DAVANGERE UNIVERSITY

Department of Physics
Proceedings of the BoS Meeting

The meeting Board of Studies (BoS – U.G.) in Physics was held on 15th June, 2024 at 11.00 A.M. in the Department of Studies in Physics, Davangere University, Shivagangothri, Davangere. The following are the members.

1. Prof. M. N. KALASAD	Chairman, BoS (U.G.)
2. Prof. SRINIVASA L.	Member
3. Prof. VINOD KUMAR E.	Member
4. Prof. M. P. RUPASHREE	Member
5. Prof. KAMALA SOPPIN	Member

Agenda:

Sl. No.	Points for the Deliberation in the BoS Meeting
1	UG Syllabus and scheme (Curriculum Structure) for I & II Semester B. Sc. Physics as per the guidelines of State Education Policy (SEP).

PROCEEDINGS:

The members have discussed the detailed UG Syllabus and Curriculum Structure of I & II Semester B. Sc. Physics and III to VI Semester B. Sc. Curriculum Structure as per the State Education Policy (SEP) in accordance with the guidelines of the Davangere University.

The meeting ended with thanks to the members by the Chair.

Signature of the Committee Members:

1. Prof. M. N. KALASAD

2. Prof. SRINIVASA L.

3. Prof. VINOD KUMAR E.

4. Prof. M. P. RUPASHREE

5. Prof. KAMALA SOPPIN

M. N. Kalasad
Chairman, BoS (U. G.)
Board of Studies
Department of Physics
Davangere University
Shivagangothri, Davangere-07

Davangere University

Shivagangothri, Davangere- 577007

SYLLABUS and COURSE STRUCTURE

of

PHYSICS

as per the Choice Based Credit System (CBCS) designed in accordance with of State Education Policy (SEP-2024)

Bachelor of Science (B. Sc. Physics)

w.e.f.

Academic Year 2024-25 and onwards

Chairman
Board of Studies
Department of Physics
Davangere University
Shivagangotri, Davangere-07

Dr. U.S. MAHABALESHWAR
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Davangere-577 007, Karnataka, India.

Registrar
Davangere University
Shivagangotri, Davangere.

Programme Outcomes:

By the end of the program the students will be able to:

1. Acquire in depth knowledge of almost all basic branches of physics such as mechanics, properties of matter, relativity, electricity and magnetism, wave motion, optics, thermal physics, electronics, classical mechanics, quantum mechanics, spectroscopy, nuclear physics, condensed matter physics and also advanced areas like nanoscience, energy science, astrophysics, instrumentation.

2. Communicate effectively physics concepts with examples related to day to day life. Acquire ability of recognizing and distinguishing various aspects of physics found in real life.

3. Learn, perform and design experiments in the laboratory to demonstrate the concepts, principles, laws of physics, theories learnt in the class rooms.

4. Acquire the ability of critical thinking and logical reasoning in physics problems and their solutions. Develop ability to analyze physics problem including simple to thought provoking problems and apply the acquired knowledge to solve.

5. Demonstrate the ability to use skills in Physics and its related areas of technology for formulating and tackling Physics-related problems and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Physics.

6. Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

7. Apply the professional ethics and norms in respective discipline.

Davangere University

Bachelor of Science (B. Sc.) Physics
Curriculum Structure for Undergraduate Programme for 2024-25

Sl. No.	Course/Paper Code	Title of the Paper	Subject Category	Teaching Hours/ week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
Semester-I									
1	24SEPPHYT-I	Mechanics and Properties of Matter	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-I	Practical I	MC-P	04	40	10	50	02	3 Hrs.
		Total		08	120	30	150	05	---
Semester-II									
2	24SEPPHYT-II	Thermal Physics, Waves and Sound	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-II	Practical - II	MC-P	04	40	10	50	02	3 Hrs.
		Total		08	120	30	150	05	---
Semester-III									
3	24SEPPHYT-III	Geometrical Optics and Electricity	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-III	Practical - III	MC-P	04	40	10	50	02	3 Hrs.
	Open Elective Optional – I*	a) Energy Sources b) Physics for All	OEL/ OP-I	02	40	10	50	02	2 Hrs.
		Total		10	160	40	200	07	---
Semester-IV									
4	24SEPPHYT-IV	Wave Optics and Electromagnetism	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-IV	Practical - IV	MC-P	04	40	10	50	02	3 Hrs.
	Open Elective Optional – II*	a) Electronic Instrumentation and Sensors b) Elements of Nanoscience	OEL/ OP-II	02	40	10	50	02	2 Hrs.
		Total		10	160	40	200	07	---
Semester-V									
5	24SEPPHYT-V	Classical Mechanics, Quantum Mechanics and Statistical Mechanics	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYT-VI	Methods of Mathematical Physics, Relativity and Astrophysics	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-V	Practical - V	MC-P	04	40	10	50	02	3 Hrs.
		Total		12	200	50	250	08	---
Semester-VI									
6	24SEPPHYT-VII	Atomic & Molecular Physics and Nuclear Physics	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYT-VIII	Condensed Matter Physics and Electronics	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-VI	Practical - VI	MC-P	04	40	10	50	02	3 Hrs.
	24SEPPHYPr	Project	MC-Pr	04	50	---	50	02	3 Hrs.
		Total		16	250	50	300	10	---
		Grand total		64	1010	240	1250	42	---

MC: *Major Course*; **MC-T:** *Major Course Theory*; **MC-P:** *Major Course Practical*; **MC-Pr:** Project; **OEL/Op:** *Open Elective/Optional*; **AEDP:** *Apprenticeship Embedded Degree Programme.*

[*in Semester-III and Semester-IV open elective papers are offered. There shall be 02 elective papers offered during each semester (Semester-III and Semester-IV) by every major subject offering Department, where a student shall choose/select opt 01 elective paper out of two to study in each semester (Semester-III and Semester-IV)].

Curriculum Structure

Sl. No.	Course/Paper Code	Title of the Paper	Subject Category	Teaching Hours/ week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
		Semester-I							
1	24SEPPHYT-I	Mechanics and Properties of Matter	MC-T	04	80	20	100	03	3 Hrs.
	24SEPPHYP-I	Practical I	MC-P	04	40	10	50	02	3 Hrs.
		Total		08	120	30	150	05	---

24SEPPHYT-I: MECHANICS AND PROPERTIES OF MATTER

TOTAL HOURS -56

Course Learning Objectives:

a) To understand the basic ideas of Dynamics, Elasticity and Fluid Mechanics

b) To understand the basic ideas of mechanics, rotational dynamics.

c) To understand the concepts of radial and transverse components of velocity and acceleration and gravitation

d) To understand the concepts of elasticity.

e) To acquire knowledge on fluid Statics and Fluid Dynamics

Course Outcome:

On successful completion of the course, the student will able to:

a) Explain the basic ideas of mechanics, rotational dynamics.

b) Explain the Concepts of radial and transverse components of velocity and acceleration and gravitation

c) Explain the importance of elasticity in mechanical structures and technologies.

d) Explain the importance of Fundamental knowledge of viscosity and surface tension that would enable an easy transition into advanced areas of fluid statics and fluid dynamics.

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SEMESTER-I

24SEPPHYT-I: MECHANICS AND PROPERTIES OF MATTER

TOTAL HOURS: 56

Unit – 1	14 hours

Chapter 1: Momentum and Energy:

Definitions of Work and energy, Golden rule of mechanics, law of conservation of linear momentum with illustrations – 2 body collision. Law of conservation of energy with illustrations – inclined plane. Rocket motion –expression for instantaneous and final velocities o*ᶜ single stage rocket. Problems. **5 hours**

Chapter 2: Dynamics of system of Particles:

Centre of mass – expression for position, velocity and acceleration of center of mass, Problems. **4 hours**

Chapter 3: Rotational Dynamics:

Definition of rigid body, rotational motion of a rigid body, review of angular momentum, law of conservation of angular momentum. Relation between angular momentum and torque, Moment of inertia, mention of law of parallel axes theorem and perpendicular axes theorem, Derivation of MI of circular disc and solid cylinder about various axes, theory of Flywheel and compound pendulum. Problems. **5 hours**

Unit – 2	14 hours

Chapter 4: Motion in plane:

Expressions for radial and transverse components of velocity and acceleration, applications of the expressions to uniform circular motion. Problems. **5 hours**

Chapter 5: Gravitation:

Review of Law of Gravitation and Kepler's laws of planetary motion. Derivation of Kepler's laws from Newton's laws of Gravitation. Review of Principle of satellite launching and satellite motion, Define and mention of expressions for orbital velocity, escape velocity, period and altitude of satellites. Problems. **5 hours**

Chapter 6: Geosynchronous orbits:

Polar, Sun s ɟnchronous and geostationary orbits. Basic idea of global positioning system. **4 hours**

Unit – 3	14 hours

Chapter 7: Elastic constants:

Review of Hooke's law - Stress-strain diagram, elastic limit, breaking point, Relation between elastic constants q, n & k, Poisson's Ratio-expression for Poisson's ratio in terms of elastic constants. Problems. **5 hours**

Chapter 8: Flexural Elasticity:

Work done in stretching, Bending of beams -bending moment, Theory of single cantilever, theory of q by uniform bending. Problems.   **5 hours**

Chapter 9: Torsional Elasticity:

Work done in twisting, Twisting couple on a cylinder. Theory of Torsional pendulum – constancy of $\frac{I}{T^2}$,Problems.   **4 hours**

| **Unit – 4** | **14 hours** |

Chapter 10: Viscosity:

Review of fluid friction (wet friction) - Streamline flow and turbulent flow, equation of continuity. Expression of viscosity by Poiseuille's method, Expression of viscosity by Stoke's method (by dimension analysis), mention Reynold's number – its expression and significance. Problems.   **5 hours**

Chapter 11: Bernoulli's principle.

Expression of Bernoulli's theorem(qualitative), Aerodynamic shape and streamlining of vehicles and aircrafts, Streamlining in nature- birds and fishes, Other applications -Atomizer, Bunsen burner.   **3 hours**

Chapter 12: Surface tension:

Definition of surface tension. Surface energy, mention relation between surface tension and surface energy. Expression for pressure difference across curved liquid surface - excess pressure inside spherical liquid drop. Angle of contact significance and examples. Problems.
                    6 hours

References Books:

Sl. No.	Title of the Book	Authors Name	Publisher	Year of Publication
1	Mechanics New Edition	Prof. D. S. Mathur, Dr. P.S. Hemne	S. Chand & co.	2000
2	Principles of Physics	Walker, halliday, Resnick	Wiley	2019
3	Physics for Degree Students B.Sc First year	C.L Arora Dr. P.S. Hemne	S. Chand & co.	2020
4	University Physics – with Modern Physics	Hugh D Young, Roget A Freedman	Pearson	2017
5	Concept of Physics (Vol. 1),	Verma H C,	Bharathi Bhavan Publishers,	2021
6	Mechanics – Berkely Physics Course, Vol-1	Charles Kittel	Tata McGraw Hill	2007
7	Properties of Matter,	Brijlal and Subramanyam	John Wiley & Sons Inc	2013

Practical Content

List of Experiments to be performed in the Laboratory (Minimum of 8 Experiments)

1.	Determination of g using bar pendulum (L versus T and L versus LT^2 graphs).
2.	Determination of moment of inertia of a Fly Wheel.
3.	Determination of rigidity modulus using torsional pendulum.
4	Determination of elastic constants of a wire by Searle's method.
5	Viscosity by Stoke's method.
6	Viscosity by capillary flow method – Poiseuille's method.
7	Surface tension by capillary rise method.
8	Surface tension and Interfacial tension by drop weight method.
9	Modulus of rigidity of a rod — Static torsion method.
10	Determination of elastic constants of a wire by Searle's method.
11	Viscosity by Stoke's method.
12	Verification of Hook's law.
13	Determination of Spring constant, acceleration due to gravity and unknown mass.
14	Determination of Young's modulus of a bar by the single cantilever method.
15	Determination of Young's modulus of a bar by uniform bending method.
16	Verification of parallel and perpendicular axes theorems.

References Books:

Sl. No.	Title of the Book	Authors Name	Publisher	Year of Publication
1	B. Sc. Practical Physics	Harnam singh, Dr. P.S. Hemne	S. Chand & co.	Revised Edition
2	Physics through experiments	B. Saraf	Vikas Publication	Revised Edition
3	B. Sc. Practical Physics	C.L Arora	S. Chand & co.	2020

SEMESTER-II

Curriculum Structure

Sl. No.	Course/Paper Code	Title of the Paper	Subject Category	Teaching Hours/ week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
		Semester-II							
2	24SEPPHYT-II	Thermal Physics, Waves and Sound	MC-T	04	80	20	**100**	03	3 Hrs.
	24SEPPHYP-II	Practical – II	MC-P	04	40	10	**50**	02	3 Hrs.
		Total		08	120	30	150	05	---

24SEPPHYT-II: THERMAL PHYSICS, WAVES AND SOUND

TOTAL HOURS -56

Course Learning Objectives:

a) To understand the basic ideas of Thermodynamics, Radiation, Waves and sound.
b) To understand the basic ideas of Laws of Thermodynamics, Heat engine's Efficiency, Entropy.
c) To understand the concepts of kinetic theory of gases, Block Body Radiation-Laws.
d) To understand the concepts of Liquefaction of gases, Oscillations, and waves.
e) To acquire knowledge on Basics of sound and Acoustics.

Course Outcome:

On successful completion of the course, the student will able to:

a) Explain the basic ideas of laws of Thermodynamics, Heat engine's Efficiency, Entropy.
b) Explain the Concepts of kinetic theory of gases Block Body Radiation-Laws.
c) Explain the importance of Liquefaction of gases, Oscillations, and waves.
d) Explain the Applications of sound theory and acoustics.

SEMESTER-II

24SEPPHYT-II: THERMAL PHYSICS, WAVES AND SOUND

TOTAL HOURS: 56

Unit – 1	14 hours
Chapter 1: Thermodynamics-I Zeroth law, first law and internal energy, Isothermal and adiabatic changes- indicator diagram. Derivation of PV^γ=constant. Application of first law for work done during 1. Cyclic process 2. Adiabatic process 3. Isothermal process 4. Isochoric process 5. Isobaric process. Carnot's engine-working –Carnot Cycle- Carnot's engine efficiency (derivation). Clausius - Clapeyron Equation-Derivation, problems. **7 hours**	
Chapter 2: Thermodynamics- II The second law of thermodynamics- Entropy concept, change of Entropy during Reservoir and Irreversible process with examples. Change of Entropy in Carnot's cycle (T-S diagram), the third law of thermodynamics (statement), problems. **7 hours**	
Unit – 2	14 hours
Chapter 3: Kinetic theory of Gases Maxwell's law of velocity distribution (No derivation) - calculation of rms velocity and most probable velocity - Derivation of expression for mean free path. Degrees of freedom. Gas laws, problems. **7 hours**	
Chapter 4: Radiation Black body radiation- Black body, properties of black body radiation, Wein's law, Rayleigh-Jean's law, Stefan's law of radiation. Deduction of Wein's displacement law, Rayleigh-Jean's law and Stefan's law from planks law, solar constant - Derivation, problems. **7 hours**	

Unit – 3	14 hours

Chapter 5: Low temperature Physics

Joule-Thomson effect, Relation between Boyle temperature, inversion temperature and critical temperature of gases. Liquefaction of oxygen by cascade process, regenerative cooling and problems. **5 hours**

Chapter 6: Oscillations

Review, setting up of differential equation describing SHM. Free, forced and damped oscillations. Resonance with examples. Analytical treatment of damped and forced oscillations. Conditions for amplitude of resonance. Phase of forced oscillations. Lissajou's figures-theory and uses, problems. **5 hours**

Chapter 07: Waves

Types of waves, particle and wave velocities, relation between them. Expression for intensity of progressive wave, problems.

4 hours

Unit – 4	14 hours

Chapter 08: Sound

Types of sound waves, characteristics, theory of Doppler effect, limitations, verification and uses. Beats-theory and uses. **5 hours**

Chapter 09: Ultrasonics

Mechanical, Chemical and biological effects and uses. Piezo – electric effect, piezo electric generator, problems. **5 hours**

Chapter 10: Acoustics

Reverberation time, absorption coefficient, Sabine's formula, requisites of good acoustics, problems. **4 hours**

Reference Books:

Sl. No.	Title of the Book	Authors Name	Publisher	Year of Publication
1	Heat, Thermodynamics and statistical Physics	Brijlal and Subramanian Revised By Hemne	S. Chand & co.	2008
2	Heat and Thermodynamics: D.S. Mathur	Anondsamoy Manna	PEARSON	2008
3	Physics for Degree Students B.Sc First year	C.L Arora Dr. P.S. Hemne	S. Chand & co.	2020
4	University Physics – with Modern Physics	Hugh D Young, Roget A Freedman	Pearson	2017
5	Concept of Physics (Vol. 1),	Verma H C,	Bharathi Bhavan Publishers, Kanpur.	2021
6	B.Sc. Physics Volume-2 : B. Basavaraj and P Sadashiva	B. Basavaraj and P Sadashiva	Omkar Publications	2016
7	Physics for Degree Students B.Sc Second Year	By C. L. Arora and Hemne	S. Chand & co.	2013
8	Ocillations and Waves	Satya Prakash, Vinod Dua	Pragathi Prakashan Meerut,	2019
9	Waves and Oscillations,	Brij Lal & N Subrahmanyam	Vikas Publication	2018
10	A Text Book of Sound	D. R. Khanna and R.S. Bedi	Atma Ram & Sons	2020
11	Berkeley Physics Course – Waves :	Frank S. Crawford Jr;	Tata Mc Graw-Hill Publishing Company Ltd.,	Special Indian Edition; 2011

Practical Content

List of Experiments to be performed in the Laboratory (Minimum of 8 Experiments)

Sl. No.	List of Experiments
1.	Velocity of Sound using Sonometer
2.	Frequency of AC using Sonometer
3.	Helmholtz Resonator
4	Melde's Experiment
5	Verification of Stefan's law
6	Study of Lissajous figures using CRO
7	Solar constant using Solar cell
8	Planck's constant using photo cell
9	Thermal conductivity of a good conductor –Searle's Apparatus
10	Thermal conductivity of Bad conductor-Lees-Charlton Method
11	Newton's law of cooling

Sl. No.	Title of the Book	Authors Name	Publisher	Year of Publication
1	B. Sc. Practical Physics	Harnam Singh, Dr. P.S. Hemne	S. Chand & co.	2000
2	Physics through Experiments	B. Saraf	Vikas Publication	1995
3	B. Sc. Practical Physics	C. L. Arora	S. Chand & co.	2020

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Practical Proper Examination I-VI semesters

Duration: 3Hrs

- Experimentation (Major & Minor/Spotters) -   30 Marks
- Viva Voice   -   10 Marks

                              Total   **40 Marks**

Internal Assessment for Practical Paper I-VI semesters

- Attendance   -   05 Marks
- Re ord/Journal   -   05 Marks

                              Total   **10 Marks**

Project Work/Internship during VI semester

- Project work/Dissertation/Internship and preparation of Report -   40 Marks
- Viva Voice   -   10 Marks

                              Total   **50 Marks**

Continuous Assessment Programme/Internal Assessment/Formative Assessment
Major Papers/Courses & Languages

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5 = 10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	05
03	• Attendance with proper record	05
	TOTAL MARKS	20

- **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%	-	03 Marks
90-95%	-	04 Marks
>95%	-	05 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment
Compulsory Papers/Courses & Elective or Optional Papers/Courses

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (2+2 = 4)	04
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	03
03	• Attendance with proper record	03
	TOTAL MARKS	10

- **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
85-90%	-	02 Marks
90-100%	-	03 Marks

<u>THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR COURSES SUBJECTS</u>
(Semesters I –VI)

B. Sc. Semester-I Degree Examination; 2024-25
(Semester Scheme; New Syllabus: 2024-25)
SUBJECT: SCIENCE MAJOR COURSES

Paper –_____: _____

Paper Code: _____

Time: 3 Hours   Max. Marks: 80

Instructions to candidates:
  1) All sections are compulsory
  2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

1. Answer **all** the following questions: (2×10=20)
  a)
  b)
  c)
  d)
  e)
  f)
  g)
  h)
  i)
  j)

SECTION-B

Answer any **SIX** of the following: (5×6=30)
  2.
  3.
  4.
  5.
  6.
  7.
  8.
  9.

SECTION -C

Answer **Any Three** of the following: (10×3=30)

  10.   From Unit-I
  11.   From Unit-II
  12.   From Unit-III
  13.   From Unit-IV

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THEORY EXAMINATION QUESTION PAPER PATTERN FOR

COMPULSORY & ELECTIVE or OPTIONAL PAPERS/COURSES

(Semesters I - V)

B. Sc. Semester-I/II/III/IV/V Degree Examination; 2024-25
(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: SCIENCE COURSES

Paper – CMPL & ELECTIVE/OPTIONAL I-V ___:_____

Paper Code: _____

Time: 2 Hours   **Max. Marks: 40**

Instructions to candidates:
1) All sections are compulsory
2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

Answer **all** the following questions: **(2×5=10)**

1.

2.

3.

4.

5.

SECTION-B

Answer any **SIX** of the following: **(5×6=30)**

6.

7.

8.

9.

10.

11.

12.

13.

*****

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