Annexure-I (Credits)

Proposed CBCS Structure from 2025-2026 for Under Graduate Courses

Courses		Papers	Total Credits	Credits for each paper/ Semester					
				B.Sc					
				I	II	III	IV	V	VI
Core Courses (DSC)	Major-1	6	30	5	5	5	5	5	5
	Major-2	6	30	5	5	5	5	5	5
	Minor-1	4	20	5	5	5	5	---	----
MIL/AEC (First language)	English	4	20	5	5	5	5	---	----
Second Language (Telugu, Hindi, Urdu etc.,)		4	20	5	5	5	5	---	----
Multi Disciplinary Course	MDC-1	1	4	---	----	---	----	4	----
SEC 1,2		2	4	---	----	---	----	2	2
SEC 3,4		2	4	---	----	---	----	2	2
Value added course (VAC)	VAC 1,2	2	6	---	----	---	----	3	3
Internships	Internship/Project	1	4	---	----	---	----	---	4
Total Credits in each semester		----	142	25	25	25	25	21	21
Total Credits in UG		---	142						

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B.Sc. PHYSICS SYLLABUS

SCHEME OF INSTRUCTIONS UNDER CBCS (w.e.f. 2025-26 academic year onwards)

Year	Semester	Title of the Paper [Theory and Practical]	Instructions Hrs/week	Number of Credits	Total Credits	Marks
1st Year	I Sem	Paper – I : Mechanics and Oscillations	4	4	5	100
		Practicals – I :Mechanics and Oscillations Lab	3	1		25
	II Sem	Paper – II: Thermal Physics	4	4	5	100
		Practicals – II : Thermal Physics lab	3	1		25
2nd Year	III Sem	Paper – III : Electromagnetic Theory	4	4	5	100
		Practicals – III : Electromagnetic Theory Lab	3	1		25
	IV Sem	Paper – IV : Optics	4	4	5	100
		Practicals – IV : Optics lab	3	1		25
3rd Year	V Sem	Paper –V : Modern Physics	4	4	5	100
		Practical's – V: Modern Physics lab	3	1		25
		Multi Disciplinary Courses (MDC-1):				
		Radiation Physics	4	4	4	100
		Skill Enhancement Courses (SEC):				
		SEC-1: Communications Skills/Professional Development Skills/ Entrepreneurship & Starts up	2	2	2	50
		SEC-3: Fundamentals of AI Tools/Ability Skills (Competitive Mathematics)	2	2	2	50
		Value Added Course (VAC)				
		VAC-1-Paper-1: Environmental Science (EVS)/ Cyber Security & Cyber laws	3	3	3	75
	VI Sem	Paper – VI : Solid State Physics	4	4	5	100
		Practicals VI : Solid State Physics	3	1		25
		Skill Enhancement Courses (SEC):				
		SEC-2: Professional Development Skills /Communications Skills/Entrepreneurship & Starts up	2	2	2	50
		SEC-4: Biomedical instrumentation	2	2	2	50
		Value Added Course (VAC)				
		VAC-2--Paper-2: Cyber Security & Cyber laws/Environmental Science (EVS)	3	3	3	75
		Project work /Internship:				
		(Innovative Products making Skill (IPMS))	4	4	4	100

Total Credits : 52

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B.Sc. (Physics)- 1 Year
Semester - II
Paper - II: Thermal Physics

Unit - I

Kinetic theory of gases: (3)

Introduction - Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena -Viscosity of gases - thermal conductivity - diffusion of gases.

Thermodynamics: (7)

Basics of Thermodynamics- Carnot's engine (qualitative)-Carnot's theorem -Kelvin's and Clausius statements - Thermodynamic scale of temperature - Entropy, physical significance - Change in entropy in reversible and irreversible processes - Entropy and disorder - Entropy of universe - Temperature- Entropy (T-S) diagram - Change of entropy of a perfect gas-change of entropy when ice changes into steam. Application of entropy in waste management.

Unit - II

Thermodynamic potentials and Maxwell's equations: (6)

Thermodynamic potentials - Derivation of Maxwell's thermodynamic relations - Clausius-Clapeyron's equation - Derivation for ratio of specific heats - Derivation for difference of two specific heats for perfect gas.

Low temperature Physics: (8)

Joule Kelvin effect - liquefaction of gas using porous plug experiment. Joule expansion - Distinction between adiabatic and Joule Thomson expansion - Expression for Joule Thomson cooling - Liquefaction of helium, Kapitza's method - Adiabatic demagnetization - Production of low temperatures - Principle of refrigeration, vapour compression type, Thermocouple- seebeck effect, Peltier effect and Thomson's effect.

Unit - III

Quantum theory of radiation: (12)

Black body-Ferry's black body - distribution of energy in the spectrum of Black body - Wein's displacement law, Wein's law, Rayleigh-Jean's law - Quantum theory of radiation - Planck's law - deduction of Wein's law, Rayleigh-Jeans law, Stefan's law from Planck's law. Measurement of radiation using pyrometers - Disappearing filament optical pyrometer - experimental determination - Angstrom pyro heliometer - determination of solar constant, effective temperature of sun.

Unit - IV

Statistical Mechanics: (12)

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles, classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas- Maxwell-Boltzmann's velocity distribution law (qualitative), Bose-Einstein Distribution law- application to Photon energy, Fermi-Dirac Distribution law- free electron gas, comparison of three distribution laws.

NOTE: Problems should be solved at the end of every chapter of all units.

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Reference books:

1. Fundamentals of Physics. Halliday / Resnick/Walker.C. Wiley India Edition 2007
2. Second Year Physics- Telugu Academy.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath (For statistical Mechanics) S. Chand & co.
4. Modern Physics by G. Aruldas and P. Rajagopal, Eastern Economy Education.
5. Berkeley Physics Course. Volume-5. Statistical Physics by F. Reif. The McGraw-Hill companies.
6. An Introduction to Thermal Physics by Daniel V. Schroeder. Pearson Education Low Price Edition.
7. Thermodynamics by R. C. Srivastava, Subit K. Saha & Abhay K. Jain Eastern Economy Edition.
8. Modern Engineering Physics by A.S. Vasudeva. S. Chand & Co. Publications.
9. B.B. Laud "Introduction to statistical Mechanics" (Macmillan 1981).

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B.Sc. (Physics) – I year
Semester - II
Paper – II: Thermal Physics Practicals

1. Co-efficient of thermal conductivity of a bad conductor by Lee's method.
2. Measurement of Stefan's constant.
3. Specific heat of a liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltages.
5. Calibration of thermo couple
6. Cooling Curve of a metallic body
7. Resistance thermometer
8. Thermal expansion of solids
9. Study of conversion of mechanical energy to heat.
10. Determine the Specific heat of a solid (graphite rod)
11. Simulations for T-S doiagram

***Note**: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.*

Reference books:

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastava

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S.S.R. DEGREE COLLEGE, (AUTONOMOUS) NIZAMABAD (C.C:5029)
FACULTY OF SCIENCE
B.Sc. CBCS Physics & Electronics
Theory Model Question paper for DSC & DSE

Time : 3 hrs **Max. Marks : 70**

Draw well – labeled diagram wherever necessary

I. Write any Six short answers of the following **6 X 5 = 30 M**

1. UNIT – I
2. UNIT – I
3. UNIT – II
4. UNIT – II
5. UNIT – III
6. UNIT – III
7. UNIT – IV
8. UNIT – IV
9. FROM UNIT – I OR II
10. FROM UNIT – III OR IV

II. Write All Essay Answers of the following **4 X 10 = 40 M**

11. A) UNIT – I
    (or)
    B) UNIT – I
12. A) UNIT – II
    (or)
    B) UNIT – II
13. A) UNIT – III
    (or)
    B) UNIT – III
14. A) UNIT – IV
    (or)
    B) UNIT – IV

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S.S.R. DEGREE COLLEGE, (AUTONOMOUS) NIZAMABAD (C.C:5029)
FACULTY OF SCIENCE
B.Sc. CBCS Physics & Electronics
Internal Assessment Pattern

Time : 1 hrs **Max. Marks : 30**

I. Internal Assessment Test – (20 M)

Section – A

1. Multiple Choice Questions — 10 X ½ = 5 M
2. Fill in the Blanks — 10 X ½ = 5 M

Section – B

3. Two Descriptive Questions with internal Choice — 2 X 5 = 10 M

Total 30 Marks

Average of 2 internal exams should be taken

Skill Based Tests

II. **Student Seminar** — 5 M

III. **Student Attendance** — 5 M

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