

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

172	B.A.Economics	NME: Information Management	20UEO4N3	2020
173	B.A.Economics	Core III: Human Resource Management	20UEO510	2020
174	B.A.Economics	Core III: Investment Policies and Programmes	20UEO511	2020
175	B.A.Economics	Core III Elective: Statistical Methods - I	20UEO5E1	2020
176	B.A.Economics	Core III Elective: Information Management	20UEO5E2	2020
177	B.A.Economics	Core III: Window Based Office Automation and Tally	20UEO512	2020
178	B.A.Economics	Core III: Economics of Transport	20UEO616	2020
179	B.A.Economics	Core III Elective: Statistical Methods - II	20UEO6E3	2020
180	B.A.Economics	Core III Elective : Principles of Management	20UEO5E4	2020
181	B.A.Economics	Core III: Tourism Economics	20UEO6E5	2020
182	B.A.Economics	Core III Elective: Women and Economy	20UEO6E6	2020
183	B.A.Economics	Skill Based: Advertising and Sales Promotion	20UEO6S3	2020
184	B.Sc. Mathematics	Core I: Classical Algebra	20UMS101	2020
185	B.Sc. Mathematics	Core II: Calculus	20UMS102	2020
186	B.Sc. Mathematics	Allied I: Mathematical Statistics-I	20UMS1A1	2020
187	B.Sc. Mathematics	Core III: Trigonometry, Vector Calculus and Fourier Series	20UMS203	2020
188	B.Sc. Mathematics	Core IV: Analytical Geometry	20UMS204	2020
189	B.Sc. Mathematics	Allied II: Mathematical Statistics-II	20UMS2A2	2020
190	B.Sc. Mathematics	Core VI: Numerical Techniques	20UMS306	2020
191	B.Sc. Mathematics	NME: Quantitative Aptitude -I	20UMS3N1	2020
192	B.Sc. Mathematics	Core VIII: Operations Research -I	20UMS408	2020
193	B.Sc. Mathematics	NME: Quantitative Aptitude -II	20UMS4N3	2020
194	B.Sc. Mathematics	Core XI: Operations Research-II	20UMS511	2020
195	B.Sc. Physics	Core VIII: Optics & Spectroscopy	20UPS508	2020
196	B.Sc. Physics	Core VII : Mechanics	20UPS507	2020
197	B.Sc. Physics	Summer Internship or Vocational training/ Project	20UPS511	2020



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198	B.Sc. Physics	Core I : Properties of Matter	20UPS101	2020
199	B.Sc. Chemistrty	Core Paper – V : Coordination and Bioinorganic Chemistry	20UCY507	2020
200	B.Sc. Botany	Major Paper XIV - Horticulture & Plant Breeding	20UBY614	2020
201	B.Sc. Botany	Skill based subjects (Major electives)-Forest Botany	20UBY6S3	2020
202	B.Sc. Botany	Major Paper XIII – Biotechnology and Genetic engineering	20UBY510	2020
203	B. Sc. Zoology	Core Major Paper I : Non Chordata	20UZY101	2020
204	B. Sc. Zoology	Core Major Paper II : Chordata	20UZY202	2020
205	B. Sc. Zoology	Ancillary Zoology Paper-II Economic Zoology	20UBY2A2	2020
206	B. Sc. Zoology	Core Major Paper- V: Genetics	20UZY405	2020
207	B. Sc. Zoology	Core Major Paper-X Biochemistry and Bioinformatics	20UZY510	2020
208	B. Sc. Zoology	Major Practical -III (Non Smester Pattern) Developmental Biology , Animal Physiology&Endocrinology, Biostatistics and Biophysics, Bioinformatics &Biochemistry and MLT	20UZY614	2020
209	B. Sc. Zoology	Skill Based Elective (SBE) Vermiculture	20UZY6S3	2020
210	B. Sc. Zoology	Core Elective Paper-VI Wild life Concervation	20UZY6E6	2020
211	M.Com	Internet,HTML and Cyber Security	20PCO103	2020
212	M.Com	Labour Legislation	20PCO309	2020
213	Tamil Aided	Tamil Paper I	20UTL101	2020
214	Tamil Aided	Tamil Paper II	20UTL202	2020
215	Tamil Aided	Tamil Paper III	20UTL303	2020
216	Tamil Aided	Tamil Paper IV	20UTL404	2020
217	B.A Tamil	Ikkala illakiyam	20UTM101	2020
218	B.A Tamil	Sitru illakiyam	20UTM204	2020
219	B.A Tamil	Kappiyangal	20UTM509	2020
220	B.A Tamil	Sanga illakiyam Ettutogai	20UTM613	2020
221	B.A Tamil	Sanga illakiyam pattupattu	20UTM614	2020



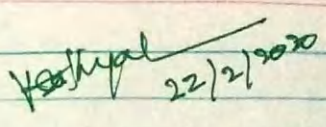
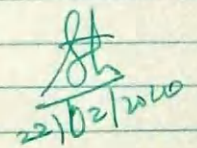
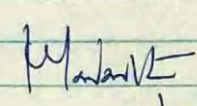
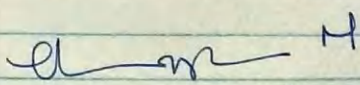
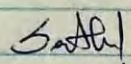
Metric : 1.2.1

New Course Introduced

Dr. R. MUTHUKUMARAN,
M.A.,M.Phil.,B.Ed.,Ph.D.,
PRINCIPAL
N.G.M. College, Pollachi - 642 001

BOARD OF STUDIES IN PHYSICS UG & P
SATURDAY 22.02.2020

106

S.NO	MEMBERS	SIGNATURE
1.	Dr. V. Sathyabama HOD OF Physics NGM College, Pollachi	 22/2/2020
2.	Dr. L. Senthilkumar Professor Department of Physics Bharathiar University Coimbatore (University Nominee)	 22/02/2020
3.	Dr. K. Marimuthu Assistant Professor of Physics Gandhigram Rural Institute (Deemed University) Gandhigram - 612 302 (Academic Auditor)	 22/02/2020
4.	Dr. M. Thenmozhi Associate Professor of Physics Sri Sarada College for Women Salem - 636 016 (Subject Expert)	 22/2/2020
5.	Mr. S. P. Senthil Subramaniam Mighty Electronics Equipments Corporation, 1b, First Street, Palaniappa Nagar, Sowripalayam Coimbatore - 641 028 (Industrial Expert)	 22/02/2020

Minutes of the Meeting

The meeting of Board of Studies in Physics was conducted on 22.02.2020 at 10 A.M in the Dept. of Physics. The complete syllabi for the B.Sc Students ^{to be} admitted in the academic year (2020-23) and M.Sc ~~by~~ Students (2020-22) are reviewed

The suggestions made by the members of the board are accepted and necessary modifications to be incorporated into the syllabi are recorded for implementation.

For UG Students

① Mechanics (19UPS102) removed from Semester I.

② Stru. Properties of Matter (19UPS101) to be strengthened.

Total no. of contact hours increased from 3hr to 6hr.

③ Heat and Thermodynamics (20UPS202)

↳ D.S. Mathur book to be followed for Unit I.

4. Mathematical Physics (20UPS508) to be shifted to Semester II from I.

5. Electricity and Magnetism (20UPS304) from III to IV.

6. To Merge Digital and Basic Electronic Circuits (20UPS509) and (20UPS510) as Analog and Digital Electronics in the Next Board

7. Optics and Spectroscopy (20UPS405) to be split into optics and spectroscopy in the Next board

S.NO	MEMBERS	SIGNATURE
6.	Dr. M. Sethuraman Associate Professor of Physics Sri Ramakrishna Mission Vidyalaya College of Arts & Science Coimbatore - 641 020 (Alumni)	M. Senthuram
7.	Dr. T. E. Manjula Valli	Dr. T. E. Manjula Valli 22/02/20
8.	Mrs. N. Revathi	Ms 22/2/20
9.	Dr. M. Karthika	1/1/20
10.	Mrs. S. Shanmugapriya	Ms 22/2/20
11.	Dr. A. Suresh Kumar	Ms 22/2/20
12.	Ms. S. Yageswari	Ms 22/2/20
13.	Mr. T. Ponraj	Ms 22/2/20
14.	Dr. A. G. Kannan	Ms 22/2/20
15.	Mrs. V. Yasodha Mahalakshmi	Ms 22/2/20
16.	Mr. K. Raghul Kumar	Ms 22/2/20
17.	Ms. M. Gayathri	Ms 22/2/20

8. Complete revamp of Ancillary Physics both in Practicals and theory.

Internship at the end of Semester IV
Maximum marks - 100.

9. Value Added Programme PCB and Circuit design and Remote Sensing and Data Fusion Using IOT ~~core to be~~ are approved passed ~~for~~ and approved.
10. The following reforms regarding Value added programme, Advanced Learner Course Components for the continuous Internal Assessment (CIA) for the Batch 2 B.Sc., Physics 2020-23, are discussed and the Annexure Attached.

For PG.

1. 20 PPS 101 : Classical Dynamics
Relativistic Mechanics to be included in the 5th Unit.
2. 20 PPS 205 : Electromagnetic Theory
Wave Guide :- to be included.
3. 20 PPS 204 Quantum Mechanics and
20 PPS 310 Advanced Quantum Mechanics
Concentration toward Problems and Solutions.
Quantum Entanglement and Teleportation to be deleted.

20 PPS 102 : Mathematical Physics

The members of the board suggested to include introduce Group Theory in Mathematical Physics (20 PPS 102) from Molecular Spectroscopy in the Next board.

Lasers + Nonlinear Optics (20 PPS 207) :

~~From~~ V Unit from this paper to be shifted to Molecular spectroscopy (20 PPS 201).

The following reforms of regarding the Components of Continuous Internal Assessment (CIA) for the M.Sc batch (2020-22) are discussed and Passed. The Annexure is also attached.

19-20 order (Scheme-P₁) to be followed as such for 20-22 Batch $\rightarrow$ (Due to Unavoidable Pandemic Situation).

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|-----------------------------|---------------------------------|
| 1. V. Sathyaabama | <u>V. Sathyaabama</u> |
| 2. L. SENTHILKUMAR | <u>L. Senthil Kumar</u> |
| 3. K. MARIMOTHU | <u>K. Marimuthu</u> |
| 4. M. THENMOZHI | <u>M. Thenmozhi</u> |
| 5. S.P. Senthil Subramaniam | <u>S.P. Senthil Subramaniam</u> |
| 6. M. PETHU RAMAN | <u>M. Pethu Raman</u> |
| 7. T.E. MANJULADATHY | <u>T.E. Manjuladathy</u> |
| 8. | |
| 9. M. KARTHA | <u>M. Kartha</u> |
| 10. S. Shanmuga priya | <u>S. Shanmuga priya</u> |
| 11. A. SURESH KUMAR | <u>A. Suresh Kumar</u> |
| 12. S. Yogeswari | <u>S. Yogeswari</u> |
| 13. T. Ponraj | <u>T. Ponraj</u> |
| 14. Dr. A.G. KANNAN | <u>Dr. A.G. Kannan</u> |
| 15. V. Yasodha mahalakshmi | <u>V. Yasodha mahalakshmi</u> |
| 16. K. Raghu Kumar | <u>K. Raghu Kumar</u> |
| 17. M. Gayathri | <u>M. Gayathri</u> |

Percentage of Revision of B.Sc. Physics
Syllabus Revised for the Academic Year - 2020-2021

B.Sc. Physics							
S.No	Course Code	Course Title	Change Details	% of Changes	Content Deleted	Content Updated	Reason for Change
1	20UPS508	Optics & Spectroscopy	Modified	20%	INTERFERENCE Characteristics of wave motion - Transverse and longitudinal wave motion - Colours of thin films - Testing the planeness of surfaces DIFFRACTION Zone plate - Zone plate as converging lens	LASER & FIBER OPTICS Laser characteristics - Einstein's coefficients - Population inversion - Pumping methods - Essential elements and Action of laser system - Ruby laser – He-Ne laser - <i>Applications: Holography and Lasers in medicine</i> - Construction and types of optical fiber - Critical angle - Acceptance angle, Acceptance cone and Numerical aperture - Propagation of light through optical fiber - Optical fiber configurations - Fiber optic communication system	Feedback from Expert
2	20UPS507	Mechanics	Modified	40%	MECHANICS OF A PARTICLE Linear momentum - Angular momentum-Work-Power- Kinetic energy - Conservative forces- Potential energy- Conservation theorem for linear momentum - Conservation theorem for angular momentum - Conservation theorem for energy - Motion of a particle under time dependent applied force –Motion of a free electron in oscillating field - Motion of a particle under damping forces - Motion of a particle under central force – Application to Projectile and simple harmonic vibrations HAMILTON - JACOBI FORMULATION Canonical or contact Transformations: Point Transformation, Canonical Transformation, Generating Function (Four forms) - Advantage of Canonical	Projectiles Projectiles – Range – Expression for the range of projectile on the inclined plane – path of a projectile - Impulse – Direct and oblique impact – Expression for velocity after direct impact- Loss of kinetic energy due to direct impact of two smooth spheres Friction Force of friction –Limiting friction – Laws of friction – Angle of friction Hydrostatics Thrust on an immersed plane, Definition and determination of centre of pressure -Archimedes principle- Laws of floatation – Definition for metacentre and metacentric height. Hydrodynamics Rate of flow of fluid - Streamline flow and	Feedback from Expert

					Transformations - Hamilton Jacobi method - Harmonic Oscillator problem by Hamilton Jacobi method - Hamilton Jacobi equation for Hamilton's Characteristic function.	turbulent flow (qualitative analysis) – Equation of continuity of flow– Bernoulli's theorem and its application Rigid body dynamics Rigid body–rotational and vibrational motion – Torque–moment of inertia – radius of gyration – kinetic energy of rotation– M.I. of a fly wheel– experimental determination–precession- Moment of inertia of diatomic molecule	
3	20UPS511	Summer Internship or Vocational training/ Project	New	100%	-	-	Feedback from Expert
4	20UPS1 01	Properti es of Matter	Modified	30%		Unit I: Density of earth, Determination of epicenter and focus – Modern application of seismology, Potential and intensity at a point due to circular disc – Intensity and potential of the gravitational field at a point due to an infinite plane- Compound pendulum – Earth Quakes Unit II: rigidity modulus: Static torsion method (Searle's method - scale and telescope) –Twisting couple on a cylinder- Strain energy in twisted cylinder - Torsional oscillation of a body, Determination of Rigidity modulus by Torsional pendulum (Dynamic torsion method) – Expression for the bending moment, cantilever – Measurement of Young's modulus: Cantilever depression –Measurement of Young's modulus by bending of beam (Non uniform and uniform bending)- Searle's method to determine the rigidity modulus	Feedback from University Nominee
					Unit III: Coefficient of viscosity, critical velocity – Reynolds number and its significance-	Unit III: Velocity of efflux of a liquid (Torricellis theorem), Velocity of	

					efflux of a gas, rotation viscometer – Comparison of viscosities (Ostwald Viscometer) – Variation of viscosity with temperature – Viscosity of gases : Rankine’s method for air, Bernoulli’s theorem – Applications:	
				Unit IV: Determination of surface tension of a bubble - Capillary rise - Energy required to raise a liquid in a capillary tube, Toricelli’s theorem – Vena contracta - Venturimeter. and pitot tube	Unit IV: Determination of surface tension , Jaeger’s experiment, drop weight method, –Applications of surface tension . DIFFUSION AND OSMOSIS Diffusion –Fick’s law – Graham’s law Osmosis and osmotic pressure – Experimental determination of Osmotic pressure (Berkeley and Hartley method) – Laws of Osmotic pressure – Osmosis and vapour pressure of a solution – Osmosis and boiling point of a solution	
				Unit V: Diffusion - Fick’s law - Graham’s law of diffusion of gases - Osmosis and osmotic pressure - Laws of osmotic pressure - Experimental determination of osmotic pressure	UNIT V: Velocity of transverse waves along a stretched string (I method) – Laws of transverse vibration of strings – Verification of the Laws of transverse vibration of strings – Melde’s experiment – Resonance – Musical sound and noise – Speech- Human voice – Human ear – Characteristic of Musical sound- Intensity of sound – Measurement of intensity of sound – Decibel – Bel – Phon (Definition only) – Acoustics – Reverberation – Sabine’s Reverberation formula – Determination of Absorption coefficient – Factors affecting, Acoustics of Buildings – Sound distribution in an auditorium – Requisites for Good Acoustics – Ultrasonics – Production of Ultrasonics : Magnetostriction Oscillator	

						– Piezo electric oscillator – Detection of Ultrasonics- Acoustic grating – Application.	
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HoD

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B.Sc.,Physics								
		Curriculum and Scheme of Examination under CBCS (2020-2023)						
Part	Subject Code	Subjects	Ins. Hrs Per Week	Examinations				Credits
				Dur. Hrs	CIA	ESE	Total	
SEMESTER - I								
I	20UTL101/ 20UHN101/ 20UFR101	Tamil /Hindi/French Paper I	6	3	30	70	100	3
II	20UEN101	English Paper I	5	3	30	70	100	3
III	20UPS101	Core I : Properties of Matter	6	3	30	70	100	3
		Physics lab I	3					
	20UPS1A1	Allied I : Mathematics I	8	3	30	70	100	5
	20UHR101	Human Rights	1	2		50	50	2
IV	20HEC101	HE - (Personal values & SKY Yoga Practice - I)	2	2		25	50	1
V		Extension Activities - Annexure I						
							500	17


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SEMESTER - V								
Part	Subject Code	Subjects	Ins. Hrs Per Week	Examinations				Credits
				Dur. Hrs	CIA	ESE	Total	
III	20UPS507	Core VII : Mechanics	5	3	30	70	100	5
	20UPS508	Core VIII : Optics & Spectroscopy	5	3	30	70	100	5
	20UPS509	Major Elective I : Basic Electronics & Circuit Systems	5	3	30	70	100	5
	20UPS510	Major Elective II : Digital Principles and application	5	3	30	70	100	5
	20UPS511	Summer Internship or Vocational training	-	-	-	-	100	3
		Electronics Lab	3					
		Digital & Microprocessor Lab	3					
IV	20UPS5S1/ 20UPS5S2	Skill based Elective I: Mechanical measurements/Fundamentals of BioPhysics	1	2	-	50	50	2
	20GKL501	General Knowledge & General Awareness	SS	2	-	50	50	2
	20HEC505	HE - (National values & SKY Yoga Practice - V)	1	2	25	25	50	1
							650	28


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Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	20UPS101	Title	Batch:	2020-2023
		Core I: Properties of Matter	Semester:	I
Hrs/Week:	6		Credits:	3

Course Objective

- To understand the basic concepts of gravitation and to get exposure to the properties of liquids and solids

Course outcomes

K1	CO1	To understand the dynamics and gravitation
K2	CO2	To understand the applications of the elastic properties of solids
K3	CO3	To explain the molecular theory of surface tension, viscosity and diffusion
K4	CO4	Familiarize with general terms in acoustics like intensity, loudness, reverberation etc, and study in detail about production, detection, properties and uses of ultrasonic waves

Syllabus

Unit	Content	Hrs
I	GRAVITATION Kepler's law- Newton's law of gravitation – Density of earth - Gravitational Constant by Boy's method – Gravitational field and potential – Potential and field intensity due to a spherical shell and solid sphere (Inside and outside) –Potential and intensity at a point due to circular disc – Intensity and potential of the gravitational field at a point due to an infinite plane- Compound pendulum – Earth Quakes – Seismic waves – Seismology – Determination of epicenter and focus – Modern application of seismology.	15
II	ELASTICITY Modulus of Elasticity –Relation between the elastic constants - Determination of rigidity modulus: Static torsion method (Searle's method - scale and telescope) –Twisting couple on a cylinder- Strain energy in twisted cylinder - Torsional oscillation of a body – Determination of Rigidity modulus by Torsional pendulum (Dynamic torsion method) – Expression for the bending moment –Depression of the loaded end of a cantilever – Measurement of Young's modulus: Cantilever depression – Measurement of Young's modulus by bending of beam (Non uniform and uniform bending)- Searle's method to determine the rigidity modulus	16
III	VISCOSITY Bernoulli's theorem – Applications: Velocity of efflux of a liquid (Torricellis theorem), Velocity of efflux of a gas - Poiseuille's equation for flow of a liquid through a horizontal capillary tube – Experimental determination of a viscosity of a liquid by Poiseuille's method – Motion in a viscous medium – Stokes law – Determination of coefficient of viscosity of a liquid : Stokes falling body viscometer , rotation viscometer – Comparison of viscosities (Ostwald Viscometer) – Variation of viscosity with temperature – Viscosity of gases : Rankine's method for air	16


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IV	SURFACE TENSION : Properties of surface tension –Excess pressure inside a liquid drop and soap bubble - Experimental study of variation of surface tension with temperature –Determination of surface tension , Jaeger’s experiment, drop weight method and capillary rise method – Experiment to determine the interfacial tension between water and kerosene –Applications of surface tension . DIFFUSION AND OSMOSIS Diffusion –Fick’s law – Graham’s law of diffusion of gases – Osmosis and osmotic pressure – Experimental determination of Osmotic pressure (Berkeley and Hartley method) – Laws of Osmotic pressure –Osmosis and vapour pressure of a solution – Osmosis and boiling point of a solution	15
V	SOUND: Velocity of transverse waves along a stretched string (I method) – Laws of transverse vibration of strings – Verification of the Laws of transverse vibration of strings – Melde’s experiment – Resonance – Musical sound and noise – Speech- Human voice – Human ear – Characteristic of Musical sound- Intensity of sound – Measurement of intensity of sound – Decibel – Bel – Phon (Definiton only) – Acoustics – Reverberation – Sabine’s Reverberation formula – Determination of Absorption coefficient – Factors affecting, Acoustics of Buildings – Sound distribution in an auditorium – Requisites for Good Acoustics – Ultrasonics – Production of Ultrasonics : Magnetostriction Oscillator – Piezo electric oscillator – Detection of Ultrasonics- Acoustic grating – Application.	16
Total contact hours		78

- *Italic font denotes self study*

Additional activities

Seminar, Assignment, Experience discussion, PPT

Text Book

- Mathur D.S. (2003). *Elements Of Properties Of Matter*. Shyam Lal Charitable Trust, S. Chand & company Ltd, New Delhi, (Units I - IV).
- Brijlal & Subramaniam. N, (2002). *Textbook of Sound*. Vikas Publications house, New Delhi. (Unit V)

Reference Books

- Brijlal & Subramaniam, N, (2000). *Properties of Matter*. Vikas Publications house, New Delhi.
- Murugesan R. (1995). *Properties of Matter*. S.Chand & Company Ltd, New Delhi.



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Mapping

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	M
CO2	H	H	H	M	L
CO3	H	M	H	H	M
CO4	H	H	H	M	M

H – High; M – Medium; L – Low

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Programme Code:	BSc	Programme Title:	Bachelor of Science	
Course Code:	20UPS507	Title	Batch:	2020-2023
		Core VII: Mechanics	Semester:	V
Hrs/Week:	3		Credits:	3

Course Objective

- To acquire a complete knowledge about mechanics and classical dynamics

Course outcomes

K1	CO1	To remember the principles of rigid body, statics and classical dynamics
K2	CO2	To understand the mechanics behind rigid body, projectiles and dynamics
K3	CO3	To apply these formalisms to obtain equations of motion for simple systems
K4	CO4	To represent these formalisms for mechanical systems

Syllabus

Unit	Content	Hrs
I	Projectiles Projectiles – Range – Expression for the range of projectile on the inclined plane – path of a projectile - Impulse – Direct and oblique impact – Expression for velocity after direct impact- Loss of kinetic energy due to direct impact of two smooth spheres Friction Force of friction –Limiting friction – Laws of friction –Angle of friction Hydrostatics Thrust on an immersed plane, Definition and determination of centre of pressure -Archimedes principle- Laws of floatation – Definition for metacentre and metacentric height.	13
II	Hydrodynamics Rate of flow of fluid - Streamline flow and turbulent flow (qualitative analysis) – Equation of continuity of flow–Bernoulli's theorem and its application Rigid body dynamics Rigid body–rotational and vibrational motion –Torque–moment of inertia – radius of gyration –kinetic energy of rotation– M.I. of a fly wheel– experimental determination–precession- Moment of inertia of diatomic molecule	13
III	MECHANICS OF SYSTEM OF PARTICLES Conservation theorem for a system of particle; Conservation theorem for linear momentum, angular momentum and energy - Constrained motion - Types of constraints with examples - Forces of constraints - Degrees of freedom - Generalized coordinates - Generalized notation for Displacement, Velocity, Acceleration, Momentum, Force and Potential - Limitations of Newton's Law	13


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IV	LAGRANGIAN FORMULATION Delta-Variation process - Hamilton's principle - Deduction of Lagrange's equations of motion from Hamilton's principle - Principle of virtual work - D'Alembert's principle - Deduction of Lagrange's equations by D'Alembert's principle for both conservative system and non-conservative system - Deduction of Hamilton's principle from D'Alembert's principle - Deduction of Newton's second law of motion from Hamilton's principle - Applications of Lagrange's equation: Linear harmonic oscillator, Simple pendulum, <i>Compound pendulum</i> .	13
V	HAMILTONIAN FORMULATION OF MECHANICS View points of the new development - Phase space and the motion of systems - Hamiltonian - Hamilton's canonical equations of motion - Cyclic coordinates - Physical significance of H - Advantages of Hamiltonian approach - Deduction of canonical equations from variational principle - Applications of Hamilton's equations of motion; Simple Pendulum, Compound pendulum, Linear harmonic oscillator.	13
Total contact hours		65

- *Italic font denotes self study*

Additional activities

Seminar, Assignment, Experience discussion, PPT

Text Books

- Mathur D.S. (1996). *Mechanics*. S.Chand & Company Ltd, New Delhi, (Units I & II).
- Venkataraman M.K. (2014). *Dynamics*. Agasthiar Publications, Trichy, (Unit II).
- Mathur D.S. (2003). *Elements of Properties of Matter*. Shyam Lal Charitable Trust, New Delhi, (Unit II).
- Gupta, Kumar, Sharma, (2006). *Classical Mechanics*. 21st Edition, Pragati prakasan, Meerut, (Units II – V).

Reference Books

- Chakraborty. B. K. (2001.) *Mechanics and General properties of matter*, (2001). Books & Allied (P) Ltd.
- Rajendran. V, Marikani. A. (1997) *Applied Physics for Engineers*. Tata Mc-Graw Hill, New Delhi.
- Herbert Goldstein, (1985). *Classical Mechanics*. 2nd Edition, Narosa publishing House, New Delhi.

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Mapping

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	H	H
CO2	M	H	H	M	H
CO3	H	L	M	H	H
CO4	M	H	H	H	M

H – High; M – Medium; L – Low

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Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	20UPS508	Title	Batch:	2020-2023
		Core VIII: Optics & Spectroscopy	Semester:	V
Hrs/Week:	5		Credits:	5

Course Objective

- To understand the mechanism of energy transfer and to impart knowledge in electromagnetic spectrum

Course outcomes

K1	CO1	To gain knowledge about fundamental properties of light, electromagnetic spectrum and splitting of spectral lines.
K2	CO2	To apply the energy transfer for absorption and emission spectra
K3	CO3	To determine structure of the molecules
K4	CO4	To evaluate bond angle and bond length etc.

Syllabus

Unit	Content	Hrs
I	INTERFERENCE & DIFFRACTION Theory of interference - Fresnel's biprism experiment - Determination of wavelength - Interference due to reflected light – Air wedge - Newton's rings - Determination of wavelength and refractive index of a liquid - Fresnel's explanation of rectilinear propagation of light - Fresnel's diffraction at a circular aperture - Fraunhofer diffraction at a single slit - Theory of the plane transmission grating - Determination of wavelength	13
II	POLARISATION Polarisation of transverse waves - Plane of polarization - Brewster's law and Brewster's window - Polarization by refraction - Double refraction - Principal section and principal plane - Nicol prism - Nicol prism as an analyser - Theory of circularly and elliptically polarised light - Optical activity - Fresnel's explanation of rotation - Specific rotation - <i>Laurent's half shade Polarimeter</i>	13
III	MOLECULAR SPECTRA Rotation of molecules - Rotational spectra of rigid diatomic molecule - Techniques and Instrumentation of Microwave Spectroscopy - Energy of a Vibrating diatomic molecule - Simple harmonic oscillator - Techniques and Instrumentation of Infrared Spectroscopy - Applications of Microwave & Infrared Spectroscopy (Basic ideas) - Raman effect and characteristics - Experimental study - Quantum theory of Raman effect	13

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IV	ATOMIC & NUCLEAR SPECTRA Normal and Anomalous Zeeman effects - Experimental study of normal Zeeman effect - Lorentz Classical interpretation and Expression for the Zeeman shift - Quantum mechanical theory of Normal Zeeman effect - Paschen Back effect - Stark effect – Basic theory of NMR, ESR and NQR - Techniques and Instrumentation - Applications	13
V	LASER & FIBER OPTICS Laser characteristics - Einstein's coefficients - Population inversion - Pumping methods - Essential elements and Action of laser system - Ruby laser – He-Ne laser – <i>Applications: Holography and Lasers in medicine</i> Construction and types of optical fiber - Critical angle - Acceptance angle, Acceptance cone and Numerical aperture - Propagation of light through optical fiber - Optical fiber configurations - Fiber optic communication system	13
Total contact hours		65

- *Italic font denotes self study*

Additional activities

Seminar, Assignment, Experience discussion, PPT

Text Books

- Subramanyam N. Brijlal, *Waves and Oscillations*. S.Chand & Co, New Delhi, (Unit - I).
- Subrahmanyam. N. Brijlal, Avathanulu M.N. (2008). *A Textbook of Optics*. S.Chand and Co Ltd., New Delhi, (Units I – II & V).
- Colin N .Banwell, Elaine M. Mc Cash, (2004). *Fundamentals of Molecular Spectroscopy*. Tata McGraw-Hill, New Delhi, (Unit - III).
- Gupta S.L. Kumar V. Sharma R.C. (2001). *Elements of Spectroscopy*. 16th edition, Pragati Prakashan, Meerut, (Unit - IV).


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Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	20UPS511	Title	Batch:	2020-2023
		Summer Internship or Vocational Training	Semester:	V
Hrs/Week:	-		Credits:	3

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