गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
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List of New Course(s) Introduced

Department	:	*Pure and applied physics*
Programme Name	:	*B.Sc. physics*

Academic Year : 2018-19

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	PS/PHY/SEC-301L	Physics Workshop Skills
02.	PS/PHY/SEC-401L	Electrical circuit network Skills
03.	PS/PHY/C-101P	Mathematical Physics-I Lab
04.	PS/PHY/CP-203	Electricity and Magnetism Lab

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Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : **2018-19**	
School	: *School of Physical Sciences*
Department	: *Pure and Applied Physics*
Date and Time :	*July 13, 2018 – 11:30 AM; July 18, 2018 – 5:00 PM*
Venue	: *Smart Class Room*

The scheduled meetings of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, were held to design and discuss the B. Sc. (Physics) Second year (III and IV Semesters), scheme and syllabi.

The following members were present in the meeting:
1. Prof. P K. Bajpai
2. Dr. H. S. Tewari
3. Prof. S. B. Kondawar (External Member)
4. Dr. M. N. Tripathi
5. Dr. P. Thakur
6. Dr. R. K. Pandey
7. Dr. T. G. Reddy
8. Dr. R. P. Prajapati
9. Dr. A. K. Gupta
10. Dr. M. P. Sharma
11. Dr. P. Das
12. Dr. T. Trivedi
13. Dr. S. P. Patel
14. Prof. R. Dhar (External member)

The committee discussed and approved the scheme and syllabi. The following Skill Enhancement courses were added in the B. Sc. (Physics) Second year (III and IV Semesters):

- ❖ Physics Workshop Skills (SEC-1)
- ❖ Electrical Circuits and Network Skills (SEC-2)
- ❖ Mathematical Physics-I Lab
- ❖ Electricity and Magnetism Lab

Signature & Seal of HoD

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Scheme and Syllabus

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / weak
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- IA)	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	Electrical circuit network Skills	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

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SUMMER Internship: 15 days	Optional elective		**SwayamSwachhta / 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 &Applications Lab**	2	4
	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)		Physics Workshop Skills	**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)		**Electrical Circuits and Network Skills**	4*	2 (4)
			TOTAL	28	34
V	Core-11		**Quantum Mechanics & Applications**	4	4
	Core -11 Practical		**Quantum Mechanics Lab**	2	4
	Core -12		**Solid State Physics**	4	4
	Core -12 Practical		**Solid State Physics Lab**	2	4
	Discipline Specific Elective (DSE-1)	PS/PHY/DSE-501L	**DSE-1: Experimental**	4	4

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			Techniques		
	DSE-1 - Practical	PS/PHY/DSE-501P	**DSE-1 Lab: Experimental Techniques Lab**	2	4
	Discipline Specific Elective (DSE-2)	PS/PHY/DSE-502L	**DSE-2: Nano Materials and Applications**	4	4
	DSE-2 - Practical	PS/PHY/DSE-502P	**DSE-2 Lab: : Nano Materials and Applications Lab**	2	4
			TOTAL	24	32
VI	Core-13		**Electro-magnetic Theory**	4	4
	Core -13 Practical		**Electro-magnetic Theory Lab**	2	4
	Core -14		**Statistical Mechanics**	4	4
	Core -14 Practical		**Statistical Mechanics Lab**	2	4
	Discipline Specific Elective (DSE-3)	PS/PHY/DSE-503L	**DSE-3: Nuclear & Particle Physics**	4	4
	DSE-3 - Practical	PS/PHY/DSE-503P	**DSE-3 Lab: : Nuclear & Particle Physics Lab**	2	4

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Mathematical Physics-I Lab

60 Lectures

The aim of this Lab is not just to teach computer programming and numerical analysisbut to emphasize its role in solving problems in Physics.

• *Highlights the use of computational methods to solve physical problems*
• *Aim at teaching students to construct the computational problem to be solved*
• *Students can use any one operating system Linux or Microsoft Windows*

Topics (Description with Applications):

Introduction and Overview Computer architecture and organization, memory and Input/output devices Basics of scientific computing Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow &overflow emphasize the importance of making equations in terms of dimensionless variables, Iterative methods Errors and error Analysis Truncation and round off errors, Absolute and relative errors, Floating point computations. Review of C & C++ Programming fundamentals Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (*If---statement. If---else Statement. Nested if Structure. Else---if Statement. Ternary Operator.Goto Statement. Switch Statement. Unconditional and Conditional Looping.While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops*), Arrays (*1D & 2D*) and strings, user defined functions, Structuresand Unions, Idea of classes and objects Programs: Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search Random number generation Area of circle, area of square, volume of sphere, value of π Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods Solution of linear and quadratic equation, solving $\alpha = \tan\alpha$; $I = Io$ [(Sinα)/α]2 in optics Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation Evaluation of trigonometric functions e.g. *sin θ, cos θ, tan θ, etc.* Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method Given Positionwith equidistant time data to calculate velocity and acceleration and vice versa. Find the area of B-H Hysteresis loop

Also attempt some problems on differential equations like:
1. Solve the coupled first order differential equations for four initial conditions. Plot x vs y for each of thefour initial conditions on the same screen for 0 ≤ t ≤ 15.
2. The ordinary differential equation describing the motion of a pendulum. The pendulum is released fromrest at an angular displacement α. Use the RK4 method to solve the equation for α = 0.1, 0.5 and 1.0 and plot
P as a function of time in the range $0 \le t \le 8\pi$. Also, plot the analytic solution valid in the small P (*sin*P ≈
P).
3. Solve differential equation with the boundary conditions and plot y and dy/dx against x in

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the given range.Both should appear on the same graph.

References:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn. , 2012, PHI Learning Pvt. Ltd.
2. Schaum's Outline of Programming with C++. J. Hubbard, 2000, McGraw---Hill Pub.
3. Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal, 3rd Edn. , 2007, CambridgeUniversity Press.

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ELECTRICITY AND MAGNETISM LAB
60 Lectures

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d)Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
4. To verify the Thevenin Theorem.
5. To verify the Norton theorem.
6. To verify the Superposition, and Maximum power transfer theorems.
7. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b)Impedance at resonance, (c) Quality factor Q, and (d) Band width.
8. To study the response curve of a parallel LCR circuit and determine its (a) Anti-resonant frequencyand (b) Quality factor Q.
9. To determine self-inductance of a coil by Rayleigh's method.
10. To determine the mutual inductance of two coils by Absolute method.
11. To determine the frequency of AC Mains using Sonometer.

References:
1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985,Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.
5. Engineering Practical physics S.Panigrihi and B.Mallick, 2015, Cengage Learning.

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ELECTRICAL CIRCUITS AND NETWORK SKILLS
(with Electrical Engineering) (Credits:02)

Theory: 30 Lectures
The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel and series-parallel combinations.AC and DC Electricity.Familiarization with multimeter, voltmeter and ammeter.**(3 Lectures)**

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase andthree-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source.Powerfactor.Saving energy and money.**(4 Lectures)**

Electrical Drawing and Symbols: Drawing symbols. Blueprints, Reading Schematics. Ladder diagrams.Electrical Schematics, Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop.**(4 Lectures)**

Generators and Transformers: DC Power sources. AC/DC generators.Inductance, capacitance and impedance.Operation of transformers.**(3 Lectures)**

ElectricMotors:Single-phase,three-phase&DCmotors.Basicdesign.InterfacingDC or AC sources to control heaters & motors. Speed & power of ac motor. **(4 Lectures)**
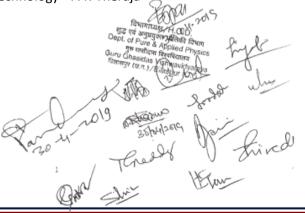
Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers.Components in Series or inshunt. Response of inductors and capacitors with DC or AC sources**(3 Lectures)**

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection.Grounding and isolating. Phase reversal. Surge protection. Relay protection device. **(4 Lectures)**

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection.Voltage drop and losses across cables and conductors.Instruments to measure current, voltage, power in DC and AC circuits.Insulation.Solid and stranded cable.Conduit.Cable trays.Splices: wirenuts,crimps,terminal blocksandsolder. Preparation of extension board.**(5 Lectures)**

References:

1. Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
2. A text book in Electrical Technology - B L Theraja - S Chand & Co.
3. A text book of Electrical Technology - A K Theraja