EWING CHRISTIAN COLLEGE, PRAYAGRAJ

(A Christian Minority Institution of Church of North India, Diocese of Lucknow)
&
An Autonomous Constituent PG College of the University of Allahabad
711, Gaughat, Mutthighanj, Prayagraj

TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Prem Prakash Singh

Course Name: B.Sc. **Semester : III**

Paper Name : Wave Motion and Wave Optics **Paper Code : 3 PHYTH 1**

Year: 2021-2022

Lecture No.	Topic
1.	Differential equation of wave motion, wavefront
2.	Plane Progressive wav in fluid and stretched string
3.	Displacement and pressure wave, Intensity and Energy transport in waves
4.	Specific and Acoustic Impedance, characteristic Impedance
5.	Reflection and Transmission coefficient at joint of two media
6.	Superposition, stationery wave and its characteristics
7.	Harmonics and overtones, Modes of Oscillations
8.	Introduction to Interference, essential condition
9.	Deviation of wavefront
10.	Deviation of wavefront
11.	Division of Amplitude
12.	Division of Amplitude
13.	Michelson Interferometer
14.	Multiple beam Interferometry
15.	Present diffraction (Half period zones, Zone Plates)
16.	Diffraction at a straight edge
17.	Diffraction at circular aperture, cornices spiral
18.	Diffraction by single slot and double slot
19.	Plane and concave grating
20.	Raylight Criteria for resolution, resolving power
21.	Resolving power of Grating and Prism
22.	Resolving power of Telescope and Microscope
23.	Introduction of Polarization, Brewster law
24.	Polarization by reflection and refraction, law of malus
25.	Double refraction by uniaxial crystals, Hiegen's theory
26.	Nichol prism and Retardation plates
27.	Production and detection of plane, circular and elliptical polarized light
28.	Babinet compensator, optical rotation
29.	Tresenel's theory of optical rotation
30.	Half shade and biquartz polarimeters

Teacher's Signature

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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Prem Prakash Singh

Course Name: B.Sc. **Semester : II**

Paper Name : Analog and Digital Electronics **Paper Code : 6 COMTH 13**

Year: 2021-2022

Lecture No.	Topic
1.	Band Theory, Semiconductor, Hall effect
2.	P-N Junction, Depletion region, Potential barrier
3.	Forward and Reverse biasing, Diode equation and characteristics
4.	Breakdown Mechanism, Transition and storage capacitors
5.	Zener diode and its characteristics
6.	Rectifiers and their mathematical analysis
7.	Fourier series (Rectifiers)
8.	Filtering by RL, RC and LC circuits
9.	NPN and PNP transistors
10.	Thermal runaway characteristic and parameter in CE
11.	Thermal runaway characteristic in CB and CC configuration.
12.	PET (Construction and Principles of Operation)
13.	PET (characteristics, parameters and application)
14.	External and internal biasing, MOS FET Enhancement mode
15.	MOSFET depletion mode, CMS as switch
16.	Introduction to Number System
17.	Inter-conversion of Number System
18.	1’s and 2’s complement
19.	Different types of codes
20.	Different types of codes
21.	Logic gate
22.	Logic gate, Truth Tale, Boolean function
23.	Venn Diagram, Switching circuits
24.	De-Morgan’s law, Commutative, associates, distribution laws.
25.	Dual and Component of Boolean functions
26.	SOP and POS
27.	Minterms and Maxterms, Karmugh’s Mapping
28.	Simplification of Boolean expression by Boolean laws and K-mapping
29.	Combinational logic circuits
30.	Previous year paper solving and discussion

Teacher’s Signature

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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Prem Prakash Singh

Course Name: B.Sc. **Semester : V**

Paper Name : Advance Electronics **Paper Code : 5 PHYTH 2**

Year: 2021-2022

Lecture No.	Topic
1.	Eber's moll model for PNP and NPN transistors
2.	Saturation parameter for Cut off, saturation and active modes
3.	Hybrid parameters and their inter-relationships
4.	Hybrid equivalent circuits.
5.	AC and DC load line, Biasing of transistor
6.	Amplifier, classification of amplifier
7.	Audio amplifier
8.	RC coupled amplifier
9.	Analysis of law. Medium and high frequency.
10.	Response curve with the help of equivalent circuit.
11.	Current, voltage and power gain
12.	Negative and Positive feedback amplifier
13.	Input and output, impedance and CMRR
14.	Operational Amplifier
15.	Inverting and Non inverting amplifiers
16.	Barkhausen criteria for sustained oscillation
17.	Components of oscillators and their functions.
18.	Hartley oscillator
19.	Calpit's oscillator
20.	Crystal controlled oscillators
21.	Piezoelectric and Magnertostriction effects
22.	Production, Detection and properties of ultrasonics
23.	Block diagram of CRO and its application
24.	Elements of communication
25.	Modulation and its need
26.	Modulation and its type
27.	AM circuit and power
28.	Example problems
29.	Demodulation
30.	Linear Diode detector
31.	Frequency and phase modulation
32.	Difference between AM, FM and PM
33.	Frequency spectrum
34	Introduction to logic family and characteristics
35.	Classification of Logic family
36.	RTL
37.	DTL
38.	TTL
39.	Integrated circuit – Introduction and classification

40.	Monolithic IV
41.	Sequential logic circuit : Flip Flops
42.	Sequential logic circuit – Flip Flops
43.	Counters
44.	Registers
45.	Convertors

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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Prem Prakash Singh

Course Name: B.Sc. **Semester : III**

Paper Name : Wave Motion and Wave Optics **Paper Code : 3 PHYTH 1**

Year: 2021-2022

Lecture No.	Topic
1.	Differential equation of wave motion, wavefront
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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Prem Prakash Singh

Course Name: B.Sc. **Semester : II**

Paper Name : Analog and Digital Electronics **Paper Code : 2 PHYTH 2**

Year: 2021-2022

Lecture No.	Topic
1.	Band Theory, Semiconductor, Hall effect
2.	P-N Junction, Depletion region, Potential barrier
3.	Forward and Reverse biasing, Diode equation and characteristics
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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Prem Prakash Singh

Course Name: B.Sc. **Semester : V**

Paper Name : Advance Electronics **Paper Code : 5 PHYTH 2**

Year: 2021-2022

Lecture No.	Topic
1.	Eber's moll model for PNP and NPN transistors
2.	Saturation parameter for Cut off, saturation and active modes
3.	Hybrid parameters and their inter-relationships
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5.	AC and DC load line, Biasing of transistor
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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Ashutosh Kumar Shukla

Course Name: B.Sc. **Semester : IV, Section 2**

Paper Name : Electromagnetism **Paper Code : 4 PHYTH 1**

Year: 2021-2022

Lecture No.	Topic
1.	Unit II – (Magnetostatics) – Magnetic field, source of magnetic field, definition of magnetic field, Gauss Law (Magnetism)
2.	Magnetic flux, Lorentz force, force on a current carrying conductor and current element, Biot-Savart Law, $\vec{B}$&$_H$
3.	Applications of Biot Savart Law (straight, circular, solenoidal and Torodial current carrying conductors)
4.	Ampere's circuital law – (Integral and differential forms)
5.	Applications of Ampere's circuital law – long straight wire, solenoid etc.
6.	Vector potential, expression for vector potential examples
7.	Lorentz force applications – Cyclotron
8.	Unit III (Electromagnetic induction) - Faraday law of electromagnetic induction – integral and differential form
9.	Self induction, self inductance of a solenoid, mutual induction
10.	Reciprocity theorem, Mutual inductance of two coils in terms of their self inductance
11.	Energy stored in coupled circuits, transformers, transformer losses

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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Ashutosh Kumar Shukla

Course Name: B.Sc. **Semester : VI**

Paper Name : Electromagnetic Theory and Nuclear Physics **Paper Code :6 PHYTH 1**

Year: 2021-2022

Lecture No.	Topic
1.	Unit I – Maxwell's equations and plane wave solution in source free space and dielectrics
2.	Characteristics of electromagnetic waves and propagation of electromagnetic wages in real medium.
3.	Propagation of electromagnetic waves in plasma, dispersion, pointing vector
4.	Poynting theorem and conservation of energy and momentum for a system of charged particles and em fields.

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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Ashutosh Kumar Shukla

Course Name: B.Sc. **Semester : V**

Paper Name : Quantum Mechanics and Spectroscopy **Paper Code : 5 PHYTH 1**

Year: 2021-2022

Lecture No.	Topic
1.	Unit IV – Electromagnetic Spectrum and types of Spectroscopy
2.	Spectra of diatomic molecules – Rotational spectra
3.	Features of rotational spectrum
4.	Rotational constant, HCl and other examples.
5.	Calculation of reduced mass, inter nuclear distance etc. (Rigid Rotator)
6.	Isotopes, Isotopomer, determination of natural abundance from spectrum
7.	Vibration energy levels, zero point energy and Term values
8.	Problems/examples based on force constant
9.	Anharmonic oscillator model and dissociation energy
10.	Non rigid rotator model, rotational constant D and effect of D on rotational levels
11.	Raman effect and Fluorescence stokes and anti stokes lines
12.	Fluorescent lamp, phosphorescence
13.	ESR, Basic principle (Quantitative)
14.	NMR, Comparison of NMR and ESR, chemical shift
15.	Unit – III - Perturbation theory – two cases
16.	Time independent perturbation theory for non-degenerate states
17.	First order correction to energy
18.	Examples – first order correction to energy – linear oscillator (ground state and n^{th} state
19.	Second order non-degenerate perturbation
20.	First order perturbation – energy correction in two fold degenerate case
21.	Application of perturbation theory to start effect.
22.	Splitting of degenerate energy levels of hydrogen atom (n = 2) due to linear stark effect.
23.	Splitting of D line of sodium in weak magnetic field
24.	Perturbation theory to solve helium atom schridinger equation
25.	Identical particles – Introduction
26.	Symmetric and anti-symmetric wave functions - construction
27.	Spin and statistics, Non-interacting identical particles, Pauli exclusion principle
28.	Pauli matrices and related problems.

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TEACHING PLAN

Department : Physics

Name of the Teacher: Dr. Ashutosh Kumar Shukla

Course Name: B.Sc. **Semester : II, Section 4**

Paper Name : Thermal Physics **Paper Code : 2 PHYTH 1**

Year: 2021-2022

Lecture No.	Topic
1.	Unit IV – (Transfer of heat) – Conduction , convection, Radiation steady and variable states, thermal conductivity
2.	Unit IV – (Transfer of heat) – Ractilinear flow of heat in a long ar, temperature gradient, thermal diffusivity.
3.	Unit IV – (Transfer of heat) – Fourier equation of heat flow, Ingen Hausz's experiment
4.	Unit IV – (Transfer of heat) –Periodic flow of heat (Qualitative) Conductivity of earth's crust.
5.	Unit IV – (Transfer of heat) –Radiant energy, Emission and absorption of radiation, prevast's theory, black body radiation.
6.	Unit IV – (Transfer of heat) – Kirchoff's law, characteristics of black body radiation, Wien's displacement law
7.	Unit III – (Thermodynamic relation) –Thermodynamic potentials, Maxwell's relations
8.	Unit III – (Thermodynamic relation) – TdS equations and their applications

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