



Unit V

Number Theory and Differential Equations

Module 1. Number theory

- Principle of Mathematical Induction. Prime factorization. Properties of divisibility. Coprime numbers. G C D and L C M of numbers. Eulers totient function and its multiplicative property. Congruences. Chinese remainder theorem. Fermats little theorem. Wilsons theorem.

Module 2. Ordinary Differential Equations

- Order and degree of differential equations. Formation of differential equation and different types of differential equations of first order. Representation of family of curves by differential equations. Orthogonal trajectories. Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, Method of variation of parameters, Wronskian. Power series solutions of differential equations. Bessel and Legendre polynomials.

Module 3. Partial Differential Equations

- Solution of the equation of the form $Pdx + Qdy + Rdz = 0$. Charpits and Jacobis method for solving first order PDEs, Classification of higher order PDEs (parabolic, elliptic and hyperbolic types). General solution of higher order PDEs with constant coefficients. Method of separation of variables. Wave equation, Heat equation and Laplace equation.

Unit VI

Topology and Functional Analysis

Module 1. Metric Topology

- Metric spaces. Discrete metric. Euclidean metric on R^n and C^n . Supremum metric on the set of real valued functions and complex valued functions on a closed interval. Limit points and convergence of sequences in a metric space. Cauchy sequences. Complete metric spaces. Completion of a metric space.

Cantors intersection theorem and Baires category theorem. Compact subsets and connected subsets of R and C . Heine-Borel theorem for R^n

Module 2. General Topology

- Topological spaces, open sets and closed sets. Usual topology on R and C . Base and subbase for a topology. Closure, interior and boundary of subsets. Compactness and connectedness. Convergence of sequences in a topological space. Non-uniqueness of limits. Hausdorff Spaces and separation axioms. Continuity of functions between topological spaces. Preservation of compactness and connectedness under continuous functions. Homeomorphisms. Product topology.

Module 3. Normed linear spaces

- Norm on linear spaces. Euclidean norm on R^n and C^n . Finite and infinite dimensional spaces. L_p spaces. Closed and non-closed linear subspaces. Closure and interior of linear subspaces. Continuous linear maps between normed linear spaces. Bounded operators and operator norm. Banach spaces. Open mapping theorem and closed graph theorem.

Module 4. Inner product spaces

- Inner products. Examples of norms arising from inner products and not arising from any inner product. Parallelogram law. Orthogonality in inner product spaces. Orthonormal bases. Fourier Expansion. Bessels inequality. Hilbert spaces. Parsevals identity. Continuous linear maps between Hilbert spaces. Projection map, Riesz representation theorem.

22. Music

Unit I

Module 1. History of music

- Period I – Natya Sastra to Sangita Ratnakara
- Period II – Chaturdandi prakasika onwards



Module 2. Vedic Music

- Sama gana and its characteristics

Module 3. Lakshana grandhas

- Natya Sastra
- Brihaddesi
- Swaramela Kalanidhi
- Chaturdandi Prakasika
- Sangita sampradya pradarsini
- Sangita Chandrika
- Chilappathikaram

Module 4.

- Different mela systems propounded by various Lakshanakaras

Module 5. 72 Sampoorana melakarta scheme

- Asampoorna mela paddathi
- Katapayadi formula
- Bhoota sankhya
- Model shift of tonic
- Vivadi melas

Module 6. Composers and Vaggeyakaras of pre-Tyagaraja period

- Annamacharya
- Bhadrachalam Ramadas
- Purandara dasar
- Narayana thirthar
- Kshetrajna
- Jayadeva
- Arunchala kavi
- Arunagiri nathar
- Sadasiva brahmendra
- Uttukkad Venkatasubhaya

Module 7. Raga lakshanas of the melakartas

- Todi
- Mayamalava gaula
- Chakravakam
- Natabhairavi
- Keeravani
- Kharaharapriya
- Gaurimanohari
- Charukesi
- Harikamboji
- Sankarabharanam
- Subhapantuvarali
- Dhenuka
- Ramapriya

- Pantuvarali
- Shanmughapriya
- Lathangi
- Vachaspathi
- Kalyani
- Dharmavati
- Simhendramadhyamam
- Hemavati

Module 8.

- Detailed knowledge of the classification of the instruments in general.

Unit II

Module 1. Music and Temples

- Role of music in temples
- Ritualistic music
- Musical iconography
- Musical stone pillars

Module 2. Musical inscriptions in Kudumiamalai and thirumayam

Module 3. Talas

- Sapta talas
- Shadanagas
- 35 talas
- Shodasangas
- Scheme of 108 talas
- 175 talas
- Navasandhi talas
- Sarabhanandana tala

Module 4. Origin and evolution of musical forms

- Prabandhas - Geethaprabandhas and Vadyaprabandhas
- Study of the structure of the musical forms Jathisvaram,
- Svarajathi, Varnam, Kriti, Ragamalika, Padam, Javali, Thillana
- Dance musical forms

Module 5. Evolution of musical concerts

Module 6. Composers and Vaggeyakaras of Tyagaraja period

- Tyagaraja
- Dikshitar
- Syama Sastri



- Subharaya Sastri
- Gopala Krishna Bharati
- Swathi Thirunal
- Irayimman Thampi
- Kuttikunji thankachi
- Veena Kuppayyar
- Marga Darsi Sesha iyangar

Module 7. Raga lakshanas

- Mohanam
- Hamsadhvani
- Kambooji
- Bilahari
- Neelambari
- Kedaragaula
- Devagandhari
- Nattakurinji
- Hindolam
- Malayamarutham
- Reetigaula
- Ananda bhairavi

Module 8. Detailed knowledge of the stringed instruments of South and North with playing technique

- Tamburu
- Ektar
- Veena
- Violin
- Gottuvadyam
- Sarangi
- Sitar
- Sarod

Unit – III

Module 1. Manodharma Sangeetha

- Raga Alapana
- Tanam
- Niraval
- Kalpanasvara

Module 2. Exposition of pallavi

Module 3. Advance knowledge of musical prosody

- Padacheda
- Varities of prasa
- Yamaka

- Yati
- Svarakshara

Module 4. Group kritis of Tyagaraja, Dikshitar, Syama Sasthri and Swathithirunal

Module 5. Treatment of music in geyanataka, nrityanataka, bhagavatamelanataka, yakshagana and kathakalakshepam

Module 6. Composers and Vaggeyakaras of post Tyagaraja period

- Pattanam Subrahmanya Iyer
- Ramanad Sriviniasa Iyengar
- Mahavaidyanatha Iyer
- Neelakantha Sivan
- Chengalvaraya Sastri
- Mysore Vasudevacharya
- Periyaranithooran
- Ambujam Krishna
- Muthuthandavar
- Koteesvara Iyer

Module7. Raga lakshana

- Abhogi
- Natta
- Gaula
- Arabhi
- Varali
- Sri
- Poorvikalyani
- Bahudhari
- Sahana
- Saveri
- Bhairavi
- Manirangu
- Valachi
- Kannada
- Saraswathi

Module 8. Detailed knowledge of the wind instruments of North and South with playing technique

- Flute
- Nagaswaram
- Ottu
- Harmonium



- Clarinet
- Shehnai
- Saxophone

Unit – IV

Module 1. Bharata's experiment dhruva veena and chala veena, cycle of 4th and cycle of 5th

Module 2. Music and mathematics

Module 3. Geographical factors and their influence

Module 4. Music and physiology – Larynx and Ear

Module 5. Yazh – its origin evolution and decline

Module 6. Composers and Vaggeyakaras of modern period

- G.N. Balasubrahmaniam
- Muthayya Bhagavata
- Papanasam Sivan
- T. Lakshmana Pillai
- K.C. Kesava Pillai
- Ennapadam Venkitarama Bhagavata
- Mysore Maharaja

Module 7. Ragalakshana

- Saranga
- Chenchurtti
- Lalitha
- Surutti
- Navarasa Kannada
- Bhoopalam
- Sudha Saveri
- Kanada
- Nagasvaravali
- Amrita Varshini
- Bhowli
- Hameerkalyani
- Ranjini
- Athana
- Behag
- Kapi

Module 8. Detailed knowledge of the percussion instruments of South and North

- Mridangam
- Tabala

- Pakhwaj
- Ghatom
- Morsing
- Taval
- Kanchira

Unit – V

Module 1. Raga Classification in ancient Tamil music

Module 2. Musical aspects of tevaram, thiruvachakam, thirupagazh and divyaprabandham

Module 3. Raga classification of Hindustani music –

Raga ragini parivara system

Module 4. Time theory of ragas

Module 5. Raga and rasa Madura bhakti and Navavidha bhakti

Module 6. Varieties of folk concerts – folk games and festival songs

- Kuravanji natakam
- Bommallattam
- Kummi
- Kolattam
- Thiruvathirakkali
- Chinnamelam
- Periyamelam
- Marriage songs

Module 7. Sopana sangeetham and its characteristics, difference between sopana sangeetham and classical music

Module 8. Music in kathakali –

- instruments used in it
- Panchavadya, tayambaka
- Talas used in it

Unit – VI

Module 1. Modern trends in Music

- Style of performing
- Digital recording system
- Modern technologies
- Electronic media
- Modern requirements for an acoustical auditorium

**Module 2. Music and Yoga****Module 3. Research**

- Journals and e-journals
- Books
- Periodicals

Module 4. Value of Music

- spiritual, intellectual, emotional & Cultural

Module 5. Musical honours and titles**Module 6. Music Education**

- Gurukula System
- Curriculum System

Module 7. Music appreciation and criticism**Module 8. Music Therapy**

- Śuddhadvaita of Vallabha and Dvaitadvaita of Nimbarka - textual sources.

Module 4.

- Systems - Lokayata - Materialism, denial of Atman and God, Concept of mind - epiphenomenalism.
- Jainism-Tirthankaras, Anēkāntavāda, Syādvāda.
- Buddhism - Ārya Satyas, Aṣṭāṅgamārga, Pratityasamutpāda, Kṣāṇikavāda, Nairātmyavāda, Nirvāṇa and Mōksa - comparison.

Module 5.

- Nyaya Vaisesika - Primary textual sources, concept of pramāṇas, doctrine of causation, Vaisesika doctrine of padārthas.
- Samkhya Yoga - Nature and scope of dualism, concept of evolution, comparison between prakṛtipariṇāma-vāda and vivartavāda.
- Aṣṭāṅgayoga - Structure of Patanjali's Yogasūtras, Samādhi pāda, Sādhana pāda, Vibhūti pāda, Kaivalya pāda.
- Purva Mimamsa - Textual sources, dharma, epistemological realism, pramāṇas accepted by Prabhakara and Kumarila Bhatta.

Module 6.

- Aesthetics - Two segments of Samaveda Samhita - Adhāra and Gāna. Nāṭyaśāstra - Rasa theory - Navarāsa, Sthāyibhāvas, Vibhāvas, Anubhāvas, Sāncāribhāvas.
- Anandavardhana - Threefold classification of dhvani - vastu, ālamkāra and rasa (definition)

23. Philosophy

Unit I Classical Indian Philosophy

Module 1. The Vedas

- Evolution from polytheism to monism, Vedic deities- concepts and names, journey to monism-intermediary concepts like Rta and Tad Ēkam.

Module 2. Prasthāna traya

- The Upanishads- Ekātma vāda, Brahman-Atman identity, The four Mahāvākyas and their sources - Aham Brahmasmi, Tattvamasi, Prajñānam Brahma, Ayamātma Brahma.
- Brahmasūtras - Structure of the text - pāda, adhyāya, adhikāraṇa.
- Bhagavad Gita - Karma Yoga, Sthitaprajña as the concept of self-management, Lōkasamgraha as an ethical concept.

Module 3.

- Vedānta darśana - Advaita - Recognition of Śabda Pramāṇa, Satta traya (only definition), Sāprapañcavāda, Nisprapañcavāda, Māya, Adhyāsa, Jīvanmukti.
- Viśiṣṭadvaita - Cit and Acit - relationship and distinction, Apratiksiddhi (definition).
- Dvaita - Nature and scope of dualism, Concept of Pañcabhēdas, Vidēhamukti.

Unit II Contemporary Indian Philosophy

Module 1.

- Indian Renaissance Movement - background, concerns and goals, prominent leaders and organizations.

Module 2.

- Swami Vivekananda -Neo-Vedānta, Four Yogas, The ideal of universal religion. Sri Aurobindo- Evolution and involution, Gnostic being, Integral Yoga.
- Rāmāṇa Maharshi - Concept of Jñānavichara.