ST. TERESA'S COLLEGE, ERNAKULAM

(AUTONOMOUS)

Affiliated to Mahatma Gandhi University, Kottayam

CURRICULUM FOR

BACHELOR'S PROGRAMME

IN PHYSICS

Under Choice Based Credit & Semester System
& Outcome Based Education

(2018 Admissions)

BPHY - B.Sc. PHYSICS

PROGRAM SPECIFIC OUTCOMES

PSO1: Explain the major concepts and theoretical principles in Physics

PSO2: Solve problems using basic understandings in Physics and mathematical and statistical tools

PSO3: Integrate critical thinking and scientific knowledge to design, perform, record and analyse experiments

PSO4: Develop communication skills to decipher and transmit the basic concepts and emerging trends in Physics and foster social responsibility and environmental consciousness

PSO5: Apply the theoretical knowledge and skills to identify, investigate and formulate new ideas and concepts

SEMESTER I

Course Code	Course Title	Credits	Course Type
EN1A01B18	Fine-Tune Your English	4	Common Course I
EN1A02B18	Pearls From The Deep	3	Common Course I
FR1A01B18	French Language And Communicative Skills -I	4	Common Course II
HN1A01B18	Kahaani Aur Upanyas	4	
MA1A01B18	Kathasahithyam	4	
MT1C01B18	Differential And Integral Calculus	3	Complementary Course I
ST1C01B18	Descriptive Statistics	3	Complementary Course II
PH1B01B18	Methodology And Perspectives Of Science	2	Core Course

SEMESTER I

COMMON COURSE I

EN1A01B18– FINE-TUNE YOUR ENGLISH

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Recognize the basics of English grammar

CO2: Choose the appropriate word classes

CO3: Identify common errors in the use of English language in various contexts

CO4: Apply the rules of grammar to comprehend, speak, and write grammatically correct English

CO5: Compose materials for business communication

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	1	1	2	1
CO2	2	1	2	3	1
CO3	2	1	1	2	1
CO4	2	1	2	3	2
CO5	1	1	2	3	2

Syllabus Content:

Module I **(18 Hours)**

The Sentence and its Structure

How to Write Effective Sentences – Phrases: What are They? – The Noun Clauses – The Adverb Clause – "If All the Trees Were Bread and Cheese" – The Relative Clause – How Clauses are Conjoined

Module II **(18 Hours)**

Word-Classes and Related Topics

Understanding the Verb – Understanding Auxiliary Verbs – Understanding Adverbs – Understanding Pronouns – The Reflexive Pronoun – The Articles I – The Articles II – The Adjective – Phrasal Verbs – Mind your Prepositions

Module III **(18 Hours)**

To Err is Human

Concord – Errors – Common and Uncommon

Spelling and Pronounciation

Pronunciation: Some Tips – More Tips on Pronunciation – An awesome Mess? – Spelling Part II

Module IV **(18 Hours)**

Tense and Related Topics

'Presentness' and Present Tenses – The 'Presentness' of a Past Action – Futurity in English – Passivisation

Interrogatives and Negatives

Negatives – How to Frame Questions – What's What? – The Question Tag

Module V **(18 Hours)**

Conversational English

Some time expressions – Is John There Please?

Miscellaneous and General Topics

Reading

Letter Writing

In addition there will be an essay question on a gene

SEMESTER I

COMMON COURSE I

EN1A02B18 - PEARLS FROM THE DEEP

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Name prominent literary figures and recognize various literary devices

CO2: Analyze inherent themes and motives

CO3: Identify the nuances of the age in which the literary work was written

CO4: Examine the different aspects of theatre

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	1	2	2
CO2	1	1	2	3	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1

Syllabus Content

Module I (Fiction) **(18hours)**

Ernest Hemingway: The Old Man and the Sea

Module II (One Act Plays) **(18hours)**

Susan Glaspell: Trifles

Asif Currimbhoy: The Refugee

A.A Milne: The Boy Comes Home

Module III (Short Stories) **(18hours)**

Guy De Maupassant: Two Friends

O. Henry: The Gift of Magi

K.A Abbas: Sparrows

Flora Annie Steel: Valiant Vicky, the Brave Weaver

Module IV (Poems) **(18hours)**

Rumi: The Chance of Humming

Walter Scott: Lochinvar

John Keats: La Belle Dame Sans Mercy

Robert Frost: After Apple Picking

Chinua Achebe: Refugee Mother and Child

Kamala Das: My Grandmother's House

Ted Hughes: Jaguar

Pablo Neruda: Tonight I can Write the Saddest Lines

P.P Ramachandran: How Simple It Is!

SEMESTER I

COMMON COURSE II

FR1A01B18 – FRENCH LANGUAGE AND COMMUNICATIVE SKILLS -I

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Describe topics such as family, professions, time, place, likes and dislikes, daily life situations.

CO2: Develop language, vocabulary and grammar skills.

CO3: Articulate various speech sounds and their determined combinations.

CO4: Prepare conversations based on scenarios which helps while traveling

CO5: Articulate the concepts to express one's opinion in a specific situation.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	1	2	1
CO2	1	1	1	3	2
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	3	2

Syllabus Content:

Module I **(25 hours)**

La population L‟alphabet – Les chiffres – Identité – Se présenter – Poser des questions – Les professions – Les nationalités

Module II **(23 hours)**

La banlieue Demander une information, un prix – l‟heure – la ville

Module III **(24 hours)**

Quartier de Paris Décrire un lieu – Indiquer un prix, un itinéraire.

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SEMESTER I

COMMON COURSE II

HN1A01B18 - KAHAANI AUR UPANYAS

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Discuss story content and structure in depth.

CO2: Analyse characterisation and comment on the development of the characters as the story/ novel unfolds.

CO3: Analyse short stories and novels on the basis of literary elements like plot, theme, metaphor, and image.

CO4: Compare treatments of theme, character and subject matter of different short stories.

CO5: Illustrate greater reading fluency and improved vocabulary in Hindi.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	2	2	1
CO2	1	1	1	3	2
CO3	1	1	2	3	1
CO4	1	1	2	3	1
CO5	1	1	1	3	1

Syllabus Content:

Module I:(16 Hrs)

Syllabus- Anthim Saakshya –Chandrakaanta Chapters 1 ,2

Eidgaah- Premchand

Module II (20 hrs)

Syllabus-Anthim Saakshya –Chandrakaanta Chapters 3, 4, 5 Jangal Ka Daah- Swayam Prakash Chchutti Ka Din- Usha Priyamvada

Module- III (20hrs)

Syllabus- Anthim Saakshya –Chandrakaanta Chapters 6,7,8 Maa Rasoi Mei Rehti Hai – Kumar Ambuj Kheer – Madhavi Kutty

Module IV:(16 Hrs)

Syllabus- Anthim Saakshya –Chandrakaanta Chapters 9, 10 Heelibon Ki Baththakhe- Agyey

SEMESTER I

COMMON COURSE II

MA1A01B18 - KATHASAHITHYAM

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: ചെറുകഥ, നോവൽ പഠനത്തിലൂടെ വായനാശേഷിയും ആസ്വാദനപ്രാപ്തിയും കൈവരിക്കൽ.

CO2: ചെറുകഥയുടെയും നോവലിന്റെയും കാലാനുസൃതമായ ഭാവുകത്വ പരിണാമം തിരിച്ചറിയൽ.

CO3: നിലവിലുള്ള സാമൂഹ്യജീവിത യാഥാർഥ്യങ്ങളെ അഭിമുഖീകരിക്കാൻ പ്രാപ്തരാക്കൽ.

CO4: ആശയവിനിമയം, ഭാഷാവിഷ്കരണം എന്നീ ശേഷികൾ കൈവരിക്കുന്നു

CO5: കഥ, നോവൽ എന്നിവയുടെ വ്യതിരിക്ത സവിശേഷതകൾ തിരിച്ചറിയുന്നു.

CO6: പുതുകാലജീവിതാനുഭവങ്ങൾ വിലയിരുത്താൻ പര്യാപ്തരാകുന്നു

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	2	3	2
CO2	1	1	1	3	2
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	2	2
CO6	1	1	1	3	2

ഖണ്ഡം ഒന്ന് **10 മണിക്കൂർ**

1.പൂവമ്പഴം -കാരൂർ

2.ഭൂമിയുടെ അവകാശികൾ -വൈക്കം മുഹമ്മദ്ബഷീർ

ഖണ്ഡം രണ്ട് **15മണിക്കൂർ**

1.കടൽ -ടി .പദ്മനാഭൻ

2.പെരുമഴയുടെ പിറ്റേന്ന് -എം. ടി. വാസുദേവൻ നായർ

3.മാനാഞ്ചിറടെസ്റ്റ് -വി .കെ.എൻ

4.തരിശു നിലം –മാധവിക്കുട്ടി

ഖണ്ഡം മൂന്ന് **15മണിക്കൂർ**

1.ആർക്കറിയാം -സക്കറിയ

2.ഓരോഎഴുത്തുകാരിയുടെഉള്ളിലും -സാറാജോസഫ്

3.തിരുത്ത് -എൻ .എസ് .മാധവൻ

4.മോഹമഞ്ഞ -കെ .ആർ .മീര

ഖണ്ഡം നാല് **10 മണിക്കൂർ**

1.അഗ്നി -സിതാര.എസ്

2.ബിരിയാണി –സന്തോഷ് എച്ചിക്കാനം

3.മോദസ്ഥിരനായി അങ്ങ്വസിപ്പൂമല പോലെ -എസ്. ഹരീഷ്

4.സ്നേഹബഹുമാനപെട്ട അന്നാമ്മയ്ക്ക്ഗീതാലക്ഷ്മി എഴുതുന്ന കത്ത് –പ്രിയ എ .എസ്

5.ചിലസ്വപ്നങ്ങളിൽ .....സീതാലക്ഷ്മിയുടെ കറുത്ത മുടിയിഴ -ഇന്ദുമേനോൻ

ഖണ്ഡം അഞ്ച് **22മണിക്കൂർ**

ആടുജീവിതം -ബന്യാമിൻ

SEMESTER I

COMPLEMENTARY COURSE I

MT1C01B18 - DIFFERENTIAL AND INTEGRAL CALCULUS

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Evaluate the rate of change of functions using the definition of limit and the differentiation rules.

CO2: Apply the concept of differentiation to find the extreme values of a function and interpret the consequences of Rolle's theorem and Mean value theorem for differentiable functions.

CO3: Interpret the area under the curve as a definite integral and find the area between curves

CO4: Apply integration to calculate lengths of plane curves, areas of surfaces of revolution and volumes by slicing and rotation about an axis.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	3	2	1	1
CO2	2	3	1	1	1
CO3	2	3	2	1	2
CO4	2	3	1	1	2

Syllabus Content

Module 1

Differential Calculus: (22 Hrs)

Rates of change and limits, calculating limits using the limit laws, the precise definition of a limit, one sided limits and limits at infinity, derivative of a function, differentiation rules, the derivative as a rate of change, derivatives of trigonometric functions, the chain rule and parametric equations, implicit differentiation.

Module II

Applications of Derivatives: (15 Hrs)

Extreme values of functions, The Mean Value Theorem, Monotonic functions and the first derivative test.

Module III

Integral Calculus: (15 Hrs)

A quick review of indefinite integral as anti-derivative,The Definite integral, The fundamental theorem of Calculus

Module IV

Application of Integrals: (20Hrs)

Substitution and area between curves, Volumes by slicing and rotation about an axis (disc method only), Lengths of plane curves, Areas of surfaces of revolution and the theorem of Pappus (excluding theorem of Pappus).

SEMESTER I

COMPLEMENTARY COURSE II

ST1C01B18 -- DESCRIPTIVE STATISTICS

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Describe the basic concepts of Statistics.

CO2: Manage raw data by constructing tables and express them by diagrams and graphs.

CO3: Illustrate the fundamental characteristics of data

CO4: Evaluate the different types of Index numbers

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	2	1	2
CO2	2	3	1	1	1
CO3	2	3	2	1	2
CO4	2	3	1	1	1

Syllabus Content:

Module I **(20 hours)**

Introduction to Statistics, Population and Sample, Collection of Data, Various methods of data collection, Census and Sampling. Methods of Sampling – Simple Random Sampling– stratified

sampling – systematic sampling (Method only), Types of data – quantitative, qualitative, Classification and Tabulation, Frequency Table, Diagrammatic representation – Bar diagram, pie diagram; pictogram and cartogram.

Module II **(20 hours)**

Measures of Central Tendency – Mean; Median; Mode; Geometric Mean; Harmonic Mean and Properties, Partition values- Quartiles, Deciles, Percentiles, Absolute and Relative measures of Dispersion – Range, Quartile Deviation, Box Plot, Mean Deviation, Standard Deviation, Coefficient of Variation. Graphical representation – histogram, frequency polygon, frequency curve, ogives and stem and leaf chart.

Module III **(16 hours)**

Raw Moments, Central Moments, Inter Relationships (First Four Moments), Skewness – Measures – Pearson's, Bowley's and Moment Measure; Kurtosis- Measures of Kurtosis – Moment Measure, Measure based on partition values.

Module IV **(16 hours)**

Index Numbers – definition, limitations, uses, Simple Index Numbers; Weighted Index Numbers – Laspeyer's, Paasche's and Fisher's Index Numbers, Test of Index Numbers, Construction of Index Numbers, Cost of Living Index Numbers – Family Budget Method, Aggregate Expenditure Method.

SEMESTER I

CORE COURSE

PH1B01B18- METHODOLOGY AND PERSPECTIVES OF PHYSICS

Credits: 2

Total Lecture Hours: 36

Course outcome

CO1: Review the emergence of new scientific concepts with reference to the contributions of various scientists

CO2: Solve number conversion problems and binary arithmetics

CO3: Compute line, surface and volume integrals of vectors

CO4: Estimate and report the errors occurring in a mathematical calculation

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**1**	**2**	**1**	**2**
CO2	**2**	**3**	**2**	**1**	**1**
CO3	**3**	**3**	**2**	**1**	**1**
CO4	**2**	**3**	**3**	**1**	**2**

Syllabus Content

Module I

Concepts and Development of Physics (8hrs)

Development of physics and the birth of new scientific concepts with reference to scientific contributions of Galileo – perspectives on universe, Newton- deterministic universe, Einstein- theory of relativity, J J Thomson – atom model, Marie Curie- radioactivity, Max Plank- quantum

hypothesis, deBroglie- matter wave, Heisenberg- uncertainty principle and Schrodinger- quantum mechanics. Contributions of Indian physicists -C V Raman, H J Babha, J C Bose, S N Bose, M N Saha, S Chandrasekhar (Topics in this part require qualitative study only).

Module II

Number systems **(18 hrs)**

Decimal, hexadecimal and Binary Numbers. Conversions, Binary arithmetic addition, subtraction and multiplication. 1's and 2's complement subtraction –signed binary numbers. Signed binary arithmetic, BCD code, ASCII code, Significance of binary number system in digital electronics, microprocessors and in computers.

Introductory Vector Analysis - Applications of vectors in Physics. Differential and integral vector calculus: – The operator - physical significance of Gradient, Divergence and Curl, Line integral, surface integral and volume integral of vectors.

Co-ordinate systems: Cartesian Co-ordinate system, plane polar and spherical polar coordinates, cylindrical coordinates (Basic ideas with examples in physics).

Module III

Experimental methods and error analysis **(10 hrs)**

Experimental methods, least count of instruments, Instruments for measuring mass, length, time, angle , current, voltage. Fundamental units. Precision and accuracy of measurements, source of error in measurements, necessity of estimating errors, types of errors, reading error of instrument, calibration error, random error, systematic error, significant digits, order of magnitude and rounding of numbers, rounding error, absolute and relative errors, Errors of computation- addition, subtraction, multiplication, division, error in power and roots, Propagation of errors, analysis of data, standard deviation, calculation of mean value.

SEMESTER II

Course Code	Course Title	Credits	Course Type
EN2A03B18	English 3 - Issues that Matter	4	Common Course I
EN2A04B18	English 4 - Savouring the Classics	3	Common Course I
FR2A03B18	French - French Language and communicative skills-II	4	Common Course II
MA2A03B18	Malayalam – Kavitha	4	
HN2A03B18	Hindi - Kavita Vyakaran Aur Anuvad	4	
MT2C01B18	Partial Derivatives, Multiple Integrals, Trigonometry And Matrices	3	Complementary Course I
ST2B02B18	Probability and Random Variables	3	Complementary Course II
PH2B02B18	Mechanics and Properties of Matter	2	Core Course
PH2BP01B18	Mechanics, Properties of Matter and Optics I	2	Core Practical

SEMESTER II

COMMON COURSE I

EN2A03B18– ISSUES THAT MATTER

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1. Identify the major issues of contemporary significance

CO2. Discuss the consequences of war and refugee crisis with respect to the psychological dimension

CO3. Employ theoretical learning in classrooms to current developments in the world

CO4. Critique the diverse experiences both historical and contemporary to create a more informed vision of the future

CO5. Develop oneself as a conscious, concerned, conscientious human being

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	1	2	2
CO2	1	1	1	2	2
CO3	1	1	1	3	2
CO4	1	1	1	3	2
CO5	1	1	1	3	3

Syllabus Content:

Module 1 **(18 hours)**

"The Unsurrendered People" – Kenzaburo Oe

"The Old Prison" – Judith Wright

"War" – Luigi Pirandello

Module 2 **(18 hours)**

Persuasions on the Power of the Word:

"On Censorship" – Salman Rushdie

"Peril" – Toni Morrison

"The Burning of the Books" – Bertolt Brecht

"The Censors" – Luisa Valenzuela

Module 3 **(18 hours)**

"The Poisoned Bread" – Bandhu Madhav

"A Trip Westward" – Zitkala-Sa

"The Pot Maker" – Temsula Ao

Module 4 **(18 hours)**

"Does it Matter?" – Richard Leakey

"On Killing a Tree" – Gieve Patel

"Hagar: A Story of a Woman and Water" (Gift in Green (chapter 2)) – Sarah Joseph

Module 5 **(18 hours)**

"Understanding Refugeeism: An Introduction to Tibetan Refugees in India" – Mallica Mishra

"Refugee Blues" – W.H Auden

"The Child Goes to the Camp" (from Palestine's Children) – Ghassan Kanafani

SEMESTER II

COMMON COURSE I

EN2A04B18 - SAVOURING THE CLASSICS

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Recognise the time-tested literary masterpieces from diverse cultures

CO2: Identify the representative authors from various genres (poetry, drama, novel, short fiction)

CO3: Recite celebrated lines from Classic works

CO4: Discuss the 'universals' of human condition

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	1
CO2	1	1	1	2	2
CO3	1	1	1	2	1
CO4	1	1	1	2	2

Syllabus Content

Module 1 (Poems) **(18hours)**

Homer: "Father and Son" (Odyssey Book 16: 113-189) (Translated by Robert Fagles)

Kalidasa: "Lovely is Youth" (Translated by J.G Jennings)

Omar Khayyam: Rubaiyat (quatrains: 25-28) (Translated by Edward Fitzgerald)

Dante: Dante meets Virgil (Inferno Canto 1: 49-102) (Translated by J.G Nichols)

John Milton: "On his Blindness"

Module 2 (Shakespeare Excerpts) **(18hours)**

Romeo and Juliet: Act II, Scene ii

The Merchant of Venice: Act IV, Scene i

Module 3 (Novel Excerpts) **(18hours)**

Miguel de Cervantes: Don Quixote (Chapter 8) (Translated by Edith Grossman)

Jane Austen: Pride and Prejudice (Chapters 1-6)

Victor Hugo: Les Miserables (Part 1- Fantine, Book II, Chapters 9-13) (Translated by Christine Donougher)

Module 4 (Short Fiction) **(18hours)**

Charles Dickens: The Black Veil

Leo Tolstoy: How Much Land Does a Man Need? (Translated by Louise & Aulmer Maude)

Rabindranath Tagore: Kabuliwala (Translated by Mohammad A Quayum)

Jorge Louis Borges: The Shape of the Sword (Translated by Andrew Hurley)

SEMESTER II

COMMON COURSE II

FR2A03B18 – FRENCH LANGUAGE AND COMMUNICATIVE SKILLS-II

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Identify familiar everyday expressions and basic phrases.

CO2: Ask questions to get meaningful responses in effective communication

CO3: Develop language, vocabulary and grammar skills.

CO4: Prepare conversations based on various situations

CO5: Articulate the concepts to express one's opinion in a specific situation.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	2
CO2	1	1	1	2	2
CO3	1	1	1	3	2
CO4	1	1	1	3	2
CO5	1	1	1	3	2

Syllabus Content

Module I **(25 hours)**

Chambre pour étudiants Localiser des objets – l'habitat – les meubles – l'appréciation

Module II **(23 hours)**

Petits boulots Téléphoner – Raconter – l'emploi

Module III **(24 hours)**

Le resto U Exprimer une opinion – Poser des questions – la nourriture

SEMESTER II

COMMON COURSE II

HN2AO3B18 - KAVITA , VYAKARAN AUR ANUVAD

Credits : 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Contextualize and Summarise the poems of different genres in Hindi.

CO2: Evaluate the Poets contribution to Hindi literature.

CO3: Demonstrate linguistic ability for translation of texts between Hindi & English

CO4: Classify Parts of Speech.

CO5: Illustrate greater fluency in Hindi by applying theoretical knowledge of Grammar

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	2
CO2	1	1	1	3	2
CO3	1	1	1	3	2
CO4	1	1	1	3	2
CO5	1	1	1	3	2

Syllabus Contents

Module I **(18 Hours)**

Vyaakaran

Module II **(20 Hours)**

Tulasidas

Kabir

Ve Muskathe Phool Nahi- Mahadevi Verma

Cheenane Aaye Hain Ve – Sarweshvar Dayal Saxena

Dilli Darwaaza – Kumar Vimal

Jungle Ke Ujaad Mei – Vinod Kumar Shukla

Aazadi Urf Gulaami – Gyanendrapathi

Module III **(20 Hours)**

Meera

Bazaar- Mangalesh Dabraal

Beesvi Sadi Ke Antim Dino Ka Aashcharya- Rajesh Joshi

Do Haathiyon Ki Ladaai- Uda Pakash

Thande Paani Ki Machine – Ekant Srivastav

Saboot – Arun Kamal

Tumhe Kuch Karna Chahiye – Chanrakanth Devthale

Module IV **(14 Hours)**

Anuvaad

SEMESTER II

COMMON COURSE II

MA2A03B18-കവിത

ക്രെഡിറ്റ് : **4**

പഠനസമയം : **72 മണിക്കൂർ**

കോഴ്സ് ഔട്ട്കം (Course Outcome)

CO1.പത്തൊൻപത് കവിതകളുടെ പഠനത്തിലൂടെ വായനാശേഷിയും ആസ്വാദന പ്രാപ്തിയും കൈവരിക്കൽ.

CO2.മലയാളകവിതകളിലെ കാലാനുസൃതമായ ഭാവുകത്വപരിണാമം തിരിച്ചറിയൽ.

CO3.നിലവിലുള്ള സാമൂഹ്യജീവിതയാഥാർഥ്യങ്ങളെ അഭിമുഖീകരിക്കാൻ പ്രാപ്തരാക്കൽ.

CO4.പരിസ്ഥിതിസൗന്ദര്യശാസ്ത്രത്തെയും ചില സാമൂഹ്യചരിത്ര പശ്ചാത്തലങ്ങളെയും കുറിച്ച് ഗ്രഹിക്കൽ.

CO5.വിദ്യാർത്ഥികളുടെ സർഗ്ഗാത്മകശേഷി വികസിക്കൽ

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	1	2	2
CO2	1	1	1	3	2
CO3	1	1	1	3	2
CO4	1	1	1	3	2
CO5	1	1	1	3	3

ഖണ്ഡം ഒന്ന്- **20 മണിക്കൂർ**

1. മാംസനിബദ്ധമല്ല രാഗം -കുമാരനാശാൻ (ലീലയിലെ 47 മുതൽ 74 വരെയുള്ള 28 ശ്ലോകങ്ങൾ)

2.സ്നേഹസുന്ദരപാതയിലൂടെ -വൈലോപ്പിള്ളി ('കുടിയൊഴിക്കലി'ലെ അവസാന ഖണ്ഡം)

ഖണ്ഡം രണ്ട് **15 മണിക്കൂർ**

1 .ഒറ്റയ്ക്കിരിക്കാൻ പഠിച്ചുകഴിഞ്ഞൂ ഞാൻ -സുഗതകുമാരി

2 .കോഴി -കടമ്മനിട്ടരാമകൃഷ്ണപിള്ള

3 .പഴഞ്ചൊല്ലുകൾ -സച്ചിദാനന്ദൻ

4 .മുള്ളൻപന്നി -കെ.ജി.ശങ്കരപ്പിള്ള

ഖണ്ഡം മൂന്ന് **15 മണിക്കൂർ**

1.തിരുത്ത്-പി .പി.രാമചന്ദ്രൻ

2.പിറക്കാത്ത മകന് -ബാലചന്ദ്രൻ ചുള്ളിക്കാട്

3.മൃഗശിക്ഷകൻ -വിജയലക്ഷ്മി

4.കുന്നിമണികൾ-കുഞ്ഞുണ്ണി

ഖണ്ഡം നാല് **22 മണിക്കൂർ**

1 .ആടിയാടില അലഞ്ഞ മരങ്ങളേ -അൻവർ അലി

2 .കൽവീട് -വി.എം.ഗിരിജ

3 . ആഴങ്ങൾ അടച്ചിട്ട പുഴ -എസ് .ജോസഫ്

4 .സ്മാരകം -വീരാൻകുട്ടി

5 .കുട്ടമ്മാൻ -എം.ർ.രേണുകുമാർ

6 .നാഷണൽ ജ്യോഗ്രഫി -എസ് .കണ്ണൻ

7 .വാഴക്കുല -കെ .ആർ.ടോണി

8 .പഴയ ചിലത് -പി.രാമൻ

9 .ഗോതമ്പുശില്പം -കവിത ബാലകൃഷ്ണൻ

SEMESTER II

COMPLEMENTARY COURSE I

MT2C01B18 - PARTIAL DERIVATIVES, MULTIPLE INTEGRALS, TRIGONOMETRY AND MATRICES

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1 :Apply the multiple integrals to calculate quantities that vary over two and three dimensions.

CO2 : Explain Geometric, Binomial, Exponential, Logarithmic, Trigonometric and Hyperbolic functions and determine the summation of infinite series and the expansion of trigonometric functions.

CO3 : Calculate the Partial derivatives using the rules of differentiation.

CO4 : Illustrate the properties of matrices and compute solution of linear equations using matrix algebra.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	3	2	1	1
CO2	1	3	2	1	2
CO3	1	3	2	1	1
CO4	1	3	2	1	1

Syllabus Content

Module 1

Multiple Integrals: **(17 Hrs)**

Double Integrals, area of bounded region in plane only, Double Integrals in Polar form, Triple integrals in rectangular co-ordinates, Volume of a region in space

Module 2

Trigonometry: **(20Hrs)**

Expansions of functions like sin nθ , cos $n\theta$, tan nθ, $\cos^n\theta$, hyperbolic functions, inverse circular and hyperbolic function. Separation into real and imaginary parts. Summation of infinite series based on C+iS method. (Geometric, Binomial, Exponential, Logarithmic and Trigonometric series)

Module 3

Partial Derivatives: **(15 Hrs)**

Functions of several variables (Definition only), Partial derivatives, The Chain Rule

Module 4

Matrices: **(20Hrs)**

Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of an elementary Transformations, Equivalent matrices, Row Canonical form, Normal form, Elementary matrices only.

Systems of Linear equations: System of non-homogeneous, solution using matrices, Cramer's rule, system of homogeneous equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors. Cayley-Hamilton theorem (statement only) and simple applications

SEMESTER II

COMPLEMENTARY COURSE II

ST2B02B18 – PROBABILITY AND RANDOM VARIABLES

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Analyse the degree of correlation between the variables using the concept of correlation

CO2: Articulate the concept of the principle of least squares to estimate the unknown parameters in regression model

CO3: Implement the concept of probability and Bayes theorem to understand the uncertainty in a given problem

CO4: Illustrate the use of probability density function (pdf) of discrete and continuous random variables

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	3	2	1	2
CO2	1	3	2	1	1
CO3	1	3	2	1	2
CO4	1	3	2	1	2

Syllabus Content:

Module I **(16 hours)**

Introduction to bivariate data. Correlation-Different types of Correlation. Concepts of Simple, Multiple and Partial Correlations. Simple Linear Correlation – Methods of finding simple linear Correlation – Scatter Diagram, Covariance Method, Rank Correlation (equal ranks).

Module II **(16 hours)**

Curve Fitting – Method of Least squares- Fitting of Straight Lines, Second Degree Equation, Exponential Curve, Power Curve. Simple Linear Regression – Regression Equations – Fitting and identification, properties.

Module III **(20 hours)**

Probability Concepts – Random Experiment, Sample Space, Events, Probability Measure, Approaches to Probability – Classical, Statistical and Axiomatic, Addition Theorem (upto 3 evens) Conditional Probability, Independence of events, Multiplication theorem (upto 3 events), Total Probability Law, Baye's Theorem and its applications.

Module IV **(20 hours)**

Random Variables – Discrete and Continuous, Probability Distributions – Probability Mass Function; Probability Density Function and Cumulative (distribution) function and their properties, change of variables (Univariate only), Bivariate random variables – Definition – Discrete and Continuous, Joint Probability Density Functions, Marginal and Conditional Distributions, Independence of Random Variables.

SEMESTER II

CORE COURSE

PH2B02B18 - MECHANICS AND PROPERTIES OF MATTER

Credits: 2

Total Lecture Hours: 36

Course outcome

CO1: Articulate various aspects of wave motion and oscillations.

CO2: Compute the variables related to rotational motion of regular rigid bodies using basic theorems

CO3: Apply the basic principles of elasticity to determine rigidity modulus and Young's modulus of different materials

CO4: Explain the principles of Hydrodynamics.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	1	2	2
CO2	3	3	2	1	1
CO3	3	3	2	1	1
CO4	3	2	1	1	2

Syllabus Content

Module I **(12 hours)**

Oscillations (8 hours)

Periodic motion, simple harmonic motion and harmonic oscillator, energy of a harmonic oscillator, examples of harmonic oscillator – simple and compound pendulum. Theory of Damped harmonic oscillator. Theory of forced oscillator, resonance, applications.

Wave motion (4 hours)

General equation of wave motion, plane progressive harmonic wave, energy density, intensity of a wave, superposition of waves, beats, transverse waves in stretched strings, modes.

Module II **(7 hours)**

Rotational mechanics (7 hours)

Angular velocity- angular acceleration- angular momentum- conservation- torque-moment of inertia- Parallel and perpendicular axes theorems - calculation of moment of inertia(rod, ring, disc, cylinder, and sphere). Theory of flywheel.

Module III **(17 hours)**

Elasticity (10 hours)

Basic ideas on elasticity – Young's modulus, bulk modulus, rigidity modulus, Poisson's ratio, relations connecting various elastic constants. Work done per unit volume in a strain. Bending of beams, bending moment, flexural rigidity. Young's modulus – uniform and non-uniform bending, cantilever. I –section girders. Determination of rigidity modulus using Static method- static torsion and Dynamic method- torsion pendulum.

Hydrodynamics (7 hours)

Streamline and turbulent flows, coefficient of Viscosity – Determination of viscosity by Poiseuille's method. Equation of continuity, energy possessed by a liquid, Bernoulli's theorem. Surface tension, surface energy, excess pressure in a liquid drop and bubble, factors affecting surface tension, applications.

SEMESTER II

CORE PRACTICAL I (I YEAR)

PH2BP01B18 - MECHANICS, PROPERTIES OF MATTER AND OPTICS I

Credit - 2

Total hours: 72

Course Outcomes

CO1: Illustrate and record basic experiments in Mechanics & Properties of matter.

CO2: Simulate basic experiments in Optics and analyse the optical constants

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	2	3	1	2
CO2	2	2	3	1	2

Syllabus Content

1. Cantilever – Young's modulus of material of bar- Scale & Telescope
2. Uniform bending – Pin and Microscope – Determination of Young's modulus
3. The Torsion Pendulum – Rigidity modulus of material of wire.
4. Symmetric Compound Pendulum-Determination of radius of gyration(K) and Acceleration due to gravity (g)
5. Static torsion- Rigidity modulus
6. Measurement of density of a solid – Sensibility method to find mass using beam balance and screw gauge / vernier calipers for dimension measurements
7. Viscosity of a liquid -Variable pressure head
8. Viscosity- Stoke's method
9. Sonometer – Verification of laws, Measurement of density of solid.

10. Lee's Disc – Thermal Conductivity.
11. Surface tension - Capillary rise method
12. Quincke's method – Determination of surface tension
13. Liquid Lens- Refractive index of Liquid
14. Spectrometer- Refractive Index of material of Prism
15. Air wedge-Diameter of wire
16. Spectrometer- Small angled prism-Refractive index of material of prism (Supplementary angle method)
17. Vertical oscillations of a spring – Determination of Young's modulus
18. One dimensional elastic collision – Hanging sphere method – Law of conservation of energy and momentum

SEMESTER III

Course Code	Course Title	Credits	Course Type
EN3A05B18	Literature And/As Identity	4	Common Course I
FR3A05B18	An Advanced Course In French -I	4	Common Course II
HN3A05B18	Naatak Aurlambi Kavita	4	
MA3A05B18	Drisyakalasahithyam	4	
MT3C01B18	Vector Calculus, Differential Equations And Analytic Geometry	4	Complementary Course I
ST3C01B18	Probability Distributions	4	Complementary Course II
PH1B01B18	Semiconductor Physics	3	Core Course Theory

SEMESTER III

COMMON COURSE I

EN3A05B18 – LITERATURE AND/AS IDENTITY

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1. Explain how literature problematizes identity.

CO2. Analyze the quest for identity in the Indian diaspora.

CO3. Illustrate the effects of partition and communal violence in South Asian Literature.

CO4. Critique the social construction of identity.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1

Syllabus Content

Module 1 (Diasporic Identities) **(18 hours)**

Agha Shahid Ali: Postcard from Kashmir

Amy Tan: Mother Tongue

Imtiaz Dharker: At the Lahore Karhai

Chitra Banerjee Divakaruni: Indian Movie, New Jersey

Module 2 (South Asian Identities) (18 hours)

Sadat Hassan Manto: The Dog of Tetwal

Intizar Hussain: A Chronicle of Peacocks

Selina Hossain: Fugitive Colours

Punakante Wijenaike: That Deep Silence

Module 3 (Life Writings) (18 hours)

Malcolm X: ―Nightmare, excerpt from *The Autobiography of Malcolm X*.

Sashi Deshpande: Learning to be a Mother in *Janani– Mothers, Daughters, Motherhood*, (Ed.) Rinki Bhattacharya.

Module 4 (Indigenous Identities (18 hours)

Leslie Marmon Silko: Lullaby

Garhwali Songs in *Painted Words- An Anthology of Tribal Literature* – Edited by G.N. Devy

Mamang Dai: Pinyar the Widow (Excerpt from Legends of Pensam)

Module 5 (Alter Identities) (18 hours)

Nathaniel Hawthorne: The Birth Mark

Girish Karnad: Hayavadana (Excerpt)

Ruskin Bond: The Girl on the Train

SEMESTER III

COMMON COURSE II

FR3A05B18- AN ADVANCED COURSE IN FRENCH - I

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Describe topics such as physical appearance of a person, sports and entertainments.

CO2: Articulate the concepts to express ones opinion in a specific situation.

CO3: Compose conversations based on scenarios which help while shopping.

CO4: Articulate the concepts to give advice and instructions and to invite a person in a specific situation.

CO5: Construct conversations based on scenarios which help during medical and health consultations.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	3	1

Syllabus Content:

Module I **(30 hours)**

Jeunes artistes: Décrire une personne - Exprimer une opinion - La description physique - Les spectacles

Module II **(30 hours)**

Tenue de soirée : Inviter - Les vêtements - Les chaussures - Les couleurs - Les matières

Module III **(30 hours)**

Faites du sport ! : Donner des conseils - Les parties du corps - Les mouvements - Les sports

SEMESTER III

COMMON COURSE II– HINDI

HN3AO5B18 - NAATAK AUR LAMBI KAVITHA

Credits – 4

Total Lecturer Hours - 90

Course Outcomes:

Upon completion of this course, the student will be able to

CO1: Summarise the poems and illustrate the socio-political and cultural concerns of the author

CO2: Discuss the Authors contribution to Hindi Literature

CO3: Analyse the characterisation of the Drama Konark

CO4: Critique excerpts of the poems and Drama

CO5: Communicate in oral and written form of Hindi with competence.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	3	1
CO2	1	1	1	2	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	3	1

Module- I **22 Hours**

Syllabus- Konark Introduction & Act 1 (Jagdishchandra Mathur)

Module- II **24 Hours**

Syllabus- - Konark Act 2 & 3(Jagdishchandra Mathur)

Module- III **22 Hours**

Syllabus-

Nagayi Mahura (Thrilochan)

Shahenshah Ki Neend (Umashankar Chaudhary)

Dhaaba- Nilesh Raghuvanshi

Module- IV **22 Hours**

Syllabus-Ithni Door Mat Bhyahna Baba- Nirmala Putul

Jawahar Tunnel – Agnishekhar

സെമസ്റ്റർ : മൂന്ന്

കോമൺ കോഴ്സ് മലയാളം
ബി.എ/ബി.എസ്.സി (റഗുലർ), ബി.എസ്.സി സൈക്കോളജി (സ്വാശ്രയം)

MA3A05B18- ദൃശ്യകലാസാഹിത്യം

Credits: 4

Total Lecture hours: 90

പഠനനേട്ടങ്ങൾ (Course Outcomes)

CO1:കേരളീയരംഗകലാപാരമ്പര്യവും സംസ്കാരപരിണാമവും ചർച്ചചെയ്യുക

CO2:ദൃശ്യകലാപഠനത്തിലൂടെ കേരളീയസംസ്കാരപരിണാമം, ചരിത്രം എന്നിവ അപഗ്രഥിക്കുക

CO3:കഥാപാത്രപഠനത്തിലൂടെ സമകാലികവിഷയങ്ങളെ വിലയിരുത്തുക

CO4: ഇതിവൃത്ത പഠനത്തിലൂടെ കഥാപാത്രങ്ങളെ വിമർശനാത്മകമായി നിരൂപണം ചെയ്യുക

CO5:സമകാലികസംഭവങ്ങളെ അടിസ്ഥാനമാക്കി നാടകം, ഹ്രസ്വചിത്രം എന്നിവ തയാറാക്കുക.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	3	1

പാഠഭാഗങ്ങൾ

ഖണ്ഡം ഒന്ന് - സംസ്കൃത നാടകം **20 മണിക്കൂർ**

മലയാളശാകുന്തളം നാലാമങ്കം - എ. ആർ രാജ രാജ വർമ

ഖണ്ഡം രണ്ട് - ആട്ടക്കഥ **15 മണിക്കൂർ**

നളചരിതം (ഒന്നാം ദിവസം) - ഉണ്ണായി വാര്യർ (തുടക്കം മുതൽ ഹംസം നളനിലുള്ള പ്രണയം ഉറപ്പിക്കുന്നത് വരെ)

ഖണ്ഡം മൂന്ന് - തുള്ളൽ **15 മണിക്കൂർ**

കല്യാണസൗഗന്ധികം (ശീതങ്കൻ തുള്ളൽ) - കുഞ്ചൻ നമ്പ്യാർ - (ഭീമൻറെ കദളീവന പ്രവേശം മുതൽ ശ്രീരാമ ദാസൻറെ വംശേ ജനിക്കയാൽ പാരം നിനക്കു മഹംഭാവമിങ്ങനെ' വരെ ഭാഗങ്ങൾ

ഖണ്ഡം നാല് - മലയാള നാടകം **20 മണിക്കൂർ**

1128 ൽ ക്രൈം 27 - സി. ജെ. തോമസ്

ഖണ്ഡം അഞ്ച്- സിനിമ **20 മണിക്കൂർ**

നിർമാല്യം തിരക്കഥ - എം. ടി . വാസുദേവൻ നായർ

SEMESTER III

COMPLEMENTARY COURSE - I

MT3C01B18-VECTOR CALCULUS, DIFFERENTIALEQUATIONS AND ANALYTIC GEOMETRY

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Analyze the path, velocity and acceleration of moving bodies using Vector Calculus

CO2: Apply line and surface integrals to calculate Circulation, flux and work done by vector fields and potential function of conservative fields.

CO3: Apply Green's , Stokes and Divergence theorems to calculate multiple integrals.

CO4: Explain different types of differential equations and solve first order differential equations.

CO5: Classify conic sections and deduce their equations and geometric properties

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	1	2
CO2	3	3	1	1	2
CO3	3	3	1	1	2
CO4	3	3	1	1	2
CO5	3	3	1	1	2

Syllabus Content:

Module 1

Vector valued Functions: (15 Hrs)

Vector Functions, Arc length and unit Tangent vector **T**, Curvature and unit Normal Vector **N**, Torsion and unit Binormal vector **B,** Directional Derivatives and Gradient Vectors**. (Sections** 13.1, 13.3, 13.4, 13.5 and 14.5 of text 2)

Module 2

Integration in Vector Fields: (25 Hrs)

Line Integrals, Vector fields and Work, Circulation and Flux, Path independence, Potential Function and Conservation Fields, Green's theorem in Plane (Statement and problems only), Surface area and Surface integral, Parameterised Surface, Stoke'stheorem(Statement and Problems only), the Divergence theorem and a Unified theory (Statement and simple problems only). (Sections 16.1 to 16.8 of text 2)

Module 3

Ordinary differential equations: (25Hrs)

Exact Differential Equation, Linear Equations , Solutions by Substitutions, Equations of first order and not of first degree , First order equations of higher Degree solvable for p , Equations solvable for y , Equationssolvable for x, Equations of first degree in x and y , Lagrange's and Clairaut's Equation (sections 2.1 , 2.2 , 2.3 , 2.4 , 3.1 , 3.2 , 3.3 , 3.4 , 3.5 of text 1)

Module 4

Analytic Geometry: (25Hrs)

Conic sections and Quadratic equations, Classifying Conic Sections by Eccentricity, Conics and Parametric equations, The Cycloid, polar co-ordinates, Conic Sections in Polar coordinates. (Sections 10.1, 10.2, 10.4, 10.5, 10.8 of Text 2) (exclude the pedal Method and Newtonian Method)

SEMESTER III

COMPLEMENTARY COURSE- II

ST3C01B18- PROBABILITY DISTRIBUTIONS

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Describe the general characteristics of random variables.

CO2: Explain various properties of some important discrete random variables.

CO3: Establish the applications of continuous distributions.

CO4: Illustrate the uses of Tchebycheff's Inequality, Laws of Large Numbers, and Central limit theorem.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	1	2
CO2	2	2	1	1	2
CO3	3	3	2	1	2
CO4	2	3	1	1	1

Syllabus Content

Module I **(25 hours)**

Mathematical Expectation – Expectation of a Random Variable, Moments in terms of Expectations, Moment Generating Functions (m.g.f.) and its properties. Characteristic Functions and its Simple Properties, Conditional Expectation.

Module II **(25 hours)**

Discrete Probability Distributions – Uniform: Geometric; Bernoulli; Binomial; Hyper geometric; Poisson; Fitting of Distributions (Binomial and Poisson). Properties – Mean, Variance, m.g.f., Additive property; recurrence relation for moments (binomial and Poisson) Memorylessness property of Geometric distribution.

Module III **(25 hours)**

Continuous distributions – Uniform; Exponential; Gamma; Beta (type I and II); Normal; Standard Normal – definitions, Mean, Variance, m.g.f., Additive property, Memorylessness property of exponential distribution Fitting of Normal, Use of Standard Normal Tables for Computation of Various Probabilities.

Module IV **(15 hours)**

Tchebycheff's Inequality, Weak Law of Large Numbers, Bernoulli's Law of Large Numbers, Central Limit Theorem (Lindberg-Levy form) with proof.

SEMESTER III

CORE COURSE

PH3B03B18 - SEMICONDUCTOR PHYSICS

Credits: 3

Total lecture hours - 54 hrs

Course Outcomes:

CO1: Construct rectifiers, voltage regulators and wave shaping circuits with pn junction diode

CO2: Compare transistor configurations, feedback amplifiers, opamp circuits and compute the circuit parameters.

CO3: Illustrate the characteristics of oscillators and FET and compute circuit parameters

CO4: Explain amplitude modulation and solve power spectrum and modulation index.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	1	1
CO2	3	3	3	1	1
CO3	3	3	2	1	1
CO4	3	3	2	1	1

Syllabus Content:

Module I **(14 hours)**

Semiconducting diodes and applications PN Junction

Depletion layer, Barrier potential, Biasing- forward and reverse, Reverse breakdown, Junction capacitance and diffusion capacitance- PN Junction diode – V-I characteristics–Diode parameters, Diode current Equation, Diode testing, Ideal diode. Zener diode and its reverse characteristics. Thermistors. Rectification - Half wave, Full wave, Centre tapped, Bridge rectifier circuits - Nature

of rectified output, Efficiency & Ripple factor-Filter circuits – Inductor Filter, Capacitor Filter, LC Filter, π Filter-Regulated Power supplies - Zener diode voltage regulator Voltage multipliers – Doubler & Tripler- Wave shaping circuits - Clipper-Positive, negative and biased – Clampers-Positive, negative and biased.

Module II **(24 hours)**

Transistors Configurations and Feedback **(12 hours)**

Bipolar junction transistors, Transistor biasing, CB, CC, CE configurations and their characteristics- Active, saturation and cut-off regions. Current gain α, β, γ and their relationships. Leakage currents- Thermal runaway. DC operating point and AC and DC Load line, Q-Point. Basic principles of feedback, positive & negative feedback, Advantages of negative feedback, negative feedback circuits – voltage series & shunt, current series & shunt.

Amplifiers and Oscillators **(12 hours)**

Need for biasing-Stabilization- Voltage divider bias. Single stage transistor Amplifiers-CE amplifier - amplification factors. Decibel system, Variations in Amplifier gain with frequency. Oscillatory Circuits, LC oscillators – Hartley Oscillator, Colpit's Oscillator, RC oscillators - Phase shift Oscillator. Astable and monostable multivibrator (basic idea only)

Module III

FET, Operational Amplifier & Modulation **(16 hours)**

FET -characteristics, FET- Parameters. Comparison between FET and BJT.MOSFET (basic idea only) OP-amp- Symbol and terminals. Characteristics of ideal OP-amp, CMRR, Applications - inverting, Non-inverting, Unity follower and Summing amplifiers. Types of modulation – AM, FM, Pulse modulation and Phase modulation (qualitative study only). Amplitude modulation-modulation index - Analysis of AM wave – Sidebands –bandwidth AM Demodulation.

SEMESTER IV

Course Code	Course Title	Credits	Course Type
EN4A06B18	Illuminations	4	Common Course I
FR4A06B18	An Advanced course in French –II	4	Common Course II
HN4A06B18	Gadya Aur Ekanki	4	
MA4A06B18	Malayala Gadhyarachanakal	4	
MT4C01B18	Fourier Series, Partial Differential Equations, Numerical Analysis and Abstract Algebra	4	Complementary Course I
ST4C01B18	Statistical Inference	4	Complementary Course II
PH4B04B18	Electricity and Electrodynamics	3	Core Course
PH4BP02B18	Mechanics, Properties of Matter and Optics II	2	Core Practicals

SEMESTER IV

COMMON COURSE I

EN4A06B18 – Illuminations

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Discover life lessons through the study of life sketches.

CO2: Explain multiple perspectives of life from the viewpoint of great minds.

CO3: Apply the language skills acquired in academic and non-academic contexts.

CO4: Analyze creative texts with a special focus on human emotions and the spirit of survival.

CO5: Critique the conventional notions of happiness, courage and failure.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	1
CO2	1	1	1	2	1
CO3	1	1	1	3	2
CO4	1	1	1	3	1
CO5	1	1	1	3	1

Syllabus Content

Module I- Life Sketches **(18 hours)**

Helen Keller: Three Days to See

Jesse Owens: My Greatest Olympic Prize

Thus Spoke Sudarshan: An Interview with God's Own Physicist Compiled from E C G Sudarshan's interviews

Module II- Essays **(18 hours)**

Stephen Leacock: Are the Rich Happy?

A.G. Gardiner: On Courage

Module III- Speeches **(18 hours)**

Lafcadio Hearn: On Reading

J.K. Rowling: The fringe benefits of failure and the importance of imagination

Chimamanda Ngozi Adichie: An Ode to Makeup

Module IV- Short Stories **(18 hours)**

Oscar Wilde: The Nightingale and the Rose

George Orwell: Roucolle, the Miser

John Galsworthy: Quality

Alice Walker: Everyday Use

Module VI- Poems **(18 hours)**

William Ernest Henley: Invictus

Robert Frost: The Road Not Taken

Kahlil Gibran: Of Good and Evil

Maya Angelou: Still I Rise

SEMESTER IV

COMMON COURSE II

FR4A06B18-AN ADVANCED COURSE IN FRENCH II

Credits: 4

Total Lecture Hours: 90 hours

Course Outcomes:

CO1: Develop language, vocabulary and grammar skills.

CO2: Prepare conversations based on various situations and speak about them.

CO3: Articulate the concepts to express one's opinion in a specific situation.

CO4: Ask questions to get meaningful responses in effective communication.

CO5: Describe events or topics based on various daily life situations such as persons, family, time schedules, visiting countries

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	3	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	1	2	1
CO5	1	1	1	2	1

Syllabus Content:

Module I **(30 Hours)**

En voiture Proposer – Accepter – Refuser – Faire des projets- Les routes – La voiture

Module II **(30 Hours)**

Sur la route Exprimer l'obligation/ L'interdiction – La météo– Le temps

Module III **(30 Hours)**

Raconter un emploi du temps Se justifier – Le tourisme - Les pays et les continents

SEMESTER IV

COMMON COURSE II

HN4AO6B18 - GADYA AUR EKAANKI

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Discuss the authors contribution to Hindi Literature

CO2: Summarise the central theme and other relevant details of all literary works.

CO3: Illustrate the socio-political and cultural concerns of the Author

CO4: Critique excerpts of the Prose and One Act Plays

CO5: Communicate in oral and written form of Hindi with competence. **Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	1	2	1
CO2	1	1	1	2	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	3	1

Syllabus Content:

Module- I **(22 hours)**

1. Aaiye hum vriksh devta ki aaradhana karen- Dr. Kishorilal vyas
2. Raajniti ka batvaara- Harishankar parsai
3. Deep daan – Ramkumar verma

Module- II **(24 hours)**

4. Himachadit uttung shikhar aur dhuli hariyali – Vijay kumar sandesh
5. Kaphan chor ka beta – Ushabaala
6. Bahu ki vida- Vinod rastogi

Module- III **(22 hours)**

7. Jab mai fail hua- Ramkumar Verma
8. Jaan se pyare – Mamta Kaaliya
9. Sati – G.K. Harjeeth

Module- IV **(22 hours)**

10. Jab intizar hussain apni janmabhoomi laute – Azhar vajahat
11. Hari ghaas par ghante bhar – Surendra verma

SEMESTER IV

COMMON COURSE II

MA4A06B18 - മലയാള ഗദ്യരചനകൾ

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: മലയാള ഗദ്യസാഹിത്യത്തിലെ സമകാലിക വിഷയങ്ങൾ ചർച്ച ചെയ്യുക

CO2: കേരളീയസംസ്കാര - കലാപരിണാമം , ചരിത്രം, ആത്മകഥ എന്നിവ അപഗ്രഥിക്കുക

CO3: ഗദ്യപാഠങ്ങളിലൂടെ സമകാലികവിഷയങ്ങളെ വിലയിരുത്തുക

CO4: സമകാലിക സാമൂഹിക വിഷയങ്ങളെ വിമർശനാത്മകമായി നിരൂപണംചെയ്യുക

CO5: വിവിധ വിഷയങ്ങളെ ആസ്പദമാക്കി ലേഖനങ്ങൾ തയാറാക്കുക. സ്വാനുഭവങ്ങൾ വിവിധ ആഖ്യാന രൂപങ്ങളിലൂടെ ആവിഷ്കരിക്കുക.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	3	1
CO2	1	1	1	3	1
CO3	1	1	1	3	2
CO4	1	1	1	3	2
CO5	1	1	1	3	1

പാഠഭാഗങ്ങൾ

പുസ്തകങ്ങൾ : ഗദ്യാരാമം , ഓർമ്മകൾ ചന്ദനഗന്ധം പോലെ

ഖണ്ഡം ഒന്ന് **15 മണിക്കൂർ**

1. കാളിദാസനും കാലത്തിൻറെ ദാസൻ - ജോസഫ് മുണ്ടശ്ശേരി
2. മേഘസന്ദേശവിവർത്തനങ്ങൾ - ഡോ. എൻ .അജയകുമാർ
3. മാതൃഭാഷയിലേക്കു വീണ്ടും - എൻ .വി . കൃഷ്ണവാര്യർ

ഖണ്ഡം രണ്ട് **20 മണിക്കൂർ**

1. വാക്കുകളുടെ വിസ്മയം - എം .ടി.വാസുദേവൻനായർ
2. മാറുന്ന മലയാള സംസാരഭാഷ - ടി .ബി .വേണുഗോപാലപ്പണിക്കർ
3. നമ്മുടെ അടുക്കള തിരിച്ചുപിടിക്കുക - സാറാ ജോസഫ്
4. കലയും കലാദർശനവും - ഡോ. ജെ . ഉണ്ണികൃഷ്ണപിള്ള

ഖണ്ഡം മൂന്ന് **15 മണിക്കൂർ**

1. ചെമ്പൈ വൈദ്യനാഥ ഭാഗവതർ സംഗീതത്തിലെ സിംഹനാദം - ഇന്ദിരാമേനോൻ
2. ഈശ്വരപിള്ളയെ ആരോർക്കുന്നു - പി. കെ . രാജശേഖരൻ
3. രവിവർമ്മ - വിജയകുമാർ മേനോൻ

ഖണ്ഡം നാല് **15 മണിക്കൂർ**

1. പ്രകാശത്തിൻറെ ആയിരം തടവറകൾ - ജീവൻ ജോബ് തോമസ്
2. ജനാധിപത്യ വിദ്യാഭാസം ചില ചിന്തകൾ - ഡോ. കെ .എൻ. പണിക്കർ
3. ഞങ്ങൾ നിങ്ങൾക്ക് ഭൂമി വിറ്റാൽ - സിയാറ്റിൽ മൂപ്പൻ

ഖണ്ഡം അഞ്ച് **25 മണിക്കൂർ**

1. ഓർമ്മകൾ ചന്ദനഗന്ധം പോലെ - ബി. സരസ്വതിയമ്മ

SEMESTER IV

COMPLEMENTARY COURSE - I

MT4C01B18- FOURIER SERIES, PARTIAL DIFFERENTIAL EQUATIONS, NUMERICAL ANALYSIS AND ABSTRACT ALGEBRA

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Compute the Fourier Series of a periodic function.

CO2 : Estimate the solutions of Legendre and Bessel's differential equations using the power series method.

CO3: Distinguish between ordinary & partial differential equations and calculate their solutions using different methods.

CO4 : Determine the roots of algebraic and transcendental equations using various numerical methods

CO5: Explain the properties of algebraic structures - groups, rings, fields and vector spaces

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1	1
CO2	3	3	2	1	1
CO3	3	3	3	1	2
CO4	3	3	3	1	2
CO5	3	3	2	1	2

Syllabus Content

Module I

Special Functions: (25Hrs)

Fourier Series : Periodic Functions, Trigonometric Series, Functions of any period p = 2L Fourier Series, Even and Odd functions, Half-range Expansions.

Legendre Polynomials –A brief introduction to power series and power series method solving Differential equations. Legendre equation and Legendre Polynomials, Rodrigues' Formula, Bessel's Equation .Bessel's Functions

Module 2 (15 Hrs)

Partial Differential Equations: Surfaces and Curves in three dimensions, solution of equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

Origin of first order and second order partial differential equations, Linear equations of the first order, Lagrange's method.

Module 3 (25 Hrs)

Numerical Analysis: (Use of Non-Programmable Scientific Calculator is Permitted) Bisection Method, Methods of false position, Iteration Method, Acceleration of convergence: Aitken's Δ^2 Process, Newton Raphson Method, the quotient – Difference method.

Module 4 (25 Hrs)

Abstract algebra:
Groups, Subgroups, Cyclic groups, Groups of Permutations and Homomorphisms, Rings and Fields , Vector Spaces. (Theorems Statement only. Omit Proofs)

SEMESTER IV

COMPLEMENTARY COURSE- II

ST4C01B18- STATISTICAL INFERENCE

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Explain the concepts of Statistics and Sampling distribution

CO2: Illustrate the methods of estimating parameters of a population

CO3: Describe the procedure of testing of hypotheses

CO4:Explain the standard error and testing procedures for parameters of a Normal Population using large and small samples

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	3	2	2	2
CO3	3	2	2	2	2
CO4	3	3	3	3	2

Syllabus Content:

Module I **(20 hours)**

Sampling Distributions – definition, Statistic, Parameter, Standard Error, Sampling Distributions of Mean and Variance, $|^2$, t and F (without derivation), properties, Inter relationships.

Module II **(30 hours)**

Concepts of Estimation, Types of Estimation – Point Estimation; Interval Estimation, Properties of Estimation – Unbiasedness, Efficiency; Consistency; Sufficiency. Methods of Estimation – MLE, Methods

of Moments, Method of Minimum Variance, Cramer Rao Inequality (without proof), Interval Estimation for Mean, Variance and Proportion.

Module III **(20 hours)**

Testing of hypothesis- Statistical hypothesis, Simple and composite hypothesis Null and Alternate hypothesis, Type I and Type II errors, Critical Region, Size of the test, P value, Power, Neyman Pearson approach

Module IV **(20 hours)**

Large Sample tests – Z test, Chi-Square test-goodness of fit, test of independence. Small sample tests – Normal tests, t - test, Chi-square test, F- test.

SEMESTER IV

CORE COURSE

PH4B04B18 - ELECTRICITY AND ELECTRODYNAMICS

Credits: 3

Total lecture hours - 54 hrs

Course Outcomes:

CO1: Analyze the aspects of transient and alternating currents in different circuits.

CO2: Summarize the magnetic field nature of electric current

CO3 Apply Gauss's law to point charges and continuous charge distribution.

CO4: Develop Maxwell's equations in conductors

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	2
CO2	3	2	2	2	2
CO3	3	3	2	2	2
CO4	3	3	2	2	2

Syllabus Content:

Module I **(18 hours)**

Transient Current (9 hrs)

Growth of current in a circuit containing a resistance and inductance - Decay of current in a circuit containing a resistance and inductance - Charge and discharge of a capacitor through a resistor - Measurement of high resistance by leakage - Growth of charge in a circuit with inductance, capacitance and resistance- Discharge of a capacitor through an inductor and a resistor in series -

Moving coil ballistic galvanometer - Current and voltage sensitivities of a moving-coil galvanometer - Measurement of charge sensitiveness - Absolute capacitance of a capacitor.

Alternating Current and Network Theorems (9hrs)

EMF induced in a coil rotating in magnetic field- AC circuit containing resistance-inductance and capacitance in series (Series resonance circuit)- Parallel resonant circuit-Power in ac circuit containing resistance- inductance and capacitance- Wattless current-Choke coil- Skin effect- Three phase ac generator- Distribution of three phases alternating current- The ac wattmeter

Network Theorem

Ideal current source- Ideal voltage source- Superposition theorem- Reciprocity theorem- Thevenin's theorem- Norton's theorem- Maximum power transfer theorem

Module II **(18 hours)**

Electrostatics & Magnetostatics (18 hrs)

Electric field - Continuous charge distribution - Divergence and curl of electrostatic fields -Gauss' Law and its application to obtain fields due to Spherically symmetric charge distribution, uniformly charged spherical conductor, Line charge, Infinite plane sheet of charge & Electric field at a point between two oppositely charged parallel plates. Electric potential- Poisson's equation and Laplace's equation- The potential of a localized charge distribution- Work and Energy in electrostatics- The work done to move a charge- Energy of a point charge distribution and continuous charge distribution. Conductors: Basic properties induced charges- Surface charge and force on a conductor- Capacitors.

Magnetic field of Steady currents: - Biot Savart's law - magnetic induction at a point due to a straight conductor, axis of a circular coil & at the axis of a solenoid - Force on a current carrying conductor in magnetic field - force between two parallel conductors carrying current- electron moving in a magnetic field and Lorentz force- Ampere's circuital law - differential form -

applications - to find the magnetic fields due to long solenoid & toroid-Comparison of magnetostatics and electrostatics

Module III **(18 hours)**

Maxwell's equations and Electromagnetic waves

Maxwell's equations- Electrodynamics before Maxwell- Modification of Ampere circuital law- Magnetic Charge-Poynting's theorem the wave equation in one dimension- Boundary condition - Reflection and Transmission- Polarization- Electromagnetic waves in vacuum-Monochromatic plane waves- Energy and momentum in Electromagnetic waves- Electromagnetic waves in matter- Propagation in linear media- Electromagnetic waves in conductors

SEMESTER IV

CORE COURSE PRACTICAL

PH4BP02B18 - MECHANICS, PROPERTIES OF MATTER AND OPTICS II

Credits: 2

Total lecture hours - 72 hrs

Course Outcomes:

CO1: Estimate elastic constants of materials using basic experiments in Mechanics & Properties of matter.

CO2: Simulate basic experiments in Optics and analyse the optical constants

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	1	2
CO2	3	3	3	1	2

List of Experiments

1. Fly Wheel – Moment of Inertia
2. Cantilever- pin & microscope –Determination of Young's modulus
3. Torsion pendulum- n and I - using two identical masses
4. Uniform bending – Young's Modulus-Optic lever method.
5. Non Uniform Bending - Young's modulus of material of bar.
6. Non Uniform bending – Optic Lever – Determination of Young's modulus
7. Young's Modulus –Koenig's method
8. Asymmetric Compound Pendulum – Acceleration due to gravity, radius of gyration & moment of inertia.

9. Viscosity-constant pressure head- coefficient of viscosity (η) of the liquid
10. Viscosity- Searle's rotation viscometer method
11. Liquid lens-Optical constants of a convex lens
12. Kater's pendulum-g
13. Spectrometer – Refractive index of liquid.
14. Spectrometer – i-d curve
15. Thermal conductivity of rubber
16. Kundt's tube- Velocity of sound
17. Specific heat of liquid –Newton's law of cooling
18. Newton's rings-Determination of wavelength.

SEMESTER V

Course Code	Course Title	Credits	Course Type
PH5B05B18	Environmental Physics And Human Rights	4	Core Course
PH5B06B18	Classical and Quantum Mechanics	3	Core Course
PH5B07B18	Physical Optics and Photonics	3	Core Course
PH5B08B18	Digital Electronics and Programming	3	Core Course
PH5D01aB18	Amateur Astronomy	3	Open course Offered by the Department for other streams
PH5D01bB18	Physics in Daily Life	3	Open course Offered by the Department for other streams
PH5D01cB18	Computer Hardware and Networking	3	Open course Offered by the Department for other streams

SEMESTER V

CORE COURSE

PH5B05B18 – Environmental Physics And Human Rights

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Explain about the various natural resources and its conservation methods.

CO2:Discuss the harmful effects of environmental pollution and methods to protect the environment.

CO3: Distinguish between the renewable and non renewable energy sources.

CO4: Examine the devices and applications powered by solar energy.

CO5: Summarise the relevance of various environment and human rights.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	1
CO2	3	2	1	2	1
CO3	3	2	2	2	2
CO4	3	2	2	2	2
CO5	1	1	1	2	1

Syllabus Content

Module I **(18 hours)**

Multidisciplinary nature of environmental studies(2 hours)

Definition, scope and importance, Need for public awareness.

Natural Resources(10 hours)

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

- Role of individual in conservation of natural resources.
- Equitable use of resources for sustainable life styles.

Ecosystems (6 hours)

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the given
- ecosystem:- Forest ecosystem

Module II **(26 hours)**
Biodiversity and its conservation (8 hours)

- Introduction

- Biogeograhical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- India as a mega-diversity nation
- Hot-sports of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered and endemic species of India

Environmental Pollution (8 hours)

- Definition, Causes, effects and control measures of: -

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment (10 hours)

- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people: its problems and concerns, Case studies
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies
- Consumerism and waste products
- Environment Protection Act

- Air (Prevention and Control of Pollution) Act
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

Module III **(10 hours)**

Non-renewable and Renewable Energy Sources (10 hours)

Non-renewable energy sources:-Coal, Oil, Natural gas; Nuclear fission energy; Merits and demerits of non-renewable energy. Renewable energy sources: Biomass energy- Biogas plant- Fixed dome type and moving dome type; Wind energy; Wave energy; Tidal energy; Hydroelectricity; Geothermal energy conversion; Ocean thermal energy conversion; Fusion energy; Hydrogen energy- Production (electrolysis) and storage; Merits and demerits of each renewable energy sources; Storage of intermittently generated renewable energy (qualitative); Fuel cell.

Module IV **(10 hours)**
Solar energy (10 hours)

Sun as a source of energy- Solar radiation, Solar Constant, Spectral distribution; Solar pond - convective and salt gradient types; Flat plate collector; Solar water heater – Direct and indirect systems- Passive and active systems; Optical concentrator – Parabolic trough reflector - Mirror strip reflector - Fresnel lens collector; Solar desalination; Solar dryer - Direct and indirect type; Solar cooker; Solar heating of buildings; Solar green houses; Need and characteristics of photovoltaic (PV) systems; Solar cells - Principle, Equivalent circuits, V-I characteristics, fill factor, conversion efficiency; PV Sun tracking systems; Merits and demerits of solar energy.

Module V **(8 hours)**
Human Rights

An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

Human Rights and United Nations

Contributions, main human rights related organs - UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities

Environment and Human Rights

Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthurirengan report. Over exploitation of ground water resources,marine fisheries, sand mining etc.

SEMESTER V

CORE COURSE

PH5B06B18 - Classical and Quantum Mechanics

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Examine the dynamical motion of classical systems using Lagrangian formalism

CO2: Explain the Hamiltonian formalism in generating equations of motion of classical system of particles

CO3: Discuss the quantum mechanical concepts using wave function formalism

CO4: Devise Schrodinger equation to one dimensional Energy Eigen value problems

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1	2
CO2	3	3	2	1	2
CO3	3	2	2	1	2
CO4	3	3	2	1	2

Syllabus Content

Module I **(18 hours)**

Lagrangian and Hamiltonian Dynamics (18 hours)

Degrees of freedom, Constraints- holonomic, nonholonomic, rheonomous, scleronmous constraints, Generalized coordinates, Principle of virtual work, D' Alembert's principle, Lagrange's equation from D' Alembert's principle, Applications -Simple pendulum, Atwood's machine, Motion under central force. Hamilton's principle and Lagrange's equations, Merits of Lagrange's equation over Newtonian approach. Calculus of variations and Euler Lagrange's equations- Applications- Shortest distance between two points, Brachistochrone problem.

Generalized momentum and cyclic coordinates, Hamilton's equations, Examples in Hamiltonian Dynamics- Applications-one dimensional Harmonic oscillator, Simple pendulum.

Module II **(18 hours)**

Quantum Mechanics

Origin of Quantum theory (10 hrs)

Limitations of classical physics, black body radiation, Planck's quantum hypothesis, particle nature of radiation, photoelectric effect, Rutherford planetary model, Bohr postulates, the Bohr atom, Compton effect, Stern and Gerlach experiment.

Wave Mechanical Concepts (6hrs)

Wave nature of matter, de Broglie hypothesis, uncertainty principle – single slit experiment, uncertainty relations for other variables, applications of uncertainty relations, principle of superposition, wave packet, particle velocity and group velocity

Module III **(20 hours)**

General formalism of Quantum Mechanics (14 hrs)

Time dependent Schrodinger equation for free particle and for particle in a field, Interpretation of wave function, probability interpretation, probability current density, expectation value, Ehrenfest's theorem , time independent Schrodinger equation, stationary states, admissibility conditions on the wave function, Operators, linear operators, the commutator, general Eigen value equation, Hermitian operator, postulates of quantum mechanics, simultaneous measurability of observables.

One dimensional Energy Eigen value Problems (6 hrs)

Particle in a box (square well potential with rigid walls), alpha emission, linear harmonic oscillator Schrodinger method (basic ideas only), zero point energy

SEMESTER V

CORE COURSE

PH5B07B18 – Physical Optics and Photonics

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Interpret the theory of interference in Fizeau and Haidinger fringe systems.

CO2: Explain Fresnel and Fraunhoffer diffractions.

CO3: Analyse the production and detection of different types of polarized light

CO4: Analyse the mechanisms of light matter interactions that lead to laser action and explain its applications

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1	2
CO2	3	3	2	1	2
CO3	3	3	3	1	2
CO4	3	3	3	1	2

Syllabus Content

Module I **(22 hours)**

Wave optics (Basic ideas) (1hr)

Nature of light- theories of light- EM nature of light. Wavefront- propagation of wavefront. Characteristics of a wave- mathematical representation of a travelling wave.

Interference (10hrs)

Review of basic ideas of interference – optical path – phase difference - coherence- superposition of waves- condition for bright and dark fringes. Interference (Analytical method) - intensity distribution. Techniques of obtaining interference- wavefront splitting- Fresnel's biprism-theory-

fringe width- lateral displacement of fringes. Amplitude splitting- Interference in thin films-plane parallel film (reflected system)-conditions for brightness and darkness-Fizeau and Haidinger fringes- Air wedge- theory-determination of wedge angle and thickness of spacer- colours in thin films. Newton's rings(reflected system)-determination of wavelength of light-refractive index of liquid. Michelson interferometer-principle- construction-working (formation of fringes-qualitative ideas)- applications-determination of wavelength- thickness of thin transparent sheet-refractive index of gases.

Diffraction (11 hrs)

Fresnel Diffraction

Huygens- Fresnel theory –Fresnel assumptions- Fresnel half period zones-theory of rectilinear propagation- zone plate – action of zone plate for an incident spherical wavefront- comparison between zone plate and convex lens. Diffraction pattern due to a straight edge – intensity at a point in the geometrical shadow.

Fraunhoffer diffraction (calculus method not required)

Fraunhoffer diffraction at a single slit, double slit- missing orders in double slit, theory of plane diffraction grating-(normal incidence, N slits)- width of principal maxima-absent spectra-overlapping of spectral lines-determination of wavelength of a spectral line- dispersive power of grating-comparison of prism & grating spectra. Comparison between interference and diffraction.

Module II **(12 hours)**

Polarization (12hrs)

Polarization- introduction to polarization- polarization by reflection- Brewster's law-Malus' Law-polarization by double refraction-calcite crystal-optic axis- principal section-Huygen's explanation of double refraction-phase difference between e ray and o ray- superposition of waves linearly polarized at right angles-types of polarized light – retarders-quarter wave plates- half wave plates – production and detection of elliptically and circularly polarized light- optical activity-Fresnels explanation of optical rotation (analytical treatment not needed)- specific rotation-application- Laurent's half shade polarimeter.

Module III **(20 hours)**

Lasers (11hrs)

Absorption and emission of light-Absorption-spontaneous emission and stimulated emission- light amplification by stimulated emission. Einstein's relations-condition forlight amplification – population inversion-pumping –pumping methods –optical pumping – electrical pumping – injection pumping. Active medium-metastable states- pumping schemes (two level, three level and four level)- Characteristics of laser beam- Optical resonator (theory not required) -Threshold condition. Types of lasers-ruby laser, He-Ne laser, semiconductor laser. Applications of lasers-Holography (principle, recording and reconstruction) - materials processing-cutting, drilling and welding.

Fiber Optics and Optical Communication (9hrs)

Optical fiber- Critical angle of propagation-modes of propagation (Ray theory only)- Acceptance angle-Fractional refractive index change- Numerical Aperture- Types of Optical fibers- pulse dispersion - Applications- Fiber optic communication system- Advantages of Optical fibers.

SEMESTER V

CORE COURSE

PH5B08B18 - DIGITAL ELECTRONICS AND PROGRAMMING

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Explain the concepts and principles in Boolean algebra and digital logic circuits

CO2: Examine various logic circuits applying sequential and combinational logic.

CO3: Solve problems in Digital Electronics.

CO4: Illustrate basic C++ program structure and develop programs

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	3	3	2	1	2
CO3	3	3	2	1	2
CO4	3	3	2	1	2

Syllabus Content

Module I **(9 hours)**

Boolean algebra and logic gates(9 hours)

Basic gates NOT, OR, AND. Universal Logic Gates- NOR, NAND. XOR and XNOR Gates. Rules and Laws of Boolean algebra. Duality theorem -De Morgan's Theorems. analysis and simplification of logic circuits. Boolean equation and truth table - SOP and POS. Minterms and Maxterms. Standard SOP and Standard POS- Conversion between Standard SOP & Standard POS. Karnaugh Map (up to four variables). K map SOP minimization.

Module II **(19 hours)**

Combinational logic (6 hours)

Half Adder and Full Adder, Half and Full subtractor, 4-bit parallel Adder/Subtractor. Multiplexer, De-multiplexer, Encoder & Decoder.

Sequential logic (13 hours)

Flip-flops, RS, Clocked RS, Master Slave JK FF, DFF, T Flip-flop, Buffer registers- Shift register- SISO and SIPO, Counters- Binary ripple counter. D/A converters (Ladder type), A/D Converter (Counter type).

Module III **(26 hours)**

Programming in C++ (26 hours)

Basic C++ program structure –comments-data types-variable types-constants operators (arithmetic, relational, logical and assignment operators)- if, if-else and else if, do while - case – loops(while, do-while, and for)-nested loops- arrays(Defining Arrays, Accessing Array Elements, Initializing Arrays)- basic ideas of functions(qualitative idea), object and classes. Programs using loops

SEMESTER V

OPEN COURSE (Offered for other streams)

PH5D01aB18 Amateur Astronomy

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Illustrate the celestial coordinate system, apparent daily and annual motions of stars and differentiate various types of telescopes.

CO2: Summarise the stellar - galactic classifications and represent different stages in stellar evolution

CO3: Discuss about the different constituents of Solar System

CO4: Compare the different models of the Universe

Syllabus Content

Module I **(18 hours)**

Observation of sky

Constellations -Celestial coordinates – Location on the celestial sphere – equatorial co- ordinate system- right ascension and declination - Apparent daily and annual motion of the stars – The ecliptic - Earth'sseasons – Equinoxes and solstices – The solar and sidereal day

The tools of Astronomy- Optical Telescope - refracting telescope, reflecting telescope – Resolving power – Magnification – Telescope aberration –Hubble Space telescope – Radio Telescope – GMRT.

Module II **(18 hours)**

Stars and Galaxies

Distance to stars, Parallax method – Spectra of stars – Spectral classes –temperature – Luminosity – apparent and absolute magnitudes – H – R Diagram -Galaxy – Milky Way- classification of galaxies - Cluster of galaxies.

Stellar Evolution – Life cycle of stars – birth, lifetimes, Shining stars, Oldage – Red giants – synthesis of heavier elements – Variable stars – Death –Mass Loss – White dwarfs – Exploding stars – Supernova – Neutron stars –Black holes

Module III **(18 hours)**

The Solar system

The sun- distance and size – structure – Rotation - surface – sunspots –Activity cycles – Magnetism – Flares and coronal mass ejections – Solar wind -Planets – Brief history and Origin – Laws of planetary motion – Comparison of Planets - Mercury – Venus – Earth – Mars – Jupiter – Saturn – Uranus –Neptune (Structure, atmosphere, Surface features – Moons of all planets) - Moon- rotation, size, density – Surface features – Craters, Mountains – Structure - Lunar and solar eclipse - Minor members of the solar system- Asteroids, comets and meteors

Module IV **(18 hours)**

Our Universe

Early models of universe- Earth at the centre- Aristotle- Ptolemy- a spinning earth- unanswered questions- Sun at the centre- Copernican model. Planetary paths- Beyond the eye- Galileo and his observations - Starry messenger- force of gravity.

The expanding universe- Hubble's law - Big bang theory – Steady state theory - age and size of universe. Extraterrestrial Life, SETI (Search for extra-terrestrial intelligence) – Space Travel

SEMESTER V

OPEN COURSE (Offered for other streams)

PH5D01bB18 - Physics in Daily Life

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Interpret the theory of Physics behind various phenomena of light and electricity

CO2: Express the equations of motion in linear and rotational motions and their applications in daily life

CO3: Explain the relevance of Physics in the realm of matter and energy

Syllabus Content

Module I **(20 hours)**

Unit 1 (8 hours)

Fundamental and derived quantities. Units and dimensions, dimensional analysis, order of magnitude, significant figures, errors.

Unit 2 Light (12 Hours)

Reflection, refraction, diffraction, interference, scattering(elementary ideas only) – examples from daily life – apparent depth, blue color of sky, twinkling of stars.

Total internal reflection, mirage, sparkling of diamond, primary and secondary rainbow – optical fibers. Concave and convex mirrors, lenses – focal length, power of a lens, refractive index, prism, dispersion. Human eye, defects of the eye – myopia, hypermetropia, presbyopia and astigmatism and their correction by lens.

Module II **(22 hours)**

Unit 3 Motion (12 Hours)

Velocity, acceleration, momentum, Idea of inertia, force - laws of motion. Newton's law of gravitation, acceleration due to gravity, mass and weight, apparent weight, weightlessness. Rotational motion, Moment of inertia, torque, centripetal and centrifugal acceleration examples- banking of curves, centrifugal pump, roller coasters.

Unit 4 Electricity (10 Hours)

Voltage and current, ohms law. Electric energy, electric power, calculation of energy - requirement of electric appliances – transformer, generator, hydroelectric power generation – wind power – solar power – nuclear power

Module III **(30 hours)**

Unit 5 Matter and energy (18 Hours)

Different phases of matter, fluids - surface tension, viscosity- capillary rise, Bernoulli's theorem and applications -Heat energy, temperature, different temperature scales – degree Celsius, Fahrenheit and Kelvin.

Waves – transverse and longitudinal waves, sound waves, Doppler Effect.

Lasers, fluorescence, phosphorescence, electromagnetic waves – applications – microwave oven, radar, super conductivity.

Unit 6 Universe (12 hours)

Planets, – solar system, moon- phases of moon, lunar and solar eclipses, constellations, Different types of stars, Galaxies, black hole. Satellites, Artificial satellites, Global positioning system. Geo stationary satellite.

SEMESTER V

OPEN COURSE (Offered for other streams)

PH5D01cB18 - Computer Hardware and Networking

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Explain the basic architecture of microprocessors

CO2: Discuss about the features of primary and secondary devices

CO3: Illustrate the installation and administration of operating systems and software tools.

Syllabus Content

Module I **(24 hours)**

Microprocessors – Basic concepts of Intel 80186, 80286, 80386, 80486 and Pentium processors. Motherboard, Expansion buses, Memory, upgrading / adding memory, BIOS Motherboard – removing, installing / configuring motherboards, BIOS set up, troubleshooting memory.

Module II **(24 hours)**

Data storage devices, IDE and SCSI controllers, hard disk, installing / upgrading CD ROM drives, DVD, Optical storage, Tape back – ups. Printers, Keyboards, pointing and positioning devices, digital camera, Scanners, Monitors, Hard disks- installing / upgrading, troubleshooting, formatting, Error codes, BIOS disk routines

Module III **(24 hours)**

Multimedia, Graphical accelerators, audio, modems, I/E add on, Networks, Power supplies, UPS Printer installation, Software installation – DOS, Windows 95, 98, Linux, Windows NT installation, Administration, Installing PASCAL, C, ORACLE, VISUAL BASIC, Software diagnostics – PC tools, Norton utilities, XT/AT diagnostics, Viruses and anti-viruses.

SEMESTER VI

Course Code	Course Title	Credits	Course Type
PH6B09B18	Thermal and Statistical Physics	3	Core Course
PH6B10B18	Relativity and Spectroscopy	3	Core Course
PH6B11B18	Nuclear, Particle and Astrophysics	3	Core Course
PH6B12B18	Condensed Matter Physics	3	Core Course
PH6B13aB18	Nano Science and Nanotechnology	3	Choice Based Course
PH6B13bB18	Material Science	3	
PH6B13cB18	Computational Physics	3	
PH6B13dB18	Instrumentation	3	
PH6B13eB18	Astronomy and Astrophysics	3	
PH6B13fB18	Information Technology	3	
PH6BP03B18	Electricity & Magnetism	2	Core Practical
PH6BP04B18	Electronics and Microprocessors	2	Core Practical
PH6BP05B18	Spectroscopy, Laser and Computer Programming	2	Core Practical
PH6BP06B18	Digital and Advanced Electronics	2	Core Practical
PH6BPRB18	Project	1	Core

SEMESTER VI

CORE COURSE

PH6B09B18– THERMAL AND STATISTICAL PHYSICS

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Discuss the real and ideal behaviours of gases.

CO2:Explain the different thermodynamics properties and efficiency of the Carnot's engine.

CO3: Examine the thermodynamic relations, thermodynamics potential and entropy

CO4: Compute the value of thermodynamic probability and illustrate the concepts and applications of classical and quantum statistics.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	1	2	2
CO2	3	3	1	2	2
CO3	3	3	1	2	2
CO4	3	3	1	2	2

Syllabus Content:

Module I **(20 Hours)**

Thermal Physics

Behaviour of real gases-Change of state, Continuity of state, Andrew's experiments on Carbon dioxide-Critical constants- Behaviour of gases at high pressure-Boyle temperature- Reasons for modification of gas equation-Vander Waals equation of state-Comparison with experimental PV curves-Estimation of critical constants - Constants of Vander Waals equation-Critical coefficient-Limitations of van der Waals equation.

Thermodynamic system- Zeroth law(Statement and explanation)-Thermodynamic equilibrium-First law of thermodynamics- Applications of first law-Specific heats of a gas, isochoric process, isobaric process, adiabatic process, adiabatic equation of a perfect gas, cyclic process, isothermal process-Indicator diagram- Work done during isothermal and adiabatic process- slopes of adiabatics and isothermals- relation between adiabatic and isothermal elasticities

Reversible and irreversible process- Heat Engines-Carnot's ideal heat engine-Carnot's cycle-Effective way to increase efficiency-Carnot's engine and refrigerator-coefficient of performance - Second law of thermodynamics-Kelvin's and Clausius's statement-Carnot's theorem.

Module II **(16 Hours)**

Thermodynamic relations and Thermal radiation

Entropy- change in entropy- entropy change in adiabatic process and reversible cycles- Principle of increase of entropy- The T-S diagram- Physical significance of entropy- Entropy of steam-Third law of thermodynamics: Nernst's Heat theorem-Zero point energy.

Thermodynamic potentials- Significance of thermodynamic potentials- relation of thermodynamic potentials with their variables- The TdS equations- Clapeyron's Latent heat equation using Maxwell's Thermodynamical relations. Thermal radiation- Prevost's theory of heat exchanges-Black body- Fery's black body- Black body radiation and its temperature dependence- Emissive power and absorptive power-Stefan–Boltzmann law.

Module III **(18 Hours)**

Statistical Mechanics

Probability – Principle of equal a priori probability – Micro and macro state – Thermodynamic probability. Position space, Momentum space, phase space, mu – space and gamma space (qualitative ideas only) Minimum size in classical and quantum mechanics – entropy and thermodynamic probability - Boltzmann's entropy relation – Ensembles – Kinds of ensembles – Gibbs paradox. Three kinds of statistics – Classical statistics – Maxwell – Boltzmann Distribution law – Need of quantum statistics – indistinguishability of particles – Bose – Einstein Distribution law and its application to black body radiation – Fermi – Dirac statistics and its application to electron gas.

SEMESTER VI

CORE COURSE

PH6B10B18 - RELATIVITY AND SPECTROSCOPY

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Compute the relativistic variation of parameters on the basis of Special theory of Relativity

CO2: Articulate the concepts of Vector atom model and explain various atomic spectroscopic properties

CO3: Illustrate the various kinds of molecular spectroscopy

CO4: Explain the basic principles and instrumentation of NMR & ESR Spectroscopy

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	1	2	2
CO2	3	3	1	2	2
CO3	3	3	1	2	2
CO4	3	2	1	2	2

Syllabus Content:

Module I

Special Theory of Relativity **(18 hours)**

Inertial and non inertial frames of reference- Galilean transformation, Significance of Michelson-Morley experiment, Postulates of Special Theory of Relativity, Lorentz transformation, Spatial contraction, Time dilation, composition of velocities, mass of moving particle, Equivalence of mass and energy.

Module II

Atomic Spectroscopy (22 hours)

Types of spectra. Absorption and emission of light by atoms, quantum theory, early atom models – Bohr model, Vector Atom model, Quantum numbers associated with vector atom model, Coupling Schemes- L-S coupling, j-j coupling, Pauli Exclusion principle, Magnetic dipole moment due to orbital and spin motion of electron, Spin-Orbit coupling.

Optical spectra, spectral terms and notations, selection rules, intensity rule and interval rule, fine structure of sodium D line, Zeeman Effect, Larmor's theorem, quantum mechanical explanation of the normal Zeeman Effect, Anomalous Zeeman effect, Paschen Back Effect and Stark Effect.

Module III

Molecular spectroscopy (22 hours)

Electromagnetic spectrum, Molecular energies, Classification of molecules, Rotational Spectra of diatomic molecules, Diatomic vibrational spectra, Explanation with simple harmonic oscillator.

Electronic Spectra of molecules, Phosphorescence and Fluorescence, Raman Scattering, Classical description of Raman scattering and its failure, Quantum theory of Raman Scattering, Raman Spectrometer. IR and Microwave spectroscopes.

Module IV

NMR and ESR Spectroscopy (10hours)

NMR Spectroscopy- Basic principles and instrumentation- Medical applications of NMR.

ESR Spectroscopy- Basic principles and instrumentation.

SEMESTER VI

CORE COURSE

PH6B11B18 - NUCLEAR, PARTICLE AND ASTROPHYSICS

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Explain the structure, properties and models of atomic nucleus to interpret nuclear reactions and their applications

CO2: Discuss the process of radioactivity and the laws governing a radioactive process

CO3: Discuss the classification of stars and the stellar evolution

CO4: Illustrate the classification and properties of elementary particles

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	1	2	2
CO2	3	2	1	2	2
CO3	3	2	1	2	2
CO4	3	3	1	2	2

Syllabus Content:

Module I

Nuclear structure & General properties of nuclei (15 hours)

Classification of nuclei – isotopes, isobars, isomers, mirror nuclei. General properties of nucleus – size, nuclear mass, density, charge - angular momentum- nuclear magnetic dipole moments- electric quadrupole moment- Mass defect- binding energy- B.E. curve- packing fraction- nuclear stability. Theories of nuclear composition – proton-electron hypothesis, proton-neutron hypothesis. Properties of Nuclear forces – Meson theory of nuclear forces. Models of Nuclear

structure- Liquid drop model -semi empirical mass formula- shell model- collective model (Quantitative ideas only). Detectors of nuclear radiations – ionisation chamber, Proportional counter, G.M Counter.

Module II

Radioactivity **(14 hours)**

Natural radioactivity – Radioactive disintegration law – half life, Mean life- Radioactive series. Radioactive dating – Uranium dating, Carbon dating. Range of α particles – range – energy relationship. Geiger – Nuttal law - Alpha particle disintegration energy- Theory of α decay – Gamow's theory. β decay - β ray energy spectrum- Neutrino hypothesis- Positron emission, orbital electron capture (Basic ideas only). γ decay – Internal conversion - Electron positron pair production by γ rays-Electron positron annihilation. Artificial radioactivity- Transuranic elements. (Basic ideas only). Nuclear waste disposal - radiation hazards from nuclear explosion.

Astrophysics **(6 hours)**

Classification of stars – Hertzsprung - Russel diagram – Luminosity of a star – Stellar evolution - White Dwarfs - Chandrasekhar limit - Neutron stars - Black holes – Supernova explosion.

Module III

Nuclear fission & Fusion **(9 hours)**

Discovery of nuclear fission – Energy released in fission - Bohr and Wheeler Theory- chain reaction- Atom Bomb-Nuclear reactors –Power reactors, Breeder reactor. Nuclear fusion – Sources of stellar energy – Proton-Proton cycle, Carbon - Nitrogen cycle- Thermonuclear reactions - Hydrogen bomb- Controlled thermonuclear reactions.

Elementary particles **(10 hours)**

Particles and antiparticles –Antimatter- Fundamental interactions in nature. Classification of elementary particles (based on nuclear interactions)-Resonance particles-Higgs bosons Elementary particle quantum numbers- conservation laws- symmetry, the quark model – Compositions of hadron (based on quark model). Cosmic rays – Discovery - lattitude effect- altitude effect- east west effect- Primary and secondary ray –Cosmic Ray showers-Origin of cosmic rays.

SEMESTER VI

CORE COURSE

PH6B12B18 - CONDENSED MATTER PHYSICS

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Discuss the fundamental aspects of crystal structures and explain the phenomenon of X-ray diffraction for the characterisation of crystal structures

CO2: Explain the evolution and origin of energy bands to describe the electrical properties of solids

CO3: Discuss about the different types of materials and their properties such as semiconducting, superconducting, magnetic and dielectric.

CO4: Apply the theoretical concepts to address the problems and challenges in condensed matter physics

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	1	2	2
CO2	3	2	1	2	2
CO3	3	2	1	2	2
CO4	3	3	1	2	2

Syllabus Content:

Module I

Crystal Structure **(14 hours)**

Crystal lattice – Unit cell- Basis – Symmetry Operations – Point groups and Space groups – Types of lattices – Lattice directions and Planes – Miller Indices - Interplanar spacing – Crystal structures – simple cubic, fcc, bcc and hcp – structure of diamond, Zinc Blende and sodium chloride

X Ray Diffraction (5 hours)

Bragg's Law – Experimental methods of X ray Diffraction –Laue's Method – Rotating crystal method - Powder Method – Reciprocal Lattice – Reciprocal lattice vectors – Elementary ideas only

Module II

Free Electron Theory and Band theory of Solids (12 hours)

Drude – Lorentz's classical theory – Sommerfeld's quantum theory – Free electron gas in one dimension – Fermi energy – Total energy- Density of states – Filling of energy levels – Application of free electron gas model

Band theory – Bloch theorem (statement only) – Kronig – Penney model (Qualitative ideas only) – Velocity and effective mass of electron – Distinction between metals, insulators and semiconductors.

Semiconducting Properties of materials (10 hours)

Semiconductors – Intrinsic and Extrinsic – Drift velocity – mobility and conductivity of Intrinsic semiconductors - Carrier concentration, Fermi level and conductivity for intrinsic and extrinsic semiconductors (Expression only), Hall Effect

Materials Science and Technology (9 hours)

Amorphous Semiconductors – Band structure- Optical absorption - Liquid Crystals – Nematic phase – Cholestric phase – Smectic Phase - Polymers – Effect of temperature - Thin films – Electron beam deposition technique –Chemical vapour deposition

Module III

Magnetic and Dielectric properties of Solids (12 hours)

Types of Magnetism – Langevin's classical theory of Dia and Paramagenetism – Ferromagnetism –Weiss theory - Domains and hysteresis – Antiferromagnetism and ferrimagnetism (Qualitative ideas only)

Dielectric properties – Local field – dielectric constant and polarisability – Clausius Mossotti relation – Sources of polarisability – Frequency dependence – Ferro and Piezo electricity (Qualitative ideas only)

Superconductivity **(10 hours)**

Superconducting phenomenon – Meissner effect –Critical field – Penetration depth - Type I and Type II superconductors – Entropy, specific heat, energy gap – Isotope Effect – London equations - Josephson Effect and Tunneling – SQUIDs – BCS theory (qualitative ideas only) – Cooper Pairs – High temperature Superconductors - Applications

SEMESTER VI

CHOICE BASED COURSE

PH6B13AB18- NANO SCIENCE AND NANOTECHNOLOGY

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Explain the properties of materials in nano-regime and distinguish the different types of quantum structures

CO2: Distinguish between different types of synthesis and characterization methods

CO3: Explain the structure, properties and applications of carbon nanotube and bulk nanostructured materials

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2
CO2	3	2	1	3	2
CO3	3	2	1	2	2

Syllabus Content:

Module I

Introduction to Nanoscience **(5 hours)**

Introduction to nanoscience- Bulk to nano transition- magic numbers-formation of 13 atom nanoparticles- mass spectroscopy, Size Dependence of Properties- mechanical, optical, electrical and magnetic properties at the nanoscale.

Applications of Nanotechnology **(2 hours)**

Nanomedicines, smart surfaces-smart window, self cleaning surfaces, smart paint, applications in automobile. MEMS, NEMS.

Quantum Confined Structures (11 hours)

Quantum confined structures-Quantum Wells, Wires, and Dots - Fermi gas model - Comparison of density of states and energy dispersion curve in bulk, Quantum well, Quantum wire and Quantum dots. Equation representing energy of electrons and holes in the quantum confined structures and the concept of Blue shift in band gap - properties dependent on density of states - absorption, emission. Applications – quantum confined structures as lasing media.

Module II

Synthesis techniques (10 hours)

Overview of Top down and Bottom Up methods. Top - down methods: a) ball milling b) laser ablation c) arc discharge method d)Lithography - electron beam lithography, nanoimprint lithography, two photon lithography. Bottom - up methods: a) homogenous nucleation, b) sol gel method, c)MBE, d) chemical vapour deposition, e) pulsed laser deposition.

Methods of Characterization (6 hours)

XRD- Determination of crystallographic structure- Particle Size Determination, Surface Structures, Microscopy for structure and size determination-Transmission Electron Microscopy-Scanning Electron Microscopy, AFM, STM

Module III

Carbon nanostructures (8 hours)

Carbon nanostructures: Carbon molecules, Buckminister fullerene, Carbon nanotube- structure, Properties-Electrical properties, Vibrational Properties, Mechanical Properties. Applications of Carbon Nanotubes –Computers, Fuel Cells, Chemical Sensors, Catalysis, Mechanical Reinforcement, Field Emission and Shielding. (Elementary ideas).

Bulk Nanostructured Materials (12hours)

Solid Disordered Nanostructures -Failure Mechanisms of Conventional Grain-Sized Materials, Mechanical Properties, Electrical Properties, Optical properties-Porous Silicon - Metal

Nanocluster Composite Glasses. Magnetic Properties- GMR, CMR materials, Spintronics, Spin Valve transistors.

Ordered Nanostructures-Natural Crystals-Zeolites-Photonic crystals:1D, 2D, 3D photonic crystals, comparison of photonic and electronic crystals(elementary ideas), features-presence of band gap-reflection and transmission of electromagnetic waves, defect and defect modes- point defect, line defect and surface defect.

SEMESTER VI

CHOICE BASED COURSE

PH6B13BB18 - MATERIAL SCIENCE

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Discuss the various properties of micro and macrostructures

CO2: Explain the properties of materials in the nanoregime

CO3: Illustrate the significance of modern engineering materials

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2
CO2	3	2	1	2	2
CO3	3	2	1	2	2

Syllabus Content:

Module I **(18 Hours)**

Structure and Properties of Materials Classification of engineering materials-Engineering requirement of materials- Level of structures, Microstructure and Macrostructure, Structure-Property relationships, Physical properties of materials, Mechanical Properties-Stress strain relationship, creep, impact strength- Thermal properties, Thermal cracking- Electrical properties-Dielectric strength and dielectric constant- Chemical and Optical properties- Identification of metals and alloys- Identification tests.

Module II **(18 Hours)**

Optical Properties of Materials

Absorption processes- Fundamental absorption-Exciton absorption- Free –carrier absorption- Photoconductivity- Photoelectric effect- Photovoltaic effect- Photoluminescence-colour centres- Generation of colour centres

Nanoscience

Materials at nanoscale- Quantum confinement - Size effect on shape- Magic numbers- Different types of nanostructures- Quantum dots- Fullerenes- Graphene- Carbon nanotubes- Structure, properties and applications

Modern Engineering Materials

Display devices- active and passive-Liquid crystals- Types of Liquid crystals- Nematic liquid crystals-Cholesteric liquid crystals- Smectic liquid crystals-General features of liquid crystals- Numeric display using LCD- Metallic glasses - Thermodynamic, Mechanical, Electronic and magnetic properties- Applications Shape memory alloy-structural change- general characteristic- Thermomechanical behavior

Module III **(18 Hours)**

Nanoscience

Metal nanoclusters-magic numbers, theoretical modelling, geometric and electronic structure, magnetic clusters; Semiconducting nanoparticles- Rare gas and molecular clusters- carbon nanostructures- Carbon clusters, CNT preparation, properties and applications; Quantum wells, wires and dots – preparation, Size and dimensionality effects, applications

SEMESTER VI

CHOICE BASED COURSE

PH6B13CB18 - COMPUTATIONAL PHYSICS

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Illustrate the solutions of linear and nonlinear equations

CO2: Illustrate the methods of curve fitting

CO3: Solve the problems in numerical integration and differentiation

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2

Syllabus Content:

Module I **(20 Hours)**

Solutions of Nonlinear Equations

Bisection Method - Newton Raphson method (two equation solution) – Regula-Falsi Method, Secant method - Fixed point iteration method - Rate of convergence and comparisons of these Methods.

Solution of system of linear algebraic equations

Gauss elimination method with pivoting strategies-Gauss-Jordan method-LU Factorization, Iterative methods (Jacobi method, Gauss-Seidel method)

Module II **(18 Hours)**

Curve fitting: Regression and interpolation

Least squares Regression- fitting a straight line, parabola, polynomial and exponential. Curve Finite difference operators-forward differences, divided difference; shift, average and differential operators- Newton's forward difference interpolation formulae- Lagrange interpolation polynomial- Newton's divided difference interpolation polynomial.

Module III **(18 Hours)**

Numerical Differentiation and Integration

Numerical Differentiation formulae - Maxima and minima of a tabulated function- Newton- Cote general quadrature formula - Trapezoidal, Simpson's 1/3, 3/8 rule –

Solution of ordinary differential equations

Taylor Series Method, Picard's method-Euler's and modified Euler's method –Heun's method-RungeKutta methods for 1st and 2nd order.

SEMESTER VI

CHOICE BASED COURSE

PH6B13DB18 - INSTRUMENTATION

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Explain the different types of measurements and instruments

CO2: Distinguish between different types of transducers

CO3: Discuss about Resistive, Inductive and Capacitive Transducers

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2
CO2	3	2	1	2	2
CO3	3	2	1	2	2

Syllabus Content:

Module I **(18 Hours)**

Measurements and Measurement Systems

Measurements-Method of measurement-Instruments and measurement systems- Mechanical, Electrical and Electronic instruments-Classification of Instruments- Applications of Measurement Systems - Elements of generalized measurement systems.

Module II **(18 Hours)**

Primary Sensing Elements and Transducers

Mechanical Devices as Primary Detectors – Mechanical Spring Devices – Pressure Sensitive

Primary Devices – Flow Rate Sensing Elements - Transducers-Classification–Characteristics (Static and Dynamic) and Choice of Transducers – Characterization

Module III **(18 Hours)**

Resistive, Inductive and Capacitive Transducers

Potentiometers –Strain gauges (Theory, types) - Rosettes – Resistance thermometer – Thermistors (materials, Constructions, Characteristics) – Thermocouples-Self inductive transducer – Mutual inductive transducers – Linear Variable Differential Transformer –LVDT Accelerometer – RVDT – Synchros – Capacitive transducer – Variable Area Type– Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

Miscellaneous Transducers **(8 hours)**

Light transducers (photo-conductive, photo emissive, photo-voltaic, semiconductor, LDR)– Piezoelectric transducer – Hall Effect transducers – Digital Encoding transducers

SEMESTER VI

CHOICE BASED COURSE

PH6B13EB18 - ASTRONOMY AND ASTROPHYSICS

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Discuss the elements and tools of observational astronomy.

CO2: Illustrate the concepts of celestial coordinate system and time

CO3: Explain the structure of Sun, different types of galaxies and concepts of Astrophysics and cosmology

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	1	1	2	2
CO2	3	3	1	2	2
CO3	3	2	1	2	2

Syllabus Content:

Module I **(12 Hours)**

Observational Astronomy

Astronomical distance scales – AU, Parsec and light year. Stellar Parallax and distance to stars from parallax. Magnitude scale - Apparent and absolute magnitudes. Variable stars as distance indicators. Cepheid variables. Astronomy in different bands of electromagnetic radiation- Optical, radio and X-ray astronomies, Radiation Laws.

Optical Telescopes. Types of telescopes-refracting and reflecting – Newtonian and Cassegrain telescopes. Magnification and f number. Resolving Power, Telescope mounts – alt-azimuth and equatorial mounts.

Module II

Celestial sphere **(8 Hours)**

Concept of celestial sphere - cardinal points, celestial equator, ecliptic, equinoxes. Diurnal motion of sun - summer solstice and winter solstice. Celestial co-ordinate systems: – Horizon system – Azimuth & Altitude, Equatorial system-Right ascension &declination, Ecliptic coordinate system.

Time - apparent and mean solar time, sidereal time. Twilight, Seasons- causes of seasons (qualitative ideas). International Date Line.

Sun **(5 Hours)**

Sun - solar atmosphere and internal structure – Photosphere, chromosphere and corona. Radiation zone & Convection Zone. Sun spots, Activity Cycles, flares, prominences, coronal holes, Solar wind.

Galaxies **(3 hours)**

Galaxies - our galaxy, galaxy types & turning fork diagram. Structure on the largest scale clusters, super clusters and voids.

Module III

Astrophysics **(14 hours)**

Gravitational contraction - Virial theorem, Jeans mass. Energy production inside stars. Thermonuclear fusion. Hydrogen burning. p-p chain. CNO cycle. Evolution of stars – birth– protostar, hydrostatic equilibrium, red giant, late stages of evolution - white dwarfs &Chandrasekhar limit, Neutron stars, Supernovae, Pulsars, Black holes. Stellar Classification, H-R diagram - Main sequence stars

Cosmology **(12 hours)**

Large scale structure of the universe – isotropy and homogeneity. Cosmological principle.

Standard big bang model - GUT, Planck Epoch, Inflation, Nucleosynthesis, Recombination & CMBR. Expanding universe - red shift. Hubble's law and Hubble parameter. Age of universe and its determination. Dark energy and Dark Matter (qualitative idea).

SEMESTER VI

CHOICE BASED COURSE

PH6B13FB18 - INFORMATION TECHNOLOGY

Credits: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Explain the basics of Information technology, computer networks and internet.

CO2: Design HTML webpage

CO3: Discuss the basic ideas of DBMS and MS/OPEN Office

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	2	2
CO2	3	2	2	3	2
CO3	3	1	1	2	2

Syllabus Content:

Module I **(20 Hours)**

Information and its Use : Information Technology – Quality of information – Message transmission – Electronic Office – E mail – Document storage – Computers in Industry –Different types – Graphical user interface.

Computer Networks:

Importance of Networks. Components of Networks. Classification of Networks: Broad cast networks-Switched networks. Switching Techniques. Types of Networks – LAN – MAN – WAN. Networking Models – OSI reference model – TCP/IP reference model-Comparison between the OSI and TCP/IP models. Network Topology –Bus- Star-Ring-Tree-Mesh- Cellular.

The Internet:

Internet Protocols – Internet Protocol (IP)-Transmission Control Protocol (TCP) -Internet Address – Structure of Internet Servers Address-Address Space- Services on Internet – Domain Name System-SMTP and Electronic mail – Http and World Wide Web-Usenet and News groups-FTP-Telnet-Network Security-Digital Signature-E-mail Privacy-Internet Tools– Search Engines-Web browsers-Internet explorer, Netscape Navigator, Mozilla Firefox (Working Knowledge)

Module II **(20 Hours)**

THE HTML:

What is HTML? Basic Tags of HTML – HTML-TITLE-BODY - Starting an HTML document – The <!DOCTYPE>declaration-setting boundaries with <HTML>-the HEAD element-the BODY element-the STYLE element and the SCRIPT element. -Formatting of text– Headers- Formatting Tags-PRE tag-FONT tag-Special Characters. Working with Images- META tag - Links – Anchor Tag -Lists – Unordered Lists-Ordered Lists-Definition Lists -Tables –TABLE, TR and TD Tags-Cell Spacing and Cell Padding-Colspan and Rowspan -Frames –Frameset- FRAME Tag-NOFRAMES Tag - Forms –FORM and INPUT Tag-Text Box-Radio Button- Checkbox-SELECT Tag and Pull Down Lists-Hidden-Submit and Reset

Module III **(14 Hours)**

Basic Idea of DBMS:

Need for Data Base – Database Systems versus File systems -View of Data – Data Abstraction-Instances and Schemas - Data Models – ER Model-Relational Model- Network Model-Hierarchical Model (general ideas) -Basic ideas aboutStructured Query Language.

MS – OFFICE/OPEN OFFICE (Working Knowledge):

Word processors – PowerPoint -Spreadsheets – Databases(No specific text book is preferred. MS office (97, 98, 2000, /Open Office which isinstalled in the lab can be used. Working practice must be given)

SEMESTER VI

CORE PRACTICAL

PH6BP03B18 - ELECTRICITY & MAGNETISM

Credits: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Apply the concepts of electricity and magnetism to construct circuits and perform basic experiments in the topic

CO2: Analyse the experimental results through mathematical calculations and arrive at a conclusion.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	1	2
CO2	3	3	3	2	3

Syllabus Content:

1. Melde's String – Measurement frequency
2. A.C Sonometer- Frequency of a.c.
3. Field along the axis of circular coil-Moment of magnet (null method)
4. Field along the axis of a coil-Variation of magnetic field along the axis of a circular coil
5. Searle's Vibration Magnetometer – Moment of magnet.
6. Electro chemical equivalent of copper.
7. Potentiometer – Resistivity of the given wire.
8. Potentiometer – Calibration of low range voltmeter.

9. Potentiometer-Calibration of low range ammeter
10. Potentiometer-Calibration of high range voltmeter.
11. Carey Foster's Bridge-Measurement of resistivity
12. Carey Foster's Bridge – Temperature coefficient of Resistance.
13. Conversion of Galvanometer in to ammeter
14. Conversion of Galvanometer into voltmeter
15. LCR circuit analysis-Series, parallel and Q-factor
16. Mirror Galvanometer-Figure of merit
17. B.G-charge sensitivity–Standard capacitor method
18. B.G.–Measurement of high resistance by leakage method
19. Verification of Thevenin's and Norton's theorem
20. Deflection and Vibration Magnetometer-m &Bh
21. e/m–Thomson's apparatus-Bar magnet/magnetic focusing
22. B.G-Measurement of capacitance

SEMESTER VI

CORE PRACTICAL

PH6BP04B18 - ELECTRONICS AND MICROPROCESSORS

Credits: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: **A**nalyse the basic experiments in electronics.

CO2: Employ programming of 8085 microprocessors to perform binary arithmetics and logical operations

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	1	2
CO2	3	3	2	1	2

Syllabus Content:

1. Diode Characteristics – Knee voltage, dynamic & static resistances.
2. Zener characteristics – forward and reverse – Study of dynamic and static properties
3. Transistor characteristics – Common Emitter Configuration
4. Half wave rectifier – Study of ripple factor and load regulation with and without filter circuit
5. Full wave rectifier – (center tap) – Study of ripple factor and load regulation with and without filter circuit
6. Full wave rectifier – (bridge) – Study of ripple factor and load regulation with and without filter circuit
7. FET – characteristics – Determination of parameters

8. Voltage regulator using zener diode – Study of line and load regulations
9. Regulated power supply–Transistor and Zener diode
10. Clippers – positive, negative and biased – Study of output waveforms
11. Clampers – positive, negative and biased – Study of output waveforms
12. Voltage multiplier-Doubler and Tripler.
13. OPAMP characteristics – Study of CMRR and open loop gain
14. OPAMP – inverter, non-inverter and buffer – Study of gain
15. Op-Amp-Adder and Subtractor
16. LC Oscillator – Colpit's /Hartley – using transistor
17. Phase shift oscillator – using transistor
18. 8085 Microprocessor-BCD addition and subtraction
19. 8085 Microprocessor–multiplication of two eight bit numbers with result 16 bit.
20. 8085 Microprocessor–sorting in ascending and descending order.

SEMESTER VI

CORE PRACTICAL

PH6BP05B18 - SPECTROSCOPY, LASER AND COMPUTER PROGRAMMING

Credits: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Illustrate the experiments in Laser and spectroscopy

CO2: Employ programming in CPP to solve numerical problems in Physics

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	1	2
CO2	3	3	3	1	2

Syllabus Content:

1. Spectrometer–Grating-wavelength
2. Spectrometer-prism-Dispersive power
3. Spectrometer-prism-Resolving Power
4. Spectrometer-Grating Resolving Power
5. Spectrometer- Grating – Dispersive power
6. Spectrometer–Cauchy'sconstants
7. Laser-Determinationofwavelength
8. Ultrasonic-Determination of velocity of ultrasonic waves
9. Single slit– Diffraction using Laser

10. Optical fiber – Determination of numerical aperture

11. Laser – Determination of spot size and divergence

12. Computer programming – Simple Pendulum –Calculation of 'g' from experimental data.

13. Computer programming – Solving differential equation – Runge kutta method – II order.

14. Computer programming – Multiplication of any two matrices- (m x n) and (n x q)

15. Computer programming–Conversion of temperature scale

16. Computer programming–sorting the numbers in ascending and Descending order C++

17. Computer programming–Solving a quadratic equation

18. Computer programming–Solving a linear equation-Bisection method.

19. Computer programming–Solving an equation by Newton–Raphson method

20. Computer programming-Generation of Fibonacci series

SEMESTER VI

CORE PRACTICAL

PH6BP06B18 - DIGITAL AND ADVANCED ELECTRONICS

Credits: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Illustrate the experiments in digital electronics

CO2: Design logic circuits based on registers

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	1	2
CO2	3	3	3	1	2

Syllabus Content:

1. Gates – AND, OR & NOT – Truth table verification.
2. Sweep Generators – ON & OFF state.
3. Universal gates IC–NAND, NOR-Realize basic gates from universal gates.
4. BCDto7segmentdecoder(IC)
5. Astable multivibrator –using transistor
6. Monostable multivibrator- using transistor
7. Monostable multivibrator–IC555
8. RegulatedpowersupplyusingIC741
9. Wave shaping RC circuits-Integrator and differentiator

10. Regulatedpowersupply-UsingIC's-LM7805, 7905, 7809, 7909, 7812, 7912

11. Construction and measurement of a dual Regulated power supply with filter.

12. R.C. Coupled amplifier-Gain

13. Amplitude modulation

14. Pulse width modulation

15. Ring counter using 74194 and 74151

16. Astable multivibrator –IC555

17. D/A Converter using IC

18. 4bitShiftregister

19. Flip-Flop–R.S

20. J.K Flip-Flop

21. Schmitt trigger using 7414

SEMESTER VI

CORE COURSE

PH6BPRB18 - PROJECT

Credits: 1

Total Lecture Hours: 0

Course Outcomes:

CO1: Validate the principles of Physics in a research based / industry oriented/ skill based problems.

Mapping of Course Outcomes with Program Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3

Syllabus Content:

All students have to begin working on the project in the area of core course in the FIFTH semester and must submit it in the SIXTH semester. The project can be done in individually or in groups (not more than three students). The report of the project in duplicate is to be submitted to the department at the sixth semester and are to be produced before the examiners.

An industrial visit is also included in the programme. The entire student must visit an industry during V or VI semester and submit a report in duplicate along with the project report. This industrial visit and the report will be evaluated internally and externally along with the project evaluation.