PITHAPUR RAJAHS GOVERNMENT COLLEGE(A)
KAKINADA

CERTIFICATE
COURSSE ON

INDIAN KNOWLEDGE SYSTEM IN SCIENCE

FOR II PHYSICS STUDENTS

DATE OF COMMENCE MENT :
07 January 2026

CONDUCTED BY

DEPARTMENT OF PHYSICS & ELECTRONICS

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) - KAKINADA
INDIAN KNOWLEDGE SYSTEM IN SCIENCE CERTIFICATE COURSE

S.No	Registration Number	Candidate Name	Gender	Specilizat	CATAGORY	phase
1	24PHY1	Y.AIESH	Male	Physics	BC_A	I
2	24PHY3	M.VIJAYA DURGA	Male	Physics	BC_A	I
3	24PHY4	M.NAGA MANI	Female	Physics	OC	I
4	24PHY5	PL VENKATA SOMESWARI	Female	Physics	ST	I
5	24PHY6	K.SEETHA MAHALAXMI	Female	Physics	OC	I
6	24PHY7	KSL V PRASANNA	Female	Physics	OC	I
7	24PHY8	PSR S.K VASU	Male	Physics	OC	I
8	24PHY10	K DURGA SURI BABU	Female	Physics	BC_B	I
9	24PHY11	A.NAGA DURGA BHAVANI	Female	Physics	OC	I
10	24PHY12	M.KARUNA SRI	Male	Physics	ST	I
11	24PHY13	SUNTRU ADI KESAVA REDDY	Female	Physics	OC	I
12	24PHY14	PULAPA PRASANNA SATYASRI	Male	Physics	BC_D	I
13	24PHY16	K U V K KUMAR VARMA	Female	Physics	OC	I
14	24PHY17	BETHA CHIRANJEEVI	Female	Physics	OC	I
15	24PHY18	DUPALLI RAJU	Female	Physics	BC_B	I
16	24PHY19	DEVISETTI ANUSHA	Female	Physics	BC_B	I
17	24PHY20	D KRISHNA UMA MAHESWARI	Female	Physics	OC	I
18	24PHY21	PATNALA LEHA SRI	Male	Physics	OC	I
19	24PHY22	YELLABOINA ANITHAJOY	Female	Physics	OC	I
20	24PHY23	VELAGA V R SAI SRIDEVI	Female	Physics	OC	I
21	24PHY24	JONNAKUTI SREERAM	Male	Physics	BC_A	II
22	24PHY25	M SRIRAM	Female	Physics	BC_A	II
23	24PHY26	P UMA MAHESWARI	Female	Physics	BC_B	II
24	24PHY27	T SIVA MANI	Male	Physics	ST	II
25	24PHY28	B V V DURGA PRASAD	Female	Physics	BC_B	II
26	24PHY29	K GOWTHAM SIVA	Male	Physics	BC_D	II
27	24PHY30	M MOUNIKA	Male	Physics	OC	II
28	24PHY31	K DURGA MADHURI	Male	Physics	SC	III
29	24PHY33	D MANI KANTA	Male	Physics	BC_B	III
30	24PHY34	S KOTESWARA RAO	Male	Physics	BC_D	III
31	24PHY36	J SURESH	Male	Physics	BC_D	III
32	24PHY37	KUDUPUDI LOHITHA	Male	Physics	ST	III
33	24PHY38	P VEERA GANGADHAR	Male	Physics	OC	III
34	24PHY39	JAKKI UMA VEERABABU	Male	Physics	OC	III
35	24PHY40	MOGILI SURYA NARAYANA	Male	Physics	OC	III
36	24PHY41	BONDU SURYAKIRAN	Male	Physics	BC_A	III
37	24PHY43	A V SATYANARAYANA	Male	Physics	BC_A	III
38	24PHY45	INJARAPU KARTHIK	Male	Physics	BC_B	III
39	24PHY46	KESABOINA ANANDKUMAR	Male	Physics	BC_A	III
40	24PHY47	CHITTHOORI KRISHNA PRASAD	Male	Physics	BC_A	II
41	24PHY48	PYLA SIVA	Male	Physics	OC	II
42	24PHY49	A V S SATYA KRISHNA	Male	Physics	OC	I
43	24PHY50	SONDE ANILKUMAR	Male	Physics	BC_A	II
44	24PHY51	P N S D H VISWAS	Male	Physics	BC_A	I

PITHAPUR RAJAHS GOVERNMENT COLLEGE(A), KAKINADA

CERTIFICATE COURSE : INDIAN KNOWLEDGE SYSTEM IN SCIENCE

Max Marks : 50 M | II PHYSICS | Time: 50 Mins

Brief Note

This certificate course on *Indian Knowledge System (IKS) in Science* is designed to introduce students to the rich scientific, philosophical, and technological heritage of India. It bridges ancient Indian knowledge traditions with modern scientific perspectives, emphasizing interdisciplinary learning. The course covers key developments in astronomy, chemistry, mathematics, and philosophical foundations of knowledge systems in India.

Aims

- To reconnect learners with India's indigenous scientific heritage.
- To promote awareness of traditional knowledge systems and their relevance today.
- To integrate ancient wisdom with contemporary scientific understanding.
- To cultivate cultural pride and intellectual rootedness among students.

Objectives

- To introduce the **scientific and technological contributions of ancient India**.
- To provide an **Indian perspective of modern science**.
- To highlight **multidisciplinary learning approaches** in traditional systems.
- To emphasize the importance of **Intellectual Property Rights (IPR)** in protecting indigenous knowledge.

Procedure (Course Structure & Implementation)

- **Eligibility:** Intermediate level with Mathematics background.
- **Credits:** 2-credit course.
- **Mode of Learning:**
    - Classroom lectures, Online Classes and discussions
    - Study of classical texts and historical developments
    - Case studies on Indian contributions to science
- **Unit-wise Coverage:**
    - **Unit 1:** Ancient philosophy (Vedas, Vedangas, Gurukul system)

- **Unit 2:** Astronomy (Aryabhata, Varahamihira, Kerala School, etc.)
- **Unit 3:** Chemistry & Metallurgy (Kanad, Nagarjuna, Sushruta, metals)
- **Unit 4:** Mathematics (Number systems, geometry, Jaina mathematics, calendars)

Outcomes

After completing the course, students will be able to:

- Develop **pride and appreciation for Indian scientific heritage**.
- Understand **ancient contributions to astronomy, chemistry, and mathematics**.
- Recognize the **integration of multidisciplinary knowledge systems**.
- Appreciate the **continuity between traditional knowledge and modern science**.
- Understand the importance of **protecting indigenous knowledge through IPR**.

SYLLABUS

- **Unit-1** Ancient philosophy of Knowledge: Vedas, Vedangas, sutras – Gurukul parampara
- **Unit-2** Astronomy in India: The Beginnings of Indian Astronomy - The Early Historical Period-The Siddhāntic Era - The Kerala School - Aryabhatta - Varahamihira- Bhaskara I – Brahamagupta- Bhaskara II – Brief notes on Astronomical instruments
- **Unit-3** Chemistry in India: Early Chemical Techniques, Atomism in Vaiśeṣika - Rishi Kanad- Nagarjuna- Al-Bīrūnī', Vāgbhaṭa- Sushruta- Carak Metallurgy in India - Definition, Metallurgy in Harappan Civilization, Metallurgy of Gold- Copper-Zinc-Bronze - Iron and steel.
- **Unit-4** Developments in Mathematics: Number systems- Geometry- works of Pingala-Baudhayana- Jaina Mahavira-Sridharacharya – Madhava Siddanthas and Calender systems

- **References:**
- 1. A Concise History of Science in India – Bose, Sen & Subbarayappa- INSA Publications
- 2. Encyclopedia of Classical Indian Sciences- Roddam Narasimha, Universities Press
- 3. NCERT Modules of KPTI

P.R. GOVERNMENT COLLEGE (A), KAKINADA

Certificate Course on

INDIAN KNOWLEDGE SYSTEM IN SCIENCE

3 Hours/Week [Total: 30 hrs.]

Blue Print

Time: 50 Mins. Max. Marks: 50 M

Section	Questions to be given	Questions to be answered	Marks
Unit 1	10	10	10M
Unit 2	15	15	15M
Unit 3	15	15	15M
Unit 4	10	10	10M
Total	50	50	50 M

** 50 MCQs will be given. Each Question carries 1 Mark.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) - KAKINADA					
CERTIFICATE COURSE : INDIAN KNOWLEDGE SYSTEM IN SCIENCE					
GROUP : II PHYSICS					
S.No	Regd. Number	Candidate Name	Gender	CATAGORY	Signature
1	24PHY1	Y.AJESH	Male	BC_A	
2	24PHY3	M.VIJAYA DURGA	Male	BC_A	
3	24PHY4	M.NAGA MANI	Female	OC	
4	24PHY5	PL VENKATA SOMESWARI	Female	ST	
5	24PHY6	K.SEETHA MAHALAXMI	Female	OC	
6	24PHY7	KSL V PRASANNA	Female	OC	
7	24PHY8	PSR S.K VASU	Male	OC	
8	24PHY10	K DURGA SURI BABU	Female	BC_B	
9	24PHY11	A.NAGA DURGA BHAVANI	Female	OC	
10	24PHY12	M.KARUNA SRI	Male	ST	
11	24PHY13	SUNTRU ADI KESAVA REDDY	Female	OC	
12	24PHY14	PULAPA PRASANNA SATYASRI	Male	BC_D	
13	24PHY16	K U V K KUMAR VARMA	Female	OC	
14	24PHY17	BETHA CHIRANJEEVI	Female	OC	
15	24PHY18	DUPALLI RAJU	Female	BC_B	
16	24PHY19	DEVISETTI ANUSHA	Female	BC_B	
17	24PHY20	D KRISHNA UMA MAHESWARI	Female	OC	
18	24PHY21	PATNALA LEHA SRI	Male	OC	
19	24PHY22	YELLABOINA ANITHAJOY	Female	OC	
20	24PHY23	VELAGA V R SAI SRIDEVI	Female	OC	
21	24PHY24	JONNAKUTI SREERAM	Male	BC_A	
22	24PHY25	M SRIRAM	Female	BC_A	
23	24PHY26	P UMA MAHESWARI	Female	BC_B	
24	24PHY27	T SIVA MANI	Male	ST	
25	24PHY28	B V V DURGA PRASAD	Female	BC_B	
26	24PHY29	K GOWTHAM SIVA	Male	BC_D	
27	24PHY30	M MOUNIKA	Male	OC	
28	24PHY31	K DURGA MADHURI	Male	SC	
29	24PHY33	D MANI KANTA	Male	BC_B	
30	24PHY34	S KOTESWARA RAO	Male	BC_D	
31	24PHY36	J SURESH	Male	BC_D	
32	24PHY37	KUDUPUDI LOHITHA	Male	ST	
33	24PHY38	P VEERA GANGADHAR	Male	OC	
34	24PHY39	JAKKI UMA VEERABABU	Male	OC	
35	24PHY40	MOGILI SURYA NARAYANA	Male	OC	
36	24PHY41	BONDU SURYAKIRAN	Male	BC_A	
37	24PHY43	A V SATYANARAYANA	Male	BC_A	
38	24PHY45	INJARAPU KARTHIK	Male	BC_B	
39	24PHY46	KESABOINA ANANDKUMAR	Male	BC_A	
40	24PHY47	CH KRISHNA PRASAD	Male	BC_A	
41	24PHY48	PYLA SIVA	Male	OC	
42	24PHY49	A V S SATYA KRISHNA	Male	OC	
43	24PHY50	SONDE ANILKUMAR	Male	BC_A	
44	24PHY51	P N S D H VISWAS	Male	BC_A	

CERTIFICATE COURSE IN INDIAN KNOWLEDGE SYSTEM IN SCIENCE

GROUP : II PHYSICS

S.No	Registration Number	Candidate Name	CATAGORY	1 07-01-2026	2 08-01-2026	3 09-01-2026	4 19-01-2026	5 20-01-2026	6 21-01-2026	7 22-01-2026	8 23-01-2026	9 24-01-2026	10 27-01-2026	11 28-01-2026	12 29-01-2026	13 30-01-2026	14 02-02-2026	15 03-02-2026	16 04-02-2026	17 05-02-2026	18 06-02-2026	19 07-02-2026	20 09-02-2026	21 10-02-2026	22 11-02-2026	23 12-02-2026	24 13-02-2026	25 16-02-2026	26 17-02-2026	27 18-02-2026	28 19-02-2026	29 20-02-2026	30 21-02-2026	31 23-02-2026	32 24-02-2026	33 25-02-2026	34 26-02-2026	35 27-02-2026	Total classes attended	EXAM on 03.04.25
1	24PHY1	Y.AJESH	BC_A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	33	P
2	24PHY3	M.VIJAYA DURGA	BC_A	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	34	P
3	24PHY4	M.NAGA MANI	OC	A	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	31	P
4	24PHY5	PL VENKATA SOMESWARI	ST	A	P	A	A	P	P	P	A	P	P	P	A	P	A	P	P	P	P	A	P	A	P	A	P	P	P	P	A	P	P	A	P	A	P	P	23	P
5	24PHY6	K.SEETHA MAHALAXMI	OC	A	P	P	V	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	31	P
6	24PHY7	KSL V PRASANNA	OC	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	31	P
7	24PHY8	PSR S.K VASU	OC	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	32	P
8	24PHY10	K DURGA SURI BABU	BC_B	A	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	30	P
9	24PHY11	A.NAGA DURGA BHAVANI	OC	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	32	P
10	24PHY12	M.KARUNA SRI	ST	P	P	A	A	P	A	A	P	P	A	A	A	P	P	P	P	P	P	P	P	P	A	P	P	P	A	A	P	P	P	A	P	P	P	P	24	P
11	24PHY13	SUNTRU ADI KESAVA REDDY	OC	A	P	A	A	P	P	A	P	A	A	P	A	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	A	P	P	25	P
12	24PHY14	PULAPA PRASANNA SATYASRI	BC_D	A	P	P	P	P	P	P	P	A	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	32	P
13	24PHY16	K U V K KUMAR VARMA	OC	A	P	P	P	P	P	P	P	P	P	P	A	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	28	P
14	24PHY17	BETHA CHIRANJEEVI	OC	A	P	P	P	P	P	A	A	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	31	P
15	24PHY18	DUPALLI RAJU	BC_B	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	34	P
16	24PHY19	DEVISETTI ANUSHA	BC_B	P	A	P	A	P	P	A	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	28	P
17	24PHY20	D KRISHNA UMA MAHESWARI	OC	P	P	P	A	P	A	P	P	P	P	P	A	P	P	P	P	A	P	P	P	A	P	P	A	P	P	A	P	P	P	A	P	P	P	P	27	P
18	24PHY21	PATNALA LEHA SRI	OC	A	P	P	A	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	A	P	P	A	P	P	P	P	P	P	P	A	P	27	P
19	24PHY22	YELLABOINA ANITHAJOY	OC	P	P		A	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	32	P
20	24PHY23	VELAGA V R S SRIDEVI	OC	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	31	P
21	24PHY24	JONNAKUTI SREERAM	BC_A	P	P	P	P	P	A	P	P	P	P	P	A	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	A	P	A	P	P	28	p
22	24PHY25	M SRIRAM	BC_A	A	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	29	P
23	24PHY26	P UMA MAHESWARI	BC_B	A	P	P	P	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	A	29	P
24	24PHY27	T SIVA MANI	ST	A	P	A	A	P	P	A	P	P	A	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	28	P
25	24PHY28	B V V DURGA PRASAD	BC_B	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	A	P	P	P	P	P	P	P	P	31	P
26	24PHY29	K GOWTHAM SIVA	BC_D	A	A	P	A	P	P	A	A	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	26	P
27	24PHY30	M MOUNIKA	OC	A	P	P	A	P	P	P	P	P	P	A	A	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	A	P	P	27	P
28	24PHY31	K DURGA MADHURI	SC	A	A	P	A	P	P	P	P	A	A	P	A	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	A	P	P	A	P	24	P
29	24PHY33	D MANI KANTA	BC_B	A	P	A	A	A	P	A	P	P	P	A	A	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	25	p

| | | |

INDIAN KNOWLEDGE SYSTEM IN SCIENCE
EXPLANATORY NOTES

UNIT–1: ANCIENT PHILOSOPHY OF KNOWLEDGE

1. Introduction

The **Ancient Indian Knowledge System (IKS)** represents one of the oldest intellectual traditions in the world. It is deeply rooted in **philosophy, observation, logic, and experiential learning**. Unlike modern compartmentalized education, ancient Indian knowledge was **holistic and interdisciplinary**, integrating science, spirituality, and ethics. The foundation of this knowledge system lies in:

- **Vedas**
- **Vedangas**
- **Sutra literature**
- **Gurukul system of education**

2. Vedas – The Primary Source of Knowledge

Definition

The **Vedas** are the oldest sacred texts of India, composed in Sanskrit, and considered the **repository of ancient knowledge**.

Four Vedas

1. **Rigveda**
    - Oldest Veda
    - Contains hymns dedicated to natural forces (Agni, Indra, etc.)
    - Early references to cosmology and nature
2. **Yajurveda**
    - Deals with rituals and sacrifices
    - Contains procedural knowledge (applied science)
3. **Samaveda**
    - Focus on music and chanting
    - Basis for Indian classical music
4. **Atharvaveda**
    - Deals with medicine, healing, and daily life
    - Contains early knowledge of herbs and diseases

Scientific Significance

INDIAN KNOWLEDGE SYSTEM IN SCIENCE
EXPLANATORY NOTES

UNIT–1: ANCIENT PHILOSOPHY OF KNOWLEDGE

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Scientific Significance

- Require commentary for full understanding

Examples

- **Brahma Sutra**
- **Yoga Sutra (Patanjali)**
- **Sulbasutras (geometry)**

Scientific Relevance

- Efficient knowledge encoding
- Similar to modern formulas or algorithms

◆ 5. Gurukul System of Education

Structure

- Students (Shishyas) lived with the teacher (Guru)
- Education was **residential and immersive**

Features

- Holistic development: **intellectual, physical, moral, spiritual**
- Learning through:
  - Observation
  - Practice
  - Discussion
- No rigid exams; focus on **understanding and application**

Subjects Taught

- Vedas and philosophy
- Mathematics and astronomy
- Medicine and warfare
- Ethics and social responsibility

Values Emphasized

- Discipline
- Self-reliance
- Respect for nature and teachers
- Character building

◆ 6. Philosophical Foundations of Knowledge

Ancient Indian knowledge was based on **pramanas (means of knowledge)**:

1. **Pratyaksha (Perception)** – Direct observation
2. **Anumana (Inference)** – Logical reasoning

3. **Shabda (Testimony)** – Reliable sources (texts/teachers)

This shows that Indian knowledge system was:

- **Empirical (observation-based)**
- **Logical (reason-based)**
- **Textual (scriptural validation)**

7. Key Characteristics of Ancient Indian Knowledge

- **Holistic approach** (integration of science + spirituality)
- **Interdisciplinary learning**
- **Oral tradition with high accuracy**
- **Application-oriented knowledge**
- **Sustainability and harmony with nature**

8. Relevance in Modern Science

- Gurukul → Modern **experiential learning**
- Vedangas → Foundations of **linguistics, astronomy, mathematics**
- Sutras → Similar to **formulas, coding logic**
- Ayurveda → Influence on **modern medicine**

Here is a **comprehensive explanatory note for Unit–2: Astronomy in India** based on your syllabus . This is structured for **teaching, exams, and conceptual clarity**.

UNIT–2: ASTRONOMY IN INDIA

1. Introduction

Astronomy in ancient India developed as a **scientific discipline driven by observation, mathematics, and practical needs** such as:

- Time measurement
- Calendar preparation
- Religious rituals

Indian astronomy combined:

- **Empirical observation (Pratyaksha)**
- **Mathematical modeling**
- **Philosophical interpretation of the cosmos**

2. Beginnings of Indian Astronomy

Early Period (Vedic Age)

- Found in **Vedanga Jyotisha**

- Focus on:
    - Motion of Sun and Moon
    - Seasons (Rituchakra)
    - Time divisions (day, month, year)

Key Features

- Lunar and solar calendars
- Nakshatra (constellation) system (27/28 stars)
- Eclipse observations

Importance

- Agriculture planning
- Ritual timing
- Social organization

3. The Siddhāntic Era (Classical Astronomy)

This period marks the transition to **mathematical astronomy**.

Features

- Use of **geometry and trigonometry**
- Development of **planetary models**
- Precise calculations of:
    - Planetary positions
    - Eclipses
    - Time cycles

Important Texts

- Surya Siddhanta
- Aryabhatiya

4. The Kerala School of Astronomy and Mathematics

Time Period

14th–16th century

Contributions

- Development of **infinite series expansions**
- Early concepts of **calculus (before Newton & Leibniz)**

Significance

- Accurate trigonometric values
- Advanced mathematical astronomy

5. Major Indian Astronomers

Aryabhata (476 CE)

Contributions

- Proposed that **Earth rotates on its axis**
- Explained **day and night**
- Calculated value of $\pi \approx 3.1416$
- Introduced **trigonometric functions (sine tables)**

Important Work

- *Aryabhatiya*

Varahamihira (505 CE)

Contributions

- Compiled earlier astronomical knowledge
- Studied:
    - Planetary motion
    - Weather prediction

Work

- *Panchasiddhantika* (summary of 5 astronomical systems)

Brahmagupta (598 CE)

Contributions

- Rules for **zero and negative numbers**
- Improved methods for:
    - Eclipse calculation
    - Planetary motion

Work

- *Brahmasphutasiddhanta*

Bhaskara I

- Known for commentaries on Aryabhata's work
- Contributions to trigonometry

Bhaskara II (1114 CE)

Contributions

- Advanced ideas similar to **differential calculus**
- Accurate astronomical calculations

Work

- *Lilavati*
- *Siddhanta Shiromani*

6. Astronomical Instruments in Ancient India

Common Instruments

1. **Gnomon (Shanku)**
    - Vertical rod used to measure shadow
    - Determines time and latitude
2. **Sundial**
    - Measures time based on Sun's shadow
3. **Armillary Sphere**
    - Represents celestial sphere
4. **Water Clocks (Ghati Yantra)**
    - Measures time using water flow

7. Scientific Concepts in Indian Astronomy

Key Ideas

- Earth is spherical
- Earth rotates on its axis
- Explanation of eclipses (shadow theory, not mythology)
- Accurate length of the year (~365 days)

Mathematical Tools Used

- Trigonometry
- Algebra
- Geometry

8. Calendrical Systems

Types

- **Solar Calendar** → Based on Sun
- **Lunar Calendar** → Based on Moon
- **Lunisolar Calendar** → Combination (Indian Panchanga)

Panchanga Elements

1. Tithi (lunar day)
2. Vara (weekday)
3. Nakshatra
4. Yoga
5. Karana

9. Contributions to Global Science

- Influenced **Arabic and European astronomy**
- Transmission of:
    - Numerals
    - Trigonometry
    - Astronomical tables

10. Characteristics of Indian Astronomy

- Strong **mathematical foundation**
- Integration of **theory and observation**
- Practical applications in daily life
- Long-term astronomical records

Here is a **comprehensive explanatory note for Unit–3: Chemistry in India** based on your syllabus . This is structured for **conceptual clarity, teaching, and exam preparation**.

UNIT–3: CHEMISTRY IN INDIA

1. Introduction

Ancient Indian chemistry, traditionally known as **"Rasayana Shastra"**, developed as a practical and experimental science. It was closely associated with:

- **Medicine (Ayurveda)**
- **Metallurgy**
- **Alchemy**
- **Daily life practices**

Unlike purely theoretical systems, Indian chemistry emphasized:

- **Experimentation**
- **Observation**
- **Application**

2. Early Chemical Techniques

Practical Applications

Ancient Indians developed various chemical processes used in everyday life:

- **Dyeing of textiles**
- **Tanning of leather**
- **Fermentation (alcohol, medicines)**
- **Extraction of plant-based drugs**
- **Preparation of perfumes and cosmetics**

Scientific Nature

- Use of **natural substances (herbs, minerals)**
- Controlled heating and cooling processes
- Knowledge of **chemical transformations**

3. Atomism in Vaiśeṣika Philosophy

Founder: Rishi Kanad

Key Concept: "Anu" (Atom)

- Matter is composed of **indivisible particles (atoms)**
- Atoms combine to form molecules
- Different combinations → different substances

Significance

- One of the earliest forms of **atomic theory**
- Comparable to modern atomic concepts

4. Contributions of Important Scholars

Rishi Kanad

- Founder of **Vaiśeṣika school**
- Proposed atomic structure of matter

Nagarjuna

- Known as the **father of Indian alchemy**
- Worked on:
    - Metal extraction
    - Preparation of compounds
- Developed methods for **purification of metals**

Charaka

- Author of *Charaka Samhita*
- Focus on:

- Medicinal chemistry
- Herbal formulations

- Described properties of drugs and their effects

Sushruta

- Author of *Sushruta Samhita*
- Contributions:
  - Surgical instruments
  - Use of chemicals in surgery
- Knowledge of antiseptics and healing substances

Al-Biruni

- Persian scholar who studied Indian science
- Documented:
  - Indian chemical knowledge
  - Metallurgical techniques

Vagbhata

- Contributed to Ayurvedic medicine
- Integrated chemical processes with healthcare

5. Metallurgy in India

Definition

Metallurgy is the science of **extraction, purification, and use of metals**.

6. Metallurgy in Harappan Civilization

Features

- Advanced knowledge of:
  - **Copper**
  - **Bronze**
- Production of:
  - Tools
  - Ornaments
  - Weapons

Techniques

- Alloy formation
- Casting methods
- Furnace technology

7. Important Metals and Alloys

Gold

- Used for ornaments
- Resistant to corrosion

Copper

- Widely used metal
- Basis for bronze

Bronze

- Alloy of **Copper + Tin**
- Stronger than pure copper
- Used in tools and statues

Zinc

- India pioneered **zinc distillation**
- Used in alloy formation

Iron and Steel

Achievements

- Production of high-quality iron
- Development of **Wootz steel**

Example

- **Iron Pillar of Delhi**
    - Corrosion-resistant
    - Demonstrates advanced metallurgy

8. Chemical Knowledge in Medicine (Ayurveda)

Features

- Use of:
    - Herbs
    - Minerals
    - Metals

Processes

- Extraction
- Purification
- Combination of substances

Importance

- Foundation for modern pharmacology
- Emphasis on **natural and holistic healing**

9. Alchemy (Rasayana)

Goals

- Transformation of metals
- Preparation of elixirs
- Longevity and health

Scientific Contribution

- Development of:
    - Laboratory techniques
    - Chemical apparatus
    - Heating methods

10. Characteristics of Indian Chemistry

- Experimental and practical approach
- Integration with medicine and metallurgy
- Advanced knowledge of materials
- Sustainable use of natural resources

11. Contribution to Modern Science

- Early atomic theory → Modern chemistry
- Metallurgy → Material science
- Ayurveda → Pharmacology
- Chemical techniques → Industrial processes

Here is a **comprehensive explanatory note for Unit–4: Developments in Mathematics** based on your syllabus . This is structured for **clear understanding, teaching, and exam preparation**.

UNIT–4: DEVELOPMENTS IN MATHEMATICS

1. Introduction

Ancient Indian mathematics is one of the **most significant contributions to global science**. It evolved through:

- Practical needs (trade, construction, astronomy)
- Philosophical inquiry
- Systematic reasoning

Indian mathematicians developed concepts that form the **foundation of modern mathematics**, including:

- Zero
- Decimal system
- Algebra
- Trigonometry
- Infinite series

2. Number System in India

Decimal Place Value System

- Based on **base-10**
- Each digit has a place value (units, tens, hundreds, etc.)

Concept of Zero (0)

- Introduced as both:
  - A number
  - A placeholder

Importance

- Simplified calculations
- Enabled development of algebra and arithmetic

Example

- Number $305 = 3\times100 + 0\times10 + 5\times1$

3. Geometry in Ancient India

Sulbasutras

- Ancient texts dealing with **geometrical constructions**
- Used for building **fire altars (yajnas)**

Key Concepts

- Measurement of lengths and areas
- Construction of squares, rectangles, circles
- Transformation of shapes

Baudhayana Theorem

Equivalent to Pythagoras theorem:

genui {"math_block_widget_always_prefetch_v2":{"content":"a^2 + b^2 = c^2"}}

Significance

- Shows advanced understanding of geometry before Greek mathematics

4. Contributions of Important Mathematicians

Pingala (Prosody & Binary System)

Contributions

- Introduced **binary number system concepts**
- Used for analyzing poetic meters (Chandas)

Importance

- Foundation for modern **computer science (binary coding)**

Baudhayana

- Author of Sulbasutra
- Developed geometric rules
- Early form of Pythagoras theorem

Mahavira (Jaina Mathematics)

Contributions

- Algebraic operations
- Solutions of equations
- Rules for fractions and permutations

Sridharacharya

Contributions

- Methods for solving **quadratic equations**
- Arithmetic and algebraic techniques

Madhava (Kerala School)

Contributions

- Founder of Kerala School
- Developed **infinite series expansions**

Importance

- Early form of **calculus**
- Preceded Newton and Leibniz

5. Algebra in India (Bijaganita)

Features

- Use of symbols and unknowns
- Solving linear and quadratic equations
- Practical applications in trade and astronomy

Contributions

- Systematic methods for:
    - Addition, subtraction
    - Multiplication, division
    - Equation solving

6. Trigonometry

Contributions

- Development of **sine (jya), cosine (kojya)** functions
- Creation of trigonometric tables

Applications

- Astronomy
- Navigation
- Calendar calculations

7. Calendar Systems (Panchanga)

Types of Calendars

1. **Solar Calendar** – Based on Sun
2. **Lunar Calendar** – Based on Moon
3. **Lunisolar Calendar** – Combination of both

Panchanga Components

1. **Tithi** – Lunar day
2. **Vara** – Weekday
3. **Nakshatra** – Star constellation
4. **Yoga** – Planetary combination
5. **Karana** – Half lunar day

Importance

- Used for festivals, rituals, agriculture

8. Characteristics of Indian Mathematics

- Logical and systematic
- Application-oriented
- Closely linked with astronomy
- Use of concise formulas (like Sutras)
- Strong computational techniques

9. Contribution to Global Mathematics

- Spread of **Indian numerals (0–9)** worldwide

- Influence on:
  - Arabic mathematics
  - European Renaissance science
- Foundations for:
  - Algebra
  - Calculus
  - Computer science

INDIAN KNOWLEDGE SYSTEM IN SCIENCE

CERTIFICATE COURSE EXAMINATION

II PHYSICS (IV SEM)

Date of Examination : 28.02.26

Max Marks : 50M Time : 50 Mins

1. Which is the oldest Veda?
   A) Yajurveda B) Rigveda C) Samaveda D) Atharvaveda
2. Jyotisha deals with:
   A) Medicine B) Astronomy C) Grammar D) Logic
3. Gurukul system emphasized:
   A) Book learning only B) Holistic education C) Industrial training D) Online learning
4. Sutras are:
   A) Long texts B) Short aphorisms C) Poems D) Stories
5. Samaveda is associated with:
   A) Medicine B) Music C) War D) Agriculture
6. Kalpa deals with:
   A) Grammar B) Rituals C) Astronomy D) Logic
7. Chandas deals with:
   A) Grammar B) Meter C) Ritual D) Astronomy
8. Guru–Shishya tradition means:
   A) Teacher–student relationship B) Business model C) Political system D) Trade
9. Aryabhata proposed:
   A) Flat Earth B) Rotating Earth C) Static Earth D) No Earth
10. Brahmagupta is known for:
    A) Geometry B) Zero C) Calculus D) Optics
11. Kerala school contributed to:
    A) Mechanics B) Calculus C) Optics D) Thermodynamics
12. Varahamihira wrote:
    A) Aryabhatiya B) Panchasiddhantika C) Lilavati D) Sulbasutra
13. Gnomon is used for:
    A) Time measurement B) Weight C) Length D) Temperature
14. Ancient astronomy helped in:
    A) Trade only B) Calendar making C) War D) Cooking
15. Surya Siddhanta deals with:
    A) Medicine B) Astronomy C) Law D) Grammar
16. Bhaskara II contributed to:
    A) Calculus concepts B) Biology C) Optics D) Chemistry
17. Varahamihira was:
    A) Chemist B) Astronomer C) Doctor D) Engineer

18. Panchasiddhantika discusses:
A) Medicine B) Astronomy systems C) Chemistry D) Biology

19. Atomic theory was given by:
A) Charaka B) Kanad C) Aryabhata D) Nagarjuna

20. Sushruta is known for:
A) Surgery B) Astronomy C) Algebra D) Physics

21. Charaka is associated with:
A) Ayurveda B) Astronomy C) Physics D) Algebra

22. Nagarjuna worked on:
A) Metallurgy B) Biology C) Optics D) Mechanics

23. Wootz steel belongs to:
A) India B) China C) Greece D) Rome

24. Zinc distillation was developed in:
A) India B) Europe C) China D) Egypt

25. Vaisheshika school proposed:
A) Relativity B) Atomism C) Evolution D) Gravity

26. Metallurgy deals with:
A) Plants B) Metals C) Animals D) Water

27. Bronze is an alloy of:
A) Copper + Tin B) Iron + Carbon C) Gold + Silver D) Zinc + Iron

28. Early chemistry included:
A) Dyeing B) Tanning C) Fermentation D) All

29. Ayurveda is related to:
A) Astronomy B) Medicine C) Physics D) Math

30. Sushruta Samhita deals with:
A) Surgery B) Math C) Physics D) Chemistry

31. Decimal system originated in:
A) Greece B) India C) Rome D) China

32. Zero concept was given by:
A) Aryabhata B) Brahmagupta C) Newton D) Euclid

33. Pingala contributed to:
A) Binary numbers B) Algebra C) Geometry D) Calculus

34. Baudhayana is known for:
A) Geometry B) Algebra C) Calculus D) Statistics

35. Madhava is known for:
A) Infinite series B) Algebra C) Logic D) Statistics

36. Sridharacharya worked on:
A) Quadratics B) Geometry C) Logic D) Biology

37. Sulbasutras deal with:
A) Geometry B) Algebra C) Biology D) Physics

38. Mahavira contributed to:
A) Algebra B) Physics C) Chemistry D) Biology

39. Place value system was developed in:
A) India B) Greece C) Rome D) China

40. Baudhayana theorem relates to:
A) Pythagoras theorem B) Algebra C) Calculus D) Logic

41. Panchanga is a:
A) Calendar B) Book C) Tool D) Formula

42. Pingala system resembles:
A) Binary B) Decimal C) Roman D) Greek

43. Indian math influenced:
A) Europe B) Arabia C) China D) All

44. Zero is important for:
A) Place value B) Algebra C) Calculus D) All

45. Indian calendars are:
A) Solar B) Lunar C) Lunisolar D) All

46. Nirukta is related to:
A) Rituals B) Etymology C) Phonetics D) Meter

47. Shiksha deals with:
A) Sound B) Meaning C) Ritual D) Logic

48. Brahmagupta worked on:
A) Negative numbers B) Biology C) Physics D) Optics

49. Harappan civilization used:
A) Iron B) Bronze C) Steel D) Plastic

50. Iron pillar of Delhi shows:
A) Rusting B) Corrosion resistance C) Weakness D) Fragility

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) - KAKINADA

INDIAN KNOWLEDGE SYSTEM IN SCIENCE CERTIFICATE COURSE

Marks Obtained in Final Examination

SUBJECT: II Physics

S.No.	Regd.No	Name of the Student	Marks
1	24PHY01	Yelichuri Ajesh	49 / 50
2	24phy03	Maddeeti Vijaya Durga	44 / 50
3	24PHY04	Mummidi Nagamani	43 / 50
4	24PHY05	Pallala. L V Someswari	50 / 50
5	24phy06	K. Seetha mahalakshmi	48 / 50
6	24phy07	K.S.L.V Prasanna	50 / 50
7	24phy08	P S R S K VASU	42 / 50
8	24phy10	Kollu Durga suribabu	36 / 50
9	24phy11	A N D Bhavani	42 / 50
10	24phy12	M karuna sri	48 / 50
11	24PHY13	Suntru.adi kesava reddy	40 / 50
12	24phy14	P.prasanna satya sri	49 / 50
13	24phy16	K.kumar varma	40 / 50
14	24phy17	B.chiranjeevi	37 / 50
15	24phy18	D raju	38 / 50
16	24phy19	D Anusha	41 / 50
17	24phy20	D krishna uma Maheswari	44 / 50
18	24Phy21	P.Leha sri	45 / 50
19	24 phy 22	Y anitha	49 / 50
20	24PHY23	Sri devi	45 / 50
21	24phy24	J sreeram	39 / 50
22	24phy25	Mutyala sri ram	38 / 50
23	24phy26	P.Uma Maheswari	50 / 50
24	24phy27	T. Sivamani	50 / 50
25	24phy28	B V V Purga Prasad	49 / 50
26	24phy30	Merugu mounika	49 / 50
27	24phy31	Kommoju durga Madhuri	43 / 50
28	24 Phy 33	Dasam Manikanta	46 / 50
29	24phy34	S.koteswarao	49 / 50
30	24PHY36	J.suresh	40 / 50
31	24PHY37	K.Lohitha	49 / 50
32	24phy38	P akhil veera gangadhar	36 / 50
33	24phy39	J uma veera babu	41 / 50
34	24phy40	Mogili surya narayana	40 / 50
35	24PHY41	B. Surya Kiran	44 / 50
36	24phy43	A.Veera Satyanarayana	43 / 50
37	24phy45	Injarapu Karthik	46 / 50
38	24PHY46	K. Anand Kumar	47 / 50
39	24phy47	Ch.kriahna prasad	41 / 50
40	24PHY48	P. Siva	41 / 50
41	24phy49	A.v.s.s.krishna	41 / 50
42	24PHY50	Sonde.Anilkumar	39 / 50
43	24PHY51	P NSDH Viswas	45 / 50

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DEPARTMENT OF PHYSICS

Certificate Course in

Indian Knowledge System in Science

This is to certify that Mr. /Ms. _____

successfully completed 30 Day Certificate Couse in Indian Knowledge System in Science

held from 07 Jan 26 to 25 Feb 2026

M. Suresh

HEAD OF DEPARTMENT
DEPT. OF PHYSICS

20/2/26

PRINCIPAL
P.R.GOVT. COLLEGE (A)