Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]
(Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur)
Kannada Linguistic Minority Institute
NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

Academic Council 1(6)
2nd July, 2020

UG Science Programme: B.Sc.-I: To be implemented from A.Y. 2020-2021

System: Choice Based Credit System (CBCS) with SGPA and CGPA

B.O.S. in*: Physics

Structure and Examination for: Discipline Specific Core Courses (DSC-A and DSC-B)

Table-1

Semester	Course		Teaching Scheme/week			
			Course Code	Hours	Lectures	Credits
I	AECC-I	ENGLISH FOR COMMUNICATION-I	2031101	3.2	4	2
	DSC-A	PHYSICS -I: MECHANICS AND PROPERTIES OF MATTER.	2031104	4	5	4
		PHYSICS -II: OPTICS AND LASER	2031105			
		PHYSICS PRACTICAL-I	2031221	3.2	4	2
II	AECC-II	ENGLISH FOR COMMUNICATION-II	2031201	3.2	4	2
	DSC-B	PHYSICS -I: HEAT AND THERMODYNAMICS	2031204	4	5	4
		PHYSICS -II: ELECTRICITY, MAGNETISM AND ELECTRONICS	2031205			
		PHYSICS PRACTICAL-I	2031221	3.2	4	2

Table-2

Semester	Course		EXAMINATION			Credits
			Marks			
			CA	SEE	Total	
I	AECC-I	ENGLISH FOR COMMUNICATION-I	15	35	50	2
	DSC-A	PHYSICS -I: MECHANICS AND PROPERTIES OF MATTER.	15	35	50	4
		PHYSICS -II: Optics and LASER	15	35	50	
II	AECC-II	ENGLISH FOR COMMUNICATION-II	15	35	50	2
	DSC-B	PHYSICS -I: HEAT AND THERMODYNAMICS	15	35	50	4
		PHYSICS -II: ELECTRICITY, MAGNETISM AND ELECTRONICS	15	35	50	
	DSC-A & DSC-B	PHYSICS PRACTICAL-I	30	70	100	4

CA: Continuous Assessment   SE: Semester End

Note: -

The above structure (Table-1 and Table-2) is for Sem-I and Sem-II of the undergraduate B.Sc.-I *

/B.S.ECS.-I /B.C.A.-I programmes under science faculty.

* B.Sc.-I Select any four DSC form Chemistry /Physics /Mathematics /Statistics /Electronics /Botany /Zoology /Geography /Psychology.

DSC: Discipline Specific Core Course   **AECC:** Ability Enhancement Compulsory Course

Passing in each course is compulsory including Democracy. course.

SGPA/CGPA and Total Marks will be calculated excluding AECC and Democracy.

courses.

Compulsory Course:

DEMOCRACY	2000232	DEMOCRACY ELECTIONS AND GOVERNANCE
PHY EDU	2000233	PHYSICAL EDUCATION

SEM-I

Syllabus for: Discipline Specific Core Courses (DSC-A and DSC-B)

Academic Council 1(6) 2nd July, 2020 **DSC-A PHYSICS-I: MECHANICS AND PROPERTIES OF MATTER.** **(Course Code:2031104) (50 Marks and 2 Credits)**		**Hours** **30**
Course Objectives: Students should be able to; ● Acquire knowledge about MI, analyze and evaluate MI with respect to mass, shape and dimensions of the body. ● Gain knowledge about oscillatory motion of a body, analyze, synthesize, apply and evaluate the elastic properties of a body. ● Gain knowledge about elasticity of a body, analyze, apply and synthesize the elastic properties of a body. ● Gain knowledge about pressure, temperature and ST and interrelation between them. On basis of this knowledge student will comprehend, apply, analyze and evaluate properties of fluids related to ST.		
Unit1	Contents: **1. Moment of Inertia** Review of M.I., Moment of Inertia of 1) Circular disc 2) Rectangular lamina 3) Spherical Shell 4) Fly wheel 5) Annular ring **6) Solid sphere. Tutorial.**	8
Unit2	Contents: **2. Pendulums** Theory of compound pendulum, Bar pendulum, Kater's Pendulum, Bassel's Theory, Bifilar pendulum (parallel suspensions of equal lengths), Torsional Pendulum. **Tutorial.**	8
Unit3	Contents: **3.Elasticity** Equivalence of shear strain to compression and extension strains, Relation between elastic constants, Poisson's ratio of rubber tube (Theory), **Bending moment, Resilience, Twisting couple on cylinder. Tutorial.**	7
Unit4	Contents:	7

	4. Surface Tension	
	Review of S.T., relation between excess pressure and surface tension, excess pressure inside a liquid drop and soap bubble, Jaeger's method to determine Surface Tension, ST by Quincke's method, Factors affecting Surface Tension, Applications of Surface Tension. **Tutorial.**	

Course Outcome:

- **Unit 1**. Students will acquire knowledge about MI, analyze and evaluate MI with respect to mass, shape and dimensions of the body.

- **Unit 2.** Students will gain knowledge about oscillatory motion, analyze, synthesize, apply and evaluate the elastic properties of a body.

- **Unit 3.** Students will gain knowledge about elasticity of a body, analyze, apply and synthesize the elastic properties of a body.

- **Unit 4.** Students will gain knowledge about pressure, temperature and ST and interrelation between them. On basis of this knowledge student will comprehend, apply, analyze and evaluate properties of fluids related to ST.

Reference Books:

1) Properties of Matter- D. S. Mathur: S. Chand Publishing, 2010

2) A Text book of properties of Matter- N.S. Khare &S. Kumar: Atma Ram and Sons, Delhi, 9999.

3) Physics Vol. I –David & Robert Resnick: John Wiley & Sons

4) University Physics-Mechanics of a Particle- Anvar Kamal

Academic Council 1(6) **2ⁿᵈ July, 2020** **DSC-A PHYSICS-II: OPTICS AND LASER** **(Course Code:2031105) (50 Marks and 2 Credits)**	**Hours** **30**
Course Objectives: Students should be able to; - Comprehend, apply and evaluate the optical properties of light based on the knowledge gained on geometrical optics. - Apply, analyze, synthesize and evaluate the knowledge gained on Interference to light and medium properties.	

	● Gain knowledge about diffraction, apply, analyze and evaluate the properties of light and medium. ● Gain knowledge about LASER, apply, analyze and evaluate LASER and their properties.	
Unit 1	Contents: **1. Aberrations and Optical Instruments** **Fermat's principle (Law of Reflection and Refraction),** Chromatic and Spherical aberration, methods to minimize Chromatic and Spherical aberrations, Types of eye-pieces Ramsden's eye-piece, Huygen's eye-piece, Gauss eye piece. **Tutorial.**	8
Unit 2	Contents: **2. Interference** Introduction, Interference in parallel faced thin film (Reflected light), **Measurement of wavelength by Biprism (Theory),** wedge shaped film, Newton's rings and its applications**. Tutorial.**	8
Unit 3	Contents: **3. Diffraction** Introduction, Wavefront, **types of wavefronts, propagation of light,** Types of diffraction, Diffraction at single slit, Plane diffraction grating and its elementary theory, its application to determine wavelength, Comparison between prism and grating spectra. **Tutorial.**	7
Unit 4	Contents: **4. LASER** Introduction, Spatial and temporal coherence, Spontaneous and Stimulated emission and absorption, Einstein's Coefficients (with derivation), Population inversion, Optical Pumping, Cavity resonator, He-Ne Laser, Ruby Laser, Properties and application. **Tutorial.**	7
Course Outcome: ● **Unit 1.** Student will comprehend, apply and evaluate the optical properties of light based on the knowledge gained on geometrical optics.		

- **Unit 2.** Knowledge gained on interference of light will help the student to apply, analyze, synthesize and evaluate the light and medium properties.
- **Unit 3.** Students will gain knowledge about diffraction and apply, analyze and evaluate the properties of light and medium.
- **Unit 4.** Students will gain knowledge about LASER and apply, analyze and evaluate LASER and their properties.

Reference Books:

1. Ray Optics by R K Verma:Discovery Publishing House, 2006
2. TextBookofOptics(newedition)–BrijlalandSubramanyam:
3. Optics byMathur:Anmol Publications Pvt Ltd
4. Concept of Physics – H C Verma:Bharati Bhawan Pub
5. Optics - Satyaprakash: Ratan Prakashan Mandir, 1983

SEM-II

Academic Council 1(6) 2nd July, 2020 **DSC-B PHYSICS-I: HEAT AND THERMODYNAMICS** **(Course Code:2031204) (50 Marks and 2 Credits)**		**Hours** **30**
Course Objectives: Students should be able to;		
● Comprehend, apply and analyze the behavior of gases based on temperature, viscosity and conductivity of the gases and medium.		
● Use the knowledge acquired on liquification of gases to apply, analyze, synthesize and evaluate phase change from gaseous state to liquid state.		
● Use the knowledge gained about thermodynamics to comprehend, apply and evaluate the effect of temperature on the existence on physical state of body.		
● Apply, comprehend, analyze and evaluate heat engines.		
Unit 1	Contents: 1. **Transport Phenomenon** Introduction, mean free path, Clausius expression for mean free path (Collision cross section), Transport Phenomenon,	8

	Coefficient of Viscosity, Thermal Conductivity and its dependence on temperature and pressure, **Diffusion of gases.Tutorial.**	
Unit 2	Contents: 2. **Liquification of Gases** LiquefactionofgasesbyJ-Teffect,Linde'sairliquefier,coolingbyadiabaticdemagnetization and expression for fall in temperature, experimental setup for adiabatic de-magnetization of paramagnetic substances, properties of liquidhelium. **Tutorial.**	8
Unit 3	Contents: 3. **Thermodynamics** Laws of thermodynamics, Reversible and Irreversible processes, Isothermal and adiabatic process, Adiabatic relations, work done during isothermal and adiabatic processes, Entropy change in reversible and irreversible processes, **Specific heat of gases, Wander Waal's equation, Relation between critical indices. Tutorial.**	7
Unit 4	Contents: 4. **Heat engines** Introduction, Carnot's heat engine and its efficiency; Heat engine, Otto cycle and its efficiency, Diesel cycle and its efficiency, comparison between Otto and diesel engine,Refrigerator,General principle, Refrigeration Cycle, coefficient of performance of refrigerator, Vapor compression Refrigerator, Air conditioning (principle and applications). **Tutorial.**	7

Course Outcome:

- **Unit 1**.Students will comprehend, apply and analyze the behaviour of gases based on temperature, viscosity and conductivity of the gases and medium.

- **Unit 2.** Students will use the knowledge acquired on liquification of gases to apply, analyze, synthesize and evaluate phase change from gaseous state to liquid state.

- **Unit 3.** Students will use the knowledge gained about thermodynamics to comprehend, apply and evaluate the effect of temperature on the existence on physical state of body.

- **Unit 4.** Students will apply, comprehend, analyze and evaluate heat engines.

Reference Books:

1) Treatise on Heat – Saha&Shrivastav:Indian Press, Limited, 1935

2) Kinetic theory of gases – V.N.Kelkar:

3) Heat and Thermodynamics – Brijlal&Subrahmanyam:S. Chand Publishing, 2008

Academic Council 1(6) 2ⁿᵈ July, 2020 **DSC-B PHYSICS-II: Electricity, Magnetism and Electronics** **(Course Code: 2031205) (50 Marks and 2 Credits)**	**Hours** **30**
Course Objectives: Students should be able to; ● Apply, evaluate and analyze the functions, properties and use of DC signals. ● Apply, analyze and evaluate the functions, properties and use of AC signals. ● Apply, analyze and evaluate the practical importance & drawbacks of magnetostatics. ● Apply, analyze and evaluate the properties, applications & precautions while handling electronic devices.	
Unit 1 Contents: 1. **Varying Current** Introduction, **KVL, KCL,** Growth and decay of current in L-R circuit, Charging and discharging of capacitor through resistor and inductor separately. Time constant of LR and CR circuit. **Tutorial.**	7
Unit 2 Contents: 2. **A.C. Circuits** Complex number, J-Operator and its applications to AC circuits, Reactance, Susceptance, Impedance, Admittance and power factor, L-C-R circuit, series and parallel resonance circuits, sharpness of resonance and quality factor, **Types of**	8

	bridges, AC bridge (Owen's bridge), **DC bridge (Carey Foster's bridge). Tutorial.**	
Unit 3	Contents: **3. Magnetostatics and Ballistic Galvanometer** Introduction, Biot and Savart's law & its application to determine magnetic induction at a point on the axis of current carrying coil of single turn and Solenoid, Transformers, Types- Step-up transformer, Step-down transformer. Construction, theory and working of B G, Constants of B G. **Tutorial.**	8
Unit 4	Contents: **4. Semiconductor Devices and applications** Bridge rectifier with Pie-Filter, Clippers, Clampers, Zener diode and its application as a voltage regulator, Tunnel Diode, Schottky Diode, LED, Avalanche Diode, **Solar cell,** Bi-junction transistor, Construction and working of transistor, input-output and transfer characteristics of CE & CB mode, Relation between α and β. Transistor as amplifier (CE mode**) Tutorial.**	7

Course Outcome:

- **Unit 1.** Students will apply, evaluate and analyze the functions, properties and use of DC signals.
- **Unit 2.** Students will apply, analyze and evaluate the functions, properties and use of AC signals.
- **Unit 3.** Students will apply, analyze and evaluate the practical importance & drawbacks of magnetostatics.
- **Unit 4.** Students will apply, analyze and evaluate the properties, applications & precautions while handling electronic devices.

Reference Books:
1) Principles of Electronics –V.K. Mehta: S. Chand Publishing, 2022
2) Electronics Principles- Malvino: McGraw-Hill Education
3) Basic electronics & linear circuits- Bhargav, Kulshrstha & Gupta: Tata McGraw-Hill Education
4) Electricity and Magnetism – Khare & Shrivastav: Atma Ram & Sons, Delhi, 1976.

DSC-A: PHYSICS PRACTICAL-I

(Course Code: 2031221) (50 Marks and 2 Credits)

Experiment No.	Title: **Group I – General Physics, Heat**
1	LC of instruments
2	Torsional pendulum
3	Bar pendulum
4	Bifilar pendulum
5	M.I. of disc by annular ring
6	Poisson's ratio of rubber
7	S.T. of liquid by Drop Weight method
8	Viscosity by Stoke's method
9	Frequency by AC mains (Magnetic wire)
10	Frequency by AC mains (Non-magnetic wire)

	Academic Council 1(6) **2nd July, 2020** **DSC-B PHYSICS PRACTICAL-I** **(Course Code: 2031221) (50 Marks and 2 Credits)**
Experiment No.	Title: **Group II – Optics, Electricity and Electronics**
1	Study of Electronic Components
2	Dispersive Power of Prism
3	Diffraction Grating
4	Use of Spectrometer to determine Angle of Prism
5	Determination of wavelength of LASER
6	Liquid lens
7	Solar Cell
8	Bridge Rectifier with π Filter
9	Out Put Characteristics of Transistor in CE mode
10	Zener diode as a Voltage Regulator

Teaching-Learning Equipment's /Tools/Methods/etc.:

● Laboratory setup as per requirement of instruments and apparatus for each experiment.

● Experimental method.

1. Advanced Practical Physics: Nelkon: Heinemann Educational Publishers; 3rd Revised edition (1 January 1970)

2. Practical Physics: Rajopadhye: Pragati Prakashan

3. Practical Physics: S. K. Sharma:

4. Practical Physics: Harnam Singh: S. Chand Publishing, 2000

Signature: SSG
Name: Mrs. S. S. Gavande
Chairman
BOS in Physics