1.1.3

List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Employability Contents	**Green**	
Entrepreneurship Contents	**Light Blue**	
Skill Development Contents	**Pink**	
Name of the Subjects/Related to all three Components (Employability/ Entrepreneurship/ Skill Development)	**Yellow**	

List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Pure and applied physics*

Programme Name : *B.Sc. (Hon.) Physics*

Academic Year : 2018-19

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	PS/PHY/C-303L	**Digital Systems andApplications**
02.	PS/PHY/C-203	**Electricity and Magnetism**
03.		**Analog Systems andApplications**

विभागाध्यक्ष/H.O.D.
शुद्ध एवं अनुप्रयुक्त भौतिकी विभाग
Dept. of Pure & Applied Physics
गुरु घासीदास विश्वविद्यालय
Guru Ghasidas Vishwavidyalaya
बिलासपुर (छ.ग.)/Bilaspur (C.G.)

Scheme and Syllabus

Subject: Physical Sciences: B.Sc. Hons. 3 (Physics)

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
I	Core-1	PS/PHY/C-101L	Mathematical Physics-I	4	4
	Core -1 Practical	PS/PHY/C-101P	Mathematical Physics-I Lab	2	4
	Core -2	PS/PHY/C-102L	Mechanics	4	4
	Core -2 Practical	PS/PHY/C-P-102P	Mechanics Lab	2	4
	Generic Elective -1 (GE- 1A)	PS/PHY/GE-101	To be opted from the pool*	4	4
	Generic Elective - Practical	PS/PHY/GE-P-101	GE-101 practical as opted	2	4
	Ability Enhancement Compulsory Course (AECC)	PS/PHY/AE-101/EC	English Communication / MIL (Hindi Communication)	4*	4
	ECA	Open elective (Optional)	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
			TOTAL	24	28
II	Core-3	PS/PHY/C-203	Electricity and Magnetism	4	4
	Core -3 Practical	PS/PHY/CP-203	Electricity and Magnetism Lab	2	4
	Core -4	PS/PHY/C-204	Waves and Optics	4	4
	Core -4 Practical	PS/PHY/CP-204	Waves and Optics Lab	2	4
	Generic Elective -2 (GE-IB)	PS/PHY/GE-202/CHM	GE-102 (second course of the same subjected as opted in GE-101	4	4
	Generic Elective - Practical	PS/PHY/GE-P-202/CHM		2	4
	Ability Enhancement Compulsory Course (AECC)	PS/PHY/AE-201/ES	Environmental Science	4*	4
	ECA	Optional elective	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
			Total	24	28
SUMMER Internship: 15 days		Optional elective	Soayam/Swachhta / NSS / Industrial/ others	2	100
III	Core-5	PS/PHY/C-301L	Mathematical Physics-II	4	4
	Core -5 Practical	PS/PHY/C-301P	Mathematical Physics-II Lab	2	4
	Core -6	PS/PHY/C-302L	Thermal Physics	4	4
	Core -6 Practical	PS/PHY/C-302P	Thermal Physics Lab	2	4
	Core - 7	PS/PHY/C-303L	Digital Systems and Applications	4	4
	Core – 7 Practical	PS/PHY/C-303P	Digital Systems	2	4

			&Applications Lab		
	Generic Elective -3 (GEII-A)		To be opted from the pool of GE	4	4
	Generic Elective-Practical			2	4
	Skill Enhancement Course (SEC - 1)		To be opted from the pool of SE courses**	4*	2 (4)
			Total	28	34
IV	Core-8		**Mathematical Physics III**	4	4
	Core -8 Practical		**Mathematical Physics-III Lab**	2	4
	Core -9		**Elements of Modern Physics**	4	4
	Core -9 Practical		**Elements of Modern Physics Lab**	2	4
	Core - 10		**Analog Systems and Applications**	4	4
	Core -10 Practical		**Analog Systems & Applications Lab**	2	4
	Generic Elective -4 (GEII-B)		To be opted from the pool of Generic courses	4	4
	Generic Elective-Practical			4	4
	Skill Enhancement Course (SEC -2)		To be opted from the pool of SE courses	4*	2 (4)
			TOTAL	28	34

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PHYSICS-C VII: DIGITAL SYSTEMS AND APPLICATIONS
(Credits: Theory-04, Practicals-02)Theory: 60 Lectures

Objectives:
Discuss the combinational logic circuits like Full Adder, Subtractor, Magnitude Comparators, Code Converters etc. and implement by using logic gates/ ICs, working of various Flip- Flops, Register types.

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base.Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. **(3 Lectures)**

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers.Decimal to Binary andBinary to Decimal Conversion.BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers.**(6 Lectures)**

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products.Idea of Minterms and Maxterms.Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.**(6 Lectures)**

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders. **(4 Lectures)**

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders.Half & Full Subtractors, 4-bit binary Adder/Subtractor.**(5 Lectures)**

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop.**(6 Lectures)**

Timers: IC 555: block diagram and applications: Astablemultivibrator and Monostablemultivibrator. **(3 Lectures)**

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(2 Lectures)**

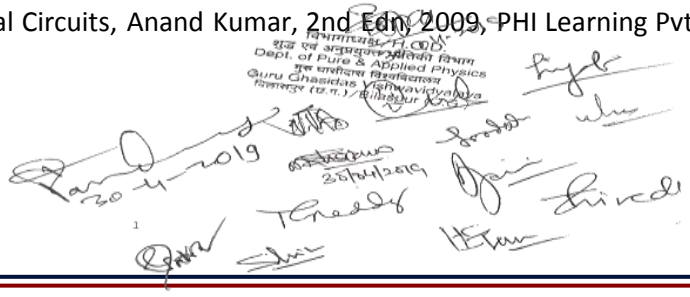
Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components. Pin-out diagram. Buses.Registers.ALU.Memory. Stack memory. Timing & Control circuitry.Timing states.Instruction cycle, Timing diagram of MOV and MVI.**(8 Lectures)**

Course Outcomes:

At the end of the course, a student will be able to convert different type of codes and number systems which are used in digital communication and computersystems.

References:

1. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
2. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.



PHYSICS-C X: ANALOG SYSTEMS AND APPLICATIONS
(Credits: Theory-04, Practicals-02)Theory: 60 Lectures

Objective:

To understand basic analog circuit and their applications using active devices. To understand electronic system (oscillators) with a continuously variable signal.

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram.Conductivity and Mobility, Concept of Drift velocity.PN Junction Fabrication (Simple Idea).Barrier Formation in PN Junction Diode.Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction.**(10 Lectures)**

Two-terminal Devices and their Applications: (1) Rectifier Diode: Half-wave Rectifiers. Centre-tappedand Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation.Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell.**(6 Lectures)**

Bipolar Junction transistors: N-P-N and P-N-P Transistors. Characteristics of CB, CE and CC Configurations.Current gains α and β Relations between α and β. Load Line analysis of Transistors.DC Load line and Q-point.Physical Mechanism of Current Flow.Active, Cutoff and Saturation Regions.**(6 Lectures)**

Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias.Transistor as 2-port Network.h-parameter Equivalent Circuit. Analysis of 29 a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains.Classification of Class A, B & C Amplifiers.**(10 Lectures)**

Coupled Amplifier: RC-coupled amplifier and its frequency response.**(4 Lectures)**

Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. **(4 Lectures)**

Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley &Colpitts oscillators.**(4 Lectures)**

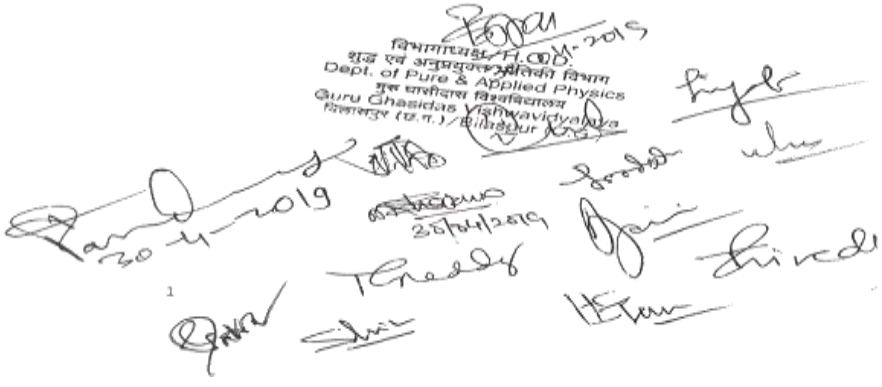
Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain.Frequency Response.CMRR. Slew Rate and concept of Virtual ground. **(4 Lectures)**

Outcomes:

Students will be able to describe the basic operation of active circuit elements. They will aware of operation of amplifiers, oscillator and feedback in a circuit.

References:

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.



PHYSICS-C III: ELECTRICITY AND MAGNETISM
Semester II (Credits: Theory-04, Practicals-02), code-
PS/PHY/C-203Theory: 60 Lectures

Objective: To deals with the study of static Electric field, Magnetic field, and Electromagnetic theory. Understand basic laws of electricity and magnetism.

Electric Field and Electric Potential

Electric field: Electric field lines. Electric flux.Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry.**(6 Lectures)**

Conservative nature of Electrostatic Field.Electrostatic Potential.Laplace's and Poisson equations.TheUniqueness Theorem.Potential and Electric Field of a dipole. Force andTorque on a dipole.**(6 Lectures)**

Electrostatic energy of system of charges.Electrostatic energy of a charged sphere.Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors.Parallel-plate capacitor.Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges.Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector **D**. Relations between **E**, **P** and **D**. Gauss' Law in dielectrics.**(8 Lectures)**

Magnetic Field: Magnetic force between current elements and definition of Magnetic Field **B**. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of **B**: curl and divergence. Vector Potential. Magnetic Force on (1) point charge

(2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.**(9 Lectures)**

Magnetic Properties of Matter: Magnetization vector (**M**). Magnetic Intensity(**H**). Magnetic Susceptibility and permeability.Relation between **B, H, M**. Ferromagnetism.B-H curve and hysteresis.**(4 Lectures)**

Electromagnetic Induction: Faraday's Law. Lenz's Law.Self Inductance and Mutual Inductance.Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations.Charge Conservation and Displacement current. **(6 Lectures)**

Electrical Circuits: AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.**(4 Lectures)**

Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem.Applications to dc circuits.**(4 Lectures)**

Outcome: Students will gain understanding of basic notions of electric field, potential and the relationship between electrostatic field and potential.

References:

1. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw
2. Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education

Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings