DEPARTMENT OF PHYSICS

COURSE CURRICULUM & MARKING SCHEME

B.Sc. I, II, III, IV Semester PHYSICS

(Based on Choice Based Credit System)

SESSION: 2025-26



ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone: 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email - autonomousdurg2013@gmail.com

FOUR YEAR UNDERGRADUATE PROGRAM (NEP- 2020) PROGRAM: BACHELOR IN SCIENCE (2024 – 28) DISCIPLINE – PHYSICS

SESSION - 2024 - 25

ns	SC- 01 to 08		ION - 2024 - 25 DSE- 01 to 12	DGI	E- 01 to 02
		Code	Course Title	Code	Course Title
Code	Course Title	Code	Introduction to Statistical	PHGE-01 T	Mechanics
PHSC- 01 T	Mechanics	PHSE- 01	Mechanics	PHGE- 01 P	Lab Course
PHSC- 01P	Lab Course		TAX	PHGE- 02 T	Electricity &
PHSC- 02 T	Electricity & Magnetism	PHSE- 02	Mathematical Physics-I	PHGE- 02 P	Magnetism Lab Course
- HSC- 02 P	Lab Course			THOE 021	
PHSC- 03 T	Heat & Thermodynamics	PHSE- 03	Nuclear Physics		
PHSC- 03 P	Lab Course		127 1 1 0 0		
PHSC- 04 T	Waves & Optics	PHSE- 04 T	Numerical Methods &C Programming		VAC
PHSC-04P	Lab Course	PHSE- 04 P	Lab Course		Renewable
PHSC- 05 T	Introduction to Quantum Mechanics	PHSE- 05	Mathematical Physics-II	PHVAC- 01	Energy and Energy
PHSC- 05 P	Lab Course	PHSE- 03	Wathemanies 2 styles		Harvesting
"HSC- 06 T	Solid State Physics &SolidStateDevices	PHSE- 06	Classical Electrodynamics		
PHSC-06P	Lab Course	PHSE-00	& Electromagnetic theory		SEC
		PHSE- 07 T	Digital Electronics		
PHSC- 07	Classical Mechanics	PHSE- 07 P	Lab Course		
	Quantum Mechanics	PHSE- 08 T	Operational Amplifier& Its Applications	PHSEC- 01	BasicElectrical Skill
PHSC- 08	Quantum Mechanics	PHSE- 08 P	Lab Course		
	THE RESERVE TO BE A STATE OF THE PARTY OF TH	PHSE- 09 T	Solid State Physics		
		PHSE- 09 P	Lab Course		
	7 4 1 7 4	PHSE- 10	Atomic and Molecular Physics		
		PHSE- 11	Statistical Mechanics		
		PHSE- 12 T	Microprocessor		
	The state of the s	PHSE- 12 P	Lab Course	Tille	

Signature of Convener & Members (CBoS):

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Program Outcomes (PO):

The learning outcomes of the undergraduate degree course in physics are as follows:

- In-depth disciplinary knowledge: The student will acquire comprehensive knowledge and understanding of the fundamental concepts, theoretical principles and processes in the main and allied branches of physics.
- Hands-on/ Laboratory Skills: Comprehensive hands-on/ laboratory exercises will impart analytical, computational and instrumentation skills. The students will be able to demonstrate mature skills for the collation, evaluation, analysis and presentation of information, ideas, concepts as well as quantitative and/or qualitative data.
- Role of Physics: The students will develop awareness and appreciation for the significant role played by physics in current societal and global issues. They will be able to address and contribute to such issues through the skills and knowledge acquired during the programme
- Communication and Skills: Various DSCs, DSEs, SECs, and GEs have been designed to enhance student's ability to write methodical, logical and precise reports. The courses will, in addition, guide the student to communicate effectively through presentations, writing laboratory/ project reports and dissertations.
- Critical and Lateral Thinking: The programme will develop the ability to apply the underlying concepts and principles of physics and allied fields beyond the classrooms to real life applications, innovation and creativity.
- Research skills: The course provides an opportunity to students to hone their research and innovation skills through assignment/internship/dissertation. It will enable the students to demonstrate mature skills in literature survey, information management skills, data analysis and research ethics.

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FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

		COURSE	CURRICULI	UM		
PA	RT - A: INTRODUCT	TION				
((Program: Bachelor Certificate/ Diploma/ D		Seme	ester: I	Session: 202	4-25
1	Course Code			PHSC-01T		
2	Course Title			Mechanics		
3	Course Type		Discipli	ne Specific C	ourse	
4			As	per Program	1	
5	Course Learning Outcomes (CLO)	➤ Analyze an ➤ Explain an energy it collision ➤ Evaluate an and analy ➤ Analyze flor Describe sy	d demonstrate the ncluding their ap and energy transfond calculate mome with the property of fluids. The province of the property of the property of the property of a moving object.	f motion to var principle of co plication in r principle. pent of inertia for perties affect the effects and the	nservation of moment eal-world scenario or objects of different e motion of rotating b	such as shapes podies. ass and
6	Credit Value	03 Credits 1	Credit= 15 Hou	ars for Learn	ing &Observation	
7	Total Marks	Maximum Ma		Minimum I	Pass Marks: 40	
- 2	T - B: CONTENT OF TH					
FAR	TotalNo.of Teaching-	-learning Period	ds (01 Hr. per per	riod) - 45 Peri	iods (45 Hours)	
Unit	Totalivo.or reacting		ourse contents)			No. of Periods
I	Historical Background: Conbiography of Vikram Sarabha Scalar & Vector products of physical significance. Laws system of particles, Concept momentum, Motion of Rocke Force as a gradient of Potentia	two vectors, Der of Motion: Revi of Center of Mas et. Work and Ene	rivatives of a vectors of a vector of Newton's s, Motion of centor water water of the vector of the	or, Gradient of Laws of moti er of mass, Co y theorem for Elastic and in-	f scalar field and its on, Dynamics of a onservation of linear conservative forces, elastic Collisions	12
	Rotational Dynamics: Angul of Inertia, Theorem of paralle Inertia of discrete and con sphere). Elasticity: Stress & Stre	ar momentum, To al and perpendiculatinuous objects Strain, Hooke's lulii (without der pefficient of visco	orque, Conservation lar axes(statement (Rectangular landaw, Elastic constant (rivation), Work dosity, Derivation o	s only), Calcul nina, disc, so ants, Poisson's lone in twistir f Poiseulli's fo	ation of Moment of olid cylinder, solid s Ratio, Relationship ng a cylinder. Fluid ormula, Motion of a	12
II d	spherical body falling in a visc Gravitation: Newton's Law of in a plane, angular momentum only), Satellite in circular orbit Oscillations: Simple harmonic Potential Energy, Total Energy	of Gravitation, Months is conserved, and applications motion, Differently and their ti	otion of a particle eal velocity is cor , Geosynchronous ntial equation of S me averages, Co	nstant), Kepler orbits. SHM and its so ompound pend	's Laws (statements lutions, Kinetic and	11
V S	equations of damped oscillation Special Theory of Relativity: nertial frames, Outcomes of M Relativity, Lorentz Transforma of velocity, Relativistic variation Momentum.	Frame of referent ichelson Morley tion. Length cont	ce, Galilean Trans 's Experiment, Po- raction, Time dila	sformations, in stulates of Spe ation, Relativis	tic transformation	10
ywora		ton's Laws, Angula	r Momentum, Elast	icity, Gravitatio	n, Oscillations, Relativ	ity
	natureofConvener&Membe		Diney -	Sitowa	ngem All foli	20-0

FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	ART - A: INTROD Program:Bachelon	r in Science	Semester: I	Session: 2	2024-25
	Certificate/ Diploma/ 1	Degree/ Honors)	PHSC- 01P		
1	Course Code		Mechanics		
2	Course Title				_
3	Course Type		Discipline Specific Course		
5	Pre-requisite (if any) Course Learning		As per Program oletion of the course, Studen	ate are ev	nected t
	Outcomes (CLO)	understand work The Students wi Assemble re experiments. Record/ obsobjectives. Analyze reco	king mechanism and laws of o ll be able to quired parts/devices and arran	the expet desired in	perform erimenta results. proposec
6	Credit Value	01 Credit 1 Cre	edit = 30 HoursLaboratory V	Vork	
900	Total Marks	Maximum Mark		Marks: 20	
- 1	RT - B: CONTENT				
Ar			ormance Periods-30 Periods (30) Hours)	
Sr.	Objects (At	least 10 of the fol	lowing or related Experimen	ts)	No. of
No.		icust 10 of the 10.			Period
1	Measurements of le travelling microsco To study the random	pe.	using vernier caliper, screw ga	uge and	30
3	To study the motion	of the spring and	calculate (a) Spring constant ar	nd, (b) g.	
4	To determine the M	oment of Inertia of	a Flywheel.		
5	To determine g and Technique.	velocity for a freel	y falling body using Digital Ti		
6			of water by Capillary Flow Me	ethod	
-	(Poiseuille's method		W 1 0 d 17 17 17 1	1	
7			a Wire by Optical Lever Metho		
			of a Wire by Maxwell's needle		
8	To determine the ela		wire by Searle's method		
9		ue of g using bar i	endulum.		
9		ue of a using Vata	r'e Pendulum		
9 0 1	To determine the val		r's Pendulum.		
0 1 2	To determine the val Study of bending of a	beam/ cantilever			
0 1 2 3	To determine the val Study of bending of a To determine Momen	a beam/ cantilever nt of Inertia of an i	rregular body by Inertia Table	ope, Elastic (Constant
0 1 2 3 ords	To determine the val Study of bending of a To determine Momen Moment of Inertia, Pend	a beam/ cantilever at of Inertia of an i ulum, Vernier Callipers Method, Cappilary Ri			Constant,

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PART - C: LEARNING RESOURCES

Text Books, Reference Books Recommended and Others

Text Books Recommended-

- 1. Mechanics & Properties of matter, D.C. Tayal & P. Tayal, 2023, Pub. By Authors.
- 2. Unified Physics I -R.P.Goyal, Shivlal Agrawal Publication
- 3. Unified Physics I, Navbodh Publication

Reference Books Recommended-

- 1. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
- 2. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
- 3. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.

Online Resources (e-books/ learning portals/ other e-resources)

- 1. All e-books of physics https://www.e-booksdirectory.com/listing.php?category=2
- 3. https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yy6xK1s0Km $a 0 VR0AWG lich RwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE$
- 4. Cambridge University Books for Physics https://www.cambridgeindia.org/
- 5. Books for solving physics problems https://bookboon.com/en/physics-ebooks
- 6. NPTEL Online courses https://nptel.ac.in/courses/115105098; https://archive.nptel.ac.in/courses/115/106/115106123/;
- 7. BSc Lectures by Prof. H C Verma: https://bsc.hcverma.in/index.php/course/relativity; https://bsc.hcverma.in/index.php/course/cml

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 100Marks

Continuous Internal Assessment (CIA):30 Marks

End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By course teacher)

Internal Test/ Quiz (2): 20#20 Assignment/ Seminar (1):10 Total Marks: 30

Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective - 10 x1= 10 Mark; Q2. Short answer type- 5x4 = 20Marks Section B: Descriptive answer type, 1 out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS

PART - C: Learning Resources

Text Books, Reference Books and others

Text Books Recommended-

- 1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
- 2. Engineering Practical Physics, S.Panigrahi& B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
- 3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- 4. Practical Physics B.Sc. I: R P Goyal, Shivlal Publications

Reference Books Recommended-

- 1. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint
- 2. Practical Physics by G.L. Squires
- 3. An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements by John R. Taylor
- 4. Mechanics and Properties of Matter by J.C. Upadhyaya

Online Resources (e-books/ learning portals/ other e-resources)

1. Link for e-Books for Physics: Physics Practical:

https://www.uou.ac.in/sites//default/files/slm/BSCPH-104.pdf

- 2. Virtual Lab : https://vlab.amrita.edu/?sub=1&brch=74
- 3. https://vlab.amrita.edu/?sub=1&brch=74&sim=571&cnt=1
- 4. https://www.ae.msstate.edu/vlsm/

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

10 &

Continuous Internal Assessment(CIA):15 Marks

EndSemester Exam(ESE):35 Marks Internal Test / Quiz - (2):

Continuous InternalAssessment(C (By Course Teacher)		10 Assignment/Seminar +Attendance -05 Total Marks - 15	Assignm against 1	
End Semester Exam (ESE):	Per Ma Sp Ma Vir	boratory Performance: On spot Assessn rformed the Task based on lab. work arks otting based on tools & technology (writte arks va-voce (based on principle/technology) arks	-20	Managed by Course teacher as per lab. status

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Better marks out of the two

FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS

		COURSE CU	RRICULU	JM		
PAR	T - A: INTRODU	CTION			Session: 2024	1-25
(C	Program: Bachelor ertificate/ Diploma/ Do	in Science egree/ Honors)		ter: II	Bession 200	
1	Course Code			PHSC-02T		
	Course Title		ELECTRICIT	Y AND MAG	ENETISIVI	
				ie Specific C		
	Course Type Pre-requisite (if any)		As	per Program	n	
5	After going through the course, the student should be able to: State various laws related with electrostatics, dielectric, current, magnetism and electromagnetic induction. Apply vector (electric fields, Coulomb's law) and scalar potential, electric potential energy) formalisms of electrostatics. Compare rise and decay of current in LR, CR, LCR circuits. Apply Biot-Savart law for calculation of magnetic field in geographic situations. Derive and analyze Maxwell's equations. Credit Value O3 Credits 1 Credit= 15 Hours for Learning & Observation		(electric			
6	Credit Value	03 Credits 1 Cre	edit= 15 Hou	irs for Lear	ning & Observe	
- MA	Total Marks	Maximum Marks	s: 100	Minimum	Pass Marks: 40	
	D. CONTENT	OF THE COURS	SE			
AK	TotalNo.of Teaching	- Learning Periods	01 Hr. per p	eriod) - 45 P	eriods (45 Hours)	
	TotalNo.of Teaching	Topics (Co	urse content	rs)		No. of Period
Unit					lastric power plants	12
I	in Chhattisgarh. Vector Analysis: Di of Vector fields, G application in electro	hattisgarh: An oververgence & Curl of V auss-divergence theo estatics and magnetos theorem of electrosts	rem and Sto	ke's theorem statics field:	of vectors and its Electrostatic Field, ss theorem- Electric	
П	Electrostatic potent a point charge, Calco capacitor, Energy per Dielectric & Electri Gauss's theorem in	application in electrostatics and magnetostatics. Electrostatics delectric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, plane charged sheet, charged conductor. Electrostatic potential: Electric potential as line integral of electric field, potential due to a point charge, Calculation of electric field from potential, Capacitance of Parallel plate capacitor, Energy per unit volume in electrostatic field. Dielectric & Electric Currents: Dielectric medium, Polarisation, Displacement vector, Gauss's theorem in dielectrics, Parallel plate capacitor completely filled with dielectric. Steady current, current density J, non – steady current and Continuity equation,				
Ш	Rise and decay of cur Magnetism: Magnet circular coil, solenoic vector potential, Amp	ostatics: Biot-Savart's d carrying current, Dipere's circuital law,	s law and its vergence and	applications- curl of magr	straight conductor, netic field, Magnetic action, permeability,	10
IV	magnetic susceptibility Electromagnetic Income self and mutual industrield.	duction: Faraday's la ctance, L of single co	ws of electro	omagnetic inc coils, Energy	duction, Lenz's law, y stored in magnetic uation of continuity	10
(eywor	of current, Displacem	ent current, Maxwell's lectrostatics, Dielect l's Equation and Elect	rics and Elec	etric Current, Vave Propaga	Magnetism, Electro	

PART - C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books

- 1. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- 2. Unified Physics Part II, R. P. Goyal, Shivlal Agrawal and Sons
- 3. Unified Physics Navbodh Publications
- 4. Introduction to Electrodynamics and Electromagnetism, H.C. Verma,

Reference Books

- Vector analysis Schaum's Outline, M.R. Spiegel, S. Lipschutz, D. Spellman, 2nd Edn., 2009, McGraw-Hill Education.
- 2. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

Online Resources (e-books/learning portals/other e-resources)

- 1. All e-books of physics https://www.e-booksdirectory.com/listing.php?category=2
- 2. Free physics text book in PDF

 https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yy6xK1s0Kma0
 VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
- 3. Cambridge University Books for Physics https://www.cambridgeindia.org/
- 4. Books for solving physics problems https://bookboon.com/en/physics-ebooks
- 5. NPTEL Online courses: https://onlinecourses.nptel.ac.in/noc21_ph05/preview
- 6. https://archive.nptel.ac.in/courses/115/104/115104088/
- 7. Classical Electromagnetism 1 (Electrostatics) https://bsc.hcverma.in/course/cee1
- 8. Classical Electromagnetism 2 (Electrostatics) https://bsc.hcverma.in/course/cee2

PART - D: Assessment and Evaluation

Maximum Marks: 10 Continuous Internal	s Evaluation Methods: OMarks Assessment (CIA):30 Marks nation (ESE): 70 Marks	
Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2): 20+20Assignment/ Seminar (1): 10 Total Marks: 30	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks
End Semester Examination (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10	Mark; Q2. Short answer type- 5x4 =20Marks

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Section B: Descriptive answer type, 1 out of 2 from each unit-4x10=40 Marks

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FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

1 (2 (3)	Program:Bachelor ertificate/ Diploma/ D Course Code		Semester: II	Session: 202	4-25
1 (2 (3)		egree/ Honors)			HE TO
2 (Course Code	egree/ Honors/	PHSC- 021	9	
3 (Course Title		Electricity & Mag	gnetism	
_	Course Type		Discipline Specific		11 _ 1 _ 1 _ 1
4]	Pre-requisite (if any)		As per progra	am	
5 (Course Learning Outcomes (CLO)	working laws of E able to Verify vario circuits. Asso experiments. Verify variot Faraday's la measuring in Record/obse recorded data Interpret resu to laws of Ele	rve data as required by the a and formulate it to get des ults and check for attainme ectricity, Magnetism and its	theorems, using simples and arrange them magnetism such as it construction, working experimental objectives are of proposed objections	ole electric to perform Lenz's law, of various es. Analyze
6 (Credit Value	01 Credit 1 Cr	edit = 30 Hours Labora		
7]	Total Marks	Maximum Mark	s: 50 Minimum Pa	iss Marks: 20	
PAR	T-B: CONTENT	OF THE COU	IRSE		
			rformance Periods -30 Pe		
Sr.	Objects (A	At least 10 of the fo	ollowing or related Expe	eriments)	No. of
No.		STREET, LYANDEDA	Strike Late College		Periods
1			Resistances, (b) AC and D	OCVoltages,(c) DC	
	Current, and (d) chec	king electrical fuse	es.		30
2	To compare capacita	nces using De'Saut	y's bridge.		
3	Measurement of field	l strength B and its	variation in a Solenoid	Determine (dB/dx).	
4	To study the Charact	eristics of a Series	RC Circuit.		
5	THE RESERVE THE PARTY NAMED IN	R circuit and detern	nine its (a) Resonant Fred	quency, (b) Quality	
	Factor.	HOLESTA LINE			
6		CR circuit and dete	rmine its (a) Anti-resonar	nt frequency and(b)	
-	Quality factor Q. To determine a Low	Pacietance by Care	v Foster's Bridge		
7	To verify the Theven				
9			um Power Transfer Theo	rem.	
9	To use a vibration ma				
10	Study of magnetic fie	THE RESERVE TO THE RE			
12	Study of magnetic fie				FALSING I
13			enoid and measurement of	its magnetic field	
	Multimeter, Cap		son, Magnetic Field, RC	Circuit, Series LCR	Circuit,

SignatureofConvener&Members (CBoS):

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PART - C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended-

- Engineering Practical Physics, S.Panigrahi&B.Mallick, 2015, Cengage Learning India Pvt.
 Ltd.
- 2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- 3. Unified Practical Physics: R P Goyal, Shivlal Agrawal & Sons
- 4. Unified Practical Physics: YugbodhPrakashan
- 5. Unified Practical Physics: NavbodhPrakashan

Reference Books Recommended-

- 1. Basic Electrical and Electronics Engineering by S. K. Bhattacharya
- 2. A Textbook of Electrical Technology by B.L. Theraja and A.K. Theraja (Volumes 1 and 2)
- 3. Engineering Circuit Analysis by William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin
- 4. Practical Physics by G.L. Squires

Online Resources (e-books/learning portals/other e-resources)

- Link for e-Books for Physics: Physics Practical:
 https://www.uou.ac.in/sites//default/files/slm/BSCPH-104.pdf
- 2. Virtual Lab : https://vlab.amrita.edu/index.php?sub=1&brch=192
- 3. http://emv-au.vlabs.ac.in/#
- 4. https://www.ae.msstate.edu/vlsm/
- 5. https://nationalmaglab.org/magnet-academy/watch-play/interactive-tutorials
- 6. https://jigyasa-csir.in/cgcri/n12-t4-a3/

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

EndSemester Exam(ESE):35 Marks

Continuous InternalAssessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance -05 Total Marks - 15	Test / Quiz	s out of the two +Marks obtained in shall be considered Marks
End Semester Exam (ESE):	Spotting based on tools & technology (written)	- 20 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

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FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	Program: Bachelor in	CTION Science	Semester:	Ш	Session: 2024	-25
	(Diploma/ Degree/ I	Honors)				
1	Course Code		THE STATE OF THE S	SC-03T		
2	Course Title			hermodynar		
3	Course Type		Discipline	Specific Cou	irse	
4	Pre-requisite (if any)			r Program		
5	Course Learning	After going thre	ough the course, the stu	dent should b	e able to:	
	Outcomes (CLO)	Demonst thermody	rate a deep compreh- namics, including con- namics.	ension of th cepts such as	e fundamental princ energy, entropy and	iaws 0
		with en	e laws of thermodynan ergy transfer, heat e mamic processes.	engines, refr	geration system and	u ome
			basic aspects of kinetic	theory and tra	insport phenomenon in	gases.
6	Credit Value	03 Credits		urs for Leaf	ning &Observation Pass Marks: 40	
7	Total Marks	Maximum M		Minimum	Pass Marks. 40	
PA	RT – B: CONTEN	T OF THE C	OURSE			
	TotalNo.of Tead		Periods (01 Hr. per pe		riods (45 Hours)	NI
Uni	t	Top	ics (Course contents)			No. o
I			storical background of	thermodyna	mics and statistical	12
	Laws of Thermoo	lynamics: Therr	Indian culture, Contribu	n of system	, Zeroth Law of	
	Reversible & irrevers	mical Processes, sible processes. So ntropy changes in of thermodynamic	Work Done during Iso econd law of thermodyr reversible & irreversibles.	thermal and a namics & Entrale le processes,	Adiabatic Processes, opy, Carnot's cycle, Entropy-temperature	
п	Reversible & irrevers Carnot's theorem, Endiagrams, Third law of the function. Maxwell's Carnot's theorem, Endiagrams, Third law of the function. Maxwell's	mical Processes, sible processes. So atropy changes in of thermodynamic otentials: Internal relations & applications, Thermodynamic	Work Done during Iso econd law of thermodyn reversible & irreversibles. I Energy, Enthalpy, He eations, Clausius- Clape dynamic energy equation	thermal and anamics & Entrale processes, elmholtz Free yron Equation n- change in its content of the change in its change in its content of the change in its con	Adiabatic Processes, opy, Carnot's cycle, Entropy-temperature Energy and Gibbs a, Expression for (C _P nternal energy of an	11
Ш	Reversible & irreverse Carnot's theorem, Endiagrams, Third law of Thermodynamic Pofunction. Maxwell's – C _V), C _P /C _V , TdS edideal and Vander Wall Kinetic Theory of speeds and velocities probable speed value Transport Phenome	mical Processes, sible processes. So atropy changes in of thermodynamic otentials: Internal relations & applications, Thermodal's gas, Joule-Thermodal's gas, Joule-Thermodal's gas, experimental s. Molecular Colling	Work Done during Iso econd law of thermodyr reversible & irreversibles. I Energy, Enthalpy, He eations, Clausius-Clape	thermal and anamics & Entrale processes, elmholtz Free yron Equation not change in it by adiabatic distinguish between mith.	Adiabatic Processes, opy, Carnot's cycle, Entropy-temperature Energy and Gibbs a, Expression for (Cputernal energy of an demagnetization. gas: distribution of ean, rms and most	11
	Reversible & irreverse Carnot's theorem, Endiagrams, Third law of Thermodynamic Postunction. Maxwell's — C _V), C _P /C _V , TdS edideal and Vander Walkinetic Theory of Speeds and velocities probable speed value Transport Phenometer	mical Processes, sible processes. So atropy changes in of thermodynamic otentials: Internal relations & applications, Thermodal's gas, Joule-The Gases: Maxwellias, Molecular Collinarin gases: Viscon: Blackbody radaw, Newton's Id Rayleigh-Jeans Id Rayleigh-Jeans Id in law and Ray's radiation law.	Work Done during Iso econd law of thermodyr reversible & irreversibles. I Energy, Enthalpy, He eations, Clausius- Clape dynamic energy equatio ompson Effect, Cooling an distribution of speed verification, distinction ision and Mean Free Pat ecosity, Conduction and liation, Spectral distribution aw of cooling from Law (Only qualitative). ryleigh- Jeans Law fire	thermal and anamics & Entral le processes, lelmholtz Free yron Equation nor change in its by adiabatic of the between much. Diffusion, Laution, Concept Stefan Boltzment Planck's radia from Planck's	Adiabatic Processes, opy, Carnot's cycle, Entropy-temperature Energy and Gibbs a, Expression for (C _P nternal energy of an demagnetization. gas: distribution of ean, rms and most w of equipartition of tof Energy Density, nann's law. Wien's tion Law, Deduction law. Experimental	11
IV	Reversible & irreverse Carnot's theorem, Endiagrams, Third law of Thermodynamic Posturation. Maxwell's — C _V), C _P /C _V , TdS edideal and Vander Wall Kinetic Theory of Speeds and velocities probable speed value Transport Phenometer Phenometer Phenometer Stefan Boltzmann I displacement law and of Wien's distributiverification of Planck Phenometer Phe	mical Processes, sible processes. So atropy changes in of thermodynamic otentials: Internal relations & applications, Thermodal's gas, Joule-The Gases: Maxwelliaes, experimental s, Molecular Colliera in gases: Viscon: Blackbody radiaw, Newton's I d Rayleigh-Jeans I ion law and Rac's radiation law.	Work Done during Iso econd law of thermodyr reversible & irreversibles. I Energy, Enthalpy, He eations, Clausius- Clape dynamic energy equatio ompson Effect, Cooling an distribution of speed verification, distinction ision and Mean Free Pat cosity, Conduction and liation, Spectral distribut aw of cooling from Law (Only qualitative).	thermal and an amics & Entral le processes, lelmholtz Free yron Equation nor change in it by adiabatic dis in an ideal no between much. Diffusion, Laution, Concept Stefan Boltzm. Planck's radiation Planck's lecond Law	Adiabatic Processes, opy, Carnot's cycle, Entropy-temperature Energy and Gibbs a, Expression for (Cputernal energy of an demagnetization. gas: distribution of ean, rms and most aw of equipartition of the energy Density, mann's law. Wien's attion Law, Deduction law. Experimental of Thermodynamics,	11

Signature of Convener & Members (CBoS):

PART - C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books

- 1. Heat and Thermodynamics: Singhal, Agrawal and Satya Prakash, Pragati Prakashan 1984
- 2. Physics (Part-2): Editor, Prof. B.P.Chandra, M.P. Hindi Granth Academy
- 3. Unified Physics -II ,R.P.Goyal, Shivlal Agrawal &Sons
- 4. Unified Physics -II. NovbodhPrakashan

Reference Books

- Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears&G.L.Salinger. 1988, Narosa
- Energy Science in Vedas: A Treatise on Vedic Thermodynamics and Free Energy (Exploring Lost Science and Technology in Vedas), Ramesh Kumar Mineria; Priya Veda Publications

Online Resources (e-books/ learning portals/ other e-resources)

- I. Basics of thermodynamics
 <u>https://www.youtube.com/watch?v=9GMBpZZtjXM&list=PLD8E646BAB3366BC8</u>
- 2. Thermodynamics https://www.youtube.com/watch?v=E9cOAMhFUz0
- 3. Second law of thermodynamics https://www.youtube.com/watch?v=F flGosPY80
- 4. NPTEL Online Lectures: https://archive.nptel.ac.in/courses/115/105/115105129/
- 5. https://archive.nptel.ac.in/courses/115/106/115106090/
- 6. https://bsc.hcverma.in/course/penopcyc
- 7. Vedic Science and Thermodynamics: https://www.puranavedas.com/vedic-physics/
- 8. https://www.amazon.in/Vedic-Physics-Raja-Ram-Mohan/dp/0968412009?asin=1988207045&revisionId=&format=4&depth=2
- 9. https://ia903100.us.archive.org/3/items/wholelottabooks/The%20Astronomical%20Code%20of%20the%20Rgveda%20-%20Shubash%20Kak.pdf

PART - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Examination (ESE): 70 Marks

Continuous Internal
Assessment (CIA):
(By course teacher)

Internal Test/ Quiz (2): 20\$20 Assignment/ Seminar (1): 10 Total Marks: 30

Better marks out of the two Test / Quiz+ marks obtained in Assignment shall be considered against 30 Marks

End Semester Exam (ESE): Two section - A & B

Section A: Q1. Objective -10 x1 = 10 Mark; Q2. Short answer type-5x4 = 20 Marks Section B: Descriptive answer type, 1 out of 2 from each unit-4x10 = 40 Marks

Name and Signature of Convener & Members of CBoS:

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FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	Prog	ram:Bachelor in	Science	Semester: III	Session: 2024	-25
	(Dip	oloma/ Degree/ H	onors)		2D	
1	Cours	se Code		PHSC- 0		
2	Cours	se Title		Heat and Thermo		
3	Cours	ве Туре		Discipline Cor		
4		equisite (if any)		As per Pro	gram	*
5	Cours	se Learning omes (CLO)	heat transfer Hands-on I transitions, Data Analysis. Predictive	er apparatus, experimental experimental skills: Thermodynan	s, pressure gauges, cal- nental setup, data acqui- nsfer, work done, entro- data, theoretical disc nic behavior, varying cal- theoretical knowledge,	ppy, phase repancies
			lah work s	vnthesis, application	S	
6	Cred	it Value	01 Credit 1 Cre	edit = 30 HoursLab	oratory Work	
7		l Marks	Maximum Marks		Pass Marks: 20	
D/			OF THE COU	RSE		
1 1	XXX	TotalNo of le	rning-Training/perf	formance Periods -30	Periods (30 Hours)	
	ir.	Objects (At least 10 of the fo	llowing or related E	xperiments)	No. of Period
	100	.1 1			naterial by Lee's disc a thermocouple with	30
	t	emperature.		TOSS two junctions of	u monitore april	
	3	To verify Newton'	law of cooling.	nt of resistance by Pl	atinum resistance	1
_	1 2	1				
	I	nermometer.	pefficient of thermal	conductivity(k) of a	rubber tube.	
		o determine the c	A SECURITION OF THE PERSON OF		14	
	- 1	Ca study the heat s	fficiency of an electr	ic kettle with varying	g voltage.	-
	6 7	To study the heat of o determine the r	fficiency of an electritio of specific heat a lement and Desorme	ic kettle with varying it constant pressure a 's method.	nd constant volume	
	6 7 7 (8	To study the heat of γ determine the respective of air C γ of determine the constant γ	fficiency of an electration of specific heat a dement and Desorme pefficient of thermal	it constant pressure a 's method. conductivity of copp	nd constant volume per by Searle's	
	6 7 7 (8 8 7 9 7)	Fo study the heat of $\gamma = Cp/Cv$ of air Cr of air Cr of attention the of Apparatus.	fficiency of an electricitio of specific heat a dement and Desorme pefficient of thermal ton of thermos-Emf of Two Junctions.	ic kettle with varying it constant pressure a 's method. conductivity of copp of thermos couple wi	nd constant volume oer by Searle's th Difference of	
	6 7 7 8 8 9 7 10 10 10 10 10 10 10 10 10 10 10 10 10	To study the heat of To determine the respect of the Control of t	fficiency of an electratio of specific heat a dement and Desorme pefficient of thermal from of thermos-Emf of Two Junctions. Two Junctions. The perfect of	it constant pressure a 's method. conductivity of coppof thermos couple wi	nd constant volume oer by Searle's th Difference of er and Barne's	
	6 7 7 8 8 7 9 7 10 6 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	To study the heat of the constant flow method in the cons	fficiency of an electricitio of specific heat a lement and Desorme pefficient of thermal from of thermos-Emf of Two Junctions. Two Junctions. The Junction of the mail and a lequivalent	ic kettle with varying it constant pressure a 's method. conductivity of copp of thermos couple wi	nd constant volume oer by Searle's th Difference of er and Barne's	
	6 7 7 (6 8 7 9 7 11 11 11 11 11 11 11 11 11 11 11 11 1	To study the heat of γ=Cp/Cv) of air C (γ=Cp/Cv) o	fficiency of an electricio of specific heat a lement and Desorme pefficient of thermal from of thermos-Emf of Two Junctions. Two Junctions. The performance of the	the constant pressure a 's method. conductivity of copport thermos couple with the conductivity of copport thermos couple with the conductivity of copport the couple with the	nd constant volume oer by Searle's th Difference of er and Barne's	mperatu

PART – C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended-

- 1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing
- 2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- 3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- 4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.
- 5. Unified Practical Physics B.Sc II: R P Goyal, Shivlal Agrawal &Sons Publications

Reference Books Recommended-

- 1. Practical Physics by C.L. Arora
- 2. Practical Physics by S.L. Gupta and Vijay Kumar
- 3. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint

Online Resources (e-books/ learning portals/ other e-resources)

Link for e-Books for Physics Practicaland Virtual labs

- 1. Thermal Physics and Statistical Mechanics: Laboratory Collectionhttps://egyankosh.ac.in/handle/123456789/67450
- 2. Virtual Lab: https://vlab.amrita.edu/index.php?sub=1&brch=194
- 3. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1
- 4. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=801&cnt=4
- 5. https://srmap.edu.in/seas/physics-virtual-lab/
- 6. https://sites.google.com/view/vlab-bnmitmech/home/heat-transfer-lab https://www.pbslearningmedia.org/resource/lsps07-sci-phys-thermalenergy/thermal-energytransfer/#.WdJiOJIrLIU

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

EndSemester Exam(ESE):35 Marks

EndSemester Exam(ESE):35 Marks		
Continuous InternalAssessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	/ Quiz +Ma	rks obtained in shall be considered Marks
End Semester	Laboratory Performance: On spot Assessm Performed the Task based on lab. work	ent - 20 Marks	Managed by Course teacher as

Performed the Task based on lab. work - 20 Marks Exam (ESE): Spotting based on tools & technology (written) - 10 Marks per lab. status Viva-voce (based on principle/technology) - 05 Marks

Name and Signature of Convener & Members of CBoS:

FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	F – A: INTRODUCT Program: Bachelor in Sc (Diploma/ Degree/ Hone	ience	Semester: I		Session: 2024-25	
1	Course Code			PHSC		
2	Course Title				nd Optics	
3	Course Type				ecific Course	
4	Pre-requisite (if any)		1	As per P	rogram	
5	Course Learning Outcomes (CLO)	After going through the course, the student should be able to: Analyze the behavior of waves propagating through different mand predict how factors such as density, elasticity, and tempaffect wave propagation. Demonstrate an understanding of interference phenomena, in constructive and destructive interference, and apply this knowled solve problems involving wave superposition. Explain the concept of diffraction and its implications for propagation, including how waves bend around obstacles and out after passing through narrow openings. Describe the polarization of waves, including linear, circular elliptical polarization, and apply polarization concepts to analymanipulate electromagnetic waves.				
		03 Credi	ipulate electromagne	Hours -	Learning &Observation	
6	Credit Value	The second second second second	m Marks: 100	Mi	nimum Pass Marks: 40	
7	Total Marks					
PAR	T - B: CONTENT O	r IIIE C	Pariods (01 Hr. ner	neriod)	- 45 Periods (45 Hours)	
	TotalNo.of Teachin	g-learning i	Course conter	te)		No. o
Unit	The state of the s		cs (Course conter			Perio
I	Contribution of C. V. Raman: Brief biography of C. V. Raman with his contribution in field of acoustics and optics. Waves in Medium: Speed of transverse waves on uniform string, Speed of longitudinal waves in a fluid, Energy density and energy transmission in waves. Group velocity and phase velocity and relationship between them. Reflection, refraction and diffraction of sound: Acoustic impedance of a medium, percentage					
	Interference: Principle of superposition, Division of wavefront and division of amplitude, Young's Double Slit experiment. Fresnel's Biprism, Phase change on reflection, Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings, measurement of wavelength and refractive index. Michelson's Interferometer, Formation of fringes, Determination of wavelength, Wavelength					
П	reflection & refraction at a Interference: Principle of Young's Double Slit ex treatment. Interference is inclination (Haidinger Fri measurement of waveleng Michelson's Interferomet	of superposition of superiment. From Thin Film (superiment), Fringer than defracter, Formation	resnel's Biprism, P s: parallel and we es of equal thicknes rive index.	hase chadge-shaps (Fizeau	od films. Fringes of equal rringes). Newton's Rings, of wavelength, Wavelength	12
П	Interference: Principle of Young's Double Slit extreatment. Interference in inclination (Haidinger Frimeasurement of waveleng Michelson's Interferomet difference. Diffraction: Fresnel Diffistraight edge, a slit and a straight edge.	of superposit periment. Fin Thin Film nges); Fringe th and refract er, Formation raction; Half- wire using ha	esnel's Biprism, P s: parallel and we es of equal thicknes rive index. n of fringes, Determined period zones. Zone	chase chase chase s (Fizeau mination plate. Fr	of wavelength, Wavelength esnel Diffraction pattern of a phofer diffraction; Single slit, ower of Grating.	11
	reflection & refraction at a Interference: Principle of Young's Double Slit extreatment. Interference is inclination (Haidinger Frimeasurement of waveleng Michelson's Interferomet difference. Diffraction: Fresnel Diffistraight edge, a slit and a Double slit. Multiple slits Polarization: Polarized double refraction, Nicol Fand elliptical polarization.	of superpositive periment. Find Thin Film nges); Fringe thand refracter, Formation faction; Half-wire using hawire using hawire using hawire nghamits frism, Double polarization polarization.	period zones. Zone image prism, Res mathematical representation of the prism of the period zone analytication of the period zone ana	chase chase chapes (Fizeau mination plate. Frau olving Posentation coid, Phase change and H	ped films. Fringes of equal a Fringes). Newton's Rings, of wavelength, Wavelength esnel Diffraction pattern of a phofer diffraction; Single slit,	11

PART - C: LEARNING RESOURCES

Text Book, Reference Book and Others

Text Books Recommended-

- 1. Berkely Physics Course: Vol.-III, 'Waves and Oscillations'
- 2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing
- 3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, S. Chand Publication
- 4. Physical Optics, A.K. Ghatak
- 5. Unified Physics- II, R. P. Goyal, Shivlal Agrawal Publications
- 6. Unified Physics- II, Navbodh Publications

Reference Books Recommended

- 1. Concepts of Physics by H.C. Verma
- 2. Fundamentals of Physics by R. Shankar
- 3. Optics by Ajoy

Online Resources (e-books/learning portals/other e-resources)

- Wave an introduction https://youtu.be/SuQE7eUEriU
- 2. Interference https://youtu.be/hvpYKPyT-vc
- 3. Diffraction https://youtu.be/3RZZQvEVrEA
- 4. Polarization https://youtu.be/nELYaf N528
- 5. Waves and Oscillations- https://archive.nptel.ac.in/courses/115/106/115106119/
- 6. Optics- https://archive.nptel.ac.in/courses/115/107/115107131/

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 100Marks

Continuous Internal Assessment (CIA):30 Marks

End Semester Examination (ESE): 70 Marks

Continuous Internal	20-20Assignment/ Seminar (1): 10	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks
E-d Comester	Two section - A & B	Mark: O2 Short answer type- 5x4 =20Marks

	Total Marks: 30	be considered against 30 Marks
E-d Somester	Two section - A & B	Mark; Q2. Short answer type- 5x4 =20Marks at of 2 from each unit-4x10=40 Marks
Examination	Section B: Descriptive answer 97	

Name and Signature of Convener & Members of CBoS:

FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

A	Program:Bachelor in	Science	Semester: IV	Session: 2024-2	5		
	(Diploma/ Degree/)	ionors)	PHSC- 04	P			
1	Course Code		Waves and O				
2	Course Title		Discipline Specific Course				
3	Course Type		As per prog	ram			
4	Pre-requisite (if any)	10 11	Ctuc	lents are expected to und	derstand		
5	Course Learning Outcomes (CLO)	laws and principles behind various optical photostery to wave nature of light. The students will also be able to Gain proficiency in operating laboratory equipment such a source i.e. mercury, sodium and Laser, spectrometers, polar demonstrating competence in setting up experiments, cali instruments, and collecting accurate data. Develop a deep understanding of optical principles so refraction, diffraction, dispersion, and interference, as well applications in various scientific disciplines. Analyze recorded data and formulate it to get desired results.					
6	Credit Value	01 Credit	1 Credit = 30 HoursLab	oratory work			
7	Total Marks	Maximum M	arks: 50 Minimum	Pass Marks: 20			
DA	DT P. CONTEN	T OF THE C	COURSE				
T F	TotalNo.of	earning-Training	g/performance Periods -30	Periods (30 Hours)			
	r. Objects	(At least 10 of	the following or related E	xperiments)	No. o Perio		
	O. San the F	requency of AC	mains with the help of Son	ometer.			
1		requeitcy of Ac	ing spectrometer.		30		
2	Determination of a	ofractive Index	of the Material of a given P	rism using			
3	The second second second						
	Spectrometer.	ersive Power of	the Material of a given Pris	m using Spectrometer			
		alue of Cauchy	Constants of a material of a	prism.			
-	The state of the s	esolving Power	of a Prism.				
	To determine the R	length of sodiur	n light using Fresnel Bipris	m.			
		length of sodiur	n light using Newton's Rin	gs Method.			
		avelength of La	ser light using Single Slit I	Diffraction.			
		langth of Sodiu	m light by laser diffraction.	TOTAL COLUMN			
1100		length of spectr	um of Mercury light using	plane diffraction			
1	Grating and Spectr	ometer.					
	To determine the R	lesolving Power	of a Plane Diffraction Gra	idth of the interference			
1	To determine the t	nickness of a thin	n paper by measuring the w	ridin of the interference			
	Ct	y a weage-snape	A I IIII				
1	fringes produced b	esolving nower t	telescope.				
1	14 Determination of r	esolving power	telescope.				
1	Determination of r	esolving power to on of sugar solu	telescope. tion using polarimeter. clocity of Waves, Wave Op	otics, Interference, Interfe	eromet		

Signature of Convener & Members (CBoS):

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PART - C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended

- 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. Practical Physics B.Sc II: R P Goyal, Shivlal Publications

ReferenceBooks Recommended

- 1. Practical Physics by S.L. Gupta and V. Kumar
- 2. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint
- 3. B.Sc. Practical Physics by C.L. Arora
- 4. Experimental Physics: Modern Methods by R.A. Dunlap

Online Resources (e-books/ learning portals/ other e-resources)

- 1. Link for e-Books for Physics: Physics Practical: https://egyankosh.ac.in/handle/123456789/82374; https://egyankosh.ac.in/handle/123456789/82374; https://egyankosh.ac.in/handle/123456789/82374;
- 2. Virtual Lab: https://vlab.amrita.edu/index.php?sub=1&brch=281
- 3. https://www.compadre.org/books/?ID=70&FID=63273
- 4. https://www.edutech.com/category/higher-education/engineering-labs/virtual-labs-1
- 5. https://phet.colorado.edu/en/simulations/wave-interference
- 6. https://egyankosh.ac.in/handle/123456789/82374

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

EndSemester Exam(ESE):35 Marks

Continuous InternalAssessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance -05 Total Marks - 15	Quiz +Marks	nall be considered
End Semester Exam (ESE):	Laboratory Performance: On spot Assessm Performed the Task based on lab. work Spotting based on tools & technology (writ Viva-voce (based on principle/technology)	- 20 Marks ten) – 10 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

P	ART-A: INTROD	UCTION		and the second		
Pr	ogram : Bachelor in (Diploma / Degree/		Semester - III	Session: 2024-2	025	
1	Course Code	PHSE-01				
2	Course Title		Introduction to Statis	tical Mechanics		
3	Course Type		Discipline Specifi	c Elective		
4	Pre-requisite (if, any)	As per Program				
5	Course Learning. Outcomes(CLO) Credit Value	physical phoCorrelate are laws.	enomenon nd compare the classical a cepts of statistical distrib	es and its requirement in and quantum statistical dispution laws for different	physica	
7	Total Marks	Max. Marks:	100		10	
PA	Total No. of Tea	ching-learning		iod) – 60 Periods (60 Hou	No. of	
U		ribution of Spec			Period	

I Maxwellian Distribution of Speeds In An Ideal Gas:
Distribution of speeds and velocity, experimental verification, distinction between mean, rms and most probable speeds, Doppler broadening of spectral lines, transport phenomena in gases: molecular collision, collision cross section, estimates of molecular diameter and mean free path; transport of mass, momentum and energy and inter-relationship, dependence on temperature and pressure.

Behaviour of Real Gases :deviation from ideal gas equation, the Virial equation, Andrew's experiment on CO₂ gas; critical constants.

II Macrostate & Microstate
Macrostate, Microstate, Number of accessible microstates and Postulate of equal a priori.
Concept of Ensemble: Concept of Gibb's ensemble, postulate of ensemble average, Micro Canonical, Canonical & Grand Canonical ensembles. Thermodynamic Probability, Postulate of Equilibrium and Boltzmann Entropy relation. Phase space, Phase trajectory, Volume element in phase space, Quantization of phase space and number of accessible microstates for free particle in 1D, free particle in 3D.

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III	Transition to quantum statistics: h as a natural constant and its implications, cases of particle in 1D and 1Dimensional harmonic oscillator, Quantum Statistical Distribution Laws: In-distinguishability of particles and its consequences, Bose-Einstein & Fermi Dirac statistics. Comparison of statistical distribution laws and their physical significance. Canonical Distribution Law: Boltzmann's Canonical Distribution Law, Boltzmann's Partition Function, Proof of Equipartition Theorem (Law of Equipartition of energy) and relation between	15
IV	Partition function and Thermodynamic potentials. Bose-Einstein Distribution Law and its Applications: Bose-Einstein Statistics: Heat capacity, Bose Einstein condensation, Radiation as a photon gas, Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law Fermi-Dirac Distribution Law and its Applications: Free electrons in a metal, Definition of Fermi energy, Determination of Fermi energy at absolute zero, Kinetic energy of Fermi gas at absolute zero and concept of Density of States, Specific Heat of Metals (Density of Orbitals). Macrostate & Microstate, ensemble, distribution laws, Bose-Einstein Statistics, Ferm	15

Name and Signature of Convener & Members of CBos:

PART-C:LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended -

- 1. Unified Physics -II, R P Goyal, Shivlal Agrawal & Sons Publication
- 2. Unified Physics-II, Yugbodh Prakashan
- 3. Unified Physics-II, Navbodh Prakashan

Reference Books Recommended-

- 1. F. Reif, "Statistical Physics (In SI Units): Berkeley Physics Course Vol 5", McGraw Hill, 2017
- 2. B.B. Laud, "Fundamentals of Statistical Mechanics", New Age International Private Limited, 2020
- 3. B.K. Agarwal, M. Eisner, "Statistical Mechanics", New Age International Private Limited, 2007

Online Resources-e-Resources / e-books and e-learning portals

- 1. MIT Open Learning Massachusetts Institute of Technology, https://ocw.mit.edu/courses/8-333statistical-mechanics-i-statistical-mechanics-of-particles-fall-2013/
- National Programme on Technology Enhanced Learning (NPTEL), https://archive.nptel.ac.in/courses/115/103/115103113/,
- https://onlinecourses.nptel.ac.in/noc19 ph10/preview,
- https://archive.nptel.ac.in/courses/115/106/115106126/
- Uttar Pradesh Higher Education Digital Library, http://heecontent.upsdc.gov.in/SearchContent.aspx
- Swayam Prabha DTH Channel,

https://www.swayamprabha.gov.in/index.php/program/current_he/8

PART-D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

100 Marks Maximum Marks:

Continuous Internal Assessment(CIA): 30 Marks

70 Marks End Semester Exam (ESE): Internal Test / Quiz-(2): 20 & 20 Better marks out of the two Test / Quiz Continuous Internal Assignment/Seminar-10 + obtained marks in Assignment shall be Assessment(CIA): Total Marks -30 considered against 30 Marks (By Course Teacher)

End Semester Exam Two section - A & B

(ESE):

Section A: Q1. Objective - 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., lout of 2 from each unit-4x10=40Marks

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

P	rogram:Bachelor in		Semester - IV	Session: 2024-2025	
1	Course Code	arionors)	PHSE-0)2	
2	Course Title	Mathematical Physics-I			
3	Course Type		Discipline Specific	c Elective	
4	Pre-requisite (if, any)		As per Progr		
5	Course Learning Outcomes(CLO)	probability ar ➤ Illustrate pro solving them ➤ Apply and spherical and ➤ Use Dirac D	nd probability distribution ficiency in writing and for a given physical systinterpret the curvilineat cylindrical symmetries. elta function for various hanical approaches.	solving Differential equation and em. or coordinates in problems with s physical situation, especially in	
	G. Jit Walne	4 Credits	Credit = 15 Hour	s -learning & Observation	
6	Credit Value	4 Citatio		Min Passing Marks: 40	

PART -B: CONTENT OF THE COURSE

Unit	Total No. of Teaching-learning Periods(01 Hr. per period) - 60 Periods (60 Hou Topics (Course Contents)	No. of Period
I	Calculus: Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions, Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers. Origin and Evolution of Mathematical concepts in Ancient India: Bhaskaracharya, the Inventor of Calculus: some examples on calculus	16
П	First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems.Particular Integral. Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.	16

Silv NC Ohney - 3:4000 and

and Poisson, with examples. Mean and variance. Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing.	15
Dirac Delta function and its properties: Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function. Problems based on dirac-delta function and its application	13
The second second	Probability. Bayes' Theorem and the idea of hypothesis testing. Dirac Delta function and its properties: Definition of Dirac delta function. Representation as limit of a Gaussian function and

Signature of Convener & Members (CBoS):

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PART-C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended -

- 1. Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning
- 2. Mathematical Physics, Goswami, 1st edition, Cengage Learning
- 3. Engineering Mathematics, S. Pal and S.C. Bhunia, 2015, Oxford University Press
- 4. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
- 5. Essential Mathematical Methods, K. F. Riley & M.P.Hobson, 2011, Cambridge Univ. Press.
- 6. Mathematical Physics, H.K. Dass and R. Verma, S. Chand & Company

Reference Books Recommended-

- 1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.
- 2. An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning
- 3. Differential Equations, George F. Simmons, 2007, McGraw Hill.
- 4. Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.

Online Resources-e-Resources / e-books and e-learning portals

- NPTEL online Courses: https://archive.nptel.ac.in/courses/115/105/115105097/
- NPTEL online Courses: https://nptel.ac.in/courses/115103036
- e-gyankosh- https://egyankosh.ac.in/handle/123456789/97951
- 4. Origin and Evolution of Calculus in India: http://mathematical-forum.org/wpcontent/uploads/2021/01/Paper-1.pdf
- 5. https://iks.iitgn.ac.in/wp-content/uploads/2016/02/Development-of-Calculus-in-India-K-Ramasubramanian-MD-Srinivas-2010.pdf
- Indian Mathematics: NPTEL Course: https://nptel.ac.in/courses/111101080

PART-D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

100 Marks Maximum Marks:

30 Marks

Continuous Internal Assessment (CIA): 70 Marks

End Semester Exam (ESE):

Assessment(CIA):

(By Course Teacher)

Continuous Internal Internal Test / Quiz-(2): 20 & 20

Assignment/Seminar-10

+ obtained marks in Assignment shall be

Better marks out of the two Test / Quiz

considered against 30 Marks

Total Marks -30

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective – $10 \times l = 10 \text{ Mark}$; Q2. Short answer type- $5 \times 4 = 20 \text{Marks}$ Section B: Descriptive answer type qts.,1 out of 2 from each unit-4x10=40Marks

Name and Signature of Convener & Members of CBoS:

FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	Program: Bachelor in	Science	Sem	ester: I	Session: 2024	1-25
(Cer	tificate/ Diploma/ De	gree/ Honor	s)	PHGE-01 T		
1	Course Code			Mechanics		
2	Course Title		C	ric Elective C	ourse	
3	Course Type					
4	Pre-requisite (if any)		A	s per Program	uld he able to:	
5	Course Learning Outcomes (CLO) After going through the course, the student should be able to: > Analyze and apply the laws of motion to various dynamical situation: > Explain and demonstrate the principle of conservation of momentum energy including their application in real-world scenario succollision and energy transformation. > Evaluate and calculate moment of inertia for objects of different shand analyze how these properties affect the motion of rotating bod. > Analyze flow of fluids. > Describe special relativistic effects and their effects on the mass energy of a moving object.					
6	Credit Value	03 Credits	1 Credit= 15 H	ours for Lear	ning & Observation	1
7	Total Marks	Maximum M		Minimum	Pass Marks: 40	
-	Γ – B: CONTENT OF TH	The second second second second				
1 / ()	Total No. of Teachin	z_learning Peri	inds (01 Hr. per	period) - 45 P	eriods (45 Hours)	
Unit	Total No. of Teaching		Course content			No. o
I	Historical Background: C biography of Vikram Sarabl Scalar & Vector products of physical significance. Laws of particles, Concept of Cen Motion of Rocket. Work a	nai with his cont of two vectors, I of Motion: Revi ter of Mass, Moti nd Energy: Wo	ribution. Vectors Derivatives of a v iew of Newton's I ion of center of ma ork-Energy theore	ector, Gradient caws of motion, ass, Conservation m for conservat	of scalar field and its Dynamics of a system of linear momentum, ive forces, Force as a	12
П	gradient of Potential Energy, Conservation of energy, Elastic and in-elastic Collisions Rotational Dynamics: Angular momentum, Torque, Conservation of angular momentum, Moment of Inertia, Theorem of parallel and perpendicular axes (statements only), Calculation of Moment of Inertia of discrete and continuous objects (Rectangular lamina, disc, solid cylinder, solid sphere). Elasticity: Stress & Strain, Hooke's law, Elastic constants, Poisson's Ratio, Relationship between various elastic modulii (without derivation), Work done in twisting a cylinder. Fluid Dynamics: Flow of fluids, Coefficient of viscosity, Derivation of Poiseulli's formula, Motion of a spherical body falling in a viscous fluid, Stoke's law, Expression for terminal velocity.					
	falling in a viscous filling of					
III	Gravitation: Newton's Lava plane, angular momentum only), Satellite in circular of Oscillations: Simple harmone Potential Energy, Total Energy	w of Gravitation, in is conserved, rbit and applicationic motion, Differgy and their tim	Motion of a partic areal velocity is ions, Geosynchron ferential equation e averages, Comp	cle in a central for constant), Kepl nous orbits. of SHM and its ound pendulum,	er's Laws (statements solutions, Kinetic and	11
III	Gravitation: Newton's Lav a plane, angular momentum only), Satellite in circular of Oscillations: Simple harmon	v of Gravitation, in is conserved, rbit and applicationic motion, Differgy and their time forced oscillationity: Frame of refuse Mormation, Length	Motion of a partic areal velocity is ions, Geosynchron ferential equation e averages, Comp ins (Conceptual or ference, Galilean Triey's Experiment contraction, Time	cle in a central for constant), Kepl mous orbits. of SHM and its ound pendulum, sly). Cransformations, t, Postulates of Seculation, Relation, Relations.	solutions, Kinetic and Differential equations Inertial and Non-Special Theory of vistic transformation	10



PART - C: LEARNING RESOURCES

Text Books, Reference Books Recommended and Others

Text Books Recommended-

- 1. Mechanics & Properties of matter, D.C. Tayal & P. Tayal, 2023, Pub. By Authors.
- 2. Unified Physics I -R. P. Goyal, Shivlal Agrawal Publication
- 3. Unified Physics I, Navbodh Publication

Reference Books Recommended-

- 1. Mechanics, Berkeley Physics, vol.1, C. Kittel, W. Knight, et.al. 2007, Tata McGraw-Hill.
- 2. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
- 3. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.

Online Resources (e-books/ learning portals/ other e-resources)

- 1. All e-books of physics https://www.e-booksdirectory.com/listing.php?category=2
- 2. Free physics text book in PDF
- https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yy6xK1s0Km a0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
- 4. Cambridge University Books for Physics https://www.cambridgeindia.org/
- 5. Books for solving physics problems https://bookboon.com/en/physics-ebooks
- NPTEL Online courses https://archive.nptel.ac.in/courses/115/106/115106123/;
- 7. BSc Lectures by Prof. H C Verma: https://bsc.hcverma.in/index.php/course/relativity; https://bsc.hcverma.in/index.php/course/relativity;

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA):

(By course teacher)

Internal Test/ Quiz (2):

Assignment/ Seminar (1):

Total Marks:

20 + 20

Better marks out of the two Test / Quiz

+ marks obtained in Assignment shall be considered against 30 Marks

End Semester Two Exam (ESE): Sect

Two section - A & B

Section A: Q1. Objective -10 x1 = 10 Mark; Q2. Short answer type-5x4 = 20 MarksSection B: Descriptive answer type, 1 out of 2 from each unit-4 x 10=40 Marks

Name and Signature of Convener & Members of CBoS:

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FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	RT – A: INTRODI	UCTION			
(Ce	Program: Bachelor ertificate/ Diploma/ D		Semester: I	Session: 20	024-25
1	Course Code		PHGE- 01	P	
2	Course Title		Mechanics	S	
3	Course Type		Generic Elective	Course	
4	Pre-requisite (if any)		As per Progr	am	
100	Course Learning Outcomes (CLO)	understand work The Students wil Assemble receive experiments. Record/obser Analyze record Interpret resur	uired parts/devices a rve data as required by rded data and formula Its and check for attair	aws of classical mand arrange them to the experimental of the it to get desired rangement of proposed of	perforn pjectives esults.
6	Credit Value		s of mechanics and its		
	Total Marks	Maximum Mark		ım Pass Marks: 20	
	RT - B: CONTEN		The state of the s	IIII 1 455 WIATRS. 20	
Ar	The state of the s			n : 1 /nn : 1	
C			ormance Periods- 30		N
Sr. No.		t least 10 of the for	lowing or related Ex	(periments)	No. of Period
1		ength (or diameter)	using vernier caliper,	screw gauge and	1 01 100
	travelling microsco			,	30
2	To study the rando	m error in observat	ions.		
3	To study the motio	n of the spring and	calculate (a) Spring of	constant and, (b) g.	
4	To determine the N	Moment of Inertia o	f a Flywheel.		
5	To determine g and Technique.	l velocity for a free	ly falling body using	Digital Timing	
6	To determine Coef (Poiseuille's metho		of water by Capillary	Flow Method	
7	To determine the Y	oung's Modulus of	a Wire by Optical Le	ever Method.	
8			of a Wire by Maxwe		
0	To determine the el		wire by Searle's met	thod	
9			Pendulum		
	To determine the va				
9					
9 10	To determine the value of bending of	alue of g using Kate f a beam/ cantileve	er's Pendulum.		
9 10 11	To determine the volume To determine the volume Study of bending of To determine Mom	alue of g using Kate f a beam/ cantilever ent of Inertia of an	er's Pendulum.	ertia Table	

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PART - C: Learning Resources

Text Books, Reference Books and others

Text Books Recommended-

- 1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
- 2. Engineering Practical Physics, S.Panigrahi& B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
- 3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- 4. Practical Physics B.Sc. I: R P Goyal, Shivlal Publications

Reference Books Recommended-

- 1. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint
- 2. Practical Physics by G.L. Squires
- 3. An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements by John R. Taylor
- 4. Mechanics and Properties of Matter by J.C. Upadhyaya

Online Resources (e-books/ learning portals/ other e-resources)

- 1. Link for e-Books for Physics: Physics Practical:
 - https://www.uou.ac.in/sites//default/files/slm/BSCPH-104.pdf
- 2. Virtual Lab : https://vlab.amrita.edu/?sub=1&brch=74
- 3. https://vlab.amrita.edu/?sub=1&brch=74&sim=571&cnt=1
- 4. https://www.ae.msstate.edu/vlsm/

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

50 Marks Maximum Marks:

Continuous Internal Assessment (CIA): 15 Marks

35 Marks End Semester Exam (ESE):

Continuous Internal

Internal Test / Quiz - (2): 10 & 10 Assignment/Seminar +Attendance -Assessment (CIA):

Total Marks -(By Course Teacher)

Better marks out of the two Test/Quiz +Marks obtained in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):

Laboratory Performance: On spot Assessment

Performed the Task based on lab. work -20 Marks Spotting based on tools & technology (written) - 10 Marks

Viva-voce (based on principle/technology) - 05 Marks

Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

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FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

-	Program: Bachelor		Semes	ster: II	Session: 2024	1-25	
1	Certificate/ Diploma/ Do	egree/ Honors)	P	HGE-02 T			
2	Course Code Course Title				NETISM		
3		Generic Elective Course As per Program					
4	Course Type Pre-requisite (if any)						
5	Course Learning Outcomes (CLO)	After going through the course, the student should be able to: > State various laws related with electrostatics, dielectric, electric curre magnetism and electromagnetic induction. > Apply vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics. > Compare rise and decay of current in LR, CR, LCR circuits. > Apply Biot-Savart law for calculation of magnetic field in simple geographic situations. > Derive and analyze Maxwell's equations.					
6	Credit Value	03 Credits 1 Ct	edit= 15 Hou	urs for Lear	ning & Observatio	n	
7	Total Marks	Maximum Mark		Minimum	Pass Marks: 40	THE	
Un		Topics (Co	ourse conten	ts)		No. of Period	
I	Chhattisgarh. Vector Analysis: D of Vector fields, O	hattisgarh: An overvivergence & Curl of Sauss-divergence the	Vector fields, I	Line, surface a	nd volume integrals of vectors and its	12	
	electric flux, Gauss	's theorem of electros	statics. Electr statics, Applica	ostatics field: ations of Gaus	Electrostatic Field, as theorem- Electric harged conductor		
10	electric flux, Gauss field due to point ch Electrostatic poten a point charge, Calc capacitor, Energy pe Dielectric & Electr Gauss's theorem in Steady current, curr	s theorem of electrosarge, infinite line of cetial: Electric potential culation of electric firer unit volume in electric Currents: Dielectrics, Parallel pent density J, non – s	statics. Electristatics, Applications, Applications, Applications, I as line integrated from potentrostatic field. It is medium, I olate capacitor teady current as	ostatics field: ations of Gaus harged sheet, c al of electric fi itial, Capacitar Polarisation, D completely fi	ss theorem- Electric harged conductor. eld, potential due to nice of Parallel plate visplacement vector, lled with dielectric.	13	
II	electric flux, Gauss field due to point ch Electrostatic poten a point charge, Calc capacitor, Energy pe Dielectric & Electr Gauss's theorem in Steady current, curr decay of current in I Magnetism: Magnet circular coil, soleno vector potential, Am Magnetic properties	s theorem of electrosarge, infinite line of carge, infinite line of electric fluorements: Dielectric Currents: Dielectric C	statics. Electricatatics, Applications, Applications, Applications, Indianated Interpretation of the Application of the Applica	ostatics field: ations of Gaus harged sheet, c al of electric fi hitial, Capacitan Polarisation, E completely fi and Continuity s applications- d curl of magn magnetic indu	st theorem- Electric harged conductor. eld, potential due to nee of Parallel plate bisplacement vector, lled with dielectric equation, Rise and straight conductor, etic field, Magnetic ection, permeability,	13	
	electric flux, Gauss field due to point charge, Calc capacitor, Energy pe Dielectric & Electric Gauss's theorem in Steady current, curredecay of current in I Magnetism: Magnetic roular coil, soleno vector potential, Am Magnetic properties magnetic susceptibil V Electromagnetic In and mutual inductar Maxwell's equation	s theorem of electrosarge, infinite line of carge, infinite line of electric fider unit volume in electric Currents: Dielectric Currents: Dielectric Currents: Dielectric Currents: Dielectric Currents, Infinite line of carging current, Infinite line of carging carging current, Infinite line of carging carginal carging carging carginal carging carginal cargi	statics. Electrostatics, Applications, Applications, Applications, Applications, Inc. Inc. Inc. Inc. Inc. Inc. Inc. Inc.	ostatics field: ations of Gaus harged sheet, c al of electric fi hitial, Capacitar Polarisation, D completely fi and Continuity sapplications- d curl of magn magnetic indund ferro-magn hagnetic inducts, Energy store regation: Equa	st theorem- Electric harged conductor. eld, potential due to nee of Parallel plate visplacement vector, lled with dielectric. requation, Rise and straight conductor, etic field, Magnetic etic materials. tion, Lenz's law, self ed in magnetic field.		

PART - C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books

- 1. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- 2. Unified Physics Part II, R. P. Goyal, Shivlal Agrawal and Sons
- 3. Unified Physics Navbodh Publications
- 4. Introduction to Electrodynamics and Electromagnetism, H. C. Verma,

Reference Books

- Vector analysis Schaum's Outline, M.R. Spiegel, S. Lipschutz, D. Spellman, 2nd Edn., 2009, McGraw-Hill Education.
- 2. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

Online Resources (e-books/ learning portals/ other e-resources)

- 1. All e-books of physics https://www.e-booksdirectory.com/listing.php?category=2
- 2. Free physics text book in PDF

 https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yv6xK1s0Kma0
 VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
- 3. Cambridge University Books for Physics https://www.cambridgeindia.org/
- 4. Books for solving physics problems https://bookboon.com/en/physics-ebooks
- 5. NPTEL Online courses: https://onlinecourses.nptel.ac.in/noc21_ph05/preview
- 6. https://archive.nptel.ac.in/courses/115/104/115104088/
- 7. Classical Electromagnetism 1 (Electrostatics) https://bsc.hcverma.in/course/cee1
- 8. Classical Electromagnetism 2 (Electrostatics) https://bsc.hcverma.in/course/cee2

PART - D: Assessment and Evaluation

Suggested Continuous	Evaluation Methods:		
Maximum Marks:		100 Marl	ks
Continuous Internal A	assessment (CIA):	30 Mar	ks
End Semester Examin	ation (ESE):	70 Marl	ks
Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2): Assignment/ Seminar (1) Total Marks:	20 + 20): 10 30	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks
End Semester Examination (ESE):			Mark; Q2. Short answer type- 5x4 =20 Marks out of 2 from each unit- 4 x 10=40 Marks

Name and Signature of Convener & Members of CBoS:

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FOUR YEARS UNDERGRADUATE PROGRAM (2024 - 28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

PA	RT - A: INTRODI	UCTION					
	Program: Bachelor Certificate/ Diploma/ D	in Science	110000000000000000000000000000000000000	ester: II	Session: 2024	1-25	
1	Course Code	2 P					
2	Course Title	Electricity & Magnetism					
3	Course Type	Generic Elective Course					
4	Pre-requisite (if any)	As per program					
5	Course Learning Outcomes (CLO)	laws of Elec Verify circuits experin Verify Farado measu Record record Interpr	tricity, Magnetis, various circuit s. Assemble requents. various laws in my's law and leving instruments. V observe data and form	m and EMWs. laws, network itred parts/dev electricity an arn about the s required by the ulate it to get a eck for attainn	nent of proposed objecti	able to ple electric to perform Lenz's law, of various es. Analyze	
6	Credit Value	01 Credit	1 Credit = 30	Hours Labor	ratory Work		
7	Total Marks	Maximum !			Pass Marks: 20		
PA	RT - B: CONTENT			100000000000000000000000000000000000000			
				e Periods - 30	Periods (30 Hours)		
Sr.			the following			No. of	
No				, remited Ex	periments	Periods	
1	To use a Multimeter	for measuring	g (a) Resistance	s, (b) AC and	DC Voltages,(c) DC	x crious	
	Current, and (d) che	cking electrica	al fuses.			30	
2	To compare capacita		HENCER HENCE CO.	·.	THE PERSON NAMED IN		
3	Measurement of fiel	d strength B a	nd its variation	in a Solenoid	Determine (dB/dx).		
4	To study the Charact	teristics of a S	eries RC Circui	t.			
5	To study a series LC Factor.	R circuit and	determine its (a) Resonant Fr	equency, (b) Quality		
6	To study a parallel L (b) Quality factor Q.				ant frequency and		
7	To determine a Low			Bridge.			
8	To verify the Theven	in and Norton	theorem.				
9	To verify the Superpo	osition, and N	faximum Power	Transfer The	eorem.		
10	To use a vibration ma			etic field.			
11	Study of magnetic fie	eld due to a cu	rrent loop.				
12	Study of magnetic fie	elds using Def	lection Magnet	ometer			
13	Mini Project: Construc	tion and Study	of Solenoid and	measurement o	of its magnetic field		
Кеун	Multimeter, Ca	pacitance Cor	mparison, Mag	netic Field, R	C Circuit, Series LCI	R Circuit,	
ana	ture of Convener & Mer			I LICO	incar rileorems		

PART - C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended-

- 1. Engineering Practical Physics, S. Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt.
- 2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- 3. Unified Practical Physics: R P Goyal, Shivlal Agrawal & Sons
- 4. Unified Practical Physics: Yugbodh Prakashan
- 5. Unified Practical Physics: Navbodh Prakashan

Reference Books Recommended-

- 1. Basic Electrical and Electronics Engineering by S. K. Bhattacharya
- 2. A Textbook of Electrical Technology by B.L. Theraja and A.K. Theraja (Volumes 1 and 2)
- 3. Engineering Circuit Analysis by William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin
- 4. Practical Physics by G.L. Squires

Online Resources (e-books/ learning portals/ other e-resources)

- Link for e-Books for Physics: Physics Practical: https://www.uou.ac.in/sites//default/files/slm/BSCPH-104.pdf
- 2. Virtual Lab :https://vlab.amrita.edu/index.php?sub=1&brch=192
- 3. http://emv-au.vlabs.ac.in/#
- 4. https://www.ae.msstate.edu/vlsm/
- 5. https://nationalmaglab.org/magnet-academy/watch-play/interactive-tutorials
- 6. https://jigyasa-csir.in/cgcri/n12-t4-a3/

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam(ESE): 35 Marks

Internal Test / Quiz-(2): 10 & 10 Better marks out of the two Continuous Internal Assignment/Seminar + Attendance -05 Test / Quiz + Marks obtained Assessment (CIA): Total Marks -(By Course Teacher) in Assignment shall be considered against 15 Marks Laboratory Performance: On spot Assessment Managed by **End Semester** Performed the Task based on lab. work - 20 Marks Course teacher Exam (ESE): Spotting based on tools & technology (written) - 10 Marks as per lab. status Viva-voce (based on principle/technology

Name and Signature of Convener & Members of CBoS:

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FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

Z	ART – A	: INTRO	DUCTION						
		A COLUMN TO THE PARTY OF THE PA	helor in Science na/ Degree/ Honor	rs)	Semester	I/III/V	Session	: 2024-2	
	Course Co	de			PHVAC-0	1			
9	Course Tit	le ·	Re	Renewable Energy and Energy Harvesting					
	Course Ty	pe	Value Addition Course						
	Pre-requis	ite (if any)		As per Program					
5 Course Learning				re expected s at nationa sources of	d to learn about al and internation energy and the	t: ional scenari ir importanc	o. e.	newable	
	Tork to the				ble energy reso		ıa.		
-	Calian	•			gy harvesting		01		
5	Credit Va	7,000	02 Credits		= 15 Hours-				
7	Total Mar		Maximum Mark			Minimum	Pass Mark	cs: 20	
P	ART -	3: CONTE	ENT OF THE	COURS	E				
	То	tal No. of Tea	ching-learning Per	iods (01 Hr	. per period) -	30 Periods	30 Hours)		
Unit			Topics					No. of	
	I	energy, thei sources. Lin aspect of en	s and Alternate S ir limitation, need of mitations of non-co- ergy, World energy al Energy: Geothern	of renewable onventional status, Ene	e energy, non energy resourgy scenario in	-conventionarces. Envir India.	al energy onmental	07	
	II	Solar energing pond, non-consolar water green house of photovol Hydro Er	gy: Solar energy, is convective solar pon- heater, flat plate consess, solar cell, absorp- taic (PV) systems, somergy: Hydro pow- ntal impact of hydro	ts important d, application collector, so otion air con un tracking wer resour	nce, storage of cons of solar peoplar distillation additioning. New systems.	f solar ener and and sola a, solar cool ed and chara	gy, solar r energy, ter, solar ecteristics	08	
	III	generation, diagram), l Biodiesel p Ocean En	factors affecting bio biogas from plant roduction from non- ergy: Ocean Energics and Statistics, Way	o-digestion, waste, bio edible oil s y Potentia	working of bio mass energy peeds.	ogas plant (w programme	ith block in India,	08	
	TV Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines. grid interconnection topologies. Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect, piezoelectric materials, Piezoelectric Energy harvesting						07		
applications. Keywords: Fossil fuel, Renewable energy sources, Solar energy, Biomass energy, Electromas Energy Harvesting, Piezoelectric Energy harvesting.									

PART - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

- 1. Non-conventional energy sources G.D Rai Khanna Publishers, New Delhi
- 2. Solar energy M P Agarwal S Chand and Co. Ltd.
- 3. Solar energy Suhas P Sukhative Tata McGraw Hill Publishing Company Ltd.
- 4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University.
- 5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
- 6. J. Balfour, M. Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).

Reference Books Recommended-

- 1. Non-Conventional Energy Resources by B.H. Khan
- 2. Renewable Energy Sources and Emerging Technologies by D.P. Kothari, K.C. Singal, and Rakesh Ranjan
- 3. Solar Energy: Fundamentals, Design, Modelling and Applications by G.N. Tiwari
- 4. Hydropower Development in India: A Sector Assessment by Pradeep Chaturvedi
- Biomass Conversion: The Interface of Biotechnology, Chemistry and Materials Science by Samir K. Khanal, edited by B.C. Meikap and P.K. Bhattacharya
- 6. Ocean Energy: Technology, Environmental Impact and Renewable Energy by Pranav Kumar and T. Balaji
- 7. Wind Energy: Theory and Practice by S. Rao and Dr. B.B. Parulekar
- 8. Piezoelectric Materials and Devices: Applications in Engineering and Medical Sciences by Arun Ghosh

Online Resources (e-books/ learning portals/ other e-resources)

- 1. http://en.wikipedia.org/wiki/Renewable energy
- 2. Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems Course (nptel.ac.in)
- 3. Technologies For Clean And Renewable Energy Production NPTEL+
- 4. NPTEL :: Mechanical Engineering NOC:Selection Of Nanomaterials For Energy Harvesting And Storage
 Application
- 5. Wind energy Labs: Mechanical Engineering: Amrita Vishwa Vidyapeetham Virtual Lab
- 6. Virtual Labs (vlabs.ac.in)
- 7. https://youtu.be/uY3x7Tycyps

PART - D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Internal Test/ Quiz- (2): 10

Assessment (CIA):
(By course teacher)

Assignment/ Seminar+ Attendance- 05
Total Marks
Internal Test/ Quiz- (2): 10 + 10
Assignment/ Seminar+ Attendance- 05
Total Marks
Better marks out of the two Test / Quiz
+ marks obtained in Assignment shall be considered against 15 Marks.

End Semester
Examination (ESE):

Two section - A & B

Section A: Q1. Objective -05 x1 = 05 Mark; Q2. Short answer type- 5x2 = 10 Marks Section B: Descriptive answer type qts.,1 out of 2 from each unit- 4x05 = 20 Marks

Signature of Convener & Members (CBoS):

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FOUR YEARS UNDERGRADUATE PROGRAM (2024-28) DEPARTMENT OF PHYSICS COURSE CURRICULUM

	Pr	ogram: Bache	lor in Science	Semeste	er: II/ IV/V/ VI	Session: 2	024-25		
(/ Degree/ Honors)						
1	Course Code				PHSEC-01				
2	Course Title			Racio	Electrical Skill	, - , , , , , , , , , , , , , , , , , ,			
3	Cour	se Type			hancement Cours	S.C.			
4	Course Type Pre-requisite (if any)					, c			
5		rse Learning		As per Program					
		comes (CLO)	electrical skill th ➤ Understandin ➤ Using basic ➤ Using variou	 Using basic mechanical tools. Using various measuring instruments. 					
6	Cred	lit Value	02 Credits		Hours for Theore		g & =		
			(1C+1C)	30 Hours La	boratory or Field	learning/ Tra	ining		
7	Tota	l Marks	Maximum Ma	rks: 50	Minimum Pas	s Marks: 20			
PA	RT-	B: CONTE	NT OF THE CO	URSE					
	179				arning Periods:				
		Theory – 15 Per	iods (15 Hrs) and Lab	or Field learning	ad/Training 30 Perio	de (30 Hours)			
				. or ricia rearrin	ig/ Halling 30 Fello	da (ao modra)			
Mo	odule	Measurement	Topic	(Course Conte	ents)		No. o		
Mo	l	used physical Voltage, Resist D.C. Circuit: application, Pri A.C. Circuits instantaneous & Heating & Lig applications, id Working: Wo Inverters, Mixe Safety measur	didea about accuracy quantities (Length, ance, capacitance, incommany and secondary of Generation of AC & RMS values, idea all thing effects of currea of commonly used orking principle of or, Electric heater etcements- Safety meas	in measurement Mass, Density ductance, frequer di parallel resistancells, maintenance voltage, wave bout R, L, C circ ent: Joule's law lighting bulb, tu Domestic appli urements in work	measuring devices Temperature, Poncy etc). The of secondary cells shape, frequency, iuits of electric heating a sibe, CFL, LED. Temperature, Poncy etc). The of secondary cells shape, frequency, iuits of electric heating a sibe, CFL, LED. The of secondary cells shape, frequency iuits	for commonly ower, Current, ff's law& their peak, average, and its domestic fan, Cooler,	Perio		
Mo	l	used physical Voltage, Resist D.C. Circuit: application, Pri A.C. Circuits instantaneous & Heating & Lig applications, id Working: Wo Inverters, Mixe Safety measur tools, testing at Laboratory W	didea about accuracy quantities (Length, ance, capacitance, incommary and secondary of Generation of AC RMS values, idea all thing effects of currea of commonly used orking principle of the common o	in measurement Mass, Density ductance, frequent parallel resistancells, maintenance voltage, wave bout R, L, C circlent: Joule's law lighting bulb, to Domestic appliances.	measuring devices y, Temperature, Poncy etc). nee circuit, Kirchhoode of secondary cells shape, frequency, iuits of electric heating a libe, CFL, LED. iances like electric king with mechanical	for commonly ower, Current, ff's law& their peak, average, and its domestic fan, Cooler,	Perio		
Mo	1	used physical Voltage, Resist D.C. Circuit: application, Pri A.C. Circuits instantaneous & Heating & Lig applications, id Working: We Inverters, Mixe Safety measur tools, testing at Laboratory W (i) Us and (ii) Us (iv) De (v) Fa	didea about accuracy quantities (Length, ance, capacitance, incommary and secondary of Generation of AC & RMS values, idea all thing effects of currea of commonly used orking principle of or, Electric heater etcements- Safety meas and repair of electrical	in measurement Mass, Density ductance, frequent parallel resistancells, maintenance voltage, wave bout R, L, C circe ent: Joule's law lighting bulb, tu Domestic appliances. ewdriver, Pliers, ing iron etc. int meter, electro of extension boardy	measuring devices y, Temperature, Poncy etc). nee circuit, Kirchhoo ee of secondary cells shape, frequency, iuits of electric heating a be, CFL, LED. iances like electric king with mechanica	for commonly ower, Current, ff's law& their peak, average, and its domestic fan, Cooler,	Perio 15		

Signature of Convener & Members (CBoS):

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Text Books, Reference Books and Others

Text Books Recommended-

- 1. A text book in Electrical Technology B L Theraja S Chand and Co.
- 2. Electrical circuits, M Nahvi and J Edminister, Schaum's outline series, Tata McGraw 2005
- 3. Circuit Theory, A Chakraborti, Dhanpat Rai & Co.
- 4. A Text book of electrical technology, Vol.1, B L Thereja, S. Chand & Co, Delhi
- 5. A text book of electrical technology- J B Gupta, SK Kalaria & Sons,
- Principle of electrical engineering- V K Mehta, Rohit Mehta, S. Chand & Co, Delhi Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

Reference Books Recommended

- 1. Electrical and Electronic Measurements and Instrumentation by R.K. Rajput
- Electrical Workshop: Safety, Commissioning, Maintenance & Testing of Electrical Equipment by R.P. Singh
- 3. Electricity and Magnetism by D.N. Vasudeva

Online Resources (e-books/ learning portals/ other e-resources)

- 1. National Digital Library- https://ndl.iitkgp.ac.in/
- 2. https://nptel.ac.in/courses/108/108/108 108076/
- 3. Basic Instrumentation Skills Selfstudy Institute
- 4. physics.iisuniv.ac.in
- https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/note 1469078786.PDF

PART - D: ASSESSMENT AND EVALUATION

Suggested Cont	inuous	Evaluation Meth	iods:			
Maximum Marks: 50 Marks						
Continuous Int	ernal A	ssessment (CIA)	: 15 Marks			
End Semester I	Exam (E	ESE):	35 Marks			
Continuous Internal Internal Test			/ Quiz-(2): 10 & ninar + Attendance -		/ Quiz + m	out of the two Test arks obtained in shall be considered arks
End Semester Examination (ESE)	A. Per B. Sp	formed the Task otting based on	formance: On spot k based on learned a tools (written) n principle/technolo	skill - –	20 Marks C 10 Marks	valuation by Coordinator

Signature of Convener & Members (CBoS):

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