Curves for near in propagation (K2,K4)

4.4 Long distance propagation (K3)

4.5 Mobile to Mobile Propagation (K3,K4)

4.6 Doppler shift. (K3,K4)

Unit V: Multiple Access Techniques

5.1 Introduction-Multiple Access Techniques (K1,K2)

5.2 FDMA (K3,K4)

5.3 TDMA (K4)

5.3 CDMA-Synchronous CDMA (K1,K2,K3,K4)

5.4 Soft handover – Hard handover (K1,K2)

5.5 Roaming – SDMA (K3,K4)

Books for Study:

1 G.K.Behera – Lopamudra: Mobile Communication – Sci-tech Publication
   Pvt.Ltd.,2009. (Unit I & V)
2 V.Jeyasri Arokiamary – Mobile Communication - Technical Publications, Pune,
   2008. (Unit II & III.)
3 G.Radha Krishna – Cellular and Mobile Communications – BS Publications, 2010.
   (Unit IV)

Books for Reference:

1. T.G. Palanivelu, R.Nakkeeran - Wireless and Mobile Communication - PHI Learning
   Pvt Ltd., 2009.