Institution integrates crosscutting issues relevant to Professional Ethics,Gender, Human

1.3.1 ***Values ,Environment and Sustainability into the Curriculum***

Courses List:

Professional Ethics			
S.No	**Course Code**	**Course Name**	**Program**
1	MBA 208	Indian Ethos and Business Ethics	MBA
2	MBAIT-404	Managing Digital Platforms	MBA
3	MBAFM-307	Cost & Management Audit	MBA
4	10JAR1	Leadership & Management Skills	B. Arch.
5	BCA605A	Social Implications of IT	BCA
6	BCA605C	Cyber Ethics & Crime	BCA
7	BBA107B	Buisness Ethics	BBA
8	BPT206	Etics and Laws in Physiotherapy	BPT
9	BA/BBA-LLB703	Law and Emerging Technologies	BA/BBA-LLB
10	BA/BBA-LLB901	Legal ethics and Court Crafts	BA/BBA-LLB
Gender			
S.No	**Course Code**	**Course Name**	**Program**
1	5JAR7	Sociology	B. Arch.
2	AG109	Rural Sociology and Educational Psychology	BSc (Ag)
3	BEd101	Childhood and Growing up	B. Ed.
4	BPT104	Sociology	BPT
5	BA/BBA-LLB904B	Socio-Economic Offences	BA/BBA-LLB
6	BA/BBA-LLB904H	Socio-Legal Dimensions of Gender	BA/BBA-LLB
7	BALLB105	Sociology-I	BA-LLB
8	BALLB204	Sociology-II	BA-LLB
9	BA/BBALLB705C	Women and Law	BA/BBA-LLB
Human Values			
S.No	**Course Code**	**Course Name**	**Program**
1	MBA401	Corporate Governance & Social Reponsibility	MBA
2	6JAR9.4	Design for Disabled	B. Arch.
3	AG110	Human Values and Ethics	B.Sc. (Ag)
4	AG108	Agricultural Heritage	B.Sc. (Ag)
5	AG411	Educaional Tour	B.Sc. (Ag)
6	AG605	Management of Beneficial Insects	B.Sc. (Ag)
7	AG702	Village attachment and Swachh Bharat Abhiyan Activities	B.Sc. (Ag)
8	MPT201	Bio-Engineering and Rehabilitation Principles	MPT
9	LLM103	Law and Justice in a Globalizing World	LLM
10	B.Ed102	Contemporary India and Education	B. Ed.
11	B.Ed105	Creatng and Inclusive School	B. Ed.
12	B.Ed106(EPC-1)	Reading and Reflecting on Texts	B. Ed.
13	B.Ed202	Knowledge and Curriculum (Part-1)	B. Ed.
14	B.Ed204(EPC-2)	Drama and Art in Education	B. Ed.
15	BPT306	Community Medicine	BPT
16	BPT405	Rationae of Rehabiliation	BPT
17	BSC601E	Chemical Technology & Society	B.Sc. (PCM)
18	BBA-LLB904A	International Refugee Law	BBA-LLB
19	BALLB104	History-I	BA-LLB
20	BALLB205	Political Science-I	BA-LLB

21	BALLB203	History-II	BA-LLB
22	BALLB305	Political Science-II	BA-LLB
23	Audit Paper 1	Value Education	M. Tech.
24	Audit Paper 2	Constitution of India	M. Tech.
25	BTHSM203	Human Values	B. Tech.
26	BTCSSODE CA 412	Social Outreach Discipline & Extra Curricular Activities	B. Tech.
Environment			
S.No	**Course Code**	**Course Name**	**Program**
1	2JAR1	Ecology & Environment	B. Arch.
2	7JAR10.1	Alternate Energy Systems in Architecture	B. Arch.
3	10JAR3.1	Urban Conservation	B. Arch.
4	AG104	Introduction to Forestry	B. Sc. (Ag)
5	AG203	Introductory Soil and Water Conservation Engineering	B. Sc. (Ag)
6	AG208	Fundamentals of Agricultural Extension Education	B. Sc. (Ag)
7	AG307	Environmental Studies and Disaster Management	B. Sc. (Ag)
8	AG403	Renewable Energy and Green Technology	B. Sc. (Ag)
9	AG510D	Biopesticides and Biofertilizers	B. Sc. (Ag)
10	AG611A	Weed Management	B. Sc. (Ag)
11	AG810	Agriculture Waste Management	B. Sc. (Ag)
12	BCA206	Environmental Studies	BCA
13	BBA101	Environmental Studies	BBA
14	BBA201	Disaater Management	BBA
15	BSC201	Environmental Science	B. Sc. (PCM)
16	BSC501C	Radiology and Safety	B. Sc. (PCM)
17	BSC501D	Weather Forecasting	B. Sc. (PCM)
18	BSC501F	Pesticide Chemistry	B. Sc. (PCM)
19	BSC603B	Green Chmeistry	B. Sc. (PCM)
20	BSC605B	Green Chemistry Lab	B. Sc. (PCM)
21	BA/BBA-LLB501	Environmental Studies & Environmental Laws	BA/BBA-LLB
22	MTEEPS103A	Renewable Energy System	M. Tech.
23	MTEEPS103D	Wind & Soalr Systems	M. Tech.
24	MTEEPS104D	Electric and Hybrid Vehicles	M. Tech.
25	MTEEPS108	Renewable Energy Lab	M. Tech.
26	MTCEEV101	Energy & Environment	M. Tech.
27	MTCEEV102	Advanced Waste Water Treatment	M. Tech.
28	MTCEEV103A	Advanced Water Treatment Technology	M. Tech.
29	MTCEEV103C	Environmental Geo Technology	M. Tech.
30	MTCEEV104A	Noise and Thermal Pollution	M. Tech.
31	MTCEEV104B	Environmental Hydraulauics	M. Tech.
32	MTCEEV104C	Environmental Chemistry & Microbiology	M. Tech.
33	MTCEEV107	Advanced Water Treatment Lab	M. Tech.
34	MTCEEV108	Sanitation Engineering Lab	M. Tech.
35	MTCEEV201	Environmental Policies & Legislation	M. Tech.
36	MTCEEV202	Environmental Impact Assessment and Auditing	M. Tech.
37	MTCEEV203A	Solid Waste Management	M. Tech.
38	MTCEEV203C	Indoor Air Quality	M. Tech.
39	MTCEEV204A	Industrial Waste Treatment	M. Tech.
40	MTCEEV204B	Hazardous Waste Treatment	M. Tech.
41	MTCEEV204C	Ground Water Pollution	M. Tech.
42	MTCEEV206	Industrial Waste Treatment Lab	M. Tech.

43	MTCEEV207	Air Quality Testing Lab	M. Tech.
44	MTCEEV301A	Air Pollution & Its Control	M. Tech.
45	MTCEEV301B	Environmental Aspects of Industries	M. Tech.
46	MTCEEV301C	Environment & Health	M. Tech.
47	MTMEPE 302F	Waste to Energy	M. Tech.
48	BTMEOEC702.B	Environmental Engineering and Disaster Management	B. Tech.
49	BTMEOEC802.B	Energy Management	B. Tech.
50	BTMEOEC802.C	Waste and By-Product Utilization	B. Tech.

Sustainability			
S.No	**Course Code**	**Course Name**	**Program**
1	MBA 207	Entrepreneurship	MBA
2	6JAR9.2	Sustainable Architecture	B. Arch.
3	6JAR9.3	Low Cost Architecture	B. Arch.
4	7JAR10.2	Vernacular Architecture	B. Arch.
5	AG101	Fundamentals of Horticulture	B. Sc. (Ag)
6	AG102	Fundamentals of Plant Biochemistry and Biotechnology	B. Sc. (Ag)
7	AG103	Fundamentals of Soil Science	B. Sc. (Ag)
8	AG106	Fundamentals of Agronomy	B. Sc. (Ag)
9	AG204	Fundamentals of Crop Physiology	B. Sc. (Ag)
10	AG205	Fundamentals of Agricultural Economics	B. Sc. (Ag)
11	AG301	Crop Production Technology-1	B. Sc. (Ag)
12	AG302	Fundamentals of Plant Breeding	B. Sc. (Ag)
13	AG303	Agricultural Finnace and Co-operation	B. Sc. (Ag)
14	AG304	Agricultural Informatics	B. Sc. (Ag)
15	AG305	Farm Machinery and Power	B. Sc. (Ag)
16	AG306	Prodction Technology for Vegetables and Spices	B. Sc. (Ag)
17	AG309	Livestock and Poultry Management	B. Sc. (Ag)
18	AG401	Crop Production Technology – II (*Rabi* crops)	B. Sc. (Ag)
19	AG402	Production Technology for Ornamental Crops, MAP and Landsc	B. Sc. (Ag)
20	AG404	Problematic Soil and their Management	B. Sc. (Ag)
21	AG405	Production Technology for Fruit and Plantation Crops	B. Sc. (Ag)
22	AG406	Principles of Seed Technology	B. Sc. (Ag)
23	AG407	Farming System and Sustainable Agriculture	B. Sc. (Ag)
24	AG408	Agricultural Marketing Trade and Prices	B. Sc. (Ag)
25	AG410A	Protected Cultivation	B. Sc. (Ag)
26	AG410B	Agribusiness Management	B. Sc. (Ag)
27	AG410C	Agrochemicals	B. Sc. (Ag)
28	AG410D	Commercial Plant Breeding	B. Sc. (Ag)
29	AG501	Principles of Integrated Pest and Disease Management	B. Sc. (Ag)
30	AG502	Manures, Fertilizers and Soil Fertility Management	B. Sc. (Ag)
31	AG503	Pests of Crops and Stored Grains and their Management	B. Sc. (Ag)
32	AG504	Diseases of Field and Horticultural Crops and their Management	B. Sc. (Ag)
33	AG505	Crop Improvement-I (Kharif crops)	B. Sc. (Ag)
34	AG506	Entrepreneurship Development and Business Communication	B. Sc. (Ag)
35	AG507	Geoinformatics and Nanotechnology and Precision Farming	B. Sc. (Ag)
36	AG508	Practical Crop Production - I (Kharif crops)	B. Sc. (Ag)
37	AG601	Rainfed Agriculture & Watershed Management	B. Sc. (Ag)
38	AG302	Protected Cultivation and Secondary Agriculture	B. Sc. (Ag)
39	AG603	Diseases of Field and Horticultural Crops and their Management	B. Sc. (Ag)

40	AG604	Post-Harvest Management and Value Addition of Fruits and Veg	B. Sc. (Ag)
41	AG606	Crop Improvement-II (Rabi crops)	B. Sc. (Ag)
42	AG607	Practical Crop Production – II (Rabi crops)	B. Sc. (Ag)
43	AG608	Principles of Organic Farming	B. Sc. (Ag)
44	AG609	Farm Management, Production & Resource Economics	B. Sc. (Ag)
45	AG610	Principles of Food Science & Nutrition	B. Sc. (Ag)
46	AG611B	Micro Propagation Technologies	B. Sc. (Ag)
47	AG611C	Hi-Tech Horticulture	B. Sc. (Ag)
48	AG611D	System Simulation and Agro-Advisory	B. Sc. (Ag)
49	AG703	Unit attachment in University/College. KVK/Research Station	B. Sc. (Ag)
50	AG704	Plant Clinic	B. Sc. (Ag)
51	AG705	Agro-Industrial Attachment	B. Sc. (Ag)
52	AG801	Production Technology for Bioagents and Biofertilizer	B. Sc. (Ag)
53	AG802	Seed Production and Technology	B. Sc. (Ag)
54	AG803	Mushroom Cultivation Technology	B. Sc. (Ag)
55	AG804	Soil, Plant, Water and Seed Testing	B. Sc. (Ag)
56	AG805	Commercial Beekeeping	B. Sc. (Ag)
57	AG806	Poultry Production Technology	B. Sc. (Ag)
58	AG807	Commercial Horticulture	B. Sc. (Ag)
59	AG8089	Floriculture and Landscaping	B. Sc. (Ag)
60	AG909	Food Processing	B. Sc. (Ag)
61	AG811	Organic Production Technology	B. Sc. (Ag)
62	AG812	Commercial Sericulture	B. Sc. (Ag)
63	AG813	Agri Business Management	B. Sc. (Ag)
64	AG814	Agro-Advisory Services	B. Sc. (Ag)
65	AG815	Nursery Management	B. Sc. (Ag)
66	BCA605D	Entrepreneurship	BCA
67	BBA503	Entrepreneurship Development	BBA
68	BSC501E	Chemistry of Cosmetics & Perfumes	B. Sc. (PCM)
69	AG510B	Landscaping	B. Sc. (Ag)

PROFESSIONAL ETHICS

MBA208: INDIAN ETHOS AND BUSINESS ETHICS

Course Content:

UNIT I Indian Ethos and Values

Indian Ethos: Concept, Need, purpose & relevance of Indian Ethos; Model of management in the Indian socio-political environment, Indian work ethos;

Values for managers, relevance of values in management, secular vs. spiritual values in management, need for values in global change-Indian perspective

UNIT II Indian Ethos in Management

Management Lessons from Vedas, Mahabharata, Panchtantra, Kautilya's Arthashastra, Discussion Examples and Models from the above texts

Relevance of Bhagvad Gita: Doctrine of Karma i.e. Nishkama Karmayoga; Guna Theory (SRT i.e. Sat, Raj & Tam Model), Theory of Sanskaras, Life Goals or Purusharthas, Bhagvad Gita & Self Management.

UNIT III Introduction to Business Ethics

Concept of Ethics and Business Ethics, Importance, Causal chains in business ethics, Ethical Dilemma, Ethical Relativism, Ethical Gap and factors affecting business ethics

UNIT IV Professional Ethics

Ethics & Religion; HRM & Ethics; Creating Work committed cultures in Organizations; Quality of Work Life; Ethical Decision Making.

UNIT V Ethics in Management

Ethics & Environment; Ethics of Advertising and Investment Decisions; Social Responsibility, Sustainable Development, Trusteeship concept of Mahatma Gandhi, Indian Vs western Management Contemporary issues in Management.

Practical Module:

- Study the Management GURU's from Indian History like Lord Krishna (Bhagvad Gita), Vivekanand (Vivekananda's ideas on Vedant), Chankaya's Arthshastra – prepare presentation, videos and role play on their philosophy for Management.
- Arrange Practical Sessions on Yoga

Text Books

- R Nandagopal, Ajith Sankar RN: Indian Ethics and Values in Management, Tata Mc Graw Hill
- Ghosh, B.: Indian Ethos in Management, Vikas Publishing House Pvt. Ltd., 2nd ed. Reprint, 2009.
- Balchandran, S. Raja K. C. R. and Nain B. K.: Ethics, Indian Ethos & Management, Shroff Publishers & Distributors Ltd., New Delhi.

Reference Books

- Chakraborty, S.K.: Foundation of Managerial Work-Contributions from Indian Thought, Himalaya Publication House, Delhi 1998
- Nandagopal, Ajith Shankar, Indian Ethos and Values in Management, Tata Mc Graw Hill, 2010
- Chakraborty, S.K., Ethics in Management: Vedantic Perspectives, Oxford University Press, Delhi, 1995

MBA IT 404: Managing Digital Platforms

Course Contents:

UNIT I : Introduction

Overview of the IT/ITES/Telecom and related businesses in India and the world – segments of these industries, growth, forecasts, trends, key players, reasons for their success etc. IT & Information Systems Resource its relevance to Human resource management & Business, Outsourcing challenges of Internal Functions – the what, Why and How

UNIT II: Innovation Management-issues and challenges

Challenges for these businesses in the domestic and international markets such as Business Development, Technology Obsolescence, Pricing, Set up & Infrastructure Costs, Talent management , Licensing costs & Intellectual property rights, Mergers and Acquisitions , Customer Contract Management and SLAs , managing Innovation , legal issues, Visa's, Foreign Soil issues, Special Incentives and schemes such as the Export Processing Zones etc

UNIT III: IT Resource Management-I

Study of various business models including onsite/off shoring, e-commerce, e-business, m – commerce and pure play 'e' and 'm' models, Effective use of IT & Information Systems resources Implementation and Acceptance, maintenance for productivity

UNIT IV: IT Resource Management-II

Introduction to IT and Information System Resource Management, Evolution of IT and Information System Resource Management (Software, Hardware, Database, Networking, and communications technology, human resource etc) for Planning and Implementation of information technology and technology base system across the functions and sectors of the industries.

UNIT V: IT resources-determinants, challenges

Determining IT and Information System's Resource Needs: Needs Analysis, planning , System Cost Justifying and Investments, Automation and Artificial Intelligence

Text Books:

1. IT Infrastructure & Management , Phalguni Gupta, Surya Prakash, Umarani, Jayaraman
2. Managing the IT Resource: Leadership in the Information Age by Luftman Pearson

Reference Books:

1. Managing IT Infrastructure – TMI
2. A Guide to PMBoK- Project Management Institute

MBA FM 307: Cost and Management Audit

Course Contents

UNIT I Introduction Of Cost Audit

Meaning &objects of cost Audit, Role & importance of cost Audit in capacity utilization, Better Labor Management, Verification & Valuation of inventories, Inter firm comparison ,Export promotion etc, Difference between Cost Audit & financial audit, Advantages of cost audit , Efficiency audit.

UNIT II Cost Auditor

Qualifications& Disqualifications and Qualities of cost auditor, Rights & Duties of cost auditor, Relationship between cost & Liabilities, Auditor , Financial Auditor & Statutory Auditor , Professional ethics & code of conduct of Auditor.

UNIT III Cost Audit

Preparation & verification of cost records .Uses of statistical sampling Method for Audit, Cost audit, Programme Form & contents of cost Audit Report, Various Annexures to the cost audit report, considerations prior to drafting the final report.

UNIT IV Introduction of Management Audit

Meaning , Nature , Scope & Concept of Management Audit ,Recruiting & Training of Audit Staff, Difference between Management Audit & Financial Audit ,Purpose & Goal of Management Audit, Key features of Management Audit, Limiting factors and fundtions of management audit.

UNIT V Review of Policies

Review of Internal Control, Review of Purchasing Control, Review of selling & Distribution Policies, Review of manufacturing policies. Corporate Social Audit – Social Cost & Social Benefits

Text Books:

1. Ramnathan , Cost & management Audit
2. Cona W.L., Mgmt & Cost Audit.

Reference books:

1. A. Ramarathan, Cost & Management Audit, Excel Books
2. Dr. Arun Kumar, Cost & Management Audit, Shuchita Prakashan
3. Dr. D.K. Jain, Guide to Cost Audit, Bharat Publishing House

Semester : **Tenth 5th Year**
Subject Name : **LEADERSHIP & MANAGEMENT SKILLS**
Subject Code : **10JAR1**

<table>
<tr><td colspan="2">Content: Leaders are foundations of the society, who face and win against adversities and odds of life. Through their words and deeds, they show path to others and transform into inspirational role models, affecting social life vividly. In the current times of cut-throat competitions, disbelief in values, techno-centric complex lifestyles, there is a dire need to emphasise the ‘human’ agency in community living. This can be done by cultivating and nurturing the innate leadership skills of the youth so that they may transform these challenges into opportunities and become torch bearers of the future by developing creative solutions.</td></tr>
<tr><td>Unit I</td><td>The architect and his office, relationship with clients, consultants, contractors. Legal responsibilities of architects, code of professional practice, fees, architectural competitions and architects registration act 1972.
Code of professional conduct.
Condition of engagement and scale of professional fees.
Copyright Act as applicable to architectural work.
Architectural competitions.
Concept of Contract.
Duties and liabilities of architects, duties and liabilities of contractors.
Articles of agreement, execution of works and payments.
Laws pertaining to property matters like Right of easements, passage, ancient light etc.
Leadership Skills
Understanding Leadership and its Importance
What is leadership?
Why Leadership required?
Whom do you consider as an ideal leader?
Traits and Models of Leadership
Are leaders born or made?
Key characteristics of an effective leader
Leadership styles
Perspectives of different leaders
Basic Leadership Skills
Motivation
Team work
Negotiation
Networking</td></tr>
<tr><td>Unit II</td><td>Tender and tendering procedures, principle of contact and</td></tr>
</table>

	agreements. Control of constructional operations. Managerial Skills: • Basic Managerial Skills o Planning for effective management o How to organise teams? o Recruiting and retaining talent o Delegation of tasks o Learn to coordinate o Conflict management • Self Management Skills o Understanding self concept o Developing self-awareness o Self-examination o Self-regulation
Unit III	• Arbitration and its proceedings and awards. Introduction to principles of business management project programming and monitoring. Entrepreneurial Skills: • Basics of Entrepreneurship o Meaning of entrepreneurship o Classification and types of entrepreneurship o Traits and competencies of entrepreneur • Creating Business Plan o Problem identification and idea generation o Idea validation o Pitch making
Unit IV	• PERT and CPM network and their analysis Human relation and personnel management. Innovative Leadership and Design Thinking : • Innovative Leadership o Concept of emotional and social intelligence o Synthesis of human and artificial intelligence o Why does culture matter for today's global leaders • Design Thinking o What is design thinking? o Key elements of design thinking: ▪ Discovery ▪ Interpretation ▪ Ideation- Experimentation - Evolution. o How to transform challenges into opportunities? o How to develop human-centric solutions for creating social goo

Unit V	• Brief Idea about accounting and book keeping, business correspondence, information storage and retrieval systems. Ethics and Integrity : • Learning through Biographies o What makes an individual great? o Understanding the persona of a leader for deriving holistic inspiration o Drawing insights for leadership o How leaders sail through difficult situations? • Ethics and Conduct o Importance of ethics o Ethical decision making o Personal and professional moral codes of conduct o Creating a harmonious life

Notes **:** Mid Term Exam shall be as of Unit I to III.

Reference Books **:**

1. Professional Practice by Dr. Roshan H. Namavati
2. Urban and Regional Planning in India: A Handbook for Professional Practice by S.K. Kulshrestha
3. Quality Management in Cement Con. by Gahlot
4. Compendium of J.D.A. and Allied Laws (Vol. I&II) by Man Singh Gupta
5. Compendium of Municipalities and Allied Laws (Vol. –I) Man Singh Gupta
6. Building Codes Illustrated for Healthcare Facilities by Steven R. Winkel.
7. Ashokan, M. S. (2015). *Karmayogi: A Bbiography of E. Sreedharan*. Penguin, UK.
8. Brown, T. (2012). *Change by Design.* Harper Business
9. Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India
10. Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All.* William Collins

BCA-605A Social Implications of IT

UNIT-I Introduction: Importance of social dimensions of science and technology, concept of demystification, definition of the term IT, Its advantages and disadvantages, trends in IT, IT and quality of life.

UNIT-II Future trends of IT: AI, Robots, Neural Networks, Fuzzy logic, Virtual Reality, Developments in hardware and software, economic role of IT (Banking and Finance, Stock market), IT and Manufacturing, IT in Retail Marketing, Presentation on future trends.

UNIT-III Social and Technical choice reshaping the people, concept of digital factors affecting nature, initiative to bridge digital divide, debate on digital divide.

UNIT-IV IT in office automation, concept of Intelligent house hold, IT role in learning and education, focus on alternative ways in which IT professionals, IT and home automation.

UNIT-V Privacy and surveillance in everyday life, impact of IT on culture, ethical issue of IT, concept of software piracy.

Text Books/Reference Books

1. Dutton, W.H. "Society on the line: Information politics in digital age" , Oxford University Press, 1999.
2. Castell M., " The Internet Galaxy" Oxford University Press,
3. Teich, A.H., "Technology and the future", 8th edition, Network St. Martin Press.

BCA-605C Cyber Ethics & Crime

Unit I Introduction to Cyber Law Evolution of Computer Technology, emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace- Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

Unit II Information technology Act Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

Unit III Cyber law and related Legislation Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).

Unit IV Electronic Business and legal issues: Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C,E security.

Unit V Application area: business, taxation, electronic payments, supply chain, EDI, E-markets Emerging Trends.

Text Books/ Reference Books

1. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher.
2. Information Security policy &implementation Issues, NIIT, PHI.
3. Cyber CRIME notorious Aspects of the Humans & net Criminals activity in Cyber World
4. Barna Y Dayal D P Dominant Publisher.
5. Cyber Crime Impact in the new millennium, Marine R.C. Auther press
6. Spam Attack, Cyber Stalking & abuse, Barna Y, Dayal D P Dominant publisher
7. Frauds & Financial criouses in Cyber space, Barna Y, Dayal D P , Dominant publisher
8. Information Security , NIIT: PHI

BBA 107 B: Business Ethics

Course Content:

Unit I Introduction

Ethics: Nature, scope and purpose of ethics; Type of Business Ethics, Values concepts, Relevance of values; Importance of Ethics & Values; Factors influencing business ethics, Ethical decision making process, Utilitarianism

Unit II Responsibility & Governance

Corporate Social Responsibility: Nature, Scope & Importance; Corporate Governance: Concept, Objectives, issues, features of Corporate Governance, importance of ethical culture and leadership, Types of CSR, Stakeholders Perspective.

Unit III Ethical issues

Consumerism, unethical issues in sales, marketing, finance and technology; Competitive strategy, value systems, Work ethics; modern business ethics and dilemmas;

Unit IV Indian Ethos

Indian Ethos: Need, purpose & relevance of Indian Ethos; Salient feature, Holistic Approach for Managers in Decision Making; Concept, importance & relevance of Trusteeship principle in modern business

Unit V Ethics of global prospective

Global trends in business ethics, Marketing ethics, promotional ethics in advertising, Financial ethics, ethics in Information Technology. The Indian Business scene, Ethical Concerns, Environmental Ethics – concerns & issues.

Text Books:

1. Chakraborty, S.K.; Ethics in Management: A Vedantic Perspective, Oxford University Press
2. Business Ethics: Fernando, Pearson Publication

Suggested Readings:

1. Business Ethics: CSV Murthy, Himalaya Publishing House.
2. Business Ethics and Professional Values: AB Rao, Excel Books

PAPER – ETHICS AND LAW IN PHYSIOTHDERAPY

CODE-BP206

UNIT -1

History of physiotherapy.
Philosophy and Philosophical statements.
Major Ethical principles applied to moral issue in health care.

UNIT -2

Rules of professional conduct.
Scope of practice.
Personnel and professional standard.
Professional standard

UNIT-3

Relationships with patients.
Relationships with medical collogues
Relationships between professional with carrier.
Relationships with in the profession.

UNIT-4

Confidentiality and responsibility.
Pervasion of services and advertising.
Sale of goods.
Professional and government licensing, Accreditation and Education standards.

UNIT -5.

Law
Legal concepts.
Protection from Malpractice claims.
Consumers protection Act.
Liability and Documentation.

Book References.

1. British Journal of Physiotherapy 1994 Issues
2. Medical Ethics- By. CM. Francis.

Law and Emerging Technologies (Elective Course)
BA/BBALLB 703: Law and Emerging Technologies

Unit-I: Introduction: Notion of Technology

a) Emergence of Technology and Industrial Revolution

b) Legal Order and Technological Innovation

c) Technology and its Impact on Society and Politics

d) Notion of Technological Society

e) Law, Ethics and Technology

Unit-II: E-Commerce

a) Model Law of E-Commerce
b) Online Contracting
c) Jurisdiction Issue in E-Commerce
d) Digital Signature/Electronic Signature
e) E-payment, E-Banking

Unit-III: Cyber Crime

a) Jurisdiction Issue in Cyber Crime
b) Cyber Crime under Information Technology Act: National Perspective
c) Cyber Crime under Information Technology Act: International Perspective
d) International Convention on Cyber Crime
e) Mobile Phones Crimes

Unit - IV: Genetic and Medical Technologies

i. Genetic Technologies
    a. Environment Effect: Environment Protection Act
    b. Genetic Engineering and Plant Variety Act
    c. Natural Resources and Bio-Diversity Act
ii. Medical Technologies
    a. Medical Technologies and Forensic Science
        i. DNA Profiling
        ii. Brain Mapping
        iii. Narco-analysis
        iv. Handwriting
        v. Any other new Forensic Science
    b. Medical Technologies and Drugs
        i. Patent Protection
        ii. Life Saving Drugs
        iii. Generic Drugs
        iv. National Drugs Policies

c. Medical Technologies and New Areas
    i. Organ Transplantation
    ii. Experiment on Human Beings
    iii. Sex Determination Test
    iv. Designer Baby
    v. Abortion
    vi. Cloning
    vii. Artificial Reproductive Technologies

PSDA (Professional Skill Development Activities)

- ❖ Practical Exercise on an E-Contract
- ❖ Trial of a Cyber Crime
- ❖ Visit to a leading Hospital in Delhi
- ❖ Interaction with Service Provider
- ❖ Creating Documentary on Contemporary Issues

Text Books:

1. *UNCITRAL Model Law of Ecommerce, 1996*
2. Vakul Sharma, *Information Technology Law and Practice*, Universal Law Publishers, 2011 (3rd Edn)
3. Harish Chander, *Cyber Laws and IT Protection*, PHI Learning Pvt. Ltd., 2012
4. Nandan Kamath, *Law Relating to Computers, Internet and Ecommerce*, Universal Law Publishing Co., Ltd., 2006

References:

1. Bernard E. Rollin, *Science and Ethics*, Cambridge University Press, 2006
2. Nandita Adhikari, *Law and Medicine*, Central Law Publication, 2012
3. Pavan Duggal, *Mobile Law*, Universal Law Publishing Co., Ltd., 2012
4. UN Office on Drugs and Crime, *Comprehensive Study of Cyber Crime* (Report)
5. Arvind Kumar, Gobind Das, *Biodiversity, Biotechnology and International Knowledge: Understanding Intellectual Property Rights*, Narosa Book Distributors Pvt. Ltd., 2010
6. Jaiprakash G. Shevale, *Forensic DNA Analysis: Current Practices and Emerging Technologies*, CRC Press, 2013
7. Lori B. Andrews, Maxwell J. Mehlman, Mark A. Rothstein, *Genetics: Ethics, Law and Policy*, Gale Cenage, 2010 (3rd Edn)

8. Evanson C. Kamau, Gerd Winter, *Genetic Resources, Traditional Knowledge and the Law: Solutions for Access and Benefit Sharing*, Routledge, 2013

9. Sapna Rathi, *Sex Determination Test and Human Rights*, Neha Publishers & Distributors, 2011

10. Anja J. Karnein, *A Theory of Unborn Life: From Abortion to Genetic Manipulation*, Cambridge University Press, 2000

11. David Price, *Legal and Ethical Aspects of Organ Transportation*, Cambridge University Press, 2000

12. Kerry Lynn Macintosh, *Illegal Beings: Human Clones and the Law*, Cambridge University Press, 2005

13. Katarina Trimmings & Paul Beaumont, *International Surrogacy Arrangements*, Hart Publications, 2013

Legal Ethics and Court Crafts (Core Course)(Clinical-II)
BA/BBALL.B. 901: Legal Ethics and Court Craft

Syllabus

Unit-I: Supreme Court Rules 1966 and Delhi High Court Rules 1967

a. Supreme Court Rules 1966

   i. Advocates and their Course of Conduct

   ii. Role of Single Judge and Registrar of the Supreme Court

   iii. Types of Petition Entertained by the Supreme Court, Writ petition, Election Petition

b. Delhi High Courts Rules

   i. Advocates and their Course of Conduct

   ii. Role and Power of Single Judge

   iii. Civil and Criminal Jurisdiction of the Court

Unit-II: The Limitation Act, 1963 and The Registration Act, 1908

a. Limitation

   i. Procedural Law: Section 5 Condonation of Delay, ss6-9 Legal Disability, ss14-15 Exclusion of Time of Proceeding in Good Faith in Wrong Court, ss18-19 Acknowledgement

   ii. Substantive Law: S25 Law of Prescription and s27 Adverse Possession, s 29 Saving Clause

b. Registration

   i. Compulsory Registered Documents s17

   ii. Optional Registration s18

   iii. Time and Place for Registration ss23-31

   iv. Effects of Registration and non Registration ss47-50

Unit-III: Bench-Bar Relations

a. The Advocates Act, 1961

b. State Bar Council and Bar Council of India: Duties and Functions

c. Professional Misconduct and Punishments s35

d. Role and power of Disciplinary Committee ss36-42

Unit- IV: Legal Ethics

a. Duty to Court, Client, Opponent, Colleagues s7 and s49, along with the Rules of the Bar Council India

b. Duty towards Society

PSDA (Professional Skill Development Activities) 2 Hrs/Week

- ❖ Client Counselling
- ❖ Mock Trial
- ❖ Moot Court
- ❖ Project work on working of BCI and State Bar Council.

Text Books:

- P RamanathaAiyer, *Legal and Professional Ethics: Legal Ethics, Duties and Privileges of a Lawyer*, Lexis Nexis, 2003
- The Advocates Act, 1960.
- W.V.H. Rogers, *Winfield and Jolowiczon Tort*, Sweet & Maxwell, 2010 (18th Edn)
- Ratanlal&Dhirajlal, *The Law of Torts*, Lexis Nexis, 2013 (26th Edn)

References:

- *Kailash Rai*, *Legal Ethics*, CLP, 2007 (7th Edn)
- Ramachandran Raju & Gaurav Agarwal ,*B.R. Agarwala's Supreme Court Practice and Procedure*, Eastern Book Company, 2002
- B.M. Gandhi, *Law of Tortswith Law of Statutory Compensation and Consumer Protection*, Eastern Book Company, 2011 (4th Edn)
- R.K. Bangia, *Law of Torts including Compensation under the Motor Vehicles Actand Consumer Protection Laws*, Allahabad Law Agency, 2013
- Ramaswamy Iyer's ,*The Law of Torts*, Lexis Nexis, 2007 (10th Edn)

PSDA (Professional Skill Development Activities) 2 Hrs/Week

- ❖ Pictorial Demonstration of Torts
- ❖ Case Comments
- ❖ Consumer Literary Camp
- ❖ Tracing old cases and discussing the Judgments

GENDER

Semester : **Fifth** **3rd Year**
Subject Name : **SOCIOLOGY**
Subject Code : **5JAR7**

Content	
Unit I	Man, environment and society.
Unit II	Distinguishing features of Rural and Urban society.
Unit III	The concept of social stratification urbanization and modernization.
Unit IV	Concept of social structure, cultural and social institutions, relation between social structure and spatial structure, social aspects of housing for different economic classes with focus on urban poor, Urban Slums and problems of slums.
Unit V	Community participation in development of public assets like schools.

Notes : Mid Term Exam shall be as of Unit I to III.

Reference Books :

1. Sociology by C.N. Shankar Rao
2. Sociology Basic Concepts by H.K. Rawat
3. Indian Social System by Ram Ahuja
4. Ideology & Theory in Indian Sociology by Yogendra Singh
5. Sociology by Anthony Giddens
6. Social Science an introduction to the study of society by Elgin F. Hunt & David C. Colander
7. Urban Sociology by N. Jayapalan
8. Urban Sociology: Images & Structure by William G. Flanagan
9. Urbanization in India Sociological Contributions by Ranvinder Singh Sandhu

AG 109	Rural Sociology & Educational Psychology	2 (2+0)

Theory

UNIT-A Sociology and Rural sociology: Definition and scope, its significance in agriculture extension.

UNIT-B Social ecology, Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development.

UNIT-C Educational psychology: Meaning & its importance in agriculture extension.

UNIT-D Behavior: Cognitive, affective, psychomotor domain, Personality, Learning, Motivation.

UNIT-E Theories of Motivation, Intelligence.

References:

1. Doshi, S.L. 2007. Rural sociology. Rawat Publishers, Delhi.
2. Jayapalan, N. 2002. Rural sociology. Altanic Publishers, New Delhi.
3. Pujari, D. 2002. Educational Psychology in Agriculture, Agrotech Publishing Academy, Udaipur
4. Bhushan, V. and Sachdeva, D.R. 2010. An introduction to Sociology, KitabMahal, New Delhi.
5. Rao, C.N.S. 2015. Sociology, S.Chand& Company, New Delhi.

B.Ed. 101: Childhood and Growing up

Credits: 6

Course Code: B.Ed. 101 **External: 70 (Marks)**

Internal: 30 (Marks)

Unit I: Role of Psychology to understand the child

- Psychology: Meaning, nature and branches of psychology.
- Methods of psychology: case study and experimental. Education Psychology:
- Meaning, nature, scope, educational implication of psychology in new era.
- Child psychology: meaning, concept.

Unit II: Multi Dimensional Development

- Growth and Development – concept, stages, principles. Dimensions. Factors in influencing development – genetic. Biological, environmental and physical
- Theories of development :
  (a) Piaget's vgotsky cognitive development
  (b) Freud's psycho-sexual development
  (c) Erikson's psycho social development
  (d) Linguistic development
  (e) Kohlberys gilligan's moral development
  (f) Bandura's social developments
  (g) Gessel's maturation theory

Unit III: Child Growing up

- Childhood: Meaning, concept and characteristics, effects of family, school, neighbourhood and community on development of a child
- Adolescence: meaning, concept, characteristics, effects of family, school, pear group, social climate and social media.
- Personality: concept and nature, theories of personality, assessment of personality
- Individual differences : concept, areas (with special educational needs concept) and educational implication
- Stress: meaning, types and coping strategies with special reference to personality of adolescent

Unit IV: Learning to Learn

- Concept and beliefs about learning:- Defining misconception. Brain's role in learning.
- Memory and forget, Behaviouristic learning theories (Thorndike, Skinner, Pavlov). Gestalt, Cognitive and Field theory. Information processing theory, Social constructive approach. Types of learning by Gagne.
- Motivation:- Concept and Maslow's literacy need theory. Creating and maintaining a productive classroom Environment:- Dealing with misbehavior. Multi-culturalism. Changing roles and responsibilities in contemporary Indian Society with regarding educational psychology.

Unit V: Psychological Attributes of an individual

- Intelligence: Meaning, types of intelligence – social, emotional and spiritual intelligence, theory of intelligence. Gardner's Multi intelligence theory. Measurement of intelligence. Creativity –

meaning, components, ways of enhancing creativity, relation with intelligence and other factors. Measurement of creativity. Higher Level thinking skills – critical thinking, reasoning, problem solving, decision making.

- Socialization and mental health: Process of Socialization – Group dynamics – Theory of Kurl lewing's. Leadership and its styles (Kimble young). Social prejudice. Mental Health- Common problems related to child- Attention deficit hyperactivity disorder (ADHD). Depression, Learning disabilities, dealing with a problematic child.

Assignment / Sessionals (Any one of the following)

- Case-study of an adolescent: Problems and Needs.
- Seminar/ Presentation on educational implications of One Learning theory of child development.
- Survey report on impact of socio-economic status of a family on child.
- Seminar/ppt Presentation on learning theories.
- Content Analysis of Media coverage on the following:
  - i. Child labour.
  - ii. Gender bias.
  - iii. About Disability

References:-

1. Aggarwal. J. C. (1981). Essential of Educational Psychology, Delhi, Doaba Book.
2. Helen Bee Denise Boyd, First Indian Reprint 2004. The Developing Child, Published by Pearson Education Pre. Ltd., Indian Branch Delhi, India
3. Ormrod Ellis Jenne, Third Edition. Educational Psychology Developing Learners Multimedia Edition (http://www.prenhall.com/ormrod)
4. Chauhan. S.S. (2001). Advanced Eduational Psychology, New Delhi: Vikas Publishing House.
5. Aggarwal. Reetu, Shukla Geeta (2014). Bal Vikas Evam Manovigyan. Rakhi Prakashan. Agra
6. Saraswat Kuldeep (2015). Bal Vikas Evam Bachpan, Published by Rakhi Prakashan, Agra.
7. Arora. Dr. Saroj. Bhargava. Rajshri (2014). Bal Manovigyan. Rakhi Prakashan, Agra
8. B.P. (2000). Personality theories, Bosten: Allyn and Bacon House.
9. Bigge. M. L. (1982). Learning Theories for Teacher, New York: Harper and Row
10. Jack Snooman, Robert Biehler Ninth Edition. Psychology Applied to Teaching. Houghton Miflin Company. Bosten New York (http://www.coursewise.com)

SOCIOLOGY

CODE: BPT104 **Total Hours- 100**

Theory-100

A. Introduction :UNIT-I

Definition of sociology. Sociology as a science, uses of study of Sociology, application of knowledge of sociology in Occupation Therapy.

B. Sociology and health :UNIT-II

Social factors affecting health status, health determinants, issues of right to health, social consciousness and perception of illness, social consciousness and meaning of illness, decision making in taking treatment. Institution of health their role in the improvement of health and the people.

C. Socialization & Social Groups: UNIT-III

Meaning of socialization, gender, relationship between gender and society, influence of social factors on personality, socialization in hospital and socialization in rehabilitation of patients.

Social groups

Concepts of social group & influence of formal and informal groups on health and sickness, the role of primary groups and secondary group in the hospital and rehabilitation setting

D. Family: UNIT-IV

Influence of family on human personality, discussion of changes in the function of a family, influence of family on the individual's family and psychosomatic disease, human values.

E. Social problems of the disabled: UNIT-V

Consequences of the following social problems in relation to sickness and disability, remedies to prevent these problems:

Population explosion
Poverty and unemployment
Beggary
Juvenile delinquency
Prostitution
Alcoholism
Problems of women in employment

Books Recommended

1. Introduction to psychology- Mums- I.D.P. Co.
2. Foundation of psychology- Weld- Publishing house, Bombay.
3. Introduction to social psychology- Akolkar- Oxford publishing house.
4. Psychology and sociology – Applied to Medicine – Porter & Alder – W.B.Saunders.
5. Behavioral Science for Medical - undergraduates –Manju Mehta – Jaypee Brothers
6. Elementary Psychology –Mohsin Moti Lal Banarsi Dass, Delhi.

Socio- Economic Offences (Seminar Paper III& IV)
BA/BBALLB 904 B: Socio-Economic Offences

Unit – I: Hoarding and Profiteering

a. Laws relating to Maintenance of Essential Supplies
b. Laws on Maintenance of Standards of Weights and Measures

Unit – II: Adulteration

a. Prevention of Food Adulteration
b. Control of Spurious Drugs

Unit – III: Corruption

Practice and Dimensions of Corruption

a. Anti Corruption Laws

Unit – IV: Investigation and Prosecution

a. Central Vigilance Commission (CVC)

b. Central Bureau of Investigation (CBI)

c. Criminal Investigation Department (CID)

d. Other Organisations

PSDA (Professional Skill Development Activities)

Text Books:

1. The Prevention of Corruption Act, 1988
2. *The Central Vigilance Commission Act, 2003*
3. *The Essential Commodities Act, 1955*

References:

1.The Prevention of Black Marketing and Maintenance of Supplies of Essential Commodities Act, 1980
2.The Drugs and Cosmetics Act, 1940
3.The Standards of Weight and Measures Act, 1976
4.The Bureau of Indian Standards, 1986

Socio- Legal Dimensions of Gender (Seminar Paper III & IV)
BA/BBALL.B. 904 H: Socio-Legal Dimensions of Gender

Syllabus

Unit-I

1. Gender as a social construct
2. Production of masculinity and femininity

Unit-II

1. Power and Subordination
2. Socio-legal dimensions of Honour Killings
3. Socio-legal Dimensions of Witch-Hunting

Unit-III

1. Resistance and Movements
2. Gender in media and market
3. Socio-legal dimensions of the Third Gender

Unit-IV

1. Emerging trends with respect to LGBT Community
2. Socio-legal dimensions of Prostitution and Trafficking

PSDA (Professional Skill Development Activities) 2Hrs/Week

References:

1. Sherry Ortner, 1974, "Is male to female as nature is to culture?" M.Z. Rosaldo and L. La mphere (eds.) *Women, Culture and Society*,Stanford: Stanford University Press (pp. 67- 8 7).
2. PatriciaUberoi, "Feminine Identity and National Ethos in Indian Calendar Art" In Econo mic and Political Weekly Vol. 25, No. 17 (Apr. 28, 1990), (pp. WS41-WS48).
3. TharuSusie, and Tejaswini Niranjana, 1999. 'Problems for a contemporary theory of gend er' in Nivedita Menon (ed.) Gender and Politics in India, New Delhi: Oxford University Press (pp 494-525).
4. SatyamevJayate, Season I, 5th episode, Air Date:- 3 June 2012
5. Review of RakhiVarma's film titled *The Indian Witch Hunt*
6. RadhaKumar, 1999, "From Chipko to Sati: The Contemporary Indian Women's Movem ent" In Nivedita Menon (ed.), *Gender and Politics in India*,New Delhi: Oxford Universit y Press (pp342-369).
7. DavidGauntlett, 2008, Media, *Gender and Identity: An Introduction*, London: Routledge
8. HE TO SHE SPECTRUM – Documentaries on Transgender issues
9. Review, "*Proud, Gay and Indian*", a short program that examines how homosexuals, or India's queer population as they are known, are harassed.
10. Visit NGO- *Shakti Vahini*
11. Review *Reehai***:** The film highlights the independence and identity of women in a rural set-up

BALLB 105: Sociology – I

Syllabus

Unit-I: Introduction

a. Sociology: Growth, Scope, Definition
b. Relationship with Law
c. Law as a tool of Social Engineering: Durkheim, Weber, Pound and Bentham

Unit-II: Basic Concepts

a. Social Groups: Cooley, Sumner, Community and Association
b. Tribes
c. Culture: Culture Relativism, Racism, Ethnicity and Ethnocentricism
d. Socialization
e. Status and Role

Unit III: Social Change

a. Social Reform Movements in India – Raja Ram Mohan Roy, Jotiba Phule, Naicker, etc.,
b. Modernization and Post Modernization
c. Liberalization and Globalization
d. Fordism and Mc Donaldization

Unit IV: Social Control

a. Custom as an Agency of Control
b. Law as an Agency of Control
c. Media as an Agency of Control
d. Public Opinion as an Agency of Control

PSDA (Professional Skill Development Activities)

- Symposium of Judicial Activism and Social Action Litigation
- Study of any popular group formation such as a laughing club, etc. / Review *Soldiers in Sarona*. This movie is about the archaic army rules prevailing in North East Part of India. It is a portrayal of Peoples resistance Movement for Human Rights.
- Evaluation of Law as an agency of Social Transformation
- Review of '*Neem ka ped*'. The story starts in pre-independent India and ends in post independent India, showing the vagaries of both the feudal and democratic systems in India with its darker side/ '*New Delhi Times*'. The film tells the story of an honest journalist who moves to Delhi to run a newspaper, and soon uncovers a political assassination, and in the process, falls prey to a corrupt system and the nexus between politicians and media barons.

Text Books:

1. C.W. Mills, *The Sociological Imagination*, New York: Oxford University Press, (pp.3-24). 2000
2. Marc Galanter, *Law and Society in Modern India*, New Delhi: Oxford India, 1997
3. Andre Beteille, Sociology: Essays on Approach and Method, New Delhi: Oxford University Press, (pp. 13-27), 2009

References:

1. Anthony Giddens, Duneier, Mitchell, Applebaum, Richard, *Introduction to Sociology*, Sixth Edition, New York: W.W. Norton and Company, (Chapter 1), 2007
2. Haralambos& Holborn, *Sociology: Themes and Perspectives*, 6th ed, Collins Educational, 2004
3. MacIver and Page, *Society: An Introductory Analysis*, (pp. 3-22), McMillon India Ltd.,1937

4. AmitaBaviskar, ed., *Contested Grounds: Essays on Nature, Culture and Power*, New Delhi, OUP, PP. 1-12, 2008.
5. Immanuel M. Wallerstein, "The Construction of Peoplehood: Racism, Nationalism, Ethnicity", in I.M. Wallerstein and E. Balibar (eds.), *Race, Nation, Class: Ambiguous Identities*, Verso: London, (pp 71-85), 1991
6. Ashutosh Varshney, *Ethnic Conflict and Civic Life*, Delhi: Oxford University Press, 2004
7. George Ritzer, *The McDonaldization of Society*, New Delhi: Sage Publications, (pp.1-22; 24-41 and 213- 244), 2004
8. T.B. Bottomore, *Sociology: A Guide to Problems and Literature*, London: George Allen & Unwin, 1962

BALLB 204: Sociology – II

Syllabus

Unit-I: Kinship, Family and Marriage

a. Descent: Patrilineal and Matrilineal, Comparative study of Northern and Southern Kinship
b. Concepts: Principles of Kinship, Consanguinity, Filiations, Incest Taboo and Affinity
c. Forms of Marriage; Monogamy/Polygamy; Endogamy/Exogamy; Sororate/Levirate
d. Forms of Family: Joint and Nuclear family

Unit-II: Religion

a. Sacred and Profane
b. Rites and Rituals
c. Communalism and Fundamentalism
d. Secularism

Unit-III: Social Stratification

a. Caste: Features, Mobility, Dominant Caste
b. Class and status: Marx and Weber
c. Gender: Equality, Neutrality and Third gender

Unit IV: Marginalised Groups and Deviants

a. Theories: Positivist Approach, Labelling Theory, Functionalist Theory, Subculture Theory
b. Social Problems and Social Legislation: Women and Children
c. Sexual Violence against Women & Children: Myths and Realities
d. Marginalised Groups: Differently abled.

PSDA (Professional Skill Development Activities)

- Debate on changing trends in family and marriage such as single parent, live-in, surrogacy, etc.
- Review *Tamas*. The film is about the massacre and exodus at the time of Partition of India and shows a gruesome side of politics and the compassionate side of humanity that survives any carnage.
- Social Audit of Reservation Policy in India/ Review*Gulaal***.** The film explores themes such as pursuit of power, quest for legitimacy, perceived injustices and hypocrisy of the powerful.
- Critical Writings on various types of Crimes: Violent, White-Collar, Cyber, Environmental and Organized

Text Book:

1. A. Giddens, *Sociology*, New Delhi: Wiley India Pvt Ltd, (Chapter 21), 2013

2. R. Crompton and M. Mann (eds.), *Gender and Stratification*, Cambridge: Polity Press, (Chapter 3, pp 23-39),1986
3. Haralambos, *Themes and Perspectives*, Oxford, (406-451)

References:

1. A.R.Radcliffe-Brown, and Daryll Forde, " Introduction" in Radcliffe-Brown and Daryll Forde (eds.), *African Systems of Kinship and Marriage*, London: Oxford University Press, (pp 1-39), 1950
2. A. M. Shah, "Changes in the Indian Family: An Examination of Some Assumptions", in A.M. Shah, *The Family in India: Critical Essays, pp. 52-63*(Orient Longman,1998.
3. E. Durkhiem, *Elementary Forms of Religious Life. A New Translation* by Carol Cosman, OUP: Oxford, (pp 25-46; 87-100 and 153-182), 2001
4. A. Van Gennep, *The Rites of Passage*, Routeledge and Kegan Paul: London, (Introduction, pp 1-14; 65-75; 74-77; 85-90; 101-107; 116-128; 125-135 and 141-165), 1960
5. T.N.Madan, *Modern Myths, Locked Minds: Secularism and Fundamentalism in India*,Del hi: Oxford University Press, (pp.1-38), 1997
6. M.N.Srinivas, *Caste: It's Twentieth Century*, New Delhi: Avtar Viking Penguin,1996
7. Gupta, "Hierarchy and Difference", in Dipankar Gupta (ed.), *Social Stratification*, Delhi: Oxford University Press, (pp 1-21), 1991
8. A. Beteille, *Caste, Class and Power*, Oxford University Press, 1971, (Chapter.1)
9. S. Jackson and S. Scott (eds.), 2002, *Gender: A Sociological Reader*, London: Routledge, Introduction, (pp 1-26)
10. Katherine Williams, *Text Book on Criminology*, Universal Law Publishing Co. Pvt. Ltd., (pp. 142-167, 197-259 and 343- 369), 1997

Women and Law (Seminar Paper-I)
BA/BBALLB 705 C: Women and Law

Syllabus

Unit - I. A. Introduction

i. Status of Women in India

ii. Status of Women – Position abroad

B. Constitution of India and Women

i. Preamble

ii. Equality Provision

Unit – II: Personal Laws and Women

a. Unequal position of women – different personal laws and Directive principles of State Policy

b. Uniform Civil Code towards gender justice

c. Sex inequality in inheritance

d. Guardianship

Unit – III: Criminal Laws and Women

a. Adultery

b. Rape

c. Outraging Modesty

d. Domestic Violence

Unit – IV: Women Welfare Laws

a. Pre-conception and pre-natal diagnostic techniques (Prohibition of Sex Selection) Act, 1994
b. Indecent Representation of Women (Prohibition) Act, 1986
c. Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redresal Act, 2013.
d. Domestic Workers Welfare and Social Security Act, 2010
e. Immoral Traffic (Prevention) Act, 1987
f. Family Courts Act, 1984

PSDA (Professional Skill Development Activities)

Text Books:

1. Mamta Rao, *Law Relating to Women and Children*, Eastern Book Company, 3rd Edition, 2012.

2. Lalita Dhar Parihar, *Women and Law*, Eastern Book Company, 2011.

References:

1. SC Tripathi and Vibha Arora, *Law relating to Women and Children*, Central Law Publication, 2006
2. DK Tiwari & Mahmood Zaidi, *Commentaries on Family Courts Act*, 1984, Allahabad Law Agency, 1997
3. BN Chattoraj, *Crime against Women: A Search for Peaceful Solution*, LNJN-NICFS, 2007
4. Nomita Agarwal, *Women and Law*, New Century Publishing House, 2005
5. Manjula Batra, *Women and Law*& Law Relating to Children in India, Allahabad Law Agency, 2001

HUMAN VALUES

MBA 401: Corporate Governance and Social Responsibility

Course Contents

UNIT I Corporation – An Overview

Definition of the word ' corporation', Evolution of the corporate structure, Purpose of corporation, corporation as a 'person', corporation as a 'moral person' corporation-expectations of society, corporation-expectations of the market.

UNIT II Introduction to Corporate Governance

Definition, roles and importance of corporate governance in modern business, evolution of corporate governance, capitalism, free enterprises and the corporation, the legal obligation of directors, ownership and control of corporate.

UNIT III Business Ethics and Corporate Social Responsibilities

Business ethics, Corporate Governance & Ethics, Ethical organization and its corporate code, Importance and need for business ethics.

Corporate Social Responsibility – Definition, Justification of CSR, Scope of Social Responsibility, Corporate Social Responsibility - Stakeholders (Internal and External), the Role of Business in Society

UNIT IV Responsibility for Corporate Governance–The Board & Top Management

Corporate governance: Board Structures & styles, corporate governance: Roles and Responsibilities of Directors, Role, Functions of Chairman, Role of CEO, Functions of CEO, CEO Succession Planning, CEO Compensation, Independent "Outside" Directors, Functions of the Board.

UNIT V Codes and Laws, Practices of Corporate Governance

Self regulatory codes, Reports of committees on corporate governance, Corporate governance – Company Law, Not for profit Organizations – the Differences, Future of Corporate Governance in India

Text Books:

1. What Is Corporate Governance?, John L. Colley, Jr., Jacqueline L. Doyle, George W. Logan, and Wallace Stettinius; McGraw-Hill
2. Corporate governance Principles, Policies and Practices, A.C. Fernando, Pearson Education.
3. Corporate governance Principles, Mechanisms and Practice, Swami (Dr.) Parthasarathy, biztantra, Indian Text Edition.

Suggested Readings:

1. Robert A.G. Monks & Nell Minow "Corporate governance"
2. Corporate Responsibility: A textbook on business ethic, governance, exact: Roles Responsibilitity Cannon Tom.
3. Corporate Social Responsibility: The Corporate Governance of the 21st century Ramon mullerat Danel Brennan

Semester : **Sixth** **3rd Year**
Subject Name : **ELECTIVE–II - DESIGN FOR DISABLED**
Subject Code : **6JAR9.4**

Content	
Unit I	Introduction of the Subject and Defining Disability. A. In physical terms, the provision of a barrier-free environment can be undertaken in four complementary domains: • Inside buildings; • In the immediate vicinity of buildings; • On local roads and paths; • In open spaces and recreational areas. B. The target group is composed of five major categories: • Wheelchair users • People with limited walking abilities • The sightless • The partially sighted • The hearing impaired
Unit II	Understanding the Basic Design Issues and Anthropometrics Related to Various Disabilities.
Unit III	**Design Considerations** **A. Architectural design considerations:** • Ramp • Elevators • Lifts • Stairs • Railings and handrails • Entrances • Vestibules • Doors • Corridors • Rest rooms B. Urban Design Considerations: • Obstructions • Signage

	• Street Furniture • Pathways • Curb Ramps • Pedestrian Crossing • Parking
Unit IV	**Accessibility Requirements of Selected Building Types.** • Residential buildings • Office Buildings • Commercial Buildings • Assembly halls • Cafeterias and Restaurants • Hotels • Hospitals and Health facilities • Educational Building • Libraries • Sports Building • Public Transit Buildings • Industrial Buildings
Unit V	Implementation Checklist for Designers and Inspectors to identify and Assess Physical Barriers in the Built-Up Environment, for both new and Existing Constructions.

Notes **:** Mid Term Exam shall be as of Unit I to III.

Reference Books **:**

1. Council of Architecture
2. Design for Aging Review by Yee (Roger)
3. A Design Manual: Living for the Elderly by Eckhard Feddersen
4. Design Manual for a Barrier Free Built Environment by Ar. Yatin Pandya

AG 110	Human Value and Ethics (Non Gradial)	1 (1+0)

Theory

UNIT-A Values and Ethics-An Introduction.Goal and Mission of Life.Vision of Life.

UNIT-B Principles and Philosophy Self Exploration.Self Awareness.Self Satisfaction.

UNIT-C Decision Making, Motivation, Sensitivity.

UNIT-D Success.Selfless Service.Case Study of Ethical Lives.Positive Spirit.Body, Mind and Soul.

UNIT-E Attachment and Detachment.Spirituality Quotient.Examination.

Reference:

1. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
2. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
3. Professional Ethics and Human Values by Prof. DR.Kiran-Tata McGraw-Hill – 2013.

AG 108	Agricultural Heritage	1(1+0)

Theory

UNIT-A Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture;

UNIT-B Past and present status of agriculture and farmers in society ;Journey of Indian agriculture and its development from past to modern era;

UNIT-C Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world;

UNIT-D Agriculture scope; Importance of agriculture and agricultural resources available in India;

UNIT-E Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

References:

1. ICAR 1989 Handbook of Agriculture, Indian Council of Agricultural Research, New-Delhi
2. Nene, Y.L. 2007. Glimpses of the Agricultural Heritage of India. Asian Agri- Histroy Foundation, Secunderabad, Andhra Pradesh.
3. Nene, Y.L., Saxena, R.C. and Choudhary, S.L.2009. A Textbook on Ancient History of Indian Agriculture, Munshiram Manoharial Publishers Pvt. Ltd,
4. Nene, Y.L., Choudhary, S.L. and Saxena, R.C. 2010. Textbook on Ancient History of Indian Agriculture, Asian Agri-History Foundation.
5. D. Kumari, Manimuthu Veeral. 2014. Text Book on Agricultural Heritage of India. Agrotech Publishing Academy.
6. ICAR. Introductory Agriculture. ICAR e-course. Indian Council of Agricultural Research, New Delhi.

AG-605	Management of Beneficial Insects	2(1+1)

Theory

UNIT-A Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication.

UNIT-B Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves.

UNIT-C Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

UNIT-D Species of lac insect, morphology, biology, and host plant, lac production – seed lac, button lac, shellac, lac- products.

UNIT-E Identification of major parasitoids and predators commonly being used in biological control. Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.

Practical

Honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies and disease.Bee pasturage, bee foraging and communication.Types of silkworm, voltinismand biology of silkworm.Mulberry cultivation, mulberry varieties and methods of harvestingand preservation of leaves. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.

Reference:

1. DeBach, P. 1974. Biological control by Natural enemies. Cambridge University Press.
2. Dhaliwal GS & Arora R. 2001. *Integrated Pest Management: Concepts and approaches.* Kalyani Publ., New Delhi.
3. Dhaliwal, GS & Koul O. 2007. *Biopesticides and Pest Management*. Kalyani Publ., New Delhi.
4. Gautam, R.D. Biological Pest Suppression, Westvill Publising Co., New Delhi.
5. Manfred Mackaur, Laster E.Ehler and Jens Roland. 1990. Critical Issues in Biological control- Intercept Ltd. Project Directorate of Biological control. 1994. Technology for mass production of Natural enemies. Technical Bulletin -4.
6. Srivastava, K.P. 2004. A Text Book of Entomology, Vol. I, Kalyani Publishers, New Delhi.
7. Abrol, D.P. 2013. Beekeeping: A Comprehensive Guide to Bee and Beekeeping, Scientific Publishers, Jodhpur.

BIOENGINEERING AND REHABILITATION PRINCIPLES
MPT 201

UNIT-I

Conceptual framework of rehabilitation, roles of rehabilitation team members, definitions and various models of rehabilitation. International classification of functioning, Epidemiology of disability with emphasis on locomotors disability, impact of disability on individual, family, and society. Preventive aspects of disability and organizational skills to run disability services.

UNIT-II

Model of service delivery : feature, merits and demerits of institutional based rehabilitation, outreach programmes, Community based rehabilitation, Legal Aspect in Disabilities: PWD act, national trust act, RCI act, Statutory provisions Schemes of assistance to persons with disabilities Govt and NGO participation in disability RCI.

UNIT-III

Principles of Orthotics- types, indications, contra indications, assessment (check out), uses and fitting –region wise.

Orthotics for the Upper Limb

Orthotics for the Lower Limb

Orthotics for the Spine

Principles of prostheses- types, indications, contra indications, assessment (check out), uses and fitting –region wise.

UNIT-IV

An outline of principles and methods of rehabilitation of speech and hearing disability

An outline of principles and methods of vocational and social rehabilitation

An outline of principles and methods of rehabilitation of mentally handicapped.

UNIT-V

An outline of principles, methods and scope occupational therapy

Architectural Barriers: Describe architectural barriers and possible modifications with reference to Rheumatoid Arthritis, CVA, Spinal Cord Injury and other disabling conditions.

An outline of the principles and process of disability evaluation

LL.M. 103: Law and Justice in a Globalizing World

UNIT-I

Introduction

(a) Meaning and significance of Globalization
(b) Concept of Global Justice
(c) Social, Political and economic dimensions of globalization.

UNIT-II

Historical and Central Challenges to Global Justice

(a) Global Poverty
(b) Armed Conflict
(c) Nationalist practices
(d) Crimes against Humanity
(e) Environment and Health

UNIT-III

Role and Reformation of Global Institutions

(a) States, Sovereignty and Transnational Law
(b) Economic and Trade Institutions-MNC's
(c) Structural reforms of United Nations-Security Council
(d) International Judicial Institutions

UNIT-IV

Models to Achieve Global Justice

(a) Social Contract and Social Justice
(b) Sarvodaya Model of Justice
(c) Multi Culturalism and Cosmopolitanism
(d) Significance of Human Rights Education
(e) Impact of globalization on judicial process and administration of justice.

Suggested Readings:

1. Springer: Encyclopedia of Global Justice 2012
2. Brian Barry, *Culture and Equality*. Cambridge: Polity, 2001
3. Duncan Bell (ed.) *Ethics and World Politics*. Oxford 2010.

4. Allen Buchanan. Justice, Legitimacy, and Self-determination: Moral Foundations for International Law. Oxford 2004.

5. Simon Caney, *Justice Beyond Borders*. Oxford:, 2005

6. Nicole Hassoun. 2008a. "World Poverty and Individual Freedom." American Philosophical Quarterly. Vol. 45, No. 2: 191-198.

7. Andrew Hurrell. 2001. "Global Inequality and International Institutions." Global Justice.

8. Martha Nussbaum, *Frontiers of Justice*. Cambridge, Mass.: Harvard University Press, 2006.

9. Thomas Pogge, *World Poverty and Human Rights*. Cambridge: Polity, 2002.

10. John Rawls, *The Law of Peoples*. Cambridge, Mass.: Harvard University Press, 1999

11. AmartyaSen, *Development as Freedom*. Oxford: 1999

12. AmartyaSen The Idea of Justice 2009

13. AmartyaSen: Development as Freedom 1999 Oxford

14. AmartyaSen: Human and Public Action Oxford

15. Journals of Oxford and Cambridge on global Justice

16. R PIERIK : Cosmopolitanism Global Justice and International Law Cambridge 2005

17. American Journal of International Law and Proceedings of American Society of International Law

B.Ed. 102: Contemporary India and Education

Course Code: B.Ed. 102 **External:70 (Marks)**
Internal:30 (Marks)

Unit I: Education as an Evolving Concept

- Education: Meaning, concept and nature. Ancient to present education as an organized and institutionalized form, formal and state sponsored activities.
- Aims of Education: Historicity of aims of Education, changing aims of education in the context of globalization, sources of aims of Education: Educational aims as derived from the constitution of India influence of aims of education on the curriculum and transactional strategies. Idea of educational thinkers such as Gandhi, Tagore, Aurobindo, Dewey Krishnamurthy, Friere and Illich.

Unit II: Issues and Challenges

- Diversity, Inequality, Marginalization:- Meaning, concept, levels with special reference to Individual Region, Language, Caste, Gender.
- Role of education in multicultural and multilingual society for Equalization and
- Hindrances of Education in India: Quality, Facilities, Access, Cost, Political unwillingness. Youth unsatisfaction, Moral crises.

Unit III: Constitution and Education

- Study of the Preamble, fundamental rights and duties of citizens. Directive principles for state and constitutional values of Indian constitution.
- Constitutional provisions for education and role of education in fulfillment of the constitutional promise of Freedom, Equality Justice, Fraternity.
- Education and politics. Constitutional vision related to aims of education. Peace Education, Role of Education. School and Teachers as agents for imparting culture. Education and Development. Education and Industrialization.

Unit IV: Programme and Policies

- Overview the development of education system in India from 1948 to 2010 University Education Commission – 1946-48. Secondary Education Commission – 1952-53. Indian Education Commission – 1964-66. National Education Policy – 1986.
- Rammurthy Committee (1990). Yashpal Committee Report (1993) Revised National Education Policy (1992) NCF-2005. NKC-2006. NCFTE-2009. RTE-2010.
- SSA, MLL, RMSA, CCE, Navodaya Vidyalaya. Kasturba Gandhi Balika Vidyalaya. Model School.

Unit V: Innovative Practices

- Concept, Need of innovation in view of technological and social change. Obstacles in innovation. Role of Education in bringing innovations.
- Education through interactive mode of teaching: Computer, Internet. Tally and Video-conferencing. Eduset, Smart Class Room. Role of E-learning. E-content, E-magazines and E-journals. E-library.
- Yoga Education. Life Skill Education. Education and Competence in life regarding social inclusion.

Assignment / Sessional (Any one of the following)

- Identification of problems of girl child, SC, ST, exploitation of children.
- Study of voluntary agency working in the field of educational and school development of society.
- Organize debate competition on any one topic.
- To study various education policies and commissions and prepare reports.
- Organize poster making activity of the subject.

Referenes:-

1. Dev. A. Dev. T.A. Das, S. (1996) Human Rights a Sourse Book, New Delhi, NCERT. Pp. 233.
2. Dubey. S.C. (1994) Indian Society. New Delhi, NBI. Pp.
3. Education and National Development: Report of the Kothari Commission on Education, New Delhi-1966.
4. Kabir. H. (1982) Education in New India, London: George Allen an Unwin.
5. M.N. Srinivas: Social Change in Modern India
6. Mookerji. R. K. (1947) Ancient Indian Education (Brahmanical and Buddhist). London: Mac Milan and Co. Ltd.)
7. vfXugks=h] johUnz% vk/kqfud Hkkjrh; f'k{kk leL;k,¡ vkSj lek/kku jktLFkku fgUnh vdknehA
8. Agnihotri. R. (1994) Ahunik Bhartiya Shiksha Samasyaye aur Samadhan. Jaipur: Rajasthan Hindi Granth Academy
9. J. F. Brown: Educational Sociology
10. Kashyap Subhash C., Our constitution: An Introduction to India's constitution and constitutional laws. National Book Trust India. 2011.

B.Ed. 105: Creating and Inclusive School

Course Code: B.Ed. 105 **External: 35 (Marks)**

Internal: 15 (Marks)

Unit I : Paradigms in Education of Children with Special Needs

- Historical perspectives and contemporary trends approaches of viewing disabilities:
- The charity model, the bio centric model, the functional model and the human rights model
- Concept of special education, integrated education and inclusive education; Philosophy of inclusive education.

Unit II: Legal and Policy Perspectives-I

- RTE Act, 2009.
- National Policy – Education of students with Disabilities in the National Policy on Education, 1968, 1986.
- POA (1992); Education in the National Policy on Disability, 2006.

Unit III: Legal and Policy Perspectives-II

- Education of Special Focus Groups under the Sarva Shiksha Abhiyan (SSA, 2000);
- MHRD, 2005, Scheme of Inclusive Education for the Disabled at Secondary School (IEDSS, 2009), National Trust and NGOs.
- Community based education.

Unit IV: Inclusive Practices in Classrooms for All-I

- Shool's readiness for addressing learning difficulties
- Technological advancement and its application – ICT, adaptive and assistive devices, equipments and other technologies for different disabilities.

Unit V: Inclusive Practices in Classrooms for All-II

- Pedagogical strategies to respond to individual needs of students; Cooperative learning strategies in the classroom, peer tutoring, social learning, buddy system, reflective teaching, multisensory teaching, etc.
- Documentation, record keeping and maintenance.

Assignment / Sessional (Any one of the following)

- Preparing report writing on given topic in the syllabus.
- Case study of a learner with special needs.
- Making a Report of a International, National, State Level Educational NGOs.
- Prepare a Report of anyone National Education Police.
- Collection of newspaper cuttings related to subject activities.

References:

1. Dunn., L & Bay, D.M (ed): Exceptional Children in the Schools, New Yark: Holt, Rinehart, Winston
2. Shankar, Udey: Exceptional Children, Jullundur: Streling Publications.
3. Singh, N N and Beale, I L (eds) Learning Disablities- Nature, Theory and Treatment Spring-Verlag, New Yark, Inc:1992

B.Ed. 106: Reading and Reflecting on Text

Course Code: B.Ed. 106 (EPC -1) **External: 35 (Marks)**

Internal: 15 (Marks)

Unit I: Engaging with narrative and descriptive account

- The selected texts could include stories on chapters from fiction, dramatic incidents, vivid descriptive, accounts, or even well produced comic strip stories.

Unit II: Engaging with narrative and descriptive expository writing

- The selected texts could include articles, biographical writing, or extracts from popular nonfiction writing, with themes that are drawn from the subject areas of the student teachers (various sciences, mathematics, history, geography, literature/language pieces) For this unit, the student teachers should work in groups divided according to their subject, within which different texts could be read by different pairs of student teachers.

Unit III: Engaging with Journalistic & Educational writing

- The selected texts would include newspaper or magazine articles on topics of contemporary interest. Student teachers can be grouped randomly. Selected texts here could be drawn from the wide range of popular educational writing in the form of well written essays.

Unit IV: Engaging with Educational writing

- Extracts or chapters from authors who deal with themes from education, schooling, teaching or learning. The writings selected should present a definite point of view or argument about some aspect of the above themes. Student teachers can be grouped randomly.

Unit V: Engaging with subject related reference books

- The student teachers should work in groups divided according to their subjects. Within these groups, pairs of the student teachers would make a choice of a specific topic in their subject area which they could research from a set of available reference books.

Assignment / Sessionals (Any one of the following)

I. Organize poster making activity of the subject.
II. Preparation of a low-cost teaching aids.
III. Preparing an assignment on given topic in the syllabus.
IV. Prepare ppt of any topic in the syllabus.
V. Prepare and present a report on Introduction of yourself

References:-

1. Prakashan, Agra-27. http://www.un.org/cyberschoolbus/peace/content.htm
2. Mahesh Bhargava and Haseen Taj (2006) Glimpses of Higher Education. Rakhi
3. The 4 Language skills www.englishclub.com/language-skill.htm

B. Ed. 202: Knowledge and Curriculum (Part-I)

Course Code: B.Ed. 202 **External: 35 (Marks)**

Internal: 15 (Marks)

Unit I: Concept of Knowledge

- Meaning and Nature of knowledge
- Sources of attainment of knowledge in schools with special references of Society, Culture and modernity

Unit II: Distinction in Educational Special Concept

- Distinctions between – Knowledge and skills
- Teaching and Training
- Knowledge and information
- Reason and belief

Unit III: Facts of Knowledge

- Different facts of knowledge and relationship such as-
- Local and Universal
- Concrete and Abstract
- Theoretical and Practical
- School and Out of School

  (With an emphasis on understanding special attributes of school knowledge)

Unit IV: Concept of curriculum

- Meaning, Nature and Objectives of Curriculum, Need for curriculum in schools
- Philosophical, Psychological, Sociological and Scientific basis of Education with reference of Gandhi, Tagore, Dewey and Plato.

Unit V: Factor & Types of Curriculum

- Difference between curriculum and syllabus
- Factors influencing curriculum
- Various types of curriculum – Subject centered, Experience centered, Activity centered, Child centered, and craft centered

Assignment / Sessional (Any one of the following)

- Comparative study of the curriculum of different boards (SSC, ICSC, CBSE,).
- Presentation of subject content in the form of summary/explanatory/writing/ diagrammatic presentation.
- Review of a text book of any school subject.
- Write a report of school knowledge get reflected in the form of curriculum and textbooks.

Study various types of curriculum.

References:-

1. Lal, R.B. and Palod S. (2015). Policy Franework and Isaues in Education. New Delhi, R. Lal Book Depot
2. Malareddy, M and Ravishankar, S. Curriculum Development and Educational Technology, New Delhi, Sterling Publisher Pvt. Ltd.
3. Aggrawal, J.C. (2008). Knowledge Commission – 2006: Major Observation and Recommendation. Educational Reforms in India for the 21st Century. New Delhi. Shipra Publication
4. Ramesh Shukla (2005), Dictionary of Education (2005), New Delhi, A.P.H. Publishing Corporation
5. Soti and Sharma, A. (2014). Eminent Educational Thinkers of India, Agra. RSA International Publisher, Agra.
6. www.knowlwedgecommission.gov.in
7. www.ncert.nic.in
8. Balsara, M (1999), Principles of Curriulum Reconstruction, New Delhi, Kanishka publication
9. Mohanty, J. (2003). Modern Trends in Education Technology. (Reprint Additior 2013)
10. Prasad, Janardan and Kumar, Vijay (1997). Advanced Curriculum Construction, New Delhi, Kanishka Publication
11. www.takingglobal.org/exprest/article.html?cid-178

B.Ed. 204 (EPC – 2)

Drama and Art in Education

Course Code: B.Ed. 204

External: 35 (Marks) **Internal: 15 (Marks)**

Unit I: Aesthetic Sense and Education

- Aesthetic sense and values: Meaning, Nature, Concept and Importance in Human Life. Arts in Education & Education in Arts. Transform art and aesthetic sense through education.
- Concept of Creativity, Creative writing. Modes in speech and importance of education for it. Relationship between Art, Literature and Education, Historical perspectives of various types of Art in India.
- Introduction to music: dhawani swar, sapttak, alankar, lay-taal, vadhaya-tantu, avnadhh. Shushir, Dhanlok, lok-geet.lok vadhya & Introduction to Dance: - History of dance-kala, lok-nritya.

Unit II: Performing Art and Learning

- Introductions & type of Drama, Social and Educational relevance of Performing Art and its place in contemporary Indian Society
- General introduction of seven classical dance style, Knowledge of Indian Dance-Drama tradition both in classical and folk, General introduction of Folk and Triba dances. Contemporary dance in Modern India.

Unit III: Folk Drama of Rajasthan

- Introduction of Folk Drama of Rajasthan: Gavri, Tamasha, Khayal, Rammat, Phed leela, Swang. Nautanki, Bhavai, Dance and Drama training, its relevance to learning at different levels of school.
- Forms of the major cultural, art festivals, exhibitions, craft-fairs of India with special reference to Rajasthan and their significant role for enhancement of aesthetic & artistic sensibility.

Unit IV: Visual Art : Teaching & Learning

- Play: Meaning, Concept, Need, Types, Importance, relationship between learning and Drama Education, Dramatic Pressure for understanding problems in a new way.
- Exploration and experimentation with different types of Visual Arts : painting printing, college, cartoon making, photography, clay modeling, model making, pottery, puppetry, rangoli, paper art.

Unit V: ICT in drama and art in education

- Use of visual art in teaching-learning process. Art and Self-Expression. Need and importance of community participation.
- Use of ICT in drama and art in education: Computer graphics, animation, special effects, documentary films, movies, slides. Use of social media: youtube, Blog, twitter.

Assignment / Sessional (Any one of the following)

- Every student-teacher must participate and practice different Art forms.
- Student-teachers may can also be motivated to interpret art works/events etc. to enhance their aesthetic sensibility. · Resource Centre for Arts and Crafts should house materials, including books,

CDs, audio and video cassettes, films, software, props, art works of Regional and National level, books and journals which must be displayed for the purpose of reference and continuous

- Preparing a assignment on given topic in the syllabus.
- Preparation of teaching aids.

References:-

1. गोस्वामी प्रेमचन्द : भारतीय कला के विविध स्वरूप पंचशील प्रकाशन, जयपुर।
2. प्रसाद देवी : शिक्षा का वाहन कला, नेशनल बुक ट्रस्ट इंडिया, 1999
3. गुप्ता डॉ. भयामला : सौंदर्य तत्वमीमांसा, सीमा साहित्य भवन, न्यू लायलपुर, दिल्ली।
4. रामअवतार वीर : भारतीय संगीत का इतिहास, राधा पब्लिकेशन, दिल्ली।
5. जोशी भोला दत्तः संगीत शास्त्र एवं रागमाला, सरोज प्रकाशन, दिल्ली।
6. भार्मा अमिता : भास्त्रीय संगीत का विकास, ईस्टर्न बुक लिंकर्स, दिल्ली।
7. Bhavani Enakshi : The Dance of India. Treasure House of Books, Bombay
8. Bhattacharya Dilip : musical Instrument of Tribal India, Manas publications, New Delhi 1999
9. Bharucha Rustom : Theatre and the world. Manohar Publication, New Delhi
10. Chaturvedi Ravi: Theatre and Democracy. Rawat publication, New Delhi
11. Datta Ajit Kumar: Indian Artifats, Cosmo Publications, London
12. Hariharan M., Kuppuswami gowri : An Anthology of Indian Music. Sandeep Prakashan, Delhi
13. Khandalavala karl J.: Indian painting. Lalit Kala Academy, New Delhi.
14. Krishna Rao U.S., Devi Chandrabhaga U.K. : A panorama of Indian dances. Shree Satguru Publication, New Delhi
15. HkkekZ lR;orh% [;ky xk;u HkkSyh fodflr vk;ke] iap'khy izdk'ku] t;iqjA
16. ekyh MkW- f'kojke] xksdkdj MkW- lq/kkdj % ukVd vkSj jaxeap] us'kuy ifCyf'kax gkÅl] fnYyhA
17. pkScs vejs'k pUnz % laxhr dh laLFkkxr f'k{k.k iz.kkyh] d`".kk cznlZ] vtesjA
18. [kqjkuk HkkUuks % [;ky xk;dh ds fofo/k ?kjkus] fl)kFkZ ifCyds'ku] fnYyhA
19. Kothari Sunil: New Directions in Indian dance, Marg Publication, Mumbai.
20. Lal Ananda: Theatres of India. Oxford Univ. Press.
21. Raja Deepak S.: Hindustani Music. D.K. Print World Ltd., New Delhi
22. Sudhakar Kanaka: Indian Classical dancing. Sterling publishers Pvt. Ltd., New Delhi
23. Tribhwn Robin D., Tribhwan Preeti R. : Tribal Dances of India. Discovery Publication House, New Delhi. 1999

PAPER - COMMUNITY MEDICINE

CODE-BPT306

Total Hours- 100 **Theory-100**

UNIT_I: Introduction to Community Medicine

1. General concepts of health and diseases, health determinants , with reference to natural history of disease with propathogenic and pathogenic phases. The role of socio economic and culture environment in health and disease. Epidemiology, emerging demographic changes, definition and scope.
2. Introduction to community health.
3. Public health administration an overview of health administration set up at Central and state levels.

UNIT_II: National Health Programmes and Strategies

4. The national health programme – highlighting the role of social, economic and culture factors in the implementation of the national programme.
5. Health problems of vulnerable groups- pregnant and lactating woman, infant and pre – school children, occupational groups.
6. CBR and Institutional based rehabilitation and strategies to intervene in rural health system.
7. CBR in relation to different medical & surgical conditions.

UNIT-III: Occupational Health and Social Security

8. Occupational Health – definition scope occupational disease prevention of occupational diseases and hazards.
9. Social security and other measurement for the protection from occupational hazards accident and diseases. Details of compensation acts.

UNIT-IV: Family Planning and Mental Health

10. Family planning – objectives of national family planning programmes and family methods. A general idea of advantage and disadvantage of the methods.
11. Mental health emphasis on community aspects of mental, role of occupational therapist in mental health problems such as mental retardation etc.

UNIT-V: Communicable Diseases and Epidemiology

12. Communicable disease- an overall view of communicable role of insect and other factors.
13. International health agencies.
14. Community medicine and rehabilitation epidemiology, habitat nutrition, environment anthropology.
    a. The philosophy and needs of rehabilitation
    b. Principles of physical medicine
    c. Basic principles of administration of organization.

Book Reference:

1. Textbook of preventive and social medicine, Dr. J E Park

PAPER - RATIONALE OF REHABILITATION

CODE- BPT405

COURSE DESCRIPTION

UNIT-1 PRINCIPLES OF ORGANIZATION & ADMINISTRATION OF REHABILITATION UNITS

Principle or relationship between personnel of rehabilitation unit and other department.

Principles of relationship between the institution and the guardians of the handicapped or patient.

Principle of relationship between head of the unit with various government and semi-government, trusts and juniors.

Relationship between a staff and his supervisors equals and juniors.

Principle of maintaining department secrecy, handling difficult problems of day to day work.

Definition of policy and how best it is to be carried out.

Introduction to job analysis of importance.

Methods of teaching to handicapped and other workers in rehabilitation Unit.

Principles of teaching and guiding student's juniors and senior in O.T. and P.T. training schools and centers.

International classification of disability

UNIT II- REHABILITATION THERAPY

I a) The philosophy and need of rehabilitation.
b) Principles of physical Medicine.

II a) Basic principles of Administration and organization philosophy approach, budget,
b)Personnel and space.
c) Vocational Rehabilitation.

UNIT III -PRINCIPLES OF ORTHOTICS AND PROSTHETICS.

a)Lower extremity Orthotics.
Spinal Orthotics
Upper Extremity Orthotic.

b) Lower Extremity Prosthetics.
Upper Extremity Prosthetics.

c) Walking and ambulatory Aids
i) Wheel Chair
ii) Crutches and Canes

UNIT IV-PRINCIPAL OF MANAGEMENT OF COMMUNICATION IMPAIRMENT.

Speech production

Communication disorders secondary to brain damage.

Evaluating Language

Aphasia and its treatment.

Dysarthria and its treatment.

Non- aphasic Language disorders.

UNIT-V PRINCIPLES IN MANAGEMENT OF SOCIAL PROBLEMS

Social needs of the patient.

Rehabilitation center environment.

The social worker as a member of the rehabilitation team.

Contribution on social work.

Community Resources.

Principle in Management of Vocational problems and occupational therapy.

Disability evaluation and management

Architectural barrier

PRACTICAL:

Various techniques of Physiotherapy for the above mentioned condition /diseases should be demonstrated and practical by the students.

Assessment planning and management of orthopedics conditions

General viva

Practical record

REFENCE BOOKS-

1. Rehabilitation –Evans.
2. Directory for disabled people.
3. Improvement residential life for disabled people- truly.
4. Physical medicine & rehabilitation- Okawanta.
5. Community diagnosis & Health action- Bennerth.
6. Hand book of Physical medicine & rehabilitation.- Rusk.

BSC601E: CHEMICAL TECHNOLOGY & SOCIETY

UNIT	CONTENTS	CONTACT HOURS
I	**Chemical Technology:** Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid liquid extraction, separation by absorption and adsorption.	5
II	An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in chemical industry. Introduction to clean technology.	8
III	**Society:** Exploration of societal and technological issues from a chemical perspective. Chemical and scientific literacy as a means to better understand topics like air and water (and the trace materials found in them that are referred to as pollutants).	8
IV	Energy from natural sources (i.e. solar and renewable forms), from fossil fuels and from nuclear fission; materials like plastics and polymers and their natural analogues.	4
V	Proteins and nucleic acids, and molecular reactivity and interconversions from simple examples like combustion to complex instances like genetic engineering and the manufacture of drugs.	5
	TOTAL	30

Reference Books:

1 John W. Hill, Terry W. McCreary & Doris K. Kolb, *Chemistry for changing times*13th Ed.

International Refugee Law (Seminar Paper III & IV)
BBALLB 904 A: International Refugee Law

Unit – I: Introduction

a. Position of refugees under Universal Declaration of Human Rights

Unit – II: Rights, Obligations and Privileges of Refugees under the Refugee Convention 1951

a. Who is a Refugee?
b. Judicial Status
c. Administrative Measures
d. The 1967 Protocol

Unit – III: The Refugee Problem in Asia and Africa

The AALCC Principles 1966

a. The OAU Convention 1969

Unit – IV: Implementation and Monitoring

a. Statute of the UNHCR 1950
b. Cartegena Declaration 1984

Text Book:

1. Guy S. Goodwin, *The Refugee in International Law*, Oxford University Press, 2000

References:

1. VibekeEggli, *Mass Refugee Influx and the Limits of Public International Law*, The Hague: Nijhoff, 2002

BALLB 104: History- I

Syllabus

UNIT-I: History and Law

a. Relevance of History to Law: Interdisciplinary Approach
b. Rethinking History and Historian's Craft
c. Indian Historiography: Orientalist, Utilitarians, Nationalists, Marxist, Religious Nationalist, Subalterns and Regional Histories

UNIT-II: Ancient India

a. State, Polity and Governance: Nature of State, Notions of Kingship (Brahminic, Buddhist, Kautalyan), and administrative apparatus in Vedic Age, Age of Mauryas and Guptas
b. Kinship, Caste and Class: Social Differentiation, Family, Patriliny, Rules of Marriage, *Gotra*, *Jatis* and *Varnas*, Access to Property and Gender
c. Religious Traditions and Polity: Brahminism, Buddhism, Jainism

UNIT-III: Medieval India

a. Kings and their Courts:
    i. Cholas: Local Self-Government
    ii. Delhi Sultanate: Theory of Kingship (Balban), Administrative Apparatus
    iii. Vijayanagara State
    iv. Mughals: Theory of Sovereignty (Akbar), Administrative Structure
b. Bhakti-Sufi Tradition in relation with the State and Reconfiguration of Identity
c. Peasant, Zamindars and the State: Market Reforms of Alauddin Khilji, Agrarian Reforms of Akbar

UNIT-IV: The Concept of Justice and Judicial Institutions in Ancient and Medieval India

a. Sources of Law in Ancient India: Concept and Sources of *Dharma*, Veda, *Dharmasutra*, *Dharma Shastra*, Tradition and Good Custom, Types of Courts and Procedures
b. Legal Thinkers of Ancient India: Manu and Yajnavalkya
c. Legal Traditions in Medieval India: Sources of Islamic Law (Quran, *Hadis*, *Ijma*, *Qiyas*), Salient Features of Islamic Criminal Law, Hanafi School of Thought

PSDA (Professional Skill Development Activities)

- Screening *Rashomon* (1950): A Film by Akira Kurosawa (1910-1998) and discussion on it on multiple interpretations in History
- Visit to National Museum, New Delhi/Any Historical Place
- Historical Walk/ Book Review of Historical Fiction
- Seminar on *Dharma* and the changing concept of justice

Text Books:

1. H.V. Sreenivasa Murthy – *History of India*, Eastern Book Company, 2011
2. E.H. Carr, *What is History*, Penguin, 2008 Edn
3. Sabyasachi Bhattacharya (ed.), *Approaches to History: Essays in Indian Historiography*, Primus Books, 2013

References:

1. Romila Thapar, *Time as a Metaphor of History*, OUP, 1996
2. Romila Thapar, *Early India: From the Origins to AD 1250*, University of California Press, 2004
3. Satish Chandra, Medieval India, Vol. I, Har-Anand, 2000, (2nd Edn)
4. Satish Chandra, Medieval India, Vol. II, Har-Anand, 2004, (3nd Edn)
5. Satish Chandra, *History of Medieval India*, Orient Blackswan, 2009
6. Bipan Chandra, *India's Struggle for Independence, 1857-1947*, Penguin, 1989
7. N. Mani Tripathi, *Jurisprudence the Legal Theory*,2013
8. T. Rama Jois, *Legal and Constitutional History of India :Ancient Legal, Judicial and Constitutional System*, Universal Law Publishing Co..,2004(Reprint)
9. A.L. Basham, *The Wonder that was India*, Part-I, Rupa& Co.,1993 (20th Edn)
10. S.A.A. Rizvi, *The Wonder that was India*, Part –II, Sedgwick & Jackson, 1987: Prakash Books, 2004
11. J.Duncan M. Derett, *Religion, Law and State in India*, Oxford, 1999
12. Robert Lingat, *The Classical Law of India*, California, 1973, Reprint Oxford, 1998
13. Marc Galanter, *Law and Society in Modern India*, Oxford University Press, 1989

BALLB 205: Political Science-I

Syllabus-

Unit -I: Political Theory

a. Introduction
   i. Political Science: Definition, Aims and Scope
   ii. State, Government and Law

b. Theories of State
   i. Divine and Force Theory
   ii. Organic Theory
   iii. Idealist and Individualist Theory
   iv. Theory of Social Contract
   v. Hindu Theory: Contribution of *Saptang* Theory
   vi. Islamic Concept of State

Unit -II: Political Ideologies

a. Liberalism: Concept, Elements and Criticisms; Types: Classical and Modern
b. Totalitarianism: Concept, Elements and Criticisms; Types: Fascism and Nazism
c. Socialism: Concept, Elements and Criticisms; Schools of Socialism: Fabianism, Syndicalism and Guild Socialism
d. Marxism and Concept of State
e. Feminism: Political Dimensions

UNIT-III: Machinery of Government

a. Constitution: Purpose, Features and classification
b. Legislature: Concept, Functions and Types
c. Executive: Concept, Functions and Types
d. Judiciary: Concepts, Functions, Judicial Review and Independence of Judiciary
e. Separation of Powers
f. Political Processes

Unit- IV: Sovereignty and Citizenship

a. Sovereignty: Definition and Types (Political, Popular and Legal)
b. Rights: Concept and Types(Focus on Fundamental and Human Rights)
c. Duties: Concept and Types
d. Political Thinkers: Plato's Justice; Aristotle on Government and Citizenship; John Rawls on Distributive Justice; Gandhi's Concept of State and *Swaraj*; Nehruvian Socialism; Jai Prakash Narain's Total Revolution

PSDA (Professional Skill Development Activities)

- ❖ Debates on Political Theories
- ❖ Political Analysis of Current Happenings
- ❖ Buzzword Groups
- ❖ Political Surveys

Text Books:

1. O.P.Gauba, *An Introduction to Political Theory,*Delhi :Macmillan, 2009
2. George H. Sabine, & Thomas L. Thorson, *A History of Political Theory*, Delhi: Oxford & IBH Co. Pvt. Ltd.,1973
3. Eddy Asirvatham, *Political Theory*, S. Chand & Company Ltd., Delhi, 2012

References:

1. A.C. Kapur, *Principles of Political Science*, S.Chand& Company Ltd., Delhi, 2012
2. Andre Heywood, *Politics*, Palgrave Macmillan, New York, 2011
3. B.L. Fadia, *Indian Government and Politics*, Sahitya Bhawan Publications,Agra, 2010
4. Peu Ghosh, *Indian Government and Politics*, Prentice Hall of India, New Delhi, 2012
5. Subhash C. Kashyap, *Our Constitution*, National Book Trust, India, 2012
6. Subhash C. Kashyap, *Our Parliament*, National Book Trust, India, 2008
7. M.P. Singh, *Indian Federalism : An Introduction*, National Book Trust,India, 2013
8. Brian R. Nelson, *Western Political Thought*, Pearson Education, India, 2009
9. B.P. Dua, M.P.Singh and Rekha Saxena, *Indian Judiciary and Politics: The Changing Landscape*, Manohar Publishers and Distributors, Delhi, 2007
10. Subrata Mukherjee, &Sushila Ramaswamy, *A History of Political Thought: Plato to Marx*, Prentice Hall of India, 2009

BALLB 203: History- II

Syllabus

UNIT-I: Early Developments (1600- 1836)

a. Charters of the East India Company: 1600, 1661

b. Settlements: Surat, Madras, Bombay

c. Courts: Mayor's Court of 1726 and Supreme Court of 1774

d. Statutes: Regulating Act, 1773; The Act of Settlement 1781

e. Conflict: Raja Nand Kumar, Kamaluddin, Patna Case, and Cossijurah

f. Adalat System: Warren Hastings's Judicial Plans of 1772, 1774 and 1780; Lord Cornwallis's Judicial Plans of 1787, 1790 and 1793; Lord William Bentinck's Judicial Reforms

UNIT-II:Evolution of Law and Legal Institutions

a. Development of Personal Laws

b. Development of Criminal Law

c. Development of Civil law in Presidency towns *Mufassil*: Special Emphasis on Justice, Equity and Good Conscience

d. Codification of Laws: Charter of 1833, The First Law Commission, The Second Law Commission

e. Establishment of High Courts under The Indian High Courts Act, 1861

f. Privy Council and Federal Court: An Appraisal

UNIT-III: Constitutional Developments and Framing of Indian Constitution

a. The Indian Councils' Act, 1861
b. The Government of India Act, 1909
c. The Government of India Acts, 1919 and 1935
d. Accession of Princely States and Reorganisation of the States

UNIT-IV: Modern and Contemporary India

a. Colonialism and Imperialism: Stages of Colonialism, Impact on Economy (Industry, Agriculture and Trade), Permanent Settlement and Emergence of the idea of land as a commodity
b. Nationalist and Civil Disobedience Movement: Only Gandhian Movements
c. Partition: Politics and Communalism
d. Changing notions of Justice and Gender from Ancient to Modern times: A Post-Colonial Discourse

PSDA (Professional Skill Development Activities)

- ❖ Enactment of Raja Nand Kumar Case, Patna Case, Cossijurah Case
- ❖ Film *Les Miserables/ Mother India* and discussion on changing concept of justice
- ❖ Seminar on Reification of Religious Tradition in modern times
- ❖ Retrospective of films on Partition: *Pinjar, Tamas*

Text Books:

1. M.P. Jain, *Outlines of Indian Legal History*, Wadhwa & Co, Nagpur,2003(6thEdn)
2. V.D. Kulshrehtha and V.M. Gandhi, *Landmarks of Indian Legal and Constitutional History*,Eastern Book Company, Kurukshetra,2005
3. M.P. Singh, *Outlines of Indian Legal History*, Universal Law Publishing Co., 2010
4. H.L.O. Garren& Abdul Hamid, *A Constitutional History of India, 1600-1935*. London, 1936

References:

1. Radha Kumar, *The History of Doing: An Illustrated Account of Movements for Women's Rights and Feminism in India, 1800-1990*, Zubaan, 1993
2. Granville Austin, *The Making of Indian Constitution*, OUP, 1999
3. Ania Loomba, *Colonialism/Postcolonialism*, Routledge, 1992
4. David Ludden, *India and South Asia: A Short History* (*Including Bangladesh, Bhutan, Nepal, Pakistan and Sri Lanka*), Oxford: One World Publications, UK, 2004
5. Ramachandra Guha, *India after Gandhi: The History of the World's Largest Democracy*, Macmillan, 2007
6. Bipan Chandra, Mridula& Aditya Muherjee, *India Since Independence*, Penguin, 2008

BALLB 305: Political Science- II

Syllabus

Unit-I: Types of Government

a. Democracy
b. Federal form of Government: Concept, Features, Merits and Demerits
c. Confederal and Quasi Federal Form(Indian Federalism)
d. Parliamentary Form of Government
e. Presidential Form of Government

Unit-II: Key Concepts in International Relations

a. Power, Elements of National Power: Population, Geography, Resources, Economy, Technology and Military
b. Limitations on National Power: International morality, Public Opinion and International Law
c. Balance of Power

Unit-III: United Nations and International Relations

a. Diplomacy: Old World and New World, Legal conflicts.
b. UN Principal Organs: General Assembly, Security Council and International Court of Justice
c. Peaceful Settlement of Disputes: Negotiations, Mediation, Conciliation, Arbitration and Judicial Settlement
d. Collective Security Mechanism

Unit-IV: Critical Global Concerns

a. Cold War: Causes, Phases and Case Studies (Korean Crisis, Vietnam Crisis, Cuban Crisis and Gulf War)
b. Post Cold War: Iraq War, US Hegemony, Rise of Japan and China
c. Alliances: NATO and Non-Aligned Movement.
d. Supra-National Organizations: EU, OAS, AU and ASEAN
e. International Terrorism: Reasons for Emergence (Issues of Resources, Territorial Claims, Culture and Religion), Forms and Combating Terrorism

PSDA (Professional Skill Development Activities)

- ❖ Mock Cabinet Meetings
- ❖ Constitution of Model Political Parties
- ❖ Model UN
- ❖ Parliamentary Debates on current political international affairs

Text Books:

1. Peu Ghosh, *International Relations*, Prentice Hall of India, 2009
2. RumkiBasu, *The United Nation: Structure and Function of an International Organisation*, South Asia Books, 2008

References:

1. Moore and Pubantz, *The New United Nations*, Pearson Education, 2008
2. Chandra Prakash, and Prem Arora, *International Relations*, Cosmos Bookhive, 1986
3. E. H.Carr, *International Relations between Two World Wars 1919-1939*, Macmillan, 2004
4. Shakti Mukherjee, and Indrani Mukherjee, *International Relations*, World Press Pvt. Ltd., 1986
5. Hans J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*, Revised, New York: Alfred A. Knopf, 2005
6. J.G. Starke, *An Introduction to International Law*, Butterworths, 1993 (Revised)
7. Joshua S. Goldstein, *International Relations*, Pearson Education, 2013
8. J.N. Dixit, *India's Foreign Policy and its Neighbours*, Gyan Books, 2001
9. Peter Calvocoressi, *World Politics:1945-2000*, Pearson Education, 2013
10. Gabriel Almond, Dalton et al., *Comparative Politics Today: A World View*, Pearson, New Delhi, 2013
11. PushpeshPant, *International Relations in the 21st Century*, New Delhi: Tata McGrawHill Education Private Limited,2011

AUDIT 1 and 2 : VALUE EDUCATION

Syllabus

UNIT-1: Values and self-development –Social values and individual attitudes.
Work ethics, Indian vision of humanism.
 Moral and non- moral valuation. Standards and principles.
 Value judgments
UNIT-2: Importance of cultivation of values.
 Sense of duty. Devotion, Self-reliance. Confidence, Concentration.
Truthfulness, Cleanliness.
 Honesty, Humanity. Power of faith, National Unity.
 Patriotism. Love for nature ,Discipline
UNIT-3: Personality and Behavior Development - Soul and Scientific attitude.
 Punctuality, Love and Kindness.
 Avoid fault Thinking.
 Free from anger, Dignity of labor.
 Universal brotherhood and religious tolerance.
UNIT-4: Positive Thinking. Integrity and discipline. Positive Thinking. Integrity and discipline.
 True friendship.
 Happiness Vs suffering, love for truth.
 Aware of self-destructive habits.
 Association and Cooperation.
 Doing best for saving nature
UNIT-5: Character and Competence –Holy books vs. Blind faith.
 Self-management and Good health.
 Science of reincarnation.
 Equality, Nonviolence ,Humility, Role of Women.
 All religions and same message.
 Mind your Mind, Self-control.
 Honesty, Studying effectively.

Suggested Studies:

- Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

AUDIT 1 and 2 : CONSTITUTION OF INDIA

Syllabus

UNIT-1: History of Making of the Indian Constitution:

History Drafting Committee, (Composition & Working).

Philosophy of the Indian Constitution: Preamble Salient Features.

UNIT-2: Contours of Constitutional Rights & Duties:

- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT-3: Organs of Governance:

- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications

 Powers and Functions

UNIT-3: Local Administration:

 District's Administration head: Role and Importance,

 Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.

 Pachayati raj: Introduction, PRI: Zila Pachayat.

 Elected officials and their roles, CEO Zila Pachayat: Position and role.

 Block level: Organizational Hierarchy (Different departments),

 Village level: Role of Elected and Appointed officials,

 Importance of grass root democracy

UNIT-5: Election Commission:

 Election Commission: Role and Functioning.

 Chief Election Commissioner and Election Commissioners.

 State Election Commission: Role and Functioning.

 Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Studies:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015

ENVIRONMENT

Semester : Second 1st Year
Subject Name : ECOLOGY & ENVIRONMENT
Subject Code : 2JAR1

Content	
Unit I	**Ecosystems:** • Concept of eco-system, • Fundamental of eco-logy and ecosystem, • Components of ecosystem, • Food chain, food web, trophic levels, energy flow, cycling of nutrients, • Major ecosystem types (forest, grassland, and aquatic eco-system). Fundamentals of Ecosystem, our Earth's Environment
Unit II	**Waste (Solid / Liquid / Gaseous):** Generated by Human Habitat and Treatment thereof (in Brief) **Air pollution:** • Atmospheric composition • Classification of air pollutants, • Source and effect of pollutants —green house effect, global warming, ozone depletion, atmospheric stability and temperature inversion etc. • Ambient air quality standards. • Architectural measures for reducing air pollution. **Water Conservation and Harvesting (in Brief):** **Water pollution:** • Hydrosphere, Natural water • Classification of water pollutants, trace elements, contamination of water, • Sources and effects of water pollution, types of pollutants • Determination and significance of DO, BOD and COD in waste water. • Eutrophication, methods and equipment's used in waste water treatment (Preliminary, secondary and tertiary) • Architectural measures for reducing water pollution. **Land and noise pollution:** • Lithosphere, • Pollutants (agricultural, industrial, urban waste, hazardous waste)— their origin and effect. • Collection of solid waste, solid waste management, recycling and reduction of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting). • Noise pollution — definitions and causes. • Sources, effects, standards and control measures.

	Architectural measures for reducing land and noise pollution.
Unit III	**Eco-friendly Architecture:** • Urban eco-system and rural ecosystems • Inter-relationship of manmade development with eco-processes. • Eco-friendly materials, • Eco-friendly energy systems. Works of various architects who have worked in the field of eco-friendly architecture.
Unit IV	• Environmental Planning and Design Guidelines • Basics Concepts of Green Architecture Geological aspects of Land strata for construction
Unit V	• Global environmental issues such as global Warming, Ozone depletion, green house effect etc. Awareness about Natural and Built Heritage

Notes : Mid Term Exam shall be as of Unit I to III.

Sessional will be in the form of drawings and models along with technical report for the subject dealt with. The evaluation should be done in intermediate reviews. There could be regular site visits to understand the ecosystems and eco-friendly architecture.

Reference Books :

1. Miller T.G. Jr., Environmental Sciences, Wadsworth Publishing Co. (TB)
2. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
3. Hawkins, Encyclopedia of Indian Natural History, Bombay Natural History Sdociety, Bombay (R).
4. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
5. McKinney, M.L & Schoch, R.M. 1996. Environmental Science System & Solutions, Web enhanced edition. 639p.
6. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
7. Encyclopaedia of Ecology and Environment (10 Vols Set) by P.R. Trivedi
8. Concepts of ecology by Kormondy Edward J
9. Environment Studies by Buruchha

Semester : **Seventh** **4th Year**

Subject Name : **ELECTIVE - ALTERNATE ENERGY SYSTEM IN ARCHITECTURE**

Subject Code : **7JAR10.1**

Content	
Unit I	• Introduction; • Present Scenario in India, • Hydel Energy, • Solar Energy, • Wind Energy, • Sustainable Architecture: a) Introduction b) Present Scenario c) Relevance in Indian Context • Tidal Energy / Biogas, Geothermal Energy,
Unit II	Green Building Concepts / Role of IGBC
Unit III	Active & Passive Means of Cooling
Unit IV	• Sources of Energy: • Renewable Non-Renewable
Unit V	• Energy Audit • Energy Consumption

Semester : Tenth 5th Year
Subject Name : ELECTIVE - URBAN CONSERVATION
Subject Code : 10JAR3.1

Content	
Unit I	**Introduction to Conservation** • Definitions: Conservation, Heritage and types of heritage, Degrees/ philosophies of conservation (preservation, restoration, rehabilitation, replication, relocation, adaptive reuse, maintenance), urban redevelopment, urban renewal, etc. • Ethics and principles of building conservation • Process/ procedures of building conservation
Unit II	**Approaches to Conservation** • Occidental and Oriental Approach • Development of Heritage Conservation in India • Approach towards formulation of an Indian Charter
Unit III	**Concepts of Historic Zones** • Introduction: definitions, characteristics and significances of historic zones • Challenges to revitalization of historic zones • Needs of Urban regeneration • Involvement and roles of stakeholders (community, development authorities, municipal corporations, local/ community leaders, etc.) • Approach to regeneration of historic zones
Unit IV	**World Heritage Sites** • What are World Heritage Sites (WHS)? • World Heritage Mission and Structure • Concepts of assessment • International initiatives for Heritage Conservation
Unit V	**Charters** • Introduction to charters: definition, philosophies and need • Charters: SPAB Manifesto, Athens Charter, Venice Charter, European charter for Architectural heritage, Florence Charter, Washington Charter, Nara Document on Authenticity, Burra Charter, International Cultural Tourism Charter, INTACH Charter, ICOMOS Declaration on Heritage and Metropolis in Asia and the Pacific **Legislation and Framework for Conservation in India** • **Introduction to Heritage Tourism in India**

Notes : Mid Term Exam shall be as of Unit I to III.

AG-104	Introduction to Forestry	2(1+1)

Theory

UNIT-A Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies.

UNIT-B Forest regeneration, Natural regeneration-natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification.

UNIT-C Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest menstruation – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method

UNIT-D Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

UNIT-E Agroforestry – definitions, importance, criteria of selection of trees in agro forestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

Practical

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

References-

1. Eyle, Alexandra. 1992. Charles Lathrop Pack: Timberman, Forest Conservationist, and Pioneer in Forest Education. Syracuse, NY: ESF College Foundation and College of Environmental Science and Forestry. Distributed by Syracuse University Press. Available: Internet Archive.
2. Hammond, Herbert. 1991. Seeing the Forest Among the Trees. Winlaw/Vancouver: Polestar Press, 1991.
3. Hart, C. 1994. Practical Forestry for the Agent and Surveyor. Stroud. Sutton Publishing. ISBN 0-86299-962-6
4. Hibberd, B.G. (Ed). 1991. Forestry Practice. Forestry Commission Handbook 6. London. HMSO. ISBN 0-11-710281-4

5. Kimmins, Hammish. 1992. Balancing Act: Environmental Issues in Forestry. Vancouver: University of British Columbia Press.
6. Maser, Chris. 1994. Sustainable Forestry: Philosophy, Science, and Economics. DelRay Beach: St. Lucie Press.
7. Miller, G. Tyler. 1990. Resource Conservation and Management. Belmont: Wadsworth Publishing.
8. Nyland, Ralph D. 2007. Silviculture: Concepts and Applications. 2nd ed. Prospect Heights: Waveland Press.
9. Oosthoek, K. Jan/ Richard Hölzl (eds.) 2019. Managing Northern Europe's Forests. Histories from the Age of Improvement to the Age of Ecology. New York/Oxford: Berghahn Publ.
10. Radkau, Joachim Wood: A History, ISBN 978-0-7456-4688-6, November 2011, Polity
11. Stoddard, Charles H. 1978. Essentials of Forestry. New York: Ronald Press.

AG 203	Introductory Soil and Water Conservation Engineering	2(1+1)

Theory

UNIT-A Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion.

UNIT-B Forms of water erosion. Gully classification and control measures.Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques.

UNIT-C Principlesof erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund andbench terracing.

UNIT-D Grassed water ways and their design. Water harvesting and its techniques.

UNIT-E Winderosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion controland its control measures.

Practical

General status of soil conservation in India.Calculation of erosion index. Estimation of soil loss. Measurement of soil loss.Preparation of contour maps.Design of grassed water ways. Designof contour bunds. Design of graded bunds.Design of bench terracing system.Problem on winderosion.

References:

1. Land and Water Management Engineering. 1982. Murthy V.V.N. Kalyani Pubhliers, New Delhi.
2. Irrigation: Theory and Practices.2012. Michael A.M. Vikas Publishing House Pvt. Ltd., New Delhi.
3. Principles of Agricultural. Engineering. Vol. II. 2012. Michael A.M. and T.P. Ojha. Jain Brothers, New Delhi.
4. Soil and Water Conservation Water Management. 2010. Mahnot, S.C., Singh P.K. and Chaplot, P.C.,. Apex Publication House, Udaipur.

AG 208	Fundamentals of Agricultural Extension Education	3(2+1)

Theory

UNIT-A Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.);

UNIT-B Various extension/ agriculture development programmes launched by ICAR/Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

UNIT-C Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions.

UNIT-D Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies.

UNIT-E Communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical

To get acquainted with university extension system. Group discussion- exercise; handlingand use of audio visual equipment's and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: visit to community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.

References-

1. Adivi Reddy, A., 2001, Extension Education, Sree Lakshmi press, Bapatla.
2. Jalihal, K. A. and Veerabhadraiah, V., 2007, Fundamentals of Extension Education and Management in Extension, Concept publishing company, New Delhi.
3. MuthaiahManoraharan, P. and Arunachalam, R., Agricultural Extension, Himalaya Publishing House (Mumbai).
4. Rathore, O. S. et al., 2012, Handbook of Extension Education, Agrotech Publishing Academy, Udaipur.
5. Ray, G. L., 1991 (1st Edition), Extension Communication and Management, Kalyani Publishers, Ludhiana {7th revised edition - 2010}.
6. Supe, S. V., 2013 (2nd Edition), A Text Book of Extension Education, Agrotech Publishing Academy, Udaipur.
7. Van Den Ban, A. W. and Hawkins, H. S., Agricultural Extension, S. K .Jain for CBS Publishers & Distributors, New Delhi.
8. Debabrata Das Gupta. Extension Education. Agrobios (India), Agro house behind Nasrani Cinema, Chaupasani Road, Jodhpur- 342402, Phone -0291-2642319, Fax- 0291-2643993, Email- agrobios@sify.com
10. Sharma, O. P. &Somani, L. L. 2012. Dimension of Agricultural Extension, Agroteh Publishing Academy, Udaipur.

AG-307	Environmental Studies and Disaster Management	3(2+1)

Theory:

UNIT-A Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use andover-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting andusing mineral resources, case studies. d) Food resources: World food problems, changes causedby agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewableenergy sources, use of alternate energy sources. Case studies.

UNIT-B f) Land resources: Landas a resource, land degradation, man induced landslides, soil erosion and desertification. Roleof an individual in conservation of natural resources.Equitable use of resources for sustainablelifestyles.Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers,consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains,food webs and ecological pyramids. Introduction, types, characteristic features, structure andfunction of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desertecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystemdiversity and biogeographical classification of India. Value of biodiversity: consumptive use,productive use, social, ethical, aesthetic and option values.

UNIT-C Biodiversity at global, National andlocal levels, India as a mega-diversity nation.Hot-sports of biodiversity. Threats to biodiversity:habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species ofIndia. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.Environmental Pollution: definition, cause, effects and control measures of: a. Air pollutionb. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollutiong. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban andindustrial wastes. Role of an individual in prevention of pollution.Social Issues and the Environment: From Unsustainable to Sustainable development, Urbanproblems related to energy, Water conservation, rain water harvesting, watershed management.

UNIT-D Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain,ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation.Consumerismand waste products.Environment Protection Act.Air

(Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act.Wildlife Protection Act.Forest ConservationAct. Issues involved in enforcement of environmental legislation. Public awareness.Human Population and the Environment: population growth, variation among nations,population explosion, Family Welfare Programme. Environment and human health: HumanRights, Value Education, HIV/AIDS. Women and Child Welfare.Role of Information Technologyin Environment and human health.

UNIT-E Disaster Management - Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods,drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves Climatic change: global warming, Sea level rise, ozone depletion.Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire,coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste waterpollution, road accidents, rail accidents, air accidents, sea accidents.Disaster Management- Effect to migrate natural disaster at national and global levels.International strategy for disaster reduction.Concept of disaster management, national disastermanagement framework; financial arrangements; role of NGOs, community –based organizationsand media.Central, state, district and local administration; Armed forces in disaster response;Disaster response; Police and other organizations.

Practical

Pollution case studies. Case Studies- Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site-Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river,hill slopes, etc.

References:

1. Bamanayha B.R., Verma, L.N. and Verma A (2005). Fundamentals of Environmental Sciences, Yash Publishing House, Bikaner.
2. Dhaliwal G.S., Sangha G.S. and Ralhan P.K. (2000) Fundamentals of Environmental Sciences,Kalyani Publishers, New Delhi.
3. Odum E.P. and Barrett G.W.(2007) Fundamentals of Ecology, Akash Press, New Delhi.
4. Dhaliwal G.S., and D.S.Kley (2006) Principles of Agricultural Ecology. Himalyan Publishing house, Bombay
5. Brij Gopal, and N.Bhardwaj (2004) Elements of Ecology. Vikash Publishing House, Pvt. Ltd., New Delhi.
6. Mishra, P.C.(2001). Soil pollution and Soil Organism, Ashish Publishing House, 8/81, Punjab Bagh, New Delhi- 110026.
7. Pathak, H.and Kumar, S.(2003). Soil and Green House Effect, CBS Publishers and Distributors, 4596/1-A, 11, Dayaganj, New Delhi – 10002002E

AG 403	Renewable Energy and Green Technology	2(1+1)

Theory

UNIT-A Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application.

UNIT-B Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource.

UNIT-C introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater.

UNIT-D Application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application.

UNIT-E Introduction of wind energy and their application.

Practical

Familiarization with renewable energy gadgets. To study biogas plants, to study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

References-

1. G.D. Rai. Non-Conventional Energy Sources, Kh Publishers, New Delhi.
2. N. S. Rathore. A.K. Kurchania, N.L. Panwar. (2007). Non Conventional Energy Sources, Himanshu Publications.
3. N.S. Rathore. A. K. Kurchania, N.L. Panwar. (2007). Renewable Energy, Theory and Practice, Himanshu Publications.
4. K.C. Khandelwal. & S.S. Mandi. (1990). Biogas Technology.

AG 510B	Landscaping (Elective Course)	3 (2 + 1)

Theory

UNIT-A Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes.

UNIT-B Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents.

UNIT-C Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas

UNIT-D Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions.

UNIT-E Bonsai: principles and management, lawn: establishment and maintenance. CAD application.ort of the ICAR Fifth

Practical

Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/ parks/ institutes.

References:

1. Randhawa, G. S. 1973. Ornamental Horticulture in India. Today and Tomorrow's Printers and Publishers, New Delhi.
2. Aora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishres, Ludhiana
3. Bose, T. K and Mukherjee, D. 1977. Gardening in India. Oxford & IBH Publishing Co. Pvt. Ltd., Calcutta.

AG 510D	Bio-pesticides & Bio-fertilizers (Elective Course)	3 (2+ 1)

Theory

UNIT-A History and concept of biopesticides.Importance, scope and potential of biopesticide.Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales.Botanicals and their uses.Mass production technology of bio-pesticides.Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes.

UNIT-B Methods of application of biopesticides.Methods of quality control and Techniques of bio-pesticides.Impediments and limitation in production and use of bio-pesticide. Bio-fertilizers - Introduction, status and scope. Structure and characteristic features of bacterial bio-fertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium*and *Frankia*;Cynobacterial.

UNIT-C Bio-fertilizers- Anabaena, Nostoc, Hapalosiphon and fungal bio-fertilizers- AM mycorrhiza and ectomycorhiza. Nitrogen fixation -Free living and symbiotic nitrogen fixation.

UNIT-D Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid bio-fertilizers.

UNIT-E FCO specifications and quality control of bio-fertilizers. Application technology for seeds, seedlings, tubers, sets etc. Bio-fertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio-fertilizers.

Practical

Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium*etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition.Quality control of biopesticides. Isolation and purification of Azospirillum , Azotobacter, Rhizobium, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.

References:

1. Shalini Suri, Biofertilizers and Biopesticides, 2011. APH Publishing Corporation.
2. Arun. K. Sharma. 2011. Handbook of Organic farming. Agrobios (India), Jodhpur.
3. S.P. Palaniappan and K.Annadurai. 2010. Organic farming – Theory and Practice. Scientific Publishers. Jodhpur.

AG- 611A	Weed Management (Elective Course)	3 (2 + 1)

Theory

UNIT-A Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.

UNIT-B Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use.Introduction to mode of action of herbicides and selectivity.

UNIT-C Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.

UNIT-D Concept of herbicide mixture and utility in agriculture.Herbicide compatibility with agro-chemicals and their application.

UNIT-E Integration of herbicides with non chemical methods of weed management.Herbicide Resistance and its management.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds.Study of herbicide formulations and mixture of herbicide. Herbicide and agrochemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

References:

1. Gupta, O.P. 2015. Weed Management: Principles and Practices (3rd Edition), Agrobios (India), Jodhpur.
2. Gupta, O.P. 2016. Modern Weed Management (3rd edition), Agrobios (India), Jodhpur.
3. Rao, V.S. 2000. Principles of Weed Science (2nd edition), Oxford and IBH Publishing Co., New Delhi.
4. Saraswat, V. N. Bhan, V.M. and Yaduraju, N.T. 2003. Weed Management, ICAR, New Delhi

AG 810	Agricultural Waste Management	10 (0+10)

Practical

Composting- Solid waste suitable for composting – Methods of composting – vermicomposting - Mineralization process in composting – Biochemistry of composting – Factors involved - Infrastructure required – maturity parameters – value addition – application methodsBiomass Briquetting– potential agro residues and their characteristics for briquetting – fundamental aspects and technologies involved in briquetting – economic analysis of briquetting – setting up of briquetting plant- appliances for biomass briquettes. Biogas and Bio Ethanol Production ,Screening of suitable lingo cellulosic substrate for biogas production -determination of bio-energy potential of agro-waste by estimating total solids – volatile solids – Calorific value- per cent total carbohydrates, moisture, lignin and cellulosic contents – preparation of feed stocks for anaerobic bio- digestion – types of digesters – factors affecting – nutrient value and utilization of biogas slurry. Ethanol production from lingo cellulosic wastes – Processing of Biomass to Ethanol -pre-treatment-fermentation-distillation.

References:

1. P.D. Grover and S.K. Mishra, Biomass Briquetting: Technology and Practices. Published by FAO Regional Wood Energy Development Programme in Asia, Bangkok, Thailand, 1996.
2. Magdalena Muradin and ZenonFoltynowicz, Potential for Producing Biogas from Agricultural Waste in Rural Plants in Poland. Sustainability, 2014, 6, 5065-5074.
3. Biochar production from agricultural wastes via low-temperature microwave carbonization.
4. Qian Kang, LiseAppels, Tianwei Tan and RafDewil, Bioethanol from Lignocellulosic Biomass: Current Findings Determine Research Priorities The Scientific World Journal, 2014, Article ID 298153, 13 pages.

BCA-206 Environment Studies

Unit-1 Ecosystem and Biodiversity: Components and types of ecosystem, Structure and functions of Ecosystem, Values, Type and levels of Biodiversity, Causes of extension, and Conservation methods of biodiversity.

Unit- 2Air Pollution: Definition, different types ofSources, effects on biotic and abiotic components and Control methods of air pollution.

Unit- 3Water pollution: Definition, different types ofSources, effects on biotic and abiotic components and treatment technologies of water pollution.

Unit- 4Noise Pollution: Introduction of noise pollution, differentSources, effects on abiotic and biotic environment and Control measures.

Unit-5 Non Conventional energy sources: Introduction, Renewable Sources of Energy: Solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and Nuclear Energy.

Recommended Reference Books:

1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
3. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. , Environmental Encycolopedia, Jaico Publishing House, Mubmbi, 2001.
4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Down to Earth, Centre for Science and Environment (R)
6. Gleick, H.P. Water in crisis, Pacific Institute for Studies in Dev., Environment &Security.StockholmEnv.Institute.Oxford Univ. Press.
7. Gilpin, Alan. Environmental Impact Assessment (EIA), cutting egde for the 21th century. Cambridge university Press.

BBA 101: Environmental Studies

Unit I Ecology

Ecosystem – Introduction- Abiotic and Biotic components. Structure and functions of **Ecosystem** – Food Chain, Food web, Ecological pyramids, Energy flow and biogeochemical cycles. **Biodiversity** – Values, Type and levels of Biodiversity. Causes of depletion. Conservation of biodiversity

Unit II Pollution

Water Pollution – Sources of water, water quality standards, type of pollutants – its sources and effects. **Air Pollution** – composition of atmosphere, Air quality standards, Sources and adverse effects of air pollution, Green house effect, global warming, acid rain, ozone depletion, **Noise Pollution** – Introduction, Level of noise, Sources and adverse effects of noise, Control of noise pollution.

Unit III Solid Waste Management

Municipal waste – Introduction, classification of solid waste, composition and characteristics of solid waste, collection conveyance and disposal of solid waste, recovery of resources. Sanitary land filling, Vermi composting, incineration. **Biomedical waste** – Generation, collection and disposal.

Unit IV Non Conventional energy sources

Introduction, renewable sources of energy: solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and nuclear energy. Potential of renewable energy resources in India.

Unit V Social Issues and EIA

Sustainable development-Rain water harvesting. Public awareness and environmental education. **Environmental Legislations in India** – Environmental Protection act-1986, Air (Prevention and control of Pollution) act, water (Prevention and control of Pollution) act, wildlife protection act, Forest conservation act.

Text Books:

1. Agarwal Shikha, Suesh Sahu, Environmental Engineering and Disaster Management, Dhanpat Rai & Co., 2010
2. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.

Suggested Readings:

1. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
2. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T., Environmental Encyclopedia, Jaico Publishing House, Mubmbi, 2001.

BBA 201: Disaster Management

Unit I Fundamentals of disaster

Introduction to Disasters: Concepts, and definitions (Disaster, Hazard, Vulnerability,

Resilience, Risks) Impacts of Disasters on People and Society. Preventive Measures of Different Disasters

Unit II Natural Disasters

Causes and effects of: Earthquakes, Tsunami, Cyclones, Floods, Droughts, Landslides.

Unit III Manmade Disasters

Causes and Effects of: Fire, Chemical & Industrial Accidents, Rail-Road & Air Disasters, Terrorist Attacks, Nuclear Hazards, Biological & Chemical warfare, Epidemic.

Unit IV Disaster Management

Goals of Disaster Management, Disaster Management Cycle, Do's & Don'ts and Mitigation Measures of Different Disasters.

Unit V Rehabilitation and reconstruction

Disaster Risk Management in India, Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management.

Text Books:

1. Cuny, F. 1983. Development and Disasters, Oxford University Press
2. Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

Suggested readings:

1. Gupta Anil K, Sreeja S. Nair. 2011 Environmental Knowledge for Disaster
2. Risk Management, NIDM, New Delhi

BSC201: ENVIRONMENTAL SCIENCE

UNIT	CONTENTS	CONTACT HOURS
I	**Ecosystem: concepts and functions** Ecosystem- Definition and Introduction of Ecosystem- Abiotic and Biotic components, types of Ecosystems, Structure and functions of Ecosystem- Food chain, Food web, Ecological pyramids, Energy flow in Ecosystem. Biodiversity- Definition, Type and levels of Biodiversity, Values, Threats of biodiversity Conservation of biodiversity- In-situ and Ex-situ**.**	9
II	**NaturalResources** Definition and classification of natural resources, Types and uses of renewable and non-renewable resources in India, potentials of resources in India.	4
III	**Environmental Pollution and Control measures** Causes, Effects and Control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, and Nuclear Hazards. **Disaster management:** Floods, earthquake, cyclone and landslides.	3
IV	**Solid Waste Management** Introduction, Classification of solid waste, Composition and characteristics of solid waste, collection, conveyance and disposal methods of solid waste, Reuse, Recycle and Recovery of waste.	6
V	**Social Issues and Environment** Sustainable development, urban problems related to energy, Water conservation, Rain water harvesting water shed management, Resettlement and rehabilitation Public awareness and Environmental Education. Environment Protection Act- 1986, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest conservation Act.	8
	TOTAL	30

Reference Books:

1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
3.Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. ,EnvironmentalEncyclopedia, Jaico Publishing House, Mumbai, 2001.
4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Agarwal, K.C. 2001 Environmental Biology, Nidhi Publ. Ltd. Bikaner.
6. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut.
7. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.

BSC501C: RADIOLOGY & SAFETY

UNIT	CONTENTS	CONTACTHOURS
I	**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	**06**
II	**Interaction of Radiation with matter: Types of Radiation:** Alpha, Beta, Gamma and Neutron and their sources, sealed and unsealed sources, **Interaction of Photons** – Photoelectric 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	**07**
III	**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.	07
IV	**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.	05
V	**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. **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	05

	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 Aluminum using GM counter. 6) Detection of α particles using reference source & determining its half-life using spark counter 7) Gamma spectrum of Gas Light mantle (Source of Thorium)	
	TOTAL	**30**

Reference Books:

1	W.E. Burcham and M. Jobes "Nuclear and Particle Physics" Longman	1995
2	W.J. Meredith and J.B. Massey, "Fundamental Physics of Radiology". John Wright and Sons, UK	1989
3	J.R. Greening, "Fundamentals of Radiation Dosimetry", Medical Physics Hand	1981
4	Practical Applications of Radioactivity and Nuclear Radiations, G.C. Lowental	2001
5	A. Martin and S.A. Harbisor, An Introduction to Radiation Protection, John Willey & Sons, Inc. New York	1981
6	W.R. Hendee, "Medical Radiation Physics", Year Book – Medical Publishers	1981

BSC501D: WEATHER FORECASTING

UNIT	CONTENTS	CONTATHOURS
I	**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.	**09**
II	**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.	**04**
III	**Weather systems:** Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes.	03
IV	**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.	06
V	**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. **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)	08
	TOTAL	**30**

Reference Books:

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

BSC501F: PESTICIDE CHEMISTRY

UNIT	CONTENTS	CONTACT HOURS
I	General introduction to pesticides (natural and synthetic), benefits and adverse effects.	5
II	Changing concepts of pesticides, structure activity relationship, synthesis	5
III	Technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion).	8
IV	Technical manufacture and uses of representative pesticides in the following classes: Carbamates (Carbofuran and carbaryl);	7
V	Technical manufacture and uses of representative pesticides in the following classes: Quinones (Chloranil), Anilides (Alachlor and Butachlor).	5
	TOTAL	30

S. No.	Experiments
1	To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
2	Preparation of simple organophosphates, phosphonates and thiophosphates

Reference Book:

1 Cremlyn, R. *Pesticides. Preparation and Modes of Action*, John Wiley & Sons, New York, 1978.

BSC603B: GREEN CHEMISTRY

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction to Green Chemistry:** What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry. **Principles of Green Chemistry and Designing a Chemical synthesis I:** Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following (1-2): 1. Designing a Green Synthesis using these principles; Prevention of Waste/byproducts; maximum incorporation of the materials used in the process into the final products , Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions. 2. Prevention/ minimization of hazardous/ toxic products reducing toxicity. risk = (function) hazard × exposure; waste or pollution prevention hierarchy.	15
II	**Principles of Green Chemistry and Designing a Chemical synthesis II:** Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following (3-6): 1. Green solvents– supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solventless processes, immobilized solvents and how to compare greenness of solvents. 2. Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy. 3. Selection of starting materials; avoidance of unnecessary derivatization –careful use of blocking/protecting groups. 4. Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, biocatalysis, asymmetric catalysis and photocatalysis.	12
III	**Principles of Green Chemistry and Designing a Chemical synthesis II:** Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following (7-8): 1. Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD “What you don’t have cannot harm you”, greener alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol) subdivision of ISD, minimization, simplification, substitution, moderation and limitation.	13

	2. Strengthening/ development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.	
IV	**Examples of Green Synthesis/ Reactions and some real world cases I:** 1. Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis) 2. Microwave assisted reactions in water: Hofmann Elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions in organic solvents Diels-Alder reaction and Decarboxylation reaction 3. Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine) 4 Surfactants for carbon dioxide – replacing smog producing and ozone depleting solvents with CO2 for precision cleaning and dry cleaning of garments.	12
V	**Examples of Green Synthesis/ Reactions and some real world cases II:** 5 Designing of Environmentally safe marine antifoulant. 6 Rightfit pigment: synthetic azopigments to replace toxic organic and inorganic pigments. 7 An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn. 8 Healthier fats and oil by Green Chemistry: Enzymatic interesterification for production of no Trans-Fats and Oils 9 Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting **Future Trends in Green Chemistry** Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; co crystal ontrolled solid state synthesis (C2S3); Green chemistry in sustainable development.	18
	TOTAL	60

Reference Books:

1 Ahluwalia, V.K. & Kidwai, M.R. *New Trends in Green Chemistry*, Anamalaya Publishers (2005).

2 Anastas, P.T. & Warner, J.K.: *Green Chemistry - Theory and Practical*, Oxford University Press (1998).

3 Matlack, A.S. *Introduction to Green Chemistry*, Marcel Dekker (2001).

4 Cann, M.C. &Connely, M.E. *Real-World cases in Green Chemistry*, American Chemical Society, Washington (2000).

5 Ryan, M.A. &Tinnesand, M. *Introduction to Green Chemistry*, American Chemical Society, Washington (2002).

6 Lancaster, M. *Green Chemistry: An Introductory Text* RSC Publishing, 2nd Edition, 2010.

BSC605B: GREEN CHEMISTRY LAB

S. No.	Experiments
1	**Safer starting materials** Preparation and characterization of nanoparticles of gold using tea leaves.
2	**Using renewable resources** Preparation of biodiesel from vegetable/ waste cooking oil.
3	**Avoiding waste** Principle of atom economy.
4	Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.
5	Preparation of propene by two methods can be studied
6	(I) Triethylamine ion + OH^- → propene + trimethylpropene + water
7	(II) 1-propanol H_2SO_4/Δ propene + water
8	Other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of atom economy.
9	**Use of enzymes as catalysts** Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.
10	**Alternative Green solvents** Extraction of D-limonene from orange peel using liquid CO2 prepared form dry ice. Mechanochemical solvent free synthesis of azomethines
11	**Alternative sources of energy** Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II). Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

Reference Books:

1. Anastas, P.T & Warner, J.C. *Green Chemistry: Theory and Practice*, Oxford University Press (1998).
2. Kirchoff, M. & Ryan, M.A. *Greener approaches to undergraduate chemistry experiment*. American Chemical Society, Washington DC (2002).
3. Ryan, M.A. *Introduction to Green Chemistry*, Tinnesand; (Ed), American Chemical Society, Washington DC (2002).
4. Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. *Green Chemistry Experiment: A monograph International Publishing House Pvt Ltd. New Delhi*. Bangalore CISBN 978-93-81141-55-7 (2013).
5. Cann, M.C. & Connelly, M. E. *Real world cases in Green Chemistry*, American Chemical Society (2008).
6. Cann, M. C. & Thomas, P. *Real world cases in Green Chemistry*, American Chemical Society (2008).
7. Lancaster, M. *Green Chemistry: An Introductory Text* RSC Publishing, 2nd Edition, 2010.
8. Pavia, D.L., Lampman, G.M., Kriz, G.S. & Engel, R.G. *Introduction to Organic Laboratory Techniques: A Microscale and Macro Scale Approach,*W.B.Saunders, 1995.

Environmental Studies & Environmental Laws (Core Course)
BA/BBALLB 501: Environmental Studies & Environmental Laws

Syllabus

UNIT-I: Environmental Protection: International and National Perspective

a. Introduction
   i. Environment: Meaning
   ii. Environment Pollution: Meaning and Issues
b. Constitutional Guidelines
   i. Right to Wholesome Environment: Evolution and Application
   ii. Relevant Provisions: Art. 14, 19 (1) (g), 21, 48-A, 51-A(g)
   iii. Environment Protection through Public Interest Litigation
c. Environmental Laws: India and International
   i. Law of Torts
   ii. Law of Crimes
   iii. Public Nuisance
   iv. Emergence of Environmental Legislations

UNIT-II: Prevention and Control of Water, Air, Noise and Land Pollution

a. The Water (Prevention and Control of Pollution) Act, 1974
   i. Water Pollution: Definition
   ii. Central and State Pollution Control Boards: Constitution, Powers and Functions
   iii. Water Pollution Control Areas
   iv. Sample of effluents: Procedure; Restraint Order
   v. Consent requirement: Procedure, Grant/Refusal, Withdrawal
   vi. Citizen Suit Provision
b. Air (Prevention and Control of Pollution) Act, 1981
   i. Air Pollution: Definition
   ii. Central and State Pollution Control Boards: Constitution, Powers and Functions
   iii. Air Pollution Control Areas
   iv. Consent Requirement: Procedure, Grant/Refusal, Withdrawal
   v. Sample of Effluents: Procedure; Restraint Order
   vi. Citizen Suit Provision
c. Noise Pollution Control Order, 2000
d. Land Pollution

UNIT-III: General Environment Legislations and Protection of Forests and Wild Life

a. Environmental (Protection) Act, 1986
   i. Meaning of 'Environment', 'Environment Pollutant', 'Environment Pollution'
   ii. Powers and Functions of Central Govt.
   iii. Important Notifications U/s 6: Hazardous Substance Regulation, Bio-Medical Waste Regulation and Coastal Zone Management, EIA
   iv. Public Participation & Citizen Suit Provision

b. Laws Related to Forest
   i. Forest Act, 1927
   ii. Kinds of forest – Private, Reserved, Protected and Village Forests
   iii. The Forest (Conservation) Act, 1980
   iv. Forest Conservation vis-a visTribals' Rights

c. The Wild Life (Protection) Act, 1972
   i. Authorities to be Appointed and Constituted under the Act
   ii. Hunting of Wild Animals
   iii. Protection of Specified Plants
   iv. Protected Area
   v. Trade or Commerce in Wild Animals, Animal Articles and Trophies; Its Prohibition

UNIT-IV: International Environment Laws and Current Trends

a. Introduction to International Environmental Laws
   i. Environmental Law: Human Rights Perspective
   ii. Stockholm Declaration: Brief overview
   iii. Rio-Declaration: Brief Overview
   iv. Important Doctrines: Sustainable Development – Meaning and Scope - Precautionary Principle: Polluter pays Principle-Public Trust Doctrine
   v. UNEP

b. National Green Tribunal
   i. Constitution
   ii. Functions and Powers

PSDA (Professional Skill Development Activities) 2 Hrs/Week

- **Field Trip to Ecologically Sensitive Places/Tribal Areas**
- **Visit to Pollution Control Boards/Yamuna Bank & Riverside Pollution/Biodiversity Park/ Zoos/ NGT, Delhi and Preparation of Projects**
- **Preparation of plans for Water, Air Pollution**
- **Interaction with Eminent Environmental Activist /Invited Talks & Lectures**

Text Books:

1. ShyamDiwan& Armin Rosencranz, *Environmental Law and Policy in India*, Oxford University Press, 2nd Edition, 2001.
2. P. Leelakrishnan, *Environmental Law in India*, Lexis Nexis, 3rd Edition, 2008

References:

1. P. Leelakrishnan, *Environmental Law Case Book*, Lexis Nexis, 2nd Edition, 2006
2. S. C. Shastri, *Environmental Law*, Eastern Book Company, 4th Edition, 2012
3. Gurdip Singh, *Environmental Law in India*, MacMillan Publisher, 2005
4. SnehLataVerma, *Environmental Problems: Awareness and Attitude,* Academic Excellence Publishers & Distributors, Delhi, 2007
5. Benny Joseph, *Environment Studies*, Tata McGraw Hill, New Delhi, 2009

Renewable Energy System (MTEEPS103A)

Unit 1: Introduction, Distributed vs Central Station Generation, Sources of Energy such as Micro-turbines**,** Internal Combustion Engines.

Unit 2: Introduction to Solar Energy, Wind Energy, Combined Heat and Power, Hydro Energy, Tidal Energy, Wave Energy**,** Geothermal Energy, Biomass and Fuel Cells.

Unit 3: Power Electronic Interface with the Grid

Unit 4: Impact of Distributed Generation on the Power System, Power Quality Disturbances Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning

Unit 5: Transmission System Operation**,** Protection of Distributed Generators

Unit 6: Economics of Distributed Generation, Case Studies

References:

- RanjanRakesh, Kothari D.P, Singal K.C, "Renewable Energy Sources and EmergingTechnologies", 2nd Ed. Prentice Hall of India ,2011
- Math H.Bollen, Fainan Hassan, "Integration of Distributed Generation in the Power System", July
- 2011, Wiley –IEEE Press
- Loi Lei Lai, Tze Fun Chan, "Distributed Generation: Induction and Permanent Magnet Generators",
- October 2007, Wiley-IEEE Press.
- Roger A.Messenger, Jerry Ventre, "Photovoltaic System Engineering", 3rd Ed, 2010
- James F.Manwell, Jon G.McGowan, Anthony L Rogers, "Wind energy explained: Theory Design and Application", John Wiley and Sons 2nd Ed, 2010

Wind and Solar Systems (MTEEPS103D)

Unit 1: Historical development and current status, characteristics of wind power generation**,** network integration issues

Unit 2: Generators and power electronics for wind turbines, power quality standards for wind turbines, Technical regulations for interconnections of wind farm with power systems.

Unit 3: Isolated wind systems, reactive power and voltage control, economic aspects

Unit 4: Impacts on power system dynamics, power system interconnection

Unit 5: Introduction of solar systems, merits and demerits, concentrators, various applications.

Unit 6: Solar thermal power generation, PV power generation, Energy Storage device. Designing the solar system for small installations.

References:

- Thomas Ackermann, Editor, "Wind power in Power Systems", John Willy and sons ltd.2005
- Siegfried Heier, "Grid integration of wind energy conversion systems", John Willy and sons ltd.,
- 2006
- K. Sukhatme and S.P. Sukhatme, "Solar Energy". Tata MacGraw Hill, Second Edition, 1996

Electric and Hybrid Vehicles (MTEEPS104D)

Unit 1: History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drive-trains on energy supplies, Basics of vehicle performance, vehicle power source characterization Transmission characteristics, Mathematical models to describe vehicle performance

Unit 2: Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

Unit 3: Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

Unit 4: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Introduction Motor drives configuration and control of Permanent Magnet Motor drives Configuration and control of Switch Reluctance, Motor drives, drive system efficiency.

Unit 5: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics Selecting the energy storage technology, Communications, supporting subsystems

Unit 6: Introduction to energy management and their strategies used in hybrid and electric vehicle,

Classification of different energy management strategies Comparison of different energy management strategies Implementation issues of energy strategies.

References:

- Sira -Ramirez, R. Silva Ortigoza, "Control Design Techniques in Power Electronics Devices", Springer.
- Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, "Sliding mode control of switching Power

  Converters"

Renewable Energy Lab (MTEEPS108)

Experiment List

1 Power Curves
2 Build a Wind Farm
3 Test the Capabilities of the Hydrogen Fuel Cells and Capacitors
4 Effect of Temperature on Solar Panel Output
5 Variables Affecting Solar Panel Output
6 Effect of Load on Solar Panel Output
7 Wind Turbine Output: The Effect of Load
8 Test the Capabilities of Solar Panels and Wind Turbines

Energy & Environment (MTCEEV101)

Syllabus

UNIT 1

Introduction - Human Development, Socio-Economic Activities and Energy Needs; Introduction to Primary and Secondary Energy Resources; Introduction to Energy Conservation Technologies. Energy Needs (fuel types) of Domestic /Commercial Transport and Industrial Sectors; National and Global Energy Demand and Supply.

UNIT 2

Environmental Implications of Energy Use - Laws of Thermodynamics, Degradation of Energy; Fuel chain, Environmental Impacts at Different Stages of the Fuel Chain; Local, Regional and global Impacts; Waste Recycling and its impacts on Energy and Environment. Air Pollution from cooking Appliances, Vehicle and Power Plants, long term Emission Standards for Indian Industries and Transport Sector.

UNIT 3

Pollution Control Technologies in Energy Sector - Clean Fuels and Environmental Friendly Cooking and Heating Appliances, Emission Control from Diesel & Petrol Engines, New and Efficient Engines: Clean Combustion Technologies for Coal; Flue Gas Desulphurization & Recirculation; Advanced Burner Technology& Staged Firing; Selective Catalytic reduction.

UNIT 4

Energy Environment Models - Analysis and design of Environmental Policies; Decision Analysis, System Dynamics and Linear Programming Models for Designing Environmental Policies, Current Research on Energy environment Interactions.

UNIT 5

Environmental Economics - Environmental Benefits and cost of the use of various options including Fossil Fuels, Bio Gas, Solar and Wind Energy.

Reference Books:

- Ecology of environment, Sharma, P D ,Rastogi Publishers.
- Concept of ecology, karmondy.
- Environmental Biology. Agrawal, K C , Nidhi publishers.

Advanced Waste Water Treatment Technology (MTCEEV103A)

Syllabus

UNIT 1

Introduction and Reuses of waste water: Waste Water Characteristics and their significance. B.O.D. Nitrification .Comparison of various methods of Determination of Organics. Screens, Grit Chamber, Floatation. Sedimentation, Zone Settling, Classification of biological Waste water Treatment Process, Aeration of Waste Water. Industrial, Agricultural and domestic reuses. Concept of Gray water and uses

UNIT 2

Wastewater Treatment Fundamentals : Flow sheets, Physico-chemical and biological processes. Screens comminutors. Grit chambers, Sedimentation, Equalization, Neutralization Floatation and chemical treatment of waste waters.

UNIT 3

Biological Treatment Processes: Fundamentals of Monods Kinetics and application in bioreactor Design Aerobic and anaerobic, Suspended – growth and Attached – growth treatments, Types, Modifications, Activated – sludge unit, Trickling filters, Aerated lagoons, Stabilization ponds, Oxidation ditches, Aerators.Theory of sludge handling treatment and disposal.

UNIT 4

Sludge Treatment: Sludge Sources, Characteristics, Volume- Mass relationship, Sludge Stabilization, Conventional and High Rate Digesters, Gas Production, Collection, Disposal of Sludge.Treatment system Chemical ,Biological, Incineration and Disposal of sludge solids.

UNIT 5

Advances in Wastewater Treatment : Nitrification, Denitrification, Phosphorousand other neutrient removal treatment processes , Total dissolved solid removal methods Introduction Use members and nano-technological -processes for wastewater treatment.

Reference Books:

- METCALF & EDDY, INC. “Wastewater Engineering - Treatment, Disposal, and Reuse ", Third Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi 1995.
- CASEY. T.J. “Unit Treatment Processes in Water and Wastewater Engineering ", John Wiley & Sons England 1993.

Advanced Water Treatment Technology (MTCEEV103A)

Syllabus

UNIT 1

Introduction and Reuses of waste water: Waste Water Characteristics and their significance. B.O.D. Nitrification .Comparison of various methods of Determination of Organics. Screens, Grit Chamber, Floatation. Sedimentation, Zone Settling, Classification of biological Waste water Treatment Process, Aeration of Waste Water. Industrial, Agricultural and domestic reuses. Concept of Gray water and uses

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- METCALF & EDDY, INC. “Wastewater Engineering - Treatment, Disposal, and Reuse ", Third Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi 1995.
- CASEY. T.J. “Unit Treatment Processes in Water and Wastewater Engineering ", John Wiley & Sons England 1993.

Environmental Geo-Technology (MTCEEV103C)

Syllabus

UNIT 1

The Earth Systems and Biosphere: Conservation of matter in various geo-spheres –lithosphere, hydrosphere, atmosphere and biosphere. Energy budget of the earth. Earth's thermal environment and seasons. Climates of India, Indian Monsoon, Climatic variability and climate change, earths process and geological metrological Hazardous, Natural hazardous and extreme weather events, Flood and droughts in introductory ideas about air pollutions and global warming.

UNIT 2

Earth's Processes and Geological Hazards: Earth's processes; concepts of residence, time and rate of natural cycles. Catastrophic geological hazards. Study of floods, landslides, earthquakes, volcanism and avalanche. Perception of the hazards and adjustments to hazardous activities.

UNIT 3

Mineral Resources and Environment: Resources and Reserves, Minerals and population. Oceans and new areas for exploration of mineral resources. Ocean and recycling of resources. Environmental impact of exploitation, processing and smelting of minerals.

UNIT 4

Acid Mine Drainage: Formation of AMD**,** Chemistry of AMD, Microbiology of AMD, Iron Oxidation**,** Effect of AMD.

UNIT 5

Remote Sensing and GIS: Principles of Remote Sensing and its application of Environmental Science. Application of GIS in Environmental Management.

Reference Books:

- Valdiya, K.S. 1987, Environmental Geology.
- Keller, E.A. Environmental Geology & Turk and Turk.
- Environmental Geology – DR Coates, John Wiley & Sons, NY 1981

Noise and Thermal Pollution (MTCEEV104A)

Syllabus

UNIT 1

Physics and effects of noise: - sources of noise, Frequency and Sound Levels, Units of Noise based power ratio, Contours of Loudness. Effects on Human, Environment and Properties.

UNIT 2

Sources and Monitoring of Noise Pollution: - Natural and Anthropogenic Noise Sources, Measuring Instruments for Frequency and Noise levels, Masking of sound

UNIT 3

Noise Sampling, list of BIS code books on noise pollution, Impacts of noise on Annoyance, Physiological effects. Loss of hearing, human performance, Nervous system, Sleeplessness, Damage to material etc

Unit 4

Control of Noise Pollution: - Treatment of noise Control at source, Control in the transmission path, using protective equipment

UNIT 5

Basics of Thermal Pollution: Waste heats into Water and other environments Sources, Effects and Control, Effects on Environment, Macro and Micro aquatic organisms . Effects case studies, methods of Control: Cooling towers and nuclear reactor cooling systems.

Reference Books:

- Noise Pollution by Tripathy, Debipras (latest edition)
- Environmental Pollution , Agrawal K C Nidhi publishers.

Environmental Hydraulics MTCEEV104B

Syllabus

UNIT 1

Properties of Fluid : Types of Fluid, Properties of Fluid, Fluid as a Continuum, Control Volume Concept Hydrostatics: Fluid Pressure at a point, Pressure-height relationship, Absolute, gauge and atmospheric pressure, Measurement of pressure using various types of manometer, Intensity of pressure, Centre of pressure, Pressure on horizontal, vertical and inclined surfaces, curved surface

UNIT 2

Basics of Fluid Kinetics & Dynamics: Different types of flow, Continuity Equation, Euler's Equation Bernoulli's Equation and its application, Flow measurement using pitot tube, venturi meter and pipe orifices Flow Through Pipes: Major and minor losses of energy in pipes , Hydraulic gradient and total energy line, Flow through pipes in series, in parallel, equivalent pipe Floe through branch pipe

UNIT 3

Flow through orifice and Mouthpiece Classification of orifices & concept of venacontracta, Hydraulic Coefficient, Discharge through small orifice, large orifice, fully - submerged orifice & partially - submerged orifice, Time of emptying a tank through an orifice of rectangular tank, hemi-spherical tank and circular horizontal tank, Classification of mouthpieces,Discharge through an external cylindrical mouthpiece, convergent-divergent and an internal mouth piece

UNIT 4

Flow Through Notches and Weirs Classification of notches and weirs, Discharge through a rectangular notch or weir, triangular notch or weir, trapezoidal notch or weir and stepped notch, Velocity of approach , Empirical formula for discharge through rectangular weir, cipolletti weir or notch , Discharge over a broad-crested weir, narrow- crested weir and submerged weir Time emptying a tank with rectangular and triangular weir or notch

UNIT 5

Flow through open channel Types of open channel and types of flow, Empirical formula for determination of flow through open channel Most efficient cross section for rectangular channel, trapezoidal channel and triangular channel

Reference Books:

- Fluid mechanics V.L.Streeter and E.B. Wylie, Mcgraw Hill, 1985, New York
- Theory and applications of fluid mechanics K Subramanya, Tata Mcgraw Hill Publishing Co, 1993, New Delhi

- Introduction to fluid mechanics E.J. Shaughnessy, I.M. Katz, and J.P Schaffer, SI Edition 2005, Oxford University press, New Delhi.
- Fluid Mechanics, F.M. White 5th edition, McGraw Hill, New York.
- Fluid Mechanics by Dr. D.S. K umar
- Fluid Mechanics & Hydraulic Mechanics by Dr.P.N. Modi & Sheth
- Fluid Mechanics By Dr. A.K. Jain
- Hydraulic Fluid Mechanics & Fluid Mechanics By S. Ramamruthan
- Engineering Fluid Mechanics By R.J. Grade & A.C Mirajgaoker

ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY (MTCEEV104C)

Syllabus

UNIT 1

Physical Chemistry: Thermodynamics, Free Energy, osmosis, dialysis, law of mass action, chemical equilibrium, basic concepts of chemical kinetics.

UNIT 2

Biochemistry: Biochemistry of carbohydrates, proteins, fats and oils, Enzymes, buffers, EMP and TCA pathways, electron transport mechanism and oxidation phosphorylation, photosynthesis.

UNIT 3

General Chemistry: Henry's law, activity coefficients, ionization of weak bases, and acids, solubility product, Common ion effect, ways of shifting chemical equilibria, Adsorption isotherms.

UNIT 4

Microbiology: Morphology and classification of bacteria, algae, fungi and viruses, elements of microscopy, Microorganisms of various aerobic and anaerobic biological waste treatment units, culture media for microorganisms, sterilization. Culture of microorganisms in batch and continuous reactors, energy and kinetics of microbial growth and metabolism and biological fate of pollutants.

UNIT 5

Microbiology of water, soil and air, Water and air borne diseases and their causative organisms, concept of indicator organisms. Tests for coli- forms and streptococci and their significance, MPN and MF techniques, bacteriological standards.

Recommended Books:

- Rose E Mckanney. Microbiology for sanitary engineers-
- Gamey and Lord. Microbiology for waste water and sewage
- Pelczhar and Reid. Test book of microbiology.
- Standard methods . APHA.
- Roger T Stainer and Michael Dandroff. General Microbiolog

Advanced Water Treatment Lab (MTCEEV107)

Syllabus

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings

References:

1. Refer Enviroment related lab guide.

Sanitation Engineering Lab (MTCEEV108)

Syllabus

1. To determine the pH of the given sample of sewage.
2. To determine Total Solids of the given sewage sample.
3. To determine the Total Dissolved Solids of the given sewage sample.
4. To find out Total Settle-able Solids of the given sewage sample.
5. To determine Total Suspended Solids of the given sewage sample.
6. To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
8. To find out Chemical Oxygen Demand of the waste water sample.
9. To study various Sanitary Fittings.
10. Design problems as per syllabus of theory.

Environmental Policies & Legislation (MTCEEV201)

Syllabus

UNIT 1

Introduction: Role of national, international, and UN agencies in dealing with the environmental aspects. Standards and setting criteria.

UNIT 2

Historical aspects: major legislations: USEPA 1969 to Clean Water and Air Act. significant legislations in developing and developed countries.

UNIT 3

Legislations in Indian context: Indian Forest Act 1950, 1980, and amendments. Acts related to air and water pollution.

UNIT 4

Norms & Standards: OHSHAS 18001 and its significance. ISO 14000 and its significance, other acts in ESE and case studies. Feasibility Studies and Management issues.

UNIT 5

Related Issues: Principles of sustainable development and implications of finite biosphere and complexities for engineering design and decision-making. Design of controlled environments to enhance health and protection of natural resources for sustainable development. Resource problems and design with ecological, economic, demographic and social dimensions. Techniques to integrate knowledge and define policy.

Reference Books:

- Meyers A. Robert (Eds.) Encyclopedia of Environmental Analysis and Remediation Vol. 1-8,John Wiley & Sons, 1998.
- Handbook of Accident prevention, ILO Publication, 1998.
- Encyclopedia of Industrial Safety and Health, 1999.
- G.M.Masters, Introduction to Environmental Engineering & Science, Prentice Hall, New Delhi,1997
- J.G. Henry and G. W. Heike, Environmental Science & Engineering", Prentice Hall International Inc., New Jersy, 1996.

Environmental Impact Assessment and Auditing (MTCEEV202)

Syllabus

Unit 1

Introduction to Environmental Impact Analysis: Terms-environment, Impact and assessment, concept of EIA, Environmental settings, Prediction and assessment of impact on physical, biological and socio-economic environment.

Unit 2

Methods of Analysis of Impacts on Environment: Adhoc, Checklist, Matrix, Network, environmental Media quality Index Method, Cost Benefit Analysis**.**

Unit 3

Public Participation: Concept, Public hearing procedure and guidelines.

Unit 4

Location of Industries: Environmental impacts of typical industries, power plants, large projects, present scenario of various government resolutions on selecting the location of industries, environmental point of view.

Unit 5

Case Histories of Engineering Projects like Energy Generation Projects both thermal and Hydal , Infra-structure projects , Power Transmission etc..

Recommended Books :

- Environmental Impact Assessment, Canter Mc Graw Hill Pub.
- Environmental Impact Analysis. R.K. Jain, L. V. Urban and G.S. Stacey Publishers : van Nostrand reinhold New York
- Environmental Impact Analysis. Hand book by John Ray and David W
- Peter Watten (Eds.) - `Environmental Impact Assessment Theory and Practice', Unwin Hyman, London (1988)
- Theory and Practice of Environmental Impact assessment: By Abbasi and Ramesh
- Environmental Impact Assessment: By Shrivastava

Solid Waste Management (MTCEEV203A)

Syllabus

Unit 1

Solid waste management: Objectives, Functional elements, Environmental impact of mismanagement. Solid waste: Sources, Types, Composition, Quantities, Physical, Chemical and Biological properties.

Unit 2

Solid waste generation rate: Definition, Typical values for Indian cities, Factors affecting. Storage and collection: General considerations for waste storage at source, Types of collection systems. Transfer station: Meaning, Necessity, Location, Economic analysis. Transportation of solid waste: Means and methods, Routing of vehicles.

Unit 3

Sorting and material recovery: Objectives, Stages of sorting, Sorting operations, Guidelines for sorting for material recovery, Typical material recovery facility for a commingled solid waste.

Unit 4

Composting of solid waste: Principles, Methods, Factors affecting, Properties of compost Vermicomposting. Energy recovery from solid waste: Parameters affecting, Biomethanation, Fundamentals of thermal processing, Pyrolysis, Incineration, Advantages and disadvantages of various technological options.

Unit 5

Landfills: Definition, Essential components, Site selection, Land filling methods, Leachate and landfill gas management.

Recommended Books:

- Manual on municipal solid waste management – Government of India publication.
- Integrated solid waste management – George Tchobanoglous. Mcgraw Hill
- Solid waste management handbook– Pavoni.

INDOOR AIR QUALITY (MTCEEV203C)

Syllabus

UNIT 1.
Indoor activities of inhabitants - Levels of pollutants in indoor and outdoor air- Design and operation of buildings for improvements of public health- IAQ policy issues- sustainability.

UNIT 2.
Air pollutants in indoor environments- private residences- offices- schools-public buildingsventilation.

UNIT 3.
Control of several pollutant classes- radon- toxic organic gases- combustion byproductsmicroorganisms such as molds and infectious bacteria.

UNIT 4.
Concepts and tools- exposure- material balance models- statistical models.

UNIT 5.
Indoor air pollution from outdoor sources- particulate matter and ozone- Combustion byproducts- Radon and its decay products- Volatile organic compounds- odors and sickbuilding syndrome- Humidity- Bio aerosols- infectious disease transmission- Special indoor environments- A/C units in indoor- Measurement methods- Control technologies- Control strategies.

RECOMONDED REFERENCE BOOKS:

- Thaddes Godish, *Indoor air and Environmental Quality*, CRC press, 2000.
- Nazaroff W.W. and L. Alvarez-Cohen, *Environmental Engineering Science*, Wiley sons, Newyork, 2001.

Industrial Waste Treatment (MTCEEV204A)

Syllabus

Unit 1.

Comparative study of industrial waste water with municipal waste water, Industrial waste water problems in India: Effects of discharges of Industrial Waste of Receiving Bodies of Water, Land and Sewer. Effluent and Stream Standards. Historical Development of law related to environmental Protection, Salient feature of Water Act- 1974, Air Act 1981 and Environmental (Protection) Act 1986

Unit 2.

Water use in industry, Industrial water quality requirements, Deterioration of water quality, Classification and characterization of Industrial wastewater, Monitoring of wastewater flow in industries, Quality and quantity variations in waste discharge, Water budgeting.

Unit 3

Specific Industrial Treatment Processes : Neutralization, Equalization and Proportioning, Volume and strength reduction. Treatment techniques for removal of specific pollutants in industrial wastewaters, e.g., oil and grease, cyanide, fluoride, calcium, magnesium, toxic organics, heavy metals, radioactivity.

Unit 4.

Raw materials, Water requirements, Process Characteristics, Composition, effects and treatment, flow sheet of Industrial Waste Waters generated from: Textile (Cotton and Synthetic), tannery, Pulp and Paper, Dairy, Metal Plating (Chromium and Cyanide problem), Slaughter house, Distillery, Dyeing and printing, Fertilizer, Copper & Cement Industry. Provision of various Indian Standards for above Industries.

Unit5.

Potential of Wastewater Recycle and Reuse in Industries, Concept of Common Effluent Treatment Plants.

Recommended Books :

- Theories and Practices of Industrial waste treatment- Nelson Nemerow.
- Waste water treatment: M.N.Rao & Datta.
- IS Standard guide for treatment and disposal of various industries

Hazardous Waste Treatment (MTCEEV204B)

Syllabus

Unit 1

Hazardous Waste: Definition, Magnitude of Problem, Public and Government awareness of Hazardous Waste, Definition of Hazardous Waste under RCRA. Basic idea of the Hazardous Waste (Management and Handling) Rules, 1989.

Unit 2

Exposure and Risk Assessment: Introduction, Hazard Identification, Process of Risk Assessment, Toxicity Assessment, Risk Characterization and Remediation.

Unit 3

Environmental Legislation: EPA obligations and Responsibilities. Hazardous Waste Management and Handling Rules. Environment Management Systems (EMS).

Unit 4

Waste Minimization : Introduction to Government Policy in Waste Reduction. Benefits of Hazardous Waste Reduction. Approaches to Hazardous Waste Reduction. Priorities in Hazardous Waste Management.

Unit 5

Treatment : Physical, Chemical and Biological Treatment of Hazardous Waste.

Recommended Books :

- Hazardous Waste minimization: By Harry M Freeman, McGraw Hill publications.
- Hazardous Waste Management: By LaGrega.

Ground Water Pollution (MTCEEV204C)

Syllabus

UNIT1.

WATER QUALITY: Natural occurrence of common solutes in water, Suspended & dissolved constituents, Principle chemical constituents in ground water, water quality criteria for drinking, Agricultural and Industrial uses, Quality of ground water resources.

UNIT 2

SOURCES OF POLLUTION Various sources & causes of ground water pollution. Activities generating contaminants, Types of contaminants & Mechanism of ground water pollution

UNIT 3

MOVEMENT OF POLLUTANTS: Principles of Pollutant movement (Darcy's law, Hydraulic Conductivity, Anisotropic Aquifer), Attenuation of pollution in the ground, Pollution dispersion in the ground. Ground water movement in saturated zone. Factors affecting Pathogen movement & Survival, Transportation equation, ground water remediation.

UNIT 4

PROBLEMS OF TOTAL DISSOLVED SOLIDS: Fluoride & Nitrate Pollution of ground water, Natural occurrence of Nitrates & sources related to man's activities.

UNIT 5

MONITORING GROUND WATER QUALITY General Principles, Monitoring Management of Ground Water Quality, Section of Parameters for Monitoring. Economic considerations in ground water quality management.

Recommended Books:

- Metcalf and Eddy Inc. - Waste water engineering: Treatment, disposal & reuse, Tata McGraw Hill
- Peavy- Environmental Engineering, McGraw Hill
- Rodger Walker- Water supply Treatment and distribution
- Sinero- Environmental Engineering: A Design Approach, Prentice Hall of India, Delhi
- Wilson- Design calculations in waste water treatment, McGraw Hill Kogakusha

Industrial Waste Treatment Lab (MTCEEV206)

Syllabus

1. To determine the pH of the given sample of Industrial Waste.
2. To determine Total Solids of the given Industrial Waste sample.
3. To determine the Total Dissolved Solids of the given Industrial Waste sample.
4. To find out Total Settle-able Solids of the given Industrial Waste sample.
5. To determine Total Suspended Solids of the given Industrial Waste sample.
6. To find out the Quantity of Dissolved Oxygen present in the given Industrial Waste sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given Industrial Waste water sample.
8. To find out Chemical Oxygen Demand of the Industrial Waste water sample.
9. To study various Sanitary Fittings.
10. Design problems as per syllabus of theory

MTCEEV207 AIR QUALITY TESTING LAB

Syllabus

1. Monitoring of respirable particulate matter
2. Monitoring of gases and particulates in ambient air
3. Indoor air quality monitors
4. Measurement of meteorological parameters
5. Bioaerosol sampling

Air Pollution and It's Control (MTCEEV301A)

Syllabus

Unit 1

Sources and classification: Classification of aerosols, gases vapors, natural air pollutants, properties of air pollutants.

Unit 2

Meteorology: Factors influencing air pollution, wind roses, plume behavior, estimation of plume rise.

Unit 3

Air pollution modeling: Dispersion models – Basquill model, ASME model, Gaussian plume model assumptions, limitations.

Unit 4

Effects of Air Pollutants: Effect on man, material, vegetation, art treasurers. Air pollution disasters, Economic effects.

Unit 5

Global effects of Air Pollutants: Green house effect, acid rains, ozone hole, heat islands.

Air pollution due to automobiles: Vehicular emissions, motor fuel combustion, automobile emission control, general concepts of transport planning for prevention of air pollution.

Recommended Books:

- Air Pollution Control Engineering by N.D. Nevers (1995) MC Graw Hill
- Air Pollution by H.C. Perkins MC Graw Hill (latest edition)
- Air pollution: By K Wark and C Warner
- Air Pollution control: By De Nevers
- Environmental Pollution control engineering: By C S Rao
- Air pollution control: By Howard and Hesketh
- Air Pollution Volume I to VII: By Stern
- Air Pollution: By Seinfeld

Environmental Aspects of Industries (MTCEEV301B)

Syllabus

Unit 1

Environmental laws related to Various Industries. Mineral production, history of environmental problems. Mining Methods- Opencast and underground mining. Unit operations: Site clearance, drilling, blasting, transportation, reclamation, mine closure, etc. Mineral beneficiation and their environmental impacts.

Unit 2

Metallurgical Industries and their Environmental Aspects: Unit operations, sources and Management of pollution in integrated steel plants, ferrous and non-ferrous metals.

Unit 3

Thermal Power Plants: Introduction: site selection, layout and unit operations; Fuel and fuel handling -types of fuels, solid, liquid and gaseous. Fuel burning equipments; Pollution control devices- ash handling, management and its utilization. Environmental management for captive power plants. Environmental problems in cement industries.

Unit 4

Petroleum Industry: Production and consumption of the oil and gas, unit operations involved in exploration and production of petroleum and natural gas; Major environmental problems in on-land and off-shore exploration; petrochemical plants.

Unit 5

R&R, industrial disasters, industrial safety. Environmental laws related to industrial production. Safety audit; Occupational Health & Safety Management System; Risk Assessment, Hazard and Operability Studies (HAZOP) and analysis; Disaster Management.

Environment & Health (MTCEEV301C)

Syllabus

Unit1

Dimensions of environmental health, causative agents of diseases, social factors, urban problems, housing and health, economy and health, climate and other atmospheric elements, violence, crime and mental health, family health practice, health care planning and delivery, chronic and communicable disease, worldwide nutrition and population control.

Unit 2

Industrial and agricultural pollutants, occupational health, epidemiological data, occupational health hazards, environmental exposure and diseases, industrial toxicants, hazardous wastes, preventing exposure to unhealthy and unsafe working conditions, vector control.

Unit 3

Disease control, disease prevention, morbidity and mortality, diseases and progressive deterioration, controlling diseases and disability. Foodborne and waterborne diseases outbreaks, controlling stress of life, epidemiology

Unit 4

Nuclear energy and environmental health, concerns and uncertainties about nuclear power, , nuclear power plants, safety. Environmental health planning, need for planning, the planning process

Unit5

Environmental health services, various agencies, International efforts, role of industry, voluntary health agencies, Law and human welfare, constitutional right to healthy environment, environmental education.

Recommended Books:

- Willgoose-Environmental Health
- Morgan-Environmental Health
- Cairncross and Feachem-Environmental Health engineering in tropics
- The world bank-Appropriate technology for water supply and sanitation

Waste to Energy (MTCOMEL302F)

Syllabus

Unit-I: Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II: Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III: Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV: Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V: Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

- Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
- Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
- Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
- Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

BTMEOEC702.B: ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

Syllabus

Unit-I

Introduction: Objective, scope and outcome of the course.

Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices. Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.

Unit-II

Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

Unit-III

Sewage-Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water.

Sewage characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.

Unit-IV

Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

Wastewater Disposal and Refuse: Disposal of sewage by dilution, Self purification of streams, sewage disposal by irrigation sewage farming, waste water reuse.

Unit-V

Air -Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air quality standards, Control measures for Air pollution

Noise-Basic concept, measurement and various control methods

BTMEPCC802.B: Energy Management

Syllabus

Unit-I

Introduction: Objective, scope and outcome of the course.

Unit-II

Energy Basics; Energy Demand Management, Conservation &Resource Development, Energy for Sustainable Development.

Unit-III

Need for Energy Management by Sector- Industry, Buildings &Houses, Transport, Electric Power.

Unit-IV

Need for Energy Management by Sector- Agriculture, Domestic;Energy forecasting techniques; Energy Integration, Energy Matrix.

Unit-V

Energy Auditing; Energy management for cleaner production,application of renewable energy, appropriate technologies.

Suggested Text / Reference Books:

1. Amlan Chakrabarti, Energy Engineering and Management, Prentice Hall India, 2011.
2. Eastop T. D. and D. R. Croft, Energy Efficiency for Engineers & Technologists, Longman, 1990.
3. Albert Thumann P. E. and W. J. Younger, Handbook of Energy Audits, Fairmont Press, 2008.
4. Doty S. and W. C. Turner, Energy Management Hand book, 7/e, Fairmont Press, 2009.
5. Rao S. and B. B. Parulekar, Energy Technology, Khanna Publishers, 2005.
6. Rai G. D., Non-conventional Energy Sources, Khanna Publishers, 2011.

BTMEOEC802.C: Waste and By-product Utilization

Syllabus

Unit-I

Introduction: Objective, scope and outcome of the course.

Unit-II

Types and formation of byproducts and waste; magnitude of wastegeneration in different agro- processing industries; concept scopeand maintenance of waste management and effluent treatment,basics pf Waste Recycling & Resources Recovery System (WRRRS),Temperature, pH, Oxygen demands (BOD, COD), fat, oil andgrease content, metal content, forms of phosphorous and sulphurin waste waters, microbiology of waste, other ingredients likeinsecticide, pesticides and fungicides residues.

Unit-III

Waste utilization in various industries, furnaces and boilersrun on agricultural wastes and byproducts, briquetting ofbiomass as fuel, production of charcoal briquette, generation ofelectricity using surplus biomass, producer gas generation andutilization.

Unit-IV

Waste treatment and disposal, design, construction, operation andmanagement of institutional community and family size biogasplants, concept of vermi-composting, Pre-treatment of waste:

sedimentation, coagulation, flocculation and floatation, Secondarytreatments: Biological and chemical oxygen demand for differentfood plant waste– trickling filters, oxidation ditches, activatedsludge process, rotating biological contractors, lagoons.

Unit-V

Tertiary treatments: Advanced waste water treatment process-sand,coal and activated carbon filters, phosphorous, sulphur, nitrogenand heavy metals removal, Assessment, treatment and disposal ofsolid waste.

SUSTAINABILITY

MBA 207: Entrepreneurship

Course Contents

UNIT I Entrepreneur & Opportunity Recognition

Entrepreneur, characteristics, functions, types, Intrapreneur – an emerging class, Entrepreneurship - meaning - Role of Entrepreneurs in Economic Development, Self – assessment, Motivations to start a business, The Entrepreneur Personality, entrepreneurial culture, stages in entrepreneurial process, Alternative Competitive Entry Wedges**.**

UNIT II Writing Business Plan

Feasibility study, Product selection - Form of Ownership - Licensing etc., project Identification - Meaning, Significance - contents and formulation of a project report - planning commission guidelines, Developing business plan, Business plan appraisal

UNIT III Start-Up Factors

Entry barriers and firm positioning, Comparison of a large and small start-up, (Technology absorption), Institutional support to entrepreneurship Development(networking with Industries and Institutions)

UNIT IV Stages of Growth in Entrepreneurial Ventures

Stages of growth model, Business crisis, Barriers to small firms, growth Factors in continued entrepreneurship in small firms.

UNIT V Entrepreneurship

Family business-Importance, Changing face of family business, Replacing the founder, Family business and multiple levels of conflict, Succession in family business, Pitfalls of the family business. Women& minority entrepreneurs, International entrepreneurship, Rural Entrepreneurship, Make in India, Startup India, Standup India

Text Books:

1. Dollinger Marc J, Entrepreneurship: Strategies and Resources, III Ed., 1995, Irwin Press
2. Hisrich Robert D and Peters Michael P, Entrepreneurship, V Ed., TMH New Delhi

Suggested Readings:

1. Kuratko Donald F and Hodgetts Richard M. Entrepreneurship: A ContemporaryApproach HarcourtCollege Publisher.
2. Zimmerer and Scarborough, Entrepreneurship and New Venture Formation. Prentice Hall
3. Timmons Jeffry A, New Venture Creation: Entrepreneurship for the Twenty First Century, Irwin

Semester : **Sixth** **3rd Year**
Subject Name : **ELECTIVE–II – SUSTAINABLE ARCHITECTURE**
Subject Code : **6JAR9.2**

Content	
Unit I	**Introduction to Sustainable Development and Architecture** a. Definitions and Principles b. Environmental Impact of Buildings c. Sustainable design priorities d. Cultural and Economic aspects e. Life Cycle Design Selected Examples of Sustainable Architecture – Vernacular, Historical and Contemporary
Unit II	**Sustainable Building Materials and Technology** Sustainable building materials and technologies are being introduced in the building industry every day. These are being codified and standardized. We are living in an era of catalogue architecture, this unit would therefore would lay more emphasis on traditional building systems, methodologies and on the use of alternate/ substitute and environment friendly materials, local and/ or low coast building materials which are cost effective, environment friendly and appropriate to the context of the site, climate and culture. ***Topics to be covered:*** **1. <u>Bamboo</u>** a. Traditional Methods b. Rope joints and split bamboo c. Bamboo as roofing, wall and floor material d. Insulation material and bamboo mats **2. <u>Wood</u>** a. Traditional methods and classification b. International and National Certifications c. Reconstructed timber i. Plywood ii. Block board iii. MDF, HDF etc. iv. Particle board v. Veneers d. Types of joints and workshops **3. <u>Mud</u>**

	a. Traditional and vernacular methods in India b. Rammed earth const. c. Auroville construction d. Mud/ clay bricks **4. <u>Conventional Construction Material</u>** a. Brick b. Cement and concrete c. Steel and iron **5. <u>Contemporary innovations in sustainable construction material</u>** **6. <u>Recycled Building Materials</u>** **<u>Life cycle of construction material</u>**
Unit III	**Ecology and Environmental Management** With global warming and environment protection major areas of concern across nations, environmental management course is a critical area of study for all Architects. This unit, thus covers the concepts and basic understanding of sustainable design and development with a special concern for ecosystem benefits and impacts at the site, local, regional, and global scales.
Unit IV	**Integrating the concepts of Climatology and Building design for sustainable building** A very important component of sustainability in buildings has to do with the fact that they have to respond to the climate in which they are sited. This unit aims to cover the various climates, mainly in India, and the implications of each for building design in these respective climates. It shall also cover concepts of human thermal comfort and its measurement.
Unit V	**Energy Efficient Building Design – Theory and Technologies** The unit will cover the understanding of design and construction techniques for reducing load, and passive/ hybrid design strategies to provide low energy heating and cooling in buildings while maximizing effective use of daylight.

Notes **:** Mid Term Exam shall be as of Unit I to III.

Reference Books **:** 1. Sustainable Ecosystems by Battle (Guy)

Semester : **Sixth** **3rd Year**

Subject Name : **ELECTIVE–II**
LOW COST CONSTRUCTION AND TECHNIQUES

Subject Code : **6JAR9.3**

Content	
Unit I	Introduction to Low Cost Building Design (Planning & Designing aspects) & Sustainability and components of buildings influencing the cost
Unit II	Evaluation of building forms based on functions, materials and construction techniques.
Unit III	Prefabrication, Modular Coordination, Fly ash, Rationalization, Cost and Usability
Unit IV	Low cost building materials, methods and techniques by CBRI, HUDCO, Development Alternatives, Laurie Baker, Anil Laul, Revati Kamathetc.
Unit V	Traditional Materials & Techniques Publications of COSTFORD

Notes : Mid Term Exam shall be as of Unit I to III.

Reference Books :

1. Hand book of Low Cost housing by A.K. Laul
2. Laurie Baker – Life, Works and Writing by Gautam Bhatia
3. Low Cost Architecture by Joseph Maria Minguet

Semester : Seventh 4th Year
Subject Name : ELECTIVE- VERNACULAR ARCHITECTURE
Subject Code : 7JAR10.2

Content	
Unit I	**Introduction to Vernacular Architecture**
	• Approaches and concepts to the study of Vernacular architecture – Introduction to Kutcha architecture and Pucca architecture
	Introduction to Vernacular architecture it's nature, purpose and scope. Study of examples of Vernacular architecture in history of architecture (inside Indian subcontinent) to understand evolution of building forms based on functions, building materials and construction techniques, art & crafts, the local conditions, traditions, climate &geography, religion & culture in the period when they were built
Unit II	**Dravidian South**
	Planning aspects, materials of construction, Constructional details & Settlement Planning of :
	• Kerala – Nair houses (Tarawads), Kerala Muslim houses(Mappilah houses), Temples, Palaces and theaters – Thattchushastra.
	• TamilNadu – Toda Huts, Chettinad Houses (Chettiars) & Palaces
	• Karnataka – Gutthu houses (land owning community), Kodava ancestral home (Aynmane)
	• Andhra Pradesh –Kaccha buildings Religious practices, beliefs, culture & climatic factors influencing the planning of the above.
Unit III	**Western Region**
	Planning aspects , Materials used, Constructional details, Climatic factors influencing the planning of
	• Jat houses for farming caste, Bhungas(Circular Huts) and Havelis(Pukka houses) of Rajasthan
	• Pol houses of Ahmedabad - Primitive forms, Symbolism, Colour, Folk art etc in the architecture of the deserts of Kutch & Gujarat state.
	• Vernacular architecture of Goa.
Unit IV	**Thern and Eastern India**
	Kashmir – Typical Kutcha houses, mosque, Dhoongas(Boathouses), Ladakhi houses, bridges
	• Himachal Pradesh – Kinnaur houses
	• Uttar Pradesh – Domestic housing of Uttar Pradesh
	Bengal – Bangla (Rural house form), Aat Chala houses – change from Bangla to Bungalow, Kutcha & Pucca architecture of Bengal. Nagaland – Naga houses & Naga village, Khasi houses Factors influencing the planning aspects, materials of construction & constructional details of the above.
Unit V	Case study/ies of works of architects in contemporary Indian architecture; whose works are influenced by the Vernacular Architecture of the region

Notes : Mid Term Exam shall be as of Unit I to III.

Reference Books :

1. Architecture of the Indian desert , Kulbushan Jain & Meenakshi Jain, Aadi Centre, Ahmedabad
2. The Royal Palaces of India , George Michell, Thames and Hudson Ltd., London
3. Chettiar Heritage, S.Muthiah, Meenakshi Meyappan, Visalakshmi RAMASWAMY, Lokavani-Hallmark Press Pvt. Ltd., Chennai
4. Encyclopaedia of Vernacular architecture of the World, Cambridge University Press
5. Havali – Wooden houses & mansions of Gujarat, V.S.Pramar, Mapin Publishing Pvt. Ltd., Ahmedabad
6. The Tradition of Indian architecture – Continuity & Controversy – Change since 1850, H.R.Tillotsum, Oxford University Press, Delhi
7. VISTARA – The architecture of India , Carmen Kagal. Pub: The Festival of India, 1986.
8. House, Form & Culture , Amos Rappoport, Prentice Hall Inc, 1969.
9. Traditional buildings of India , Ilay Cooper, Thames and Hudson Ltd., Londo.

AG 101	Fundamentals of Horticulture	2(1+1)

Theory

UNIT-A Horticulture- Its definition and branches, importance and scope; horticultural and botanicalclassification; climate and soil for horticultural crops.

UNIT-B Plant propagation-methods and propagating structures; Seed dormancy, Seed germination.

UNIT-C Principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation, unfruitfulness.

UNIT-D Pollination, polliizers and pollinators, fertilization and parthenocarpy, medicinal and aromatic plants.

UNIT-E Importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

Practical

Identification of garden tools.Identification of horticultural crops.Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops.Visits to commercial nurseries/orchard.

Reference:

1. Chada, K.L. (2002) Handbook of Horticulture, ICAR, New Delhi.
2. Neeraj Pratap Singh (2005) Basic concepts of Fruit Science, IBDC Publishers
3. Jitendra Singh (2011) Basic Horticulture, Kalyani Publications, New Delhi.

AG 102	Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)

Theory

UNIT-A Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importanceand classification. Structures of Monosaccharides, Reducing and oxidizing properties ofMonosaccharides, Mutarotation; Structure of Disaccharides and Poly saccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins.

UNIT-B Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes.

UNIT-C Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

UNIT-D Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture,cell suspension culture, callus culture, anther culture, pollen culture and ovule culture andtheir applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization cybrids; Somaclonal variation and its use in crop improvement; cryo-preservation;

UNIT-E Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.

Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids.Quantitative estimation of glucose/ proteins. Titration methods for estimation of aminoacids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paperchromatography/ TLC demonstration for separation of amino acids/ Monosaccharides.Sterilization techniques.Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization.Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.

Reference:

1. NK Gupta and Sunita Gupta, 2017. Fundamentals of plant Biochemistry and biotechnology. Kalyani Publication
2. BD Sing, 2001. Biotechnology Expanding Horizon. Kalyani Publication
3. L. Nelson; Michael M. Cox, Lehninger Principles of Biochemistry. Seventh Edition| ©2017David
4. H.S.Chawla, Introduction to plant biotechnology. 2001. Pinnalani for Oxford & IBH publishing Co. Pvt. Ltd. New Delhi.

AG-103	Fundamental of Soil Science	3(2+1)

Theory

UNIT-A Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity;

UNIT-B Elementary knowledge of soil taxonomy classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth,

UNIT-C Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation;

UNIT-D Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects;

UNIT-E Soil pollution - behaviour of pesticides andinorganic contaminants, prevention and mitigation of soil pollution.

Practical

Study of soil profile in field.Study of soil sampling tools, collection of representative soilsample, its processing and storage.Study of soil forming rocks and minerals.Determination of soil density, moisture content and porosity.Determination of soil texture by feel and Bouyoucos Methods.Studies of capillary rise phenomenon of water in soil column and water movement in soil.Determination of soil pH and electrical conductivity.Determination of cation exchange capacity of soil.Study of soil map.Determination of soil colour.Demonstration of heat transfer in soil.Estimation of organic matter content of soil.

AG 106	Fundamentals of Agronomy	4(3+1)

Theory

UNIT-A Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency

UNIT-B Water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, logging.

UNIT-C Weeds- importance, classification, crop weed competition, concepts of weed management principles and methods, herbicides- classification, selectivity and resistance, allelopathy.

UNIT-D Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles

UNIT- E Adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

Practical

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agroclimatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk densityand infiltration rate, Measurement of irrigation water.

References:

1. ICAR. 2010. Handbook of Agriculture (6^{th} edition), Indian Council of Agricultural Research, New Delhi.
2. Panda, S.C. 2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
3. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2^{nd} edition), Agrobios (India), Jodhpur
4. Reddy, T.Yellamanda and Reddy, G.H. Sankara. 2016. Principles of Agronomy (2^{nd} edition) , Kalyani Publishers, Ludhiana
5. Reddy, S.R.2012. Principles of Crop Production (4^{th} edition), Kalyani Publishers, Ludhiana.Gupta, O.P. 2005. Weed Management: Principles and Practices (2^{nd} Ed) Agribios (India) Jodhpur.

AG 204	Fundamentals of Crop Physiology	2(1+1)

Theory

UNIT-A Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology;

UNIT-B Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms;

UNIT-C Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCAcycle and electron transport chain;

UNIT-D Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses.

UNIT-E Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

Practical

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis,

Measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments

Through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue testfor mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO2assimilation by Infra Red Gas Analyser (IRGA).

Reference:

1. S.N. Pandey and B. K. Sinha.1977.Plant Physiology. Vikas Publishing House Pvt. Ltd, New Delhi.
2. A. Kumar and S.S.Purohit.1998. Plant Physiology Fundamental and Application. Agrobotanica 4E 176 J.N. Vyas Nagar, Bikaner.
3. N.K. Gupta and S. Gupta. 2005. Plant Physiology. Oxford & IBH, New Delhi.
4. M.Bala, S.Gupta and N.K.Gupta.2013.Practicals in Plant Physiology. Scientific publisher, Jodhpur.
5. D.L.Bagdi. 2016.Crop Physiology. New India Publishing Agency, New Delhi.

AG 205	Fundamentals of Agricultural Economics	2(2+0)

UNIT-A Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare.

UNIT-B Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

UNIT-C Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points.

UNIT-D Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit.National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socioeconomic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation.

UNIT-E Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Reference:

1. K.K. Dewett and J.D. Verma (1986) Elementary Economic Theory, S. Chand & Company, New Delhi
2. S.K. Mishra and V.K. Puri (1996) Indian Economy, Himalaya Publishing House, New Delhi
3. G.B. Jakhar and S.G. Beri (1996) Elementary Principles of Economics, Oxford University Press (10^{th} Edition), Delhi
4. Berkeley Hill (1980) An Introduction to Economics for students of agriculture, Pergaman Press, Oxford
5. B.L. Gupta (1996) Introduction to Economic Theory, Arya Book Depot, New Delhi

AG-301	Crop Production Technology – I (*Kharif* crops)	3(2+1)

Theory

UNIT- A Origin, geographical distribution, economic importance of Kharif Crop.

UNIT- B Soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops.

UNIT- C Agronomical practices for Kharif Cereals – rice, maize, sorghum, pearl millet and finger millet.

UNIT- D Agronomical practices for Kharif pulses -pigeon pea, mungbean and urdbean and Oilseeds Crops- Groundnut, and soybean.

UNIT-E Cultural Practices for fibre crops- cotton & Jute and forage crops-sorghum, cowpea, cluster bean and Napier.

Practical

Rice nursery preparation, transplanting of Rice, sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of *kharif* season crops, effect of sowing depth on germination of kharif crops, identification of weeds in *kharif* season crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of *kharif* season crops, study of crop varieties and important agronomic experiments at experimental farm. study of forage experiments, morphological description of *kharif* season crops, visit to research centres of related crops.

References:

1. Singh, Chhidda, Singh, Prem and Singh, Rajbir. 2003. Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co., New Delhi.
2. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
3. Singh, S.S.and Singh, Rajesh. 2013. Crop Management Under Irrigated and Rainfed Conditions. Kalyani Publishers, New Delhi.
4. Singh, S.S.and Singh, Rajesh. 2015. Principles and Practices of Agronomy (5^{th} Re-set), Kalyani Publishers, New Delhi, Kalyani Publishers, Ludhiana.
5. Rathore, P.S. 2000. Techniques and Management of Field Crop Production, Agrobios (India), Jodhpur.

AG-302	Fundamentals of Plant Breeding	3(2+1)

Theory

UNIT-A Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility- genetic consequences, cultivar options. Domestication, Acclimatization and Introduction;

UNIT-B Centres of origin/diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept.

UNIT-C Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes-Ear to row method, Modified Ear to Row, recurrent selection schemes; Heterosis and inbreedingdepression, development of inbred lines and hybrids, composite and synthetic varieties;

UNIT-D Breeding methods in asexually propagated crops, clonal selection and hybridization; maintenance of breeding records and data collection; Wide hybridization and prebreeding; Polyploidy in relation to plant breeding, mutation breeding-methods anduses;

UNIT-E Breeding for important biotic and abiotic stresses; Biotechnological tools-DNAmarkers and marker assisted selection. Participatory plant breeding; IntellectualProperty Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self pollinated and cross pollinated crops. Emasculation and hybridization techniques in self & cross pollinated crops.Consequences of inbreeding on genetic structure of resulting populations.Study of male sterility system.Handling of segregating populations.Methods of calculating mean, range, variance, standard deviation, heritability.Designs used in plant breeding experiment, analysis of Randomized Block Design and components of genetic variance. To work out the mode of pollination in a given crop and extent of natural out crossing.Prediction of performance of double cross hybrids.

Reference:

1. Alard, R.W. 2000.Principles of Plant Breeding. John Willey & Sons, New York.
2. Chahel, G.S. and S.S. Ghosal.2002.Principles and Procedures of Plant Breeding, Biotechnological and Conventional Approaches. Narosa Publishing House, New Delhi.
3. Singh, B.D. 2005. Plant Breeding. Kalyani Publishing House, New Delhi.
4. Singh, P. 2001.Essentials of Plant Breeding-Principles and Methods. Kalyani Publishing House, New Delhi.

AG -303	Agricultural Finance and Co-Operation	3(2+1)

Theory

UNIT-A Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks,

UNIT-B. Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank,

UNIT-C. Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement.Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

UNIT-D. Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture.

UNIT-E. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practicals.

Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business – A case study.Preparation and analysis of balance sheet – A case study.Preparation and analysis of incom statement – A case study. Appraisal of a loan proposal.– A case study. Techno-economic parameters for preparation of projects Preparation of Bankable projects for various agricultural products and its value add products. Seminar on selected topics.

References:

1. Reddy, S. and Raghu Ram, P. "Agricultural Finance and Managament" Oxford and IBH, New Delhi
2. Singh, J.P. (1990) "Agricultural Finance- Theory and Practice" Ashish Publishing House, New Delhi
3. Pandey, U.K. "An Introduction to Agricultural Finance" Kalyani Publishes, New Delhi
4. Pandey, Mukesh and Tewari, Deepali "Rural and Agriculture Marketing"
5. Krishnaswami, O.R. "Fundamental of Cooperation"
6. Nelson, A.G. and Murray, W.G. 1988 "Agricultural Finance" IOWA State University Press, Amies, IOWA, USA

AG 304	Agricultural Informatics	2(1+1)

Theory

UNIT-A Introduction to Computers, Anatomy of computer, Operating Systems, definition and type, Applications of MS Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture.

UNIT-B World Wide Web (WWW): Concepts and components Introduction to computer programming languages, concepts and standard input/output operations.

UNIT-C e-Agriculture, concepts and applications, Use of ICT in AgricultureComputer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management.

UNIT-D Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc.Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture.

UNIT-E Agriculture Expert System, Soil Information Systems etc. for supporting Farm decisions.Preparation of contingent crop-planning using IT tools.

Reference:

Agro-Informatics Book by G. Vanitha

AG-305	Farm Machinery and Power	2(1+1)

Theory

UNIT- A Status of Farm Power in India, Sources of Farm Power , I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines

UNIT- B Study of different components of I.C. engine, I.C. engine terminology and numerical

UNIT-C Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication ,fuel supply and hydraulic control system of a tractor, Familiarization with Power transmission system : clutch, gear box, differential and final drive of a tractor , Tractor types, Cost analysis of tractor power

UNIT- D Estimation of field capacity and power requirements of implements Familiarization with Primary and Secondary Tillage implement, implement for intercultural operations

UNIT- E Familiarization with sowing and planting equipment, Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing equipment.

Practicals

Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Familiarization with different types of primary and secondary tillage implements: mould board plough, disc plough and disc harrow . Familiarization with seed metering mechanism and calibration of seed drill, Familiarization with different types of sprayers and dusters Familiarization with different inter-culture implement, Familiarization with harvesting and threshing equipments and machinery.

References:

1. Jagdeeswar Sahay, Elements of Agricultural Engineering.
2. A.M. Michael and T. P. Ojha Principles of Agricultural Engineering, Vol. 1
3. Kepner, Bainer and Bergar Principles of Farm Machinery
4. Barger, Carleton, Mckilben and Bainer Tractor and their Power Units

AG-306	Production Technology for Vegetables and Spices	2(1+1)

Theory

UNIT-A Importance of vegetables & spices in human nutrition and national economy, kitchen gardening.

UNIT-B Brief about origin, area, climate, soil, improved varieties and Cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield.

UNIT-C Physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean, Peas

UNIT-D Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic, Root crops such as Carrot, Radish, and Beetroot

UNIT-E Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak.Perennial vegetables).

Practical

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting.Study of morphological characters of different vegetables & spices.Fertilizers applications.Harvesting & preparation for market.Economics of vegetables and spices cultivation.

Reference:

1. Choudhary, B.R. (2009). A Text book on production technology of vegetables, Kalyani Publishers.
2. Yawalkar, K. S. (2008) Vegetable crops in India Agri-Horticultural, Pub. House. Nagpur
3. Rana, M.K. (2008) Olericulture in India Kalyani Publishers, New Delhi.
4. Dhaliwal, M.S. (2008). Handbook of Vegetable Crops, Kalyani Publishers, New Delhi.
5. Nath Prem, (1994) Vegetables for the Tropical Regions, ICAR New Delhi
6. Kamath, K.V (2007). Vegetable Crop Production Oxford Book Company

AG 309	Livestock and Poultry Management	4(3+1)

Theory

UNIT-A Role of livestock in the national economy.Reproduction in farm animals and poultry.Housing principles, space requirements for different species of livestock and poultry.

UNIT-B Management of calves, growing heifers and milch animals.Management of sheep, goat and swine.Incubation, hatching and brooding.Management of growers and layers.Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.

UNIT-C Improvement of farm animals and poultry.Digestion in livestock and poultry.Classification of feedstuffs. Proximate principles offered.

UNIT-D Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

UNIT-E Introduction of livestock and poultry diseases. Prevention (including vaccination schedule)and control of important diseases of livestock and poultry.

Practical

External body parts of cattle, buffalo, sheep, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry.Culling of livestock and poultry.Planning and layout of housing for different types of livestock.Computation of rations for livestock.Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments.Management of chicks, growers and layers.Debeaking, dusting and vaccination.Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Refrences:

1. Banerjee, G.C. 2013. A Taxe Book of Animal Husbandry. 8th Ed.ICAR.
2. Choudhary J.L. and Gupta Lokesh. 2016. a Text Book of Animal Husbandry. Somani Publication
3. Devendra C and Mecleroy GB 1982. Goat and Sheep Production in Tropics.
4. Dimri,U, Sharma,M C and Tiwari R.2013. Swine Production and Health Management. New India Pub Agency.
5. Sastry N S R and Thomas, Ck 2006. Livestock Production and Management. Kalyani

AG-401	Crop Production Technology – II (*Rabi* crops)	3(2+1)

Theory

UNIT-A Origin, geographical distribution, economic importance, soil and climatic requirements,

UNIT-B varieties, cultural practices and yield of Rabi crops; cereals –wheat and barley,

UNIT-C pulses-chickpea,lentil, peas,

UNIT-D oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane;

UNIT-E medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.

Practical

Sowing methods of wheat and sugarcane, identification of weeds in rabiseason crops, study of morphological characteristics of rabi crops, study of yield contributing characters of rabi season crops, yield and juice quality analysis of sugarcane, study of important agronomic experiments of rabi crops at experimental farms. Study of rabiforage experiments, oil extraction of medicinal crops, visit to research stations of related crops

References:

1. Singh, Chhidda, Singh, Prem and Singh, Rajbir.2003. Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co., New Delhi.
2. Singh, S.S.1998. Crop Management Under Irrigated and Rainfed Conditions. Kalyani Publishers, New Delhi.
3. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
4. Singh, S.S.and Singh, Rajesh. 2013. Crop Management Under Irrigated and Rainfed Conditions. Kalyani Publishers, New Delhi.
5. Rathore, P.S. 2000. Techniques and Management of Field Crop Production, Agrobios (India), Jodhpur.

AG-402	Production Technology for Ornamental Crops, MAP and Landscaping	2(1+1)

Theory

UNIT-A Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping.Landscape uses of trees, shrubs and climbers.

UNIT-B Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditionsand gladiolus, tuberose, chrysanthemum under open conditions.

UNIT-C Package of practices for looseflowers like marigold and jasmine under open conditions.Production technology of importantmedicinal plants like ashwagandha, asparagus, aloe, costus, cinnamomum, periwinkle, isabgol.

UNIT-D Aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.

UNIT-E Processing and value addition in ornamental crops and MAPs produce.

Practical

Identification of Ornamental plants.Identification of Medicinal and Aromatic Plants.Nursery bed preparation and seed sowing.Training and pruning of Ornamental plants.Planning and layout of garden.Bed preparation and planting of MAP.Protected structures – care and maintenance.Intercultural operations in flowers and MAP. Harvesting and post harvest handling of cut and loose flowers. Processing of MAP. Visit to commercial flower/MAP unit.

Reference

1. Chada, K.L. (2002) Handbook of Horticulture, ICAR, New Delhi.
2. Neeraj Pratap Singh (2005) Basic concepts of Fruit Science, IBDC Publishers.
3. Fullagar, Richard, Judith Field, Tim Denham, and Carol Lentfer (2006) Early and mid Holocene tool-use and processing of taro (Colocasia esculenta), yam (Dioscorea sp.) and other plants at Kuk Swamp in the highlands of Papua New Guinea Journal of Archaeological Science 33: 595–614.
4. Jitendra Singh (2011) Basic Horticulture, Kalyani Publications, New Delhi.
5. Jules Janick. "History of Horticulture". Purdue University. Archived from original on September 10, 2012. Retrieved September 21, 2012.

AG-404	Problematic Soils and their Management	2(2+0)

Theory

UNIT-A Soil quality and health, Distribution of Waste land and problem soils in India. Theircategorization based on properties. Reclamation and management of Saline and sodic soils, Acidsoils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

UNIT-B Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems.

References:

1. Bear FE. 1964. Chemistry of the Soil. Oxford & IBH.
2. Jurinak JJ. 1978. Salt-affected Soils. Department of Soil Science & Biometeorology. UtahState Univ.
3. USDA Handbook No. 60. 1954. Diagnosis and improvement of Saline and Alkali Soils. Oxford & IBH.
4. Abrol, I.P. and Dhurvanarayana, V.V. (1998) Technologies for wasteland development,ICAR, New Delhi-110012
5. Cirsan Paul, J.(1985) Principles of remote sensing. Longman, New York.
6. Richards, L.A. (1954). Diagnosis and improvement of saline and alkali soils. USDA Hand book No. 60, Washington, DC USA.
7. Somani, L.L. and Totawat, K.L. (1993). Management of salt affected soils and waters. Agrotech publishing Academy, Udaipur.

AG-405	Production Technology for Fruit and Plantation Crops	2(1+1)

Theory

UNIT-A Importance and scope of fruit and plantation crop industry in India.

UNIT-B Importance of rootstocks.

UNIT-C Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, litchi, papaya, sapota, apple, pear, peach, walnut, almond.

UNIT-D Minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry.

UNIT-E Plantation crops-coconut, arecanut, cashew, tea, coffee &rubber.

Practical

Seed propagation.Scarification and stratification of seeds.Propagation methods for fruit and plantation crops.Description and identification of fruit.Preparation of plant bio regulators and their uses, important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Reference:

1. Bal, J.S., (2010). Fruit Growing Kalyani Publishers, New Delhi.
2. Banday F.A. and Sharma M.K., (2010). Advances in Temperate Fruit Production Kalyani Publishers, New Delhi
3. Bose, T.K., Mitra, S.K. and Sanyal, D., (2002). Tropical and Sub-Tropical-Vol-I, Nayaprakash, Kolkata
4. Chadha, T.R, (2001). Text Book of Temperate Fruits, ICAR Publication.
5. Chattopadhyay T.K., (2009), A text book on Pomology-IV Devoted to Temperate fruits, Kalyani Publishers, New Delhi.
6. K.L.Chadda, (2009), Advanced in Horticulture, Malhotra Publishing House, New Delhi.

AG-406	Principles of Seed Technology	3(1+2)

Theory

UNIT-A Seed and seed technology: introduction, definition and importance. Deterioration causesof crop varieties and their control; Maintenance of genetic purity during seed production, seedquality; Definition, Characters of good quality seed, different classes of seed.

UNIT-B Foundation andcertified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seedcertification, phases of certification, procedure for seed certification, field inspection. Seed Act andSeed Act enforcement. Duty and powers of seed inspector, offences and penalties.

UNIT-C Seeds ControlOrder 1983, Varietal Identification through Grow Out Test and Electrophoresis, Molecular andBiochemical test. Detection of genetically modified crops, Transgene contamination in non-GMcrops, GM crops and organic seed production.

UNIT-D Seed drying, processing and their steps, seed testing for quality assessment, seed treatment,its importance, method of application and seed packing. Seed storage; general principles, stagesand factors affecting seed longevity during storage. Measures for pest and disease control duringstorage.

UNIT-E Seed marketing: structure and organization, sales generation activities, promotionalmedia. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private andpublic sectors and their production and marketing strategies.

Practical

Seed production in major cereals: Wheat, Rice, Maize, Sorghum and Bajra. Seed production in major pulses: Urd, Mung, Cowpea, Pigeonpea, Lentil, Gram, Fieldpea. Seed production in major oilseeds: Soybean, Rapeseed and Mustard, Groundnut. Seed production in vegetable crops & Seed spices.

Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Seed certification: Procedure, Field inspection, Preparation of field inspection report. Visit to seed production farms, seed testing laboratories and seed processing plant.

References:

1. Agarwal, R.L.1991.Seed Technology, Oxford & IBH Publishing Co. Delhi
2. Agarwal, P.K. 1999. Seed Technology, ICAR, New Delhi.
3. Subir Sen and Nabinanda Ghosh.1999. Seed Science and Technology, Kalyani Publishers. New Delhi.
4. DhirenraKhare and Mohan S. Bhale.2000. Seed Technology. Scientific Publishers (India), Jodhpur.
5. Maloo,S.R., Intodia, S.K. and Pratap Singh.2008. Beej Pradyogiki.Agrotech Publishing Academy.
6. A.K. Joshi and B.D. Singh.2005.Seed Technology. Kalyani Publishers, New Delhi.
7. Saxena,R.P.1984. BeezSansadhan, GBPA&T, Pantnagar.
8. Singh, B.D. 2005. Plant Breeding. Kalyani Publishing House, New Delhi.

AG 407	Farming System & Sustainable Agriculture	1(1+0)

Theory

UNIT-A Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance.

UNIT-B Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system.

UNIT-C Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability.

UNIT-D Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques.

UNIT-E Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

References:

1. Panda, S.C.2004. Cropping Systems and Farming Systems, Agrobios (India), Jodhpur.
2. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
3. Sharma, Arun K. 2002. A Handbook of Organic Farming, Agrobios (India) Ltd., Jodhpur
4. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2^{nd} edition), Agrobios (India), Jodhpur.
5. Shukla, Rajeev K. 2004. Sustainable Agriculture, Surbhee Publications, Jaipur
6. Palaniappan, S.P.1985. Cropping Systems in the Tropics: Principles and Management, Wiley Easter Ltd. and TNAU, Coimbatore.
7. Reddy S. R. 2016. Principles of Agronomy (5^{th} edition), Kalyani Publishers, Ludhiana.

AG 408	Agricultural Marketing, Trade & Prices	3(2+1)

Theory

UNIT-A Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets**;** demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's.

UNIT-B Surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions:

UNIT-C Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agriculturalmarketing; meaning and definition of marketing channel;number of channel levels; marketing channels for different farm products;

UNIT-D Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India;

UNIT-E Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Practical

Plotting and study of demand and supply curves and calculation of elasticities**;** Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

Reference:

1. Acharya SS & Aggarwal NL. (2011) Agricultural Marketing in India, Oxford and IBH
2. J.R. Moore, S.S. Johl and A.M. Khusro (1973) Indian Food Grain Marketing, Printice Hall.
3. A.S. Kahlon & D.S. Tyagi (1983) Agricultural Price Policyin India, Allied Publishers, New Delhi
4. V.K. Bhall and S. Shiva Ramu (1996) International Business-Environment and Management, Anmol Publications (P) Limited, New Delhi
5. Chandra P. (1984) Projects: Preparation, Appraisal & Implementation, McGraw Hill Inc.
6. Sampat Mukherjee (2002) Modern Economic Theory. New Age International
7. Gupta RD & Lekhi RK. (1982) Elementary Economic Theory, Kalyani Publishers
8. S.S.Acharya & N.L.Agarwal,: Agricultural prices-Analysis and Policy, Oxford &IBH Publishing Co. PVT. LTD. New Delhi

AG 410 A	Protected Cultivation	2(1+1)

Theory

UNIT-A Green house technology: Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses.

UNIT-B Green house equipments, Irrigation systems used in greenhouses, typical applications, passive solar greenhouse, hot air green house heating systems.

UNIT-C Plastic Mulching and soil solarization..

UNIT-D Organic Farming and Vermi Bed Preparation.

UNIT-E Water Resource Management and water ponds.

Practical:

Mulching - Surface covered cultivation – plastics mulching – code of practice.Greenhouse - Plastic film for Greenhouses - Recommendations for Layout, Design and Construction of Greenhouse Structures . Recommendations for Heating, Ventilating and cooling of Greenhouses Steel Tubes for Structural Purpose.Agro Shade nets for Agriculture & Horticulture Purpose

Protection Nets Plant. Vermi-Bed Agro Textiles- High Density Polyethylene (HDPE) Woven Beds For Vermi- culture Specification.

References:

1. Green house: Science and Technology. 2016. Kothari S, S.C.Kaushic and A.N.Mathur. Himanshu Publication, Udaipur.
2. Green House Technology- Application and Practice. Sharma A and V.M.Salokhe. 2006. Agro Tech. publication, Udaipur
3. Principles of Agricultural Engineering, Vol. I. 2012. Michael, A.M. and T. P. Ojha . Jain Brothers, New Delhi.
4. Post Harvest Technology of Cereals, Pulses and Oil Seeds.1999. Chakravarty, A. Oxford and IBH Pub. New Delhi.
5. Agricultural Process Engineering. 1955. Henderson, S.M. and R.L. Perry. John Willy and Sons, New York.
6. Unit operation of Agriculture Processing. 2004. Shay K.M. and Singh, K.K. Vikas Publication House, New Delhi.

AG 410B	AGRIBUSINESS MANAGEMENT	3(2+1)

Theory

UNIT- A Transformation of agriculture into agribusiness,various stakeholders and components of agribusiness systems, Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management. Importance and needs of agro-based industries, Classification of industries and types of agro based industries.

UNIT-B Institutional arrangement, procedures to set up agro based industries, Constraints in establishing agro-based industries, Agri-value chain, Understanding primary and support activities and their linkages.

UNIT-C Business environment: PEST & SWOT analysis. Management functions, Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget.

UNIT-D Components of a business plan, steps in planning and implementation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance.Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies.

UNIT-E Consumer behavior analysis, Product Life Cycle (PLC).Sales & Distribution Management.Pricing policy, various pricing methods.Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation.Project Appraisal and evaluation techniques.

Practical

Study of Agri - input markets. Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD.Preparations of projects and Feasibility reports for agribusiness entrepreneur.Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques.Case study of agro-based industries. Trend and growth rate of prices of agriculturalcommodities. Net present worthtechnique for selection of viableproject.Internal rate of return.

Reference:

1. *Agribusiness Management* and Trade. Language: English. Pages: 239. Author: K.B. Vedamurthy.
2. G. L. Meena S. S. Burark D. C. Pant Rajesh Sharma published Fundamentals of *Agribusiness Management*
3. Agribusiness Management (Routledge Textbooks in Environmental and Agricultural Economics) 4th Edition by Freddie L. Barnard (Author), Jay T. Akridge (Author), Frank J. Dooley (Author), John C. Foltz (Author), Elizabeth A. Yeager (Author)
4. Agribusiness and Farm Management at a Glance Vol 1: Objective Fundamentals 2nd ed by L L & G L Meena Somani
5. Fundamentals of Agribusiness Finance by Ralph W. Battles,Robert C. Thompson
6. Farm Business Management: The Fundamentals of Good Practice (Farm Business Management Series) by P.L. Nuthall.

AG 410C	Agrochemicals (Elective Course)	3 (2+1)

Theory

UNIT-A An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides.Fate of herbicides.

UNIT-B Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride.Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb.Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use.

UNIT-C Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea.

UNIT-D Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassiumchloride, potassium sulphate and potassium nitrate. Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures.

UNIT-E Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing.Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Practical

Sampling of fertilizers and pesticides.Pesticides application technology to study about various pesticides appliances.Quick tests for identification of common fertilizers.Identification of anion and cation in fertilizer.Calculation of doses of insecticides to be used.To study and identify various formulations of insecticide available kin market.Estimation of nitrogen in Urea.Estimation of water soluble P2O5 and citrate soluble P2O5 in single super phosphate.Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer.Determination of copper content in copper oxychloride.Determination of sulphur content in sulphur fungicide.Determination of thiram.Determination of ziram content.

References:

1. Shalini Suri, Biofertilizers and Biopesticides, 2011. APH Publishing Corporation.
2. Arun. K. Sharma. 2011. Handbook of Organic farming. Agrobios (India), Jodhpur.
3. Mathur and Upadhyay, 2005. A Text Book of Entomology, Aman Publishing House, Meerut.
4. David, B.V. and Ramamurthy, V.V. 2016. Elements of Economic Entomology, 8th Ed. Popular Book Depot, Chennai.

AG 410D	Commercial Plant Breeding (Elective Course)	3 (2+1)

Theory

UNIT-A Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production.

UNIT-B Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc.

UNIT-C Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.

UNIT-D IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act.

UNIT-E Variety testing, release and notification systems in India. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Practical

Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production. Concept of rouging in seed production plot.Concept of line its multiplication and purification in hybrid seed production.Role of pollinators in hybrid seed production.Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops.Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality seed management. Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.

Reference:

1. Alard, R.W. 2000.Principles of Plant Breeding. John Willey & Sons, New York.
2. Chahel, G.S. and S.S. Ghosal.2002.Principles and Procedures of Plant Breeding, Biotechnological and Conventional Approaches. Narosa Publishing House, New Delhi.
3. Singh, B.D. 2005. Plant Breeding. Kalyani Publishing House, New Delhi.
4. Singh, P. 2001.Essentials of Plant Breeding-Principles and Methods. Kalyani Publishing House, New Delhi.

AG 501	Principles of Integrated Pest and Disease Management	2(1+1)

Theory

UNIT-A Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis.

UNIT-B Methods of detection and diagnosis of insect pest and diseases.Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control:

UNIT-C Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment.Introduction to conventional pesticides for the insect pests and disease management.Survey surveillance and forecasting of Insect pest and diseases.

UNIT-D Development and validation of IPM module.Implementation and impact of IPM (IPM module for Insect pest and disease.

UNIT-E Safety issues in pesticide uses. Political, social and legal implication of IPM.Case histories of important IPM programmes.Case histories of important IPM programmes.

Practical

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of

insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM,Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of Trichoderma, Pseudomonas, Trichogramma, NPV etc.Identification and nature of damage of important insect pests and diseases and their management.Crop (agroecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmer's fields.

References:

1. Agrios, G.N. 2005. Plant Pathology. 5th ed. Academic Press, New York.
2. Mehrotra, R.S. and Agrawal, A. 2013. Plant Pathology. 2nd ed. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. Singh, R.S. 2011. Introduction to Principles of Plant Pathology. 4th ed. Oxford & IBH Publishing Company. New Delhi.
4. Nene Y.L. and Thapliyal, P.N. 2011. Fungicides in Plant Diseases Control. 3rd Ed. Oxford & IBH published Co. Pvt. Ltd. New Delhi.
5. Dube, H.C. 2012, Modern Plant Pathology, 2nd ed. Agrobios (India), Jodhpur

AG-502	Manures Fertilizers and fertility Management	3(2+1)

Theory

UNIT-A Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green manuring.Fertilizer recommendation approaches.Integrated nutrient management.

UNIT-B Chemical fertilizers: classification, composition and properties of major nitrogenous,phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nanofertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

UNIT-C History of soil fertility and plant nutrition.criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

UNIT-D Chemistry of soil nitrogen, phosphorus, potassium,calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing.

UNIT-E Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants,.Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils.Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils . Estimation of soil extractable S in soils..Estimation of DTPA extractable Zn in soils.Estimation of N in plants.Estimation of P in plants.Estimation of K in plants.Estimation of S in plants.

References:

1. Rai, M.M. (2002) Principal of Soil Science,Mac Millan India Ltd, New Delhi
2. Mehra R.K. (2004) Text book of Soil Science, ICAR New Delhi
3. ISSS (2002) Fundamental of Soil Science Div. of Soil Science,IARI, New Delhi
4. Singh Dhyan, Chhonkar,P.K. and Dwivedi V.S. (2005) Manul on Soil Plant and water analysis. Westville Publishing House,New Delhi
5. Singh Vinay (1996) (Hindi) Soil Science,fertilizer& Manures ,V.K. PrakashanBarotMerrut (U.P)
6. Yawalkar, K.S. and Agarwal. J.P. (1992). Manure and fertilizers. Agriculture-Horticulture Publishing House, Nagpur.
7. Sanchalli, V.K. (1960). Chemistry and Technology of Fertilizers. Reinheblpublishingcorporation, New York,USA.
8. Chopra, S.L. and Kanwar, J.S. (1991). Analytical Agriculture, Chemistry, Kalyani Publishers, New Delhi.
9. Tandon, H.L.S. (1989). Soil water and fertilizers analysis, Fertilizer Development and Consultant organization, New Delhi.

AG-503	Pests of Crops and Stored Grains and Their Management	3(2+1)

Theory

UNIT-A General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and

UNIT-B Scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments.

UNIT-C Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

UNIT-D Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management.

UNIT-E Storage structure and methods of grain storage and fundamental principles of grain store management.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonalhistory of various insect pests attacking crops and their produce: (a) Field Crops; (b) VegetableCrops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identificationof insect pests and Mites associated with stored grain. Determination of insect infestation bydifferent methods.Assessment of losses due to insects.Calculations on the doses of insecticidesapplication technique.Fumigation of grain store / godown.Identification of rodents and rodentcontrol operations in godowns.Identification of birds and bird control operations in godowns.Determination of moisture content of grain.Methods of grain sampling under storage condition.Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory,Department of Food., Delhi. Visit to nearest FCI godowns.

Reference:

1. Atwal, A.S. and Dhaliwal, G.S. 2002. Agricultural Pests of South Asia and Their Management, Kalyani Publishers, New Delhi.
2. David, B.V. and Ramamurthy, V.V. 2016. Elements of Economic Entomology, 8th Ed. Popular Book Depot, Chennai.
3. Mathur and Upadhyay, 2005. A Text Book of Entomology, Aman Publishing House, Meerut.
4. Nayar, M.R.G.K. 1986. Insects and Mites of Crops in India, ICAR, New Delhi.
5. Srivastava, K.P. 2004. A Text Book of Entomology, Vol.I & II, Kalyani Publishers, New Delhi.
6. Reddy, P. Parvatha 2010. Insect, Mite and Vertebrate Pests and their Management in Horticultural Crops. Scientific Publishers, Jodhpur.

AG 504	Diseases of Field and Horticultural Crops and their Management-I	3(2+1)

Theory

UNIT-A Symptoms, etiology, disease cycle and management of major diseases of following crops: Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro;Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose.

UNIT-B Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea:

UNIT-C Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthorablight;Tobacco: black shank, black root rot and mosaic.

UNIT-D Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top;Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot andblack rot; Brinjal: Phomopsis blight and fruit rot and

UNIT-E Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans:anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and wellmounted specimens.

References:

1. Cook, AA. 1981. Diseases of Tropical and Sub-Tropical Field Fiber and Oil Plants. Mac Millan Publishing Co. New York.
2. Gupta V K and Paul Y S. 2002. Diseases of Field Crops. Indus Publishing Co. New Delhi.
3. Mehrotra R S and Agrawal A. 2013. Plant Pathology. 2nd.ed. Tata McGraw-Hill Publishing Co Ltd. New Delhi.
4. Rangaswamy, G and Mahadevan, A. 2001. Diseases of Crop Plants in India. Prentice hall of India Pvt. Ltd. New Delhi.
5. Singh, R.S. 2009. Plant Diseases. 9th ed. Oxford & IBH Publishing Company Pvt. Ltd. New Delhi.
6. Agrios, G.N. 2005. Plant Pathology. 5th ed. Academic Press, New York.
7. Gupta, S.K. and Thind, T.S. 2012. Disease problem in vegetable production. Scientific Publishers, Jodhpur.
8. Singh, R.S. 2012. Diseases of Fruit Crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
9. Singh, R.S.1998. Diseases of Vegetable Crops. 3rd ed. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

AG-505	Crop Improvement-I (*Kharif* crops)	2(1+1)

Theory

UNIT-A Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds;fibres; fodders and cash crops; vegetable and horticultural crops;

UNIT-B Plant genetic resources, itsutilization and conservation, study of genetics of qualitative and quantitative characters;

UNIT-C Importantconcepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Majorbreeding objectives and procedures including conventional and modern innovative approachesfor development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stressitolerance and quality (physical, chemical, nutritional);

UNIT-D Hybrid seed production technology inMaize, Rice, Sorghum, Pearl millet and Pigeonpea, etc.

UNIT-E Ideotype concept and climate resilientcrop varieties for future.

Practical

Emasculation and hybridization techniques in different crop species; viz., Rice, Maize, Sorghum, Pearl Millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame , Castor, Cotton, Cowpea, Pearl millet and Tobacco. Maintenance breeding of different kharif crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

References:

1. Chopra, V.L. 2000 Breeding of Field Crops (Edt.). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Chaddha.K.L. and Rajendra Gupta. 1995. Advances in Horticulture Vol. II Medicinal and Aromatic Plant. Malhotra Publishing House, New Delhi.
3. Mandal, AK., P.K. Ganguli and S.P. Banerjee. 1991. Advances in Plant Breeding Vol. I and II.CBS Publishers and Distributors, New Delhi.
4. Manjit S. Kang 2004. Crop Improvement: Challenges in the Twenti-First Century (Edt). International Book Distributing Co. Lucknow.
5. Poehlman, J.M. 1987. Breeding of Field Crops. AVI Publishing Co..INC, East Port, Conneacticut, USA.
6. Ram, H.H. and H.G. Singh. 1994. Crop Breeding and Genetics. Kalyani Publishers, New Delhi.
7. Sharma, A.K. 2005.Breeding Technology of Crop Plants (Edt.). Yash Publishing House, Bikaner.
8. Ram.H.H. 2005.Vegetable Breeding — Principles and Practices.Kalyani Publishers, New Delhi.

AG 506	Entrepreneurship Development and Business Communication	2 (1+1)

Theory

UNIT-A Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs ;SWOT Analysis & achievement motivation,

UNIT-B Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agri enterprises,

UNIT-C Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skills (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills),

UNIT-D Problem solving skill, Supply chain management and Total quality management,

UNIT-E Project planning Formulation and report preparation; Financing of enterprise, Opportunities for agri entrepreneurship and rural enterprise.

Practical

Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

References:

1. Harold Koontz & Heinz Weihrich. 2004. *Essentials of Management: An International Perspective,* 2nd Ed. Tata Mc-Graw Hill Publishing Pvt Ltd.
2. Chole, R. R. Kapse, P. S. and Deshmukh, P. R.2012. Entrepreneurship Development and Communication Skills scientific Publisher (India), Jodhpur.
3. Bhaskaran, S. 2014. Entrepreneurship Development and Management.Aman Publishing House, Meerut.
4. Mancuso, J. 1974. The Entrepreneurs Handbook (Vol. 192(, Artech House, Inc., USA.
5. Karthikeyan,C. et al. 2008.. A Text Book of Agricultural Extension Management. Atlantic Publishers, New Delhi.
6. Natrajan,K. and Ganeshan, K.P. 2012.Principles of Management. Himalaya Publishing House, New Delhi.
7. Mukesh Pandey & Deepali Tewari. 2010. *The Agribusiness Book.* IBDC Publishers.
8. Nandan H. 2011. *Fundamentals of Entrepreneurship.* PHI Learning Pvt Ltd India.

AG-507	Geoinformatics and Nanotechnology and Precision Farming	2(1+1)

Theory

UNIT-A Precision agriculture: concepts and techniques; their issues and concerns for Indianagriculture; Geo-informatics- definition, concepts, tool and techniques; their use in PrecisionAgriculture.

UNIT-B Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendationusing geospatial technologies;

UNIT-C Spatial data and their management in GIS; Remote sensing conceptsand application in agriculture; Image processing and interpretation;

UNIT-D Global positioning system(GPS), components and its functions; Introduction to crop Simulation Models and their uses foroptimization of Agricultural Inputs; STCR approach for precision agriculture;

UNIT-E Nanotechnology,definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles,nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer,plant protection for scaling-up farm productivity.

Practical

Introduction to GIS software, spatial data creation and editing.Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

References:

1. Krishna, K.K. 2013. Precision Farming: Soil Fertility and Productivity Aspects. Apple Academic Press
2. Srivastava, G.S. 2014. An Introduction to Geoinformatics. McGrew Hill Education (India) Pvt. Ltd. , New Delhi
3. Gupta, R.K. and Subhash Chander. 2008. Principles of Geoinformatics. Jain Brothers, New Delhi.
4. Choudhary, S. 2011. Applied Nanotechnology in Agriculture. Arise Publishers & Distributors
5. Sekhon, B.S. 2014. Nanotechnology in agri-food production: an overview. *Nanotechnology, Science and Applications***7**:31-532

AG-508	**Practical Crop Production – I (*Kharif* crops)**	**2(0+2)**

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

References:

1. Yawalkar, K.S., Agarwal, J.P. and Bokde, S. 2008. Manures and Fertilizers (10th edition), Agri-Horticultural Publishing House, Nagpur.
2. Balasubramaniyan, P. and Palaniappan, S.P. 2016. Principles and Practices of AgronomyAgrobios (India), Jodhpur.
3. Reddy, S. R., 2016. Principles of Agronomy (5th edition), Kalyani Publishers, Ludhiana.
4. Singh, S.S. and Singh, Rajesh. 2015. Principles and Practices of Agronomy (5th Re-set), Kalyani Publishers, New Delhi, Kalyani Publishers, Ludhiana.

AG-601	Rainfed Agriculture & Watershed Management	2(1+1)

Theory

UNIT- A Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India.

UNIT- B Problems and prospects of rainfed agriculture in India; Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques.

UNIT- C Drought: types, effect of water deficit on physio- morphological characteristics of the plants, Crop adaptation and mitigation to drought.

UNIT- D Concept and importance of Water harvesting and its techniques, efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.

UNIT- E Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

Practical

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed**.**

References:

1. Jayanthi, C. and Kalpana, R. 2016. Dryland Agriculture, Kalyani Publishers, Ludhiana.
2. Reddy, S.R. and Reddy, G. Prabhakara. 2015. Dryland Agriculture, Kalyani Publishers, Ludhiana.
3. Murthy, J. V. S. 1994. Watershed Management, Wiley Eastern Limited. New Age International Limited, New Delhi.
4. Dhruva Narayan, V.V. Singh, P.P., Bhardwaj, S.P., U. Sharma, Sikha, A.K., Vital, K.P.R. and Das, S.K. 1987. Watershed Management for Drought Mitigation, ICAR, New Delhi.
5. Singh, R.P., Sharma, S., Padmnabhan, N.V. Das, S.K. and Mishra, P.K. 1990.A Field Manual on Watershed Management, ICAR (CRIDA), Hyderabad.

AG 602	Protected Cultivation and Secondary Agriculture	2(1+1)

Theory

UNIT-A Green house technology: Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of green house for cooling and heating purposes.

UNIT-B Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar greenhouse, hot air green house heating systems, green house drying.

UNIT-C Cost estimation and economic analysis .Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation.

UNIT-D Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, recirculatory dryer and solar dryer).

UNIT-E Material handling equipment; conveyer and elevators, their principle, working and selection.

Practical

Study of different type of green houses based on shape. Determine the rate of air exchange inan active summer winter cooling system. Determination of drying rate of agricultural productsinside green house.Study of green house equipments. Visit to various Post Harvest Laboratories.Determination of Moisture content of various grains by oven drying & infrared moisturemethods. Determination of engineering properties (shape and size, bulk density and porosity ofbiomaterials).Determination of Moisture content of various grains by moisture meter.Field visitto seed processing plant.

References:

1. Green house: Science and Technology. 2016. Kothari S, S.C.Kaushic and A.N.Mathur. Himanshu Publication, Udaipur.
2. Green House Technology- Application and Practice. Sharma A and V.M.Salokhe. 2006. Agro Tech. publication, Udaipur
3. Principles of Agricultural Engineering, Vol. I. 2012. Michael, A.M. and T. P. Ojha . Jain Brothers, New Delhi.
4. Post Harvest Technology of Cereals, Pulses and Oil Seeds.1999. Chakravarty, A. Oxford and IBH Pub. New Delhi.
5. Unit operation of Agriculture Processing. 2004. Shay K.M. and Singh, K.K. Vikas Publication House, New Delhi.

AG 603	Diseases of Field and Horticultural Crops and their Management-II	3(2+1)

Theory

UNIT-A Symptoms, etiology, disease cycle and management of following diseases: Field Crops: Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoo stunting and PokkahBoeng; Sunflower: n

UNIT-B Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust. Horticultural Crops:

UNIT-C Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry:

UNIT-D Leaf spot Potato: early and late blight, black scurf, leaf roll, and mosaic; Cucurbits: downy mildew, powdery mildew, wilt;

UNIT-E Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems.Collection and prese*r*vation of plant diseased specimens for herbarium.

Note: *Students should submit 50 pressed and well-mounted specimens.*

References

1. Cook, AA. 1981. Diseases of Tropical and Sub-Tropical Field Fiber and Oil Plants. Mac Millan Publishing Co. New York.
2. Gupta V K and Paul Y S. 2002. Diseases of Field Crops. Indus Publishing Co. New Delhi.
3. Mehrotra R S and Agrawal A. 2013. Plant Pathology. 2nd.ed. Tata McGraw-Hill Publishing Co Ltd. New Delhi.
4. Rangaswamy, G and Mahadevan, A. 2001. Diseases of Crop Plants in India. Prentice hall of India Pvt. Ltd. New Delhi.
5. Singh, R.S. 2009. Plant Diseases. 9th ed. Oxford & IBH Publishing Company Pvt. Ltd. New Delhi.
6. Agrios, G.N. 2005. Plant Pathology. 5th ed. Academic Press, New York.
7. Gupta, S.K. and Thind, T.S. 2012. Disease problem in vegetable production. Scientific Publishers, Jodhpur.
8. Singh, R.S. 2012. Diseases of Fruit Crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
9. Singh, R.S.1998. Diseases of Vegetable Crops. 3rd ed. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

AG 604	Post-Harvest Management and Value Addition of Fruits and Vegetables	2(1+1)

Theory

UNIT-A Importance of post-harvest processing of fruits and vegetables, extent and possible causesof post harvest losses;

UNIT-B Pre-harvest factors affecting postharvest quality, maturity, ripening andchanges occurring during ripening;

UNIT-C Respiration and factors affecting respiration rate; Harvestingand field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept;

UNIT-D Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade,preserve, candy – Concepts and Standards; Fermented and non-fermented beverages.

UNIT-D Tomatoproducts- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept andmethods, osmotic drying. Canning -– Concepts and Standards, packaging of products.

Practical

Applications of different types of packaging, containers for shelf life extension.Effect of temperature on shelf life and quality of produce.Demonstration of chilling and freezing injury in vegetables and fruits.Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products -- physico-chemical and sensory. Visit to processing unit/ industry.

Reference:

1. Battacharjee, S. K. and De, L. C.,(2005). Post Harvest Technology of Flowers and Ornamentals Plants, Pointer Publisher
2. Jacob John, P., (2008). A Handbook on Post Harvest management of Fruits and vegetables, Daya Publishing House, Delhi
3. Manoranjan, K. and Sangita, S.,(1996) Food Preservation & Processing, Kalyani Publishers
4. Mitra, S. K. (1997) Post Harvest Physiology and Storage of Tropical and Sub-tropical Fruits. CAB International
5. Verma, L. R. and Joshi, V. K. (2000) Post Harvest Technology of Fruits and Vegetables Vol. I & II, Indus Publishing Co., New Delhi
6. Vijay, K.,(2001).Text Book of Food Sciences and Technology, ICAR

AG 606	Crop Improvement-II *(Rabi crops)*	2 (1+1)

Theory

UNIT-A Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds;fodder crops and cash crops; vegetable and horticultural crops;

UNIT-B Plant genetic resources, itsutilization and conservation;

UNIT-C Study of genetics of qualitative and quantitative characters;

UNIT-D Majorbreeding objectives and procedures including conventional and modern innovative approachesfor development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stresstolerance and quality (physical, chemical, nutritional);

UNIT-E Hybrid seed production technology of rabicrops. Ideotype concept and climate resilient crop varieties for future.

Practical

Emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rapeseed Mustard, Sunflower, Potato, Berseem. Sugarcane, Cowpea; Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

Reference:

1. Chopra, V.L. 2000 Breeding of Field Crops (Edt.). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Chaddha.K.L. and Rajendra Gupta. 1995. Advances in Horticulture Vol. II Medicinal and Aromatic Plant. Malhotra Publishing House, New Delhi.
3. Mandal, AK., P.K. Ganguli and S.P. Banerjee. 1991. Advances in Plant Breeding Vol. I and II.CBS Publishers and Distributors, New Delhi.
4. Manjit S. Kang 2004. Crop Improvement: Challenges in the Twenti-First Century (Edt). International Book Distributing Co. Lucknow.
5. Poehlman, J.M. 1987. Breeding of Field Crops. AVI Publishing Co..INC, East Port, Conneacticut, USA.
6. Ram, H.H. and H.G. Singh. 1994. Crop Breeding and Genetics. Kalyani Publishers, New Delhi.
7. Sharma, A.K. 2005.Breeding Technology of Crop Plants (Edt.). Yash Publishing House, Bikaner.
8. Ram.H.H. 2005.Vegetable Breeding — Principles and Practices.Kalyani Publishers, New Delhi.

AG-607	Practical Crop Production – II (Rabi crops)	1(0+1)

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

References:

1. Yawalkar, K.S., Agarwal, J.P. and Bokde, S. 2008. Manures and Fertilizers (10^{th} edition), Agri-Horticultural Publishing House, Nagpur.
2. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2^{nd} edition), Agrobios (India), Jodhpur.
3. Reddy, S. R. 2016. Principles of Agronomy (5^{th} edition), Kalyani Publishers, Ludhiana.
4. Singh, S.S. and Singh, Rajesh. 2015. Principles and Practices of Agronomy (5^{th} Re-set), Kalyani Publishers, New Delhi, Kalyani Publishers, Ludhiana.

AG 608	Principles of Organic Farming	2(1+1)

Theory

UNIT-A Organic farming, principles and its scope in India; Initiatives taken by Government (central/ state), NGOs and other organizations for promotion of organic agriculture;

UNIT-B Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming;

UNIT-C Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production;

UNIT-D Operational structure of NPOP; Certification process and standards of organic farming;

UNIT-E Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

Practical

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

References:

1. Dhama, A.K. 2014.Organic Farming for Sustainable Agriculture (2nd edition), Agrobios (India), Jodhpur.
2. Sharma, Arun K. 2013. A Handbook of Organic Farming, Agrobios (India), Jodhpur
3. Palaniappan, S.P. and Anandurai, K.1999. Organic Farming – Theory and Practice. Scientific Pub. Jodhpur
4. Thapa, U and Tripathy, P. 2006. Organic Farming in India, Problems and prospects, Agrtech, Publising Academy, Udaipur.

AG 609	Farm Management, Production & Resource Economics	2(1+1)

Theory:

UNIT-A Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product product relationship, law of equip-marginal/or principles of opportunity cost and law of comparative advantage.

UNIT-B Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises.

UNIT-C Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises.

UNIT-D Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance– weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources.

UNIT-E Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical

Preparation of farm layout.Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equip-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of input use in a farm production process. Determination of least cost combination of inputs Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises Preparation of farm plan and budget, farm records and accounts and profit & loss accounts.Collection and analysis of data on various resources in India.

References:

1. Mittal, S.K. and Sethi, C.P. “Linear Programming.”
2. Tandan, R.K. and Dhondiyal, S.P. “Principles and Methods of Farm Management”.
3. Heady, E.O. and Candler, W. “Linear Programming Methods.”
4. Johl, S.S. and Kapoor, T.R. “Fundamental of Farm Business Management, Kalyani Publishers, Ludhiana and New Delhi
5. Sankhayan, P.L “Introduction to the Economics of Agricultural Production.”
6. Singh, I.J. “Elements of Farm Management”
7. Dorfman, R. and Samuelson and Solow, R. “Linear Programming and Economic Analysis.”
8. Heady, E.O. and Dillors, J.L.”Agricultural Production Function”.
9. Karam, A.S. and Karan Singh “Economics of Farm Management in India”.
10. M.E. Sharpe and Armonk, N.Y.: Environmental and Natural Resource Economics: Theory, Policy and the Sustainable Society
11. Hartieick, J.M. and Olewiler, N.D.: The Economics of Natural Resource Use.

AG 610	Principles of Food Science & Nutrition	2(2+0)

Theory

UNIT-A Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.);

UNIT-B Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions);

UNIT-C Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods);

UNIT-D Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.);

UNIT-E Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

References:-

1. Heldman, Dennis R. "IFT and the Food Science Profession." Food Technology. October 2006. p. 11.
2. Potter, Norman N.; Hotchkiss, Joseph H. (1998). Food Science. Food science texts series (5th ed.). Springer. ISBN 9780834212657.
3. "Food Science Activity Guides". IFT.org. Archived from the original on March 27, 2015. Retrieved February 2, 2015.
4. John M. de Man.1999. Principles of Food Chemistry (Food Science Text Series), Springer Science, Third Edition
5. John M. de Man. 2009. Food process engineering and technology, Academic Press, Elsevier: London and New York, 1st edn.
6. Fratamico PM and Bayles DO (editor). (2005). Foodborne Pathogens: Microbiology and Molecular Biology. Caister Academic Press. ISBN 978-1-904455-00-4.

AG 611B	Micro Propagation Technologies (Elective Course)	3 (2 + 1)

Theory

UNIT-A Introduction, History, Advantages and limitations; Types of cultures (seed, embryo, organ, callus, cell),

UNIT-B Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture),

UNIT-C Organogenesis (callus and direct organ formation),

UNIT-D Somatic embryogenesis, cell suspension cultures,

UNIT-E Production of secondary metabolites, Somaclonal variation, Cryopreservation

Practical

Identification and use of equipments in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants, Preparation of stocks and working solution, Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

Reference Books

1 BD Sing, 2001. Biotechnology Expanding Horizon. Kalyani Publication

2 H.S.Chawla, Introduction to plant biotechnology. 2001. Pinnalani for Oxford & IBH publishing Co. Pvt. Ltd. New Delhi.

AG 611C	Hi-Tech Horticulture (Elective Course)	3 (2 + 1)

Theory

UNIT-A Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops, Modern field preparation and planting methods.

UNIT-B Protected cultivation: advantages, controlled conditions, method and techniques,

UNIT-C Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding.

UNIT-D Components of precision farming: Remote sensing, Geographical Information System (GIS).

UNIT-E Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA), application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

Practical

Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

AG 611D	System Simulation and Agro-Advisory (Elective Course)	3 (2 + 1)

Theory

UNIT-A System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.

UNIT-B Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis.

UNIT-C Potential and achievable crop production- concept and modelling techniques for their estimation. Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance.

UNIT-D Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity;

UNIT-E Crop weather calendars; preparation of agro-advisory bulletin based on weather forecast.Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models.Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast.Feedback from farmers about the agroadvisory.

References:

1. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad..
2. Varshneya, M.C. and Balakrishna, Pillai, 2003. Text book of Agricultural Meteorology. ICAR, New-Delhi.
3. Sahu, D.D., 2007. Agrometeorology and Remote sensing: Principles and Practices , Agrobios (India) , Jodhpur.
4. Murithy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology , Kalyani Publishers, New-Delhi

AG 801	Production Technology for Bio-agents and Bio-fertilizers	10 (0+10)

Practical:

History and concept of biopesticides.Importance, scope and potential of biopesticide.Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales.Botanicals and their uses.Mass production technology of bio-pesticides.Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium*etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition.Quality control of biopesticides. Isolation and purification of Azospirillum , Azotobacter, Rhizobium, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.Identification of major parasitoids and predators commonly being used in biological control. Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques.

References:

1. Shalini Suri, Biofertilizers and Biopesticides, 2011. APH Publishing Corporation.
2. Arun. K. Sharma. 2011. Handbook of Organic farming. Agrobios (India), Jodhpur.
3. S.P. Palaniappan and K.Annadurai. 2010. Organic farming – Theory and Practice. Scientific Publishers. Jodhpur.

AG-802	Seed Production& Technology	(0+10,)

Practical

Seed production in major cereals: Wheat, Rice, Maize, Sorghum and Bajra. Seed production in major pulses: Urd, Mung, Cowpea, Pigeonpea, Lentil, Gram, Fieldpea. Seed production in major oilseeds: Soybean, Rapeseed and Mustard, Groundnut. Seed production in vegetable crops & Seed spices.

Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Seed certification: Procedure, Field inspection, Preparation of field inspection report. Visit to seed production farms, seed testing laboratories and seed processing plant.

Maintenance of genetic purity during seed production, seedquality; Definition, Characters of good quality seed, different classes of seed.

Reference:

1. Agarwal, R.L.1991.Seed Technology, Oxford & IBH Publishing Co. Delhi
2. Agarwal, P.K. 1999. Seed Technology, ICAR, New Delhi.
3. Subir Sen and Nabinanda Ghosh.1999. Seed Science and Technology, Kalyani Publishers. New Delhi.
4. DhirenraKhare and Mohan S. Bhale.2000. Seed Technology. Scientific Publishers
5. (India), Jodhpur.
6. Maloo,S.R., Intodia, S.K. and Pratap Singh.2008. Beej Pradyogiki.Agrotech Publishing Academy.
7. A.K. Joshi and B.D. Singh.2005.Seed Technology. Kalyani Publishers, New Delhi.
8. Saxena,R.P.1984. BeezSansadhan, GBPA&T, Pantnagar.
9. Singh, B.D. 2005. Plant Breeding. Kalyani Publishing House, New Delhi.

AG 803	Mushroom Cultivation Technology	10 (0+10)

Practical

Role of mushroom in economic growth, nutritional and medicinal values, Taxonomy of mushroom. Pure culture of fungus, preparation of span production Importance of mushroom cultivation, Cultivation procedure of paddystraw mushroom (outdoor/indoor), concepts, types, uses, food values,Acquaintance with edible, non-edible, medicinal and poisonous mushrooms. Reproduction in Fungi,Fungal growth factors,Nutrition of Mushroom.Cultivation procedure of oyster, Mushrooms, Cultivation procedure milk, Mushroom. Organic mushroom production technology. Demonstration on bag preparation of oyster and milk mushrooms. Opportunities and Constraints. Mushroom processing and preservation (drying/ dehydration, pickling and canning) Value addition in mushroom, preparation of value added products, skill development and marketing activities. Mushroom spawn: quality attributes storage and transport, Acquaintance with mushroom contaminants.

References

1. R.D. Rai and T. Arumuganathan (2008). Post Harvest Technology of Mushrooms, Technical Bulletin-2008, NRCM, ICAR, Chambaghat, Solan-1731213, (H.P.).
2. Sharma .B.C&Sharma V. P. Mushroom cultivation in india
3. Tripathi D P, Mushroom Cultivation Export IDH Publishing Company
4. Shubhratar &R. MishraTechnique of Mushroom Cultivation
5. Rajan S. Mushroom Technology .CBS Publisher and Distributer

AG 804	Soil, Plant, Water and Seed Testing	10 (0+10)

Practical

Determination of soil texture by Bouzoukis hydrometer method, capillary rise phenomenon of water in soil column. Laboratory Organization, Laboratory Safety, Quality Control and Standardization Procedures, Data Processing. Concept of seed processing, diversity in seed storage and viability issues, Methods of testing of seed viability. Behavior of seed germination and concept of speed of germination/seed vigor, design of experiments for evaluation of seed related traits. Seed moisture test Germination test – types of germination, Germination test – different methods of germination Seed certification: Procedure.The concentration and composition of dissolved salts in any water determine its quality for irrigation. Mostly the concerns with irrigation water quality relate to possibility of high salt concentration, sodium hazard, carbonate and bicarbonate hazard, or toxic ions (e.g., B or Cl). The analyses required for determining water quality include EC, soluble anions and cations.

References:

1. Maliwal, G. La. and SomaniL.L. 2010. Nature Properties and Management of Sineand Alkali Soils. Agrotech Publishing Academy, Udaipur 313 002. pp. 335.
2. Agrawal, P. K., (2010).Principles of Seed Technology. Indian Council of AgriculturalResearch, New Delhi.
3. Hybrid Seed Production in Field Crops: Principles and Practices by N. C. Singhal, 2003,
    a. Kalyani publication, Delhi

AG 805	Commercial Beekeeping	10 (0+10)

Importance of beneficial Insects, Honey bee species, castes of bees.Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication.Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.Seasonal management for beekeeping.Adoption of beekeeping as entrepreneur.Important schemes of government to beekeeping.

Reference:

1. Srivastava, K.P. 2004. A Text Book of Entomology, Vol. I, Kalyani Publishers, New Delhi.
2. Abrol, D.P. 2013. Beekeeping: A Comprehensive Guide to Bee and Beekeeping, Scientific Publishers, Jodhpur.

AG 806	Poultry Production Technology	(0+10)

Practical

Different types of feather and function and different type of comb and function (Demo). External body poultry. Respiratory, ciculatory diigestive and excretory system. Male and female reproductive system. Egg structure and its function.Nervours and endocrine system (Demo).Immune system.Identification method of poultry.Visit to IDF and IPF to study breeds of poultry and daily routine farm operations and farm records.Culling ofpoultry. Planning and layout of housing forpoultry farm. Hatchery operations, incubation and hatching equipment. Management of chicks, growers and layers. Debeaking, dusting and vaccination

Reference:

1. K.K. Dewett and J.D. Verma (1986) Elementary Economic Theory, S. Chand & Company, New Delhi
2. S.K. Mishra and V.K. Puri (1996) Indian Economy, Himalaya Publishing House, New Delhi
3. G.B. Jakhar and S.G. Beri (1996) Elementary Principles of Economics, Oxford University Press (10^{th} Edition), Delhi

AG 807	Commercial Horticulture	10(0+10)

Practical

Identification of garden tools.Identification of horticultural crops.Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard.Training and pruning of fruit trees.Preparation of potting mixture.Fertilizer application in different crops.Visits to commercial nurseries/orchard.

Reference:

1. Chada, K.L. (2002)Handbook of Horticulture, ICAR, New Delhi.
2. Neeraj Pratap Singh (2005) Basic concepts of Fruit Science, IBDC Publishers
3. Jitendra Singh (2011) Basic Horticulture, Kalyani Publications, New Delhi.

AG 808	Floriculture and Landscaping	10(0+10)

Practical

Study of various features of an ornamental garden with suitable plants and identification of plants for each feature, formal gardens (Mughal, Persian, Italian and French gardens) with their different features, special type of gardens (Terrace garden and Rock garden, Commercial Flowers and their packaging, landscaping Highways, Railway stations, Bus terminus and Airports, landscaping factories, places of historic importance, places of worship, landscaping cities, towns, country side, canals and along the bank of rivers, Visit to nearby places of worship, places of historic importance, Airport and highways for study of landscape design

References:

1. Randhawa, G. S. 1973. Ornamental Horticulture in India. Today and Tomorrow's Printers and Publishers, New Delhi.
2. Aora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishres, Ludhiana
3. Bose, T. K and Mukherjee, D. 1977. Gardening in India. Oxford & IBH Publishing Co. Pvt. Ltd., Calcutta.

AG 809	Food Processing	10(0+10)

Practical

Comparison of conventional and microwave processing of food, Preservation of food by the process of freezing, Drying of food using Tray dryer/other dryers, Preservation of food by canning(Fruit/Vegetable/meat), Cut-out analysis of canned food, Osmotic dehydration, Minimal Processing, Testing of Packaging material.

References-

1. Desrosier NW and Desrosier JN, The Technology of Food Preservation, CBS Publication, New Delhi, 1998
2. Paine FA and Paine HY, Handbook of Food Packaging, Thomson Press India Pvt Ltd, NewDelhi- 1992
3. Potter NH, Food Science, CBS Publication, New Delhi, 1998
4. Ramaswamy H and Marcott M, Food Processing Principles and Applications CRC Press,2006
5. Rao PG, Fundamentals of Food Engineering, PHI Learning Pvt Ltd, New Delhi, 2010
6. Toledo Romeo T, Fundamentals of Food Process Engineering, Aspen Publishers, 1999.

AG 811	Organic Production Technology	10(0+10)

Practical

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

References:

1. Dhama, A.K. 2014.Organic Farming for Sustainable Agriculture (2nd edition), Agrobios (India), Jodhpur.
2. Sharma, Arun K. 2013. A Handbook of Organic Farming, Agrobios (India), Jodhpur
3. Palaniappan, S.P. and Anandurai, K.1999. Organic Farming – Theory and Practice. Scientific Pub. Jodhpur
4. Thapa, U and Tripathy, P. 2006. Organic Farming in India, Problems and prospects, Agrtech, Publising Academy, Udaipur.
5. Singh SP. (Ed.). 1994. Technology for Production of Natural Enemies. PDBC, Bangalore.
6. Lampin N. 1990. Orgnaic Farming. Press Books, Ipswitch, UK.

AG 812	Commercial Sericulture	10(0+10)

Practical

1. Sericulture maps:
   a) World maps and Silk Road
   b) Sericulture map of India and West Bengal
2. Preparation of histograms and pie charts on:-
   a) Production of Textile fibres in India
   b) World Silk Production
   c) Pie chart on mulberry and non-mulberry silk production in India
3. Organization set up in India :- (Demonstration & Exercise)
   a) Govt. of India, b) Five traditional states viz., Karnataka, Andhra Pradesh, Tamilnadu, West Bengal and Jammu & Kashmir
4. Identification and study of Sericulture products:Cotton and Silk Yarn different types, Pupae, Silk Yarn, Noil Yarn
5. Laboratory Note Book, Internal Assessment

References:

1. Charsley, s.r. (1982). culture and sericulture. academic press inc., new york, u.s.a
2. Fao manuals- imulberry cultivation. faorome.
3. Foth, h.d. (1984) fundamentals of soil science. 7th edn., john wiley& sons, new york.
4. Ganga, g., and j. sulochanachetty. (1991) an introduction to sericulture.oxford&ibh publishing company.
5. Hasaoaruga (1994). principles of sericulture (translated from japanese) oxford &ibh publishing co., pvt.ltd. new delhi.
6. Kichisaburo m. (1997) moriculture – science of mulberry cultivation. oxford&ibh
7. Krishnaswami, s.; narasimhanna, m.n.; suryanarayan, s.k and kumararaj, s. (1973) sericulture,manual-2 - silkworm rearing. agriculture service bulletin, fao, rome.

AG 813	AGRIBUSINESS MANAGEMENT	10(0 +10)

Practical

Study of Agri - input markets. Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD.Preparations of projects and Feasibility reports for agribusiness entrepreneur.Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques.Case study of agro-based industries. Trend and growth rate of prices of agriculturalcommodities. Net present worthtechnique for selection of viableproject.Internal rate ofreturn.

Reference:

1. *Agribusiness Management* and Trade. Language: English. Pages: 239. Author: K.B. Vedamurthy.
2. G. L. Meena S. S. Burark D. C. Pant Rajesh Sharma published Fundamentals of *Agribusiness Management*
3. Agribusiness Management (Routledge Textbooks in Environmental and Agricultural Economics) 4th Edition by Freddie L. Barnard (Author), Jay T. Akridge (Author), Frank J. Dooley (Author), John C. Foltz (Author), Elizabeth A. Yeager (Author)
4. Agribusiness and Farm Management at a Glance Vol 1: Objective Fundamentals 2nd ed by L L & G L Meena Somani
5. Fundamentals of Agribusiness Finance by Ralph W. Battles,Robert C. Thompson
6. Farm Business Management: The Fundamentals of Good Practice (Farm Business Management Series) by P.L. Nuthall

AG 814	Agro-Advisory Services	10(0+10)

Practical:

Overview of integrated Agro- Advisory services in India, variability in weather/climate impacting agriculture. Precipitation events.Needs of farmers - agro-climate & its variability Weather forecast Short & Medium Range Extended range Seasonal Scale Climate Prediction Pest/disease prognosis & control measures Advice on sowing/harvest, cultivar selection, farm input management & intercultural operations.Strategies to empower farmers- Generate information on Weather & Climate (Observations & Forecast) Impact of likely weather on crop Impact of likely weather on P&D Weather based input management Weather sensitivity of farm operations Develop decision making Tools: Data base Crop/Soil/P&D Modeling Remote Sensing & GIS Crop/Soil Monitoring, Drought Monitoring etc. Disseminate information Outreach, capacity building, Feedback. Operational Agro-Meteorology -TIER 1 Apex Policy Planning Body, Delhi Network of 130 Agromet Field Units TIER 2 National Agromet Service HQ Execution, Pune Network of AAS units in the country TIER 3 State Agromet Centres (28) Coordination/Monitoring TIER 4 Agromet Field Units Agroclimatic Zone Level (130) TIER 5 District Level Extension and Training Input Management as advisory~640 Service Goal: Locale & Crop specific Advisory & Farmer Level Outreach.

Reference

1. Chattopadhyay, N. and Chandras, S., Agrometeorological advisory services for sustainable development in Indian agriculture. Biodiversity International Journal. 2(1): 13-18 (2018).
2. Dhakar, R., Chandran, M.A.S., Nagar, S. and Kumar, S., Significance of Agrometeological advisory services in changing climate scenario. Indian Farming. 66(8): 44-46 (2016).
3. Khobragade, A.M., Ade, A.U. and Vaseem, A.M.G., Usefulness of Agro Advisory Services (AAS) Regarding Climate Change in Selected Villages of AICRPAMNICRA Project for Marathwada Region. Journal of Agroecology and Natural Resource Management. 1(3): 127-129 (2014).
4. Nesheim, I., Barkved, L. and Bharti, N., What Is the Role of Agro-Met Information Services in Farmer Decision-Making? Uptake and Decision-Making Context among Farmers within Three Case Study Villages in Maharashtra, India. Agriculture. 7(70): 1-16 (2017).
5. Palkhiwala, K., Agromet Advisory Services - Farmers Empowerment. Press Information Bureau, Government of India. Special Service and Features, May 15, 2012 17: 20 IST (2012).
6. Singh, K.K., Weather forecasting and agromet advisory services in India. India Meteological Department, Ministry of Earth Sciences, Press released, New Delhi. 22: 240-243 (2015).

AG-815	Nursery Management	10(0+10)

Practical

Identification of propagation material and equipment.Layout of nurseries and management of progeny orchard. Use of protrays and root trainers in vegetable nursery.Raising and maintenance of root stock. Multiplication of plants by sexual methods.Raising of seedlings. Propagation by cuttings in Horticultural crops.Propagation by budding in Horticultural crops.Propagation by grafting in Horticultural crops.Use of plant growth regulators in propagation. Potting, repotting or lifting of saplings (packaging) for transportation. Use of propagation media.Tetrazolium salt test for determining germination. Visit of commercial nurseries.

Reference Books

1. Bose, T.K. Mitra, SK and Sandhu MK (1986). Propagation of tropical & sub-tropical horticultural crops, Naya Prakash, Calcutta.
2. Hartman, HT and Kester, DE (1986). Plant propagation principles and practices. Prentice Hall of India Pvt. Ltd., Bombay
3. Gill, SS. Bal, JS and Sadhu, AS (1985). Raising Fruit Nursery, Kalyani Publishers, New Delhi.

BCA-605D Entrepreneurship

UNIT – I **Introduction to Entrepreneurship:** Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies.Entrepreneurial growth and development.

UNIT – II **Creativity and Innovation:** Creativity and Innovation: Concepts Shifting Composition of the Economy Purposeful Innovation & the 7 Sources of Innovative Opportunity The Innovation Process.

Innovative Strategies : Strategies that aim at introducing an innovation. Innovation &entrepreneurship: Can they work together? Planning-incompatible with Innovation &entrepreneurship.

UNIT – III **Entrepreneurial Motivation:** Need for continuous learning & relearning Acquiring Technological Innovation Entrepreneurial motivation (nAch story) Achievement Motivation in Real life. Case Study.

UNIT – IV **International Entrepreneurship:** Concepts and Nature of International Entrepreneurship.The changing International environment. Ethics and International Entrepreneurship.Strategic Issues in International Entrepreneurship.

UNIT – V **Problem Identification and Problem Solving:** Problem Identification. Problem solving.Innovation and Diversification

BBA 503: Entrepreneurship Development

Course Contents

Unit I **Entrepreneur & Opportunity Recognition**

Entrepreneur, characteristics, functions, types, Entrepreneurship - meaning - Role of Entrepreneurs in Economic Development, Self – assessment, Motivations to start a business, The Entrepreneur Personality, (Mental Sequences in Idea Development, Go/No-Go Decisions,) Preliminary Screening Questions, Alternative Competitive Entry Wedges**.**

Unit II **Writing Business Plan**

Feasibility study, Product selection - Form of Ownership - Licensing etc, projection Identification - Meaning, Significance - contents and formulation of a project report - planning commission guidelines, Developing business plan, Business plan appraisal

Unit III **Start-Up Factors**

Entry barriers and firm positioning, Comparison of a large and small start up, (Technology absorption), Institutional support to entrepreneurship Development (networking with Industries and Institutions)

Unit IV **Stages of Growth in Entrepreneurial Ventures**

Stages of growth model, Business crisis, Barriers to small firm, growth Factors in continued entrepreneurship in small firms, International entrepreneurship

Unit V **Setting up a Small Business Enterprise**

Meaning and definition of small scale industries; role of small scale industries, Institution supporting small business enterprises. Importance and functions of Financial Management , Production Management and HR Management in SSIs ,Women & minority entrepreneurs

Text Books:

1. Dollinger Marc J, **Entrepreneurship: Strategies and Resources**, III Ed., 1995, Irwin Press
2. Hisrich Robert D and Peters Michael P, **Entrepreneurship**, V Ed., TMH New Delhi
3. Management of small scale industry, Himalaya publication house

Suggested Readings:

1. Kuratko Donald F and Hodgetts Richard M. **Entrepreneurship: A Contemporary Approach** Harcourt College Publisher.
2. Zimmerer and Scarborough, **Entrepreneurship and New Venture Formation**. Prentice Hall
3. Timmons Jeffry A, **New Venture Creation: Entrepreneurship for the Twenty First Century**, Irwin

BSC501E: CHEMISTRY OF COSMETICS & PERFUMES

UNIT	CONTENTS	CONTACT HOURS
I	A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions.	8
II	A general study including preparation and uses of the following: face powder, lipsticks, talcum powder, nail enamel.	8
III	A general study including preparation and uses of the following: creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours.	5
IV	Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandal wood oil,	5
V	Essential oils and their importance in cosmetic industries with reference to eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.	4
	TOTAL	30

S. No.	Experiments
1	Preparation of talcum powder.
2	Preparation of shampoo.
3	Preparation of enamels.
4	Preparation of hair remover.
5	Preparation of face cream.
6	Preparation of nail polish and nail polish remover.

Reference Books:

1 E. Stocchi: *Industrial Chemistry*, Vol -I, Ellis Horwood Ltd. UK.

2 P.C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.

3 Sharma, B.K. & Gaur, H. *Industrial Chemistry,* Goel Publishing House, Meerut (1996).