Model Curriculum for Three/Four Year Degree Course

(With Multiple Entry /Exit Option)

Based on NEP-2020

Sanskrit

Odisha State Higher Education Council, Bhubaneswar

Government of Odisha

Contents

Programme Outcome

- To prepare the students for a career in
- To prepare the students for Higher Education and Research in
- To develop a conceptual understanding of the subject and to develop an inquisitiveness in the subject.
- To enable the student to acquire basic skills necessary to understand the subject and to master the skills to handle equipment’s utilized to learn the subject.
- To generally promote wider reading on the subject and allied inter disciplinary subject.

Core I **Semester - I**

Moral Teachings

Unit I&II

- **Hitopodesa Mitralabha** *(Prastavana, Kathamukha, Kapotalubdhakakatha, Brddhavyaghrapathiakakatha, Mrgajambukakatha & Grdhravidalakatha)*

Unit III & IV

- **Yaksaprasna of Mahabharata**
  (Aranyakaparva, Ch.313 from Verse no.41 to 133)

Core Reading:

- ✓ *Hitopadesh (Mitralabhah) (Ed.) Dr. Braja Sundar Mishra, Vidyapuri, Cuttack, 2009.*
- ✓ *Mahabharata, Gita Press, Gorakhpur (Prescribed Text).*
- ✓ *Yaksaprasna, Ed. Dr. Nirmal Sundar Mishra, Kalyani Publishers, Cuttack, 2024.*

Suggested Readings:

- ✓ *Hitopadesh (Mitralabhah) (Ed.) Kapildev Giri, Chaukhamba Publications, Varanasi.*
- ✓ *Yaksaprasna of Mahabharata and Basics of Sanskrit, Ed. Dr. Niranjan Pati and Sushree Sasmita Pati, Kalyani Publishers, 2020.*
- ✓ *Yaksaprasna, T. K. Ramaayiyar, R.S. Vadhyar & Sons, Palkad, Kerala.*

Core II

Epics, Philosophy and History of Sanskrit Literature 1

Unit I:

- Valmiki Ramayana *(Ch. IX of Aranyakanda on Ahimsa prasamsa)*

Unit II:

- Srimad Bhagavad Gita Ch. XV *(Purusottama Yoga)*

Unit III and IV:

- History of Sanskrit Literature *(Ramayana, Mahabharata, General outlines of Purana (Definition and Number), Mahakavya with special reference to Asvaghosa, Kalidasa,*
- *Bharavi, Magha and Sriharsa. Sanskrit Drama with special reference to Bhasa, Kalidasa, Sudraka, Visakhadatta, Asvaghosa and Bhattanarayana)*

Core Readings:

- ✓ *Kathopanisad, Ramayana & Srimad Bhagavad Gita, , Ed. Dr. Niranjan Pati and Sujata Dash , Kalyani Publishers, 2020.*
- ✓ *Srimad Valimkiya Ramayanam,Gita Press, Gorakhpur (Prescribed Text)*
- ✓ *Shrimad Bhagavad Gita with Sankarabhasya, Gita Press, Gorakhpur (Prescribed Text).*
- ✓ *Samskrta Sahitya ka Itihasa, Baladeva Upadhyaya, Sarada Niketan, Varanasi, Reprint,1992.*
- ✓ *Samskrta Sahityara Itihasa, H.K. Satapathy, Kitab Mahal, Cuttack.*

Suggested Readings:

- ✓ *Valmiki Ramayana, (Critical Edition), Oriental Institute, Baroda.*
- ✓ *Srimad Bhagavad Gita (Ed.) S. Radhakrishnan, Bharatiya Vidya Bhavan*
- ✓ *Srimad Bhagavad Gita ,(Ed.) Gambhirananda, Ramakrishna Mission.*
- ✓ *Srimad Bhagavad Gita ,(Ed.) Swami Ranganathananda, Advaita Ashrama, Kolkata-(8th reprint), 2014.*
- ✓ *Samskrta Sahitya Itihasa, Text Book Bureau, Govt. of Odisha, Bhubaneswar.*

Core III **Semester II**

Gadyakavyam Padyakavyam ca (Prose and Poetry) - 1

Unit I and II

- Sukanasopadesah from Kadambari.

Unit III and IV

- Meghadutam (*Purvamegha*).

Core Readings:

- ✓ *Sukanasopadesa (Ed.) Nirmal Sundar Mishra, Kalyani Publishers, New Delhi.*
- ✓ *Meghaduta, Ed. Dr. BrajaSundar Mishra, Vidyapuri, Cuttack, 1999.*
- ✓ *Meghadutam ,(Ed.) M.R. Kale, Motilal Banarsidass, Delhi*.

Suggested Readings:

- ✓ *Meghadutam (Ed.) Radhamohan Mahapatra, Books and Books, Vinodvihari, Cuttack,1984.*
- ✓ *Sukanasopadesa (Ed.) Ramakanta Jha, Choukhamba Vidyabhavan, Varanasi*.

Core IV

Drama and History of Sanskrit Literature 2

Unit I and II

- Abhijnanasakuntalam (Act 1-4)

Unit III and IV

- History of Sanskrit Literature *(Khandakavya / Gitikavya with special reference to Kalidasa, Bharttrhari , Banabhatta, Mayurakavi and Jayadeva.Campu kavya with special reference to Ramayanacampu, Bharatacampu, Nalacampu and*
- *Nilakanthacampu.. Gadyakavya with special reference to Subandhu, Banabhatta and Dandi .Kathasahitya with special reference to Gunadhya ,Somadeva, Visnusarma and Pandita Narayana).*

Core Readings:

- ✓ *Abhijnanasakuntalam,(Ed.) Prof. H.K. Satapathy, Kitab Mahal,Cuttack.*
- ✓ *Samskrta Sahityara Itihasa, Prof. H.K. Satapathy, Kitab Mahal,Cuttack.*

Suggested Readings:

- ✓ *Abhijnanasakuntalam (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd., NewDelhi-11007, 8thReprint-2010.*
- ✓ *Abhijnanasakuntalam (Ed.) R.M.Mohapatra, Books & Books , Cuttack.*
- ✓ *Samskrta Sahitya ka Itihasa, Baladev Upadhyaya, Sarada Niketan,Varanasi, Reprint, 1992.*

Core V **Semester-III**

Introduction to the Techniques of Paninian Grammar and Prosody

Unit I:

- Technical Terms : *Astadhyayi, Siddhantakaumudi, Sutra, Varttika, Bhasya, Dhatupatha, Agama, Adesa, Nistha, Krdanta, Taddhita, Tinanta, Nijanta, Namadhatu, Vikarana, Luk, Lopa, Ti, Upadha and PancangaVyakarana.*

Unit II:

- Samjna Prakarana of Vaiyakarana-siddhantakaumudi.

Unit III:

- Chandas with special reference to *Arya, Sloka, Indravajra, Upendravajra, Upajati, Bhujangaprayatam,Vamsastham, Drutavilambitam, Vasantatilaka, Mandakranta, Malini, Sikharini, Harini, Sardulavikridita and Sragdhara from Srutabodha or Chandomanjari.*

Unit IV:

- Sloka writing and recitation basing on the above chandas (Practical)

Core Readings:

- ✓ *Paribhasika Sabdavali Siddhanta-kaumudi evam Amarakosa, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2023.*
- ✓ *Sahityadarpana evam Chanda, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2014.*

Suggested Readings:

- ✓ *Siddhantakaumudi Srutabodha and Amarakosa, Ed. Dr. NiranjanPati and Minatirani Pati, Kalyani Publishers, Reprint, 2024.*
- ✓ *Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack, 2024*
- ✓ *Siddhanta-kaumudi (Ed.) P.R.Ray, Sailabala Womens College,(Skt.Deptt.) ,Cuttack.*
- ✓ *Sahitya Darpana (Ed.) P.V.Kane, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi.*

Core VI

Drama and Dramaturgy

Unit I , II & III :

Abhijnanasakuntalam (Act 5-7)

Unit IV :

Dramaturgy : *Nandi, Prastavana, Purvaranga, Nataka, Prakarana, Panca Sandhi, Panca Arthaprakrti and Panca Arthopaksepaka from Sahityadarpana.*

Core Readings:

- ✓ *Abhijnanasakuntalam (Ed.) Prof. H.K. Satapathy, Kitab Mahal,Cuttack.*
- ✓ *Sahityadarpana evam Chanda, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2014.*

Suggested Readings:

- ✓ *Abhijnanasakuntalam (Ed.) M.R. Kale,Motilal Banarsidass Publishers Pvt. Ltd., NewDelhi-11007, 8th Reprint-2010.*
- ✓ *Abhijnanasakuntalam ,(Ed.) R.M.Mohapatra, Books & Books ,Cuttack.*
- ✓ *Sahityadarpana, Niranjan Pati & Minati Rani Pati, Kalyani Publishers, New Delhi, 2020.*

Core VII

Rules of Paninian Grammar, Poetics and Figures of Speech

Unit I :

Paribhasa Prakarana of Vaiyakaranasiddhantakaumudi .

Unit II:

Sahityadarpana Ch. 1 *(Kavyalaksana, Kavyaprayojana, Kavyahetu)*

Unit III

Sahityadarpana *Ch. 2 (Vakya, Pada, Abhidha, Laksana and Vyanjana).*

Unit IV:

Alamkaras : *Anuprasa, Yamaka, Slesa, Upama, Rupaka, Utpreksa, Bhrantiman, Nidarsana, Arthantaranyasa, Aprastutaprasamsa, Apahnuti, Vyatireka, Vibhavana, Visesokti, Samasokti and Svabhavokti from Sahityadarpana.*

Core Readings:

- ✓ *Paribhasika Sabdavali Siddhanta-kaumudi evam Amarakosa, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2023.*
- ✓ *Sahityadarpana evam Chanda, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2014.*

Suggested Readings:

- ✓ *Siddhanta-kaumudi (Ed.) Prof. G.K. Dash & Dr(Mrs) K.Dash with Navanita tika, A.K.Mishra Publishers Pvt. Ltd, Cuttack.*
- ✓ *Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack.*
- ✓ *Siddhantakaumudi Srutabodha and Amarakosa, Ed. Dr. NiranjanPati and Minatirani Pati, Kalyani Publishers, Reprint, 2024.*
- ✓ *Siddhanta-kaumudi (Ed.) P.R.Ray, Sailabala Womens College, (Skt.Deptt.) ,Cuttack.*
- ✓ *Sahitya Darpana (Ed.) P.V.Kane, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi.*
- ✓ *Sahityadarpana, Niranjan Pati & Minati Rani Pati, Kalyani Publishers, New Delhi, 2020.*

Core VIII **Semester IV**

Grammar and Philosophy

Unit I and II :

Karaka Prakarana of Vaiyakaranasiddhantakaumudi (1-4) .

Unit III and IV :

Kathopanisad

Core Readings:

- ✓ *Paribhasika Sabdavali Siddhanta-kaumudi evam Amarakosa, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2023.*
- ✓ *Kathopanisad with Sankarabhasya, Gita Press, Gorakh Pur.*
- ✓ *Kathopanisad, Ramayana & Srimad Bhagavad Gita, , Ed. Dr. Niranjan Pati and Sujata Dash , Kalyani Publishers, 2020.*

Suggested Readings:

- ✓ *Siddhanta-kaumudi (Ed.) Prof. G.K. Dash & Dr (Mrs) K.Dash with Navanita tika, A.K.Mishra Publishers Pvt. Ltd, Cuttack.*
- ✓ *Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack.*
- ✓ *Siddhantakaumudi Srutabodha and Amarakosa, Ed. Dr. NiranjanPati and Minatirani Pati, Kalyani Publishers, Reprint, 2024.*
- ✓ *Kathopanisad with Sankarabhasya, Ed. Dr. Haramohan Mishra, Vidyapuri, Cuttack.*

Core IX **Grammar and Lexicon**

Unit I and II :

Karaka Prakarana of Vaiyakaranasiddhantakaumudi (5-7) .

Unit III :

Vedic Grammar: *Chandasi Pare'pi, Vyavahitasca, Caturthyarthe bahulam Chandasi, chandasi lun-lan-litah, Linarthe let, Leto'datau, Sibbahulam leti, Itasca lopah parasmaipadesu, Ata ai, Vaito'nyatra, Chandasyubhayatha, Tumarthe se-senase-asen-kse-kasenadhyai-adhyain-kadhyai-kadhyain-sadhyai-sadhyain-tavai-taven-tavenah, supan suluk-purvasavarnacheyadadyayajalah, Idantomasi, Ajjaserasuk and Dirghadati samanapade from Vaiyakaranasiddhantakaumudi.*

Unit IV :

Amarakosa : *Devata, Svarga, Visnu, Laksmi, Durga, Surya, Brahma, Siva, Karttikeya, Ganesa and Sarasvati.*

Core Readings:

- ✓ *Paribhasika Sabdavali Siddhanta-kaumudi evam Amarakosa, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2023.*
- ✓ *Amarakosa with Ramasrami tika, Choukhamba Sanskrit Series office, Varanasi*

Suggested Readings:

- ✓ *Siddhanta-kaumudi (Ed.) Prof. G.K. Dash & Dr(Mrs) K.Dash with Navanita tika, A.K.Mishra Publishers Pvt. Ltd, Cuttack.*
- ✓ *Siddhanta-kaumudi (Ed.) Minati Mishra, Vidyapuri, Cuttack.*
- ✓ *Veda O Vaidika Prakarana,(Ed) Niranjan Pati, Vidyapuri, Cuttack.*
- ✓ *Namalinganuasanam (Amarakosa), D.G.Pandye,Choukhamba Sanskrit Series Office, Varanasi.*

Core X

Sri Jagannatha in Skandamahapurana (*Utkala Khanda*)

Unit I :

Vaisnavakhanda – Utkalakhanda – Adyaya 1(Sri Purusottama Ksetra Mahatmyam)

(From the verse narayanam namaskrtya --- till the verse prabhurantaradhiyata).

Unit II :

Vaisnavakhanda – Utkalakhanda – Adyaya 2 (Sri Nilamadhava Darsanam)

(*From the verse tato brahma'gamatturnam --- till the verse nirbhayah sancare yatha).*

Unit III :

Vaisnavakhanda – Utkalakhanda – Adyaya 19 (Caturddhamurti Darsanam)

(From the verse tatah sa prthivipala --- till the verse sarvan nrpa manogatan).

Unit IV :

Vaisnavakhanda – Utkalakhanda – Adyaya 20 (Naradakrta Jagannath Stutih)

(From the verse Ittham prabodhitastena --- till the verse yena na sadhito me).

Core Reading:

- ✓ *Sri Purusottamaksetramahatmyam (Part 1), Odia Translation – Baba Chaitanya Charan Das, Ed. Prof. Pyarimohan Pattanaik and others, Sri Jagannath Temple Administration, Puri, 2nd edition, 2016.*

Suggested Readings:

- ✓ *Skandamahapurana (Vaisnavakhanda), Vol.II, Ed. S.N. Khandelwal, Chowkhamba Sanskrit Series Office, Varanasi, 2020.*
- ✓ *Sri Mahapurusavidya, Ed. Prof. Gopal Krishna Dash, Sri Jagannatha Chetana Gavesana Pratisthan, Saradhavali, Puri-752001, 2021.*

Core XI **Semester V**

Gadyakavyam Padyakavyam Abhilekhasca (Prose, Poetry & Inscription)

Unit I:

Dasakumaracaritam (*Dvitiya Ucchvasa*)

Unit II:

Sisupalavadham of Magha (canto 1, verses 1- 48)

Unit III:

Kiratarjuniyam of Bharavi (canto 1)

Unit IV:

Inscriptions: *Girnar Inscription of Rudradaman , Prayaga (Allahabad) Inscription of Samudragupta ,Mandasore Inscription of Yasovarman*

Core Readings:

- ✓ *Dasakumaracarita (Ed.) M.R. Kale, Motilal Banarsidass,Delhi.*
- ✓ *Kiratarjuniyam & Sisupalabadham, Sushree Sasmita Pati, Kalyani Publishers, New Delhi, 2020*
- ✓ *Kiratarjuniyam (Cantos I-III) (Ed.) M.R. Kale, Motilal Banarsidass Publishers Pvt. Ltd.,Delhi,4th Edn-1966,Rpt-1993*
- ✓ *Abhilekhacayana (Ed.) Jayanta Tripathy, Vidyapuri, Cuttack*

Suggested Readings:

- ✓ *Dasakumarcarita, Chaukhamba Publications, Varanasi.*
- ✓ *Sisupalabadham - Canto-I (Ed.), Devanarayan Mishra,(With Sarvankasa-tika*
- ✓ *of Mallinatha) Sahitya Bhandar, Meerut*
- ✓ *Kiratarjuniyam (Canto- I) (Ed.) Niranjan Pati,Vidyapuri, Cuttack.*
- ✓ *Sisupalabadham – H.K. Satpathy, Kitab Mahal, Cuttack*
- ✓ *Selected Sanskrit inscriptions (Ed.) by D.B. Pusalkar, Classical Publisher, New Delhi.*
- ✓ *Abhilekhamala (Ed.) Sujata Dash, Kalyani Publisher, New Delhi.*
- ✓ *Sisupalabadham (Ed.) S.R. Ray, Vallabhatika, Bharatiya Vidya Prakashan, New Delhi.*

Core XII **Vaidika Sukta and Vaidika Sahitya**

Unit I and II:

Vedic Suktas from different Samhitas: *Agni (RV I.1), Indra (RV II.12), Savita (RV I.35), Usa (RV I.48), Purusasukta (YV XXXI. 1.16), Sivasamkalpa (YV XXX.1.6), Samjnana (RV X.191), Vak (RV X.125).*

Unit III and I:

History of Vedic Literature: *Samhita, Brahmana, Aranyakaand Upanisad.*

Core Readings :

- ✓ *Veda O Vaidika Prakarana*,(Ed) Niranjan Pati, Vidyapuri, Cuttack.
- ✓ *New Vedic Selection* (Part-I) (Ed.) Telang and Chaubey, Bharatiya Vidya Prakashan, NewDelhi
- ✓ *Vaidika sahitya o Samskrti* , A.C. Das, Grantha Mandira, Cuttack.

Suggested Readings :

- ✓*Samskrta Sahiytara Itihasa*, (Odia) H.K. Satapathy, Kitab Mahal, Cuttack-753003.
- ✓*History of Indian Literature* Vol. I, M.Winternitz, MLBD, New Delhi.
- ✓ *Vaidik sahitya ki Ruparekha,*Umashankar Sharma Rsi,Chawkhamba Vidyaprakashan, Varanasi
- ✓ Vaidika Sahitya O Samskrti, Bholanath Rout, Chitrotpala Publication, Salipur
- ✓ Vaidika Sahitya aur Samskrti, Baladeva Upadhyaya, Chaukhamba Publications, Varanasi.
- ✓ Vaidika Sahitya O Samskrti , A.C. Das, Grantha Mandira, Cuttack.
- ✓ History of Indian Literature Vol. I, M.Winternitz, MLBD, New Delhi.

Core XIII

Dharmasastra and Arthasastra

Unit I :

Manusmrti (Ch. 2, verses 1-39)

Unit II and III :

Yajnavalkyasmrti (Ch. 2, verses 1-65)

Unit IV :

Arthasastra *(Prakarana 1, Adhyayas 1 – 7, Vidyasamuddesa, Anviksiki, Trayisthapana, Vartta, Dandanitisthapana, Vrddhasamyoga, Indriyajayah, Arisadvargatyagah, Rajarsivrttam and Amatyaniyuktih).*

Core Readings:

- ✓ Manusmrti, Ed. Dr. Braja Sundar Mishra, Vidyapuri, Cuttack, 1995.
- ✓ *Yājñavalkyasmṛti* (*Vyavahārādhyāya*),(Ed.) Kishore Chandra Mahapatra, Jageswari lane, Balighai, Puri.
- ✓ *Kautilya Arthashastra*, (Ed.) Karunakar Das, Kitab Mahal, Cuttack.

Suggested Readings:

- ✓ The*Arthashastra*. (Ed.& Trans), L.N. Rangarajan, Penguin Classics, India, 1992
- ✓ The*Arthashastra*. (Ed.) N.P. Unni, Bharatiya Vidya Prakashan, New Delhi
- ✓ *Arthashastra* (Odia Trans.) Anantarama Kar, Odisha Sahitya Academy, Bhubaneswar
- ✓ *Yājñavalkyasmṛti*, (Ed.) M.N. Dutta, Parimal Publications, New Delhi
- ✓ *Kautilya Arthashastra*, (Ed. &Trans.) R.P. Kangle, 3 Vols., Motilal Banarsidass, New Delhi.
- ✓ Manusmrti, Jwala Prasad Chaturvedi, Ranadhir Book Sales, Haridwar, 1992

Core XIV **Semester VI**

Likhana-Kala (Writing Skill)

Unit I :

One Essay in Sanskrit (around 300 words) .

Unit II :

Translation from Odia to Sanskrit *(One Odia passage will be given to translate into Sanskrit)*

Unit III:

Transliteration: Two Sanskrit verses are to be written in Roman Script with diacritical marks.

Unit IV:

Communicative Skill : Minimum 5 sentences are to be written in Sanskrit on a specific theme.

Core Reading:

1. Samskrta Vyakaranadarpana, Odisha Text Book Bureau, Bhubaneswar
2. Samskrta Nibandha Satakam, Kapildev Dwivedi, Chawkhamba Publication, Banaras

Suggested Readings:

1. Brht Anuvada Shiksa, Chakradhara Hansa Nautiyal, MLBD, New Delhi
2. Samskrta- nibandhadarsah, Rammurti Sharma, Sahitya Niketan, Kanpur

Core XV **Jyotisa Sastra and Vastu Sastra**

Unit I and II :

JyotisaSastra : Jyotihsararatnavali *(Ch. 1, Grahanaksatraparicaya Prakarana).*

Unit III and IV :

VastuSastra : Vasturatnakara *(Ch. 1, BhuParigrahaPrakarana).*

Core Readings:

- ✓ *Grahanaksatra paricaya prakaranam, Dr. N.S. Mishra, Kalyani Publishers, Ludhiana,2023.*
- ✓ *Bhuparigraha – prakaranam, Dr. N.S. Mishra, Kalyani Publishers, Ludhiana,2022.*

Suggested Readings:

- ✓ *Jyotihsara-ratnavali(Part-I) (Ed.) Pandit Baikoli Mahapatra, Radhakrishna Pustakalaya, Satyanarayan Temple Road, Berhampur,Ganjam,Odisha*
- ✓ *Vasturatnakar (Ed.) Vindhyeshwari Prasad Dwivedi, Chowkhamba Krishnadas Academy, Varanasi*
- ✓ *Jyotisavisvakosa, Haridutta Sharma, Subodh Publication, New Delhi*
- ✓ *Vaidika jyotisa, Dr.G.S.Shastri, Chaukhamba Samskriti bhabana, Varanasi*
- ✓ *Bharatiya jyotisa, Dr.Nemichandra Shastri, Bharatiya Jnanapitha,New Delhi-110003*
- ✓ *Jyotisa- tattvanka, Gitapress, Gorakhpur (2014)*
- ✓ *RajaballavamVastusatram, Ed. Dr Srhrikrishna Jugnu, Parimal Publication, Delhi, 2005.*
- ✓ *Vastu, Astrology & Architecture, (Copmilation of Research Paper of ANational Conference on Vastu & Jyotisa), Ed.by Gayatri Dev Vasudev, MLBD,New Delhi,(4th reprint-2015)*

Core XVI **Semester VII**

Grammar (Laghusiddhantakaumudi) and Linguistics

Unit I :

- **Sandhi** (selected sutras): Ac Sandhi: *Ikoyanaci, eco'yavayavah, Yathasamkhyamanudesahsamanam, vantoyiptatyaye, Ad gunah, Vrddhireci, Eni pararupam, Akah savarne dirghah, Enah padantadati, Sarvatravibhasagoh, Avansphotayanasya, Indreca, Acorahabhyamdve and Rtyakah* .
- Hal Sandhi : *Stohscunascuh, Sat, Jhalamjaso'nte, Yaro'nunasike'nunasikova, Torli, Jhayoho'nyatarasyam, Mo'nusvarah, nascapadantasyajhali, Anusvarasyayayiparasavarnah, Vapadantasya, Kharavasanayorvisarjaniyah and Visarjaniyasyasah.*
- VisargaSandhi : *Va sari , Sasajuso ruh , Ato roraplutadaplute , Hasi ca , Ro'supi, Dhralope purvasya dirgho'nah , vipratisedhe param karyam , So'ci lope cet padapuranam*.

Unit II :

- Samasa (selected sutras) : *Samarthah Padavidhih, Prak Kadarat Samasah, Saha Supa . Avyayibhavasamasah – Avyayibhavah, Avyayam vibhakti-samipaisamrddhi-vryuddhyarthabhavatyayasamprati-sabdapradurbhava-pascadyathanupurvya-yaugapadya-sadrsya-sampatti-sakalyantavacanesu, Prathamanirdistam samasa upasarjanam, Upasarjanam purvam, Avyayibhavasca, Trtiyasaptamyor bahulam, Nadibhisca and Nastaddhite*.
- Tatpurusasamasah : *Tatpurusah, Dvigusca, Dvitiyasritatitapatitagatatyastapraptaparnaih, Karttrkarane krta bahulam, Caturthi tadartharthabalihitasukharaksitaih, Pancami bhayena, Sasthi, Saptami saundaih, Diksamkhye samjnayam, Tatpurusah samanadhikaranah karmadharayah, Samkhyapurvo dviguh, Sa napumsakam, Visesanam visesyena bahulam, Upamanani samanyavacanaih, Nan, Na lopo nanah, Kugatipradayah, Tatropapadam saptamistham and Rajahsakhibhyastac.*
- Bahuvrihisamasah : *Seso bahuvrihih, Anekamanyapadarthe, Saptamivisesane bahuvrihau, Haladantat saptamyah samjnayam and Sesad vibhasa.*
- Dvandvasamasah: *Carthe dvandvah, Rajadantadisu param, Dvandve ghi, Alpactaram, Pita matra and Dvandvasca praniturya*senanganam.

Unit III :

- Bhasa-utpattih (Origin of Language), Bhasa-vargikaranam (Classification of Languages), Bharopiya-bhasa-parivarah (Indo Europian Language Family), Vedah Avesta ca
  (Veda and Avesta).

Unit IV :

- Samskrta-varnah (Sanskrit Alphabets), Vakya-vijnanam (Syntax), Pada-vijnanam (Morphology), Dhvani-vijnanam (Phonology), Dhvani-parivartanam (Phonetic change), Arthaparivartanam (Semantic change).

Core Readings:

- ✓ *Laghusiddhantakaumudi, Ed. Sridharananda Shastri, Motilal Banarsidas, Delhi, 2000.*
- ✓ *Paribhasika Sabdavali Siddhanta-kaumudi evam Amarakosa, Ed. Dr. Braja Sundar Mishra, Satyanarayan Book Store, Cuttack, 2023.*
- ✓ *Bhasavijnana evam Bhasasastra, Kapildev Dwivedi, Visvavidyalaya Prakashan, Varanasi, 13th Edition, 2012*

Suggested Readings:

- ✓ Laghusiddhantakaumudi, P. Iswarachandra, Samskruta Granthagara, Delhi,2007
- ✓ Siddhanta-kaumudi srutabodha and Amarakosa (Ed.) Dr. Niranjan Pati & Minatirani Pati, Kalyani Publishers, New Delhi,2024
- ✓ Elements of the Science of Language-I.J.S. Taraporewala, Calcutta University, 4th Edition, 1978.
- ✓ An Introduction to Comparative Philology (relevant portions), I.II.Ill -P.D. Gune
- ✓ Linguistic Introduction to Sanskrit, I, II, III- B.K. Ghosh
- ✓ Tulanatmaka Bhasa Vijnana (in Hindi)- Mangaldev Shastri

Core XVII **Poetry**

Unit I & II

Uttaramegha

Unit III & IV

Buddhacaritam *(canto 1, verses 1 – 38)*

Core Readings:

- ✓ *Meghadutam (Ed.) M.R. Kale, Motilal Banarsidass, Delhi*
- ✓ *Buddhacaritam (Part-I), Swami dwarikaprasad Shastri, Chaukhamba Sanskrit series Office, Varanasi,2004*

Suggested Readings:

- ✓ Meghadutam, G.R. Nandargikar, New Bharatiya Book Corporation, Delhi, 2001
- ✓ Meghadutam of Kalidasa, Saroj Bharadwaj, Vidyanidhi Prakashan, Delhi, 2003
- ✓ Buddhacaritam, E.H. Johnston, MLBD, Delhi, 2015

Core XVIII **Fundamentals of Research**

Unit - I

Meaning, Importance, Characteristics and Objectives of Research, Types of Research, Qualifications of a Researcher.

Unit - II

Collection of Research Materials, Tools of Research and techniques of data collection

Unit – III

Outlines of Research Design, Formal Constituents of a Dissertation, Documentation - preparation of Bibliography, Foot notes.

Unit - IV

General Idea about Indological Research Centres with Special reference to Oriental Institute of Baroda, Bhandarkar Oriental Research Institute, Pune, Royal Asiatic Society, Kolkata, Oriental Research Institute, Mysore & Oriental Research Institute and Manuscripts Library, Kerala.

Core Readings:

- ✓ *Sodha-pravidhih (in Sanskrit), Acharya, Satya Narayan, Puri, Odisha, 2005*
- ✓ *Elements of Research Methodology in Sanskrit, Dr. Keshab Chandra Dash, Chaukhamba Sanskrit Sansthan, Varanasi, 2009.*
- ✓ *Thesis and Assignment Writing, Anderson & others, 2nd Edition – 1977*

Suggested Readings:

- ✓ *Research Methodology, Ranjit Kumar, Sage publications India Pvt Ltd, Mathura Road, New Delhi, 2015*
- ✓ *How to write Assignments, Research Papers, Dissertations and Theses, Bedekar, V.H., Kanak Publications, New Delhi, India, 1982*
- ✓ *An Introduction to Indian Textual Criticism and Book publishing, Bharati, H.L.N. , CIIL, Mysore, 1988*
- ✓ *Methodology of Social Research in India, Dasgupta, S(Ed.) Implex India, New Delhi, 1967*
- ✓ *Research Methodology, Braja Kishore Swain, Swetapadma Granthalaya, Puri, 2013*

Paper XIX

Project Work (on Any aspect of Indology)

Paper XX **Semester VIII**

Indian Philosophical Thought

Unit I and II :

General Outlines of Astika Darsana

Unit III :

General Outlines of Nastika Darsana

Unit IV :

PatanjalaYogasutra *(Selected sutras: Samadhipada: Atha Yoganusasanam, Yogascittavrttinirodhah, Pramana-Viparyaya- Vikalpa-Nidra-Smrtayah, Pratyaksanumanagamah Pramanani, Viparyayo Mithyajnanamatadrupapratistham.)*

Core Reading:

- ✓ *Bharatiya Darsana (Odia), Gouranga Charana Nayak, The Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.*
- ✓ *Patanjala Yogadarsan, Ramashankar Tripathy, Chaukhamba Krishnadasa Academy, Varanasi, 2013*

Suggested Readings:

- ✓ *History of Indian Philosophy, S.N. Dasgupta, MLBD, New Delhi.*
- ✓ *Indian Philosophy, S. Radhakrishnan, George Allen and Unuin Ltd., New York.*
- ✓ *A Critical Survey of Indian Philosophy, C. D. Sharma, MLBD, New Delhi.*
- ✓ *Outlines of Indian Philosophy, M. Hiriyana, MLBD, New Delhi.*

Paper XXI **Poetics**

Unit I and II

Kavyaprakasa of Mammata(Ch. 1)

Unit III and IV

Dasarupaka of Dhananjaya (Ch. 1)

Core Readings:

- ✓ *Kavyaprakasa, Ed. Pandit Narayana Mahapatra, Odisha Sahitya Akademi, Bhubaneswar, 2004*
- ✓ *Dasarupakam, Lokamani Dahala, Chaukhamba Amarabharati Prakashan, Varanasi, 2008*

Suggested Readings:

- ✓ *Kavyaprakasa, Ed. Revaprasad Dwivedi, Baranas Hindu University, Varanasi,1981*
- ✓ *Kavyaprakasa of Mammata, Ed. Ganganatha Jha , Bharatiya Vidya Prakashan, Varanasi, 1967*
- ✓ *Kavyaprakasa, Ed. Shrinivas Sharma , Bharatiya Vidya Prakashan, Varanasi, 2017*
- ✓ *Dasarupaka, Rajbali Pandey, Urmila Publications,Delhi, 1992*
- ✓ *Dasarupaka, Dr. L.S. Vadirajacharya, Vidyadhesha Post Graduate Sanskrit Research Centre, Bangalore, 2014*

Core XXII Odishan Contribution to Sanskrit Kavyas : Past and Present

Unit I and II : General Idea about the following kavyas

Gitagovinda of Jayadeva, Sahrdayananda-mahakavya of Krsnananda, Bhaktibhagavata-mahakavya of Jivadevacarya, Bharatamrta-mahakavya of Dibakara Mishra,Dasagrivavadha-mahakavya of Markandeya Mishra, Kosalananda-mahakavya of Gangadhara Mishra, Vasantotsava-mahakavya of Haladhara Mishra and Sivalilamrta-mahakavya of kavi Nityananda.

Unit III : General Idea about the following kavyas

Kicakavadham of Baikumtha Bihari Nanda, Sri Sarala Satakam of Gobinda Chandra Mishra, Disa Vidisa of Keshab Chandra Dash, Bharatayanam of Harekrushna Satapathy, Kusabhadra-mahakavyam of Prafulla Kumar Mishra, Sunyemegha-ganam of ArunaRanjan Mishra, Malayadutam of Prabodha Kumar Mishra, Kargil-kavyam of Braja Sundar Mishra, Manasa-sandesa of Digambara Mohapatra and Rathesa-satakam of Krushna Kesaba Sarangi.

Unit IV : General Idea about the following translated kavyas

Vaidehisa-vilasah (Original Odia Author Kavi Samrat UpendraBhanja, Sanskrit translation –Bhagavata Prasada Dash), Vandinah svadesa-cinta (Original Odia Author Utkalamani Pandita Gopabandhu Das, Sanskrit translation –Prabodha Kumara Mishra), Cilika (Original Odia Author Kavivara Radhanatha Ray, Sanskrit translation- Dr. Khiroda Chandra Dash), Candrabhaga(Original Odia Author Kavivara Radhanatha Ray, Sanskrit translation -Dr. Braja Sundar Mishra) ,Tapasvini (Original Odia Author Prakrtikavi Gangadhara Meher, Sanskrit translation- Dr. Harekrushna Meher) , Jajnaseni (Original Odia Author Padmasri Pratibha Ray, Sanskrit translation- Bhagirathi Nanda) , Amrtaphalam (Original Odia Author Padmasri Manoj Das, Sanskrit translation- Gopabandhu Mishra) .

Core Readings:

- ✓ *A Descriptive Catalogue of Sanskrit Manuscripts of Orissa (Vol.II), Ed. Kedarnath Mahapatra, Orissa Sahitya Akademi, Bhubaneswar, 1996.*
- ✓ *Contemporary Sanskrit Writings of Odisha, Prof. Aruna Ranjan Mishra, Pratibha Prakashan, Delhi, 2006*

Suggested Readings:

- ✓ *Contribution of Orissa to Sanskrit Literature, Prof. (Dr.) Raghunath Panda , Dr. G. C. Nanda, Kalpan publication , Dhara Shree Radha Trust; 4th edition 2020*
- ✓ *Odishara Samskruta Lekha O Lekhaka, Odisha Sahitya Academy, Bhubaneswar*

Core XXIII Manuscriptology and Cataloguing

Unit-I : Manuscript

Meaning & Definition, Types of Manuscripts *(Calligraphy, Illuminated & Illustrated)*

Unit-II

Writing Surface & Materials *(Tala-patra (Plamleaf), Bhurja-patra (Brich bark), Paper, Cloth, Parchment, Metals, Stone, Ink, Quill and Stylus)*

Unit-III

Manuscript Cataloguing : Origin and Development, Types Catalogue (Alphabetical & Descriptive)

Unit-IV

Outlines of New Catalogus Catalogorum (NCC), Manuscript Preservation Centers in India (IGNCA, GOML, BORI & Orissa State Museum)

Core Readings:

- ✓ *Introduction to Manuscriptology, R. S. Shivaganesha Murthy, Cambridge University Press (1 January 1996)*
- ✓ *Gabeesana Prabidhi, Dr. Subodh Kumar Chatarjee, Published By Vidyapuri, Cuttack, 1999*

Suggested Readings:

- ✓ *The Fundamentals of Manuscriptology, P. Visalakshy, Dravidian Linguistics Association, 2003*
- ✓ *Manuscriptology, S. Jagannatha, Published by Parimal Publications, 2007*
- ✓ *Catalogue of Books and manuscripts, Harvard College Library, Ruth Mortimer, Lessing J. Rosenwald, Belknap Press of Harvard University Press, Cambridge, 1964*
- ✓ *New Catalogus Catalogorum, University of Madras, Hassell Street Press, Chennai, 2021*
- ✓ *Manuscripts, Catalogues, Editions: Steps Taken for the Collection, Preservation and Utilisation of Manuscripts, V. Raghavan, Bharati Vijayam Press, 1963*

ABILITY ENHANCEMENT COURSE (AEC)

Functional Sanskrit

Unit-I Sanskrit Alphabets, General Idea about Sanskrit Karaka, Vibhakti, Vacana, Purusa, Pada, Linga, Vacya, Lakara, Upasarga.

Unit-II Useful Sanskrit words, Sentence Formation in Sanskrit, Simple Sanskrit Sentences for conversation, Preparation of News in Sanskrit.

Unit-III Letter writing in Sanskrit, Notice Writing in Sanskrit, Invitation writing in Sanskrit, Description of Festivals in Sanskrit.

Unit-IV Sloka Recitations, Numerical Counting in Sanskrit, Sanskrit Story telling, Self introduction in Sanskrit (Practical).

Core Readings:

1. Samskrta Vyakarana Darpana,
2. Samskrta Vyakarana manjusa, Kamalesh Bhatia, Chaukhamba Sanskrit Pratisthan, Delhi,2022

Suggested Readings:

1. Samskrta jnananidhi, Dr.Ram Vilash Choudhuri and Dr. Dhruva Kumari Choudhuri, MLBD, Delhi, Reprint,2016
2. A Higher Sanskrit Grammar, M.R. Kale, MLBD, Delhi,2005

Skill Enhancement Courses

(Credit-3)

List of Subject Based Skill Enhancement Courses under Model Curriculum

Sl No.	Subject	SEC
1.	**Biotechnology**	Plant tissue culture
2.		Marine Biotechnology
3.		Computational Biology
4.	**Geology**	Mapping & Surveying
5.		Digital Cartography
6.	**Economics**	Data Analytics I
7.		Data Analytics II
8.	**Psychology**	Understanding and Managing Self
9.		Psychological First Aid
10.	**Sanskrit**	Computer Application
11.		Ayurveda and Vrksayurveda
12.	**Philosophy**	Philosophical Counselling
13.	**Public Administration**	Personality Development
14.		Secretarial Practices
15.	**Sociology**	Sociology Of Disaster Resilience And Recovery
16.		Doing Ethnography
17.	**Social Work**	Working with Individuals
18.		Working with Groups
19.		Analytical Ability and Logical Reasoning
20.		Quantitative Aptitude and Data Interpretation
21.		Personality Development
22.		Working with Communities
23.	**Law**	Legal in Drafting
24.	**Commerce**	Quantitative & Logical Thinking
25.		Fundamentals of Data Science and Data Management
26.		Introduction to Financial Technology (Fin-Tech)
27.	**Zoology**	Fermentation Technology and Industrial Enzymes
28.		Molecular Diagnostics
29.	**Microbiology**	Food Fermentation Techniques
30.		Microbial Diagnosis in Health Clinics
31.	**History**	Basics of Museum & Archives
32.		Historian's Craft

33.	**Urdu**	Terjuma Nigari
34.		Urdu Sahafat
35.	**Botany**	Bio fertilizers
36.		Nursery & Gardening
37.		Soilless Cultivation
38.		Organic farming
39.		Ethno botany
40.		Mushroom Cultivation
41.		Tissue Culture & plant regeneration
42.		Vermicomposting
43.	**BSc. IST**	Business Intelligence with Power BI
44.		VB.NET
45.	**Education**	Life Skill Education
46.		Peace education
47.		Art and Craft Education
48.		Computer Application in Teaching Learning Process
49.	**Computer Science**	Advanced Python Programming
50.		Principles of Management
51.	**Physics**	Renewable energy and energy harvesting
52.		Applied Optics and Photonics
53.	**Political Science**	Electoral Studies and Public Opinion Poll
54.		Political Journalism
55.		Data Journalism
56.		Podcasting
57.	**IRPM/PMIR**	Project Management
58.		Time Management and Productivity Improvement
59.	**Mathematics**	Introduction to Python
60.		Programing with Mathematics
61.		Type setting in Latex
62.	**Library Science**	Communication Skill for Library Professionals
63.		Online Search Strategies and Techniques
64.	**Chemistry**	Computational chemistry and Molecular Modelling
65.		Cosmetic and pharmacological chemistry
66.		Corrosion and Prevention
67.	**Odia**	ଅନୁବାଦ ସାହିତ୍ୟ-(**Please Refer to Detail Syllabus of Odia)**
68.		ଗଣମାଧ୍ୟମ ଓ ଗଣଲଯାଗାଲଯାଗ-(**Please Refer to Detail Syllabus of**

		Odia)
69.		ଓଡ଼ିଆ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା-(**Please Refer to Detail Syllabus of Odia)**
70.	**Geography**	Open Source GIS
71.		GPS & Drone Technology Applications in Geography
72.		Environmental Impact Assessment
73.		Digital Image Processing
74.		Multivariate Analysis and Modelling
75.		Welfare and Development Programs: Monitoring and Evaluation

Plant Tissue Culture

Course Outcomes

This course aims to understand the basic principles of plant tissue culture and its application biotechnology. Course provides insight knowledge of to enable the students to

- Understand the basic principles of plant tissue culture
- Understand the methods in biotechnology
- Get an insight into Recombinant DNA technology and Methods of gene transfer.
- Appreciate the applications of Biotechnology recombinant DNA technology and methods of gene transfer.

Learning Outcome:

To enable the students to

- Understand the basic principles of plant tissue culture
- Understand the methods in biotechnology
- Get an insight into Recombinant DNA technology and Methods of gene transfer.
- Appreciate the applications of Biotechnology in plant tissue culture

Unit I:

History of plant tissue culture research - basic principles of plant tissue callus culture, meristem culture, organ culture, Totipotency of cells, differentiation and dedifferentiation. Methodology - sterilization (physical and chemical methods), culture media, Murashige and Skoog's (MS medium), phytohormones, medium for micro-propagation/clonal propagation of ornamental and horticulturally important plants. 3. Callus subculture maintenance, growth measurements, morphogenesis in callus culture – organogenesis, somatic embryogenesis.

Unit II:

Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique. Production of secondary metabolites. Cryopreservation; Germ plasm conservation.

Unit III:

Recombinant DNA technology 1. Restriction Endonucleases (history, types I-IV, biological role and application); concepts of restriction mapping. Cloning Vectors: Prokaryotic (pUC 18, pBR322,Ti plasmid and Lambda phage, Eukaryotic Vectors (YAC and briefly PAC). Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning). Construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by complementation technique, colony hybridization.

Unit IV:

Methods of gene transfer: Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

Text Book:

- ✓ *Botany-Plant tissue culture and its Biotechnological applications, by B. R. C. Murthy & V. S.T. Sai, Venkateswara Publications, Guntur, 2017*

Reference Books

- ✓ *Pullaiah. T. and M.V.Subba Rao. 2009. Plant Tissue culture. Scientific Publishers, New Delhi.*
- ✓ *Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands*

Marine Biotechnology

Course Objective:
This course aims to grow competent, innovative and productive marine biologist who can pursue their research in this area. It will also provide information about microbes available in aquatic environment and their role and interaction with marine environment.

Learning Outcome:

- This course explores the marine ecosystems and microbial diversity of ocean. Give detailed knowledge of about the physiological capability and biogeochemical roles of marine microbes. Explains fundamental principles of aquaculture biotechnology.

Unit I

Marine Biotechnology - An Introduction, Marine Ecosystem and its Functions, Chemical Oceanography, Sedimentation, Marine microbiology, Values of Marine Biodiversity, Importance of costal aquaculture, Mariculture, Induced Breeding in Fish, Culture of Shrimps and Marine Macroalgae – Seaweeds, Culture of Live Feed Organisms, Bio-floc technology, aquaponics

Unit II

Classification of marine environment. Diseases of Fish and Shrimp, Diagnosis of Diseases of Fish and Shrimp, Chromosomal Manipulation in Fish, Transgenic Fish, Aquatic Vaccines, Probiotics in Aquaculture, Fish feed technology.

Unit III

Bio-communication in oceans, Microbe-microbe interaction, Quorum sensing, Marine biomass and productivity, Biogeochemical processes- Nutrient Cycling, Carbon , Sulphur, Phosphorus and Iron nitrogen cycle, marine pollution

Unit IV

Cryopreservation in Fishery Sciences, Biofouling, Marine Bioremediation, Marine By-products, Marine Pharmaceuticals, Marine Natural Products and their Applications, Marine Protein, Food preservation and processing, Packing.

Text Book:

- ✓*Aquaculture –Principles and Practices, 1990 – TVR Pillay, Fishing Nets Boooks.*
- ✓*Aquaculture Biotechnology, First edition, 2012, Eds. Garth L. Fletcher and Mathew L Rise, Wiley-Blackwell publication*
- ✓*Aquaculture Biotechnology, V. Ramachandran, 2013, Black Prints 4. Marine Biology – An ecological approach, 1988 – James W. Nybken, Harper Collins publication*

Computational Biology

Course Objective:

This course aims to develop analytical and mathematical modelling of biological systems. This course introduces students to rapidly evolving field of bioinformatics. It also gives idea about different databases available and their advantages over traditional file system.

Learning Outcome:

- To understand the basic Bioinformatics and algorithms used in Computational Biology
- Prediction of secondary and tertiary protein structures
- Evolutionary identification of different species through phylogeny analysis
- Deep knowledge regarding drug designing and its use to address different diseases

Unit I

Primary and secondary data base, Genbank, EMBL, Swissprot, DDBJ, PIR, TIGR, Protein and Nucleic acid sequences. Computational complexities, analysis of merits and demerits, sequence pattern database, PROSITE, BLAST and FASTA algorithm, Needleman-Wusch & Smith-Waterman algorithms.

Unit II

Representation of molecular structures, external and internal co-ordinates, concept of free energy of molecules, Monte Carlo and molecular dynamics simulation, Phylogeny analysis.

Unit III

Molecular structure determination, X-ray crystallography and NMR spectroscopy analysis, 2D protein data bank, Nucleic acid data bank, storage and dissemination of molecular structures, Ligand database. Exploration and analysis of data obtained from above techniques using computational platform.

Unit IV

Homology modelling, threading and structure prediction, structure-structure comparison of macromolecules, Docking, Drug Design

Text Book:

- ✓ *Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.*
- ✓ *Wünschiers, R. (2004). Computational Biology: Unix/Linux, data processing and programming. Springer.*

Reference Books:

- ✓ *Zvelebil, M. J., & Baum, J. O. (2008). Understanding bioinformatics. Garland Science.*
- ✓ *David W Mount (2004). Bioinformatics: Sequence and Genome analysis 2nd edition, CSHL press.*

- ✓ *A. Baxevanis and FBF Ouellette (2001), Bioinformatics: a practical guide to the analysis of genes and proteins, 2nd Edition, John Wiley.*
- ✓ *Jonathan Pevsner (2003), Bioinformatics and functional genomics. 1st Edition, Wiley-Liss.*

Mapping & Surveying

Course Objectives

- Introduce the principles of mapping and Surveying
- Introduce field measurement methods using various instruments
- Explain the concepts of satellite positioning

Learning Outcomes

- Make measurements of the field
- Elaborate the methods of satellite positioning and their accuracy
- Interpret aerial photographs
- Create topographic and thematic maps.

Unit I: Topographical Surveying for Geological work

Topographic maps, Preparation for survey work; chain and compass survey. Plane table survey. Theodolite and miners dial survey. Tacheometry survey. Triangulation survey and bore hole surveymethod.

Unit II: Photogrammetry and air photo interpretation

Types of aerial photographs ; Vertical aerial photographs, Oblique aerial photographs, Taking vertical photographs. Stereo pair photographs. Photographic scale. Relief displacement and image parallax. Airphoto interpretation. Airphoto interpretation elements. Application of air photo interpretation in mineral exploration, ground water exploration and geomorphology.

Unit III: Mapping & Cartography

Geometric operations; Elementary image distortions ;Two-dimensional approaches (Georeferencing and Geocoding). Three-dimensional approaches ;Orientation , Monoplotting, Orthoimage production, Stereo restitution. RADAR; Principles of imaging radar, Geometric properties of radar. Cartographic maps and types of Maps (Topographic Maps, ThematicMaps), GIS Cartography.

Practical:

- ✓ *Chain and compass survey instrument and procedure.*
- ✓ *Numerical problems of coordinate transformation*
- ✓ *GIS Cartography and thematic maps.*

Textbook

- ✓ *Tiberius, Marel, Reudink and Leijen (2022) Surveying & Mapping, TU Delft Open (https://textbooks.open.tudelft.nl/textbooks/catalog/view/46/150/382)*

Suggested Books :

- ✓ *Courses in mining geology by R. N. P. Arogyaswamy · 1968*
- ✓ *Lillesand, T.M., R.W. Kiefer and J.W. Chipman, 2004, Remote Sensing and Image Interpretation, 4th Edition, John Wiley and Son, New York.*
- ✓ *Chandra, A.M. (2005) Surveying, New Age International Publishers*
- ✓ *ESRI (2000) Understanding map projections, ESRI, USA (http://downloads2.esri.com/support/documentation/ao_/710Understanding_Map _Projecti ons.pdf)*
- ✓ *Harvey, F. (2008) A primer of GIS: Fundamental Geographic and Cartographic Concepts, The Guilford Press*

Digital Cartography

Course Objectives

- To know the basics, importance, and methods of Cartography
- To study the various maps projection and co-ordinate systems.
- To study the different aspects of design in cartography.
- To learn the Generalization and designing aspects of cartography
- To learn the different techniques of Map production and Reproduction\

Learning Outcome:

- Able to define and justify the purpose of each cartographic element
- Use digital tools for generating cartographic products
- Evaluate digital maps for their thematic appropriateness
- Generate maps with a scale and requisite projection

Unit I: Introduction

History and evolution of Cartography. Definition, scope and concepts of cartography. Characteristics of Map. Categories of maps. Methods of mapping, relief maps, thematic maps. Trends in Cartography.

Unit II: Cartographic (Map) Elements

Geoid & Spheroid, Map projection & Transformation, Map Scale and Coordinate system. Plane co- ordinates in UTM system, projection used in Survey of India topographic sheets.

Unit III: Cartographic Representation & Visualization

Digital Data types, Data sources (Survey and positioning, Remote sensing, Census and sampling), Data Visualization of different data types, Labels and Symbols, Visualizing discrete and continuous data. Map design and generation.

Practical:

- Analyzing Toposheets and Geological Maps
- Digital cartographic Data Sources (vector and Raster data)
- Projection and Transformation
- Map design and cartographic output

Textbook:

- ✓ *Cromley .R.G, "Digital Cartography", Prentice-Hall of India, New Delhi, 1992.*

Suggested Readings:

- ✓ *Robinson .A. H, Morrison .J. L, Muehrcke .A. C, Kimerling .A. J and Guptill .S. C, "Elements of Cartography", 6th Edition, John Wiley and Sons, 1995.*
- ✓ *Dent .B. D, "Cartography – Thematic Map Design", 5th Edition, W C B McGraw-Hill, Boston, 1999.*
- ✓ *Anson .R.W and Ormeling .F.J, "Basic Cartography for students and Technicians", Vol., I, II and III Elsevier Applied Science publishers 2nd Edition, 1995.*

Data Analytics I

Course description

This paper helps students to learn the fundamental elements of Data Analytics and to gain proficiency in working with SPSS. Upon Completing the Course, students will be able to identify advanced techniques of data analytics using Statistical Package for Social Sciences (SPSS), use Exploratory data analysis to visualize the data, analyses survey and other data sets using statistical methods

Course Outcomes:

- This course is designed to help students learn fundamental elements of Data Analytics and to gain proficiency in working with SPSS.
- Upon Completing the Course, students will be able to identify advanced techniques of data analytics using Statistical Package for Social Sciences (SPSS) software.
- They will be exposed to exploratory data analysis techniques.
- This course shall enable them to use statistical tools to visualize and analyze surveys and other data sets.

Unit I: Introduction to Data Analytics

Concept of data analytics; Role of data analyst; Classification of Data- Structured, Semi-Structured, Unstructured data; Scale of measurement of data; Various Data sources, Modern Data collection Methods

LO: This module shall help the students to understand the basics of data analytics and identify, understand, and dealwith different types of data sets.

Unit II: Data Visualisation and Basic Statistics

Data presentation and visualization, Types of Diagrams; Descriptive statistics like measure of central tendency, Dispersion, Skewness, Correlation etc.; Univariate, Bivariate, Multivariate analysis

LO: Students shall develop proficiency in data visualization to identify patterns, trends, and outliers in data sets; and be able to understand applied statistics to develop suitable concepts and methods that will help to analyse data and solve research problems in this module.

Unit III: Introduction to SPSS

Different Menu‘s in SPSS, creating a data file, opening excel files, variables and labels, selecting cases by filtering, recoding of data, merging of files, Sorting of Cases and Variable, SPSS Output and its transfer to excel and word.

LO: This module shall enable the students to calculate/recode variables and prepare data for analysis using SPSS.

Unit IV: Exploratory Data Analysis using SPSS

Data visualization using frequency tables and charts, descriptive statistics, cross tabulations, Compare-Means, ANOVA, Independent Sample t-test, Paired Sample t-test, One-way ANOVA, chi square tests. Simple and Partial correlation; General Linear Model

LO: Upon completion of this module, the learners shall be able to carry out exploratory data analysis using SPSS that can test hypotheses.

Text Books

- ✓ *Brian C. Cronk (2018), How to use SPSS: A Step-By-Step Guide to Analysis and Interpretation, Tenth edition, Routledge.*
- ✓ *Nancy L. Leech et. al. (2005), SPSS for Intermediate Statistics: Use and Interpretation,Second edition, Lawrence Erlbaum Associates, Inc.*

Additional Reading

- ✓ *William E. Wagner (2015), Using IBM SPSS statistics for research methods and social science statistics, Fifth edition, SAGE Publications, Inc.*
- ✓ *IBM 2016, IBM Knowledge Center: SPSS Statistics, IBM, viewed 18 May 2016, https://www.ibm.com/support/knowledgecenter/SSLVMB/ welcome/ 2.*

Data Analytics II

Course Description

This course introduces R and Python, which are popular statistical programming languages. The course covers data reading and its manipulation using R and Python, which is widely used for data analysis internationally. Loading, installing and building packages are covered in the syllabus.

Course Outcomes:

1. To develop Problem-solving and programming capabilities.
2. Getting introduced to R and Python, which are popular statistical programming languages, and use them to read data and manipulate it.
3. Developing an R script and execute it, understand working with Python language, install, load, and deploy the required packages, and build new packages for sharing and reusability,
4. To visualize and summarize the data, and design an application with database connectivity for data analysis.

Module I: Introduction to R Programming

R Installation, loading and using packages; data types, data structure-Vectors, Matrix, Lists, Factors; Data Frames, conditional statements, loop statements, custom function, the apply family; Reading and getting data into R (External Data): using CSV files, Web Data, Excel files etc. Finding of Invalid values and Outliers, Descriptive Statistics, data visualization using scatter plot, line plot, bar chart, histogram, box plot etc.; Linear Regression using R.

LO: This module shall enable the students to explore and understand how to use the R documentation including R-packages and create simple programs using R.

Module II: Python Basics

Installation of Python software; keywords, identifiers, comments in Python, python indentation, python statement; Data Structure and Data types; String operations in Python; Input-Output and formatting; operators and control flow; Functions in Python;

LO: This module shall educate the students to understand and use Python- Syntax, Libraries, and Functions.

Module III: Data Analysis with Python

Introduction to Data Science: NumPy and Pandas; Data Visualization in Python; Exploratory data analysis with Python.

LO: This module shall impart the ability among the learners to create simple programs using Python and conduct exploratory data analysis to uncover the underlying structure in the data sets.

Module IV: Capstone in Business Analytics

Find an industry or business problem, collect data, develop a solution, create a business case, and present it to industry leaders and faculties in the department

LO: Upon completion of this module, students can carry out a Business Analytics Capstone Project to apply dataanalytics for data-driven decisions to handle a real business problem.

Text Book

- ✓ *Cotton, R., Learning R: A step-by-step function guide to data analysis. 1st edition. O'reilly Media Inc.*
- ✓ *Suresh Kumar Mukhiya and Usman Ahmed: Hands-On Exploratory Data Analysis with Python: Perform EDA techniques to understand, summarize, and investigate your data*

Additional Readings

- ✓ *Gardener, M. (2017). Beginning R: The statistical programming language, Wiley.*
- ✓ *Lawrence, M., & Verzani, J. (2016). Programming Graphical User Interfaces in R. CRCPress. (ebook)*
- ✓ *Paul Barry (2016): Head-First Python, 2nd edition, O'Reilly*
- ✓ *Avinash Navlani, Armando Fandango, Ivan Idris (2021) Python Data Analysis: Perform data collection, data processing, wrangling, visualization, and model building using Python*

Understanding and Managing Self

Introduction:

Student life is a critical period for their personal and professional development.

Their success is determined not only through their academic competencies but also through their soft skills. This course is designed to help students exploring their self and develop insight into it. They will also learn new skills and increase their competency to manage self for personal and professional success.

Course Outcomes:

- To learn the basic concepts of self and increasing self-awareness skills.
- To understand the importance of Emotional Intelligence and the importance to personal success.
- To manage self through stress management, time management
- To manage anger and being assertive with people.
- To improve interpersonal skills through transactional analysis

Unit I: **Understanding and Exploring Self**

(i) **Definition of Self**; Dimensions of Self; Importance of Self-Awareness, Exploring self through Johari-Window & SWOC Analysis

(ii) **Emotional Intelligence**: Meaning and Definition, Need for Emotional Intelligence, Competencies of Emotional Intelligence; Skills to develop emotional Intelligence

(iii) **Activities:** Psychometric Test (Johari– Window), SWOC Analysis of self

Learning Outcomes

- Understand the basic concepts of self and enhance their self-Awareness skills.
- Gain understanding of emotional intelligence and its importance to personal success.

Unit II: Managing Self

(i) Stress Management: What is Stress? Sources of Stress; Effect of Stress, Managing Stress: Relaxation Exercise, Yoga and Meditation; Time Management: Principles and Techniques; Being Assertive, Saying 'No'

(ii) Improving interpersonal relationships through 'Transactional Analysis': Understanding Ego states, Transactions, Life Positions

Learning Outcomes

- Manage their stress effectively, manage time better and be assertive with people.
- Improve their interpersonal skills and communicate better.

Activities: Progressive Muscles Relaxation Exercise, In-basket Exercises for time management, Psychometric Test (Transactional Analysis)

Text Books:

- ✓ *Soft Skills: An Integrated Approach to Maximize Personality, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India*
- ✓ *Personality Development and Soft Skills, Barun K. Mitra, Oxford Press*

Reference Books:

- ✓ Trevor J. Powell, Mental Health Handbook (2017), 3rd Edition, Routledge
- ✓ David A. Whetten, Kim. S. Cameron, Developing Management Skills (2011), 8th Edition, PHI Learning Private Limited
- ✓ *Daniel Goleman (1996) Emotional Intelligence. Why it can matter more than IQ. Bantam Doubleday Dell Publishing Group.*
- ✓ *Harris T. A. (1969), I'm OK, You're Ok: A Practical Guide to Transactional Analysis, New York, Harper & Row*

Psychological First Aid

Course Outcomes:

- This course is aimed at increasing the learners' abilities in managing psychological crisis situations.

Unit I:

- How do crisis events affect people, Introduction to Psychological First Aid (PFA), Concept and Development of PFA; PFA: Who, when and where; How to help responsibly (respect safety, dignity and rights of the people); Core Competencies of PFA

Learning Outcomes:

- Increase their abilities to discuss key concepts related to PFA and Listen reflectively
- Manage psychological crisis reactions, learn and apply psychological first aid and Practice self-care

Unit II:

- Psychological Consequences of Trauma (Posttraumatic Stress Disorder, Depression, Generalized Anxiety, Panic Disorder, Substance abuse)
- Psychological consequences of Disaster (Natural Disasters, Technological Disasters, Human-Made Disasters: riots, war; Accident)

Learning Outcomes:

- Recognize the potential risk factors and warning signs for a range of mental health problems, including: depression, anxiety/trauma, substance use disorders, and self-injury.

Unit III:

- Practicing the Art of PFA (RAPID Model): Rapport and Reflective Listening, Assessment of Needs, Prioritization, Intervention, Disposition

Learning Outcomes

- Increase their abilities to discuss key concepts related to PFA and Listen reflectively
- Use a 5-step action plan to help an individual in crisis connect with appropriate professional help.

Text Books:

- ✓ *George, S. Everly, Jr. (2017). The Johns Hopkins guide to psychological first aid. Johns Hopkins University Press.*
- ✓ *National Disaster Management Training Module (1-4) Psychosocial First Aid. (2023). NIMHANS, Bengaluru; NDMA, New Delhi.*

Reference:

- ✓ *World Health Organization, War Trauma Foundation and World Vision International (2011). Psychological first aid: Guide for field workers. WHO: Geneva.Baker, E. K. (2003). Caring for ourselves as psychologists. The Register Report, 28, 7–10. http://www.nationalregister.org/trr.html.*
- ✓ *Dieltjens, T., Moonens, I., Van Praet, K., De Buck, E., &Vandekerckhove, P. (2014). A systematic literature search on psychological first aid: lack of evidence to develop guidelines. PloS one, 9(12), e114714. https://doi.org/10.1371/journal.pone.0114714*
- ✓ *Everly, G. S., Jr. (1999). Toward a model of psychological triage. International Journal of Emergency Mental Health, 1, 151–154. 5. Everly, G. S., Jr., &Lating, J. M. (2013). A clinical guide to the treatment of the human stress response (3rd ed.). New York, NY: Springer.*

- ✓ *Weiten, W. (2013). Psychology: Themes and variations (9th ed.). Belmont, CA: Wadsworth Cengage Learning.*
- ✓ *Choudhary, V., Sharma, P., Dhingra, A. (2016). Be Equipped Psychologically: The Psychological First Aid. The International Journal of Indian Psychology, 4(1), 311-320.*

Computer Application

Unit I and II: Fundamentals of Computer Application: *MS Office Word, Excel, Email, Important Sanskrit websites (Sodha Ganga, E-Pathasala & E- Sanskrit Books), Find & Replace*

Unit III and IV: DTP, Page maker & Power Point

Core Readings:

- ✓ *Computer Fundamentals and Applications, Ashok Arora, Vikas Publishing, 2015*
- ✓ *DTP, Ranu Banik, Friends Publisher, Cuttack,2006*

Suggested Readings:

- ✓ *Computer Fundamentals, Priti Sinha, Pradeep K., Sinha, BPB Publications; 6th edition, 2004*
- ✓ *Computer Fundamentals (1St Edition), RS Salaria, Khanna Publishing House,2017*
- ✓ *Fundamentals of Computers, E Balagurusamy, McGraw Hill Education (India) Private Limited, 2009*

Ayurveda and Vrksayurveda

Unit I and II: Ayurveda: Caraka Samhita *(Sutrasthana, Dirghamjivitiyaadhyaya- verses 41-135. From the verse – hitahitamsukhamdukha- till the verse rogebhyo yah pramocayet).*

Unit III and IV: Vrksayurveda: Brhatsamhita – Adhyaya 54.

Core Readings:

- ✓ *Carakasamhita, Purushottama Kar Sharma, Dharma Grantha Store, Cuttack, 2011*
- ✓ *Carakasamhita, Brahmananda Tripathy, Chawkhamba Surabharati Prakasan, Varanasi.*
- ✓ *Brhatsamhita of Barahmihira, Ed. Sudhakar Dwivedi, Sampurnanda Samskrita Viswavidyalaya,Varanasi*
- ✓ *Vrksayurveda, Ed. Dr. Narayana Prasad Dash, Vidyapuri, Cuttack.*

Suggested Readings:

- ✓ *Samskrita Vanmaya ka brhata itihas (Vol.17) Ayurved ka itithas Uttarpradesh Samskrit Sansthan, Lukhnow, 2006*
- ✓ *Ayurved ka Brhat Itithas, Atridev Vidyalankar, Chawkhamba, Delhi*
- ✓ *Carakachintanam, Priyabrata Sharma, Chawkhamba, Delhi*

Philosophical Counselling

Introduction:

This course on philosophical counseling would equip students with the skills and knowledge necessary to provide guidance and support to individuals facing philosophical questions and existential dilemmas. Students would be equipped with the theoretical knowledge, practical skills, and ethical understanding needed to provide philosophical counseling to individuals seeking guidance and support in navigating life's existential and philosophical challenges.

Course Outcomes:

- Understanding the dialectics of life.
- Developing a sense of flexibility in considering the available opinions and alternatives.
- Resolving life problems and dilemmatic situations through proper counseling.
- Developing self-awareness and responsibility and taking recourse to fair reason

Learning Outcome:

Unit I

Define philosophy as the systematic study of fundamental questions about existence, knowledge, ethics, and reality. While the practice of philosophical counseling as a distinct discipline emerged in the latter half of the 20th century, its roots can be traced back to ancient philosophical traditions. Philosophers such as Socrates, Plato, and the Stoics engaged in dialogues aimed at fostering self-awareness, critical thinking, and ethical reflection, which laid the groundwork for philosophical counseling practices.

Unit II

Philosophical counseling employs philosophical methods and insights to help individuals address existential, ethical, and life-related concerns. While there is no single philosophical method of counseling, practitioners draw on a variety of philosophical approaches and techniques to engage clients in reflective dialogue and exploration. Here are some key philosophical methods commonly used in philosophical counseling:

Unit III

Logic-Based Therapy (LBT) is a form of counseling that integrates principles of logic and reasoning into therapeutic practice. It draws on insights from philosophy, cognitive psychology, and formal logic to help individuals identify and challenge irrational beliefs, develop more rational thought patterns, and make better decisions.

Unit IV

Existentialism-based therapy (EBT) is an approach to counseling and psychotherapy that draws on existential philosophy to help individuals confront the fundamental questions and challenges of human existence. Rooted in the existentialist tradition, EBT emphasizes themes such as freedom, responsibility, meaninglessness, and the search for authenticity.

Course Content

Unit I: Introduction to Philosophical Methods

Socratic method, Cartesian Method, Ockham's razor; History of Philosophical counseling, Difference between psychological and philosophical counseling. General Counselling, Defining and Meaning, Basic Assumptions, Forms of Counselling, Steps in Counselling Procedure, Personal qualities of a Counsellor, Characteristics of Effective Counselling.

Unit II: Philosophical methods of counseling

Greek Stoicism - Apatheia, Epicureanism - long-term pleasure. Dialectical Method: the Salient Features of the Method of Dialectic: Question and Answer Form. Phenomenological Method- Bracketing and reduction, subjectivity and observing essence,

Unit III: Logic-Based Therapy, Meaning, scope, LBT fallacies, antidotes, Cognitive Behavior Therapy- View of Emotional Disturbance, Therapeutic Process, Rational Emotive Behavior Therapy, Cognitive Methods, Behavioral Techniques; Person-centered Therapy- Functional Role, Reflection of Feelings, Crisis intervention, Creativity and Stimulating Experiences.

Unit IV: Existentialism Therapy, Narrative construction therapy, Authentic life, Existential Therapy- Capacity for Self-awareness, Freedom and Responsibility, Personal Identity, Anxiety as a Condition, Awareness of Death; Reality Therapy- Choice Theory, Characteristics of Reality Therapy.

Prescribed Books: -

- ✓ *Richard Nelson-Jones, Theory and Practice of Counselling and Therapy, Fifth Edition, SAGE Publications India Ltd.*
- ✓ *Richard Sharf, S., Theories of Psychotherapy and Counselling Concepts and Case, Brooks/Cole, Australia.*
- ✓ *Alex Howard, Philosophy for Counselling and Psychotherapy; Pythagoras to Postmodernism, Palgrave Macmillan.*
- ✓ *Elliot D Cohen, and Samuel Zinaich, eds. Philosophy, Counseling, and Psychotherapy, Cambridge Scholars Publishing.*
- ✓ *Elliot D Cohen, Logic-based therapy and everyday emotions: A case-based approach, Lexington Books*
- ✓ *Chhaya Rai, Studies in Philosophical Methods, University of Jabalpur.*

Reference Books: -

- ✓ *Lou Marinoff, Philosophical Practice, Academic Press, UK.*
- ✓ *Ran Lahav, Maria da Venza Tillmanns (ed.), Essays on Philosophical Counselling, University Press of America*
- ✓ *Timothy Williamson, Philosophical Method: A Very Short Introduction, OUP Oxford.*
- ✓ *Chris Daly, An Introduction to Philosophical Methods, Broadview Press.*
- ✓ *Richard E Creel, Thinking Philosophically, Blackwell Publishers, USA 2.*
- ✓ *`Sample Questions: 1 for Part- I Objective; Part- II Very Short Type (in 50 Words); Part-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);*

Unit I

1. Which method is adopted by Socrates?

2. Difference between psychological and philosophical counseling.

3. What personal skills does a counselor need?

4. Explain Forms of Counselling, Steps in Counselling Procedure & Characteristics of Effective Counselling.

Unit II

1. Who is the advocator of Stoicism?

2. Difference between hedonism and rationalism.

3. What is the Bracketing method?

4. Discuss the Salient Features of the Method of Dialectic.

Unit III

1. LBT stands for ____.

2. What do you mean by Therapy?

3. Discuss the Person centered Therapy.

4. Why therapy is required in philosophical methods and Counselling? Define different kinds of therapy

Unit IV

1. Existentialism Based _____, Narrative construction_____.

2. Write down two examples of Existential-based therapy.

3. Why does narrative construction therapy work?

4. Explain the Characteristics of reality therapy and how it is related to present life.

Personality Development

Unit I Personality Development, Decision Making and Communication: Personality Development - Concept; Skills and Value orientation of personality development; stages of personality development; factors affecting personality development; personality traits; Concepts - Creativity: Attitudes and Etiquettes.

Unit II Managing Self - Mind and Motivation, Managing Self - Mind, Body and Soul;. Conflict - meaning, reasons and consequences. Conflict Resolution: Need and various approaches and institutions

Text Books:

- ✓ *Adair, John (2009); Effective Communication (Revised Edition), Pan MacMillan: London*
- ✓ *Ajmani, J C (2012); Good English: Getting it Right, Rupa Publications: New Delhi*
- ✓ *Andrews, Sudhir (1988); How to Succeed at Interviews (21st Reprint), Tata McGraw Hill: New Delhi*
- ✓ *Becker, Ethan F. and Wortmann, Jon (2009); Mastering Communication at Work: How to Lead, Manage, and Influence? McGraw Hill: New Delhi*

Reference Books:

- ✓ *Heller, Robert (2002); Effective Leadership, D K Publishing: New Delhi*
- ✓ *Hurlock, E. B. (2006); Personality Development (28th Reprint), Tata McGraw Hill: New Delhi*
- ✓ *Khan, S R (2014); Personality Development, Ramesh Publishing House: Delhi*
- ✓ *Mile, D. J. (2004); Power of Positive Thinking, Rohan Book Company: Delhi*
- ✓ *Prasad, H. M. (2001); How to Prepare for Group Discussion and Interview, Tata McGraw Hill: New Delhi*

Secretarial Practice

Course Outcomes:

- Developing an understanding of the basic concepts of office management.
- Acquiring quality skills and competencies in office management, official correspondence and time management.
- To discuss the basic concepts of office management.
- To study the skills and competencies in official correspondence.

Unit I

Secretary: Meaning, Types, Importance; Professional and Personal Qualities of a Secretary, Duties and Responsibilities of a Personal Secretary; Scheduling Appointments. Planning for Travel Arrangements for Officers on official duty; Organizing Meetings – Notice, Agenda, Quorum, Minutes; Handling of Mail; Use of Ready Reckoner, Office Manuals & Emergency Services

Unit II Time Management: Definition, Importance of Time, Setting priorities. Correspondence: Business Correspondence, Enquiry Letter, Quotation, Order, Tender, Complaint letter, Adjustment Letter and their formats, Banking Correspondence; Government Correspondence; Un-official Notes

Text Books:

- ✓ *Bist, G D (2017) Officer Secretarial Practice. Shorthand House: New Delhi*
- ✓ *De Vires, Mary A (1995) Professional Secretary's Handbook: Guide to the Electronic and Conventional Office (3rdEdition). American Heritage: USA*
- ✓ *Debnath, B K (2001) A Guide to Secretarial Practice & Office Procedure. New Central Book Agency : Delhi*

Reference Books:

- ✓ *France, Sue (2015) The Definitive Personal Assistant & Secretarial Handbook. Kegan Page: Delhi*
- ✓ *Kuchhal, M C (2008) Secretarial Practice (18th Edition). Vikas Publication : New Delhi*

Sociology of Disaster Resilience and Recovery

The coming effects and implication of disaster whether it is of natural or of man-made create an intense speculation worldwide. With increasing disaster risks and consequent social disruptions, the relief, resettlement and rehabilitation of disaster victims are getting intensified and magnified worldwide. In this context, the sociology of disaster provides a unique perspective on disaster, disaster resilience and disaster recovery in a promising action.

Course Outcomes:

- Students can visualize the extents of disaster induced socio-economic and cultural impacts
- Will come to know exactly how to manage any crisis of disasters
- Visualise disasters prediction systems- rescue, relief, rehabilitation and reconstruction before and aftermath of disasters incidents.

Unit-I: Introduction to the concepts of Disaster, Disaster Resilience and Recovery

- Natural Disaster: Types
- Man-made Disaster: Types
- Disaster and Recovery
- Disaster vulnerability, Risk and Resilience

Learning Outcomes:

- Students will be able to increase the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and consequences.

Unit-II: Impacts of Disaster

- Social Consequences
- Economic Consequences
- Cultural consequences
- Destruction of Ecosystem

Learning Outcomes:

- After studying this unit, students can understand the several consequences of disaster.
- Analyse different factors influencing vulnerabilities and capacities to face disasters.

Pedagogy:

- The students can be asked to visit disaster affected area and documents the consequences from the victims through recall methods.

Unit-III: Disaster Preparedness and Role of Agencies

- Meaning of Disaster Preparedness, Risk perception, Evacuation, Rehabilitation
- Agency role for Rehabilitation: Educational Institutions, Media, Government Organizations
- Disaster Rehabilitation: Local Self-Government, Anganwadi Workers, Asha Worker
- Disaster Rehabilitation: Role of SHGs and NGOs/Civil Society Organizations.

Learning Outcomes:

- After studying this, students understand theoretical and practical processes of disaster management (disaster risk perception and risk reduction, response, and recovery) and their interconnections.

Pedagogy:

- The students can be asked to make content analysis of disasters and listing disasters of Odisha
- They are asked to visit to OSDMA, NGOs and SHGs to have better insights of disaster management and rehabilitation

Unit-IV: Disaster Resilience and Recovery

- Meaning of Disaster Resilience and Recovery, Core elements of Disaster Resilience
- Disaster Recovery Planning Process
- Social Capital in building Resilience and ensuring Recovery
- Recovery and Resilience Mechanism and Best Practices

Learning Outcomes:

- Students will be able to analyse, and communicate information on risks, resilience and focus on recovery.
- Students can think of ideas about the resilience and recovery plans by the lessons learned from earlier disasters that help to formulate strategies for mitigation in future.

Pedagogy:

- Students study FAQ (frequently asked questions) on disaster resilience and recovery from website and confirm these in the field.
- Students can make presentation about their ideas of resilience and recovery or use of technology and social media about awareness of disaster resilience.
- They will learn role of different agencies as well as get equipped with various methods of risk reduction measures and risk mitigation.

Lesson Plans:

Unit	Thrust Areas	Method	Total No. of Classes	References
I	The concepts of Disaster, Disaster Resilience and Recovery and Disaster vulnerability and Risk	Lecture/ Tutorial a/	15	1. Blaikie, Piers et al. (1994). At risk: Natural hazards, people's vulnerability, and disasters. New York: Routledge 2. Parasuraman, S., and Acharya, N. (2000). Analysing forms of vulnerability in a disaster. The Indian Journal of Social Work, 61(4 3. Video on Disasters : Concepts and Management (CEC, New Delhi) https://www.youtube.com/watch?v=Eh8dAmiJ- 4. Meaning and Classification of Disaster (Odisha State Open University) https://egyankosh.ac.in/bitstream/123456789/56103/1/B-1U-1.pdf
II	Impacts of disaster on society, culture, economy and ecosystem	Lecture/ Tutorial a/ filed visit	15	1. Benson, C., & Clay, E. (2004). *Understanding the economic and financial impacts of natural disasters*. The World Bank. 2. Natural Disasters – Meaning, Types & Effects and Hydrological Disasters (Odisha State Open University) https://drive.google.com/file/d/1AtyglzYoeGMUBpxe0f5I7YOeBcu_4noU/view
III	Disaster preparedness and agency role for rehabilitation (Educational Institutions, media, GOs) and disaster rehabilitation by SHGs, NGO and Local Self-Government	Lecture/ Tutorial a/ filed visit& content anaysis	15	1. Sinha, Prabhas Chandra (2006). (ed.) Disaster Mitigation Preparedness Recovery and Response, SBS, New Delhi. 2. Dhir, K.C. (2017). Beyond Disaster: The Disaster Risks and Rehabilitation Strategies, N. Delhi. 3. Disaster Preparedness: Role and Responsibilities of Various Agencies (Odisha State Open University) https://www.egyankosh.ac.in/bitstream/123456789/25409/1/Unit-8.pdf

IV	Disaster recovery planning process, mechanism and best practices, social capital in building resilience	Lecture/ Tutorial a/ filed visit& Documenting	15	1. Arefian, F. F. (2018). Organising Post-Disaster Reconstruction Processes. Springer 2. National Disaster Management Authority (NDMA), India – Disaster risk and resilience: An analytical study,2019. https://ndmindia.mha.gov.in/images/pdf/Disaster%20Risk%20and%20Resiience%20in%20India.pdf 3. Recovery, Rehabilitation and Reconstruction, Unit 1(Odisha State Open University) https://drive.google.com/file/d/1s2aJ31pkXujF2bplFoKkTSGM7pWaTRrK/view

Text Books:

- ✓ *Tierney, K. (2019). Disasters: A Sociological Approach. United Kingdom: Wiley.*
- ✓ *Pandey, Rajendra. K. (2020), Disaster management in India, Sage, India,*
- ✓ *Sinha, Prabhas Chandra (2006). (ed.) Disaster Mitigation Preparedness Recovery and Response, SBS, New Delhi.*
- ✓ *Fisher, Henry W. (1998). Response to Disaster: Fact Versus Fiction & Its Perpetuation: The Sociology of Disasters. New York: University Press of America, Inc.*

References:

- ✓ *Blaikie, Piers et al. (1994). At risk: Natural hazards, people's vulnerability, and disasters. New York: Routledge*
- ✓ *Parasuraman, S., and Acharya, N. (2000). Analysing forms of vulnerability in a disaster. The Indian Journal of Social Work, 61(4)*
- ✓ *Benson, C., & Clay, E. (2004). Understanding the economic and financial impacts of natural disasters. The World Bank.*
- ✓ *Dhir, K.C. (2017). Beyond Disaster: The Disaster Risks and Rehabilitation Strategies, N. Delhi.*
- ✓ *Arefian, F. F. (2018). Organising Post-Disaster Reconstruction Processes. Springer*
- ✓ *Dhir, K.C. (2019). Floods in Orissa, Winshield Press, New Delhi.*

E.Resources:

- ✓ Video on Disasters : Concepts and Management (CEC, New Delhi) https://www.youtube.com/watch?v=Eh8dAmiJ-
- ✓ Meaning and Classification of Disaster (Odisha State Open University)
- ✓ (https://egyankosh.ac.in/bitstream/123456789/56103/1/B-1U-1.pdf)
- ✓ Natural Disasters – Meaning, Types & Effects and Hydrological Disasters (Odisha State Open University) https://drive.google.com/file/d/1AtyglzYoeGMUBpxe0f5I7YOeBcu_4noU/view
- ✓ *Disaster Preparedness: Role and Responsibilities of Various Agencies (Odisha State Open University) https://www.egyankosh.ac.in/bitstream/123456789/25409/1/Unit-8.pdf*
- ✓ *National Disaster Management Authority (NDMA), India – Disaster risk and resilience: An analytical study,2019. https://ndmindia.mha.gov.in/images/pdf/Disaster%20Risk%20and%20Resiience%20in%20India.pdf*
- ✓ *Recovery, Rehabilitation and Reconstruction, Unit 1(Odisha State Open University) https://drive.google.com/file/d/1s2aJ31pkXujF2bplFoKkTSGM7pWaTRrK/view*

- ✓ *Terminology: Basic terms of disaster risk reduction*
  https://www.preventionweb.net/files/7817_7819isdrterminology11.pdf

(Answer all questions of the given Part-I, II, III&IV. Part-I with 12 questions one mark each, Part-II with eight questions two marks each and Part-III with 10 questions out of which eight to be answered three marks each and answer all questions within 500 words in Part-IV seven marks each).

Part-I

1. Answer the following questions Mark 1x12=12

Q. What do you mean by disaster vulnerability?

Part-II

Write any eight questions within two or three sentences each Mark 8x2=16

Q. Mention two social consequences of natural disaster

Part-III

3. Answer any eight questions within 75 words each Marks 8x3=24

Q. Analyse the role of educational institution for disaster rehabilitation

Part-IV

4. Answer all of the following with 500 words each Marks 7x4=28

Q. Discuss disaster recovery planning processes

Doing Ethnography

Ethnography has become a common approach in social sciences today. It gives the researcher direct access to the culture and practices of a group. It is a useful approach for learning first-hand information about the behaviour and interactions of people within a particular context.

Course Outcomes:

- By the end of this course the student is expected to develop skills that will enable him/her to negotiate access to the field, take field notes, and use audio-visual recordings of ethnographic data.
- Gain hands-on experience collecting, analyzing and writing up data using a variety of ethnographic techniques including in-depth reading discussions, field exercises, and writing of an original research paper or proposal.

Unit-I: Ethnography

- Meaning and approaches of ethnography
- Narrative ethnography
- Historical ethnography
- Virtual ethnography

Learning Outcomes:

- After completing this unit students can understand and define the meaning, approaches and objectives of ethnography.
- Students can learn concept and principles through narrative, historical and virtual ethnography.

Unit-II: Doing Ethnography

- Art of ethnographic fieldwork
- Visual ethnography
- Framing photographic ethnography
- Digital video as research practice

Learning Outcomes:

- After studying this unit students can understand the methods and ethics of ethnographic study.
- Students can analyse the relationship of innovations in film and digital media on the production of vernacular, documentary and ethnographic visual representations.

Pedagogy:

- Students can use their camera/ smartphones to take any social phenomena and analyze how photographic study is different than written text.
- Students can watch digital videos and documentary to observe and learn visual representation.
- Students can take a case study and use digital media, newspapers to analyze the content.

Unit-III: Conducting Ethnography (group activity)

- Observing a group of children playing
- Observing a village meeting
- Observing medical personnel in a hospital
- Observing an indigenous village
- Observing a high school classroom

Learning Outcomes:

- After studying this unit students can do better observation and critically analyze a social situation.
- Through observation method students can learn from the surroundings and gain insights to some information that will be impossible to gain simply through texts.

Pedagogy: Make a field visit to:

- Observe group of children playing, a village meeting, medical professional in hospital, a indigenous village and high school classroom
- Write observational and critical analysis report of the cases they visited.

Unit-IV: Ethnographic Skill and Ethics

- Observing
- Interviewing
- Taking Notes
- Writing report

Learning Outcomes:

- After studying this unit students will be equipped with skills, tools and techniques that requires for ethnographic study.
- They will learn methods like observation, making of interview schedule, taking notes while visiting field and writing report with critical analysis skill.

Pedagogy:

- Students can take up any research topic of their liking and conduct research while using the ethnographic methods, tool and techniques they learned.
- Prepare an interview schedule and collect responses, take note while conducting survey and write a report of the field study.

Lesson plans-

Units	Thrust areas	Teaching methods	Total no. of classes required	References
I	Approaches of ethnography, Narrative ethnography, Historical ethnography and Virtual ethnography	Lecture/ tutorial	15	1. Hine, C (2000) Virtual Ethnography. London: Sage Publications 2. Understanding Ethnography (IGNOU) https://egyankosh.ac.in/bitstream/123456789/83669/1/Unit-1.pdf

				3. Video-Lecture 2: Situating Ethnography(IIT Bombay) https://www.youtube.com/watch?v=7JA0InnelMY&list=PLOzRYVm0a65fhRBCF65lHpOj0JJ84UoEZ&index=3
II	Doing Ethnography- Art of ethnographic fieldwork, Visual ethnography, Framing photographic ethnography and Digital video as research practice	Lecture/ tutorial	15	1. Walsh, D. (1998). Doing ethnography (Vol. 2012, pp. 245-262). London: Sage. 2. Grimshaw, A. (2001). *The Ethnographer's Eye: Ways of Seeing in Anthropology*. Cambridge: Cambridge University Press. 3. Coleman, E.G. (2010) 'Ethnographic approaches to digital media', Annual Review of Anthropology,39(1) 487-505
III	Conducting Ethnography: (group activity)Observing a group of children playing, a village meeting, medical personnel in a hospital, an indigenous village and school classroom	Lecture/ tutorial	15	4. Goffman, E. (1989). On Fieldwork. Journal of Contemporary Ethnography, 18:123-32. 5. Walsh, D. (1998). Doing ethnography (Vol. 2012. London: Sage.
IV	Ethnographic Skill and Ethics-Observing, Interviewing, Taking Notes and Writing report	Lecture/ tutorial	15	1. Goode, J and P.K. Hatt. (2017).Methods in Social Research. Asia Law House. Atkinson,

Text Books:

- ✓ *Hammersley, Martyn and Paul Atkinson. (1995). Ethnography: Principles in Practice. Routledge: London.*
- ✓ *Heyl, Barbara Sherman. (2001). "Ethnographic Interviewing," Handbook of Ethnography, edited by Paul Atkinson, et al. Thousand Oaks, CA: Sage.*
- ✓ *Grimshaw, A. (2001). The Ethnographer's Eye: Ways of Seeing in Anthropology. Cambridge: Cambridge University Press.*

References:

- ✓ *Pink, S. (2001). Introduction from Doing Visual Ethnography. Thousand Oaks, CA: Sage.*
- ✓ *Hine, C (2000) Virtual Ethnography. London: Sage Publications*
- ✓ *Walsh, D. (1998). Doing ethnography (Vol. 2012, pp. 245-262). London: Sage.*
- ✓ *Coleman, E.G. (2010) 'Ethnographic approaches to digital media', Annual Review of Anthropology,39(1) 487-505*
- ✓ *Goffman, E. (1989). On Fieldwork. Journal of Contemporary Ethnography, 18:123-32.*
- ✓ *Walsh, D. (1998). Doing ethnography (Vol. 2012. London: Sage.*
- ✓ *Goode, J and P.K. Hatt. (2017).Methods in Social Research. Asia Law House. Atkinson,*

E. Resources:

- ✓ *Understanding Ethnography(IGNOU) lhttps://egyankosh.ac.in/bitstream/123456789/83669/1/Unit-1.pdf*
- ✓ *Video-Lecture 2: Situating Ethnography(IIT Bombay) https://www.youtube.com/watch?v=7JA0InnelMY&list=PLOzRYVm0a65fhRBCF65lHpOj0JJ84UoEZ&index=3*

Sample Questions

Answer all questions of the given Part-I, II, III&IV

Part-I

1. Answer all questions of the following Mark 1x12=12

Q. What do you mean by visual ethnography?

Part-II

2. Write any eight questions within two or three sentences each Marks 8x2=16

Q. Write two features of narrative ethnography

Part-III

3. Answer any eight questions within 75 words each Marks 8x3=24

Q. Explain ethnographic skill and ethics of interviewing

4. Answer all following questions with 500 words each Marks 7x4=28

Q. Elaborate ethnographic group work of village meeting

Working with Individuals

Course Objectives

- To understand the individuals and their social context
- To understand Social Casework as a method of Social Work practice
- To gain knowledge about the basic concepts, tools, techniques, processes and skills of working with individuals
- To develop an understanding of working with individuals in diverse settings

Learning Outcomes

- Able to demonstrate familiarity with case work processes and learn their application various settings
- Able to use skills and tools of case work in diverse settings

Unit – I: Social Case Work

Meaning, definitions, scope, purpose and objectives. Historical development of case work. Case work relationship-nature and importance. Principles of case work relationship.

Unit – II: **Components of Social Case Work**

Components- Person, Problem, Place, Process. Case Work Process- Intake, Psycho-social study, Social diagnosis, Treatment/Intervention, Evaluation & Termination

Unit-III: Tools, Techniques and Skills

Skills of caseworker- Observation, Rapport Building, Listening, Interviewing, Home Visits and Resource mobilization. Techniques of Case Work- Treatment methods in case work, direct treatment, Administration of practical services and environmental manipulation. Recording as a tool of learning.

Unit – IV: Approaches and Practice of Social Case Work

Task centered approach, social psychological approach, problem solving approach, strength based approach, functional and diagnostic approach and radical case work. Practice of case work in schools, correctional settings, elderly care homes, hospitals and rehabilitation centers.

Reading List:

- ✓ *Hamilton, Gordon (2013) The Theory and Practice of Social Case Work, Rawat Publication, New Delhi*
- ✓ *Pearlman, H H. (1957). Social Case Work: a Problem Solving Process. Chicago: University of Chicago.*
- ✓ *Richmond, Mary (1970) Social Diagnosis, New York: Free Press*
- ✓ *Fook J. (1993). Radical Case Work: A Theory of Practice. Allen & Unwin*
- ✓ *Gordon, H. (2013). The Theory and Practice of Social Case Work. New Delhi: Rawat Publication.*
- ✓ *Timms, N. (1998). Social Case Work Principles and Practices. London: Routledge*

  Upadhyay, R. K. (2004). Social Case Work Therapeutic Approach. Jaipur: Rawat Publication.

- ✓ *Venkat, P. R. (2017). Strengths-Based Approach in Social Work: A distinct ethical advantage. Queensland: International Journal of Innovation, Creativity and Change. Retrieved from https://www.researchgate.net/publication/320411435_Strengths-Based_Approach_in_Social_Work_A_distinct_ethical_advantage*
- ✓ *Young S. (1996). New Developments in Case Work. London: George & Allen Publishers*

Working with Groups

Course Objectives

- To understand the nature and types of groups
- To understand Social Group Work as a method of Social Work practice
- To know the basic concepts, tools, techniques, processes and Skills of working with groups
- To develop an understanding of process of group development and group dynamics
- To develop an understanding of application of group work in diverse settings

Learning Outcomes

- Able to demonstrate familiarity with Group Work processes, tools and techniques and their application in Professional Social Work Practice
- Able to develop skills of Facilitation, Analytical Thinking, Leadership Building, Programme Planning, Evaluation and using Programme Media in groups

Unit – I: Introduction to Social Group Work

Social Groups: Meaning, Characteristics and Importance. Types of Groups: Primary and Secondary, Open and Closed, Formal and Informal. Evolution of Social Group Work. Values of Social Group Work

Unit – II: Social Group Work and its Practice

Assumptions and Objectives of Social Group Work. Models of Social Group Work Practice Application of Social Group Work with Different Groups: Children, Adolescents, Older Persons, Women and Persons with Disability Areas of Social Group Work Practice in Different Settings

Unit – III: Group Process and Dynamics

Stages of Group Development. Group Dynamics.Principles of Social Group Work. Social Group Work Process: Facilitation, Role of Group worker, Leadership and Decision Making

Unit – IV: Skills and Techniques of Social Group Work

Social Group Work Skills: Facilitation, Analytical Thinking and Leadership Building. Programme Planning and Evaluation.Use of Programme Media. Group Discussion, Group Counselling, Group Decision Making, and Recording in Group work.

Reading List

- ✓ *Alissi, A.S.1990 Perspectives on Social Group Work Practice: A Book of Readings, New York, The Free Press.*
- ✓ *Balgopal,P.R. and Vassil. Groups in Social Work- An Ecological Perspective, New York, Macmillan Publishing Co. Inc.*
- ✓ *Brandler S & Roman CP 1999, Group Work, Skills and Strategies for Effective Interventions, New York. The Haworth Press.*
- ✓ *Brandler S & Roman CP 1991.Group Work, Skills and Strategies for Effective Interventions, New York. The Haworth Press.*
- ✓ *Garland, J.A.(Ed) 1992. Group Work Reaching Out: People, Places and Power, New York, The Haworth Press.*
- ✓ *Garwin, C 1987. Contemporary Group Work, New York Prentice- Hall Inc.*
- ✓ *Golpelwar, Banmala, 2007 Social Group Work, Indian Institute of Youth welfare, Nagpur.*
- ✓ *Kurland, R & Salmon, R 1998.Teaching a Methods Course in Social Work with Groups Alexandria: Council on Social Work Education.*
- ✓ *Siddiqui H.Y.2005. Group Work, theories and Practice, Rawat Publication New Delhi.*

- ✓ *Toseland RW 1998. An introduction to Group Work Practice, New York Macmillan Publication Co. Harleigh B 1990. Social Group Work: Principles and Practice, New York: Association Press.*

Analytical Ability and Logical Reasoning

Course Objectives

- To cover various forms of reasoning including deductive, inductive, and abductive, and integrate these with critical thinking skills.
- To explore logical sequences, coding-decoding, and arrangements as key elements of logical reasoning.
- To delve into complex logical reasoning constructs such as alphanumeric series, reasoning analogies, and calendars.
- To engage with arguments involving two or more premises and utilize connectives effectively.

Learning Outcomes

- To be acquainted with using facts, evidence, rules, and principles to draw valid conclusions and make sound judgments
- Able to practice pattern recognition, spatial reasoning, and decision-making as fundamental components of analytical reasoning
- Able to apply logical reasoning to practical scenarios involving cause and effect, dices, directions, and visual reasoning
- Able to master logical constructs such as statements and assumptions, conclusions, and syllogisms

Unit-I: Analytical Reasoning

Deductive Reasoning, Inductive Reasoning, Abductive Reasoning, Critical Thinking, Pattern Recognition- Data, Sequences, Structures, Logical Reasoning, Spatial Reasoning, Causal Reasoning, Decision Making.

Unit-II: Basic Logical Reasoning Concepts

Logical Sequence Series- patterns and sequences in reasoning. Coding- Coding decoding. Arrangements-Seating arrangements and data arrangement. Blood Relations-problems related to blood relations. Input and Output Patterns. Binary Logic Problems

Unit-III: Logical Reasoning

Alphanumeric series, Reasoning Analogies, Calendars, Cause and Effect, Clocks, Cubes and cuboids, Data Sufficiency, Decision Making, Deductive Reasoning/Statement Analysis, Dices, Directions, Mirror and Water Images,

Unit-IV: Logical Statements

Two premise argument. More than two premise argument using connectives. Statement and Assumptions. Statement and Conclusions. Syllogism.

Quantitative Aptitude and Data Interpretation

Course Objectives

- To understand various numerical concepts including whole numbers, fractions, and indices
- To grasp foundational quantitative concepts
- To explore geometric shapes and their properties
- To calculate time related to work, and understand concepts of speed, distance, and their interrelationships
- To interpret and analyze raw and grouped data using bar graphs, pie charts, and measures of central tendency

Learning Outcomes

- Able to apply numerical concepts and methods for problem-solving
- Able to solve problems involving ratios, proportions, and mixtures
- Able to solve practical problems using basic time and work formulas
- Able to apply the Pythagorean Theorem and calculate perimeter and area for various polygons
- Able to understand basic probability concepts and calculate probabilities

Unit-I: Numbers

Whole numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surds and Indices, Problems on Numbers, Divisibility. Steps of Long Division Method for Finding Square Roots

Unit-II: Basic concepts

Different formulae of Percentage, Profit and Loss, Discount, Simple interest, Ratio and Proportion, Mixture.

Unit-III: Time

Time and Work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed; relationship among them.

Unit-IV: Concept of Angles

Different Polygons like triangles, rectangle, square, right angled triangle, Pythagorean Theorem, perimeter and Area of Triangles, Rectangles, Circles.

Unit-V: Raw and grouped Data

Bar Graphs, Pie charts, Mean, Median and Mode, Events and Sample Space, Probability

Personality Development

Course Objectives

- To help the learners understand the concept and significance of Life Skills.
- To enhance one's ability to be fully self-aware by overcoming fears and insecurities for holistic personal growth.
- To develop interpersonal skills and adopt effective leadership behavior for self-empowerment and the empowerment of others
- To demonstrate effective communication skills for personal and professional growth

Learning Outcomes

- Define and identify different life skills required in personal and professional life.
- Develop self-awareness and apply techniques to cope with emotions and stress.
- Enhance interpersonal skills and demonstrate effective leadership qualities.
- To have developed good communication skills

Unit-I: Overview of Life Skills
Meaning and Significance of Life Skills; Social and Negotiation Skills; Thinking Skills and Coping Skills; Application of Life Skills

Unit-II: Life Skills Identified by WHO
Self-awareness; Empathy, Critical Thinking; Creative Thinking, Decision Making; Problem Solving, Effective Communication; Interpersonal Relationship, Coping with Stress; Coping with Emotions.

Unit-III: Leadership Skills
Meaning of Leadership; Leadership Styles; Leadership Functions; Qualities of a Good Leader.

Unit-IV: Communication Skills for Personal and Professional Growth
Importance of Effective Communication; Verbal and Non-Verbal Communication Skills; Active Listening Techniques

Reading List

- ✓ *Education, P. (2011). Teacher's Manual: Step by Step: Learning Language and Life Skills. Pearson Education India.*
- ✓ *UNICEF. (2019) Boys on the Move: A trainer's handbook for implementation of a Life Skills Programme for Unaccompanied Adolescents Boys and Young Men. https://www.unicef.org/eca/media/10271/file*
- ✓ *UNODC Module 7: Life Skills. https://www.unodc.org/pdf/youthnet/action/message/escap_peers_07.pdf*

- ✓ *American India Foundation. (2018)Handbook of Activities on Life Skills. New York. https://aif.org/wp-content/uploads/2018/10/Lifeskills-2018a_MAST.pdf*
- ✓ *Northouse, Peter G.(2009). Leadership: Theory and Practice, Sage Publications Pvt. Ltd.*
- ✓ *Plecas. Darryl, Squires. Colette and Garis. Len, (2018). The Essentials of Leadership in Government: Understanding the basics, University of Fraser Valley: US https://cjr.ufv.ca/wp-content/uploads/2018/02/Essentials-of-Leadership-book-2nd-Ed-web.pdf*
- ✓ *Singh. Sanjay Kumar and Lata. P. (2015) Communication Skill, Oxford University Press: India*

Working with Communities

Course Objectives

- Develop understanding regarding community organization as a method of social work
- Understand the critical elements of community organization practice
- Enhance the understanding of the roles of the agencies and community organizer
- Understand Urban, Rural and Tribal social systems and their problems

Learning Outcomes

Able to conduct community need assessment, identify and analyze community assets, and understand the socio-economic, cultural, and political context of Indian communities to inform intervention strategies effectively.

Unit – I: Understanding Community

Definitions, Characteristics, types and nature. Distinct Characteristics of Urban, Rural and Tribal communities.

Unit-II: Introduction to Community Organization

Concepts and definitions of community organization. Rationale, values and Principles of community organisation. Steps and process of community organisation. Skills for Community Organization.

Unit – III: Conceptualizing Community Organization

Approaches and Models of Community Organization.

Unit-IV: Building Fraternity in Community

Appreciating diversity and building bridges between groups- situating the self in the context of the community, relationship building and interactions.

Reading List

- ✓ *Goel, K. (2014). Understanding community and community development (Doctoral dissertation, Niruta Publications).*
- ✓ *Goel, K., Pulla, V., & Francis, A. P. (Eds.). (2014). Community Work: theories, experiences and challenges. Niruta Publications.*
- ✓ *Reisch, M., & Wenocur, S. (1986). The future of community organization in social work: Social activism and the politics of profession building. Social Service Review, 60(1), 70-93.*
- ✓ *Hardina, D. (2002). Analytical skills for community organization practice. Columbia University Press.*
- ✓ *Hardina, D. (2000). Innovative Approaches for Teaching Community Organization Skills in the Classroom. Routledge.*
- ✓ *Minkler, M. (Ed.). (2005). Community organizing and community building for health. Rutgers University Press.*
- ✓ *Perkins, D. D., Brown, B. B., & Taylor, R. B. (1996). The ecology of empowerment: Predicting participation in community organizations. Journal of Social Issues, 52(1), 85-110.*
- ✓ *Andharia, J. (2007). Reconceptualizing community organization in India: A transdisciplinary perspective. Journal of Community Practice, 15(1-2), 91-119.*

- ✓ *Shukla, S. R., & Sinclair, A. J. (2010). Strategies for self-organization: Learning from a village-level community-based conservation initiative in India. Human Ecology, 38, 205-215.*
- ✓ *Jha, M. K. (2016). Community organising and political agency: changing community development subjects in India. In Politics, Power and Community Development (pp. 65-82). Policy Press.*
- ✓ *Moffatt, K., George, P., Alphonse, M., Kanitkar, A., Anand, V., & Chamberlain, J. (2011). Community practice at a crossroads: the impact of the global on the local in India. Community development journal, 46(1), 104-121.*

Legal Drafting

Aim of the course is to equip participants with the essential skills and knowledge required for proficient legal drafting in both civil and criminal contexts, thereby enabling them to effectively navigate legal proceedings and contribute meaningfully to the any profession.

Course Objective:

- Develop comprehensive understanding of fundamental rules of civil and criminal pleadings.
- Cultivate proficiency in drafting legal documents like plaints, bail applications, etc.
- Acquire knowledge of procedural aspects.
- Foster critical thinking for accurate and legally sound drafting.
- Enhance ability to apply legal principles effectively in drafting.

Course Outcomes:

- Understand fundamental rules of pleadings in civil and criminal cases.
- Proficiency in drafting legal documents such as plaints, bail applications, etc.
- Knowledge of procedural aspects.
- Practical skills in drafting notices, replies, agreements, petitions, and applications.

Learning Outcomes:

- Comprehensive understanding of pleading structure and content.
- Effective application of legal principles in drafting.
- Evaluation of legal process steps in civil and criminal contexts.
- Development of critical thinking for accurate and legally sound drafting.

Unit I: Fundamental Legal & Professional Skills

(a) Legal language & Communications Skills
(b) Client Counselling, Advocacy ,Mediation & Para-legal skills.
(c) Plaint- Nature and Structure
(d) Written Statement and Affidavit

Unit II: General Principles of Criminal Pleadings

(a) Information to Police in Cognizable and Non-Cognizable case under Section 173 & 174 of BNSS (Second), 2023.
(b) Complaint to Magistrate, Section 223- of BNSS (Second), 2023
(c) Grant of Maintenance for Wives, Children and Parents under Section 144 of BNSS (Second), 2023
(d) Application for Bail.

Unit III: Drafts

(a) Notice to the tenant under section 106 of Transfer of Property Act
(b) Reply to notice
(c) General Power of Attorney
(d) Will

Unit IV: Drafts

a) Agreement to Sell, Sale deed
b) Petition for grant of probate / Letters of Administration
c) Application for appointment of receiver/Local Commissioner

Quantitative & Logical Thinking

Course objectives

- To select and apply appropriate methods to solve real world problems;
- To interpret quantitative model and understand a variety of methods of communicating them;
- To improve decision making skills, problem solving skills and setting goals.

Course Outcomes

After completion of the course, learners will be able to

- To apply appropriate methods to solve real world problems,
- To understand various methods to solve the difficulties and communicating thereafter,
- To draw conclusion and / or make decisions based on analysis and critique of quantitative information using proportional reasoning.

Unit –I: Whole numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surds and Indices, Problems on Numbers, Divisibility; Steps of Long Division Method for Finding Square Roots.

Unit –II: Basic concepts, Different formulae of Percentage, Profit and Loss, Discount, Simple interest, Ratio and Proportion, Mixture, Time and Work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed; relationship among them

Unit –III: Concept of Angles, Different Polygons like triangles, rectangle, square, right-angled triangle, Pythagorean Theorem, Perimeter and Area of Triangles, Rectangles, Circles.

Unit-IV: Analogy basing on kinds of relationships, Simple Analogy; Pattern and Series of Numbers, Letters, Figures. Coding-Decoding of Numbers, Letters, Symbols (Figures), Blood Relations. Logical Statements – Two premise argument, more than two premise argument using connectives; Venn Diagrams, Mirror Images, Problems on Cubes and Dices.

Suggested Readings

- ✓ Skill Enhancement Compulsory Course-II – Quantitative and Logical Thinking (Special Course) – Odisha State Higher Education Council, Bhubaneswar
  (The recommended Books are to be decided by the Board of Studies)

Fundamentals of Data Science & Data Management

Course Objectives
The course aims to

- To understand the Basics of Data Science:
- To explore Data Collection and Pre-processing Techniques:
- To learn Fundamentals of Data Analysis:
- To master Data Visualization and Communication:
- To gain Proficiency in Data Management:
- To develop Skills in Machine Learning and Predictive Modeling:
- To apply Data Science Techniques to Real-World Problems:

Course Outcomes
After completion of the course, learners will be able to:

- Define the key concepts and principles of data science and data management.
- Collect, clean, and pre-process data for analysis using appropriate techniques.
- Analyze data using statistical methods and interpret the results effectively.
- Create informative and visually appealing data visualizations to communicate insights.
- Demonstrate proficiency in managing data and ensuring its integrity, security, and privacy.
- Apply machine learning algorithms to build predictive models and evaluate their performance.
- Solve real-world problems using data science techniques and present findings in a clear and concise manner.

Unit 1: Foundations of Data Science

Introduction to Data Science, Definition and Scope of Data Science, Historical Overview and Evolution, Applications and Real-World Examples, Understanding Data, Types of Data: Structured, Semi-Structured, and Unstructured, Data Sources and Collection Methods, Data Quality and Pre-processing Techniques, Introduction to Programming for Data Science, Basics of Python Programming Language, Data Structures and Control Flow, Introduction to Libraries such as Pandas and NumPy for Data Manipulation, Statistics for Data Science.

Unit 2: Data Analysis and Visualization

Exploratory Data Analysis (EDA), Data Visualization Techniques: Matplotlib, Seaborn, Summary Statistics and Data Visualization, Identifying Patterns and Relationships in Data, Data Munging and Data Wrangling, Cleaning and Pre-processing Data, Handling Missing Values and Outliers, Data Transformation and Feature Engineering, Data Dashboards and Storytelling, Principles of Effective Data Visualization, Tools for Creating Interactive Dashboards: Tableau, Power BI, Communicating Insights from Data through Storytelling

Unit 3: Machine Learning Fundamentals

Introduction to Machine Learning, Supervised vs. Unsupervised Learning, Regression and Classification Techniques, Model Evaluation and Selection Criteria, Deep Learning Basics,

Introduction to Neural Networks, Deep Learning Architectures: CNNs, RNNs, Applications of Deep Learning in Commerce and Business

Unit 4: Advanced Topics in Data Science

Big Data and Distributed Computing, Introduction to Big Data Technologies: Hadoop, Spark, Handling Large Volumes of Data: Batch vs. Real-Time Processing, Scalable Data Storage and Processing Solutions, Data Ethics and Privacy, Ethical Considerations in Data Collection and Usage, GDPR and Data Privacy Regulations, Strategies for Ensuring Data Security and Compliance

Introduction to Financial Technology (Fin-Tech)

Course Objectives

- To provide students with a foundational understanding of financial technology (Fin-Tech) and its evolution within the financial services industry.
- To explore the key technologies driving Fin-Tech innovation, including block-chain, artificial intelligence, big data analytics, and machine learning.
- To examine the impact of Fin-Tech on traditional financial services, including banking, insurance, investment management, and payment systems.
- To analyze the regulatory challenges and opportunities associated with the adoption of Fin-Tech solutions.
- To evaluate the role of start-ups, incumbents, and partnerships in driving Fin-Tech innovation and disruption.
- To discuss emerging trends and future directions in Fin-Tech, including decentralized finance (DeFi), digital currencies, and financial inclusion initiatives.
- To develop critical thinking and problem-solving skills through case studies, discussions, and hands-on exercises related to real-world Fin-Tech applications.

Course Outcomes

After completion of the course, learners will be able to:

- Students will be able to explain the concept of financial technology (Fin-Tech) and its significance in transforming the financial services industry.
- Students will demonstrate an understanding of key Fin-Tech technologies, including block-chain, artificial intelligence, and big data analytics, and their applications in financial services.
- Students will be able to analyze the impact of Fin-Tech on traditional financial institutions and business models, identifying opportunities and challenges for innovation and disruption.
- Students will understand the regulatory environment surrounding Fin-Tech and its implications for industry stakeholders, including compliance requirements and consumer protection measures.
- Students will evaluate different strategies for leveraging FinTech, including partnerships, acquisitions, and in-house development, to enhance business operations and customer experiences.
- Students will be able to identify emerging trends and opportunities in the Fin-Tech landscape, such as decentralized finance (DeFi), digital identity, and sustainable finance solutions.
- Students will develop critical thinking skills by analyzing and proposing solutions to real-world Fin-Tech challenges through case studies and group projects.

Unit 1: Foundations of FINTECH

Introduction to FINTECH, Definition and Scope of FINTECH, Historical Evolution and Impact on Financial Services Industry, Key Drivers and Trends in the FINTECH Landscape.Regulatory Environment; Overview of Regulatory Frameworks Governing FINTECH, Compliance and Legal Considerations for FINTECH Start-ups, Understanding Regulatory Challenges and Opportunities.Emerging Technologies in FINTECH; Block-chain Technology and Cryptocurrencies, Artificial Intelligence and Machine Learning in Financial Services, Robotic Process Automation (RPA) and its Applications.

Unit 2: Digital Payments and Transactions

Digital Payment Ecosystem, Evolution of Payment Systems: From Cash to Digital Payments, Payment Gateways, Wallets, and Payment Apps, Trends in Contactless Payments and Mobile Wallets, Peer-to-Peer (P2P) Lending and Crowdfunding, Overview of P2P Lending Platforms, Understanding Crowdfunding Models: Rewards, Equity, and Debt-Based Crowdfunding, Risks and Benefits of P2P Lending and Crowdfunding, Cryptocurrencies and Decentralized Finance (DeFi). Introduction to Cryptocurrencies: Bitcoin, Ethereum, and Altcoins, Decentralized Finance (DeFi) Ecosystem, Opportunities and Challenges in Cryptocurrency Trading and Investing

Unit 3: Financial Inclusion and Access

Microfinance and Mobile Banking, Role of Microfinance Institutions (MFIs) in Financial Inclusion, Mobile Banking Solutions for the Unbanked and Underbanked, Case Studies of Successful Financial Inclusion Initiatives, Insurtech and Digital Insurance, Overview of Insurtech: Innovations in the Insurance Industry, Digital Insurance Platforms and Peer-to-Peer Insurance Models, Improving Access to Insurance Through Technology, Wealthtech and Robo-Advisors, Introduction to Wealthtech: Digitizing Wealth Management Services, Robo-Advisors: Automated Investment Platforms, Benefits and Limitations of Robo-Advisory Services

Unit 4: Future Trends and Career Opportunities

Emerging Trends in FINTECH; Future of Banking: Open Banking and API Integration, Rise of Embedded Finance and Financial Superapps, Impact of Quantum Computing and Internet of Things (IoT) on FINTECH. Career Opportunities in FINTECH; Roles and Responsibilities in the FINTECH Industry, Skills and Qualifications Required for Careers in FINTECH, Networking and Professional Development Opportunities

Suggested Readings

- ✓ *Akkizidis, I., &Stagars, M. (2015). Marketplace Lending, Financial Analysis, and the Future of Credit. New Jersey: Wiley.*
- ✓ *Chishti, S., &Barberis, J. (2016). The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries. New Jersey: Wiley.*
- ✓ *Chishti, S., Craddock, T., Courtneidge, R., &Zachariadis, M. (2020). The PayTech Book. New Jersey: Wiley.*
- ✓ *Diamandis, P. H., &Kotler, S. (2020). The Future Is Faster Than You Think: How Converging Technologies Are Disrupting Business, Industries, and Our Lives. New York: Simon & Schuster.*
- ✓ *Hill, J. (2018). FinTech and the Remaking of Financial Institutions. London: Academic Press, Elsevier.*

Fermentation Technology and Industrial Enzymes Credit

Unit I

Introduction to fermentation: History and development of fermentation technology, basic requirements of fermentation, Types of fermentations: Aerobic and Anaerobic fermentation, Solid state and Submerged fermentation (Batch, Fed-Batch and continuous system), Upstream and Downstream processing.

Unit II

Isolation and preservation of industrial microorganisms, Controlling mechanism and regulation of catabolic and anabolic processes/pathways in microbial induction, carbon catabolite repression, feedback inhibition. Types of culture medium; Selective media, differential media, industrial media, carbon and nitrogen sources, use of anti-foamimg agents.

Unit III

Basic function of fermenter for microbial and animal cell culture, fermenter design (Stirred tank, bubble columns, airlift) and body construction, various parts of fermenter. Biochemical process variables and their measurements; Measurement and control of pH, temperature, dissolved oxygen, aeration and agitation. Online analysis and control of process parameters and biosensors.

Unit IV

Enzymes of industrial applications, enzyme classification and nomenclature, quantification of enzyme activity and specific activity. Kinetics of enzyme catalyzed reaction (steady state kinetics). Industrial production of enzymes; Amylase and Cellulase. Industrial application of Enzyme immobilization (Calcium alginate beads, polyacrylamide beads).

Practical

1. Screening and Identification of industrially important microorganisms from natural habitats through microbial methods i.e. spread plate, streak plate, serial dilution, simple staining, differential staining, acid fast staining and spore staining.
2. Enumeration of starch hydrolyzing and cellulose decomposing bacteria through plate countmethods.
3. Production of amylase and cellulose from steady state batch culture fermentation in Erlenmeyer flask.
4. Study on extraction and purification of enzymes (crude enzyme, partially purified enzyme) through ammonium sulphate precipitation, gel/size – exclusion chromatography (demonstration of procedures through pictomicrograhs/ slides/presentations).

Molecular Diagnostics

Programme Outcome

- Understanding of disease diagnosis and types of infectious disease.
- To diagnose diseases.
- Knowledge of advanced technology for interpretation of genetic diseases .
- Knowledge of various immunoassays and Immunohistochemistry techniques.

Course Outcome

- Acquisition of skills in disease diagnosis.
- Understanding PCR based molecular diagnosis of bacterial, viral and fungalpathogens.
- Knowledge on application of DNA sequencing and DNA finger printing**.**

Learning Outcome

- Learner gains knowledge on collection methods and storage of clinical samples fordisease diagnosis.
- Acquire skills for detection and quantification of biological parameters for diseaseidentification and diagnosis.
- Molecular diagnosis of pathogens through DNA sequencing, PCR and restrictionenzyme based technique.
- Understanding the role of immunohistochemistry in disease diagnosis.

Unit I

Introduction and history of disease diagnosis, mode and type of infectious disease, philosophy and ethics for clinical samples. Various methods of collection, storage and transport/shipping procedures for clinical samples. Diagnosis of infectious disease caused by bacteria, fungi, viruses, protozoa and Helminthes.

Unit II

Biochemical parameters for detection and quantification of clinical samples (i.e. urine, blood, feacal matters, tissue biopsy) for bacterial disease. Detection and quantification of sugars, albumin, urea, protein, globulin and vitamins. Disease identification, genetic test for disorders, population screening for genetic disorder. Treatment and management in genetic diseases.

Unit III

Culture independent analysis of bacteria, PCR based microbial typing, Molecular diagnosis offungal pathogens. DNA finger printing, Southern blotting and electrophoresis analysis, RAPD and RFLP techniques, DNA sequencing (Sanger). Multiplex-PCR analysis.

Unit IV

Principle and diagnosis techniques of immunoassays: Radio immunoassay (RIA), Enzyme linked immunosorbent assay (ELISA), chemiluminescent immunoassay (CIA), fluorescent antibody test/ immunoassay (FIA). Principle and techniques of Immunohistochemistry. Application of Biosafety cabinets and containment for clinical specimens. Good laboratory practices in handing clinical samples.

Practical

1. Introduction to Biosafety Laboratory (BSL-1 to 4) level for bacteria/ cell culture.
2. Culture and analysis of pathogenic microbes from clinical samples (Refer: BSL-1/2).
3. Preparation of buffer solutions, reagents and culture media.
4. Isolation of chromosomal and plasmid DNA from bacteria.
5. Isolation of genomic DNA from tissue.
6. Spectrophotometric Quantitation of genomic DNA.
7. Gel electrophoresis of DNA and PCR amplification (procedure demonstrationthrough Pict micrograph/ slides/ video lectures)

Food Fermentation Techniques

Unit 1

- **Fermented Foods:** Definition, types, advantages and health benefits
- **Grain Based Fermented Foods:** Soy sauce, Bread, Idli and Dosa: Microorganisms and production process
- **Vegetable Based Fermented Foods:** Pickels, Saeurkraut: Microorganisms and production process

Unit 2

- **Milk Based Fermented Foods:** Dahi, Yogurt, Buttermilk (Chach) and cheese: Preparation of inoculums, types of microorganisms and production process
- **Fermented Meat and Fish:** Types, microorganisms involved, fermentation process
- **Probiotic Foods:**Definition, types, microorganisms and health benefits

Suggested Readings

- ✓ *Hui YH, Meunier-Goddik L, Josephsen J, Nip WK, Stanfield PS (2004) Handbook of food and*
- ✓ *fermentation technology, CRC Press*
- ✓ *Holzapfel W (2014) Advances in Fermented Foods and Beverages, Woodhead Publishing.*
- ✓ *Yadav JS, Grover, S and Batish VK (1993) A comprehensive dairy microbiology, Metropolitan*
- ✓ *Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer.*

Microbial Diagnosis in Health Clinics

Unit 1

- **Importance of Diagnosis of Diseases**: Bacterial, Viral, Fungal and Protozoan Diseases of various human body systems, Disease associated clinical samples for diagnosis.
- **Collection of Clinical Samples**: How to collect clinical samples (oral cavity, throat, skin, Blood, CSF, urine and faeces) and precautions required. Method of transport of clinical samples to laboratory and storage.

Unit 2

- **Direct Microscopic Examination and Culture**: Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa stained thin blood film for malaria.
- Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar, Distinct colony properties of various bacterial pathogens.
- **Testing for Antibiotic Sensitivity in Bacteria**: Importance, Determination of resistance/sensitivity of bacteria using disc diffusion method, Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method

Unit 3

Serological and Molecular Methods

- **Serological Methods** : Agglutination, ELISA, Chemiluminiscence, Immunofluorescence Assay (IFA), Western blotting
- **Nucleic acid amplification techniques**: **PCR,** Ligase chain reaction (LCR), Isothermal amplification [Nucleic acid sequence-based amplification (NASBA); Transcription- mediated amplification (TMA**); Strand displacement amplification (SDA)]**
- **Nucleic acid hybridization techniques:** Fluorescence in situ hybridization (FISH), Line probe assay (LiPA).
- **Kits for Rapid Detection of Pathogens**: Typhoid, Dengue and HIV, Swine flu

Suggested Reading

- ✓ *Ananthanarayan R and Paniker CKJ (2009)Textbook of Microbiology, 8th edition, Universities Press Private Ltd.*
- ✓ *Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication*

- ✓ *Randhawa, VS, Mehta G and Sharma KB (2009) Practicals and Viva in Medical Microbiology 2nd edition, Elsevier India Pvt Ltd*
- ✓ *Tille P (2013) Bailey's and Scott's Diagnostic Microbiology, 13th edition, Mosby*
- ✓ *Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and Mccartney Practical Medical Microbiology, 14th edition, Elsevier.*

Basics of Archives and Museum

Course Objectives:

- To introduce students to the institutions of Archives and Museums as a site of knowledge.
- To aid students to understand the making of the primary sources for the study of history.
- To help students understand and appreciate the different kinds of archives and museum and then new structuring in the digital era.

Course Outcomes:

- Students would learn about the many uses of archives and museums as a site of historical and social knowledge.
- They would be trained to use archives and understand the process of classification and cataloguing of the records.

Unit I: Definition of Archives and Museum: types - digital, virtual, crafts, media; difference between archives, museum, and library

This unit defines Archives and Museum. It also elaborates on the types of archives and museums which includes digital, virtual, crafts, media. It also tells the difference between archives, museum, and library.

Unit II: History of development of archives and museums in India with one case study each

This unit examines the history of development of archives and museums in India with one case study each.

Unit III: Collection, documentation, preservation

This unit elaborates upon distinct characteristics of collection. It also examines the concerns which govern its documentation and preservation.

Unit IV: Museum presentation and exhibition

This unit familiarizes students with the way in which museums are organised and managed. It also examines the considerations which govern the way exhibitions in museums are managed.

Unit I: Students will learn about archives and museums; their types, and their advances.

Unit II: Students will grasp the historical development of archives and museums by collectively studying one case study each. They will understand and be able to discuss their significance.

Unit III: Students will understand and closely witness the processes of archiving and preservation in museums. How records and artifacts and collected, classified, and preserved.

Unit IV: In the last unit students will be acquainted to the process of presentation and exhibition of artifacts.

Suggested Readings

- ✓ *Singh, Kavita. (2003). "Museum is National: The Nation as Narrated by the National Museum New Delhi". in Geeti Sen (Ed.). India: A National Culture. New Delhi:Sage.*
- ✓ *Bhattacharya, Sabyasachi. (2018). Archiving the Raj: History of Archival Policy of the Govt. of India with Selected Documents 1858- 1947. Delhi: Oxford University Press*
- ✓ *Agrawal, O. P. (2007). Essentials of Conservation and Museology. Delhi: Sundeep.*
- ✓ *Kathpalia, Y. P. (1973). Conservation and Restoration of Archive Material. Paris: UNESCO.*
- ✓ *Mathur, Saloni. (2000). "Living Ethnological Exhibits: The Case of 1886". Cultural Anthropology vol. 15 no.4, pp. 492-524.*
- ✓ *Breckenridge, Carol. (1989). "Aesthetics and Politics of Colonial Collecting*: India at World *Fairs." Comparative Studies in Society and History vol. 31 no.2, pp. 195-216*

Reference Readings

- ✓ *Ambrose, Timothy & Crispin Paine. (1993). Museum Basics. London: Routledge.*
- ✓ *Choudhary, R. D. (1988). Museums of India and their Maladies. Calcutta: Agam Prakashan.*
- ✓ *Mathur, Saloni. India by Design: Colonial History and Cultural Display. Berkeley: University of California.*
- ✓ *Nair, S. N. (2011). Bio-Deterioration of Museum Materials. Calcutta: Agam Prakashan.*
- ✓ *Sengupta, S. (2004). Experiencing History through Archives. Delhi: MunshiramManoharlal.*

Internet Resources

1. Internet Archives https://archive.org/

2. Partition Archives https://in.1947partitionarchive.org/

3. National Museum https://nationalmuseumindia.gov.in/en

Activities to Do

1. Students are expected to collect and catalogue some primary sources by downloading them from internet or getting them photocopied from a local archive or a library.

2. Students are expected to collect and record the details of various museums in their state and others.

Historian's Craft

Course Objectives

- This course aims to make students acquainted with how historian's constructs past and why there are so many versions of historians on the same event or person. It seeks to endow students with an understanding of what historians do, i.e. how he identifies his research questions, and pursues the research questions through his scientific enquiry. He explores causation, contingency, understanding human experiences, comprehending factors affecting human life and its surroundings, identifying structuring social forces operating in time and space
- It examines how historians choose a historical frame, contextualize, and use different social categories like class, caste, gender, race, region, religion when producing a historical narrative.
- The course deals with historians craft such how historian locates sources for history writing, check the credibility of sources, and distinguishes between different kinds of sources. By familiarising the students with the essential tools of historical analysis, the course shall enable them to examine primary sources and their application to address a historical issue, problem or interpretation.

Course Outcomes

On successful completion of this course, the students shall be able to:

- Outline / illustrate the need for historical perspective
- Explain the historical nature of all human activities and social sphere
- Distinguish essential features of historical inquiry
- Identify a social phenomenon and use a historical perspective to contextualize the concerned phenomenon, i.e. trace its changing nature / dynamics.
  Delineate sources that can be used to describe and interpret a social issue, an event, a given time period, or a wider social development
- Differentiate between sources and assess their credibility in defining a historical development
- Demonstrate the ability to interpret sources, and to identify biases and blind spots in a historical narrative.

Unit 1: Historicizing Human Activities:

This unit explores what it means to be historian, his subject matter, how a historian historicises the past. It deals why history is always complex.

i. History, men and Time

ii. Boundaries between Past and Present and their interpenetration

iii. Causation in History & n Natural Sciences: Differences

Unit 2: The Historian's Craft:

i. Historical observation (Characteristics of Observation, Evidence)

ii. Historical Criticism: Internal and External Criticism, Corroboration,

iii. Historical Analysis: Quantitative, Qualitative and their Differences

Unit 3: Sources and interpretations

i. Primary and Secondary Sources

ii. Understanding Texts and Their Context: Hatigumpha Inscription, Macaulay's Minutes, Rebati of Fakir Mohan

(Verbatim representation of primary sources in historical writing is not historians. It is important to historicise these primary texts. The meaning of the texts becomes clear when Texts are read in its context. Students are encouraged to read the following primary sources and then encouraged to historicise these texts by locating them in their contexts)

Unit IV: Interpretation and Social Theories: Positivism, Marxism and Gender

i. Complexities of Historicisation: Different dimensions of Human Past, Multiple Explanation, Theoretical frameworks of looking at multiple Dimensions of Human past

ii. Positivist Methods: Linear, stage theory Progress, Positivist methodology, Emphasis on Great Leaders

iii. Marxist Methods: Historical materialism, Class Dimension, Used and Exchange Value, Role of Ideology

Outcomes: Unit wise

Unit I: Students will learn why it is important to "historicise". Why do you we think about things, people, social processes, economy, culture, and every aspect of human existence historically. How History is different from other aspects of such disciplines like Geology, Life Sciences, and others that also study past and origins of earth and life.

Unit II: How does a historian work? How is history constructed? Is History written, constructed, or reconstructed? These questions which are at the heart of the discipline of History will be asked, discussed, and taught in this unit.

Unit III: What are the different sources for writing history? How sources come into being? Who produces them? And how does a historian interpret the sources to produce a cogent and cohesive narrative of the past.

Unit IV: What are the different perspectives of reading and writing history? Why history writing with the same set of sources could produce different interpretations of the past? These are the questions that the students will ask and understand.

Essential Readings

- ✓ *Bloch, Marc. (1992). The Historian's Craft, Manchester University Press. Reprint ("Introduction", pp. 1-19).*
- ✓ *Hobsbawm, Eric J. (1998).On History, UK: Abacus (Ch.2, "A Sense of the Past", and Ch.3: 3, "What Can History Tell Us About Contemporary Society)*
- ✓ *Schlabach, Gerald. A Sense of History: Some Components https://www.geraldschlabach.net/resources/courses/handouts/sense-of-history/*
- ✓ *Daniels, Robert V. (1981), Studying History: How and Why, third edition, Englewood Cliffs, N.J.: Prentice-Hall, pp.11-13 and 25-39.*
- ✓ *Carr, E.H. (1991). What is History. Penguin. Reprint. (Ch.1, "The Historian and His facts, from E.H. Carr What is History.*
  Rebati from Fakirmohan Granthavali (Available in Srujanika's Odia Bibhaba)
- ✓ *Maculay's Minutes (1835): http://home.iitk.ac.in/~hcverma/Article/Macaulay-Minutes.pdf*
- ✓ *Hatigumpha Inscription : https://en.wikipedia.org/wiki/Hathigumpha_inscription*

Internet Resources

1. What is History Now? https://www.youtube.com/watch?v=9Xh8hIF2TNg

Activities to Do

- Students are expected to compile and contextualise at least five primary sources. They need to focus on a primary source, then see how different historians have interpreted them, and contextualise the findings in a comparative perspective.

Tarjuma Nigari

Course Outcomes:

- To acquaint the students with the tradition of Translation and its relevance.
- To develop understanding among students towards techniques of Translation and differences between creative and non-creative writings.

Unit I

1- ترجمہ کی تعریف اور اہمیت و افادیت

2.ترجمے کا وصول و ضابطہ

Learning Outcome: After completion of this unit the learner will be able to explain the need and utility of translation and understand the techniques of translation also.

Unit II

1۔ ریختہ ادبی ترجمہ

2۔ ادبی ترجمہ

3۔ سائنسی ترجمہ

Learning Outcome: After completion of this unit the learner will be able to explain about different types of translation and their methods and differentiate between translation method of prose and poetry forms and literary and non-literary language.

Unit III

1۔ اصطلاح سازی کے اصول

2۔ اردو ترجمے کے ادارے

Learning Outcome: After completion of this unit the learner will be able to discuss about the uses of terminologies and its formation and get informed about different institutions of Urdu translation.

Unit-IV

1۔ رتہمج ی ک شم

ا۔ ارگن ی زی ے س ار دو رتہمج

۲۔ دنہ ی/ا دن ا ے س ار دو رتہمج

Learning Outcome: After completion of this unit the learner will be able to translate the literary and non-literary text from Hindi/English to Urdu or vice-versa.

کتونL

1۔ نف رتہمج اگنری---قیلخ امجن

2۔ رتہمج اگنری--- نا قت دص ی قی

3۔ نف رتہمج اگنری---وہظر ادلنی

4۔ اصطالاح ب رتہمج---اخدل ومحمد

Model Questions

1۔ رتہمج اگن ری ے ک ی سک ان ک ادار ے اک ن ام لکھی ے۔	01
2۔ رتہمج ی ک رعتف ی دنچ اافل ظ ی م ےیجیک۔	02
3۔ اصطالح سا زی ے ک اوصل رپ رصتخما روش ن دا ےیل۔	05
4۔ رتہمج اگن ری ے ک اوصل و وضاب ے س ث حب ےیجیک۔	08

Urdu Sahafat

Course Outcomes:

- To acquaint the students with the basic feature of Journalism and its relevance.
- To develop understanding among students towards Journalism and professional opportunity in this field.

Unit I

1 ۔ اصحافت کی تعریف

2۔ادب اور اصحافت کا فرق

3۔ خبر کی تعریف اور اقسام

Learning Outcome: After completion of this unit the learner will be able to explain the need and utility of journalism and differentiate a literary piece from a journalistic work and discuss about news and its

forms.

Unit II

1۔ خبر کے وصول کے ذرائع

2۔ خبر کے اقسام (رپورتاژ، ادارتی اور فیچر)

Learning Outcome: After completion of this unit the learner will be able to explain about the sources of news and its collection and news writing.

Unit III

1۔ خبر اگہی کی کیا ضرورت

ا۔ عرضداشت

۲۔ رشتہ

۳۔ شہریت

Learning Outcome: After completion of this unit the learner will be able to explain about different types of news and differentiate among objective news, elaborative news and investigative news.

Unit-IV

1۔ رچیف اگنری

2۔ اداریہ اگنری

3۔ ارٹنووی

Learning Outcome: After completion of this unit the learner will be able to write news feature and editorial and take interview hence creating employability for themselves.

Lونتک

1۔ ریخ اگنری--- ساعفدقوایئ

2۔نفادصتف---وہظرادلنی 3۔نفادصتف---

رمحیلعااہلمش 4۔اردورجزلنحم۔۔۔۔نسحاعدبی

5۔اردوادصتف رتہمجوادارب۔۔۔دیسایض اہلل

6۔رربہاابخرونیسی۔۔۔۔دیسااقبل اقدری

Model Questions

1۔خ .بوکیئربخ اےسی صخشےکوتطسےسےلموج اس اظالغ ےسواتیفقےکساھتساھت اسیک رہشتاک

ااقدتسقیھبرکھن ٓاوہوتربخےکاےسی ذراعئایکہال ےتںیہ؟ 01

2۔ربخیکرعتفیرصتخما ًلھکی ے۔ 02

3۔شیتفتربخرپرصتخما ًونب لھکی ے۔ 05

4۔ربخےکوصحل ےک ذراعئےسثحبےیجیک۔ 08

Bio-Fertilizers

Course Objectives

- To understand the methods of isolation, propagation, and application of different bacterial, fungal and algal biofertilizers.
- To learn the characteristics of strains of importance for use as biofertilizers and the methods of their cultivation, processing and application.
- To inculcate the knowledge for understanding the concept and procedure of organic farming for sustainable agroecosystem.
- To learn the processing and recycling methods of biodegradable organic wastes of diverse origin and their integration with biofertilizers.
- To learn the techniques and application of composting, vermin-composting and reuse of complex organic maters and method of their agricultural application.

Course Outcomes:

After the completion of the course the students are expected to have

- Knowledge of biofertilizers belonging to different microbial groups and their association with crop plants.
- Skill on isolation, culture, mass propagation and harvesting, processing, storage and marketing of various types of biofertilizers.
- Detailed understanding on the techniques and benefits of organic farming following green manuring and organic manure application.
- Knowledge on the nutritional advantage of the application of biofertilizers and the field doses of various biofertilizers for nitrogen and phosphorus nutrition.
- Skill to properly compost the organic wastes of various complexity and use of the compost on crop field for enhanced yield.

Unit I: LO: Awareness about the microbial groups, preparation and types of biofertilizers

General account about the microbes used as biofertilizer– Rhizobium – isolation, identification, mass multiplication, carrier-based inoculants, Actinorrhizal symbiosis. *Azospirillum*: isolation and mass multiplication, *Azotobacter*: classification, characteristics – crop response to Azotobacter inoculums, maintenance and mass multiplication.

Unit II:
LO: Knowledge on isolation, culture, harvesting, processing, storage and marketing of biofertilizers

Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation,factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit III: LO: Understanding the nutritional advantage of various biofertilizers

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation andinoculum production of VAM, and its influence on growth and yield of crop plants.

Text Books:

- ✓ *Mahendra Rai, (2006). Hand book of Microbial Bio-fertilizers. CRC Press.*

ReferenceBooks:

- ✓ *Dubey, R.C., 2005 A Text book of Biotechnology S. Chand & Co, New Delhi.*
- ✓ *Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.*
- ✓ *John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication,New Delhi.*
- ✓ *Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.*
- ✓ *Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New -Delhi.*
- ✓ *Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic. Farming Akta Prakashan, Nadiad*

Pravin Chandra Dwivedi. (2008). Biofertilizers. Pointer Publishers.

Nursery and Gardening

Course Objectives

- To give a general concept on the nursery techniques and requirements.
- To impart knowledge on seeds and seed technology.
- To learn about the methods of propagation of plants in the nurseries and infrastructural requirements.
- To give a general knowledge on the gardening techniques at different scales.
- To impact knowledge on modern methods of gardening with respect to the application of computer technology.
- To learn the techniques of raising seedlings of common horticulturally and agriculturally important plants.

Course Outcomes

On completion of the course the students shall

- Have knowledge on plants and planting methods.
- Be able to understand the process for storing seeds and plant propagules.
- Skills on various methods of propagation and requirements of production of propagules.
- Able to understand the type of gardens and methods to develop a garden.
- Have knowledge on garden management and disease control.
- Have ability to cultivate commonly used vegetable crops and understand the method of cultivation.

Unit-I:

LO: Students will learn about the idea of nursery activities. They will also learn about the seed planting and production.

- Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.
- Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion – Seed production technology - seed testing and certification.

Unit-II:

LO: Students will learn about various methods of plant propagation and about green house.

- Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants – green house - mistchamber, shed root, shade house and glass house.

Unit-III:

LO: Students will learn about types of gardening for landscape and home. They will also learn about the soil, water and pest management.

Gardening: definition, objectives and scope - different types of gardening – landscape andhome gardening - parks and its components - plant materials and design – computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting

Text Books:

- ✓ *Saidaiah Pidigam, Sindhuja S., Geetha Amarapalli. (2018) Text Book of Nursery, Gardening and floriculture, Kalyani Publishers, New Delhi.*

Reference Books:

- ✓ *Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.*
- ✓ *Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.*
- ✓ *Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.*
- ✓ *Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.*
- ✓ *Agrawal, P.K. 1993, Handbook of Seed Technology, Dept. of Agriculture and Cooperation, National - Seed Corporation Ltd., New Delhi.*
- ✓ *Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.*

Soil less Cultivation

Course Objectives:

- To study about Introduction Soilless Organic and Semi-organic Cultivation, types, importance of Cultivation of plants under Hydroponic condition.
- To learn about the Physical parameters affecting growth of Hydroponically Cultivated plants.
- To study about various Nutrition medium for Hydroponic Cultivated plants.
- To understand about Disease and pest management and Management of waste Nutrient Solution
- To learn about the future prospective of Hydroponic Cultivation of Commercial plants.

Course Outcomes:

- Have knowledge about the types, methods and importance of Hydroponic. Cultivation of plants.
- Have clear understanding how the physical parameters affect the growth of Hydroponically Cultivated plants.
- Have ability to understand the different types of Nutrition medium available for Hydroponic Cultivated plants.
- Gain knowledge about different Nutrition medium for Hydroponic Cultivated plants.
- Be able to describe the Disease and pest management of hydroponic plants

Unit I:

LO: Students will learn basic and importance of soilless farming.

- Introduction to soilless plant cultivation: available issues in soil-based plant cultivation.
- Introduction to soilless farming. Organic, Inorganic and Semi-organic cultivation.
- Basic principle and technique of soilless cultivation. Importance of soilless cultivation in the current scenario.
- Advantages and disadvantages of Soilless cultivation.

Unit II: LO: This will enable to acquire knowledge hydroponic plant cultivation techniques

Hydroponic Plant Cultivation: Importance of nutrients (Macronutrient and micronutrient) for plant growth. Nutrient media used in soilless culture. Use of Biofertilizer: Phosphate Solubilizing Bacteria, Potassium Solubilizing Bacteria, Nitrogen fixing Bacteria etc. Nutrient in chemical forms and Real time Monitoring of nutrient via Sensors: TDS, pH, DO etc.

Unit III:

LO: This is to understand the semi-hydroponic plant cultivation techniques.

- Semi-hydroponic Plant Cultivation: Growing plants through various substrate culture. Vermiculite, Vermicompost, Cocopeat, perlite, Lica ball, Rock wool etc. Substrate as organic nutrient and neutral
- substrate. Aeroponics cultivation and its mechanism. Nutrient deficiency and disease Management.

Text Books:

- ✓ *Singh, D. J., & Davidson, J. (2016). Introduction to Hydroponics-Growing Your Plants Without Any Soil. Mendon Cottage Books.*

Reference Books:

- ✓ *Resh, H. M. (2022). Hydroponic food production: a definitive guidebook for the advanced home gardener and the commercial hydroponic grower. CRC press.*
- ✓ *Raviv, M., Lieth, J. H., & Bar-Tal, A. (Eds.). (2019). Soilless culture: Theory and practice: Theory and practice. Elsevier.*

Organic Farming

Course Objectives:

- To understand about organic farming and its significance in modern day of farming
- To learn the characteristics features of organic farming and its difference from traditional method of farming.
- To learn about government promotions and beneficial role of organic farming towards farmers.

Course Outcomes

After the completion of the course the students are expected to have

- Knowledge of organic farming and its need and prospect in modern day farming.
- Learn about the organic farming and its relevance with the sustainability, biodiversity and ecological balance.
- To get idea on the government policies on organic farming

Unit I:

LO: The students will learn about the concept of organic farming and its relevance with modern day farming.

- Definition need and scope of organic farming, Relevance to modern agriculture. Difference between organic and conventional farming practices.
- Modern farming practices – Permaculture, biodynamic farming.
- Organic farming – perspective in Odisha and India. Global status of organic farming. Future prospects of organic farming - advantages and barriers.

Unit II:

LO: Learners will learn about government initiative and promotions. They will learn about organic fertilizers used in organic farming.

- Governmental initiative on promotion of organic farming in India - policies and success stories. Marketing and export potential of organic products – impact on national economy Organic nutrient sources and their fortification, Nutrient management in organic farming
- Green Organic manures – methods of preparation of green manures, impact of green. manures towards organic farming.
- Biofertilisers – types, methods of application – benefits and limitations

✓ *Dabbert, S., Haring, A. M., & Zanoli, R. (2004). Organic farming: policies and prospects. Zed*

Unit III:

LO: The students will learn about the methods of controlling pest and diseases during organic farming. Also, they will learn about bioformulations for better organic farming

- Disease management, weed management and insect management under organic farming. Use of biological methods for pest and disease management
- Use of plant-based formulations for disease management – Use of neem extracts, seed kernels and other natural non-chemical-based formulation for management of diseases and pest for organic farming

Text Books:

Maliwal, P. L. (2020). Principles of Organic Farming: Textbook. Scientific Publishers.

Reference Books:

✓ *Somasundaram, E., Nandhini, D. U., & Meyyappan, M. (2021). Principles of organic farming. CRC Press.*

✓ *Das, S., Chatterjee, A., & Pal, T. K. (2020). Organic farming in India: a vision towards a healthy nation. Food Quality and Safety, 4(2), 69-76*

✓ *books.*

Ethno botany

Course Objectives:

- To educate the students about the concept and importance of ethno botany as an interdisciplinary science.
- To learn about the tribal / ethnic groups of India, their life style and their role in conservation of medicinal plants.
- To acquire basic knowledge about key medicinal plants used in ethno botany.
- To understand the legal aspect of ethno botany

Course Outcome:

After the completion of the course the students are expected to

- Conceptualize the importance of ethnobotany as an interdisciplinary science.
- Understand various methodologies of ethnobotany studies and traditional practices for conservation of knowledge and plants.
- Have an understanding about the taxonomic and medicinal importance of widely used medicinal plants.
- Understand the legal aspect associated with ethnobotany, biopiracy and Intellectual Property
- Rights to protect the interest in tribals.

Unit I:

LO: Students will able to conceptualize the methods of ethnobotany as an interdisciplinary science

- Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.
- Methodology of Ethnobotanical studies a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.

Unit II:

LO: Students acquire knowledge about different plants and its role in ethnobotany as well as the role of ethnobotany on modern medicine.

Role of ethnobotany in modern Medicine Medico-ethnobotanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) *Azadiracta indica* b) *Ocimum sanctum* c) *Vitex negundo* d) *Gloriosa superba* e) *Tribulus terrestris* f) *Pongamia pinnata* g) *Cassia auriculata* h) *Indigofera tinctoria*. Role of ethnobotany in modern medicine with special example *Rauvolfia sepentina, Trichopus zeylanicus*, *Artemisia*, *Withania.*

Unit III:

LO: Students will comprehend the importance of ethnic group and forest management for Conservation of plants.

Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest Management (participatory forest management).

Practical:

1. Collection and taxonomy of local medicinal plants
2. Documentation of use of local medicinal plants
3. Filed survey and study of local medicinal plants.
4. Extraction of active ingredients of medicinal importance- aqueous extract, acetone extracts, alcohol extracts, combination extracts
5. Rotary evaporation methods
6. Collection and taxonomy of local medicinal plants
7. Documentation of use of local medicinal plants
8. Filed survey and study of local medicinal plants.
9. Extraction of active ingredients of medicinal importance- aqueous extract, acetone extracts, alcohol extracts, combination extracts
10. Rotary evaporation methods
11. Antimicrobial activity of crude extracts
12. Determination of minimum inhibitory concentration and zone of inhibition

Text Books:

- ✓ *Faulks, P.J. 1958.An introduction to Ethnobotany, Moredale pub. Ltd*

Reference Books:

- ✓ *S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.*
- ✓ *S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981*
- ✓ *Lone et al, Palaeo ethnobotany*
- ✓ *S.K. Jain (ed.) 1989. Methods and approaches in Ethnobotany. Society of Ethnobotanists, Lucknow, India.*
- ✓ *S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.*
- ✓ *Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons –Chichester*
- ✓ *Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in AndhraPradesh, India. Botanical Survey of India. Howrah.*
- ✓ *Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine – INA –SHREE Publishers, Jaipur-1996*
- ✓ *Rath, A. K. and Mishra, S. R. (2017). Ethnobotany, Kalyani Publishers, New Delhi.*

Mushroom Cultivation

Course Objectives:

- To study about types, nutritional and medicinal value of edible mushrooms and the toxicity of Poisonous Mushrooms.
- To learn the Cultivation Technology of edible mushrooms and its regulating factors.
- To know about short-term and long-term storage of mushrooms and their products.
- To understand the Cost benefit ratio - Marketing in India and abroad.

Course Outcomes:

On completion of the course the students shall

- Have knowledge about the importance for integrating mushroom as an alternate nutritive food. Mushrooms.
- Have knowledge and skills for Cultivation of edible mushrooms.
- Know about the edible mushrooms available in India and their processing and storage methods.
- Have an understanding about the Low-cost cultivation Technology of edible mushrooms and adoption of mushroom cultivation as a profitable entrepreneurship.

Unit I:

LO: The students know about the nutritional and medicinal value of edible mushrooms and the toxicity of Poisonous Mushrooms.

Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. Cultivation Technology: Infrastructure: substrates (locallyavailable) Polythene bag, vessels, Inoculation hook, inoculation loop, low-cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.

Unit II: LO: The students will know the Cultivation Technology of edible mushrooms.

Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation -paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low-cost technology, Composting technology in mushroom production.

Unit III:

LO: The students know about the short-term and long-term storage of mushrooms and their products.

Storage and nutrition: Short-term storage (Refrigeration – up to 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fiber content - Vitamins.

Practical:

1. Preparation of spawn, mycelium culture (paddy mushroom)
2. Raw materials of mushroom bed preparation
3. Treatment of raw materials for sterilization
4. Composting technology in mushroom production
5. Storage, packaging and nutrient analysis of mushroom

Text Books:

- ✓ *B. C. Suman and V. P. Sharma. (2007). Mushroom Cultivation in India. DayaPublishing House, New Delhi.*

Reference Books:

- ✓ *Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.*
- ✓ *Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing andPublishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.*
- ✓ *Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications,Delhi.*
- ✓ *Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.*
- ✓ *Anon. (2010). The Cultivation of Mushrooms - An Outline of Mushroom Culture,Read Book Design, New Delhi*

Tissue Culture & Plant Regeneration

Course Objectives:

- To know the about the plant tissue culture techniques and its practical applications.
- To understand the requirement for setting up a tissue culture laboratory.
- To know the commercial aspects of plant tissue culture.

Course Outcomes:

On completion of the course the students shall

- Have ability to understand the basic of plant tissue culture methods.
- Have knowledge to develop a startup facility using tissue culture techniques.
- Be able to understand the economics of the process and know its potential.

UNIT I:

LO: Learners gain knowledge of tissue culture, its laboratory and basic requirements.

Introduction to plant tissue culture: Laboratory organization and instruments requirement, aseptic techniques required for tissue culture, culture medium (MS) and its composition, plant growth regulators and their uses in plant tissue culture, preparation of culture media. Totipotency.

UNIT II:

LO: Learners know about different methods of plant regeneration through plant tissue culture.

Micropropagation: Micropropagation by mature nodal explants, surface sterilization, stages of micropropagation, selection of plants and explants, proliferation of shoot, rooting of shoots, acclimatization; organogenesis, environment inside the culture room.

UNIT III:

LO: Students will know the applications of plant tissue culture

Tissue culture applications: Uses of micropropagation, another culture (haploid and doubled haploid production), shoot apex/ tip culture (virus elimination), secondary metabolite production, synthetic seed production (germplasm transfer); Cryopreservation and in vitro culture (germplasm Conservation).

Practical:

1. Sterilization of plasticwares, glass wares and use of autoclaves or its alternatives.
2. Preparation of tissue culture medium (e.g., MS medium).
3. Readiness of Laminar air flow cabinet for aseptic culture work (Demonstration).
4. Demonstration of in vitro sterilization and inoculation methods using nodal explants of any plant species as per available.
5. Over all study of micropropagation by photographs.
6. Study of another culture through photographs.
7. Preparation of synthetic seeds.

Text Books:

- ✓ *Chawla, H. S. (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*
- ✓ *Purohit S.D. (2013) Introduction to Plant Cell, Tissue and Organ Culture. PHI Learning Private Ltd., Delhi*

Reference Books:

- ✓ *Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.*
- ✓ *Singh, B. D. (2018). Plant Biotechnology Kalyani Publishers, New Delhi.*
- ✓ *Gupta, P. K. (2017). Plant Biotechnology, Rastogi Publication, Meerut.*

Vermi technology

Course Objectives:

- To introduce the students with the scope and importance of vermitechnology.
- To introduce the students with different methods of vermicomposting.
- To introduce the students with the role of vermicomposting.

Outcomes:

- Students would understand the scope and importance of vermin-technology.
- Students would get the skill to produce vermin-compost.
- Students would understand the use of vermicomposting and its potential & contstaint in India

Unit I:

LO: Students will learn about the scope and importance of vermitechnology

Vermiculture: Definition, scope and importance; Common earthworm species for vermiculture; Environmental parameters; Culture methods-warmery-breeding techniques; monoculture & polyculture

Unit II:

LO: Students will able to know different methods of vermicomposting.

Vermicomposting of wastes in field its, ground heaps, tank method, roof shed method, harvesting the compost, storage, vermiwash-preparation & application

Unit III:

LO: Students will able to comprehend the role of vermicomposting and its potential

Use of vermicomposting in organic farming; management of solid wastes using vermitechnology; predator/pathogen control in wormeries; potential and constraints for vermiculture in India.

Practicals:

1. Isolation of common earthworms species
2. Preparation of culture bed using cow dungs and plant wastes.
3. Culture of vermiworms
4. Determination of moisture content of vermicompost
5. Determination of water holding capacity of vermicompost

Text Books:

- ✓ *Sreenivasan, E. (2014). Handbook of Vermicomposting Technology. The Western India Plywoods Ltd, Kerala, India*

Reference book:

- ✓ *Anand, K., & Sinha, P. B. (2020). Vermitechnology: a solution for agricultural waste. In Innovative Waste Management Technologies for Sustainable Development (pp. 273-290). IGI Global.*
- ✓ *Walia, S. S., & Kaur, T. (2024). Vermitechnology: History and Its Applications. In Earthworms and Vermicomposting: Species, Procedures and Crop Application (pp. 37-53). Singapore: Springer Nature Singapore.*

Business Intelligence with Power BI

Course Objectives:

- Understand the fundamentals of Business Intelligence and its significance in decision-making processes.
- Gain proficiency in using Power BI, a leading Business Intelligence tool, for data analysis and visualization
- Develop skills in data modelling, transforming, and preparing data for analysis in Power BI

Course outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Develop proficiency in using Power BI to analyze and visualize data effectively.
- Ability to create interactive reports and dashboards that provide valuable insights to stakeholders.
- Apply data modelling techniques to establish relationships and optimize data structures for efficient analysis
- Develop skills in writing complex DAX formulas to perform advanced calculations and create custom
- Measures
- Automate report generation and distribution using Power Automate, saving time and increasing productivity.
- Understand the importance of data governance in Power BI and implement best practices for data quality and security.

Unit I Introduction to Power BI
Understanding the concept of Business Intelligence (BI), Introduction to Power BI and its features, Installing and configuring Power BI Desktop, Connecting to different data sources.

Unit II- Data Modelling in Power BI
Importing and transforming data using Power Query Editor, creating relationships between tables, implementing data modelling best practices, Creating calculated columns andmeasures, Working with DAX (Data Analysis Expressions) formulas

Unit III- Data Visualization with Power BI
Creating interactive reports and dashboards, Using different visualizations(charts, tables, maps, etc.) in Power BI, Applying filters, slicers, and drill-through functionality, Enhancing visualizations with formatting and custom visuals, Creating hierarchies and implementing drill-down capabilities

Unit IV- Power BI and Data Governance
Implementing data governance policies and practices in Power BI, Creating and managing dataflow for data preparation and reuse, Implementing data lineage and data quality checks in Power BI

Text Books

- ✓ *Power BI Data Modeling: Build Interactive Visualizations, Learn DAX, Power Query, and Develop BI Models (English Edition) Paperback*

References: Microsoft Power BI for Dummies, New Paperback

VB.NET

Course Objectives:

- Understand the Fundamentals: Gain a solid understanding of programming concepts and the role of VB.NET in application development. Develop knowledge of the .NET Framework and become familiar with the IDE (Integrated Development Environment) and tools used in VB.NET development.
- Master VB.NET Syntax: Become proficient in writing VB.NET code and utilizing its syntax effectively. Learn about variables,data types, operators, and control structures such as decision-making (if-else, switch) and looping (for, while, do-while).
- Design Graphical User Interfaces (GUI): Develop skills in designing and creating user-friendly GUI applications using VB.NET.Learn about Windows Forms application development, controls, events, user input validation, and the use of dialog boxes, messageboxes and database connectivity.

Course outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the fundamental concepts of programming and the role of VB.NET in application development
- Demonstrate proficiency in writing VB.NET code and using its syntax.
- Apply programming constructs such as variables, data types, decision-making structures, loops, and arrays.
- Design and develop graphical user interfaces (GUI) using VB.NET
- Utilize exception handling techniques in VB.NET applications
- Design and develop database connectivity code

Unit I

- **Introduction to VB.NET:** Overview of programming concepts, Introduction to the .NET Framework, IDE (Integrated Development Environment) and tools for VB.NET development
- **Decision making in VB.Net:** If...Then, If...Then...Else, If...Else If...Else, Nested If and Select Case Statements.

Unit II

- **Loops in VB.Net:** Do Loop, For...Next Loop, While... End While Loop, With... End With Statement,Nested Loops.
- **Arrays in VB.Net:** Creating Arrays, Multi-Dimensional Arrays.
- **Functions in VB.Net**: Defining a Function, Function Returning a Value, Recursive Function, PassingArrays as Function Arguments.
- **Sub Procedures in VB.Net:** Defining Sub Procedures, Passing Parameters by Value.

Unit III

- **Exception Handling in VB.Net.**
- **Basic Controls:** Forms, Text Box, Label, Button, List Box, Combo Box, Radio Button, Check Box ,Picture Box, Progress Bar, Date Time Picker. Control Properties and Control events.
- **Database Access:** ADO.Net Object Model, Data Provider, Dataset, Connecting to a Database.

Unit IV

- **Database programming:** Introduction, Connection, Data adapter, Data sets.
- **ADO .NET:** Introduction, Creating Connection, Creation new table, Insert data, SQL connection, SQL command, SQL data adapter, SQL data reader, Data table, Data column, Data row, Data grid view.

Text Books

- ✓ *Expert One-On-One Visual Basic Database Programming (Paperback)by Roger Jennings*

References

- ✓ *Visual Basic(r).NET: The Complete Reference by Jeffrey R. Shapiro*
- ✓ *Beginning Visual Basic .NET, Matthew Reynolds, Richard Blair, Jonathan Cross land, Thear on Willis Wrox Press*

VB. NET LAB

Topic

- Write a program to calculate the sum of two numbers entered by the user
- Create a simple calculator application with buttons for basic arithmetic operations (addition, subtraction, multiplication, division) and text boxes to display the operands and the result.
- Develop a temperature conversion application that allows the user to convert between Fahrenheit and Celsius.
- Include text boxes for input and labels to display the converted temperature.
- Create a currency converter application that converts between different currencies. Include drop-down menus for currency selection, text boxes for input, and labels to display the converted amounts.
- Develop a registration form with text boxes and drop-down menus for users to enter their personal information (name, address, age, gender, etc.). Include a submit button to process and store the data.
- Create a simple image viewer application that allows the user to select and display images from their computer. Include buttons for image selection and navigation, and a picture box to display the selected image.
- Develop a password strength checker application that evaluates the strength of a user's password based on certain criteria (e.g., length, use of uppercase, lowercase, numbers, and special characters). Display the strength level using labels or progress bars.
- Develop a stopwatch application with start, stop, and reset buttons. Display the elapsed time in a label or text box.
- Create a search application that allows users to enter a search keyword and retrieves matching records from a database table. Display the search results in a data grid view or list view.
- Create a weather app that retrieves and displays current weather information for a selected location. Include drop-down menus for location selection, labels to display weather data, and buttons to refresh the data.
- Create a student management system that allows users to add, edit, and delete student records. Include text boxes for input, a data grid view to display the records.
- Create a reservation system for a hotel or restaurant. Include date pickers or drop-down menus for selecting the date and time, text boxes for entering customer details, and buttons to book or cancel reservations.
- Develop a task management application that allows users to create, update, and delete tasks. Include text boxes for entering task details, checkboxes to mark tasks as completed
- Develop a photo album application that displays a collection of images. Include buttons for navigating through the images, a picture box to display the selected image, and a thumbnail view for quick navigation.

Life Skills Education

Course Outcomes (COs):

On completion of this course, the learners will be able to:

- Identify career opportunities in consideration of their own potential and aspirations.
- Gain self-competency and confidence.
- Participate in simulated interview.
- Analyse the role of digital literacy in professional life.
- Develop interpersonal skills and adopt good leadership behaviour for self-empowerment and the empowerment of others.
- Demonstrate a set of practical skills such as time management, self-management, conflicts management, team leadership etc.
- Understand the importance of values in individual, social circles, career path and national life.

Course Contents

CO: *Familiar with the concept of Life Skills.*

Unit I: Introduction to Life Skills Education.

- Concept, need and objectives of life skills education.
- Recommendations of WHO and UNICEF over the years.
- Four Pillars of Education - Learning to Know, Learning to Do, Learning to Be, Learning to Live Together.

Unit II: Social Skills

CO: *Communicate efficiently and develop good interpersonal skills.*

CO: *Use social digital platforms efficiently.*

- Communication skill-types of communication, barriers to communication, strategies for effective communication.
- Interpersonal skills-determinants, maintaining and sustaining a relationship, conflict resolution.
- Digital literacy and social media-digital ethics and cyber security.

Unit III: **Life Skills for Self-Management and Career Planning**

CO: *Develop awareness about one's own self and plan a career accordingly.*

- Self-awareness-self-concept, self-esteem, time management and empathy.
- Emotional intelligence, social intelligence and spiritual intelligence.
- Choosing a career-sources of career information, preparation of resume, interview facing and group discussion.

Unit IV: Universal Human Values

CO: *Understand the importance of values and develop values for life.*

- Truth, love, compassion and non-violence.
- Constitutional values- justice and human rights.
- Understanding happiness and prosperity correctly- a critical appraisal of the current scenario.

Sample Questions

- What is meant by Life skills? (1 Mark)
- Mention any two life skills as laid down by WHO. (2 Marks, Within 50 words)
- Define Communication. Discuss strategies for effective communication. (5 Marks, Within 300 words)
- Critically reflect on Four Pillars of Education. (8 Marks, Within 500 to 800 words).

Mode of Course Transaction: Seminar, Team Teaching, Dialogue, Peer-Teaching, Collaborative and Cooperative Learning, Field Trip, Concept Mapping, Self-Learning.

Activities

Each student will be required to prepare and submit a report on any one of the following**:**

- Prepare a report on the implications of any two pillars of education in developing life skills education in India.
- Examine the opportunities and challenges in application of life skills education and write a report.
- Conduct a semi structured interview on parents exploring the challenges of parenting and life skills needed for effective parenting. Compare the gender difference of parenting.
- Conduct Case study on life history of great personalities who contributed towards universal values.

Suggested Readings

- ✓ *Dahama O.P., Bhatnagar O.P, (2005). Education and Communication for Development (2nd Edn.). New Delhi: Oxford & BH Publishing Co. Pvt. Ltd.*
- ✓ *Hendricks, P.A.* Developing Youth Curriculum Using the Targeting Life Skills Model: Incorporating Developmentally Appropriate Learning Opportunities to Assess Impact of Life Skill Development *(Iowa State Extension Publication 4H-137A, 1998). Ames, IA: Iowa State University.*
- ✓ *Konar, N. (2011). Communication Skills for Professionals (Second Edition). New Delhi: PHI Learning Private Limited.*
- ✓ *Mangal, S.K. ,and Mangal, U.(2014). Essentials of Educational Technology, PHI Learning Pvt. Ltd. 3.*
- ✓ *Sampath, K, A., Panneerselvam, S.S. (2007).Introduction to Educational Technology. Sterling Publisher Pvt. Ltd.*
- ✓ *Verma, S. Development of Life Skill-II, Vikas Publishing House.*
- ✓ *http://www.unesco.org*
- ✓ *http://www.unicef.org*
- ✓ *http://www.un.org*
- ✓ *http://www.who.int/en/*

Peace Education

Course Outcomes (COs):

On completion of this course, the students will be able to:

- Understand the need of peace education in life.
- Acquire a holistic and critical understanding of the theory and practice of peace education.
- Describe the reports of different commissions and role of eminent personalities for the establishment of world peace.
- Critically examine the key concepts, theories and ethical considerations underpinning peace education.
- Appreciate positive action and non-violent conflict resolution in society.
- Develop personal initiative and resources for the pursuit and promotion of peace.
- Summarize the concept of peace education and point out the role of social institutions in developing values among children.

Course Contents

Unit I: Introduction to Peace Education

CO: *Understanding Peace Education and its implication.*

- Concept and significance of peace education.
- Aims and objectives of peace education at different levels.
- Role of social agencies in promoting peace education-family, religion, mass media and education.

Unit II: Contribution of Organisations and Eminent Personalities for Peace

CO: *Familiar with international organisations engaged in Peace Education.*

CO: *Informed about role of distinguished individual and organisation for peace.*

- Delor's Commission 1996, UNESCO's Conferences/recommendations for peace and international understanding.
- Contribution of eminent personalities for peace-Mother Teresa, Mahatma Gandhi and Dalai Lama.
- Contribution of organizations towards global peace- organizations working under United Nations.

Unit III: Peace in Indian Context

CO: *Able to explain peace education in Indian context.*

- Role of religion in propagation of peace.
- Democracy and peace**,** secularism.
- Socio-cultural diversity and peace.

Unit IV: Building a Culture of Peace

CO: *Able to appreciate activities to promote a culture of peace.*

- Challenges to peace- stress, conflict, terrorism, crime and violence.
- Sources of conflict and conflict management strategies.
- Factors contributing to violence in schools.
- Strategies of teaching peace education and role of teacher.

Sample Question

1. What is meant by peace? (1 Mark)
2. Mention any two objectives of peace education. (2 Marks, Within 50 words)
3. Define Conflict. Discuss the strategies for conflict management with suitable examples. (5 Marks, Within 300 words)
4. Critically reflect the contributions of Dalai lama towards peace education. (8 Marks, within 500-800 words)

Mode of Course Transaction: Team Teaching, Dialogue, Peer-Teaching, Peer Group Discussion, Collaborative and Cooperative Learning, Field Trip, Self-Learning.

Practicum/Activities

Each student will be required to prepare and submit a report on any one of the following**:**

- Organize an activity in school to promote world peace.
- Write a report on great personalities who contributed towards world peace.
- Write about the contribution of any two Nobel Prize winners who worked for world peace.
- Prepare an album of Indian philosophers and write their thoughts on peace.
- Prepare a proposal covering short analysis of any contemporary conflict and ways to resolve it.

Suggested Readings

- ✓ *Delor Jacques. (1996). Learning the Treasures Within. UNESCO Publishing, Paris.*
- ✓ *Gandhi, M.K., (1944). Non-violence in Peace and War. Ahmedabad: Navajivan Publishing House.*
- ✓ *Harris, I. & Morrison, M. (2003). Peace Education. New York: McFarland & Co.*
- ✓ *Johnson, D. W.& Johnson, R. T. (1991). Teaching students to be peacemakers. Edina, MN: Interaction Book Company.*
- ✓ *Kaur, B. (2006). Peace Education: New Trends and Innovations. New Delhi: Deep & Deep Publications Private Limited.*
- ✓ *Kreidler, W.J. (1995), Teaching, Conflict Resolution Through Children's Literature: New York: Scholastic.*
- ✓ *Loknath, M. (2009). Peace Education Framework for Teachers. New Delhi: A.P.H. Publishing Corporation.*
- ✓ *NCERT. (2004). Peace Education: Self Instructional Package for Teacher Education. NCERT, New Delhi.*
- ✓ *NCERT. (2006). NCF 2005 Position Paper, National Focus Groups on Education for Peace. New Delhi.*
- ✓ *Timpson, W. (2002). Teaching and learning peace. Madison, WI: Atwood Publishing.*
- ✓ *UNESCO. Learning the Way of Peace: Teacher's Guide.*

Art and Craft Education

Course Outcomes (COs)

On completion of the course, the students will be able to:

- Define arts education and craft education.
- Differentiate different forms of art education.
- Develop aesthetic sensibility among learners about the environment, including classroom, school, home and community through an integrated learning approach.
- Develop a perspective and appreciation of art, nature, and human existence relationship.
- Develop awareness about the rich cultural heritage of their own locality/state/region as well as that of the nation.
- Reflect on life and work of artists and their contribution to teaching and learning.

Unit I: Understanding Basics of Art Education

LO: *Familiar with art traditions.*

- Meaning and Concept of Art Education(i)Visual Arts (ii) Performing Arts and its significance in school Education
- Nature and Scope of Art Education
- Knowledge of Regional Arts and Crafts (Local Specific) and its Relevance in Regional Art and Craft, Teaching Students about Folk Objects and Traditional Arts, Knowledge of contemporary Arts and Artists

Unit II: Expression through Art Forms

LO: *Understand and create new art expressions.*

- Expressing ideas about different aspects of life
- Expressing various emotions
- Enhancing communication and presentation skills, developing imagination, creativity and aesthetic sensibility among the student teachers
- Utilizing different art expressions in teaching learning situation

Unit III: Literature and Art

LO: *Understand literary expressions and the methods of teaching.*

- Meaning and Aims of Literature art
- Different parts of literary Education
  - Story writing
  - Poem writing
  - Writing of drama
- Method of teaching of literary art at the elementary stage.
- Evaluation of literary art at the elementary stage.

Unit IV: Cultural heritage of India

LO: *Familiar with cultural heritage of India.*

- Exposure to the cultural heritage of (i) Locality (ii) state/region (iii)o Nation
- Reflection and incorporation of the rich cultural heritage during the celebrations of festivals, functions and special days
- Document processes of an art or craft form from the pedagogical point of view; such as weaving or printing of textiles, making of musical instruments, folk performances in the community.

Sample Questions

- What is art education? (1 Mark)
- Write any two objectives of Literature art. (2 Marks, Within 50 words)
- Discuss the nature and scope of Art education. (5 Marks, Within 300 words)
- Discuss the method of teaching of literary art at the elementary stage. (8 Marks, Within 500 to 800 words).

Mode of Course Transaction:

Seminar, Team Teaching, Dialogue, Peer-Teaching, Peer Group Discussion, Collaborative and Cooperative Learning, Field Trip, Concept Mapping, Lecture Method, Self-Learning.

- Preparation of an album of greeting cards with appropriate caption.
- Prepare three rangoli / paintings / teracota art
- Conduct Art Exhibition in the institution by displaying art of different forms
- Dramatize any topic for classroom presentation
- Conduct of story/ poem writing competition in the school and document those writings.

Suggested Readings

- ✓ *Dodd, Nigel and Winifred Hickson (1971/1980).Drama and theatre in education. London: Heinmann.*
- ✓ *Gupta, Arvind (2003). Kabad se Jugad: Little Science. Bhopal: Eklavya.*
- ✓ *Khanna, S. and NBT (1992).Joy of Making Indian Toys, Popular Science. New Delhi: National Book Trust.*
- ✓ *NCERT, (2006).Position Paper National Focus Group on Arts, Music, Dance and Theatre. New Delhi: NCERT.*
- ✓ *Sahi, Jane and Sahi, R. (2009).Learning through art. Bhopal: Eklavya.*
- ✓ *NCERT (2023).Art Integrated Learning, New Delhi https://ncert.nic.in/deaa/pdf/ArtIntegratedLearning-Handbook-Classes%20VI-VIII.pdf*

Computer applications in teaching learning

Course Outcomes (COs):

On completion of this course, the learners will be able to:

- Learn basis of Basics of MS Windows.
- Demonstrate basic understanding of computer applications with reference to MS Windows, MS excel and MS PowerPoint.
- Generate spread sheets, charts and presentations.
- Design personal, academic and business documents using MS Office.
- Model the modes of development of self-learning materials and prepare different types of instructional material.
- Explain different OERs, MOOCs available for effective learning.
- Develop learners' e-portfolios.
- Classify various e-resources for effective learning.
- Describe the concept of artificial intelligence and its applications in teaching learning.
- Determine similarity index of the various documents like dissertations, theses etc.

Course Contents

Unit I: Basics of Computer Applications

LO: *Able to use a computer.*

LO: *Operate MS Window System, MS Excel, PPT and Hyperlinking.*

- Basics of MS Windows: Desktop, Recycle bin, My Computer, Documents, Pictures, Music, Videos, Task Bar and Control Panel. MS-Word and its features: Creating, Editing, Formatting and Printing of Documents, Inserting, Word Art, Page Numbers, Mail Merge.
- MS-Excel and its features: Creating a new worksheet, selecting cells, Entering and editing Text, Numbers, Inserting Rows/Columns, changing widths and heights of row and columns, Formulae, referencing cells, changing of font sizes and colours.
- MS-PowerPoint and its features: Creating, Inserting and Deleting Slides of a Presentation. Adding Pictures, Inserting Objects, Audio, Video, Custom Animation and Hyperlinking of documents.

Unit II: Introduction to E-learning

LO: *Understand and use E-learning facilities through computer and other digital instruments like mobile and tablets.*

- Concept of e-learning, benefits of E-learning, Introduction to LMS using E-learning
- Approaches to e-learning: Offline, Online, Synchronous, Asynchronous, Blended learning and Mobile Learning.
- Security concerns related to interactive contents: Viewing, disabling and managing interactive content; securing the computer from viruses and other internet attacks.

Unit III: Application of E-Learning

LO: *Able to apply E- Learning tools.*

- Creating and Sharing: (i) G-Suite: Gmail, Drive, Calendar, Meet, Chat, Doc, Sheet, Slides (ii) Surveying: SurveyMonkey, Google Forms, online spreadsheets (iii) Google Classroom: conducting classes, assessment and evaluation.
- Development of Self-Learning Materials (SLM) and e-content: Concept and its purposes, Conventional Teaching versus SLMs & e-content, Types of SLMs and E-content,
- Process of Developing SLMs and e-content, Content Organization, Integrating video and audio into SLMs.

Unit IV: Trends in Teaching Learning Practices

LO: *Understand contemporary utilisation of E-tools for teaching learning process.*

- Open Education Resources: Creative Common, Massive Open Online Courses; creating learners' E-portfolios; accessing Online Repositories, Online Libraries and E-Resources.
- Artificial Intelligence: Concept and its applications in teaching learning practices. Introduction to SPSS and R, Latex.
- Plagiarism: Regulations, similarity index of the various documents like dissertations, theses etc. through plagiarism testing software (Mendeley, Zotero).

Sample Question

1. What is meant by computer? (1 Mark)
2. Mention any two benefits of mobile learning. (2 Mark, Within 50 words)
3. Discuss the benefits of e- learning and LMS in teaching learning process. (3 Mark, Within 300 words)
4. Give an account of Artificial Intelligence with reference to classroom management. (8 Mark, within 500-800 words)

Transaction Mode

Workshop, ICT-Lab Learning, Lecture Method, Seminar, team teaching, tutoring, peer group discussion, mobile teaching, self-learning, Collaborative learning, Cooperative learning.

Practical/ Assignment/ Activities:

Each student is required to submit Practical/Project report/Assignments selecting any one of the following:

1. Prepare Project Report on Role of Technology for Women Empowerment.
2. Overview of different Plagiarism detection tools and suggestive measures.
3. Prepare a Power Point Presentation of any content of your course and Presentation includingViva Voice.

* It will be evaluated by External and Internal Examiners.

References Books:

- ✓ *Creating learning materials for open and distance learning: A Handbook for Authors and Instructional Designers (2005). Commonwealth of Learning. Vancouver: Canada*
- ✓ *Excel 2020 in easy steps-Michael Price – TMH publications*
- ✓ *Foundations of Self-Learning Materials. http://wikieducator.org/Session_3.*
- ✓ *Garrison, D.R. and Anderson, T. (2003). e-learning in the 21st century: a framework for research and practice. London: Routledge.*
- ✓ *Haas, K.B. and Packer, H.Q. (1990): Preparation and use of audio-visual aids, 3rd Edition, Prentice Hall, Inc.*
- ✓ *Jayaram, K and Dorababu, K.K. (2015). Self-learning materials in distance education system. International Journal of Current Research. Vol. 7, Issue, 10, pp.21929-21934.*
- ✓ *Minnick, D.R. (1989). A guide to creating Self Learning Materials. International Rice Research Institute Los Baños, Laguna, Philippines.*
- ✓ *MS Office 2007 in a Nutshell –Sanjay Saxena – Vikas Publishing House.*
- ✓ *Murthy, CRK and Santosh Panda (2002). Report of the workshop on strategies for revision of self-learning materials, IGNOU, New Delhi. (Unpublished).*
- ✓ *Oreyet.al. (2009). Educational media and technology. New York: Springer Science Business Media.*
- ✓ *Rana, S. (1994): Open Learning in India, Commonwealth Publishers, New Delhi.*
- ✓ *Roblyer, M.D. (2008). Integrating educational technology into teaching. New Delhi: Pearson.*
- ✓ *Rowntree, Derek (1986). Teaching through self-instruction, Kogan Page, London/Nichola Pub. Comp. New York.*
- ✓ *Senapaty, H.K. (2009). ICT integrated learning materials on basic school subjects from constructivist perspectives. Bhubaneswar: Regional Institute of Education, NCERT.*
- ✓ *UNESCO (2005). How ICT can create new, open learning environments: Information and communication technologies in schools: A handbook for teachers. Paris: UNESCO.*
- ✓ *UNESCO (2008). Capacity building for ICT integration in education. Retrieved from http://portal.unesco.*
- ✓ *UNESCO (2008). ICT Competency standards for teachers: Policy Framework. Retrieved from http://portal.unesco.*
- ✓ *Working in Microsoft Office – Ron Mansfield - TMH.*

Advanced Python Programming

Course Objective:

This course introduces students to data visualization in the field of exploratory data science using Python.

Learning Outcomes:

Upon completion of this course, students will be able to:

- Learn use of objects & classes and perform data handling using Numpy arrays
- Do data manipulation using Pandas

UNIT-1:

- Object Oriented Programming: classes, objects and methods.
- File and exception handling: File handling through libraries; Errors and exception handling.
- Array Manipulation using Numpy: Numpy array: Creating Numpy arrays, Data Types for Numpy arrays, Arithmetic with NumPy Arrays Basic Indexing and Slicing.

UNIT-2:

Data Manipulation using Pandas: Data Structures in Pandas: Series, DataFrame, Index objects, Loading data into Pandas data frame. Working with Data frames. Grouped and aggregate calculations.

Text Books:

- ✓ *McKinney W. Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media, 2018.*
- ✓ *Chen D. Y, Pandas for Everyone: Python Data Analysis, Pearson, 2018.*
- ✓ *Balaguruswamy E. Introduction to Computing and Problem Solving using Python, 2nd*
- ✓ *edition, McGraw Hill Education, 2018*

Lab: Advanced Python Programming

1. Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese".
2. Write a python program to demonstrate various kinds of inheritance.
3. Write a python program to catch following exception i) Value Error ii) Index Error iii) Name Error iv) Type Error v) Divide Zero Error
4. a) Create a numpy array from list, tuple with float type
   b) Python program to demonstrate slicing, integer and boolean array indexing
5. a) Write a python program to find min, max, sum, cumulative sum of array.
   b) Write a python program to demonstrate use of ndim, shape, size, dtype.
6. a) Write a python program to implement Pandas Series with labels.
   b) Create a Pandas Series from a dictionary.
   c) Creating a Pandas DataFrame.
   d) Write a program which makes use of following Pandas methods
      i) describe () ii) head() iii) tail()
7. a) Write a program that converts Pandas DataFrame and Series into numpy.array.

b) Write a program that demonstrates the column selection, column addition, and column deletion.
c) Write a program that demonstrates the row selection, row addition, and row deletion.
d) Get n-largest and n-smallest values from a particular column in Pandas dataFrame

8. a) Write a program which use pandas inbuilt visualization to plot following graphs:
   i. Histograms ii. Line plots iii. Scatter plots iv. Bar plots
   b) Write a program to demonstrate use of groupby() method.
9. a) Write a program to demonstrate pandas Merging, Joining and Concatenating
   b) Creating dataframes from csv and excel files.
10. Write a Python program using pandas that finds Missing Data and replace missing data.

5. Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese".
6. Write a python program to demonstrate various kinds of inheritance.
7. Write a python program to catch following exception i) Value Error ii) Index Error iii) Name Error iv) Type Error v) Divide Zero Error
8. a) Create a numpy array from list, tuple with float type
   b) Python program to demonstrate slicing, integer and boolean array indexing

5. a) Write a python program to find min, max, sum, cumulative sum of array.
   b) Write a python program to demonstrate use of ndim, shape, size, dtype.
6. a) Write a python program to implement Pandas Series with labels.
   b) Create a Pandas Series from a dictionary.
   c) Creating a Pandas Data Frame.
   d) Write a program which make use of following Pandas methods
      i) describe() ii) head() iii) tail()
7. a) Write a program that converts Pandas Data Frame and Series into numpy.array.
   b) Write a program that demonstrates the column selection, column addition, and column deletion.
   c) Write a program that demonstrates the row selection, row addition, and row deletion.
   d) Get n-largest and n-smallest values from a particular column in Pandas data Frame
8. a) Write a program which use pandas' inbuilt visualization to plot following graphs:
   i. Histograms ii. Line plots iii. Scatter plots iv. Bar plots
   b) Write a program to demonstrate use of group by() method.
9. a) Write a program to demonstrate pandas Merging, Joining and Concatenating
   b) Creating data frames from csv and excel files.
10. Write a Python program using pandas that finds Missing Data and replace missing data.

Principles of Management

Course Objectives:

- To understand the basic principles of management
- To provide an insight into different management functions and strategies

Learning Outcomes:

Upon completion of this course, students will be able to:

- Understand the evolution management and various school of thoughts
- Learn different management functions and decision-making process
- Know about different leadership styles and importance of co-ordination
- Learn about the need for strategic management

Unit I:

Nature of Management: Meaning, Definition, its nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration- Organization. Evolution of Management Thought: Contribution of F.W. Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Various approaches to management (i.e. Schools of management thought) Indian Management Thought.

Unit II:

Functions of Management (Part-I) Planning - Meaning - Need & Importance, types levels– advantages & limitations, Forecasting - Need & Techniques, Decision making - Types - Process of rational decision making & techniques of decision making. Organizing - Elements of organizing & processes: Types of organizations, Delegation of authority - Need, difficulties in delegation – Decentralization.

Unit III:

Functions of Management (Part-II) Staffing - Meaning & Importance, Direction - Nature – Principles, Communication - Types & Importance, Motivation - Importance – theories, Leadership - Meaning - styles, qualities & functions of leaders. Controlling- Need, Nature, importance, Process & Techniques, Coordination - Need, Importance.

Unit IV:

Strategic Management Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India.

Text Books:

- ✓ *Essential of Management by Horold Koontz & Iteinz Weibrich, McGraw-Hills International.*
- ✓ *Essential of Business Administration by K. Aswathapa, Himalaya Publishing House.*

Reference Books:

- ✓ *Principles & Practice of Management by L.M. Prasad, Sultan Chand & Sons pub.*
- ✓ *Principles of Management by Tripathi & Reddy, Tata McGraw Hill*

Renewable Energy and Energy Harvesting

Course Outcomes

- Basic understanding of alternative sources of energy.
- Conceptual understanding and importance of solar cell , characterization
- Understating the energy harvesting and its applications using wind and piezoelectric materialCO-4: Understating the electromagnetic energy harvesting and its applications

Unit I

Fossil fuels and Alternate Sources of energy:

Fossil fuels and Nuclear Energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Unit II

Solar energy:

Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Unit III

Wind Energy harvesting:

Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power.

Unit IV

Electromagnetic Energy Harvesting:

Linear generators, physics mathematical models, recent applications 42 Carbon captured technologies, cell, batteries, power consumption Environmental issues and Renewable sources of energy, sustainability.

Reference Books:

- ✓ *Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi*
- ✓ *Solar energy - M P Agarwal - S Chand and Co. Ltd.*
- ✓ *Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.*
- ✓ *Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, OxfordUniversity Press, in association with The Open University.*
- ✓ *Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009*
- ✓ *J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).*
- ✓ *http://en.wikipedia.org/wiki/Renewable_energy*

Applied Optics and Photonics

Course Outcomes

- Basic understanding of different sources and detectors, principles.
- Conceptual understanding of frequency filtering and its application.
- Basic concept of holography, and its application in microscopy and interferometry.
- Basic knowledge in Optical fiber, and its principle and application in sensors.
- Apply the acquired knowledge in Experiments

Unit I

Sources and Detectors

Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einstein's coefficients, light amplification, Characterization of laser beam, He-Ne laser, Semiconductor Lasers.

Unit II

Fourier Optics and Electron Microscopy

Concept of spatial Frequency Filtering, Fourier Transforming property of a thin lens.

Electron Microscope, Working Principle, Types of electron microscope: TEM, SEM(BASICS), Applications of electron microscope, Advantages and limitations of electron microscope

Unit III

Holography

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry.

Unit IV

Photonics: Fiber Optics

Optical fibers and their properties, Principal of light propagation through a fiber, The numerical aperture, Attenuation in optical fiber and attenuation limit, Single mode and multimode fibers, Fiber optic sensors.

1. Experiment on Lasers:

   To find the width of the wire or width of the slit using diffraction pattern obtained by a He-Ne or solid-state laser.

2. Experiments on Semiconductor Sources and Detectors

a. V-I characteristics of LED
b. Photovoltaic Cell

3. Experiments on Holography and interferometry.

a. Constructing a Michelson interferometer or a Fabry Perot interferometer.
b. Constructing a Mach-Zender interferometer.

4. Experiments on Photonics: Fiber Optics

a. To measure the numerical aperture of an optical fiber.
b. To study the variation of the bending loss in a multimode fiber.
c. To determine the power loss at a splice between two multimode fiber

Reference Books:

- ✓ *Fundamental of Optics, F.A. Jenkins &H.E. White , 1981, Tata McGraw hill*

Electoral Studies and Public Opinion Poll

Course Objectives:

Democracy will be truly functional when the citizens would be informed about the electoral politics and exercise their choice independently without being influenced by any vested interest. Thus, Media plays a crucial role in shaping the popular opinion and intern affects the electoral politics. The course thus attempts to make the learners understand the significance of public opinion in electoral politics. It also reflects on the role and function of the election commissioner in ensuring free and fair election. The political parties are also to be studied to have a comprehensive understanding of electoral dynamics of political parties, media and public opinion.

Learning Outcome:

After studying this course, learners would acquire practical skills in electoral studies. The unit wise learning outcomes are given below:

Unit I: Learners would be aware of the significance of public opinion in electoral politics.

Unit II: Learners would be aware of the Representation of People's Act, constituency and the dynamics of political parties in electoral politics.

Unit III: This unit would enable the students to be informed about the Election Commission, election code of conduct with respect to the electoral politics.

Unit IV: The learners would know opinion polls, exit polls, their impact on electoral result and analysis of electoral data which would infuse pragmatic understanding about the electoral behaviour in them.

Course Content:

Unit I: What is Public Opinion, Agents of formulating Public Opinion, Ways of developing healthy public opinion

Unit II: Meaning of Electoral Studies. Representation of People's Act 1951, What is a Constituency, National and Regional Political Parties

Unit III: Composition and Powers of Election Commission in India, State Election Commission, Media and Election Model Code of Conduct.

Unit IV: Different stages of Election analysis, Opinion Poll, Exit Poll, Methods of analysing electoral Data, Analysing Media Reports.

Essential Readings:

- ✓ *Verma, R., & Sardesai, S. (2014). Does media exposure affect voting behaviour and political preferences in India?. Economic and political weekly, 82-88.Kanungo, N. T. (2015). India's digital poll battle: Political parties and social media in the 16th Lok Sabha elections. Studies in Indian Politics, 3(2), 212-228.*
- ✓ *Rai, P. (2021). Psephological fallacies of public opinion polling. Economic & Political Weekly, 56(28), 51.*
- ✓ *Fisher, J., Fieldhouse, E., Franklin, M. N., Gibson, R. K., Cantijoch, M., & Wlezien, C. (Eds.). (2018). The Routledge handbook of elections, voting behavior and public opinion (pp. 280-292). London: Routledge.*
- ✓ *Morwitz, V. G., & Pluzinski, C. (1996). Do polls reflect opinions or do opinions reflect polls? The impact of political polling on voters' expectations, preferences, and behavior. Journal of Consumer Research, 23(1), 53-67.*
- ✓ *Traugott, M. W. (2014). Public opinion polls and election forecasting. PS: Political Science & Politics, 47(2), 342-344.*

Additional Readings:

- ✓ *Rai, P. (2021). Demystifying the Bandwagon Effect of Election Opinion Polls in India. Academia Letters, 2.*
- ✓ *Lang, K., & Lang, G. E. (1984). The impact of polls on public opinion. The Annals of the American Academy of Political and Social Science, 472(1), 129-142.*

Internet Sources:

- ✓ Representative of People's Act, 1951 Available at https://ceodelhi.gov.in/WriteReadData/ManualElectionLaw/REPRESENTATION%20OF%20THE%20PEOPLE%20ACT,%201950.pdf
- ✓ ADR Recommendations on Electoral reforms https://adrindia.org/sites/default/files/ADR_and_NEWs_recommendations_for_electoral_and_political_reforms_Final_April_20_2011.pdf
- ✓ Model Code of Coduct https://www.eci.gov.in/mcc/
- ✓ Model code of conduct

https://deo.dnh.gov.in/Download/OldUpdates/Model_Code_of_Conduct.pdf

- ✓ The Theodore H. White Lecture on Press and Politics: "The Press and the Polls" https://youtu.be/rKQWvnUOGa4?si=H6jtDKGfFqlQ7mjU

Activities to do:

1. Students are recommended to observe and note the difference in opinion poll and exit poll and study the factors behind this.
2. Students are encouraged to have a comparative assessment on exit poll conducted by different media houses and find out if it has been reflected in the election result.
3. Students can visit to the voters and conduct a study to find out if the opinion poll affect the public opinion and if it actually changes the vote preferences.

Model Questions:

1. When was People's Representative Act enacted? [1 Mark]
2. What is the difference between Opinion Poll and Exit poll? [2 Marks]
3. What is the impact of opinion poll on vote preference in India? [5 Marks]
4. Election commission is the watch dog of Indian Democracy. Comment. [8 Marks]

Political Journalism

Course Objective:

Media being the 4th pillar of democracy has vital role to make people vigilant. The strength of democracy to a great extent depends upon the impartiality and autonomy of the media. With the growing commercialisation of the media houses, it actually emerges to be a grave concern across the globe. Media ought to be the watch dog in a democracy making people vigilant and make them informed about the governance. The course attempts to study journalism, the principles underlying reporting. It then reflects on the vested interest and political propaganda which attempts to influence the journalism of the day. It intends to train the learners to develop writing skills in featured articles on political subjects as well as enhance their analytical skills to analyse the prevailing political events.

Learning Outcome:

The course would make the learners informed about the basics of journalising and reporting and its dynamics with respect to politics. The unit wise outcomes are given below:

Unit I: It would introduce the students with the basics of journalism and reporting.

Unit II: The students would be aware of the vested interest and propaganda in influencing the media reports and the funding of media houses.

Unit III: The unit would enhance writing skills of the learners to write feature articles on political issues.

Unit IV: This would enhance the analytical skills of the learners and train them to analyse the political events.

Course Content:

Unit 1: Meaning of Journalism, Ideal principles of Reporting,

Unit 2: Political propaganda and vested interest in Journalism: Yellow journalism and TRP; Funding of media houses, Paid news. Types of Reporting Political issues, Making Posters on Political Issue.

Unit 3: Writing skills for Features articles on political issues.

Unit 4: Analytical skills to analyse the political events.

Essential Readings

1. Maheshwari, S., & Sparks, C. (2021). Political elites and journalistic practices in India: A case of institutionalized heteronomy. Journalism, 22(1), 231-247. https://doi.org/10.1177/1464884918761630
2. McNair, B. (2009). Journalism and democracy. In *The handbook of journalism studies* (pp. 257-269). Routledge.

3. Paul, S. (2018). Between participation and autonomy: Understanding Indian citizen journalists. Journalism Practice, 12(5), 526-542.
4. Udupa, S. (2015). News, Publics and Politics in Globalising India: Media, Publics, Politics. Cambridge University Press.

Additional Reading List:

- ✓ *Bennett, W. L., & Livingston, S. (2018). The disinformation age: Politics, technology, and disruptive communication. Cambridge University Press.*
- ✓ *Curran, J., & Seaton, J. (2018). Power without responsibility: Press, broadcasting and the internet in Britain (9th ed.). Routledge.*
- ✓ *Harrower, T. (2012). Inside reporting: A practical guide to the craft of journalism (3rd ed.). McGraw-Hill.*
- ✓ *Herman, E. S., & Chomsky, N. (2010). Manufacturing consent: The political economy of the mass media. Random House.*
- ✓ *Kovach, B., & Rosenstiel, T. (2014). The elements of journalism: What newspeople should know and the public should expect (3rd ed.). Three Rivers Press.*
- ✓ *Mencher, M. (2011). News reporting and writing (12th ed.). McGraw-Hill.*
- ✓ *Schudson, M. (2011). The sociology of news (2nd ed.). W. W. Norton & Company.*
- ✓ *Sedorkin, G., & McGregor, J. (2002). Interviewing: A guide for journalists and writers. Allen & Unwin.*
- ✓ *Tuchman, G. (1978). Making news: A study in the construction of reality. Free Press.*

Internet Sources:

1. Writers Life Lecture Series: Political Journalism
   https://www.youtube.com/watch?v=StHbMlCucHo
2. Journalism and Politics Lecture | The Evolution of TV News
   https://www.youtube.com/live/-LaiZLigO9M?si=BXBYPhZTSwudGbmw

Activities to Do:

1. Students will be provided with a selection of news reports or articles related to political issues. They will analyze these reports based on the ideal principles of reporting, identifying any instances of yellow journalism, political propaganda, or vested interests. Students will present their findings and engage in a class discussion on the importance of ethical and unbiased journalism.
2. Students will work in groups to create posters on a political issue of their choice. The posters should effectively communicate the issue, raise awareness, and potentially influence public opinion. This activity will encourage critical thinking, creativity, and the ability to convey complex political topics through visual communication.

3. Students will select a political subject of their interest and write a feature article on that topic. The article should be well-researched, informative, and engage the reader while adhering to journalistic writing standards. This activity will develop research skills, writing abilities, and the ability to present complex political issues in an accessible and compelling manner.
4. Students will choose a significant political event (past or present) and conduct an in-depth analysis of the event. They will present their findings to the class, discussing the key players, factors, and implications of the event. This activity will enhance critical thinking,

research skills, and the ability to analyze and communicate complex political events effectively.

Model Questions

1. Which is considered the first newspaper published in India? [1]
2. Briefly explain the term ‘yellow journalism’. [2]
3. Critically analyse the TRP Funding of Media Houses and its impact on journalism. [5]
4. Distinguish between ‘paid news’ and legitimate funding sources for media houses, highlighting the ethical concerns associated with paid news. [8]

Data Journalism

Course Description

Proficiency with gathering, analysing and visualizing data is essential in journalism today as commodity content becomes increasingly ineffective in both serving the public interest and engaging audiences. This course introduces to use data as a source, and "interviewing" datasets using quantitative analysis and data visualization tools. This syllabus focuses on core concepts and principles in data journalism, exploring how data enhances reporting and giving an overview of tools for producing data visualizations. Topics include analyzing and structuring data, combining data from multiple data sets, and developing engaging visualizations.

Course Objectives:

- To understand fundamentals of Data Journalism.
- To understand steps involved in the reporting process for data driven journalism.
- To identifying, gathering and exploring a dataset for an investigative data story.
- To present data in appropriate visual formats such as tables, charts and maps.

Learning Outcomes:

Upon course completion, students will be able to: Develop a "data frame of mind" by demonstrating proficiency in:

- Finding stories in data and finding data to report stories.
- Evaluating the strengths and weaknesses of data sources and methods.
- Acquiring data through public sources and by scraping websites and PDFs.
- Cleaning (fix mistakes in) data through Open Refine, Excel and Access.
- Analyzing data to find patterns and avoid erroneous conclusions.
- Joining and analyzing geographic data.
- Creating basic data visualizations using Excel, Google Fusion and Tableau.
- Publishing a meaningful story based on acquiring and analyzing data.

UNIT-1

Introduction to Data Journalism, Data Journalism: Meaning, Definition and Importance, Data journalism defined; building a "data frame of mind", How Data is Used for Public Interest Stories, How to Find a Story in Data, Sector-Specific Data Stories, From Data to Stories

UNIT-II

Common Data Formats, Types of data; data pitfalls; data sources, Finding Data Online, Acquiring data from websites and PDFs (Tableau, Cometdocs), Alternative Data Sources, Find a data set that interests you.

UNIT-III

Planning a Data Story: Hypothesis and Questions, Enriching Stories with Data, Analyzing Fact Sheets, Organizing Data, Verifying Data, Summarizing and Simplifying Data Insights, Essential Statistics, Evaluating Data Interpretation, Data Privacy

UNIT-IV

Data Visualization, Purpose of Data Visualization, Matching Data and Graph Types, Design and Color Basics, Map Theory, Visual Storytelling, reaching your Audience, Data Driven Interviews. Anatomy of a Data Story, Data-Driven Leads, Data-Driven Writing, Ethics of Data Visualization.

Suggested Books

- ✓ *The Data Journalism Handbook: How Journalists Can Use Data to Improve the News by Jonathan Gray, Lucy Chambers and Liliana Bounegru*
- ✓ *The Data Journalist: Getting the Story by David McKie and Fred Vallance-Jones*
- ✓ *Data-Driven Storytelling by Christophe Hurter, Nathalie Henry Riche, Nicholas Diakopoulos, Sheelagh Carpendale*
- ✓ *Finding Stories in Spreadsheets by Paul Bradshaw*
- ✓ *Data for Journalists: A Practical Guide for Computer-Assisted Reporting by Brant Houston*
- ✓ *The Data Journalism Handbook: Towards A Critical Data Practice by Liliana Bounegru, Jonathan Gray*
- ✓ *Data Literacy: A User's Guide by David Herzog*
- ✓ *Facts Are Sacred by Simon Rodgers*
- ✓ *The Functional Art: An Introduction to Information Graphics and Visualization by Alberto Cairo*
- ✓ *Data Journalism and the Regeneration of News by Alfred Hermida*
- ✓ *Data Journalism: Mapping the Future by Richard Keeble & John Mair*

Podcasting

Course Description: This course is designed to acquaint students with all aspects of podcasting and to help them become better storytellers. It will train students to think critically about stories they consume, and it will give them a working knowledge of current trends in audio production. There will be lessons on sound gathering using professional sound gear as well as cell phones, interviewing, script writing, audio editing and developing a "radio voice." Each student will spend the semester creating one feature-length podcast on a subject of their choice. Additionally, the course is designed to strengthen students in several areas: embracing creative risks, being fearless in the face of technical challenges, and working collaboratively to solve problems. The course is not aiming for technical perfection but rather for interesting content and creative approaches to telling stories.

Course Objectives:

- To develop the technical aspects of podcast production, including recording, editing, and sound design.
- To enhance storytelling abilities focusing on narrative structure and audience engagement.
- To gain proficiency with audio equipment and software used in podcasting.
- To develop skills for conducting effective interviews.
- To understand ethical and legal issues in podcasting.
- To analyse and understand target audiences to tailor content.

Learning Outcomes: Students will able to

1. Demonstrate an understanding of audio storytelling, recognizing the podcast medium as an intimate form of storytelling.
2. The essentials of quality sound and podcast production.
3. Understand the role of ethics and diversity in podcasting.
4. Improve broadcast skills, including writing, research, interviews, editing and on-air presentation.
5. Appraise and establish protocols to launch and distribute podcasts
6. Use the power of podcasting to benefit ourselves and society

Unit- I

Podcast: Digital Audio Story Telling, What is this medium? How does it differ from radio? History & Growth of Podcasting, Status of Podcasting Platforms in India, Reason for popularity of Podcast, Features of Indian Podcast, Scope and Advantage of Podcast in India, Why Podcasting is a powerful audio storytelling medium

Unit- II

Genres of Podcast, Podcast Formats, Creative Idea Generation and Deciding the topic, Research Techniques, Developing Script, Interview Techniques

Unit- III

Components of the Podcasting Story, Scene Set - The Sound of Audio Storytelling, Voice Modulation & Narration, Role of the Host and Harnessing the Voice, Title Selection, Standing out of the Crowd, Cover Page Design for the Audio Story, Selection of Audio, Recording Equipment, Effective Use of Audio & Studio Equipment, Audio Editing & Use of open-source audio editing software, Selection of Background Sound & Music, Ethics in Editing, Common Pitfalls, Essential Skills of a Podcaster.

Unit IV

Create a podcast, at least 10 minutes in length, incorporating sound, scene, visual writing and interview, Record an expert on a topic relevant to your podcast 10-15 minutes in length, Critique the 3 podcasts you've chosen to follow, Produce a 5-minute presentation, incorporating audio samples, Open Presentation in the Classroom

Suggested Reading:

- ✓ *Geller, Beyond Powerful Radio: A Communicator's Guide to the Internet Age_News, Talk, Information & Personality for Broadcasting, Podcasting, Internet, Radio 2nd Edition, Focus Press, Franklin, TN 2012.*
- ✓ *Kern, Sound Reporting: The NPR Guide to Audio Journalism and Production, 3rd Edition, The University of Chicago Press, Chicago, IL, 2008.*
- ✓ *Abel, Out on the Wire: The Storytelling Secrets of the New Masters of Radio, Broadway Books, New York, NY, 2015.*
- ✓ *Kaempfer, Swanson, Radio Producer's Handbook, Allworth Press, New York, NY, 2004.*
- ✓ *Biewen, Dilworth, Reality Radio: Telling True Stories in Sound, The Universityof North Carolina Press, Chapel Hill, NC, 2010*

Project Management

Course Objectives:

- Provide essential understanding of project management principles, methodologies, and their application across industries.
- Understand fundamental project management principles and terminologies.
- Apply project management techniques to develop project plans, schedules, and budgets.
- Utilize risk management strategies to mitigate project risks effectively.
- Emphasize key concepts such as project lifecycle, scope management, risk assessment, and project monitoring and control.
- Equip students with practical tools and techniques to plan, execute, and manage projects effectively.

Learning Outcomes:

- Unit 1:
  Introduction to Project Management: Definition of a project, Importance of project management in various industries, Historical perspective and evolution of project management
- Unit 2:
  Project Planning and Scope Management: Defining project scope, Scope statement and Work Breakdown Structure (WBS), Scope creep and change control processes, Activity definition and sequencing, Estimation techniques (PERT, CPM), Critical Path Method (CPM).
- Unit 3:
  Project Execution and Risk Management: Team formation and development, Resource allocation and management, Quality management and assurance, Risk identification, assessment, and prioritization, Risk response planning, Risk monitoring and control
- Unit 4:
  Project Monitoring, Control, and Closure: Performance measurement and metrics, Change management processes, Project communication and reporting, Criteria for project closure

Books Recommended:

1. Dr. K.K. Chitkara:
   Book: "Project Management"
   Publisher: McGraw-Hill Education
1. Dr. S. Narayanan:
   Book: "Project Management: Techniques in Planning and Controlling Construction Projects"
   Publisher: Prentice-Hall of India
2. Dr. Prasanta Chandra Mandal:
   Book: "Project Management: A Complete Handbook"
   Publisher: Pearson Education India
3. Dr. Rajiv Mishra:
   Book: "Software Project Management"
   Publisher: Oxford University Press
4. Dr. Narendra K. Sharda
   Book: "Project Management"
   Publisher: Himalaya Publishing House
5. Prof. P.K. Bhattacharya
   Book: "Principles and Practice of Management"
   Publisher: Pearson Education India

Model Questions
1 Mark Questions:

1. What is a project milestone?

2. Define project deliverables.

3. What is the role of a project sponsor?

4. Define the term "project scope."

5. What is project governance?

2 Mark Questions:

1. Explain the difference between project management and general management.

2. Describe the purpose of a project charter.

3. What are the key components of a project plan?

4. Discuss the importance of stakeholder management in project management.

5. Explain the concept of project constraints.

4 Mark Questions:

1. How does a project manager handle conflicts within a project team?

2. Discuss the significance of risk management in project execution.

3. Explain the difference between qualitative and quantitative risk analysis.

4. Describe the steps involved in the project procurement process.

5. How can a project manager effectively manage project resources?

8 Mark Questions:

1. Compare and contrast the Waterfall and Agile project management methodologies.

2. Discuss the stages of the project life cycle and their significance.

3. Explain how earned value management (EVM) is used to assess project performance.

4. Analyze the impact of poor communication on project success, providing examples.

5. Describe the process of project closure and the key activities involved. • Analyse tasks and projects to determine their relative importance and urgency, applying principles of the Eisenhower Matrix or similar prioritization frameworks.

Make informed decisions about resource allocation, including time, energy, and attention, to maximize productivity and achieve desired outcomes.

Evaluate the impact of different time management strategies on decision quality, efficiency, and overall effectiveness in achieving personal and organizational goals.

Time Management and Productivity Improvement

Learning Outcomes:

- Identify common time wasters, distractions, and productivity pitfalls and implement strategies to mitigate their impact.
- Develop techniques to overcome procrastination, perfectionism, and other barriers to productivity through self-awareness and behavioral change.
- Implement stress management techniques, establish boundaries, and cultivate habits and routines that promote sustained productivity and work-life balance

Unit 1:
Foundations of Time Management: Introduction to Time Management Principles, Setting SMART Goals and Priorities, Time Audit: Assessing Current Time Usage, Techniques for Effective Goal Setting

Unit 2:
Planning and Organization: Planning Techniques: To-Do Lists, Time Blocking, and Prioritization, Introduction to Time Management Tools and Software, Creating Effective Schedules and Timelines.

Unit 3:
Productivity Improvement Strategies: Identifying and Eliminating Time Wasters, Managing Distractions and Interruptions, Effective Task Management, Strategies for Handling Information Overload

Unit 4:
Sustainable Productivity and Work-Life Balance: Stress Management Techniques for High-Pressure Environments, Building Habits and Routines to Sustain Productivity, Strategies for Maintaining Work-Life Balance, Reflection and Action Planning: Implementing Personal Productivity Systems

Books recommended:

- ✓ Dr. Ujjwal Patni:
  Book: "Power Thinking: Learn Time Management with Practical Strategies"
  Publisher: Manjul Publishing House Pvt. Ltd.

- ✓ Vijay Agrawal:
  Book: "Time Management and Organization Behavior"
  Publisher: Laxmi Publications Pvt Ltd.

- ✓ Rajen Jani:
  Book: "Time Management for Business Leaders"
  Publisher: Jaico Publishing House

- ✓ N. N. Jhaveri:
  Book: "Maximize Your Time"
  Publisher: Navneet Publications ,

- ✓ Gopal Poddar:

  Book: "Time Management for Students"

  Publisher: V & S Publishers

- ✓ Dr. Kiran Bedi:
  Book: "Time Management"
  Publisher: Wisdom Tree Publishers

- ✓ Rakesh Mittal:
  Book: "Essentials of Time Management"
  Publisher: Viva Books Pvt Ltd

Introduction to Python

Course Objective:

The objective of this course is to aware the students for Python language and the programing as well as to create a learning platform to apply for slicing to access data and mathematical problems.

Learning Outcomes:

After completion of this course, students will be able to:

- Understand why Python is a useful scripting language for applications.
- Learn how to use lists, tuples, and dictionaries in Python programs, learn how to write loops and decision statements in Python, learn how to use indexing and slicing to access data in Python programs.
- Learn how to use python for solving mathematical problems.

UNIT-I

Introduction to Python programming, installation of Python, application of Python, writing Python code, running Python programs, variables, basic input-output operations, operators.

UNIT-II

Number, string, list, tuple, set, dictionary, arrays and vectors, conditional statements (if, if-else, if-elif- else), loops (for loop, while loop).writing and calling functions, function inputs and outputs, local and global scope of variable, Lamda function , types of errors.

UNIT-III

Library for mathematics (sympy and numpy), problems on algebraic expression, ordinary and partial derivatives, integral, limit, ordinary differential equations, algebra of matrices, plotting of functions.

Books Recommended:

- ✓ *Harsh Bhasin, Python for Beginners. New Age International; 1st Edition,2018.*
- ✓ *Tim Hall and J-P Stacey, Python 3 for Absolute Beginners. Apress, 2009.*
- ✓ *Suggestive digital platforms web links: NPTEL/SWAYAM/MOOCS.*
- ✓ *e-Learning Source http://ndl.iitkgp.ac.in ; http://ocw.mit.edu ; http://mathforum.org*

Programing with Mathematica

Course Objective:

The objective of this course is to aware the students for Mathematica language and the programing as well as to create a learning platform to apply for complex mathematical problems.

Learning Outcomes:

After completion of this course, the students will be able to:

- Understand basic principles of programming language, plotting mathematical functions and solving algebraic equations.
- Learn the technique to find the solutions of ODE and PDE equations.
- Learn the numerical computation for differentiation and integration.

UNIT-I

User interface**,** mathematica language and syntax**,** functions manipulation**,** plotting mathematical functions and data. plotting 2D, 3D functions and manipulation**,** solving algebraic equation**:** root finding, transcendental equation**.**

UNIT-II

Solving ordinary differential equation (ODE)**,** solving partial differential equation (PDE)**.**

UNIT-III

Vectors and matrices**,** limits, integration and differentiation**,** numerical computation**,** symbolic manipulation.

Books Recommended:

- ✓ Stephen Wolfram ,*The Mathematica Book*, 5th Edition, Wolfram Media Inc, 2003.
- ✓ José Guillermo Sánchez León, *Mathematica Beyond Mathematics:The Wolfram Language in the Real World*, 1st Ed., Chapman and Hall/CRC, 2017.
- ✓ Suggestive digital platforms web links: NPTEL/SWAYAM/MOOCS.
- ✓ e-Learning Source http://ndl.iitkgp.ac.in ; http://ocw.mit.edu ; http://mathforum.org

Type Setting In Latex (PRACTICAL)

Course Objective:

The objective of this course is to familiarize students how to write research papers and books using the book format process of type setting by LaTex, how to prepare for document presentation

Learning Outcomes:

After completion of this course, the students will be able to:

- Handle different types of documents, organize documents into different sections, subsections, etc., learn formatting pages (margins, header, footer, orientation).
- Learn formatting text and writing of complex mathematical formulae, tables and images.
- Learn cross-referencing, bibliography writing, indexing, read error messages as and when required, learn to create presentations using Beamer.

This is a practical paper. Students will be externally examined on their expertise on following aspects of typing as per the rules of the university/affiliated institutions:

Installation of LaTeX and different IDEs, Creating the first document using LaTeX, organizing content into sections using article and book class of LaTeX, formatting the page by setting margins, paper size, usepackage, customizing header and footer, changing the page orientation, dividing the document into multiple columns, reading different types of error messages. Formatting text (styles, size and alignment), adding colors to text and entire page, and adding bullets and numbered items,

Creating basic tables, matrices and arrays, adding simple and dashed borders, merging rows and columns, and handling situations where a table exceeds the size of a page, adding an image, exploring different properties like rotate, scale, etc., writing equations in different formats, creating various form of mathematics documents, create items, add cross-referencing (refer to sections, table, images), add bibliography (references), and create back index, introduction to creating slides, adding frames, dividing the slide into multiple columns, adding different blocks, etc.

Book Recommended:

- ✓ *LaTeX Beginner's Guide: Create visually appealing texts, articles, and books for business and science using LaTeX, 2nd Edition , Packt Publishing, 2021.*
- ✓ *Firuza Karmali Aibara : A short introduction to LaTeX: A book for beginners, Createspace Independent Publishing Platform, 2019.*
- ✓ *Dilip Datta: LaTeX in 24 Hours: A Practical Guide for Scientific Writing , 1st ed., Springer, 2017.*
- ✓ *Suggestive digital platforms web links: NPTEL/SWAYAM/MOOCS.*
- ✓ *e-Learning Source http://ndl.iitkgp.ac.in ; http://ocw.mit.edu ; http://mathforum.org*

Communication Skillfor Library Professionals

Course Outcome:
Upon successful completion of the course, students will be able to:

- Understand the principles of effective communication
- Learn different standard forms of official communication
- Learn the speaking skills in different situation
- Apply the techniques of effective communication skills in work places

Unit-1

Effective Writing Skills: Elements of Effective Writing, Main Forms of Written Communication: Agenda, Minutes, Notices, Writing of CV, Memo, Drafting an E-mail,Press Release. Correspondence: Personal, Official and Business, Report Writing

LearningOutcome

Understand different standards in official communication
Apply the techniques in official communication

Unit-2

Presentation Skills, Interviews, Public Speaking, Preparing the Speech, Organising theSpeech, Special Occasion Speeches, Greeting and introducing, Practicing Short Dialogues, Group Discussions, Seminars/Paper-Presentations, Listening News/Conversations/Telephonic Conversation

Learning Outcome

Learn different forms of verbal communication in the office
Apply the techniques of verbal communication in work places

Text Books

- ✓ *Patil, S. (2020). Handbook on Public Speaking, Presentation & Communication Skills : Principles & Practices to create high impact presentations & meaningful conversations. Notion Press Media Pvt Ltd, Chennai*
- ✓ *Paul, D. S. (2022). Advanced Writing Skills. Goodwill Publishing House ,New Delhi*

References

- ✓ Communication Skills, NCERT. https://ncert.nic.in/vocational/pdf/iees101.pdf
- ✓ Communication Skill Notes. Department of Business Studies, Siaya Instituteof Technology. https://siayainstitute.ac.ke/wp- content/uploads/2021/05/COMM-SKILLS-NOTES.pdf

Online SearchStrategies and Techniques

Course Outcome:

Upon successful completion of the course, students will be able to:

- Understand the concept of search strategy, need and the process
- Learn different types of search techniques for simple and advanced search
- Learn about different online search tools and their functions
- Apply the search techniques in different online databases

Unit-1

Search Strategy: Concept, need, development of a search strategy; Process for Searching: Preparing to search, Feedback and Refining; Basic Search Techniques:Word and Phrase, Boolean, Truncation, Proximity, Field, Metadata, Limit Search Techniques

Learning Outcome

- Understand the concept and process of search strategy
- Learn different techniques of online literature search

Unit-2

Online Search and Retrieval: Definition, Historical development, basic features; Searching vs. browsing;Online Search tools: Search Engines- Primary Search Engines, Meta search Engines, Crawler-based search engines and Directories; Subject Gateways; Google Search tools and techniques.

Learning Outcome

- Learn different tenets of online search and retrieval
- Know about different online search tools and their functions

Unit-3

- Online Databases: Google Scholar, PubMed, Directory of Open Access Journals (DOAJ), Directory of Open Access Books (DOAB),
- World Cat, Ind Cat, Directory of Open access Repositories.

Learning Outcome

- Comprehend online databases with different types of content and searchinterfaces
- Apply the search techniques while searching these online databases for information.

Text Books

- ✓ *Chowdhury, G. G. and Chowdhury, S. (2001). Information sources and searching on the World Wide Web. London: Library Association Publishing*
- ✓ *Chowdhury, G. G. (2004). Introduction to modern information retrieval. 2nded. London: Facet Publishing*.

References

- ✓ Choudhury, G. G. (2006). Unit-19 Search Strategies, Processes and Techinques, Indira Gandhi National Open University, New Delhi, http://egyankosh.ac.in//handle/123456789/76456
- ✓ Databases Searching. https://libguides.library.cqu.edu.au/c.php?g=760913&p=5456502

Model Questions:

1-Mark Questions:

1. Define time management in one sentence.
2. What is the primary goal of productivity improvement?
3. What does the acronym "SMART" stand for in the context of goal setting?
4. Briefly explain the Eisenhower Matrix.
5. Define the term "procrastination."

2-Mark Questions:

1. Mention two benefits of effective time management in the workplace.
2. Explain the difference between urgent and important tasks.
3. Name two common time management tools used to prioritize tasks.
4. Briefly describe the Pomodoro Technique.
5. Identify two common time wasters in a typical workday.

4-Mark Questions:

1. Discuss four strategies for overcoming procrastination.
2. Describe the concept of "batching" tasks and provide an example.
3. Explain the "80/20 rule" (Pareto Principle) and its relevance to time management.
4. Compare and contrast two popular time management methodologies, such as GTD and Pomodoro Technique.
5. Outline four steps for creating an effective to-do list.

8-Mark Questions:

1. Discuss the impact of poor time management on personal and professional life, citing examples from both domains.

2. Explain how technology can be both a boon and a bane for time management, providing examples of tools that facilitate productivity and those that cause distractions.

3. Analyze the relationship between stress and time management, and propose four stress management techniques that can help individuals cope with time-related pressures.

4. Critically evaluate the effectiveness of different time management techniques for individuals working in creative industries versus those in highly structured corporate environments.

5. Describe the process of creating a weekly schedule using time blocking, and explain how it can help individuals manage their time more efficiently and achieve their goals.

Computational Chemistry and Molecular Modelling

Course Objectives:

The objectives of a course in environmental chemistry typically aim to make students learn the theoretical background of computational techniques in molecular modelling. To give the different flavours of computational chemistry by the end of this course. To provide hands-on experience in molecular modelling on various software.

Course outcomes:

- Explain the theoretical background of computational techniques and selective application to various molecular systems.
- Compare computational and experimental results and explain deviations.
- Perform Optimization of geometry parameters of a molecule (such as shape, bond length and bond angle) through the use of software like Chem Sketch and Argus Lab in interesting hands-on exercises.
- Perform analysis of molecular properties using various software.

UNIT I

Molecular mechanics – Vibrational motion, normal modes of vibration, the quantum mechanical treatment, the taylor expansion, the morse potential, more advanced empirical potential, molecular mechanics, professional molecular mechanics force fields, a sample MM calculation, General features of potential energy surfaces.

UNIT II

The LCAO procedure, the electronic energy, the koopmans theorem, open-shell system, unrestricted Hartree-Fock theory, the J and K operator, Bond lengths and the Huckel model, molecular mechanics and pi-electron systems, alternant hydrocarbons, treatment of heteroatoms, Extended Huckel theory.

UNIT III

Basic sets – Introduction, the energy calculation from the STO function, the energy calculation of multielectron systems, Gaussian type orbitals, Difference between STOs & GTOs, classifications of basis sets, A comparison of energy calculation of the Hydrogen atoms based on STO-2G, STO-3G & STO-^G basis sets, contracted Gaussian type orbitals, Double and Zeta basis sets and split Valence basis sets, polarized basis sets.

UNIT IV

Semiempirical methods – Introduction, NDO, CNDO, MNDO, AM1 & PM3 methods, Ab Intio Method – Introduction, level of theory, geometry input, An Ab-intio HF-LCAO calculation, computation of the correlation energy, Density Functional Theory – Introduction, electron density, pair density, development of DFT, the kohn and Sham method, density functionals, the Lee, Yang and Parr correlation energy functional and the potentials, DFT methods, application of DFT method.

Text Books

- ✓ *Alan Hinchliffe, Modelling Molecular structures, John Wiley & sons, ltd*
- ✓ *Lewars, E. (2003),* ***Computational Chemistry****, Kluwer academic Publisher.*
- ✓ *Cramer, C.J. (2004),* ***Essentials of Computational Chemistry****, John Wiley & Sons.*

References Books

- ✓ *Electron Density theory of atoms and molecules-N. H. March, Academic press, London*
- ✓ *Hinchcliffe, A. (1996),* ***Modelling Molecular Structures****, John Wiley & Sons.*
- ✓ *Leach, A.R. (2001),* ***Molecular Modelling****, Prentice-Hall.*
- ✓ *House, J.E. (2004),* ***Fundamentals of Quantum Chemistry****, 2nd Edition, Elsevier.*
- ✓ *McQuarrie, D.A. (2016),* ***Quantum Chemistry****, Viva Books.*
- ✓ *Levine, I. N.;* ***Physical Chemistry****, 5th Edition, McGraw –Hill.*

E-content and tools available:

1. https://www.afs.enea.it/software/orca/orca_manual_4_2_1.pdf
2. https://dasher.wustl.edu/chem430/software/avogadro/learning-avogadro.pdf
3. http://www.arguslab.com/arguslab.com/ArgusLab.html
4. https://barrett-group.mcgill.ca/tutorials/Gaussian%20tutorial.pdf
5. https://gaussian.com/techsupport/
6. https://gaussian.com/man/
7. https://gaussian.com/wp-content/uploads/dl/gv6.pdf
8. https://dasher.wustl.edu/chem478/software/spartan-manual.pdf
9. http://www.mdtutorials.com/gmx/
10. https://vina.scripps.edu/manual/

Cosmetic and pharmacological chemistry

Course Objectives:

The objectives of a course aim at introducing the fundamental principles in pharmaceuticsand cosmetics alongside analytical techniques and basics in biological systems, cell biology, microbiology and physiology. This course will focus on design, formulation, manufacture and evaluation of pharmaceutical and cosmetic products. The final year willdelve deeper into more advanced and niche topics including drug design, personalised medicines, responsible innovation and sustainability.

Course outcomes:

Students after successful completion of the course will be able to:

- Explain the principles of formulation and application of Cosmetics & perfumes.
- Acquire a critical knowledge on synthetic techniques of drugs.
- Demonstrate the skills in various aspects of the fermentation technology and apply for production.
- Comprehend the applications offer mentation.

Unit-I

Chemistry ofCosmetics

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours.

Unit- II

Chemistry of Perfumes

Essential oils and their importance in cosmetic industries with reference to Eugenol, Geranial, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmine, Civet one, Mascon.

Unit–III

Drugs & Pharmaceuticals – I

Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, ibuprofen)

Unit–IV

Drugs & Pharmaceuticals - II

Synthesis of the representative drugs of the following classes: Antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam), Cardiovascular (Glycerol triturate), antilaprosy (Daps one), HIV-AIDS related drugs (AZT-Zidovudine).

Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.

Text Books

- ✓ *A handbook of lndustrial Organic Chemistry by Samuel P Sadtler, JB Lippincott company.*
- ✓ *Handbook Industrial Chemistry by Mohammad Farhat Ali Khan, First edition*
- ✓ *Industrial Chemistry, E. Stocchi: Vol -I, Ellis Horwood Ltd. UK.*

Reference Books:

- ✓ *Engineering Chemistry P.C. Jain, M. Jain:Dhanpat Rai & Sons, Delhi.*
- ✓ *Industrial Chemistry, Sharma, B.K. & Gaur, Goel Publishing House, Meerut (1996)*
- ✓ *Introduction to Medicinal Chemistry, G.L. Patrick: Oxford University Press, UK.*
- ✓ *Medicinal and Pharmaceutical Chemistry, Hakishan, V.K. Kapoor: Vallabh Prakashan, Pitampura, New Delhi.*
- ✓ *Principles of Medicinal Chemistry, William O. Foye, Thomas L., Lemke, David A. William:*
- ✓ *B.I. Waverly Pvt. Ltd. New Delhi.*
- ✓ *Industrial Microbiology, 3rd Edition, JR Casida L.E. (2015New Age International (P) Limited Publishers, New Delhi, India.*
- ✓ *Industrial Microbiology: An Introduction. 1st Edition, Waites M.J., Morgan N.L., Rockey J.S. and Higton G. (2001) Blackwell Science, London, UK.*
- ✓ *Microbiology. 5th Edition, Pelczar M.J., Chan E.C.S. and Krieg N.R. (2003) Tata McGraw- Hill Publishing Company Limited, New Delhi*

Corrosion and prevention

Course Objectives:

Most of the industries such as chemical, mining and petroleum industries are facing the corrosion problems. In a recent survey made in India it was estimated that the annual loss due to corrosion is approximately 3 – 4% loss of the GDP. The course is offered to impart: Knowledge about the problem faced by industries, Develop understanding about the mechanism and process of corrosion, Knowledge about various methods for protection against corrosion. The scientific principles and methods that underlie the cause, detection, measurement, and prevention of many metal corrosion problems in engineering practice.

Course outcomes:

- To obtain detailed understanding of corrosion science and technology, basic theory and correlation with materials degradations
- Students should able to solve the problems related to corrosion analysis and to design a suitable material for causes
- To examine corrosion reliability issue in industry using corrosion instrument and standards
- Corrosion data interpretation, analysis, and integration and Understand the criteria for determining corrective action for high-level corrosion problems within various industrial systems

UNIT-I

Definition of corrosion, Corrosion Damage, Classification of corrosion, Electrochemical Aspects, Electrochemical Reactions, Mixed Potential Theory

UNIT-II

Polarization, Passivity, Environmental Effects, Effect of Oxygen and Oxidizers, Effect of Temperature, Effects of Corrosive Concentration, Effect of Galvanic Coupling Using Mixed Potential Theory

UNIT-III

Corrosion Testing: Standard Expressions for Corrosion Rate, Galvanic corrosion, Erosion Corrosion, Crevice Corrosion, Intergranular Corrosion, Pitting, Stress Corrosion. Tafel and Linear Polarization, AC Impedance, Small-Amplitude Cyclic Voltammetry. Paint Tests, Sea Water Tests. Interpretation of Results

UNIT-IV

Materials Selection, Alteration of Environment, Design, Cathodic and Anodic Protection, Coatings, High-Temperature Corrosion and Mechanisms and Kinetics, High-Temperature Materials, Corrosion problems in selected industry

Text Books:

- ✓ *Mars G. Fontana, Corrosion Engineering, 3rd edition, McGraw-Hill Book Company, 1986*
- ✓ *David Talbot and James Talbot, Corrosion Science and Technology, CRC Press, New York, 1998*
- ✓ *H. H. Uhlig and R. W. Revie, Corrosion and Corrosion Control, Wiley (NY) (1985)*

Reference Books:

- ✓ K.E. Perumal and V.S. Raja, Corrosion Failures: Theory, Case Studies, and Solutions" 1st edition, John Wiley & Sons, USA
- ✓ ASM Handbook Vol-13 (A, B & C)
- ✓ ASTM and NACE standards for corrosion testing
- ✓ R. G. Kelly, John R. Scully, D. W. Shoesmith, and R. G. Buchheit "Electrochemical Techniques in Corrosion Science and Engineering" 1st edition, CRC Press
- ✓ Neil Birks, Gerald H. Meier, Frederick S. Pettit "High Temperature Oxidation and Corrosion of Metals" Cambridge University Press.

OPEN SOURCE GIS

Unit-I:

LO 1: *provide advanced, broadening knowledge of all that open source (OS) includes and how it is used in geographic information technology (GIT).*

Introduction to Open and FOSS GIS, Open data standards and SDI, Introduction to Source Internet GIS & Mapping, Mobile GIS and its application; Open-source software for Desktop GIS and WEB mapping – Proprietary vs Open source – OGC Standards.

Unit-II:

LO 2: *realize the potential possibilities when using OS programs.*

Web GIS: Definition, Concepts, History, Principles and Significance; Transferred Geo data, Interactive Web Maps, Internet Map Services, Web GIS Architectures, Web GIS development, Requirement Analysis, Conceptual design, Web GIS system Integration, Open-Source GIS; Web Based Geo Portal, India Geoportal; State Geoportal and District Geoportal. Vehicle Tracking Systems, Mobile Mapping, Location Based Services, Intelligent transportation systems; What is LOud storage, Google earth engine and application of open LOud base platform in GIS.

Unit-III: Practical

LO: *Providing hands on training in OPEN SOURCE GIS.*

1. Introduction to the need for Open-Source GIS and open-source plug-ins
2. Collaboration, Workflow Management, and Version Control in Open-Source GIS
3. QGIS – basic and advanced, tools and libraries
4. Uses of Web and Mobile GIS
5. Accessible Open-Source mapping
6. Open-Source GIS applications to Physical Geography and other applied sciences
7. Natural hazard mapping in Open-Source GIS
8. Practical Record and Viva

Text Books:

- ✓ *Fu, P. and Sun, J. 2011. Web GIS: Principles and Applications, Redlands: Esri Press.*
- ✓ *Muehlenhaus, I. 2013. Web Cartography: Map Design for Interactive and Mobile Devices. CRC Press.*

Reference Books:

- ✓ *DuVander, A 2010. Map Scripting 101: An Example-Driven Guide to Building Interactive Maps with Bing, Yahoo!, and Google Maps. Available as an eBook (free) through UCONN Libraries.*
- ✓ *Bandara, R. M. P. N. S., Jayasinghe, A. B., & Chemin, Y. (2014). Application of Mobile GIS for Mobility Mapping. International Conference of Communication (ICC), 91–100.*
- ✓ *Peng, Z.R. and Tsou, M.H. 2003. Internet GIS: distributed geographic information services for the Internet and wireless networks. New York: John Wiley and Sons, Inc.*
- ✓ *Peterson, M. 2014. Mapping in the Cloud. The Guilford Press.*
- ✓ *Pérez-Cutillas, P., Pérez-Navarro, A., Conesa-García, C., Zema, D. A., & Amado-Álvarez, J. P. (2023, January 1). What is going on within google earth engine? A systematic review and meta-analysis. Remote Sensing Applications: Society and Environment. Elsevier B.V.*

GPS & Drone Technology Applications in Geography

Unit-I

LO: *Students will gain comprehensive knowledge of GPS fundamentals, covering its historical development, essential components, and detailed insights into signal structure. They will apply this understanding practically by exploring GPS error sources and biases, alongside becoming proficient in using standard formats like RINEX and NMEA 0183 for effective navigation and data processing applications.*

Overview of GPS; History and development of GPS; Overview of satellite navigation systems; Components of GPS: space segment, control segment, and user segment; GPS Signal Structure and Processing: Signal structure and modulation; Pseudorandom noise (PRN) codes; Signal acquisition and tracking, GPS errors and Biases. Mobile Mapping and GPS Applications. Advanced GPS Technologies: Multi-constellation GNSS (e.g., NavIC, GLONASS, Galileo, BeiDou). GPS Applications: Environmental monitoring and management; Transportation and logistics; Urban planning and infrastructure management; Disaster management and emergency response. Over view of DGPS.

Unit-II

LO: *Students will learn about UAVs, including types and components, alongside India's drone regulations, safety guidelines, and ethical considerations. They will also explore UAV applications in Geography, covering environmental monitoring, disaster response, urban planning, agriculture, and land use mapping.*

Overview of UAVs and their evolution, Types of drones and their specifications, Components of a drone system, Drone Regulations and Safety special reference to India: Overview of drone regulations and policies, Safety guidelines and best practices, Legal and ethical considerations. Applications in Geography: Environmental monitoring and management; Land use and land cover mapping; Disaster management and emergency response; Urban planning and infrastructure assessment; Agricultural applications

Unit-III Practical

LO: *Students will gain hands-on experience in GPS fundamentals, including initial setup and creating attribute tables for GPS receivers. They will practice collecting point, line, and area data using GPS devices, and learn to create and manage attribute tables in GPS Pro software. Additionally, students will develop skills in exporting data and preparing outputs for integration with GIS, equipping them with practical expertise in utilizing GPS technology for spatial data collection and analysis in various applications.*

Introduction to a GPS and initial setting, Point, Line and area data collection using GPS and measurements, Creating attribute table in GPS pro software and Export functions, GPS and GIS integrations output preparation

Textbooks

- ✓ *Ghosh J.K., (2015). A Text Book on Gps Surveying. Createspace Independent Pub; First Edition (28 December 2015)*

Reference books

- ✓ *Hofmann-Wellenhof, B., Lichtenegger, H., & Wasle, E. (2008). GNSS - Global Navigation Satellite Systems: GPS, GLONASS, Galileo, and more. Springer.*
- ✓ *Additional Readings: Selected journal articles and conference papers (provided by the instructor) Software: Access to GPS data processing software (e.g., Trimble Business Center, GNSS Solutions)*
- ✓ *Ahmed EI-Rabbany- Introduction to GPS the global positioning system: Artech House Boston. London.*
- ✓ *Christopher J. Hegarty (eds), Elliott D. Kaplan- Understanding GPS: Principles and Applications, 2nd Ed.- Artech House Boston. London.*
- ✓ *Fundamentals of Global Positioning System Receivers: A Software Approach James Bao-Yen Tsui Copyright @ 2000 John Wiley & Sons, Inc.*
- ✓ *Parkinson, B. W., J. Spilker, et al. Global Positioning System: Theory and Applications. Vol. 1. American Institute of Aeronautics & Ast, 1996. ISBN: 9781563471063.*
- ✓ *Colomina, I., & Molina, P. (2014). Unmanned Aerial Systems for Photogrammetry and Remote Sensing: A Review. ISPRS Journal of Photogrammetry and Remote Sensing.*

Environmental Impact Assessment

Unit-I:

LO: *The main objective of this course is to introduce students to environmental impact assessment.*

EIA: Principles of EIA, Concepts and approaches of EIA, methods and procedure of EIA and current issues in EIA.EIA practices in developed and developing countries (one example each).

Unit-II:

LO: *These concepts include understanding how laws work, quantitative and qualitative reasoning.*

EIA: Baseline data, evaluation and mitigation, valuation of environmental impacts, public

participation, presentation and review. Environmental Impact Assessment Regulations and Policies in India, Role of NGT in EIA.

Unit-III: Practical

LO: *Also interpreting graphs and tables, critical thinking, reading, and visual display of information.*

Project report/term paper

Case Studies of environmental impact assessment: Social Impact Assessment; Mining Impact Assessment. Water Impact assessment.

Text Books:

- ✓ *J. Glasson, R. Therivel and A. Chadwick, 1994. Introduction to Environmental Impact Assessment: Principles and Procedures, Process, Practice and Prospects, Research Press, Delhi.*
- ✓ *Judith, Petts (eds.) 1999. Handbook of Environmental Impact Assessment, Blackwell Science Publication*

Reference Books:

- ✓ *Betty Bowers Marriott, 1997. Environmental Impact Assessment, Mc Graw Hill Professional Bookstore.*

- ✓ *Goel, R.S. 2000. Environmental Impacts Assessment of water Resources Projects - concerns, Policy Issues Perceptions and Scientific Analysis, Oxford Publishing Co. Pvt. Ltd.*
- ✓ *Goel R.S., and R.N. Srivastava, 1999. Hydropower and River Valley Development Environment Management, Case Studies and Policy Issues, Oxford & IBH Publishing Co. Pvt., New Delhi.*
- ✓ *Goudie, A. 2000. The Human Impact on the Natural Environment, Blackwell, Publishers, Oxford.*
- ✓ *Prasad, K. and Goel, R. S. 2000. Environmental Management in Hydro Electric Projects*

Digital Image Processing

Unit-I

LO: *Students will learn the basics of digital image processing (DIP), including concepts of digital images, data sources, formats, hardware, and software considerations. They will also cover essential steps in DIP like data loading, image restoration, and techniques for image reduction and magnification, preparing them for practical application in image analysis tasks.*

Introduction to digital image processing- concept of digital image, steps in DIP, Source of Data, Data Formats, Hardware and Software Consideration for Digital Image Processing, Data loading, Image Restoration, Image Reduction and Magnification. Image Pre-processing: Fundamental of image rectification, definition, principle and procedure, Sources of Error in image data, Image Rectification, and Registration, Resampling Techniques, Radiometric & geometric correction, Image calibration methods (DN to radiance, radiance to reflectance).

Unit-II

LO: *Students will learn image enhancement techniques including contrast manipulation, spatial texture filtering, edge enhancement, and multi-image manipulation. They will also explore color enhancement, image transformations, and supervised/unsupervised image classification methods, along with accuracy assessment techniques.*

Image enhancement techniques - an overview; Contrast Manipulation: Gray Level Thresholding, Level Slicing; Contrast Stretching – Linear and Non-linear, histogram equalization and density slicing, Spatial Texture Manipulation: Spatial filtering – Linear, High Boost, Directional and Gradient Filters; Edge Enhancement and Fourier Analysis, Multi-image Manipulation: Band Ratioing and Differencing, Principal and Canonical Components, Vegetation Components, Image Fusion, Enhancement by using colours - advantages, types of colour enhancements; Image transformation -Intensity Hue Saturation (HIS) and PCA. Image classification types - supervised and unsupervised, advantage and limitations; Classification accuracy assessment.

Unit-III Practical

LO: *Students will study atmospheric correction techniques for multispectral optical data, image enhancement and filtering methods, and both unsupervised and supervised image classification. They will also learn techniques for assessing the accuracy of image classifications, preparing them for advanced analysis and interpretation of remote sensing data.*

Atmospheric Correction, Image enhancement and filtering of multispectral optical data, Image classification (Unsupervised, Supervised), and Accuracy assessment.

Text Books

- ✓ *Jensen J.R. (2005) Digital Image Processing: A Remote Sensing Perspective, 3rd ed., Prentice Hall.*
- ✓ *Jensen J.R. (2007) Remote Sensing of the Environment: An Earth Resource Perspective, 2nd ed., Prentice Hall.*
- ✓ *Joseph, George, (2003), Fundamental of Remote Sensing, University Press (India) Pvt. Ltd, Orient Longman Pte. Ltd., Hyderabad, India*
- ✓ *Lillesand, T.M. and Kieffer, R.W., 2003. Remote Sensing and Image Interpretation, 5th Edition., Wiley, New York*
- ✓ *Panda, B. C., 2008. Remote Sensing: Principles and Applications, Viva Books Private Limited, India*

Reference Books:

- ✓ *Campbell J.B. (2002) Introduction to Remote Sensing, 3rd ed., The Guilford Press.*
- ✓ *Campbell, James B., Introductory Remote Sensing: Principles and Concepts, Routledge.*
- ✓ *Castleman, K.R. (1979) Digital Image Processing. Prentice Hall Inc, New Jersey.*
- ✓ *Cracknelll, A.P., and L.W.B.Hayes, Introduction to remote sensing, Taylor and Francis, Washington, DC,1991*
- ✓ *Curran, P.J. (1980) Mulltispectral remote sensing of vegetation amount, Progress in Physical Geography, 4:315*
- ✓ *Curran, P.J. (1988) Principles of Remote Sensing, ELBS Edn. Longman Group UK Ltd.*

Multivariate Analysis and Modelling

Unit-I

LO: *Students will learn about multivariate data, variables, and modeling concepts, exploring real-world applications and measurement techniques. They will study different types of multivariate techniques, guidelines for analysis, and structured approaches to model building, preparing for practical applications in complex data analysis and modeling scenarios.*

Overview of multivariate data; Types of variables; Definitions and basic concepts of multivariate modeling; measurement scale, measurement error, multivariate measurement; types of multivariate techniques, classification of multivariate techniques. Multivariate Distributions: Multivariate normal distribution; Properties and applications; Estimation of mean vectors and covariance matrices.

Unit-II

LO: *Students will gain practical skills in multivariate distributions, hypothesis testing with Hotelling's T-squared and MANOVA, dimension reduction techniques (PCA, Factor Analysis, CCA), and multivariate regression models (logistic, linear). They will apply these tools to analyze complex datasets in statistics, social sciences, and business analytics.*

Multivariate Hypothesis Testing: Hotelling's T-squared test; MANOVA (Multivariate Analysis of Variance); Testing equality of covariance matrices. Dimension Reduction Techniques: Principal Component Analysis (PCA); Factor Analysis; Canonical Correlation Analysis (CCA); Multivariate Regression Models: logistic regression; multivariate linear regression. Clustering Techniques: Hierarchical clustering; K-means clustering. Time series analysis with multivariate data; Applications in various fields (e.g., Geo-spatial, biology, social sciences). Model evaluation: goodness of fit.

Unit-III Practical

LO: *Students will practice PCA using software, logistic and multivariate linear regression, various clustering algorithms, and classification model building. They will also learn to evaluate model performance, preparing them for data-driven analysis in diverse fields.*

Performing PCA using software; logistic regression; multivariate linear regression; Implementing various clustering algorithms; Building classification models using different methods; Evaluating model performance.

Text Books:

- ✓ *Paul L. Meyer: Introductory Probability and Statistical Applications, Adsion Wesley.*
- ✓ *Shanti Narayan: Textbook of Matrices, S. Chand and Co.*
- ✓ *Kapoor and Gupta: Fundamentals of Mathematical Statistics, S Chand and Sons.*

Reference Books

- ✓ *Johnson R.A. and Wichern D.W., Applied Multivariate Statistical Analysis, Pearson Education, Delhi, 2002, 767 pp.*
- ✓ *Hair J.F., Anderson R.E., Tatham R.L., Black W.C., Multivariate data analysis with readings, Prentice Hall, Englewood Cliffs, New Jersey 07632, 1995, 745 pp.*
- ✓ *Agresti A. Analysis of ordinal categorical data, John Wiley and Sons, New York, 1984, 287 pp.*
- ✓ *Anderson S., Aquier A., Hauck W.W., Oakes D., Vandaele W., and Weisberg, H.I., Statistical methods for comparative studies, John Wiley and Sons, New York, 1980, 287 pp.*

Welfare and Development Programs: Monitoring and Evaluation

Unit-I:

LO: *Demonstrate an understanding of the concepts, approach and method of M&E*

Concepts of theory of change and logical framework, definition of program monitoring and evaluation, difference between monitoring and evaluation, concept and purpose of monitoring of development program, types of monitoring, tools and techniques of monitoring, Uses of monitoring in implementation of developmental programme

Unit-II:

LO: *Describe and explain various types of M&E*

Concept and purpose of evaluation in development program, types of evaluation, evaluation approaches and methods (quantitative, qualitative and mixed), evaluation design (experimental and quasi-experimental) and criteria, sampling methodology for evaluation, data analysis for evaluation, use of evaluation in implementation of developmental programme

Unit-III: Practical

LO: *Design basic monitoring indicators and design approach and method of evaluation*

a) Development of indicators and framework of monitoring of a Government sponsored development program
b) Preparation of approach and methodology of impact evaluation of a government sponsored development program (select any Government program after 2-3 years of its inception)
c) Viva-Voce

Text Books:

- ✓ *UNDP Evaluation Office. (2002). Handbook on Monitoring and Evaluation for Results.*
- ✓ *Phillips, J. J. (1997). Handbook of training evaluation and measurement methods (3rd ed.). Houston, TX: Gulf.*

Reference Books:

- ✓ *Campbell, D. T., & Stanley, J. (1963). Experimental and quasi- experimental designs for research. Chicago: Rand-McNally.*
- ✓ *Chen, H.-T. (2005). Practical program evaluation: Assessing and improving planning, implementation, and effectiveness. Thousand Oaks, CA: SAGE.*
- ✓ *Cook, T. D., & Campbell, D. T. (1979). Quasi- experimentation: Design and analysis issues for fi eld settings. Boston: Houghton Mifflin.*

- ✓ *Creswell, J. W., & Creswell, J. D. (2017). Research design: qualitative, quantitative, and mixed methods approaches. Sage publications*
- ✓ *Fitzpatrick, J. L., Sanders, J. R., & Worthen, B. R. (2004). Program evaluation: Alternative approaches and practical guidelines. Upper Saddle River, NJ: Pearson/Allyn & Bacon.*
- ✓ *Funnell, S. C. and P. J. Rogers (2011). Purposeful Program Theory: Effective Use of Theories of Change and Logic Models, John Wiley & Sons*
- ✓ *ILO (2022). Basic Principles of Monitoring and Evaluation.*
- ✓ *Kultar Singh (2007): Quantitative Social Research Methods, Sage Publication*
- ✓ *Rossi, P., Lipsey, M. W., & Freeman, H. E. (2004). Evaluation: A systematic approach (7th ed.). Thousand Oaks, CA: SAGE.*
- ✓ *Segone, M. (2009). Country-led monitoring and evaluation systems. Geneva, Switzerland: UNICEF*
- ✓ *Regional Office.*
- ✓ *Stuffl ebeam, D. L., & Shinkfi eld, A. J. (2007). Evaluation theory, models, and applications. San Francisco: Jossey-Bass.*
- ✓ *UN-Women. (2014). Guide for the evaluation of programmes and projects with a gender, human*
- ✓ *rights and intercultural perspective.*
- ✓ *Weiss, C. H. (1972). Evaluation research: Methods of assessing program effectiveness. Englewood Cliffs, NJ: Prentice-Hall.*
- ✓ *Weiss, C. H. (1998). Evaluation research: Methods for studying programs and policies (2nd ed.). Upper Saddle River, NJ: Prentice Hall.*
- ✓ *W. K. Kellogg Foundation (WKKF). (2004a). Evaluation handbook. Battle Creek, MI: Author.*