JANGIPUR COLLEGE

DOCUMENTS

SKILL ENHANCEMENT COURSE

(CBCS)

Biswas

Principal
Jangipur College
P.O.- Jangipur, Dist.- Murshidabad
Pin- 742213

JANGIPUR COLLEGE
Estd
1950
MURSHIDABAD

B.A BENGALI (Honours)

SEMESTER II			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-H-AECC-T-1	বাংলা	AECC	2
পর্ব-১			
বোধ পরীক্ষণ পাঠ্যবিষয় বহির্ভূত রচনা থেকে নির্বাচিত হবে।			
পর্ব-২			
ক. পত্ররচনা (আবেদন পত্র) **খ. প্রতিবেদন** (সংবাদপত্র প্রকাশ উপযোগী কোন ঘটনার প্রতিবেদন) **গ. পরিভাষা** (কল্যাণী বিশ্ববিদ্যালয় থেকে প্রকাশিত সংকলনের ২০০ টি পরিভাষা থেকে নির্বাচিত)			
পর্ব-৩			
ছোটগল্প: (কল্যাণী বিশ্ববিদ্যালয় থেকে প্রকাশিত 'আবশ্যিক বাংলা পাঠ সংকলন' থেকে নির্বাচিত) খোকাবাবুর প্রত্যাবর্তন- রবীন্দ্রনাথ ঠাকুর আদরিণী- প্রভাত কুমার মুখোপাধ্যায়			
কবিতা: (কল্যাণী বিশ্ববিদ্যালয় থেকে প্রকাশিত 'আবশ্যিক বাংলা পাঠ সংকলন' থেকে নির্বাচিত) নির্ঝরের স্বপ্নভঙ্গ- রবীন্দ্রনাথ ঠাকুর শিকল পরার গান- নজরুল ইসলাম			

	SEMESTER III		
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-H-SEC-T-1	বানান বিধি, প্রুফ সংশোধন, সাহিত্য পাঠ ও প্রয়োগ বৈচিত্র্য (ব্যবহারিক)	SEC	2

পর্ব-১ বানান বিধি, প্রুফ রিডিং।
পর্ব-২ গ্রন্থ পর্যালোচনা (যে কোন গ্রন্থ নির্বাচন করা যাবে)।
পর্ব-৩ কবিতা ও নাটক পাঠ।
পর্ব-৪ সাহিত্য বিষয়ক আলোচনাচক্র (তাৎক্ষণিক বিষয় ভিত্তিক)

এটি ব্যবহারিক পত্র। অন্য কলেজের অধ্যাপক বহিরাগত পরীক্ষক হিসেবে থাকবেন।

SEMESTER IV			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-H-SEC-T-2	প্রতিবেদন, বিজ্ঞাপন রচনা, গবেষণার রীতি পদ্ধতি ও ব্যবহারিক প্রয়োগ	SEC	2
পর্ব-১ প্রতিবেদন, বিজ্ঞাপন রচনা।			
পর্ব-২ গবেষণার রীতি পদ্ধতি।			
পর্ব-৩ সাহিত্য বিষয়ক প্রবন্ধ রচনা।			
পর্ব-৪ সঙ্কলনা, সংবাদ পাঠ।			

টি ব্যবহারিক পত্র। অন্য কলেজের অধ্যাপক বহিরাগত পরীক্ষক হিসেবে থাকবেন।

B.A BENGALI (General)

SEMESTER- I			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-G-AECC-T-1	বাংলা	AECC	2

পর্ব-১ বোধ পরীক্ষণ
পাঠ্য বহির্ভূত যে কোন রচনার নির্বাচিত অংশ
পর্ব-২
ক. পত্ররচনা- আবেদন পত্র খ. প্রতিবেদন- সংবাদপত্রে প্রকাশের উপযোগী করে কোনও ঘটনার প্রতিবেদন রচনা। গ. পরিভাষা - (কল্যাণী বিশ্ববিদ্যালয় কর্তৃক প্রকাশিত 'আবশ্যিক বাংলা পাঠ সংকলন' গ্রন্থ নির্বাচিত ২০০টিই পাঠ্য)
পর্ব-৩
ছোটগল্প- (কল্যাণী বিশ্ববিদ্যালয় কর্তৃক প্রকাশিত 'আবশ্যিক বাংলা পাঠ সংকলন' গ্রন্থ নির্বাচিত) খোকাবাবুর প্রত্যাবর্তন- রবীন্দ্রনাথ ঠাকুর আদরিণী- প্রভাত কুমার মুখোপাধ্যায়
কবিতা (কল্যাণী বিশ্ববিদ্যালয় কর্তৃক প্রকাশিত 'আবশ্যিক বাংলা পাঠ সংকলন' গ্রন্থ নির্বাচিত) নির্ঝরের স্বপ্নভঙ্গ- রবীন্দ্রনাথ ঠাকুর শিকল পরার গান- কাজী নজরুল ইসলাম।

SEMESTER- II			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-G-LCC-T-1	শাক্ত পদাবলী, কাব্য ও উপন্যাস	LANGUAGE 2	6

পর্ব-১ শাক্ত পদাবলী (কল্যাণী বিশ্ববিদ্যালয় কর্তৃক প্রকাশিত 'শাক্ত পদ সঙ্কলন' গ্রন্থের নির্বাচিত পদ)
১. গিরি, এবার আমার উমা এলে- রামপ্রসাদ সেন ২. আমি কি হেরিলাম নিশি স্বপনে-কমলাকান্ত ভট্টাচার্য ৩. ওরে নবমী নিশি- কমলাকান্ত ভট্টাচার্য ৪. যেয়ো না রজনী আজি লয়ে তারাদলে- মধুসূদন দত্ত। ৫. মা আমায় ঘুরাবি কত - রামপ্রসাদ সেন।
পর্ব-২ কাব্য
মেঘনাদবধ কাব্য (ষষ্ঠ সর্গ)
পর্ব- ৩ উপন্যাস
পল্লীসমাজ–শরৎচন্দ্র চট্টোপাধ্যায়

SEMESTER- III			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-G-SEC-T-1	প্রুফ সংশোধন, সাহিত্য পাঠ ও প্রয়োগ বৈচিত্র্য (ব্যবহারিক)	SEC	2
পর্ব-১ বানান বিধি, প্রুফ সংশোধন			
পর্ব-২ গ্রন্থ পর্যালোচনা (যে কোন গ্রন্থ নির্বাচন করা যাবে)			
পর্ব-৩ সাহিত্য বিষয়ক আলোচনা চক্র।			
পর্ব ৪ কবিতা ও নাটক পাঠ			

বি.দ্র- এটি ব্যবহারিক পত্র। অন্য কলেজের অধ্যাপক বহিরাগত হিসেবে নির্দিষ্ট কলেজে গিয়ে পরীক্ষা নেবেন।

SEMESTER- IV			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-G-LCC-T-2	কবিতা ও নাটক ও ছোটগল্প	CORE LANGUAGE 1	6
পর্ব-১ কবিতা ও নাটক			
কবিতা- জন্মভূমির প্রতি- মধুসূদন দত্ত সোনার তরী- রবীন্দ্রনাথ ঠাকুর বনলতা সেন- জীবনানন্দ দাশ			
পর্ব-২ নাটক			

SEMESTER- IV			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-G-SEC-T=2	প্রতিবেদন, বিজ্ঞাপন রচনা, সাহিত্য পাঠ ও প্রয়োগ বৈচিত্র্য	SEC	2
পর্ব-১ প্রতিবেদন ও বিজ্ঞাপন রচনা			
পর্ব-২ সাহিত্য বিষয়ক প্রবন্ধ রচনা			
পর্ব-৩ সঞ্চালনা ও সংবাদ পাঠ			

SEMESTER- V			
COURSE CODE	COURSE TITLE	COURSE NATURE	CREDIT
BNG-G-SEC-T-3	লোকগান	SEC	2
পর্ব-১ ভূমিকা ও লোকগান সম্পর্কে প্রাথমিক আলোচনা			
ক.ভূমিকা ও বিষয় ভিত্তিক লোকগান সম্পর্কে প্রাথমিক আলোচনা খ. বিশ্লেষণ: ঋতুর গান- বৈশাখী দিন যায় খর তাপ লাগে গায় বিয়ের গান- মেহেদির পাতা চিরল গোচারল			
পর্ব-২ তত্ত্বমূলক গান			
ক.তত্ত্বমূলক গান সম্পর্কে প্রাথমিক আলোচনা খ. বিশ্লেষণ: সব লোকে কয় লালন কি জাত সংসারে- লালন সাঁই এই ধর্মের বিচার করো রে ভাই- কুবীর গোঁসাই।			
পর্ব-৩ ভাওয়াইয়া, ভাটিয়ালি, আলকাপ			
ক. ভাওয়াইয়া, ভাটিয়ালি, আলকাপ এর সম্পর্কে প্রাথমিক আলোচনা খ. বিশ্লেষণ: যে জন প্রেমের ভাব জানে না (ভাওয়াইয়া) পদ্মা গাঙের মাঝি ও ভাই (ভাটিয়ালি) বড় দুঃখ পাইয়্যা বাংলার শিল্পী মরত্যাছে (আলকাপ)			

SEMESTER- VI			
	COURSE TITLE	**COURSE NATURE**	**CREDIT**
BNG-G-SEC-T-4	**প্রুফ সংশোধন, আই.পি.এ ও প্রবন্ধ রচনা**	**SEC**	**2**
পর্ব-১			
প্রুফ সংশোধন			
পর্ব-২			
আই.পি.এ (আন্তর্জাতিক ধ্বনিমূলক বর্ণমালা)			
পর্ব-৩			
সাহিত্য বিষয়ক প্রবন্ধ রচনা			

Course: UG-H-BOT-SEC-T-01

Course title: A. Biofertilizers

Core Course; Credit – 2; Full Points – 50

COURSE OBJECTIVES:

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

- elucidate different types of fertilizers using biological organisms;
- apply the knowledge gained in utilization of biofertilizers in organic farming.

COURSE CONTENT (THEORY) - UG-BOT-SEC-T-01:

Unit 1: (4)

General account about the microbes used as biofertilizer – *Rhizobium* – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.

Unit 2: (8)

Azospirillum: isolation and mass multiplication – carrier based inoculants, associative effect of different microorganisms. *Azotobacter*: classification, characteristics – crop response to *Azotobacter* inoculum, maintenance and mass multiplication.

Unit 3: (4)

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

Unit 4: (8)

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

Unit 5: (6)

Organic farming – Green manuring and organic fertilizers, recycling of biodegradable municipal, agricultural and industrial wastes – biocompost making methods, types and method of vermicomposting – field application.

SUGGESTED READINGS/ REFERENCES:

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

Course: UG-H-BOT-SEC-T-01

Course title: B. Plant Diversity and Human WelfareCore Course;

Credit – 2; Full Points – 50

COURSE OBJECTIVES:

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

- explain the concept and value of biodiversity, threats to biodiversity, need for conservation and environmental stewardship;
- apply and implement conservation strategies for biodiversity management.

COURSE CONTENT (THEORY) - UG-H-BOT-SEC-T-01:

Unit 1: Plant diversity and its scope (8)

Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.

Unit 2: Loss and Management of Biodiversity (8)

Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss, Management of Plant Biodiversity: Organizations associated with biodiversity management- Methodology for execution- IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit 3: Conservation of Biodiversity: (8)

Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit 4: Role of plants in relation to Human Welfare (6)

a) Importance of forestry their utilization and commercial aspects, b) Avenue trees, c) Ornamental plants of India, d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses.

SUGGESTED READINGS/ REFERENCES:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles andPractices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.

Course: UG-H-BOT-SEC-T-01

Course title: C. Floriculture

Core Course; Credit – 2; Full Points – 50

COURSE OBJECTIVES:

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

- apply the assimilated knowledge and skills in production, processing, and distribution of flowers, cut flowers, foliage, and related plant materials;
- prescribe best management practices in field and greenhouse production of flowers and related plant materials and the arrangement of plant materials for ornamental purposes.

COURSE CONTENT (THEORY) - UG-H-BOT-SEC-T-01:

Unit 1: (2)

Introduction: History of gardening; Importance and scope of floriculture and landscape gardening.

Unit 2: (8)

Nursery Management and Routine Garden Operations: Sexual and vegetative methods of

propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.

Unit 3:Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai.

Unit 4: **(4)**

Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India.

Unit 5: **(4)**

Landscaping Places of Public Importance: Landscaping highways and Educational institutions.

Unit 6: **(6)**

Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Lilium, Orchids).

Unit 7: **(2)**

Diseases and Pests of Ornamental Plants.

SUGGESTED READINGS/ REFERENCES:

1. Randhawa, G.S. and Mukhopadhyay, A. (1986). Floriculture in India. Allied Publishers.

Course: UG-H-BOT-SEC-T-02

Course title: A. Medicinal Botany

Core Course; Credit – 2; Full Points – 50

COURSE OBJECTIVES:

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

- discuss the history, scope and importance of plants as sources of medicines;
- describe methods for sustainable utilization of plant herbal resources;

apply the knowledge gained in utilising plants used as traditional/ folk medicines andstrategise their conservation.

COURSE CONTENT (THEORY) - UG-H-BOT-SEC-T-02:

Unit 1: **(10)**

History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope - Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations.

Unit 2: **(10)**

Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; *In situ* conservation: Biosphere reserves, sacred groves, National Parks; *Ex situ* conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants: Objectives of the nursery, its classification,

important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

Unit 3: **(10)**

Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. Folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.

SUGGESTED READINGS/ REFERENCES:

1. Purohit, S.S. and Vyas, S.P. (2008). Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.
2. Trivedi P.C. (2006). Medicinal Plants: Ethnobotanical Approach, Agrobios, India.

Course: UG-H-BOT-SEC-T-02

Course title: B. Mushroom Culture Core Course;

Credit – 2; Full Points – 50

COURSE OBJECTIVES:

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

- describe nutritional and medicinal values of edible mushrooms and their cultivation strategies;
- apply the knowledge gained in storage and food preparation.

COURSE CONTENT (THEORY) - UG-H-BOT-SEC-T-02:

Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms;Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea,Pleurotus citrinopileatus, Agaricus bisporus*. **(5)**

Unit 2: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag,vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroomunit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium,sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddystraw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production. **(12)**

Unit 3: 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 fibre content - Vitamins. **(8)**

Unit 4: Food Preparation: Types of foods prepared from mushroom. Research Centres -National leevel and Regional level. Cost benefit ratio - Marketing in India and abroad, ExportValue. **(5)**

SUGGESTED READINGS/ REFERENCES:

1. Bahl, N. (1984-1988). Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
2. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Swaminathan, M. (1990). Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

4. Tewari, P. and Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

Course: UG-H-BOT-SEC-T-02

Course title: C. Intellectual Property RightsCore Course;

Credit – 2; Full Points – 50

COURSE OBJECTIVES:

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

- identify different types of Intellectual Properties (IPs), right of ownership, scope of protection of IP and ways to create and extract value from IP;
- recognize the role of IP in different sectors for promoting product and technology development;
- identify activities that constitute IP infringements and the remedies available to the IP owner and describe the steps to be taken to prevent infringement of such rights in products and technology development;

discuss the processes and various approaches of Intellectual Property Management (IPM).

COURSE CONTENT (THEORY) - UG-H-BOT-SEC-T-02:

Unit 1: Introduction to intellectual property rights (IPR) (2)

Concept and kinds. Economic importance. IPR in India and World. Genesis and scope, some important examples. IPR and WTO (TRIPS, WIPO).

Unit 2: Patents (3)

Objectives, Rights, Patent Act 1970 and its amendments. Procedure of obtaining patents, Working of patents. Infringement.

Unit 3: Copyrights (3)

Introduction, works protected under copyright law, rights, transfer of copyright, infringement.

Unit 4: Trademarks (3)

Objectives, types, rights, protection of goodwill, infringement, passing off, defences, domain name.

Unit 5: Geographical Indications (3)

Objectives, justification, international position, multilateral treaties, national level, Indian position.

Unit 6: Protection of Traditional Knowledge (4) Objective, concept of traditional knowledge, holders, issues concerning, bio-prospecting andbio-piracy, alternative ways, protectability, need for a *Sui-Generis* regime, traditional knowledge on the International arena, at WTO, at national level, Traditional Knowledge Digital Library.

Unit 7: Industrial Designs (2)

Objectives, rights, assignments, infringements, defences of design Infringement.

Unit 8: Protection of Plant Varieties (2)

Plant Varieties Protection- objectives, justification, International position, Plant varieties protection in India. Rights of farmers, breeders and researchers. National gene bank, benefit sharing. Protection of Plant Varieties and Farmers' Rights Act, 2001.

Unit 9: Information Technology related Intellectual Property Rights (4)

Computer Software and Intellectual Property, Database and Data Protection, Protection of Semi-conductor chips, Domain Name Protection.

Unit 10: Biotechnology and Intellectual Property Rights (4)

Patenting Biotech Inventions: objective, applications, concept of novelty, concept of inventive step, microorganisms, moral issues in patenting biotechnological inventions.

SUGGESTED READINGS/ REFERENCES:

1. Gopalakrishnan, N.S. and T.G. Agitha, (2009). Principles of Intellectual Property. Eastern Book Company, Lucknow.
2. Narayanan, P. (2010). Law of Copyright and Industrial Designs; Eastern law House, Delhi.
3. Parulekar A. and D' Souza, S. (2006). Indian Patents Law – Legal & Business Implications; Macmillan India Ltd.
4. Wadehra, B.L. (2000). Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India.

Course: UG-H-BOT-SEC-T-01

Course title: A. Biofertilizers

Course: UG-H-BOT-SEC-T-01

Course title: A. Biofertilizers

Core Course; Credit – 2; Full Points – 50

CHEMHS – 1A	IT skills for Chemist	2 Credit

1. Mathematics (10L)

i. Fundamentals, mathematical functions, polynomial expressions, logarithms, the exponential function, units of a measurement, interconversion of units, constants and variables, equation of a straight line, plotting graphs.

ii. Uncertainty in experimental techniques: Displaying uncertainties, measurements in chemistry, decimal places, significant figures, combining quantities.

iii. Uncertainty in measurement: types of uncertainties, combining uncertainties. Statistical treatment. Mean, standard deviation, relative error. Data reduction and the propagation of errors. Graphical and numerical data reduction. Numerical curve fitting: the method of least squares (regression).

iv. Algebraic operations on real scalar variables (e.g. manipulation of van der Waals equation in different forms). Roots of quadratic equations analytically and iteratively (e.g. pH of a weak acid). Numerical methods of finding roots (Newton-Raphson, binary –bisection, e.g. pH of a weak acid not ignoring the ionization of water, volume of a van der Waals gas, equilibrium constant expressions).

v. Differential calculus: The tangent line and the derivative of a function, numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals gas, potentiometric titrations).

vi. Numerical integration (Trapezoidal and Simpson's rule, e.g. entropy/enthalpy change from heat capacity data).

2. Computer programming (10L)

Constants, variables, bits, bytes, binary and ASCII formats, arithmetic expressions, hierarchy of operations, inbuilt functions. Elements of the BASIC language. BASIC keywords and commands. Logical and relative operators. Strings and graphics. Compiled versus interpreted languages. Debugging. Simple programs using these concepts. Matrix addition and multiplication. Statistical analysis. BASIC programs for curve fitting, numerical differentiation and integration (Trapezoidal rule, Simpson's rule), finding roots (quadratic formula, iterative, Newton-Raphson method).

3. Hands On (10L)

i. Introductory writing activities: Introduction to word processor and structure drawing (ChemSketch) software. Incorporating chemical structures, chemical equations, and expressions from chemistry (e.g. Maxwell-Boltzmann distribution law, Bragg's law, van der Waals equation, etc.) into word processing documents.

ii. Handling numeric data: Spreadsheet software (Excel), creating a spreadsheet, entering and formatting information, basic functions and formulae, creating charts, tables and graphs. Incorporating tables and graphs into word processing documents. Simple calculations, plotting graphs using a

spreadsheet (Planck's distribution law, radial distribution curves for hydrogenic orbitals, gas kinetic theory- Maxwell-Boltzmann distribution curves as function of temperature and molecular weight), spectral data, pressure-volume curves of van der Waals gas (van der Waals isotherms), data from phase equilibria studies. Graphical solution of equations.

iii. Numeric modelling: Simulation of pH metric titration curves. Excel functions LINEST and Least Squares. Numerical curve fitting, linear regression (rate constants from concentration- time data, molar extinction coefficients from absorbance data), numerical differentiation (e.g. handling data from potentiometric and pH metric titrations, pKa of weak acid), integration (e.g. entropy/enthalpy change from heat capacity data).

iv. Statistical analysis: Gaussian distribution and Errors in measurements and their effect on data sets. Descriptive statistics using Excel. Statistical significance testing: The t test. The F test.

v. Presentation: Presentation graphics

Reference Books

1. McQuarrie, D. A. Mathematics for Physical Chemistry University Science Books (2008). 2. Mortimer, R. Mathematics for Physical Chemistry. 3rd Ed. Elsevier (2005). 3. Steiner, E. The Chemical Maths Book Oxford University Press (1996). 4. Yates, P. Chemical calculations. 2nd Ed. CRC Press (2007). 5. Harris, D. C. Quantitative Chemical Analysis. 6th Ed., Freeman (2007) Chapters 3-5. 6. Levie, R. de, How to use Excel in analytical chemistry and in general scientific data analysis, Cambridge Univ. Press (2001) 487 pages. 7. Noggle, J. H. Physical chemistry on a Microcomputer. Little Brown & Co. (1985). 8. Venit, S.M. Programming in BASIC: Problem solving with structure and style. Jaico Publishing House: Delhi (1996).

style. Jaico Publishing House: Delhi (1996).

CHEMHS – 1B	Basic Analytical Chemistry	2 Credit

1. **Introduction** **(2L)**
   Strategies of Analytical Chemistry and its interdisciplinary applicability. Protocol of sampling. Variability and validity of analytical measurements. Presentation of experimental data and results, from the point of view of significant figures.
2. **Complexometry** **(4L)**
   Complexometric titrations, Chelation, Chelating agents, use of indicators. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration.
   Soil Analysis
   Composition, pH of soil samples, estimation of calcium and magnesium content.
3. **Analysis of water** **(4L)**
   Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.
   Determination of pH, acidity and alkalinity of a water sample.
   Determination of Biological Oxygen Demand (BOD).
4. **Analysis of food products** **(4L)**
   Nutritional value of foods, idea about food processing and food preservations and adulteration.
   Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.
   Analysis of preservatives and colouring matter.
5. **Chromatography** **(4L)**
   Definition, general introduction on principles of chromatography, paper chromatography, TLC etc.

Paper chromatographic separation of mixture of metal ion (Fe^{3+} and Al^{3+}).
To compare paint samples by TLC method.

6. **Ion-exchange** **(4L)**
   Column, ion-exchange chromatography etc. 2. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).
7. **Analysis of cosmetics** **(3L)**
   Major and minor constituents and their function
   Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate.
   Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide, Zinc oxide and Calcium carbonate by complexometric titration
8. **Suggested Applications (Any one)** **(2L)**
   To study the use of phenolphthalein in trap cases.
   To analyse arson accelerants.
   To carry out analysis of gasoline.
9. **Suggested Instrumental demonstrations** **(3L)**
   Estimation of macro nutrients: Potassium, Calcium, Magnesium in soil samples by flame photometry.
   Spectrophotometric determination of Iron in Vitamin / Dietary Tablets.
   Spectrophotometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drinks

Reference Books

1. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental Methods of Analysis, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988. 2. Skoog, D.A., Holler, F.J. & Crouch, S. Principles of Instrumental Analysis, Cengage Learning India Edition, 2007. 3. Skoog, D.A.; West, D.M. & Holler, F.J. Analytical Chemistry: An Introduction 6th Ed., Saunders College Publishing, Fort Worth, Philadelphia (1994). 4. Harris, D. C. Quantitative Chemical Analysis, 9th ed. Macmillan Education, 2016. 5. Dean, J. A. Analytical Chemistry Handbook, McGraw Hill, 2004. 6. Day, R. A. & Underwood, A. L. Quantitative Analysis, Prentice Hall of India, 1992. 7. Freifelder, D.M. Physical Biochemistry 2nd Ed., W.H. Freeman & Co., N.Y. USA (1982). 8. Cooper, T.G. The Tools of Biochemistry, John Wiley & Sons, N.Y. USA. 16 (1977). 9. Vogel, A. I. Vogel's Qualitative Inorganic Analysis 7th Ed., Prentice Hall, 1996. 10. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009. 11. Robinson, J.W. Undergraduate Instrumental Analysis 5th Ed., Marcel Dekker, Inc., New York (1995). 12. Christian, G.D. Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.

Mukherjee, G. N., University of Calcutta

CHEMHS – 2A	Pharmaceutical Chemistry	2 Credit

1. **Drugs & Pharmaceuticals:** **(16L)**
   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); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam),Cardiovascular (Glyceryl trinitrate), antilaprosy (Dapsone), HIV-AIDS related drugs (AZT- Zidovudine).
2. **Fermentation:** **(6L)**
   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.
3. **Hands On Practical:** **(8L)**
   Preparation of Aspirin and its analysis.
   Preparation of magnesium bisilicate (Antacid).

Reference Books

1. Patrick, G. L. Introduction to Medicinal Chemistry, Oxford University Press, UK, 2013. 2. Singh, H. & Kapoor, V.K. Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, New Delhi, 2012. 3. Foye, W.O., Lemke, T.L. & William, D.A.: Principles of Medicinal Chemistry, 4th ed., B.I. Waverly Pvt. Ltd. New Delhi.

CHEMHS – 2B	Analytical clinical Biochemistry	2 Credit

1. Review of Concepts from Core Course **(8L)**

Carbohydrates: Biological importance of carbohydrates, Metabolism, Cellular currency of energy (ATP), Glycolysis, Alcoholic and Lactic acid fermentations, Krebs cycle. Isolation and characterization of polysachharides.

Proteins: Classification, biological importance; Primary and secondary and tertiary structures of proteins: α-helix and β- pleated sheets, Isolation, characterization, denaturation of proteins.

Enzymes: Nomenclature, Characteristics (mention of Ribozymes), and Classification; Active site, Mechanism of enzyme action, Stereospecificity of

enzymes, Coenzymes and cofactors, Enzyme inhibitors, Introduction to Biocatalysis: Importance in "Green Chemistry" and Chemical Industry.

Lipids: Classification. Biological importance of triglycerides and phosphoglycerides and cholesterol; Lipid membrane, Liposomes and their biological functions and underlying applications. Lipoproteins. Properties, functions and biochemical functions of steroid hormones. Biochemistry of peptide hormones.

2. Biochemistry of disease: A diagnostic approach by blood/ urine analysis.(12L)

Blood: Composition and functions of blood, blood coagulation. Blood collection and preservation of samples. Anaemia, Regulation, estimation and interpretation of data for blood sugar, urea, creatinine, cholesterol and bilirubin.

Urine: Sampling and preservation, composition and estimation of constituents of normal and pathological urine.

3. Hands On Practical **(10L)**

Identification and estimation of the following:

i. Carbohydrates – qualitative and quantitative.
ii. Lipids – qualitative.
iii. Determination of the iodine number of oil.
iv. Determination of the saponification number of oil.
v. Determination of cholesterol using Liebermann- Burchard reaction.
vi. Proteins – qualitative.
vii. Isolation of protein.
viii. Determination of protein by the Biuret reaction.
ix. Determination of nucleic acids

Reference Books

1.Cooper, T.G. Tool of Biochemistry. Wiley-Blackwell (1977). 2. Wilson, K. & Walker, J. Practical Biochemistry. Cambridge University Press (2009). 3. Varley, H., Gowenlock, A.H & Bell, M.: Practical Clinical Biochemistry, Heinemann, London (1980). 4. Devlin, T.M., Textbook of Biochemistry with Clinical Correlations, John Wiley & Sons, 2010. 5. Berg, J.M., Tymoczko, J.L. & Stryer, L. Biochemistry, W.H. Freeman, 2002. 6. Talwar, G.P. & Srivastava, M. Textbook of Biochemistry and Human Biology, 3rd Ed. PHI Learning. 7. Nelson, D.L. & Cox, M.M. Lehninger Principles of Biochemistry, W.H. Freeman, 2013. 8. O. Mikes, R.A. Chalmers: Laboratory Handbook of Chromatographic Methods, D. Van Nostrand & Co., 1961.

** Pool of skill enhancement courses from Chemistry:

CHEMHS – 1A	IT skills for Chemist
CHEMHS-1B	Basic Analytical Chemistry
CHEMHS – 2A	Pharmaceutical Chemistry
CHEMHS - 2B	Analytical clinical Biochemistry

B.COM. (HONOURS)
SEMESTER-III
Course Code: UG BCOM-H-SEC-T+P-01A
Course Title: E-COMMERCE AND COMPUTER APPLICATIONS IN BUSINESS
Skill Enhancement Course; Credit-2; Full Marks-50

Module I
E-COMMERCE (Theory)

COURSE OBJECTIVE:

The objective is to enable the student to become familiar with the mechanism for conducting business transactions through electronic means.

COURSE CONTENTS:

1. Introduction - Limitation of conventional commerce, Origin of E-Commerce, Evolution of E-Commerce, E-Commerce and E-Business, Definition of E-Commerce, Features of E-Commerce, M-Commerce-The concept- How it is done- Purposes of use.

2. Models of E-Commerce- Concepts and examples Business - to - Business (B2B), Business - to - Consumer (B2C), Consumer - to - Consumer (C2C), Consumer - to - Business (C2B), Business - to - Government (B2G), Government - to - Business (G2B), Government - to - Citizen (G2C).

3. Digital Money Transactions

Methods of e-payments [Debit Card, Credit Card, Smart Cards, e-Money], electronic or digital wallet, digital signature (procedures, working and legal provisions), payment gateways[Core Banking Solution or CBS, Mobile Payment, UPI, NCPI, International Payments],Online banking [meaning, concepts, importance, electronic fund transfer, automated clearinghouse, automated ledger posting]; Risks involved in e-payments.

4. E-Commerce in India

Module II
COMPUTER APPLICATIONS IN BUSINESS (Practical)

COURSE OBJECTIVES:

The objective is to provide basic knowledge and skills of computer.

COURSE CONTENTS:

Accounting and Related Software

1. Tally (Current Version):

(a) Creation of Masters- Creation of Company, Creation of Ledgers, Creation of Stock Items, Creation of Manufacturing voucher type.

(b) Activation of GST option, Activation of Debit Note / Credit Note.

(c) Passing of Accounting Voucher Entries (including inventory and GST) in – (i) Receipt, (ii) Payment, (iii) Contra, (iv) Purchase, (v) Sales, (vi) Debit Note, (vii) Credit Note, and (viii) Journal, modes.

(d) Passing of Inventory Voucher Entries- Manufacturing type.

(e) Preparation of Bank Reconciliation Statement.

2. Excel

(a) Insertion and deletion of Column/ Row/ Sheet.

(b) Change of Column Width.

(c) Freezing of Column & Row.

(d) Sorting- Single column and Multi Column (i.e. data base).

(e) Linking of one cell with another in the same sheet/ another sheet.

(f) Autosum and Formula copy with fill handle.

(g) Preparation of Chart- Column Chart, Bar Chart, Pie Chart, and Line Chart.

Suggested Readings:

1. P. T. Joseph**,** E-Commerce: An Indian Perspective, PHI Learning.
2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, E-Commerce: Fundamentals and Applications, Wiley.
3. Laudon, E-Commerce, Pearson Education India.
4. Schneider G., E-Business, Cengage.
5. Bhaskar, B., E–Commerce, McGraw Hill.
6. Nadhani, A K, Mastering Tally ERP 9, BPB Publications, New Delhi.
7. Singh, S & Mehera, N, Tally ERP: Power of Simplicity, Amazon Books.
8. Mac Donald, Matthew, Excel 2007 for Starters: The Missing Manual, PBC Books, Delhi.
9. Laing, Roger, Microsoft Excel Basics: Expert Advice, Made Easy, PBC Books, Delhi.

B.COM. (HONOURS)
SEMESTER-IV
Course Code: UG BCOM-H-SEC-T-02A
Course Title: TAX RETURNS AND FILING OF TAX RETURNS
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE OBJECTIVE:

To acquaint the students of the actual practice of filing Tax Returns so that in future they can opt for self-employment in Tax matters.

COURSE CONTENTS:

A. Returns under Income Tax (10 Marks)

1. PAN and TAN- Procedure for application of PAN/TAN.
2. (a) Payment of Advance Tax and Self Assessment Tax.
   (b) Interest- Interest u/s 234A, 234B, 234C, (simple problems).
3. Filing of Returns- Due dates of filing of Returns- Section 139(1); Section 139(4) [after due date]; Section 139(5) [Revised Return]; Section 139(9) [Defective Return]; Section 142 (1) [Notice to submit Return]. Different types of Returns and Due dates for filing of those Returns.
4. Procedure of filing e-Return- ITR 1 only.

B. Returns under Goods and Services Tax (10 Marks)

1. Different types of Taxable Persons and Returns to be submitted by them; Due dates for filing of Returns.
2. Procedure of filing e-Return- GSTR 1 and GSTR 4 only.

C. Practical on hard copy of ITR 1(20 Marks)

Suggested Readings:

1. Singhania, V. and Singhania, M., Students' guide to Income Tax, Taxmann.
2. Lal & Vashist, Income Tax and Central Sales Tax, Pearson.
3. Ahuja & Gupta, Systematic Approach to Income Tax, Bharat.
4. Sengupta, C.H., Income Tax, Dey Book Concern.
5. Bhadra and Satpati, Bharoter Kar Babosthapona, Books and Allied Pvt.Ltd.
6. Mehrotra and Goyal, Income Tax Law and Accounts, Sahitya Bhavan Publication.
7. Bare Act and Relevant Rules.
8. Software: Singhania, V.K., E-Filing of Income Tax Returns and Computations of Tax, Taxmann.

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3. E-CRM and SCM
E-CRM-definition, features, goals of E-CRM business framework, phases of E-CRM, types of E-CRM, Functional components of E-CRM, strategies for E-CRM solutions; SCM-definition, features, types of supply chain.

4. Digital Money Transactions
Methods of e-payments [Debit Card, Credit Card, Smart Cards, e-Money], electronic or digital wallet, digital signature (procedures, working and legal provisions), payment gateways[Core Banking Solution or CBS, Mobile Payment, UPI, NCPI, International Payments], Online banking [meaning, concepts, importance, electronic fund transfer, automated clearinghouse, automated ledger posting]; Risks involved in e-payments.

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5. Bhaskar, B., E–Commerce, McGraw Hill.
6. Nadhani, A. K., Mastering Tally ERP 9, BPB Publications, New Delhi.
7. Singh, S. & Mehera, N., Tally ERP: Power of Simplicity, Amazon Books.
8. MacDonald, Matthew, Excel 2007 for Starters: The Missing Manual, PBC Books, Delhi.
9. Laing, Roger, Microsoft Excel Basics: Expert Advice, Made Easy, PBC Books, Delhi.

B.COM. (GENERAL)
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3. Filing of Returns- Due dates of filing of Returns- Section 139(1); Section 139(4) [after due date]; Section 139(5) [Revised Return]; Section 139(9) [Defective Return]; Section 142 (1) [Notice to submit Return]. Different types of Returns and Due dates for filing of those Returns.
4. Procedure of filing e-Return- ITR 1 only.

B. Returns under Goods and Services Tax (10 Marks)
1. Different types of Taxable Persons and Returns to be submitted by them; Due dates for filing of Returns.
2. Procedure of filing e-Return- GSTR 1 and GSTR 4 only.

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4. Sengupta, C.H., Income Tax, Dey Book Concern.
5. Bhadra and Satpati, Bharoter Kar Babosthapona, Books and Allied Pvt. Ltd.
6. Mehrotra and Goyal, Income Tax Law and Accounts, Sahitya Bhavan Publication.
7. Bare Act and Relevant Rules.
8. Software: Singhania, V.K., E-Filing of Income Tax Returns and Computations of Tax, Taxmann.

B.COM. (GENERAL)
SEMESTER-V
Course Code: UG BCOM-G-SEC-T-03A
Course Title: CORPORATE ACCOUNTING AND FINANCIAL MANAGEMENT
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE OBJECTIVE:
The objective is to help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the corporate financial statements.

COURSE CONTENTS:
1. Introduction to Company Accounts: Meaning of Company and its Classification; Books of Accounts; Maintenance of Books of Accounts; Financial Year; Financial Statements – Meaning, Forms & Contents; Concept of True and Fair View, Authentication of Financial Statements; Filing of Financial Statements.

2. Final Accounts of Companies: Preparation of Statement of Profit & Loss and Balance Sheet as per Schedule III to the Companies Act, 2013.

3. Accounting for Shares and Debentures of Company: Kinds of Share Capital; Issue, Forfeiture, Reissue of Shares; Right Shares and Bonus Shares; Issue of Debentures, Underwriting of Shares and Debentures; Redemption of Preference Shares**.**

4. Sources of Finance and Cost of Capital: Different sources of finance - long term and short term sources. Cost of capital- concept, relevance of cost of capital, specific costs and weighted average cost, rationale of after tax weighted average cost of capital, marginal cost of capital.

5. Working Capital and Its Management: Meaning, concept, composition, nature, types of working capital, Determining factors of working capital, Working Capital Cycle, Estimation of working capital requirements (excluding problems on extra shift working capital and working capital policy). Working Capital Management– Importance of working capital management, Working capital financing – Long-term, medium and short-term.

6. Cash Flow Statement: Meaning, Objectives, Importance and Limitations of cash flow statement – Fund flow statement vs. Cash flow statement – Various sources and uses of cash – Preparation of cash flow statement.

7. Valuation: Valuation of Goodwill and Shares (Simple Problem).

Suggested Readings:
1. Gupta, R.L. and M. Radhaswamy, ‘‘Advanced Accountancy’’, Vol-II, Sultan Chand and Sons, New Delhi.
2. Maheshwari, S.N. and S. K. Maheshwari, ‘‘Corporate Accounting’’, Vikas Publishing House, New Delhi.
3. Jain, S.P. and K.L. Narang, ‘‘Corporate Accounting’’, Kalyani Publishers, New Delhi.
4. Shukla, M.C., T.S. Grewal, and S.C. Gupta, ‘‘Advanced Accounts’’, Vol-II, S. Chand &Co.,New Delhi.

5. Monga, J.R., ‘‘Fundamentals of Corporate Accounting’’, Mayur Paper Backs, NewDelhi.
6. ‘‘Compendium of Statements and Standards of Accounting’’, The Institute of Chartered Accountants of India, New Delhi.
7. ‘‘Financial Statements Presentation under Companies Act, 2013: Practitioner’s Perspective’’, The Institute of Chartered Accountants of India, New Delhi.
8. Dr. S.N.Maheswari and S.N. Mittal: Management Accounting – Shree MahavirBook Depot., New Delhi.
9. Khan, M.Y. and Jain, P.K., Financial Management: Text, Problems and Cases, Tata McGraw Hill Publishing Co., Ltd. New Delhi.
10. Pandey, I.M., Financial Management, Vikas Publishing House Pvt. Ltd., New Delhi.
11. B. Banerjee., Financial Management, PHI, New Delhi.

B.COM. (GENERAL)
SEMESTER-VI
Course Code: UG BCOM-G-SEC-T-04B
Course Title: AUDITING
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE OBJECTIVE:

The objective is to provide knowledge of auditing principles, procedures and techniques as well as relevant legal requirements and professional standards.

COURSE CONTENTS:

1. Introduction: Definition of Auditing, Standards on Auditing (Preliminary idea only), Objectives of Audit, Basic Principles Governing an Audit, Scope of Audit, Inherent limitations of Audit, Different types of Audit, Auditing and Investigation. Basic Concepts in Auditing - Auditor's Independence, Advantages of an independent Audit, Audit Evidence, Concept of Materiality, Concept of True and Fair.

2. Preparation for an Audit: Auditor's Engagement, Audit Process, Audit Techniques, Audit Planning, Audit Programme, Continuous and Final Audit, Audit Planning and Materiality, Audit Working Papers, Quality Control for Audit Work, Elements of Statistical Sampling, Audit Risk, Surprise Checks, Obtaining Certificate from Management.

3. Internal Control, Internal Check and Internal Audit: Concept of Internal Control, Internal Control and Management, Internal Control and the Auditor, Testing of Internal Control, Examination in Depth, Internal Check, Internal check and Auditor, Internal Audit, Relationship between the Statutory and the Internal Auditors, Internal Financial Control.

4. Vouching: Concept of Vouching; Vouching of- Cash Transactions, Payments, Receipts, Trading Transactions, Purchases, Sales.

5. Verification- Bank Balance and Cash-in-Hand, Other Assets; Verification of Liabilities.

Suggested Readings:

1. Gupta, K. Contemporary Auditing, Tata McGraw Hill.
2. Ghatalia, S. V., Spicer and Pegler's Practical Auditing (by Bigg, Walter W.), 5th Indian Edition, Allied Publishers Pvt. Ltd.
3. Basu, S. K., Nirikshar Tattwa-o- Koushal (Bengali), Pearson.
4. Bhattacharya, K. and Sheel, K. L.,Nireekshashastrer Tatwa O Prayog, Rabindra Library.
5. Tandon, B.N., Principles of Auditing, S. Chand &Co.
6. Tandon, B.N., Sudharsanam, S. and Sundharabahu, S., A Handbook of Practical Auditing, S. Chand & Company.
7. Kundu, J. L., Nirikshashastra, ABS Publishers.
8. Majumder, P., Nirikhasastra, Dove Publishing House.

- Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th Edition, 2010
- N. Gregory Mankiw, Principles of Macroeconomics, Indian imprint of South Western by Cengage India, 6th Edition, 2015
- Richard T. Froyen, Macroeconomics, Pearson Education Asia, 2nd Edition, 2005
- Andrew B. Abel and Ben S. Bernanke, Macroeconomics, Pearson Education Inc., 7th Edition, 2011
- Soumyen Sikdar, Principles of Macroeconomics, Oxford University Press.
- Steven M. Sherffrin, Rational Expectations, Cambridge University Press, 2nd Edition, 1996.
- William Branson, Macroeconomic Theory and Policy, Indian Reprint, East West Press, 3rd Edition, 2014.

Course: ECON-H-SEC-T-1
Course title: Statistical Tools for Data Analysis
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE OBJECTIVES:

This course introduces the student to collection and presentation of data. It also discusses how data can be summarized and analysed for drawing statistical inferences. The students will be introduced to important data sources that are available and will also be trained in the use of free statistical software to analyse data.

COURSE CONTENT:

1. Sources of Data, Population versus sample surveys, Random sampling

2. Presentation of Data; Univariate Frequency Distribution; Measures of central tendency, Measures of Dispersion, Moments, Skewness and Kurtosis; Bivariate Frequency Distribution- correlation and regression.
3. Time Series (Components, Measures of trend, Moving Average, Curve fitting (linear only)
4. Index Numbers (Laspayer's, Paasche and Fisher, Cost of Living, Factor Reversal and Time Reversal Test)
5. Vital Statistics (Life Tables – Concepts Only)

Reference Books

1. P.H. Karmel and M. Polasek (1978), Applied Statistics for Economists, 4th edition, Pitman.
2. M.R. Spiegel (2003), Theory and Problems of Probability and Statistics (Schaum Series).
3.Das, N.G, Statistical Methods
4.Goon, Gupta Dasgupta, Fundamentals of Statistics
5.A.L. Nagar and R.K Das, Basic Statistics, OUP second ed
6. Gupta and Kapoor, Statistics

SUGGESTED READINGS:

► Snowdon and Vane (ed), A Macroeconomics Reader, Routledge, Taylor and Francis Group.
► R. Barro. Macroeconomics, 5th edition, The MIT Press, 1989
► W.H. Branson. Macroeconomics, Haper and Row, 3rd edition, 1989
► A.K. Sen (ed). Growth Economics, Penguin, 1970

► Andrew B. Abel and Ben S. Bernanke, Macroeconomics, Pearson Education, Inc., 7th edition, 2011
► J.B Hall and R.E. Taylor. Macroeconomics, W.W. Nortan and Company, 5th revised edition, 1997
► Errol D'Souza. Macroeconomics, Pearson Education (New Delhi), 2009
► Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010

Course: ECON-H-SEC-T-2
Course title: Computer Application for Data Analysis
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE OBJECTIVES:

This course introduces the student to how to analyse primary and secondary data using computer software. The students will be introduced to important data sources that are available and will also be trained in the use of free statistical software to analyse data.

COURSE CONTENT:

In this paper students will be taught MS Excel programme and how to use MS Excel programme for data analysis. Relevant mathematical and statistical functions using MS Excel will be taught.

Evaluation of students in this paper will be done in terms of a practical examination. There will be no theoretical examination. External examiners will take the said practical examination.

SEMESTER – V

Course: ECON-H-CC-T-11
Course Title: International Economics
Core Course; Credit – 6; Full Marks - 75

COURSE OBJECTIVES:

After completion of the course the learner will be able to:

- The fundamentals of international economics theories and some relevant empirical facts.

COURSE CONTENT:

E. Skill enhancement courses (SEC)

1. EDU-H-SEC-T-1(A): Statistical Analysis

2. EDU-H-SEC-T-1(B): Achievement Test

3. EDU-H-SEC-T-2(A): Lesson Planning

4. EDU-H-SEC-T-2(B): Uses of Teaching Aids

Semester III			
EDU-H-SEC-T-1	A. Statistical Analysis	Skill enhancement (30L)	2 (2L)
	B. Achievement Test		
Semester III			
POL-H-SEC-T-2	A. Lesson Planning	Skill enhancement (30L)	2 (2L)
	B. Uses of Teaching Aids		

B.A. Education (Honours)
SEMESTER-III
EDU-H-SEC-T-1(A): Statistical Analysis
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion of the course the learners will be able to:
- Explain the concept of central tendency, variability and their properties
- Discuss the concept of Percentile and Percentile Rank and its application.
- Describe the concept of co-relation and their application
- Explain the concept of Parametric and Non-Parametric Test
- Apply the knowledge and calculate different statistical values

Unit-I: Descriptive Statistics
a) Meaning of Central Tendency- Mean, Median and Mode-their Properties, Calculation and Application.
b) Measure of Variability- Range, AD, SD and QD- their Properties, Calculation and Application)
c) Percentile and Percentile Rank- Definition, Calculation, Application, Graphical Determination.

Unit-II: Relationship and Inferential Statistics
a) Concept of Correlation – Computation of Co-efficient of Correlation by Rank difference method and Product moment method, Interpretation of Co-efficient of Correlation,
b) Parametric and Non-Parametric Test- (only Concept and Uses).

Practical:
Calculate - Mean, Median and Mode; Range, AD, SD & QD; PP, PR; Co-relation; Standard score & Z score from different frequency distribution.

Suggested Books:
1) S. K. Mangal- Statistics in Education and Psychology
2) A. K. Singh – Test, Measurement and Research Methods in Behavioural Sciences
3) H.E. Garret- Statistics in Education and Psychology
4) R. A. Sharma- Mental Measurement and Evaluation
5) Y. P. Aggarwal- Statistics Methods Concepts, Application and Computation

B.A. Education (Honours)
SEMESTER-IV
EDU-H-SEC-T-1(B): Achievement Test
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion of the course the learners will be able to:
- Define Achievement Test
- Explain the characteristics of Achievement Test
- State the objectives of Achievement Test
- Discuss the functions of Achievement Test
- Describe the steps of constructing Achievement test
- Construct Achievement test

Unit-I: Concept of Achievement test
a) Meaning & definition of Achievement test
b) Characteristics of Achievement Test
c) Objectives of Achievement Test

Unit-II: Different aspects of Achievement Test
a) Principles of Achievement test construction
b) Steps involved in the construction of Achievement Test

Practical:
Construct of an Achievement Test

Suggested Books:
- Purnendu Acharjee- Shiksha r khetre mullayan o nirdesana.
- R. A. Sharma- Mental Measurement and Evaluation
- Y. P. Aggarwal- Statistics Methods Concepts, Application and Computation

B.A. Education (Honours)
SEMESTER-IV
EDU-H-SEC-T-2(A): Lesson Planning
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion of the course the learners will be able to:
- Discuss the meaning and characteristics of Lesson Plan
- Explain the advantages of Lesson Plan
- Classify different Lesson Plans
- Explain the steps of constructing Lesson Plan
- Discuss the principles of Lesson Plan
- Develop Lesson Plan

Unit-I: Concept of Lesson Planning
a) Definition & Meaning of Lesson Plan
b) Characteristics of Lesson Plan
c) Advantages of Lesson Plan

Unit-II: Different aspects of Lesson Plan
a) Types of Lesson Plan
b) Steps involved in Lesson Planning
c) Principles of development of Lesson Plan

Practical:
Development of Lesson Plan (At least 20).

B.A. Education (Honours)
SEMESTER-IV
EDU-H-SEC-T-2(B): Uses of Teaching Aids

Skill Enhancement Course; Credit-2.
Full Marks-50

Course Objectives:
After completion the course the learners will be able to:
- Discuss the meaning and characteristics of Teaching Aids
- Explain the usability of Teaching Aids
- Express the quality and limitation of Teaching Aids
- Discuss the classification of Teaching Aids
- Develop different Teaching Aids

Unit-I: Concept of Teaching Aids
a) Definition & Meaning of Teaching Aids
b) Characteristics of Teaching Aids
c) Utility of Teaching Aids
d) Limitations of Teaching Aids

Unit-II: Different Types of Teaching Aids
a) Classification of Teaching Aids (Concept only)
b) Projected Teaching Aids- OHP, Slide Projection, Film Strip (Concept, principles of construction, uses)
c) Non-Projected Teaching Aids- Model, Chart, Poster (Concept, principles of construction, uses)

B.A. ENGLISH (Honours)

SEMESTER-I

Course Code	Course Title	Course Type	Credit	Full Marks
ENGH-H-AECC-T-1	English Communication (L1/L2)	AECC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the only prescribed textbook for this course

Objective:

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills. Some of these are : Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note-taking etc.

While, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. It is hoped that after studying this course, students will find a difference in their personal and professional interactions. The recommended readings given at the end are only suggestive; the students and teachers have the freedom to consult other materials on various units/topics given below. Similarly, the questions in the examination will be aimed towards assessing the skills learnt by the students rather than the textual content of the recommended books.

1. Introduction: Theory of Communication, Types and modes of Communication

2. Language of Communication:

Verbal and Non-verbal
(Spoken and Written)
Personal, Social and Business
Barriers and Strategies
Intra-personal, Inter-personal and Group communication

3. Speaking Skills:

Monologue
Dialogue

Group Discussion
Effective Communication/ Mis-Communication
Interview
Public Speech

4. Reading and Understanding

Close Reading
Comprehension
Summary Paraphrasing
Analysis and Interpretation
Translation(from Indian language to English and vice-versa)
Literary/Knowledge Texts

5. Writing Skills

Documenting
Report Writing
Making notes
Letter writing

B.A. ENGLISH (Honours)
SEMESTER-III

Course Code	Course Title	Course Type	Credit	Full Marks
ENGH-H-SEC-T-1	English Language Teaching	SEC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the only prescribed textbook for this course

Any four of the following topics
1. Knowing the Learner
2. Structures of English Language
3. Methods of teaching English Language and Literature
4. Materials for Language Teaching
5. Assessing Language Skills
6. Using Technology in Language Teaching

Further Readings

1. Penny Ur, *A Course in Language Teaching: Practice and Theory.* CUP,1996.
2. Marianne Celce-Murcia, Donna M. Brinton, and Marguerite Ann Snow, *TeachingEnglish as a Second or Foreign Language.*Cengage Learning, 4th ed, 2014.
3. Adrian Doff, *Teach English: A Training Course For Teachers.* Cambridge UP, 1988.
4. *Business English.*Pearson, 2008.

5. Diane Larsen-Freeman. *Techniques and Principles in Language Teaching*.OUP, 1986.
6. Patsy M. Lightbown and Nina Spada.*How Languages are Learned*. 4th ed. OUP, 2013.
7. GeethaNagaraj. *English Language Teaching: Approaches, Methods, Techniques*. Orient Blackswan, 2010.
8. Jack C Richards and Theodore S Richards. *Approaches and Methods in Language Teaching*.CUP, 2001.

B.A. ENGLISH (Honours)
SEMESTER-IV

Course Code	Course Title	Course Type	Credit	Full Marks
ENGH-H-SEC-T-2	Soft Skills	SEC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the only prescribed textbook for this course

Topics and skills to be learnt
Teamwork
Emotional Intelligence
Adaptability
Leadership
Problem solving

Readings

1. S.P. Dhanavel. *English and Soft Skills.*OrientBlackswan, 2013
2. *English for Students of Commerce: Précis, Composition, Essays, Poems*. Eds.Kaushik,et al.

B.A. ENGLISH
(General)
SEMESTER-I

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-LCC-T-1	Indian Writingin English	Core (Language 2)	6	60+15=75

Textbook*: Introduction to Undergraduate English: Book II. Cambridge University Press, 2018*.is the only prescribed textbook for this course

[See **Instructions for question papers in end-semester evaluation for CC1-4, DSE 1-2,** LCC1-2 on Page 3 of this document]

Group	Texts	Marks of questions to be set	Numbers of questions to be set
A	R.K. Narayan.“Selvi”	2,5	16 X2; 9X5
	H.L.V.Derozio. “The OrphanGirl”	2,5	
	ToruDutt. “Our Casuarina Tree”	2,5	
	Kamala Das. “Introduction”	2,5	
	Jayanta Mahapatra.“Dawn a tPuri”	2,5	
B	Nirad C Chaudhuri.“MyBirthplace”	10	4X10
	RabindranathTagore.*ThePost Office*	10	

B.A. ENGLISH
(General)
SEMESTER-III

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-LCC-T-2	Literature of the British Isles	Core (Language 1)	6	60+15=75

Textbook*: Introduction to Undergraduate English: Book II. Cambridge University Press, 2018*.is the only prescribed textbook for this course

[See **Instructions for question papers in end-semester evaluation for CC1-4, DSE 1-2, LCC1-2** on Page 3 of this document]

Group	Texts	Marks of questions to be set	Numbers of questions to be set
A	Katherine Mansfield. “The Doll's House”	2,5	16 X2; 9X5
	William Shakespeare. Sonnet XVIII	2,5	
	John Milton. “On His Blindness”	2,5	
	William Wordsworth. “She dwelt among Untrodden Ways”	2,5	
	Louis MacNeice. “Prayer before Birth”	2,5	
B	George Bernard Shaw. “Freedom”	10	4X10
	Lady Gregory. *The Rising of the Moon*	10	

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-AECC-T-1	English Communication(L1)	AECC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the only prescribed textbook for this course

Objective:

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. Oneof thecritical links amonghuman beingsandanimportantthread that binds societytogether is theabilityto sharethoughts,emotions and ideasthrough various means ofcommunication: both verbal and non-verbal.In thecontext of rapidglobalizationand increasingrecognition of socialandculturalpluralities, the significance of clearandeffectivecommunicationhas substantiallyenhanced.

The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills. Some of these are

: Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note-taking etc.

While, to an extent, the art of communication is natural to all livingbeings, in today's world ofcomplexities, it has alsoacquired someelementsof science.It is hoped that afterstudyingthiscourse,students will find a difference in their personal and professionalinteractions. Therecommendedreadingsgiven at the end areonlysuggestive; thestudents and teachershave thefreedom to consultothermaterials on various units/topics givenbelow.Similarly, the questions inthe examinationwill be aimedtowards assessingtheskills learnt bythe students ratherthan thetextual content ofthe recommended books.

1. Introduction: Theory of Communication, Types and modes of Communication

2. Language of Communication: Verbal and Non-verbal (Spoken and Written), Personal, Social and Business, Barriers and Strategies, Intra-personal, Inter-personal and Group communication

3. Speaking Skills: Monologue, Dialogue, Group Discussion, Effective Communication/Mis-Communication, Interview, Public Speech

4. Reading and Understanding Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation (from Indian language to English and vice-versa) Literary/Knowledge Texts

5. Writing Skills

Documenting, Report Writing, Making notes, Letter writing

Readings:

1. *Fluency in English*- PartII,Oxford UniversityPress, 2006.
2. *Business English*, Pearson, 2008.
3. Language,Literature and Creativity,OrientBlackswan, 2013.

B.A.ENGLISH
(General)
SEMESTER-III

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-SEC-T-1	English Language Teaching	SEC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the <u>only</u> prescribed textbook for this course

Any four of the following topics

1. Knowing the Learner
2. Structures of English Language
3. Methods of teaching English Language and Literature
4. Materials for Language Teaching
5. Assessing Language Skills
6. Using Technology in Language Teaching

Further Readings

1. Penny Ur, *A Course in Language Teaching: Practice and Theory.*CUP,1996.
2. Marianne Celce-Murcia, Donna M. Brinton, and Marguerite Ann Snow, *Teaching English as a Second or Foreign Language.* Cengage Learning, 4thed, 2014.
3. Adrian Doff, *Teach English: A Training Course For Teachers.* Cambridge UP, 1988.
4. *Business English.*Pearson, 2008.
5. DianeLarsen-Freeman.*Techniques and Principles in Language Teaching*.OUP, 1986.
6. Patsy M. Lightbown and Nina Spada. *How Languages are Learned*. 4thed.OUP, 2013.
7. Geetha Nagaraj. *English Language Teaching: Approaches, Methods, Techniques*. OrientBlackswan, 2010.
8. Jack C RichardsandTheodoreS Richards.*Approaches and Methods inLanguageTeaching*.CUP, 2001.

B.A.ENGLISH
(General)
SEMESTER-IV

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-SEC-T-2	Soft Skills	SEC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the <u>only</u> prescribed textbook for this course

Topics andskills to be learnt

1. Team work
2. Emotional Intelligence
3. Adaptability
4. Leadership
5. Problem solving

B.A.ENGLISH
(General)
SEMESTER-V

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-SEC-T-3	Business Communication	SEC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the only prescribed textbook for this course

Any four of the following

1. Introduction to the essentials of Business Communication: Theory and Practice
2. Citing references, and using bibliographical and research tools
3. Writing a project report
4. Writing reports on fieldwork/visits to industries, business concerns etc./ business negotiations
5. Summarizing annual report of companies
6. Writing minutes of meetings
7. E-correspondence
8. Spoken English for business communication (viva for internal assessment)
9. Making oral presentations (viva for internal assessment)

B.A.ENGLISH (General)
SEMESTER-VI

CourseCode	CourseTitle	Course Type	Credit	FullMarks
ENGH-G-SEC-T-4	TechnicalWriting	SEC	2	50

Textbook*: Introduction to Undergraduate English: Book I. Cambridge University Press, 2018*. is the only prescribed textbook for this course

1. Communication: Language and communication, differences between speech and writing, distinct features of speech, distinct features of writing
2. Writing skills: Selection of topic, thesis statement, developing the thesis, introductory,

transitional and concluding paragraphs. Linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.

3. Technical writing: scientific and technical subjects; formal and informal writings; formal writings; formal writings/ reports, handbooks, manuals, letters, memorandum, notices, agenda, minute, common errors to be avoided

SKILL ENHANCEMENT COURSE 01 (Code: UG-ENVS-H- SEC-01a)

REMOTE SENSING, GEOGRAPHIC INFORMATION SYSTEM & MODELLING

FULL MARKS: 50, CREDITS: 2

Preamble: This course introduces the students to various computer-based and statistical methods used for study and management of natural resources and the environment. The students are expected to learn about remote-sensing techniques, physical principles, sampling, statistics and image-analysis methods.

Unit 1: Remote Sensing: definitions and principles; electromagnetic (EME) spectrum; interaction of EMR with Earth's surface; spectral signature; satellites and sensors; aerial photography and image interpretation.

Unit 2: Geographical Information Systems: definitions and components; spatial and non-spatial data; raster and vector data; database generation; database management system; land use/ land cover mapping; overview of GIS software packages; GPS survey, data import, processing, and mapping.

Unit 3: Applications and case studies of remote sensing and GIS in geosciences, water resource management, land use planning, forest resources, agriculture, marine and atmospheric studies.

Unit 4: Basic elements of statistical analyses: sampling; types of distribution – normal, binomial, poisson; measurements of central tendency and dispersion; skewness; kurtosis; hypothesis testing; parametric and non-parametric tests; correlation and regression; curve fitting; analysis of variance.

Unit 5: Demonstrative exercise

- Visual interpretation of standard False Colour Composite (FCC) data.
- Thematic map generation.
- Digitisation of thematic layer.
- Overlay analysis of thematic layer in GIS environment.
- GIS laboratory visit.

Suggested Readings

1. Zar, J. H. 2010. *Biostatistical Analysis* (5th edition). Prentice Hall Publications.
2. Edmondson, A. & Druce, D.1996. *Advanced Biology Statistics*. Oxford University Press.
3. Demers, M. N. 2005. *Fundamentals of Geographic Information System*. Wiley & Sons.
4. Richards, J. A. & Jia, X. 1999. *Remote Sensing and Digital Image Processing*. Springer.
5. Sabins, F. F. 1996. *Remote Sensing: Principles an Interpretation*. W. H. Freeman.

-OR-

SKILL ENHANCEMENT COURSE 01: (Code: UG-ENVS-H- SEC- 01b)

OCCUPATIONAL HEALTH AND ENVIRONMENTAL SAFETY

FULL MARKS: 50, CREDITS: 2

Preamble: This course introduces the students to acquire knowledge about various occupational diseases and safety measures with particular attention to accident prevention in work place, safety education and training.

Unit 1: Introduction

Concept of occupational health and diseases: Occupation related diseases, mode, effects, risk, diagnosis and methods of prevention.

Unit 2: Occupational health hazards and devices

Evaluation of injuries: Medical services in industrial establishment, its function, action programs for work related diseases at the national level.

Personal Protective Equipment: Introduction, requirements and assessment of PPE, types of PPE.

Non-respiratory personal protective devices; head, ear, face and eye protection, feet and body protection, supply, use, care and maintenance of PPE, requirements under factory Acts and Rules. Respiratory PPE: Types of respiratory PPE, supply, use, care and maintenance of breathing apparatus, training for the use of breathing apparatus.

Unit 3: Introduction to Environmental Safety

Environmental Safety: Safety awareness, annual toll of industrial accidents in India, need for safety, legal, humanitarian factors impending safety, safety audit.

Health concern for workers of textile, dye, bidi making and brick kiln factory/industry.

Unit 4: Principles of accident prevention

Definition of accidents: injury, types of accidents, causes and remedial measures, injury records, prevention, modes of prevention, physiological factors.

Unit 5: Safety education and training

Assessment of training needs, design and developments of training program.

Unit 6: Demonstrative exercise

- Industry/factory visit to assess the safety measures adopted for the workers in textile, dye, bidi making and brick kiln factory/industry and fire.
- Occupational health study of small scale industry workers through survey and documentation.

Suggested Readings

1. Reese, C. D., 2015. *Occupational health and safety management: a practical approach*. CRC press.
2. Friis, R. H., 2015. *Occupational health and safety for the 21st century*. Jones & Bartlett Publishers.

SKILL ENHANCEMENT COURSE 02 (Code: UG-ENVS-H-SEC-02a)

ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

FULL MARKS: 50, CREDITS: 2

Preamble: This course recognizes the growing need of industry to anticipate and incorporate environmental concerns and risks while developing large-scale projects. The course emphasizes on the contemporary tools and techniques to assess various environmental impacts and outlines various management options needed to mitigate these risks.

Unit 1: Environmental impact assessment (EIA): definitions, introduction and concepts; rationale and historical development of EIA; scope and methodologies of EIA; role of project proponents, project developers and consultants; Terms of Reference; impact identification and prediction; baseline data collection; Environmental Impact Statement (EIS), Environmental Management Plan (EMP).

Unit 2: Rapid EIA; Strategic Environmental Assessment; Social Impact Assessment; Cost-Benefit analysis; Life cycle assessment; environmental appraisal; environmental management - principles, problems and strategies; environmental planning; environmental audit; introduction to ISO and ISO 14000; sustainable development.

Unit 3: EIA regulations in India; status of EIA in India; current issues in EIA; case study of hydropower projects/ thermal projects, Environmental audit.

Unit 4: Life cycle assessment (LCA)- concept; Cradle to grave approach; lifecycle inventory of solid waste; role of LCA in waste management; advantage and limitation of LCA; case study on LCA of a product.

Unit 5: Risk assessment: introduction and scope; project planning; exposure assessment; toxicity assessment; hazard identification and assessment; risk characterization; risk communication; environmental monitoring; community involvement; legal and regulatory framework; human and ecological risk assessment.

Unit 6: Demonstrative exercise

- Model EIA preparation- Demonstrative exercise.
- Steps in environmental clearance exercise.
- Model public consultation procedure of a developmental project.

Suggested Readings

1. Barrow, C. J. 2000. *Social Impact Assessment: An Introduction.* Oxford University Press.
2. Glasson, J., Therivel, R., Chadwick, A. 1994. *Introduction to Environmental Impact Assessment.* London, Research Press, UK.
3. Judith, P. 1999. *Handbook of Environmental Impact Assessment.* Blackwell Science.
4. Marriott, B. 1997. *Environmental Impact Assessment: A Practical Guide.* McGraw-Hill, New York, USA.

-OR-

SKILL ENHANCEMENT COURSE 02 (Code: UG-ENVS-H- SEC -02b)

ENVIRONMENTAL QUALITY MONITORING AND ASSESSMENT

FULL MARKS: 50, CREDITS: 02

Preamble: This paper deals with environmental quality monitoring and assessment. An attempt will be made to have a compressive idea about different aspects of environmental contamination, with special emphasis on air, water, soil and noise qualities, perturbation of which may have adverse effects on environmental and human health. It will lay emphasis on understanding mechanisms of pollutants impact on human health by developing an understanding of different types of pollutants, their sources and mitigation measures. The students will also be introduced to the concept of standards and permissible limits.

Unit 1: Concept of environmental quality monitoring viz. physical, chemical and biological methods.

Unit 2: Assessment of water and soil quality parameters, their characterization and control strategies. Water resources-origin of waste water, types of water pollution and their effects, water quality standards (surface and drinking water), basic processes of water and waste water treatment, recovery of material from process effluents, solid and hazardous waste management-sources and classification, public health aspects, methods of collection, disposal methods.

Causes of soil pollution and degradation; effect of soil pollution on environment, vegetation and other life forms; control strategies.

Unit 3: Concept of biomonitoring, bioindicator organisms, biomonitoring of water and soil quality-indicator organism (planktons, worms, molluscs/ soil microbes), biomonitoring of air quality (lichens and higher plants).

Unit 4: Assessment of air and noise quality parameters and their characterization, control strategies.

Sources and effects, behaviour and fate of air pollutions, photochemical smog, collection of gaseous and particulate air pollutants, analysis of air pollutants, SOx, NOx, CO, oxidants, ozone, hydrocarbons and particulate matter, air quality index, control of particulate and gaseous emission, ambient air quality standards, auto emission standard and noise quality standards.

Unit 5: Mapping of environmental quality zones, air and water pollution laws and standards, ISO14000.

Unit 6: Demonstrative exercise

- Determination of SPM, NOx and SOx from air samples.
- Bio-monitoring of water and soil quality (planktons, soil microbes).
- Determination of chloride, iron, arsenic, nitrate.
- Field survey based on environmental quality zone map preparation of a model area (urban/ rural/ industrial).

UNIVERSITY OF KALYANI

GEOGRAPHY SYLLABUS UNDER CBCS SYSTEM

SEMESTERWISE SEC SYLLABUS

HONOURS

SEMESTER -III

SKILL ENHANCEMENT COURSE (SEC): GEO/H/SEC/P/01/A: (Practical): Computer Basics and Computer Applications 2 Credits

1. Numbering Systems; Binary Arithmetic

2. Data Computation, Storing and Formatting in Spreadsheets: Computation of Rank, Mean, Median, Mode, Standard Deviation, Moving Averages, Derivation of Correlation, Coefficient of Variation , Regression

3. Preparation of Annoted Diagrams and its Interpretation: Scatter Diagram and Histogram

4. Internet Surfing: Generation and Extraction of Information

*A Project File of exercises consisting of each theme is to be submitted

Reference Books: Bartee, T. C., 1977: Digital Computer Fundamental; McGraw Hill Blissmer, 1996: Working with MS Word; Houghton Mifflin Co Chauhan, S., Chauhan, A., and Gupta, K., 2006: Fundamental of Computer; Firewall Media Flake, L. J., McClintock, C. E., and Turner, S., 1989: Fundamental of Computer Education; Wordsworth Pub. Co Johnson, S., 2007: Microsoft Power Point 2007; Pearson Paravia Bruno Leon, A., and Leon, M., 1999: A Beginners Guide to Computers, Vikas Leon, A., and Leon, M., 1999: Introduction to Computer, USB Publishers' Distributors Ltd Leon, A., and Leon, M., 1999: Introduction to Computer, USB Publishers' Distributors Ltd Malvino, A. P., Leach, D. P., 1981: Digital Principles and Applications; Tata McGraw Hill Mano, M. M., and Kime, C. R., 2004: Logic and Computer Design Fundamental; Prentice Hall Rajaraman, V., 2003: Fundamentals of Computer, Prentice Hall Publisher Rajaraman, V., 2008: Computer Primer; Prentice Hall of India Pvt. Ltd Sarkar, A., and Gupta, S. K., 2002: Elements of computer Science, S Chand and Company, New Delhi Sarkar, A., and Gupta, S. K., 2002: Elements of Computer Science, S Chand and Company, New Delhi Shepard, A., 2007: Perfect Pages; Shepard Publications Tyson, H. L., 2007: Microsoft Word 2007 Bible; John Wiley Walkenbach, J., 2007: Excel 2007 Bible; John Wiley

SEMESTER-IV

GEO/H/SEC/P/02/B: (Practical): Field Work 2 Credits

Students are required to carry out a comprehensive field work in a village/mouza/town/C.D.Block/ drainage basin selecting a particular research problem. There should be a clear-cut Problem background, major Objectives, Methodology and Findings. The text of the fieldwork should not exceed 5000 words and 15-20 pages of illustrations (A4 Pages). The fieldwork along with the diagrams and illustrations should be prepared in computer using the standard (Using MS-Word for typing and Excel for calculation and graphs). The cartographic and statistical techniques used in the fieldwork should be at par with the syllabus of the UG Course.

Guidelines for Fieldwork:

The following methods are to be followed for framework:

1. Preparation of questionnaire for assessing the physical/cultural/environment/socio-economic components. A filled-in questionnaire used in the survey should be attached with the report signed by the concerned teacher and the student.

2. Preparation of maps (hand-drawn) with suitable scale and latitude and longitude.

3. Preparation of charts/graphs in MS-Excel and duly labelled.

4. The report should be typed in MS-Word. The font size is fixed at 12 in Times New Roman and the line spacing 1.5.

5. Each field work should have a certificate of authenticity duly signed by the project supervisor.

PROGRAM COURSE

SEMESTER-III

SKILL ENHANCEMENT COURSE (SEC): SEC/01: Computer Basics and Computer Applications OR Remote Sensing 2 Credits

GEO/G/SEC/P/01/A: (Practical): Computer Basics and Computer Applications 2 Credits

1. Numbering Systems; Binary Arithmetic

2. Data Computation, Storing and Formatting in Spreadsheets: Computation of Rank, Mean, Median, Mode, Standard Deviation, Moving Averages, Derivation of Correlation, Coefficient of Variation , Regression

3. Preparation of Annoted Diagrams and its Interpretation: Scatter Diagram and Histogram

4. Internet Surfing: Generation and Extraction of Information

Reference Books:

 Bartee, T. C., 1977: Digital Computer Fundamental; McGraw Hill Blissmer, 1996: Working with MS Word; Houghton Mifflin Co Chauhan, S., Chauhan, A., and Gupta, K., 2006: Fundamental of Computer; Firewall Media Flake, L. J., McClintock, C. E., and Turner, S., 1989: Fundamental of Computer Education; Wordsworth Pub. Co Johnson, S., 2007: Microsoft Power Point 2007; Pearson Paravia Bruno Leon, A., and Leon, M., 1999: A Beginners Guide to Computers, Vikas Leon, A., and Leon, M., 1999: Introduction to Computer, USB Publishers' Distributors Ltd Leon, A., and Leon, M., 1999: Introduction to Computer, USB Publishers' Distributors Ltd Malvino, A. P., Leach, D. P., 1981: Digital Principles and Applications; Tata McGraw Hill Mano, M. M., and Kime, C. R., 2004: Logic and Computer Design Fundamental; Prentice Hall Rajaraman, V., 2003: Fundamentals of Computer, Prentice Hall Publisher Rajaraman, V., 2008: Computer Primer; Prentice Hall of India Pvt. Ltd Sarkar, A., and Gupta, S. K., 2002: Elements of computer Science, S Chand and Company, New Delhi Sarkar, A., and Gupta, S. K., 2002: Elements of Computer Science, S Chand and Company, New Delhi Shepard, A., 2007: Perfect Pages; Shepard Publications Tyson, H. L., 2007: Microsoft Word 2007 Bible; John Wiley Walkenbach, J., 2007: Excel 2007 Bible; John Wiley

SEMESTER –IV

GEO/G/SEC/P/02/B: (Practical): Field Work 2 Credits

Students are required to carry out a comprehensive field work in a village/mouza/town/C.D.Block/ drainage basin selecting a particular research problem. There should be a clear-cut Problem background, major Objectives, Methodology and Findings. The Field Report should be written within 4000 words and the total number of pages in the Field Report should not exceed 30 pages ((A4 Pages) including texts, figures, tables, photographs, maps, references (APA) and appendices. The fieldwork along with the diagrams and illustrations should be prepared in computer using the standard (Using MS-Word for typing and Excel for calculation and graphs). The cartographic and statistical techniques used in the fieldwork should be at par with the syllabus of the UG Course.

Guidelines for Fieldwork:

The following methods are to be followed for framework:

1. Preparation of questionnaire for assessing the physical/cultural/environment/socioeconomic components. A filled-in questionnaire used in the survey should be attached with the report signed by the concerned teacher and the student.

2. Preparation of maps (hand-drawn) with suitable scale and latitude and longitude.

3. Preparation of charts/graphs in MS-Excel and duly labelled.

4. The report should be typed in MS-Word. The font size is fixed at 12 in Times New Roman and the line spacing 1.5.

5. Each field work should have a certificate of authenticity duly signed by the project supervisor.

SEMESTER-V

GEO/G/SEC/P/03: Field Techniques and Survey Based Project Report or Collection, Mapping and Interpretation of Climatic Data 2Credits

GEO/G/SEC/P/03/A: (Practical): Field Techniques and Survey Based Project 2 Credits

1. Students will prepare a survey based field report in a rural area or an urban area to study specific problems

2. The report should be hand written in candidate's own words (within 2000 words)

3. The total number of pages in the Field Report should not exceed 30 pages including texts, figures, tables, photographs, maps, references (APA) and appendices

4. Preparation of maps (hand-drawn) with suitable scale and latitude-longitude

5. A copy of the bound report, duly signed by the concerned teacher, should be submitted

SEMESTER-VI

GEO/G/SEC/P/04/B: (Practical): Rocks and Minerals and their Megascopic Identification 2 Credits

1. Types and characteristics of rocks and minerals

2. Megascopic identification of the following rocks and minerals mentioning their identifying characteristics.

Rocks: Granite, Basalt, Dolerite, Shale, Limestone, Sandstone, Gneiss, Slate, Quartzite, Marble

Minerals: Quartz, Feldspar, Mica (Muscovite and Biotite), Calcite, Bauxite, Magnetite, Haematite, Galena, Chalcopyrite

Reading

A.L.Basham : *Atiter Ujjal Bharat* (Bengali)
A. L. Basham : *The Wonder That Was India*
S.A.A. Rizvi : *The Wonder That Was India*
Upinder Singh : *A History of Ancient and Early Medieval India*
J.H.Dave : *Immortal India*
E.M Forster: *A Passage to India*
Sidney Toy: *The Fortified Cities of India*
Virginia Fass, Rita Sharma: *The Forts of India*
Sudha G. Tilak :*Temple Tales: Secrets & Stories from India's Sacred Places*
Rachana Chabaria: *Festival Stories through the Year*
R. Chandravarkar: *History, Culture & the Indian City*
Sumanta Banejee: *The Parlour and the Street: Elite & Popular Culture in 19th Century Calcutta*

2. B.N.Goswami : *Essence of Indian Art* ; Niharranjan Roy : *An approach to Indian Art*
S.S.Biswas : *Protecting the Cultural Heritage* ; D.P.Agarwal : *The Archaeology of India*

Course – II

Sports and Society in India in Historical Perspective

Unit-1 : Concepts and theories – Sports and History – Greek Philosophy of Sports – Greek and Roman Tradfition of Sports – the Olympics.

Unit-2 : Ideas of sports from ancient and medieval texts of India – sociology of pre-colonial Indian sports – race, religion, caste and gender.

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Unit-3 : Colonization of Indian sports in the 19th and 20th centuries – imposition of European sports on Indian society – commercialization of sports - impact on mind and body

Unit-4 : Sports in post-colonial India – sports in education – sports and economy – sports and politics – sports and diplomacy - effects of globalization on Indian sports.

Reading

1. Kausik Bandyopadhyay : *Sports History in India. Prospects and Problems*
2. Ronojoy Sen *Nation at Play. A History of Sports in India*
3. J. Coakley : *Sports and Society. Issues and Controversies*

Semester-4

Semester-4
(Any one)

Course – I
The Bengal Music

Unit-1 : History of Music in Bengal – influence of Vaishnava poetry of the 13th – 14th century – mixture of Hindu and Islamic trends – patronage of Nawabs and big landlords particularly the Baro Bhuiyans.

Unit-2 : Consolidation of the elite society in Bengal and growth of different forms of music in the 18th, 19th and early 20th centuries – Bishnupur Gharana – Rabindrasangeet, Nazrulgeeti, Dwijendrageeti, Atulprasadi Rajanikanter Gaan – swadeshi and nationalist songs.

Unit-3 : Aspects of folk culture and folk music of Bengal – Baul, Bhatiali, Bhawaiya, Dhamali, Gambhira, Jhumur, Kavigaan and Jatra.

Unit-4 : Modern Bengali Music – post-colonial western influences – middle class romanticism and transformation of Bengali music – leftist movements and new forms of music – media and music – Bengali music in theatre and film – globalization and changes in musical forms – rock and band music.

Reading

Basu : *Romance of Indian Journalism*

Course 11

Studies in Museum and Archaeology

Unit 1 : Origin, meaning, definition, and purpose of Museum - development of museum in the global context - museum development in India - changing role and social relevance of museum - functions of a museum - classification of museum according to collection, scope and management. .

Unit II : Organization of museum – ethics for acquisition and procedure of collection - documentation, accession, indexing, cataloguing and digitization - presentation and exhibition, in house and out house – communicative education and outreach activities -curatorial care, scientific preservation, protection and vigilance - museum publication and library - museum and tourism

Unit 111 : Definition of archaeology and ethno-archaeology – importance of archaeology for historical research – types of archaeology – prehistoric, historic, rural-urban and underwater archaeology – history of Indian archaeology – important archaeological sites of India – Bhimbetka, Anegundi, Brahmagiri, Lothal, Dholavira, Kalibangan, Rakhigarhi, Adichanallur, Hallur, Hampi, Sanchi, Khajuraho, Ajanta, Udayagiri-Khandgiri and Mogalmari.

Madhuparna Roychowdhury : *Displaying India's Heritage*

Skill Enhancement Course (SEC)
Semester-V1 (Any one of the following two)

Course 1
History and Tourism in India

Unit 1 : Recollecting cultural heritage of India from the Epics for a tourist – displaying India's heritage through art and architecture, particularly in South India – the culture of Indian History.

Unit 11 : Looking for Immortal India – Kasi, Rameswaram, Kurukshetra, Prayagraja, Gaya, Puri, Madurai, Dwarka, Ujjain, Kanchi, ayodhya, Mathura, Sringeri, Srirangam, Kedarnath, Badrinath, Pushkar, Tirupati, Nasik, Khajuraho, Kamakhya, and Dakshineswar.

Unit 111 : The wonder that was medieval India – Delhi, Agra, Ajmer, Ahmedabad, Daulatabad, Junagarh, Lucknow, Chittor, Jaipur, Jodhpur and Jaisalmir.

Unit 1V : Legacy of European Culture in India with special focus on the South, the East and the North East – revisiting Bengal at Kolkata, Serampore, Chandannagar, Hooghly, the Duars and the hill station of Darjeeling.

Unit 1V : Methods of archaeological explorations and site discoveries - horizontal and vertical excavation, concept of stratigraphy and stratification - dating methods and techniques - dendrochronology, radio carbon dating (C-14), thermoluminescence dating, electron spin resonance dating, optically stimulate microscopy dating, fission track dating – great scholars of archaeology - Alexander Cunningham, John Hubert Marshall, Mortimer Wheeler, Rakhaldas Bandyopadhyay, Daya Ram Sahni, D. R. Bhandarkar, H. D. Sankalia, B.B. Lal, M. K. Dhavalikar, R. S. Bisht, Debala Mitra and Shereen Ratnagar.

Reading

Rangankanti Jana : *Sangrahasala ebong Lekhyagar* (Bengali)
Moloy De : *Sangrahasala ebong Lekhyagar* (Bengali)
Rupak Das : *Puratattva Mahafejkhana O Jadughar* (Bengali)
Sachindranath Bhattacharyya : *Shilpabastu Sangrakshan* (Bengali)
Somnath O Sachindranath Bhattacharyya: *Sangrahashala – Itihas O Sangrakshan* (Bengali)
Atulchandra Bhaumik : *Jansikhaya Museum-er Bhumika* (Bengali)
Sudhiranjan Das, *Uthkhanan Vijnan* (Bengali)
S. F. Markham and H. Hargreaves, *The Museums of India,*
Dwivedi, V.P. Dwivedi and G.N.Pant, *Museums and Museology: New Horizons*
O.P. Agarwal : Care and Preservation of Museum Objects
P. Barker : *Techniques of Archaeological Excavation*
L.R.Binford : *In Pursuit of the Past: Decoding the Archaeological Record*
B. Fagan : *In the beginning: An Introduction to Archaeology*
Madhuparna Roychowdhury : *Displaying India's Heritage*

7. K. Hoffman, R. Kunze, Linear Algebra, Pearson.
8. John B. Fraleigh, A First Course in Abstract Algebra, Pearson.
9. P. R. Vittal, Analytical Geometry 2D and 3D, Pearson.
10. S. L. Loney, Co-ordinate Geometry, Arihant Publications.

B.A./B.Sc. Mathematics (Honours)
SEMESTER-III
Course: MATH-H-SEC-T-1A
Course title: Programming in 'C'
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE CONTENT: 2 Credits (Theory)

Unit 1. **[7L]**

- Brief historical development. Computer generation. Basic structure and elementary ideas of computer systems, operating systems, hardware and software.
- Positional number systems: Binary, octal, decimal, hexadecimal systems. Binary arithmetic.
- BIT, BYTE, WORD. Coding of data -ASCII, EBCDIC, etc.
- Algorithms and flow chart: Important features, ideas about complexities of algorithms. Application in simple problems.

Unit 2. **[18L]**

- Programming language and importance of 'C' programming.
- Constants, variables and data type of 'C'-Program: Character set. Constants and variables data types, expression, assignment statements, declaration.
- Operation and expressions: Arithmetic operators, relational operators, logical operators.
- Decision making and branching: Decision making with if statement, if-else statement, nesting if statement, switch statement, break and continue statement.
- Control statements: While statement, do-while statement, for statement.
- Arrays: One-dimension, two-dimensional and multidimensional arrays, declaration of arrays, initialization of one and multi-dimensional arrays.
- User-defined Functions: Definition of functions, scope of variables, return values and their types, function declaration, function call by value, nesting of functions, passing of arrays to functions, recurrence of function.

SUGGESTED READINGS/REFERENCES:

1. Yashvant Kanetkar, Let us C, BPB Publications.
2. V. Krishnamoorthy, K.R. Radhakrishnan, Programming in C, Tata McGraw Hilll.
3. Noel Kalicharan, C by Example, Cambridge Low price edition.
4. E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill.
5. C. Xavier, C-Language and Numerical Methods, New Age International.
6. Byron S. Gottfried, Programming with C, McGraw Hill Education.
7. A. N. Kamthane, Programming in C, Pearson.

B.A./B.Sc. Mathematics (Honours)
SEMESTER-IV
Course: MATH-H-SEC-T-2B
Course title: Graph Theory
Skill Enhancement Course; Credit-2; Full Marks-50

COURSE CONTENT: 2 Credits (Theory)

Unit 1. **[8L]**

- Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs isomorphism of graphs.

Unit 2 **[10L]**

- Eulerian circuits, Eulerian graphs, semi-Eulerian graphs, Hamiltonian cycles.
- Representation of a graph by matrix, the adjacency matrix, incidence matrix, weighted graph.

Unit 3. **[7L]**

- Travelling salesman's problem, shortest path, tree and their properties, spanning tree, Dijkstra's algorithm, Warshall algorithm.

SUGGESTED READINGS/REFERENCES:

1. B. A. Davey and H. A. Priestley, Introduction to Lattices and Order, Cambridge University Press, Cambridge.
2. R. J. Wilson, Introduction to Graph theory, Pearson.
3. Rudolf Lidl and Gunter Pilz, Applied Abstract Algebra, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint.
4. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, Pearson Education (Singapore) P. Ltd., Indian Reprint.

4. A few Model World-views and corresponding paths leading to Perfection Plato's view, *Gītā*, Ten Commandments	**18 Credits**

Recommended Readings:

• H. Cappelen: *The Oxford Handbook of Philosophical Methodology,* Oxford University Press, 2016

• B.K. Matilal: *The Word and The World,* Oxford University Press, 2001

• Bimal Krishna Matilal: *The Character of Logic in India*

• Bertrand Russell: *Problems of Philosophy*

• Paul F. Kisak: *Philosophical Methodology: the Methods of Philosophical Inquiry* CSI Publishing Platform, 2016

• E. V. Stubley: Philosophic as a Method of Inquiry

• R. M. Keon: Philosophic Semantics and Philosophic Inquiry

• The Methods of philosophy is the Methods of Inquiry (https://explicitblog.wordpress.com)

• Plato : *The Republic*

• G. E. Moore: *Some Main Problems of Philosophy,* New York

• Īśvarakṛṣṇa : *Sāṁkhyakārikā*

• Sadānanda Yogīndra: *Vedāntasāra*

From Second Discipline/Subject

SEMESTER VI

PHIL-G-SEC-T-04

YOGA PHILOSOPHY

Prescribed Course :

Recommended Topics:	**Total: 38Credits**
The Definition and Essence of Yoga	**10 Credits**
Yoga in Jainism, *Yoga* in Buddhism (*vipassanā*) and *Yoga* in *Bhagvadgītā*	**18 Credits**
Patanjali's *Astāngika Yoga Mārga*	**10 Credits**

Recommended Readings:

• Abhishiktananda, Swami: (1974) Guru and Disciple, London: Society for the Promotion of Christiona Knowledge,

• Aranya, H.: (1983) Yoga Philosophy of Patanjali, rev. ed.. Trans. by P. N. Mukherji, Albany, New York: Suny Press,

• Bhattacharya, H. (1956) (ed.). The Cultural Heritage of India, Calcutta: Ramkrishna Mission Institute of Culture, 4 vol.

• Cleary, T. (1995) translated Buddhist Yoga: A Comprehensive Course, Boston, Mass: Shambhala Publications.

• Dasgupta, S. N. (1930) Yoga Philosophy in Relation to Other Systems of Indian Thought, Calcutta: University of Calcutta.

• Gopalan S. (1974) *Outlines of Jainism*, John Wiley & Sons (Asia) Pvt Ltd.

SEMESTER IV

PHIL-H-SEC-T-02
Logical Rules and Fallacies (Western)

Prescribed Course:

PHIL-G-SEC-T-02

Logical Rules and Fallacies (Western)

Prescribed Course: **Total: 38 Credi**

R.Jeffry: Formal Logic (1st Edition) It's scope and Limits, Chapter-4	19 **Credits**
P. Suppes : Introduction to Logic (Indian edition) Chapter-9 , Section – 9.1 to 9.8	19 **Credits**

SEMESTER V

PHIL-G-SEC-T-03

Philosophy in Practice

Prescribed Course:

Recommended Topics:

Total: 38 Cred

1. Common and Differentiating Characteristics of Philosophy and *darśana* 2.Nature of Inquiry in Philosophy and *darśana*	**10 Credits**
3. Outlines of the types of Inquiry in Philosophy and *darśana*: (a) Epistemic Inquiry in Philosophy and *darśana,* (b) Metaphysical Inquiry in Philosophy and *darśana,* (c) Axiological Inquiry in Philosophy and *darśana*	**10 C**
4. A few Model World-views and corresponding paths leading to Perfection Plato's view, *Gītā*, Ten Commandments	**18 Credits**

Recommended Readings:

- H. Cappelen: *The Oxford Handbook of Philosophical Methodology,* Oxford University Press, 2016
- B.K. Matilal: *The Word and The World,* Oxford University Press, 2001
- Bimal Krishna Matilal: *The Character of Logic in India*
- Bertrand Russell: *Problems of Philosophy*

- • Future Evolution of Man-The Divine Life Upon Earth: Sri Aurobindo
- • Sri Aurobindo-The Prophet of Life Divine: Haridas Choudhuri
- • Sri Aurobindo's Concept of the Superman: Chittaranjan Goswami

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SEMESTER III

PHIL-H-SEC-T-01 **Logical Rules and Fallacies (Indian)**		
Prescribed Course:		**Total 38 Credits**
Unit: I	Definition and classification of *anumāna* (a) The Nyāya model (*chala, jāti, nigrahasthāna, vāda, jalpa, vitaṇḍā*) (b) The Buddhist model (*prasaṅga*)	12 **Credits**
Unit: II	**Aid to *Anumāna*:** (a) *tarka* (b) *avayava* (c) *dṛṣṭānta* (d) *siddhānta*	8 **Credits**
Unit: I II	Nature of *Hetu* and *Hetvābhāsa*	18 **Credits**

Suggested Readings:

- Phanibhushan Tarkabagish: *Nyāya Parichaya*
- Th. Stcherbatsky: *Buddhist Logic*, Vol.-I
- Bimal Krishna Matilal: *The Character of Logic in India*
- B. N. Singh: *Indian Logic*
- S. C. Chatterjee: *Nyāya Theory of Knowledge References*
- Bimal Krishna Matilal: *Perception*, Chap. 3 (OUP,1986)
- J.N. Mohanty: *Reason and Tradition in Indian Thought* (Oxford, 1998) . Challenging interpretations of many key doctrines
- Marie-Helene Gorisse and Peter Van Ormondt: A Day of Indian Logic
- Bidubhusan Bhattacharya: *Indian Logic,*Motilal Baranasidass, Delhi
- Dilipkumar Mohanta: *Madhyamaka Darsaner Ruprekha*
- Dilipkumar Mohanta: *Vigrahavyavartanī,* Mahabodhi Soci

	truth, validity, soundness.	
Unit: II	Aristotelian classification of categorical proposition, Distribution of terms.	**04 Credits**
Unit: III	Immediate inference based on the square of opposition ; conversion , obversion	**04 Credits**
Unit: IV	Categorical syllogism; figure, mood, rules of validity; Fallacies.	**06 Credits**
Unit: V	Symbolic Logic: Use of Symbols.	**03 Credits**
Unit: VI	Truth-Functions ; negation ,conjunction, disjunction, implication, equivalence	**05 Credits**
Unit: VII	Tautology, Contradiction, Contingency.	**05 Credits**
Unit: VIIII	Decision Procedure : Truth Table	**05 Credits**
Unit: IX	Using Truth Tables for testing the validity of arguments; Venn Diagram for testing validity; Fallacies.	**08 Credits**
Unit: X	Mill's Method of experimental enquiry, Analogy	**12 Credits**

Suggested Readings:

I.M. Copi & C. Cohen: *Itroduction to Logic (13th edn.)*

Indra Kumar Roy: *Pratiki Nyaya*

Rama Pradas Das: *Sanketic juktivijñān* (vol-I-IV)

PHIL-H-SEC-T-02
Logical Rules and Fallacies (Western)

Prescribed Course:

PHIL-G-SEC-T-02

Logical Rules and Fallacies (Western)

Prescribed Course: **Total: 38 Credits**

R.Jeffry: Formal Logic (1st Edition) It's scope and Limits, Chapter-4	19 **Credits**
P. Suppes : Introduction to Logic (Indian edition) Chapter-9 , Section – 9.1 to 9.8	19 **Credits**

Debabrata Sen : *Bharatiya Darsan* (in Bengali)

Pradyot Kr. Mondal : *Bharatiya Darsan* (in Bengali)

Nirod Baran Chakraborty : *Bharatiya Darsan* (in Bengali

Dakshina Ranjan Sastri : *Chavaka Darsan* (in Bengali)

Debiprasad Chattopadhyay : *Bharatiya Darsane Bastubad* (in Bengali)

Satish Chandra Nyayacharya : *Jaina Darsaner Digdarsan*

Pradyat Kr. Mondal : *Vaisesika Darsan* (in Bengali)

PHIL-H-SEC-T-01 **Logical Rules and Fallacies (Indian)**		
Prescribed Course:		**Total 38 Credits**
Unit: I	Definition and classification of *anumāna* (a) The Nyāya model (*chala, jāti, nigrahasthāna, vāda, jalpa, vitaṇḍā*) (b) The Buddhist model (*prasaṅga*)	12 **Credits**
Unit: II	**Aid to *Anumāna*:** (a) *tarka* (b) *avayava* (c) *dṛṣṭānta* (d) *siddhānta*	8 **Credits**
Unit: I II	Nature of *Hetu* and *Hetvābhāsa*	18 **Credits**

Suggested Readings:

- Phanibhushan Tarkabagish: *Nyāya Parichaya*
- Th. Stcherbatsky: *Buddhist Logic*, Vol.-I
- Bimal Krishna Matilal: *The Character of Logic in India*
- B. N. Singh: *Indian Logic*
- S. C. Chatterjee: *Nyāya Theory of Knowledge References*
- Bimal Krishna Matilal: *Perception*, Chap. 3 (OUP,1986)
- J.N. Mohanty: *Reason and Tradition in Indian Thought* (Oxford, 1998) . Challenging interpretations of many key doctrines
- Marie-Helene Gorisse and Peter Van Ormondt: A Day of Indian Logic
- Bidubhusan Bhattacharya: *Indian Logic*,Motilal Baranasidass, Delhi
- Dilipkumar Mohanta: *Madhyamaka Darsaner Ruprekha*
- Dilipkumar Mohanta: *Vigrahavyavartanī*, Mahabodhi Soci

- A board consisting of all teachers of the department and an expert from other college/ university shall be formed after getting approval of the departmental committee meeting.

- Marks distribution:

Preparation of the dissertation : 15
Presentation of the dissertation : 20
Merit of the dissertation and Viva-voce : 5

Skill Enhancement Course (any two for Hons. & any four may be chosen for pass course) (Credit: 02 each)

PHY—H-SEC-T-01: PHYSICS WORKSHOP SKILLS (Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

30 Lectures

The aim of this course is to enable the students to familiar and experience with various mechanical and electrical tools through hands-on mode

Introduction: Measuring units. conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

(4 Lectures)

Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet. (10 **Lectures)**

Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using

transistor and relay **(10 Lectures)**

Introduction to prime movers: Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism, Lifting of heavy weight using lever. braking systems, pulleys, working principle of power generation systems. Demonstration of pulley experiment. **(6 Lectures)**

Reference Books:

- A text book in Electrical Technology - B L Theraja - S. Chand and Company.
- Performance and design of AC machines - M.G. Say, ELBS Edn.
- Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt. Ltd.
- Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]
- New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN: 0861674480]

OR, PHY—H-SEC-T-01: COMPUTATIONAL PHYSICS SKILLS

(Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

Theory: 30 Lectures

The aim of this course is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- *Highlights the use of computational methods to solve physical problems*
- *Use of computer language as a tool in solving physics problems (applications)*
- *Course will consist of hands on training on the Problem solving on Computers.*

Introduction: Importance of computers in Physics, paradigm for solving physics problems for solution. Usage of linux as an Editor. **Algorithms and Flowcharts:** Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots
of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin(x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal. **(4 Lectures)**

Scientific Programming: Some fundamental Linux Commands (Internal and External commands). Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of

Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic. Examples from physics problems. **(5 Lectures)**

Control Statements: Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DO-WHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL, COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, open a file, writing in a file, reading from a file. Examples from physics problems.

Programming:

1. Exercises on syntax on usage of FORTRAN
2. Usage of GUI Windows, Linux Commands, familiarity with DOS commands and working in an editor to write sources codes in FORTRAN.
3. To print out all natural even/ odd numbers between given limits.
4. To find maximum, minimum and range of a given set of numbers.
5. Calculating Euler number using exp(x) series evaluated at x=1 **(6 Lectures)**

Scientific word processing: Introduction to LaTeX: TeX/LaTeX word processor, preparing a basic LaTeX file, Document classes, Preparing an input file for LaTeX, Compiling LaTeX File, LaTeX tags for creating different environments, Defining LaTeX commands and environments, Changing the type style, Symbols from other languages. **Equation representation:** Formulae and equations, Figures and other floating bodies, Lining in columns- Tabbing and tabular environment, Generating table of contents, bibliography and citation, Making an index and glossary, List making environments, Fonts, Picture environment and colors, errors. **(6 Lectures)**

Visualization: Introduction to graphical analysis and its limitations. Introduction to Gnuplot. importance of visualization of computational and computational data, basic Gnuplot commands: simple plots, plotting data from a file, saving and exporting, multiple data sets per file, physics with Gnuplot (equations, building functions, user defined variables and functions), Understanding data with Gnuplot

Hands on exercises:

1. To compile a frequency distribution and evaluate mean, standard deviation etc.
2. To evaluate sum of finite series and the area under a curve.
3. To find the product of two matrices
4. To find a set of prime numbers and Fibonacci series.
5. To write program to open a file and generate data for plotting using Gnuplot.
6. Plotting trajectory of a projectile projected horizontally.
7. Plotting trajectory of a projectile projected making an angle with the horizontally.
8. Creating an input Gnuplot file for plotting a data and saving the output for seeing on the screen. Saving it as an eps file and as a pdf file.

9. To find the roots of a quadratic equation.
10. Motion of a projectile using simulation and plot the output for visualization.
11. Numerical solution of equation of motion of simple harmonic oscillator and plot the outputs for visualization.
12. Motion of particle in a central force field and plot the output for visualization.

(9 Lectures)

Reference Books:

- Introduction to Numerical Analysis, S.S. Sastry, 5th Edn, 2012, PHI Learning Pvt. Ltd.
- Computer Programming in Fortran 77". V. Rajaraman (Publisher: PHI).
- LaTeX-A Document Preparation System", Leslie Lamport (Second Edition,
Addison-Wesley, 1994).
- Gnuplot in action: understanding data with graphs, Philip K Janert, (Manning 2010)
- Schaum's Outline of Theory and Problems of Programming with Fortran, S
Lipsdutz and A Poe, 1986Mc-Graw Hill Book Co.

- Computational Physics: An Introduction, R. C. Verma, et al. New Age International
Publishers, New Delhi(1999)
- A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning
- Elementary Numerical Analysis, K.E. Atkinson, 3 rd Edn., 2007, Wiley India Edition.

OR, PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS (Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

Theory: 30 Lectures

The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multimeter, voltmeter and ammeter. **(3 Lectures)**

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money. **(4 Lectures)**

Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop. **(4 Lectures)**

Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. **(3 Lectures)**

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor. **(4 Lectures)**

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources **(3 Lectures)**

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device) **(4 Lectures)**

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board. **(5 Lectures)**

Reference Books:

- A text book in Electrical Technology - B L Theraja - S Chand & Co.
- A text book of Electrical Technology - A K Theraja
- Performance and design of AC machines - M G Say ELBS Edn.

OR, PHY—H-SEC-T-01: BASIC INSTRUMENTATION SKILLS

(Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

Theory: 30 Lectures

This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed below are to be done in continuation of the topics.

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. **Multimeter:** Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. **(4 Lectures)**

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC **millivoltmeter:** Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance. **(4 Lectures)**

Cathode Ray **Oscilloscope:** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only- no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. (6 **Lectures)**

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working. **(3 Lectures)**

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

(4 **Lectures)**

Impedance Bridges & **Q-Meters:** Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges. **(3 Lectures)**

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. **(3 Lectures)**

Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution. **(3 Lectures)**

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.
3. Circuit tracing of Laboratory electronic equipment,
4. Use of Digital multimeter/VTVM for measuring voltages
5. Circuit tracing of Laboratory electronic equipment,
6. Winding a coil / transformer.
7. Study the layout of receiver circuit.
8. Trouble shooting a circuit
9. Balancing of bridges

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q- meter.

4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/ frequency counter.
6. Measurement of rise, fall and delay times using a CRO.
7. Measurement of distortion of a RF signal generator using distortion factor meter.
8. Measurement of R, L and C using a LCR bridge/ universal bridge.

Open Ended Experiments:

1. Using a Dual Trace Oscilloscope
2. Converting the range of a given measuring instrument (voltmeter, ammeter)

Reference Books:

- A text book in Electrical Technology - B L Theraja - S Chand and Co.
- Performance and design of AC machines - M G Say ELBS Edn.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Logic circuit design, Shimon P. Vingron, 2012, Springer.
- Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
- Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
- Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk, 2008, Springer
- Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING (Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

Theory: 30 Lectures

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible

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. **(3 Lectures)**

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. **(6 Lectures)**

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies. **(3 Lectures)**

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices. **(3 Lectures)**

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass. **(2 Lectures)**

Geothermal Energy: Geothermal Resources, Geothermal Technologies. **(2 Lectures)**

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources. **(2 Lectures)**

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 **(4 Lectures)**

Electromagnetic Energy Harvesting: Linear generators, physics mathematical models, recent applications **(2 Lectures)**

Carbon captured technologies, cell, batteries, power consumption **(2 Lectures)**

Environmental issues and Renewable sources of energy, sustainability. **(1 Lecture)**

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules.

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, Oxford University 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

OR, PHY—H-SEC-T-02: TECHNICAL DRAWING

(Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

Theory: 30Lectures

Introduction: Drafting Instruments and their uses. lettering: construction and uses of various scales: dimensioning as per I.S.I. 696-1972. Engineering Curves: Parabola: hyperbola: ellipse: cycloids, involute: spiral: helix and loci of points of simple moving mechanism.2D geometrical construction. Representation of 3D objects. Principles of projections. **(4 Lectures)**

Projections: Straight lines, planes and solids. Development of surfaces of right and oblique solids. Section of solids. **(6 Lectures)**

Object Projections: Orthographic projection. Interpenetration and intersection of solids. Isometric and oblique parallel projection of solids. **(4 Lectures)**

CAD Drawing: Introduction to CAD and Auto CAD, precision drawing and drawing aids, Geometric shapes, Demonstrating CAD- specific skills (graphical user interface. Create, retrieve, edit, and use symbol libraries. Use inquiry commands to extract drawing data). Control entity properties. Demonstrating basic skills to produce 2-D and 3-Ddrawings. 3D modeling with Auto CAD (surfaces and solids), 3D modeling with sketch up, annotating in Auto CAD with text and hatching, layers, templates & design center, advanced plotting (layouts, viewports), office standards, dimensioning, internet and collaboration, Blocks, Drafting symbols, attributes, extracting data. basic printing, editing tools, Plot/Print drawing to appropriate scale. **(16 Lectures)**

Reference Books:

- K. Venugopal, and V. Raja Prabhu. Engineering Graphic, New Age International
- AutoCAD 2014 & AutoCAD 2014/Donnie Gladfelter/Sybex/ISBN:978-1-118-57510-9
- Architectural Design with Sketchup/Alexander Schreyer/John Wiley & Sons/ISBN:
978-1-118-12309-6

OR, PHY—H-SEC-T-02: RADIATION SAFETY

(Credits: 02)
F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]
Theory: 30 Lectures

The aim of this course is for awareness and understanding regarding radiation hazards and safety. The list of laboratory skills and experiments listed below the course are to be done in continuation of the topics

Basics of Atomic and Nuclear Physics: Basic concept of atomic structure; X rays characteristic and production; concept of bremsstrahlung and auger electron, The

composition of nucleus and its properties, mass number, isotopes of element, spin, binding energy, stable and unstable isotopes, law of radioactive decay, Mean life and half life, basic concept of alpha, beta and gamma decay, concept of cross section and kinematics of nuclear reactions, types of nuclear reaction, Fusion, fission.

(6 Lectures)

Interaction of Radiation with matter: Types of Radiation: Alpha, Beta, Gamma and Neutron and their sources, sealed and unsealed sources,

Interaction of Photons - Photo electric effect, Compton Scattering, Pair Production, Linear and Mass Attenuation Coefficients,

Interaction of Charged Particles: Heavy charged particles - Beth-Bloch Formula, Scaling laws, Mass Stopping Power, Range, Straggling, Channeling and Cherenkov radiation. Beta Particles- Collision and Radiation loss (Bremsstrahlung), **Interaction of Neutrons-** Collision, slowing down and Moderation. (7 **Lectures)**

Radiation detection and monitoring devices: Radiation Quantities and Units: Basic idea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose, effective dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived Air Concentration (DAC).

Radiation detection: Basic concept and working principle of *gas detectors* (Ionization Chambers, Proportional Counter, Multi-Wire Proportional Counters, (MWPC) and Gieger Muller Counter), *Scintillation Detectors* (Inorganic and Organic Scintillators), *Solid States Detectors* and *Neutron Detectors, Thermo luminescent Dosimetry.* (7 **Lectures)**

Radiation safety management: *Biological effects of ionizing radiation,* Operational limits and basics of radiation hazards evaluation and control: radiation protection standards, International Commission on Radiological Protection (ICRP) principles, justification, optimization, limitation, introduction of safety and risk management of radiation. Nuclear waste and disposal management. Brief idea about Accelerator driven Sub-critical system (ADS) for waste management. **(5 Lectures)**

Application of nuclear techniques: Application in medical science (e.g., MRI, PET, Projection Imaging Gamma Camera, radiation therapy), Archaeology, Art, Crime detection, Mining and oil. *Industrial Uses:* Tracing, Gauging, Material Modification, Sterization, Food preservation. **(5 Lectures)**

Experiments:

1. Study the background radiation levels using Radiation meter

Characteristics of Geiger Muller (GM) Counter:

2) Study of characteristics of GM tube and determination of operating voltage and plateau
   length using background radiation as source (without commercial source).

3) Study of counting statistics using background radiation using GM counter.
4) Study of radiation in various materials (e.g. KSO4 etc.). Investigation of possible
radiation in different routine materials by operating GM at operating voltage.
5) Study of absorption of beta particles in Aluminium using GM counter.
6) Detection of a particles using reference source & determining its half life using spark counter
7) Gamma spectrum of Gas Light mantle (Source of Thorium)

Reference Books:

1. W.E. Burcham and M. Jobes - Nuclear and Particle Physics - Longman (1995)
2. G.F.Knoll, Radiation detection and measurements
3. Thermoluninescense Dosimetry, Mcknlay, A.F., Bristol, Adam Hilger (Medical
Physics Handbook 5)
4. W.J. Meredith and J.B. Massey, "Fundamental Physics of Radiology". John
Wright and Sons, UK, 1989.
5. J.R. Greening, "Fundamentals of Radiation Dosimetry", Medical Physics Hand
Book Series, No.6, Adam Hilger Ltd., Bristol 1981.
6. Practical Applications of Radioactivity and Nuclear Radiations, G.C. Lowental and P.L. Airey, Cambridge University Press, U.K., 2001
7. A. Martin and S. A. Harbisor, An Introduction to Radiation Protection, John
Willey & Sons, Inc. New York, 1981.
8. NCRP, ICRP, ICRU, IAEA, AERB Publications.
9. W.R. Hendee, "Medical Radiation Physics", Year Book - Medical Publishers
Inc. London, 1981

OR, PHY—H-SEC-T-02: APPLIED OPTICS

(Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

THEORY: 30 Lectures

Theory includes only qualitative explanation. Minimum five experiments should be performed covering minimum three sections.

Sources and Detectors(No. of Lectures:7)

Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einstein's coefficients,

Light amplification, Characterization of laser beam, He-Ne laser, Semiconductor lasers.

Experiments on Lasers:

1. Determination of the grating radial spacing of the Compact Disc (CD) by reflection using He-Ne or solid statelaser.
2. To find the width of the wire or width of the slit using diffraction pattern obtained by a He-Ne or solid statelaser.
3. To find the polarization angle of laser light using polarizer and analyzer
4. Thermal expansion of quartz using

laser Experiments on Semiconductor

Sources and Detectors

1. V-I characteristics ofLED
2. Study the characteristics of solid statelaser
3. Study the characteristics ofLDR
4. PhotovoltaicCell

Characteristics of IRsensor

Fourier Optics (No. of Lectures:7)

Concept of Spatial frequency filtering, Fourier transforming property of a thin

lens, Experiments on Fourier Optics:

1. Fourier optic and imageprocessing
    a. Optical imageaddition/subtraction
    b. Opticalimagedifferentiation
    c. Fourier opticalfiltering
    d. Construction of an optical 4fsystem

Fourier Transform Spectroscopy (FTS) is a powerful method for measuring emission and absorption spectra, with wide application in atmospheric remote sensing, NMR spectrometry and forensic science. Experiment:

1.To study the interference pattern from a Michelson interferometer as a function of mirror separation in the interferometer.There sulting interferogram is the Fourier trans form of the power spectrum of the source. Analysis of experimental interferograms

allows one to determine the transmission characteristics of several interference filters. Computer simulation can also be done. Urier Transform Spectroscopy

Holography (No. of Lectures:6)

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

Experiments on Holography and interferometry

1. Recording and reconstructing holograms
2. Constructing a Michelson interferometer or a Fabry Perot interferometer
3. Measuring the refractive index of air
4. Constructing a Sagnac interferometer
5. Constructing a Mach-Zehnder interferometer

White light Hologram

Photonics: Fibre Optics(No. of Lectures:10)

Optical fibres and their properties, Principal of light propagation through a fibre, The numerical aperture, Attenuation in optical fibre and attenuation limit, Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating

Experiments on Photonics: Fibre Optics

1. To measure the numerical aperture of an optical fibre
2. To study the variation of the bending loss in a multimode fibre
3. To determine the mode field diameter (MFD) of fundamental mode in a single-mode fibre by measurements of its far field Gaussian pattern
4. Tomeasurethenearfieldintensityprofileofafibreandstudyitsrefractiveindexprofile

To determine the power loss at a splice between two multimode fibre

Reference Books

- Fundamentalofoptics,F.A.Jenkins&H.E.White,1981,TataMcGrawhill.
- LASERS: Fundamentals & applications, K.Thyagrajan & A.K.Ghatak, 2010,TataMcGrawHill
- Fibre optics through experiments, M.R.Shenoy, S.K.Khijwania, et.al. 2009,

VivaBooks

- Nonlinear Optics, Robert W. Boyd, (Chapter-I), 2008,Elsevier.
- Optics, Karl Dieter Moller, Learning by computing with model examples, 2007,Springer.
- Optical Systems and Processes, Joseph Shamir,2009,PHI Learning Pvt.Ltd.
- Opto electronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt.Ltd.
- Optical Physics, A.Lipson, S.G.Lipson, H.Lipson, 4th Edn., 1996, Cambridge Univ. Press

OR, PHY—H-SEC-T-02: WEATHER FORECASTING

(Credits: 02)

F.M. = 50 (Theory - 40, Internal Assessment – 10)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Tutorial) – 05]

Theory: 30 Lectures

The aim of this course is not just to impart theoretical knowledge to the students but to enable them to develop an awareness and understanding regarding the causes and effects of different weather phenomenon and basic forecasting techniques

Introduction to atmosphere: Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature with height; air temperature; requirements to measure air temperature; temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics. **(9 Periods)**

Measuring the weather: Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws. **(4 Periods)**

Weather systems: Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes. **(3 Periods)**

Climate and Climate Change: Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate. **(6 Periods)**

Basics of weather forecasting: Weather forecasting: analysis and its

historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

(8 Periods)

Demonstrations and Experiments:

1. Study of synoptic charts & weather reports, working principle of weather station.
2. Processing and analysis of weather data:
   (a) To calculate the sunniest time of the year.
   (b) To study the variation of rainfall amount and intensity by wind direction.
   (c) To observe the sunniest/driest day of the week.
   (d) To examine the maximum and minimum temperature throughout the year.
   (e) To evaluate the relative humidity of the day.
   (f) To examine the rainfall amount month wise.
3. Exercises in chart reading: Plotting of constant pressure charts, surfaces charts, upper wind charts and its analysis.
4. Formats and elements in different types of weather forecasts/ warning (both aviation and non-aviation)

Reference books:

- Aviation Meteorology, I.C. Joshi, 3rd edition 2014, Himalayan Books
- The weather Observers Hand book, Stephen Burt, 2012, Cambridge University Press.
- Meteorology, S.R. Ghadekar, 2001, Agromet Publishers, Nagpur.
- Text Book of Agrometeorology, S.R. Ghadekar, 2005, Agromet Publishers, Nagpur.
- Why the weather, Charls Franklin Brooks, 1924, Chpraman & Hall, London.
- Atmosphere and Ocean, John G. Harvey, 1995, The Artemis Press.

POLITICAL SCIENCE HONOURS CBCS KALYANI UNIVERSITY SYLLABUS SINCE 2018-19

Skill enhancement courses (SEC)

1. POL-H-SEC-T-1(A): Legislative Practices and Procedures

2. POL-H-SEC-T-1(B): Democratic Awareness with Legal Literacy

3. POL-H-SEC-T-2(A): Public Opinion and Survey Research

4. POL-H-SEC-T-2(B): Peace and Conflict Resolution

Semester III			
POL-H-SEC-T-1 (any One)	A. Legislative Practices and Procedures	Skill enhancement (30L)	2 (2L)
	B. Democratic Awareness with Legal Literacy		
Semester III			
POL-H-SEC-T-2 (any one)	A. Public Opinion and Survey Research	Skill enhancement (30L)	2 (2L)
	B. Peace and Conflict Resolution		

B.A. Political Science (Honours)
SEMESTER-III
POL-H-SEC-T-1(A): Legislative Practices and Procedures
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion the course the learners will be able to:
 To Identify the legislative process in India at various levels,

 To understand the basic requirements of peoples' representatives in policy making process.

 To understand the basic skills required for understanding the political process.

Unit 1: Powers and functions of people's representative at different tiers of governance: Members of Parliament, State Legislative Assemblies - functionaries of rural and urban local governance.
Unit 2: Legislative Process - How a Bill becomes a Law, Role of the Standing Committee in reviewing a Bill, Legislative Consultations, amendments to a Bill, the framing of Rules and Regulations.
Unit 3: Legislative Committees: Types and role – Types of committees, Role of committees in reviewing government finances, policy, programmes, and legislation**.**
Unit 4 : Budget Document : Overview of Budget Process, Role of Parliament in reviewing the Union Budget, Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries.

Unit 5: Media monitoring and communication: Types of media and their significance for legislators. Basics of communication in print and electronic media.

Suggested Readings:

1. Jayal, N and Mehta, P (eds), *The Oxford Companion to Politics in India,* Oxford University Press: New Delhi

2. B. Jalan, (2007) *India's Politics,* New Delhi: Penguin.

3. H. Kalra, (2011) *Public Engagement with the Legislative Process* PRS, Centre for Policy Research, New Delhi.

4. Subhash Kashyap, (2006) *Parliamentary Procedure, Law Privilege, Practice & Precedents* - Delhi: Universal Law Publishing.

5. Madhavan, M.R. & N. Wahi ***Financing of Election Campaigns*** PRS, Centre for Policy Research, New Delh, 2008: http://www.prsindia.org/uploads/media/conference/Campaign_finance_brief.pdf

6. Vanka, S. ***Primer on MPLADS*** Centre for Policy Research, New Delhi, 2008. can be accessed on: http://www.prsindia.org/parliamenttrack/primers/mplads-487/

B.A. Political Science (Honours)
SEMESTER-III
POL-H-SEC-T-1(B): Democratic Awareness with Legal Literacy
Skill Enhancement Course; Credit-2. Full Marks-50

Course Objectives:

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

 Understand the structure and manner of functioning of the legal system in India.

 Develop an understanding of the formal and Alternate Dispute Redressal (ADR) mechanisms that exist in India, public interest litigation.

Unit1: Constitution – fundamental rights, fundamental duties, other constitutional rights and their manner of enforcement and the expansion of certain rights under Article 21 of the Constitution.

Unit 2: Laws relating to criminal jurisdiction – Provision relating to filing of an FIR, arrest, bail, search seizure- Understanding the question of evidence procedure in Cr.P.C. and related laws - dowry, sexual harassment and violence against women – laws relating to consumer rights – Juvenile Justice- Prevention of atrocities on Scheduled Castes and Scheduled Tribes.

Unit3: Anti-terrorist laws: Implication for security and human rights. Laws relating to cybercrimes.

Unit 4: System of courts/ tribunals and their jurisdiction in India – criminal and civil courts, writ jurisdiction, specialized courts such as juvenile courts, Mahila courts and tribunals- Alternate dispute such as Lokadalats, non-formal mechanisms.

Unit 5: Critical Understanding of the Functioning of the Legal System – Legal Service Authorities Act and Right to Legal aid, ADR system – Concepts like Burden of Proof, Presumption of Innocence, Principles of Natural Justice – Fair Comment under Contempt Law.
Unit 6 : Human Rights - emerging trends; Role of legal aid agencies, Human Rights Commissions, NGOs and Civil liberties groups- Role of Police and Executive in criminal law administration.
Suggested Readings:
1. Basu, D. D & Others, *Introduction to the Constitution of India*, Nagpur: LexisNexis Butterworths, 2008.

2. Kashyap, S, *Our Constitution: An Introduction to India's Constitution and Constitutional Laws,* New Delhi, National Book Trust, 1994.

3. Gender Study Group, (1996) *Sexual Harassment in Delhi University, A Report*, Delhi:

University of Delhi.
4. D. Srivastva, (2007) 'Sexual Harassment and Violence against Women in India: Constitutional and Legal Perspectives', in C. Kumar and K. Chockalingam (eds) *Human Rights, Justice, and Constitutional Empowerment*, Delhi: Oxford University Press.

5. B.L. Wadhera, *Public Interest Litigation - A Handbook*, Universal, Delhi, 2003.

6. Aggarwal, N., *Women and Law in India*, New Century, Delhi, 2002.

B.A. Political Science (Honours)
SEMESTER-IV
POL-H-SEC-T-2(A): Public Opinion and Survey Research
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion the course the learners will be able to:
 Identify the debates, principles and practices of public opinion polling in the context of democracies with special reference to India.

 Understand how to conceptualize and measure public opinion using quantitative methods, with particular attention being paid to developing basic skills pertaining to the collection, analysis and utilisation of quantitative data.

Unit 1: Definition and characteristics of public opinion, conceptions and characteristics, debates about its role in a democratic political system, uses for opinion poll.
Unit 2: Measuring Public Opinion: What is sampling? Why do we need to sample? Sample design, Methods and Types of Sampling- Non-Random Sampling (Quota, Purposive and Snowball sampling) – Random Sampling (Simple and Stratified)) , Sampling error and non-response.
Unit 3: Interviewing: Interview techniques pitfalls, different types of and forms of interview
Unit4: Questionnaire: Question wording; fairness and clarity
Unit 5: Quantitative Data Analysis: Introduction to quantitative data analysis, Basic concepts: correlation research, causation and prediction, descriptive and inferential Statistics.

Unit 6: Prediction in polling research: possibilities and pitfalls, Politics of Interpreting Polls.

Suggested Readings:

1. R. Erikson and K. Tedin, *American Public Opinion,* 8th edition, New York, Pearson Longman Publishers, 2011.

2. G. Gallup, *A Guide to Public Opinion Polls.* Princeton: Princeton University Press, 1948.

3. Kothari, C. R., *Research Methodology*, New Delhi, PHI, 2004.

4. Ahuja, Ram, *Research Methods*, New Delhi, Rawat Publications, 2001.

5. Kalton, G., *Introduction to Survey Sampling* Beverly Hills, Sage Publication, 1983.

6. Asher, H., 'Chapters 3 and 5', in *Polling and the Public: What Every Citizen Should Know,* Washington DC: Congressional Quarterly Press, 2001.

7. Kumar, S. and Rai, P. 'Chapter 1', in *Measuring Voting Behaviour in India*, New Delhi, Sage, 2013.

B.A. Political Science (Honours)
SEMESTER-IV
POL-H-SEC-T-2(B): Peace and Conflict Resolution
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:

After completion the course the learners will be able to:

- Help build an understanding of a variety of conflict situations.
- Understand the various dimensions of Conflict.
- Identify the Gandhian Techniques of Peace-Building.
- Develop ideas on Conflict Responses.

Unit 1: Understanding Conflict and Conflict Management, Conflict Resolution and Conflict Transformation- Peace Building.

Unit 2: Dimensions of Conflict: Ideological, Economic (Resource Sharing) and Socio-Cultural (Ethnicity, Religion and Gender).
Unit 3: Nature of Local, Sub-national and International Conflicts.
Unit 4: Techniques of Conflict Resolution: Negotiations – Trust building; Mediation: Skill Building and Active Listening; Track- I, II & and Multi Track Diplomacy; Gandhian Methods.

Suggested Readings:

1. O. Ramsbotham, T. Woodhouse and H. Miall, (2011) 'Understanding Contemporary Conflict', in *Contemporary Conflict Resolution*, (Third Edition), Cambridge: Polity Press, pp. 94-122.
2. S. Ryan, (1990) 'Conflict Management and Conflict Resolution', in *Terrorism and Political Violence*, 2:1, pp. 54-71.
3. R. Rubenstein, (2003) 'Sources', in S. Cheldelin, D. Druckman and L. Fast (eds.) *Conflict: From Analysis to Intervention*, London: Continuum, pp.55-67.
4. P. Le Billon, (2009) 'Economic and Resource Causes of Conflicts', in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.), *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 210-224.

5. S. AyseKadayifci-Orellana, (2009) 'Ethno-Religious Conflicts: Exploring the Role of Religion in Conflict Resolution', in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 264-284.
6. J Bercovitch, V. Kremenyuk, and I. Zartman (eds.) (2009), *The Sage Hand Book of Conflict Resolution*, London: Sage Publications.
7. M. Steger, (2001) 'Peacebuilding and Non-Violence: Gandhi's Perspective on Power', in D. Christie, R. Wagner and D. Winter, (eds.), *Peace, Conflict, and Violence: Peace Psychology for the 21st Century Englewood Cliffs,* New Jersey: Prentice Hall.

8. I. Doucet, (1996) *Thinking About Conflict,* Resource Pack for Conflict Transformation: International Alert.

9. P. Le Billon, (2009) 'Economic and Resource Causes of Conflicts', in J. Bercovitch, V.

Kremenyuk and I. Zartman (eds.) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 210-224.
10. J. Davies and E. Kaufman (eds.), (2003) *Second Track/Citizens' Diplomacy: Concepts and Techniques for Conflict Transformation*, Rowman & Littlefield: Maryland.

CBCS CURRICULUM IN SEC FOR THREE YEARS UNDER-GRADUATE COURSE IN
POLITICAL SCIENCE (GENERAL)

E. Skill enhancement courses (SEC)

1. POL-G-SEC-T-1: **Legislative Practices and Procedures**
2. POL-G-SEC-T-2: **Public Opinion and Survey Research**
3. POL-G-SEC-T-3: **Democratic Awareness with Legal Literacy.**
4. POL-G-SEC-T-4: **Peace and Conflict Resolution**

Semester III			
POL-G-SEC-T-1 (any One)	A. Legislative Practices and Procedures From Second Discipline/Subject	Skill enhancement (30L)	2 (2L)
Semester III			
POL-G-SEC-T-2 (any one)	A. Public Opinion and Survey Research From Second Discipline/Subject	Skill enhancement (30L)	2 (2L)
POL-G-SEC-T-3 (any one)	Democratic Awareness with Legal Literacy. From Second Discipline/Subject	Skill enhancement (30L)	2 (2L)
POL-G-SEC-T-4 (any one)	Peace and Conflict Resolution From Second Discipline/Subject	Skill enhancement (30L)	2 (2L)

SEMESTER-III
POL-G-SEC-T-1: Legislative Practices and Procedures
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion the course the learners will be able to:
 To Identify the legislative process in India at various levels,

 To understand the basic requirements of peoples' representatives in policy making process.

 To understand the basic skills required for understanding the political process.

Unit 1: Powers and functions of people's representative at different tiers of governance: Members of Parliament, State Legislative Assemblies - functionaries of rural and urban local governance.
Unit 2: Legislative Process - How a Bill becomes a Law, Role of the Standing Committee in reviewing a Bill, Legislative Consultations, amendments to a Bill, the framing of Rules and Regulations.
Unit 3: Legislative Committees: Types and role – Types of committees, Role of committees in reviewing government finances, policy, programmes, and legislation**.**
Unit 4: Budget Document: Overview of Budget Process, Role of Parliament in reviewing the Union Budget, Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries.
Unit 5: Media monitoring and communication: Types of media and their significance for legislators. Basics of communication in print and electronic media.
Suggested Readings:
1. Jayal, N and Mehta, P (eds), *The Oxford Companion to Politics in India,* Oxford University Press: New Delhi

2. B. Jalan, (2007) *India's Politics,* New Delhi: Penguin.

3. H. Kalra, (2011) *Public Engagement with the Legislative Process* PRS, Centre for Policy Research, New Delhi.

4. Subhash Kashyap, (2006) *Parliamentary Procedure, Law Privilege, Practice & Precedents* - Delhi: Universal Law Publishing.

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Policy Research, New Delh, 2008:
http://www.prsindia.org/uploads/media/conference/Campaign_finance_brief.pdf
6. Vanka, S. ***Primer on MPLADS*** Centre for Policy Research, New Delhi, 2008.
can be accessed on:
http://www.prsindia.org/parliamenttrack/primers/mplads-487/

SEMESTER-IV
POL-G-SEC-T-2: Public Opinion and Survey Research
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion the course the learners will be able to:
 Identify the debates, principles and practices of public opinion polling in the context of democracies with special reference to India.

 Understand how to conceptualize and measure public opinion using quantitative methods, with particular attention being paid to developing basic skills pertaining to the collection, analysis and utilisation of quantitative data.

Unit 1: Definition and characteristics of public opinion, conceptions and characteristics, debates about its role in a democratic political system, uses for opinion poll.
Unit 2: Measuring Public Opinion: What is sampling? Why do we need to sample? Sample design, Methods and Types of Sampling- Non-Random Sampling (Quota, Purposive and

Snowball sampling) – Random Sampling (Simple and Stratified)), Sampling error and non-response.
Unit 3: Interviewing: Interview techniques pitfalls, different types of and forms of interview
Unit4: Questionnaire: Question wording; fairness and clarity
Unit 5: Quantitative Data Analysis: Introduction to quantitative data analysis, Basic concepts: correlation research, causation and prediction, descriptive and inferential Statistics.
Unit 6: Prediction in polling research: possibilities and pitfalls, Politics of Interpreting Polls.
Suggested Readings:
1. R. Erikson and K. Tedin, *American Public Opinion,* 8th edition, New York, Pearson Longman Publishers, 2011.
2. G. Gallup, *A Guide to Public Opinion Polls.* Princeton: Princeton University Press, 1948.
3. Kothari, C. R., *Research Methodology*, New Delhi, PHI, 2004.
4. Ahuja, Ram, *Research Methods*, New Delhi, Rawat Publications, 2001.
5. Kalton, G., *Introduction to Survey Sampling* Beverly Hills, Sage Publication, 1983.
6. Asher, H., 'Chapters 3 and 5', in *Polling and the Public: What Every Citizen Should Know,* Washington DC: Congressional Quarterly Press, 2001.
7. Kumar, S. and Rai, P. 'Chapter 1', in *Measuring Voting Behaviour in India*, New Delhi, Sage, 2013.

SEMESTER-V
POL-G-SEC-T-3: Democratic Awareness with Legal Literacy.
Skill Enhancement Course; Credit-2. Full Marks-50
Course Objectives:
After completion of the course the learners will be able to:
 Understand the structure and manner of functioning of the legal system in India.

 Develop an understanding of the formal and Alternate Dispute Redressal (ADR) mechanisms that exist in India, public interest litigation.

Unit1: Constitution – fundamental rights, fundamental duties, other constitutional rights and their manner of enforcement and the expansion of certain rights under Article 21 of the Constitution.
Unit 2: Laws relating to criminal jurisdiction – Provision relating to filing of an FIR, arrest, bail, search seizure- Understanding the question of evidence procedure in Cr.P.C. and related laws - dowry, sexual harassment and violence against women – laws relating to consumer rights – Juvenile Justice- Prevention of atrocities on Scheduled Castes and Scheduled Tribes.
Unit3: Anti-terrorist laws: Implication for security and human rights. Laws relating to cybercrimes.
Unit 4: System of courts/ tribunals and their jurisdiction in India – criminal and civil courts, writ jurisdiction, specialized courts such as juvenile courts, Mahila courts and tribunals- Alternate dispute such as Lokadalats, non-formal mechanisms.
Unit 5: Critical Understanding of the Functioning of the Legal System – Legal Service Authorities Act and Right to Legal aid, ADR system – Concepts like Burden of Proof, Presumption of Innocence, Principles of Natural Justice – Fair Comment under Contempt Law.
Unit 6: Human Rights - emerging trends; Role of legal aid agencies, Human Rights Commissions, NGOs and Civil liberties groups- Role of Police and Executive in criminal law administration.

Suggested Readings:

1. Basu, D. D & Others, *Introduction to the Constitution of India*, Nagpur: LexisNexis Butterworths, 2008.

2. Kashyap, S, *Our Constitution: An Introduction to India's Constitution and Constitutional Laws,* New Delhi, National Book Trust, 1994.

3. Gender Study Group, (1996) *Sexual Harassment in Delhi University, A Report*, Delhi:

University of Delhi.

4. D. Srivastva, (2007) 'Sexual Harassment and Violence against Women in India: Constitutional and Legal Perspectives', in C. Kumar and K. Chockalingam (eds) *Human Rights, Justice, and Constitutional Empowerment*, Delhi: Oxford University Press.

5. B.L. Wadhera, *Public Interest Litigation - A Handbook*, Universal, Delhi, 2003.

6. Aggarwal, N., *Women and Law in India*, New Century, Delhi, 2002.

SEMESTER-VI

POL-G-SEC-T-4: Peace and Conflict Resolution

Skill Enhancement Course: Credit-2. Full Marks-50

Course Objectives:

After completion the course the learners will be able to:

- Help build an understanding of a variety of conflict situations.
- Understand the various dimensions of Conflict.
- Identify the Gandhian Techniques of Peace-Building.
- Develop ideas on Conflict Responses.

Unit 1: Understanding Conflict and Conflict Management, Conflict Resolution and Conflict Transformation- Peace Building.

Unit 2: Dimensions of Conflict: Ideological, Economic (Resource Sharing) and Socio-Cultural (Ethnicity, Religion and Gender).

Unit 3: Nature of Local, Sub-national and International Conflicts

Unit 4: Techniques of Conflict Resolution: Negotiations – Trust building; Mediation: Skill Building and Active Listening; Track- I, II & and Multi Track Diplomacy; Gandhian Methods

Suggested Readings:

1. O. Ramsbotham, T. Woodhouse and H. Miall, (2011) 'Understanding Contemporary Conflict', in *Contemporary Conflict Resolution*, (Third Edition), Cambridge: Polity Press, pp. 94-122.

2. S. Ryan, (1990) 'Conflict Management and Conflict Resolution', in *Terrorism and Political Violence*, 2:1, pp. 54-71.

3. R. Rubenstein, (2003) 'Sources', in S. Cheldelin, D. Druckman and L. Fast (eds.) *Conflict: From Analysis to Intervention*, London: Continuum, pp.55-67.

4. P. Le Billon, (2009) 'Economic and Resource Causes of Conflicts', in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.), *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 210-224.

5. S. AyseKadayifci-Orellana, (2009) 'Ethno-Religious Conflicts: Exploring the Role of Religion in Conflict Resolution', in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 264-284.

6. J Bercovitch, V. Kremenyuk, and I. Zartman (eds.) (2009), *The Sage Hand Book of Conflict Resolution*, London:
Sage Publications.

7. M. Steger, (2001) ‘Peacebuilding and Non-Violence: Gandhi’s Perspective on Power’, in D. Christie, R. Wagner and D. Winter, (eds.), *Peace, Conflict, and Violence: Peace Psychology for the 21st Century Englewood Cliffs,* New Jersey: Prentice Hall.

8. I. Doucet, (1996) *Thinking About Conflict,* Resource Pack for Conflict Transformation: International Alert.

9. P. Le Billon, (2009) ‘Economic and Resource Causes of Conflicts’, in J. Bercovitch, V. Kremenyuk and I. Zartman (eds.) *The Sage Hand Book of Conflict Resolution*, London: Sage Publications, pp. 210-224.
10. J. Davies and E. Kaufman (eds.), (2003) *Second Track/Citizens' Diplomacy: Concepts and Techniques for Conflict Transformation*, Rowman & Littlefield: Maryland

Skill Enhancement Course

SANS-H-SEC-T-01 Evolution of Indian Scripts		
Prescribed Course:		**Total 28 Credtis**
Section 'A'		14 Credits
Section 'B'		14 Credits
Unit-Wise Division Section 'A'		
Unit: I	1. Antiquity of writing in India 2. Early *Brāhmī* and *Kharoshthi* Scripts 3. Development of *Devanāgarī* Scripts 4. Development of Eastern Indian Scripts with Special Reference to Bengali and Odia	**14 Credits**
Section 'B'		
Unit: I	1. Types/Kinds of the *Brāhmī* script by 400 A.D. 2. Transition to early modern Indian scripts 3. Causes of variation in the *Brāhmī* script	**14 Credits**

SANS-H-SEC-T-02 Basic Elements of *Āyurveda*		
Prescribed Course:		**Total 28 Credits**
Section 'A'	Introduction of Āyurveda	14 Credits
Section 'B'	*Carakasaṃhitā* – (Sūtra-sthānam)	14 Credits
Unit-Wise Division **Section 'A'** **Introduction of *Āyurveda***		
Unit: I	Introduction of Āyurveda, History of Indian Medicine in the pre-caraka period, The two schools of Āyurveda: *Dhanvantari* and *Punarvasu*.	**07 Credits**
Unit: II	Main Ācāryas of Āyurveda – *Caraka*, *Suśruta*, *Vāgbhaṭṭa*, *Mādhava*, *Sārṅgadhara* and *Bhāvamiśra*	**07 Credits**
Section 'B' ***Carakasaṃhitā* – (*Sūtra-sthānam*)**		
Unit: I	*Carakasaṃhitā* – (*Sūtra-sthānam*): Division of Time and condition of nature and body in six seasons. Regimen of Fall Winter (*Hemanta*), Winter (*Śiśira*) & Spring (*Vasanta*) seasons. Regimen of Summer (*Grīṣma*), Rainy (*Varṣā*) and Autumn (*Śarada*) seasons.	**14 Credits**

SkillEnhancementCourses(SEC**)**

SANS-G-SEC-T-01 EvolutionofIndianScripts		
PrescribedCourse:		**Total28Credits**
Section'A'		14Credits
Section'B'		14Credits
Unit-WiseDivisionSection'A'		
Unit:I	1. AntiquityofwritinginIndia 2. EarlyBrāhmīandKharoshthiScripts 3. DevelopmentofDevanāgarīScripts 4. DevelopmentofEasternIndianScriptswith SpecialReferencetoBengaliandOdia	**14Credits**
Section'B'		

Unit:I	1. Types/KindsoftheBrāhmīscriptby400A.D. 2. TransitiontoearlymodernIndianscripts 3. Causesofvariation intheBrāhmīscript	**14Credits**

SANS-G-SEC-T-02 BasicElementsofĀyurveda		
PrescribedCourse:		**Total28Credits**
Section'A'	IntroductionofĀyurveda	14Credits
Section'B'	Carakasaṃhitā–(Sūtra-sthānam)	14Credits
Unit-WiseDivision **Section'A'** **IntroductionofĀyurveda**		
Unit:I	IntroductionofĀyurveda,HistoryofIndianMedicineinthepre-carakaperiod,ThetwoschoolsofĀyurveda:DhanvantariandPunarvasu.	**07Credits**
Unit:II	MainĀcāryasofĀyurveda–Caraka,Suśruta,Vāgbhaṭṭa,Mādhava,Sārṅgadharaand Bhāvamiśra	**07Credits**
Section'B' ***Carakasaṃhitā*–(Sūtra-sthānam)**		
Unit:I	Carakasaṃhitā–(Sūtra-sthānam):DivisionofTimeandconditionofnatureandbodyinsixseasons.RegimenofFallWinter(Hemanta),Winter (Śiśira)& Spring (Vasanta)seasons.RegimenofSummer(Grīṣma),Rainy (Varṣā)andAutumn(Śarada)seasons.	**14Credits**

SANS-G-SEC-T-03 YogasūtraofPatañjali		
PrescribedCourse:		**Total28Credits**
Section'A'	**Yogasūrta of Patañjali:SamādhiPāda**	14Credits
Section'B'	**Yogasūrta of Patañjali:SādhanaPāda**	14Credits
Unit-WiseDivision **Section'A'** **Yogasūrtaof Patañjali– SamādhiPāda**		
Unit:I	YogasūrtaofPatañjali:SamādhiPāda(Sutras:1-15)	**07Credits**
Unit:II	YogasūrtaofPatanjali:SamādhiPāda(Sutras:16-29)	**07Credits**
Section'B' **Yogasūrtaof Patañjali: SādhanaPāda**		
Unit:I	YogasūrtaofPatanjali:SādhanaPāda(Sutra:29-45).	**07Credits**
Unit:II	YogasūrtaofPatanjali:SādhanaPāda(Sutras:46-55)	**07Credits**

SANS-G-SEC-T-04 IndianTheatre		
PrescribedCourse:		**Total28Credits**
Section'A'	**TraditionandHistoryofIndianTheatre**	07Credits
Section'B'	**Theatre:TypesandConstructions**	07Credits
Section'C'	**Acting:Āgika,Vācika,SāttvikaandĀhārya**	07Credits
Section'D'	**Drama:Subject-Plot(*vastu*),Hero(*netā*)andSentiment(*rasa*).**	07Credits
Unit-WiseDivision **Section'A'** **TraditionandHistoryofIndianTheatre**		
Unit:I	Originanddevelopmentofstageindifferentages:pre-historic,Vedicage.	**02Credits**
Unit:II	Epic-puranicage,courttheatre,templetheatre,opentheatre,moderntheatre,folktheatre,commercialtheatre,nationalandstatelevel theatre.	**05Credits**
Section'B' **Theatre:TypesandConstructions**		
Unit:I	Theatre:TypesandConstructions	**07Credits**
Section'C' **Acting:Āgika,Vācika,Sāttvikaand Āhārya**		
Unit:I	Acting:Āṅgīka,Vācika	**03 Credits**
Unit:II	SāttvikaandĀhārya	**04Credits**
Section'D' **Drama:Subject-Matter(vastu), Actor(netā)andrasa**		
Unit:I	***Vastu***(Subject-Matter)	**02Credits**
Unit:II	***Netā*****(**Hero)	**02Credits**
Unit:III	***Rasa*****(Sentiment)**	**03 Credits**

Skill Enhancement Course (SEC) Syllabus

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-H-SEC- 01	Aquarium Fish Keeping	2 (20)	30	30

Unit 1: Introduction to Aquarium Fish Keeping

Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Anemone fish and Butterfly fish

Unit 3: Food and feeding of Aquarium fishes

Use of live fish feed organisms. Preparation and composition of formulated fish feeds,

Unit 4: Fish Transportation

Live fish transport - Fish handling, packing and forwarding techniques.

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-H-SEC- 02	Apiculture	2 (20)	30	30

Unit 1: Biology of Bees

Biology and social organization of honey bees.

Unit 2: Rearing of Bees

Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth; Bee Pasturage; Selection of Bee Species for Apiculture; Bee Keeping Equipment; Methods of Extraction of Honey (Indigenous and Modern).

Unit 3: Diseases and Enemies

Bee Diseases and Enemies; Control and Preventive measures.

Unit 4: Bee Economy

Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc

Unit 5: Entrepreneurship in Apiculture

Report on a visit to an apiculture farm.

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-H-SEC- 03	Sericulture	2 (20)	30	30

Unit 1: Introduction

Types of silkworms, Distribution and Races

Exotic and indigenous races

Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm

Life cycle of *Bombyx mori*

Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms

Rearing house and rearing appliances

Disinfectants: Formalin, bleaching powder

Silkworm rearing technology: Early age and Late age rearing

Types of mountages.

Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases

Pests of silkworm: Uzi fly, dermestid beetles and vertebrates

Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial

Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture

Report on a visit to a sericulture center.

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-H-SEC- 04	Medical Diagnostic Techniques	2 (20)	30	30

Unit 1: Diagnostics Methods Used for Analysis of Blood

Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit 2: Diagnostic Methods Used for Urine Analysis

Urine Analysis: Physical characteristics; Abnormal constituents

Unit 3: Non-infectious Diseases

Testing of blood glucose using Glucometer/Kit

Unit 4: Infectious Diseases

Diagnosis of Tuberculosis and Hepatitis, Malarial parasite (Microscope based and ELISA based)

Unit 5: Clinical Biochemistry

LFT, Lipid profiling

Unit 6: Clinical Microbiology

Antibiotic Sensitivity Test

Unit 7: Tumors

Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Unit 8: Lab visit

Visit to Pathological Laboratory and Submission of Project.

Skill Enhancement Courses (SEC) Syllabus

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-G-SEC- 01	Aquarium Fish Keeping	2 (20)	30	30

Unit 1: Introduction to Aquarium Fish Keeping

Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Anemone fish and Butterfly fish

Unit 3: Food and feeding of Aquarium fishes

Use of live fish feed organisms. Preparation and composition of formulated fish feeds

Unit 4: Fish Transportation

Live fish transport - Fish handling, packing and forwarding techniques.

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-G-SEC- 02	Apiculture	2 (20)	30	30

Unit 1: Biology of Bees

Biology and social organization of honey bees.

Unit 2: Rearing of Bees

Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth; Bee Pasturage; Selection of Bee Species for Apiculture; Bee Keeping Equipment; Methods of Extraction of Honey (Indigenous and Modern).

Unit 3: Diseases and Enemies

Bee Diseases and Enemies; Control and Preventive measures.

Unit 4: Bee Economy

Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc.

Unit 5: Entrepreneurship in Apiculture

Report on a visit to an apiculture farm.

Reference Books:

- Economic Zoology – Chaki, Kundu, Sarkar, New Central Book Agency.
- Moumachhi o tader palonkotha – Kishor Dhara,

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-G-SEC- 03	Sericulture	2 (20)	30	30

Unit 1: Introduction

1. Types of silkworms, Distribution and Races
2. Exotic and indigenous races
3. Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm

1. Life cycle of *Bombyx mori*
2. Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms

1. Rearing house and rearing appliances.
2. Disinfectants: Formalin, bleaching powder,
3. Silkworm rearing technology: Early age and Late age rearing
4. Types of mountages
6. Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases

1. Pests of silkworm: Uzi fly, dermestid beetles and vertebrates
2. Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial
3. Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture

Report on a visit to various sericulture centre.

Reference Books:

- Economic Zoology – Chaki, Kundu, Sarkar, New Central Book Agency.

Course Code	Course Title	Total credits (FM)	Total no. of Lectures	Total no. of hours
ZOOL-H-SEC-04	Medical Diagnostic Techniques	2 (20)	30	30

Unit 1: Diagnostics Methods Used for Analysis of Blood

Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit 2: Diagnostic Methods Used for Urine Analysis

Urine Analysis: Physical characteristics; Abnormal constituents

Unit 3: Non-infectious Diseases

Testing of blood glucose using Glucometer/Kit

Unit 4: Infectious Diseases

Diagnosis of Tuberculosis and Hepatitis, Malarial parasite (Microscope based and ELISA based)

Unit 5: Clinical Biochemistry

LFT, Lipid profiling

Unit 6: Clinical Microbiology

Antibiotic Sensitivity Test

Unit 7: Tumors

Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Unit 8: Lab visit

Visit to Pathological Laboratory and Submission of Project.

Reference Books

- Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
- Guyton A.C. and Hall J.E. Textbook of Medical Physiology, Saunders
- Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

Semester-III

SEC-1: Grammar , Translation & Letter Writing

1) قواعد النحو والترجمة على أساس المواد التالية **(on the basis of Following Grammatical rules)**:
الجملة الاسمية , الجملة الفعلية,الجملة الشرطية, حروف المشبه بالفعل ، الأفعال الناقصة ، مواضيع تقديم المبتدأ على الخبر ، مواضيع تقديم الخبر على المبتدأ وفعلا التعجب

2) Letter Writing (Official, Educational , Personal and etc.)

Semester -IV

SEC-2: Grammar, Translation & Essay Writing:

a) قواعد النحو والترجمة على أساس المواد التالية **(on the basis of Following Grammatical rules)**:
الاستثناء ، لا لنفي الجنس ، خاصية أبواب: افعال ، تفعيل ، استفعال ، مفاعلة وافتعال

b) كتابة المقال **(Essay Writing)**: زيارة المدينة المشهورة ، زيارة المكتبة الشهيرة ، زيارة حديقة الحيوانات ، شخصية تحبه كثيرا (الأدب العربي)

Note : Sec-1 & 2 (General) and Sec-1&2 are common

Semester-V

SEC-3: Specific literary feature of Modern Arabic Literature

7

تاريخ النهضة العربية ، أسباب النهضة ، مدرسة الديوان ومؤسسوها عباس محمود العقاد ، إبراهيم المازني وعبد الرحمن شكري، مدرسة أبولو ومؤسسوها أحمد زكي أبو شادي ، إبراهيم ناجي ، أبو القاسم الشابي

Semester-VI

SEC-4: Specific literary feature of Modern Arabic Literature in Exile

تاريخ أدب المهجر ، الرابطة القلمية ومؤسسوها جبران خليل جبران ، إيليا أبو ماضي وميخائيل نعيمة و العصبة الأ ها ميشال معلوف ، رشيد سليم الخوري و الياس فرحات

Discipline Specific Electivess