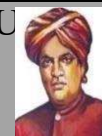




MANONMANIAM SUNDARANAR UNIVERSITY - TIRUNELVELI
PROGRAMMES



OPEN AND DISTANCE LEARNING (ODL) PROGRAMMES

(FOR THOSE WHO JOINED THE PROGRAMMES FROM THE ACADEMIC YEAR 2023-2024 ONWARDS)

B.SC PHYSICS

Semester	Course	Title of the Course	Course Code	Course Type	Credits
V	Core-IX	Electricity Magnetism and Electromagnetism	JMPH51	Theory	4
	Core-X	Atomic and Nuclear Physics	JMPH52	Theory	4
	Core-XI	Analog and Communication Electronics	JMPH53	Theory	4
	Core-XII	Laser Physics	JMPH54	Theory	2
	Elective-V	Python Programming and Basics of AI and Data Science	JEPH51	Theory	3
	Core- Practical V	Physics Practical-V	JMPHP5	Practical	3
	Core-Practical VI	Physics Practical-VI	JMPHP6	Practical	3
	NMC/Substitute Paper	Modern Physics	JNPH51	Theory	2

ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM	
UNIT-I	CAPACITORS AND THERMOELECTRICITY Capacitor - principle - capacitance of a parallel plate capacitor (with and without dielectric slab)-effect of dielectric-Carey Foster bridge-temperature coefficient of resistance – Seebeck effect - Laws of thermoelectric emf - Peltier effect - Thomson effect-Thermoelectric diagrams and their uses - thermodynamics of thermocouple.
UNIT-II	MAGNETIC EFFECT OF CURRENT Biot and Savart's law-magnetic induction due to circular coil -force on a current element by magnetic field - force between two infinitely long conductors - torque on a current loop in a field - moving coil galvanometer - damping correction - Ampere's circuital law - differential form – divergence of magnetic field - magnetic induction due to toroid.
UNIT-III	MAGNETISM AND ELECTROMAGNETIC INDUCTION Magnetic induction B - Magnetization M - relation between B, H and M - magnetic susceptibility- magnetic permeability- experiment to draw B-H curve - energy loss due to hysteresis - importance of hysteresis curve – Faraday and Lenz laws - vector form - self-inductance -coefficient of self-inductance of solenoid - Anderson's method - mutual inductance - coefficient of mutual inductance between two coaxial solenoids - coefficient of coupling.
UNIT-IV	TRANSIENT AND ALTERNATING CURRENTS Growth and decay of current in a circuit containing resistance and inductance-growth and decay of charge in a circuit containing resistance and capacitor-growth and decay of charge in an LCR circuit (expression for charge only)-peak, average and rms values of ac -LCR series-parallel circuits-resonance condition-Q factor -power factor.

UNIT-V	MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES Maxwell's equations in vacuum, material media-physical significance of Maxwell's equations- displacement current- plane electromagnetic waves in free space-velocity of light-Poynting vector-electromagnetic waves in a linear homogeneous media-refractive index.
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TEXT BOOKS	1. Murugesan. R., - Electricity and Magnetism, 8thEdn, 2006, S. Chand and Co, New Delhi. 2. Sehgal D. L., Chopra K. L, Sehgal N.K., -Electricity and Magnetism, 3. Sultan Chand and Sons, New Delhi. 4. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition. 5. National Publishing Co., Meerut.
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ATOMIC AND NUCLEAR PHYSICS

UNIT-I	VECTOR ATOM MODEL: Introduction – Vector atom model – electron spin – spatial quantisation – quantum numbers associated with vector atom model. Coupling Schemes L-S and j-j coupling. Pauli's Exclusion Principle. Magnetic dipole moment due to orbital motion and spin motion of the electron – Bohr magneton – Stern-Gerlach experiment.
UNIT-II	ATOMIC SPECTRA: Spectral term and notations–Zeeman Effect – quantum mechanical explanation of normal Zeeman effect. Anomalous Zeeman Effect–quantum mechanical theory–fine structure of sodium D-lines. Paschen-Back Effect, Stark Effect.
UNIT-III	STRUCTURE OF NUCLEI: General Nuclear Properties – charge, size, shape, mass, density, spin, parity. Mass defect and Binding energy – Binding energy curve. Nuclear force – characteristics of nuclear forces. Nuclear Models – Liquid Drop Model – similarities between nucleus and liquid drop – mass formula. Shell Model-magic numbers–evidences that led to shell
UNIT-IV	RADIO ACTIVITY: Discovery of radioactivity – exponential decay law–half-life, mean-life. Natural and Artificial radio activity. Properties of alpha rays, beta rays and gamma rays – Gamow's theory of alpha decay (qualitative study) – Geiger- Nuttal law – beta decay spectra
UNIT-V	Nuclear Reactor, Accelerator and Detectors: Nuclear fusion–Nuclear fission. Nuclear Reactor – construction and working – radio isotopes and its applications. Charged Particle Accelerators - Cyclotron –Detectors of Nuclear Radiation – Geiger Muller Counter – Scintillation Counter. Nuclear facilities in India.

TEXT BOOKS	1. R. Murugesan, Modern Physics, S. Chand and Co. (All units) (Units I and II-Problems) 2. Brijlal and N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units) 3. J.B. Rajam, Modern Physics, S. Chand and Co. 4. Sehgal and Chopra, Modern Physics, Sultan Chand, New Delhi 5. Arthur Beiser– Concept of Modern Physics, Mc Graw Hill Publication, 6th Edition.

ANALOG AND COMMUNICATION ELECTRONICS	
UNIT-I	DIODES: Diode characteristics –half wave rectifier, center tapped and bridge full wave rectifiers, calculation of efficiency and ripple factor - clipper circuits, clamping circuits. DC power supply: Block diagram of a power supply, Zener diode as voltage regulator.
UNIT-II	TRANSISTOR AMPLIFIERS: Transistor configurations: CB, CE and CC modes – I-V characteristics and hybrid parameters – DC load line–Q point self-bias-RC coupled CE amplifier–power amplifiers–push pull amplifiers –tuned amplifiers.
UNIT-III	TRANSISTOR OSCILLATORS: feedback amplifier - principle of feedback, positive and negative feedback - voltage and current gain – advantages of negative feedback-Barkhausen ‘scriterion-Transistor oscillators: Hartley, Colpitts, Phase shift oscillators.
UNIT-IV	OPERATIONAL AMPLIFIERS AND TIMER: Differential amplifiers – OP-AMP characteristics – IC 741 pin configuration – inverting and non-inverting amplifiers– summing and difference amplifiers – differentiator and integrator –IC 555 pin configuration-a stable multivibrator (square wave generator) – monostable vibrator

UNIT-V	MODULATION AND DEMODULATION: Theory of amplitude modulation – frequency modulation – comparison of AM and FM – phase modulation – pulse width modulation – pulse modulation systems: PAM, PPM, and PCM– Demodulation: AM and FM detection.
TEXTBOOKS	1. V.K. Mehta- Principles of Electronics, S. Chand and Co. Ltd., 2004. 2. V.Vijayendran-Integrated Electronics, S. Vishwanathan Publishers, Chennai. 3. B.L. The raja -A Textbook of Electrical Technology. 4. John D. Ryder-Electronic fundamentals and Applications. 5. Malvino- Electronic Principles, Tata Mc Graw Hill.

PYTHON PROGRAMMING AND BASICS OF AI & DATA SCIENCE	
UNITS	COURSE DETAILS
UNIT-I	BASICS -Python Introduction–Tokens: literals, Variables, reserved Words, Operators, Delimiters and Escape sequences - Standard Data Types -Expressions –Comments in Python – Input and Output functions -Simple Physics formula-based programming in Python.
UNIT-II	CONTROL STATEMENTS : Control Flow Statements and Syntax with examples-Looping statements-string operations-LISTS: List-list slices-list methods - list loop–Tuples assignment– sets- Dictionaries.
UNIT-III	FUNCTIONS : Definition and types- Passing parameters to a Function- Scope–Type Conversion-Passing Functions to a Function- Modules-Standard Modules–Inbuilt Function-Scope of Variables.
UNIT-IV	OBJECT ORIENTED FEATURES : Introduction-Defining Classes-Public and private Data member- Creating Object-Accessing class members-Using objects. Constructors-Destructors-Introduction of simple Inheritance – Introduction of simple Polymorphism- ERROR HANDLING : Run Time Errors- Exception Model
UNIT-V	ARTIFICIAL INTELLIGENCE AND DATA SCIENCE : Introduction-History of AI-Applications of AI–Defining Algorithm– A*Algorithm. DATASCIENCE : Introduction–Defining Data, Information and Data structure- Basic concept of Probability and Statistics.
TEXT BOOKS	1. Fundamental of Pythons-First program by Kenneth A. Lambert 2. Python Programming-A modular approach by pearson-sheetalTaneja 3. Handson AI for beginners by Patric D. Smith Introduction to Data Science by Dr. Sushil Dohare, Dr. V SelvaKumar Sachin Raval

COURSE	FIFTH SEMESTER–CORE PRACTICAL 5
COURSE TITLE	PHYSICS PRACTICAL V
GENERAL PHYSICS EXPERIMENTS-I	
Minimum of Six Experiments from the list: 1. Potentiometer–Calibration of Voltmeter (High Range) 2. Spectrometer–Grating-Normal Incidence-Wavelength of Mercury spectral lines. 3. Spectrometer–Grating-Minimum Deviation-Wavelength of Mercury spectral lines. 4. Young ‘s Modulus–Elliptical Fringes 5. Bi-prism–Determination of Wavelength. 6. Thevenin ‘s and Norton‘s Theorem verification 7. Y–by Cornus method. 8. Forbe ‘s method–Thermal conductivity of a metal rod. 9. Spectrometer–(I-d) curve. 10. Spectrometer–(i-i') curve. 11. Ballistic Galvanometer–High resistance by leakage 12. Desauty ‘s Bridge–Determination of C, C1& C2 in series and parallel	

COURSE	FIFTH SEMESTER–CORE PRACTICAL 6
COURSE TITLE	PHYSICS PRACTICAL VI
ELECTRONICS EXPERIMENTS-I	
Minimum of Six Experiments from the list: 1. V-I Characteristics of Junction diode and Zener diode 2. Zener diode–voltage regulations bridge rectifier 3. Dual power supply using IC ‘s 4. OPAMP–Adder & Subtractor 5. OPAMP–Low Pass & High Pass Filter 6. Characteristics of a transistor– (CE mode) 7. RC coupled CE transistor amplifier-single stage. 8. Colpitt ‘s oscillator-transistor. 9. FET- characteristics. 10. UJT–characteristics 11. Astable multivibrator using 555 timer 12. Bistable multivibrator–555timer	

MODERN PHYSICS	
UNIT-I	Waves and vibrations Waves- Generation of waves by vibrating particles- Types of wave motion, transverse, and longitudinal wave motion-Simple harmonic motion- Vibration of spring mass system.
UNIT-II	Electrostatics Coulomb 's Law –Intensity of Electric Field- Intensity due to a Point Charge- Electric Flux –Electric Potential-Electric Potential due to a Point Charge
UNIT-III	Electricity Ohm 's law-Resistance of a conductor-specific resistance-Heating effect of current and concept of electric power.
UNIT-IV	Semiconductor physics Energy bands-intrinsic and extrinsic semiconductor-p-n junction diode – characteristics of diode.
UNIT-V	Super conductivity Phenomenon of super conductivity-Type I super conductor-Type II super conductor – applications of super conductor.
TEXT BOOKS	1. Modern Physics, R. Murugesan & Kiruthiga Sivaprasath, S. Chand & Co. 2. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan) 3. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)

16. LASER PHYSICS

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Objective:

- To introduce the physical and engineering principles of laser operation and their applications.

Unit 1: Fundamentals of LASER

Spontaneous emission – Stimulated emission – Meta stable state –Population inversion – Pumping – Laser Characteristics

Unit 2: Production of LASER

Helium – Neon Laser – Ruby Laser – CO₂ Laser – Semiconductor Laser

Unit 3: Industrial Applications of LASER

Laser cutting – Welding – Drilling – Hologram – Recording and reconstruction of hologram

Unit 4: Lasers in Medicine

Lasers in Surgery – Lasers in ophthalmology – Lasers in cancer treatment

Unit 5: Lasers in Communication

Optic fibre communication – Total internal reflection – Block diagram of fibre optic communication system – Advantages of fibre optic communication.

Books for study:

1. N. Avadhanulu , *An introduction to LASERS*, S. Chand & Company, 2001.

Books for References:

1. William T. Silfvast, *Laser fundamentals*, University Press, Published in South Asia by Foundation books, New Delhi, 1998
2. K. Thyagarajan and A.K. Ghatak, *LASER Theory and Application*, Mc Millan, India Ltd, 1984.