



UNIVERSITY OF AGRICULTURAL SCIENCES, DHARWAD - 580 005



SYLLABUS

**Courses for
the Undergraduate Programme of
of**

B.Sc.

(Agricultural Marketing and Cooperation)

SEMESTER SYSTEM

2016-2017

**UNIVERSITY OF AGRICULTURAL
SCIENCES, DHARWAD**



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Schedule of Courses for B.Sc. (Ag Maco)

I. CORE COURSES

Agricultural Marketing and Cooperation		
AMR 101	Introduction to Agricultural Marketing	2 (1+1)
AMR 102	Principles of Management	2 (2+0)
AMR 201	Agricultural Marketing Legislation and Policies	3 (3+0)
AMR 203	Agricultural Input Marketing	2 (1+1)
AMR 202	Agricultural Commodity and Livestock Marketing	3 (2+1)
AMR 204	Marketing Management	2 (2+0)
AMR 301	Consumer Behaviour and Market Research	2 (1+1)
AMR 302	Recent Advances in Agricultural Marketing	2 (1+1)
AMR 303	International Trade and Export Management	3 (2+1)
AMR 304	Market Information System and Futures Trading	2 (2+0)
AMR 305	Agricultural Price Analysis	2 (1+1)
COP 101	Theory and Practice of Cooperation	2 (1+1)
COP 201	Management of Cooperatives	2 (2+0)
AFN 101	Monetary Theory and Public Finance	3 (3+0)
AFN 201	Theory and Practice of Banking	3 (2+1)
AFN 301	Agricultural Finance and Insurance	2 (1+1)
AFN 302	Agricultural Project Analysis	3 (2+1)
GTC 101	Standardization, Grading and Quality Control in Crop Produce	3 (2+1)
GTC 201	Standardization, Grading and Quality Control in and Livestock Livestock Products	2 (1+1)
CAC 101	Accountancy	3 (2+1)
CAC 201	Advanced Accounting and Auditing	3 (2+1)
Total		51 (36+15)

Agricultural Economics

ECN 101	Macro Economics	2 (1+1)
AEC 101	Fundamentals of Agricultural Economics	2 (2+0)
AEC 201	Farm Management, Production and Resource Economics	2 (1+1)
Total		6 (4+2)

Agricultural Engineering

AEG 201	Farm Machinery and Power	2 (1+1)
AEG 202	Protected Cultivation and Secondary Agriculture	2 (1+1)
Total		4 (2+2)

Agricultural Entomology

AET 101	Fundamentals of Entomology	3 (2+1)
AET 301	Pests of Crops and Stored Grain and their Management	3 (2+1)
AET 302	Management of Productive Insects	1 (0+1)
Total		7 (4+3)

Agricultural Extension Education

AEX 101	Constitution of India, Rural Sociology and Educational Psychology	2 (1+1)
AEX 103	Fundamentals of Agricultural Extension Education	3 (2+1)
AEX 202	Communication Skills and Personality Development	2 (1+1)
AEX 301	Entrepreneurship Development and Business Communication	2 (1+1)
Total		9 (5+4)

Statistics, Computer Application and IPR

AST 201	Agri-informatics	1 (0+1)
AST 202	Statistical Methods	3 (2+1)
AST 302	Intellectual Property Rights	1 (0+1)
Total		5 (2+3)

Agronomy

AGR 104	Introduction to Agronomy	2 (1+1)
AGR 201	Crop Production Technology – I (<i>Kharif</i> crops)	3 (2+1)
AGR 203	Crop Production Technology – II (<i>Rabi</i> crops)	2 (1+1)
AGR 202	Practical Crop Production - I (<i>Kharif</i> crops)	1 (0+1)
Total		8 (4+4)

**Biochemistry / Biotechnology/Physiology / Microbiology/
Environmental Sci./Forestry**

AMB 201	Agricultural Microbiology	3 (2+1)
FOR 101	Introduction to Forestry	2 (1+1)
ENS 202	Environmental Studies and Disaster Management	2 (1+1)
BTH 302	Fundamentals of Plant Biotechnology	1 (1+0)
CPH 103	Post-harvest Physiology of Market Produce	1 (1+0)
Total		9 (6+3)

Genetics and Plant Breeding

GPB 102	Fundamentals of Genetics and Plant breeding	2 (1+1)
Total		2 (1+1)

Horticulture

HRT 102	General Horticulture	2 (1+1)
HRT 302	Post-harvest Management and Value Addition of Fruits and Vegetables	2 (1+1)
Total		4 (2+2)

Plant Pathology

PAT 101	Fundamentals of Plant Pathology	3 (2+1)
PAT 304	Post-harvest Diseases and their Management	2 (1+1)
Total		5 (3+2)

Seed Science and Technology

SST 201	Principles of Seed Technology	3 (1+2)
Total		3 (1+2)

Soil Science and Agricultural Chemistry

SAC 102	Introduction to Soil Science	3 (2+1)
SAC 301	Manures, Fertilizers and Soil Fertility Management	3 (2+1)
Total		6 (4+2)

Animal Production

ASC 202	Livestock, Poultry and Fish Production Management	3 (2+1)
Total		3 (2+1)

Food Science

FSN 103	Principles of Food Science and Nutrition	1 (1+0)
Total		1 (1+0)

Language

ENG 101	Comprehension and Spoken English	2 (1+1)
Total		2 (1+1)

Total of Core Courses**125****II. ELECTIVES****(Any three)*A student can select three courses out of the following offered during 5th, 6th and 8th Semesters.**

AMR 311	WTO and Agriculture	3 (3+0)
AMR 312	Food Safety and Standards	3 (2+1)
AMR 313	Retailing Management	3 (3+0)
AMR 314	Value Chain in Agriculture	3 (2+1)
AMR 315	E-Commerce in Agribusiness	3 (2+1)
AFN 311	Recent Advances in Banking	3 (2+1)
Total		9

III. Rural Agri-Institutional Work Experience and Agro-industrial Attachment (RAIWE & AIA)- Student READY Programme

RAIWE & AIA

SRP 401	Attachment to villages, KVKs, Research Stations, Other Institutions	14 (0+14)
SRP 402	Attachment to Plant Clinics and Agro-Industries	6 (0+6)
Total		20 (0+20)

Experiential Learning (EPL)/HOT (Any Two)*

A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the VIII semester.

Course No	Title of the Module	Departments	Credits
AEL 401	Production Technology Bio-agents and Bio-fertilizer	AMB/ PAT/ AET	0+10
AEL 402	Seed Production and Technology	SST	0+10
AEL 403	Mushroom Cultivation Technology	AMB	0+10
AEL 404	Soil, Plant, Water and Seed Testing	SAC/SST	0+10
AEL 405	Commercial Beekeeping	AET	0+10
AEL 406	Poultry Production Technology	ANS	0+10
AEL 407	Commercial Horticulture	HRT	0+10
AEL 408	Floriculture and Landscaping	HRT	0+10
AEL 409	Food Processing	FSN/AEG	0+10
AEL 410	Agriculture Waste Management	AMB/ AGR/ AET	0+10
AEL 411	Organic Production Technology	AGR/ SAC/ AET/ PAT/ AMB	0+10
AEL 412	Commercial Sericulture	AET	0+10
AEL 415	Agri-business Management	ABM	0+10
Total			20 (0+20)
Total – Gradial Courses			
(Core Courses+Electives+Student READY)			174

IV. NON-GRADIAL COURSES

NCC101/		
PED 101	NCC/Physical Education & Yoga Practices -I	1(0+1)
NCC102/		
PED 102	NCC/Physical Education & Yoga Practices -II	1(0+1)
NSS 201	National Service Scheme	1(0+1)
AEX 102	Human Values & Ethics	1(1+0)
TOR 401	All India Study Tour	1(0+1)
KAN 101 /		
KNK 101	Kannada Krishi Bhag-1 /Kannada Bhashe	1(0+1)
KAN 102 /		
KNK 102	Kannada Krishi Bhag-2 /Kannada Sanskriti	1(0+1)
Total		7 (1+6)

Total (Gradial+ Nongradial) 181

V. REMEDIAL COURSES

GPB 111	Introductory Biology	2(1+1)
OR		
MAT 111	Elementary Mathematics	2(2+0)
Total		2
Grand Total		183

Abstract of Credit Hours

Sl. No.	Courses	Proposed
I.	Core Courses	125
II.	Electives	09
III.	Student READY:	
	a) RAIWE + AIA	20
	b) AEL	20
IV.	Non-gradial Courses	07
Total		181
V.	Remedial Courses	02
Grand Total		183

SUGGESTED PERMANENT SCHEDULE OF SEMESTER-WISE DISTRIBUTION OF COURSES FOR B.Sc.(AGMACO)

Sl. No.	Course No	Title of Course	Credit Hours
I YEAR I SEMESTER			
1.	AEC 101	Fundamentals of Agricultural Economics	2 (2+0)
2.	ENG 101	Comprehension and Spoken English	2 (1+1)
3.	AEX 101	Constitution of India, Rural Sociology and Educational Psychology	2 (1+1)
4.	FSN 103	Principles of Food Science and Nutrition	1 (1+0)
5.	SAC 102	Introduction to Soil Science	3 (2+1)
6.	AMR 101	Introduction to Agricultural Marketing	2 (1+1)
7.	AFN 101	Monetary Theory and Public Finance	3 (3+0)
8.	COP 101	Theory and Practice of Cooperation	2 (1+1)
9.	KAN 101/ KNK 101	Kannada Krishi Bhaga-1/ Kannada Bhashe*	1 (0+1)*
10.	AEX 102	Human Values & Ethics*	1 (1+0)*
11.	NCC 101/ PED 101	NCC/Physical Education & Yoga Practices-I*	1 (0+1)*
1.	GPB 111	Introductory Biology**	2 (1+1)**
OR			
2.	MAT 111	Elementary Mathematics**	2 (2+0)**
Total			17+3*+2**

* Non-gradual courses;

** Remedial course

Sl. No.	Course No	Title of Course	Credit Hours
I YEAR II SEMESTER			
1.	AEX 103	Fundamentals of Agricultural Extension Education	3 (2+1)
2.	FOR 101	Introduction to Forestry	2 (1+1)
3.	PAT 101	Fundamentals of Plant Pathology	3 (2+1)
4.	AET 101	Fundamentals of Entomology	3 (2+1)
5.	AGR 104	Introduction to Agronomy	2 (1+1)
6.	GPB 102	Fundamentals of Genetics and Plant Breeding	2 (1+1)
7.	HRT 102	General Horticulture	2 (1+1)
8.	ECN 101	Macro Economics	2 (1+1)
9.	AMR 102	Principles of Management	2 (2+0)
10.	CAC 101	Accountancy	3 (2+1)
11.	KAN 102/ KNK 102	Kannada Krishi Bhaga-2/ Kannada Sanskriti*	1 (0+1)*
12.	NCC 102/ PED 102	NCC/Physical Education & Yoga Practices-II*	1 (0+1)*
Total			24+2*

Sl. No.	Course No	Title of Course	Credit Hours
II YEAR I SEMESTER			
1.	AGR 201	Crop Production Technology – I (<i>Kharif Crops</i>)	3 (2+1)
2.	SST 201	Principles of Seed Technology	3 (1+2)
3.	AEC 201	Farm Management, Production and Resource Economics	2 (1+1)
4.	AGR 202	Practical Crop Production - I (<i>Kharif crops</i>)	1 (0+1)
5.	AMB 201	Agricultural Microbiology	3 (2+1)
6.	AEG 201	Farm Machinery and Power	2 (1+1)
7.	AST 201	Agri-informatics	1 (0+1)
8.	ASC 202	Livestock, Poultry and Fish Production Management	3 (2+1)

9.	AMR 201	Agricultural Marketing Legislation and Policies	3 (3+0)
10.	AMR 202	Agricultural Commodity and Livestock Marketing	3 (2+1)
11.	NSS 201	National Service Scheme-I*	1 (0+1)*
Total			24+1*

Sl. No.	Course No	Title of Course	Credit Hours
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II YEAR II SEMESTER

1.	AGR 203	Crop Production Technology –II (<i>Rabi</i> Crops)	2 (1+1)
2.	AEG 202	Protected Cultivation and Secondary Agriculture	2 (1+1)
3.	ENS 202	Environmental Studies and Disaster Management	2 (1+1)
4.	AEX 202	Communication Skills and Personality Development	2 (1+1)
5.	CPH 103	Post Harvest Physiology of Market Produce	1 (1+0)
6.	AST 202	Statistical Methods	3 (2+1)
7.	AMR 203	Agricultural Input Marketing	2 (1+1)
8.	AMR 204	Marketing Management	2 (2+0)
9.	AFN 201	Theory and Practice of Banking	3 (2+1)
10.	GTC 101	Standardization, Grading and Quality Control in Crop Produce	3 (2+1)
Total			22

* Non-gradual courses

Sl. No.	Course No	Title of Course	Credit Hours
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III YEAR I SEMESTER

1.	PAT 304	Post-harvest Diseases and their Management	2 (1+1)
2.	SAC 301	Manures, Fertilizers and Soil Fertility Management	3 (2+1)
3.	AET 301	Pests of Crops and Stored Grain and their Management	3 (2+1)

4.	AEX 301	Entrepreneurship Development and Business Communication	2 (1+1)
5.	AMR 301	Consumer Behaviour and Market Research	2 (1+1)
6.	AFN 301	Agricultural Finance and Insurance	2 (1+1)
7.	COP 201	Management of Cooperatives	2 (2+0)
8.	CAC 201	Advanced Accounting and Auditing	3 (2+1)
9.		Elective-1	3 (2+1)
Total			22

Sl. No.	Course No	Title of Course	Credit Hours
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III YEAR II SEMESTER

1.	HRT 302	Post-harvest Management and Value Addition of Fruits and Vegetables	2 (1+1)
2.	AET 302	Management of Productive Insects	1 (0+1)
3.	BTH 302	Fundamentals of Plant Biotechnology	1 (1+0)
4.	AST 302	Intellectual Property Rights	1 (0+1)
5.	AMR 302	Recent Advances in Agricultural Marketing	2 (1+1)
6.	AMR 303	International Trade and Export Management	3 (2+1)
7.	AMR 304	Market Information System and Futures Trading	2 (2+0)
8.	AMR 305	Agricultural Price Analysis	2 (1+1)
9	AFN 302	Agricultural Project Analysis	3 (2+1)
10	GTC 201	Standardization, Grading and Quality Control in Livestock and Livestock Products	2 (1+1)
11		Elective- 2	3 (2+1)
Total			22

IV YEAR I SEMESTER

SN.Rural Agri-Institutional Work Experience and Agro-industrial Attachment(RAIWE & AIA)

Course No.	Activities	No. of weeks	Credit Hours
SRP-411	General orientation and On campus training by different faculties	1	14
	Village attachment	8	
	Unit attachment to University/ College KVK/ Research Station/ Other institutions	5	
	SRP-412	Plant clinic	2
	Agro-Industrial Attachment	3	04
	Project Report Preparation, Presentation and Evaluation	1	
	Total weeks for RAIWE & AIA	20	20
TOR-401	All India Study Tour*		1 (0+1)*
	Total		20 + 1*

Sl. No.	Course No	Title of Course	Credit Hours
IV YEAR II SEMESTER			
Elective- 3	3 (2+1)		
AEL-401	Module 1		10 (0+10)
AEL-402	Module 2		10 (0+10)
	Total		23

* Non-gradual courses

Syllabus

I. Core Courses

1. Agricultural Marketing

1. Introduction to Agricultural Marketing AMR-101 2 (1+1)

Theory :Meaning and definition of the terms-market and marketing. Evolution and development of agricultural marketing. Marketed and marketable surplus. Classification of markets-buyers and sellers markets, rural marketing and its importance. Approaches to the study of marketing. Marketing functions-Meaning and classifications. Packaging, transportation, grading and standardization, warehousing, processing, market information and intelligence, financing and risk management. Methods of sale. Perfect and imperfect markets and their characteristics. Price determination in perfect and imperfect markets. Price discovery. Marketing institutions, agencies and marketing channels. Marketing costs, margins, price spread and marketing efficiency. Regulation of agricultural marketing: objectives and importance. Green marketing concepts with respect to agricultural products

Practicals :Review of agricultural marketing concepts, visit to village Shandy; Visit to Regulated Markets; Visit to Taluka Agricultural Produce Co-operative Marketing Society (TAPCMS); Visit to State Warehousing Corporation(SWC); Visit to Central Warehousing Corporation(CWC); Estimation of returns to storage, Estimation of marketed and marketable surplus; Estimation of marketing costs, margins and price spread; Visit to Food Corporation of India (FCI); Visit to Cotton Corporation of India (CCI); Visit to Input dealers; Visit to Raitha Santhe; Identification of marketing channels and compromising of efficiency

Suggested references:

1. Acharya, S.S, Agricultural Production, Marketing and price policy- A study of Pulses, Mittal Publications, New Delhi.
2. Acharya, S.S. and N.L. Agarwal, Agricultural Prices- Analysis and Policy, Oxford and IBH, New Delhi.
3. Amarchand, D. and B. Varadharajan, Introduction to marketing, Vikas Publishing House Private Ltd., New Delhi.
4. Bunk, M.E. and L.B. Darrah, Marketing of Agricultural Products, The Ronald Press Company, New York.

5. Gupta, A.P., Marketing of Agricultural Produce in India, Vora and Co-Publishers Pvt. Limited, Bombay.
6. Jain, S.C., Principles and Practices of Agricultural Marketing and Prices, Vora and Co Publishers Pvt. Limited, Bombay.
7. Jagadish Prasad, Encyclopedia of Agricultural Marketing, Mittal Publishers Pvt. Limited, Bombay.
8. Kahlon, A.S. and M.V. George, Agricultural Marketing and Price Policies, Allied Publishers Private Limited, New Delhi.
9. Kohls, R.L. and J.N. Uhl, Marketing of Agricultural Products, Macmillan Publishing Company Inc., New York.
10. Nayyar, H. and P. Ramaswamy, Globalisation and Agricultural Marketing, Rawat Publications, Jaipur.
11. Prasad A. Shivarama, Agricultural Marketing in India, Mittal Publications, New Delhi.
12. Singhal, A.K., Agricultural Marketing in India, Anmol Publications, New Delhi.

2. Principles of Management AMR-102 2 (2+0)

Introduction to management-Management functions -Management levels-Managerial roles-Management skills-Definitions of management-Role of management. Evolution of Management thought-Management Theories-Scientific Management-Administrative Management-Bureaucratic Organisation - Human Relations School-Behavioural Schools -Modern Management Theory -Systems Theory -Contingency Theory . Functions of Management: Planning: Nature and importance-Purpose of planning-Forms of planning- types of planning -Steps in planning -Limitations of planning-Decision Making-Meaning-Types of decisions.Organizing: Meaning-Nature and purpose of organizing- Span of Management-Principles of organizing-Organization structure and design-Authority-Delegation and Decentralization- Informal organisation- Managing Human Resources-Staffing-importance- human resource planning- recruitment- sources of recruitment- Recruitment process-Selection-steps in the selection process-Orientation on socialization-Training and development-Training programs - Management development programmes.Leading- Leadership-meaning - Leadership behaviour & styles -Human factors in Managing-Motivation-Meaning and purpose-Motivational Theories-Motivational techniques- - Communication-meaning-objectives-Importance-types-barriers.Controlling:-

Meaning and nature of controlling-Essential elements of controlling-Requirements and effective control system.Ethics & Social Responsibility in Business: Meaning & implications-Responsibility to customers - Consumers' Associations- Employees-Business community- Shareholders and State-Social audit.

Suggested references:

1. Andrew J. Dubrin, 2012, Essentials of Management, Thomson Southwestern, 9th edition.
2. Charles W.L Hill and Steven L McShane, 2007, Principles of Management, McGraw Hill Education, Special Indian Edition
3. Harold Koontz and Heinz Wehrich, 2012, Essentials of management: An International and Leadership Perspective, 9th edition, Tata McGraw-Hill Education
4. Samuel C. Certo and Tervis Certo, 2012, Modern management: concepts and skills, Pearson education, 12th edition

3. Agricultural Marketing Legislation and Policies AMR-201 3 (3+0)

Evolution of market legislation. Need and scope for market legislation. Review of Agricultural Produce Market Acts in India and Karnataka. Distribution of legislative powers between parliament and state Assemblies. Salient features of Essential Commodities Act-1955 Food Safety and Standards Act 2006, Consumer Protection Act 1986, Patent Act 2002, Monopolies and Restrictive Trade Practices Act/ Competition Act 2002, Forward Markets Act 1952, Standards of Weights and Measures Act 1976, The Central warehousing Corporation Act. Provisions of Karnataka Agricultural Produce Marketing (Regulation and Development) Act, 1966 and Rules 1968. Establishment of Market, Constitution of Market Committee, Special Market, conduct of business of the market committee, Powers and duties of Market committee, staff of the Market committee, regulation of the contract farming trade, Karnataka state Agricultural Marketing Board - constitution and functions. Role of State Department of Agricultural Marketing and Directorate of Agricultural Marketing and Inspection. Agricultural Marketing Policies of the government – Administered price policies – Commission for Agricultural Costs and Prices (CACPC) and its working. Policies of procurement, Levy and public distribution system. Minimum support prices, ceiling price and parity prices. Floor price scheme. Food security policy - procurement, buffer stock, distribution, subsidies. Food zone. Agri Export Zones (AEZs)/ Export Oriented Units (EOUs).

Suggested references:

1. Acharya, S.S. and Agarwal, N.L., Agricultural Marketing in India
2. Agricultural Legislation in India, Govt. of India, Govt. Press, New Delhi
3. Elner, R. Kiehl, Agricultural Marketing in India- Role, strategies and implications.
4. Jain, S.C., Principles and practices of Agricultural Marketing and prices
5. Jayaprakash, The Essential Commodities Act, 1955
6. Karnataka Agricultural Produce Marketing (Regulation) Act, 1966, Lawyer's Law Book, Bangalore
7. Kulkarni, K.R., Agricultural Marketing in India
8. Monopolies and Restrictive Trade Practices Act, Govt. of India, Govt. Press, New Delhi
9. Rajgopal, Planning Agricultural Marketing in India
10. Singh, C.P., Regulated markets in India

4. Agricultural Commodity and Livestock Marketing AMR-202 3 (2+1)

Theory: Production and marketing system and important markets for major food and non-food field crops. Problems in the marketing of major field crops. Marketable and marketed surplus of field crops. Export avenues for the major field crops. Import and export policies concerning field crops. State policies in food grain trading. Food security programmes of the state and their implications for food grain marketing. FCI and State Food and Civil Supplies Corporation. Production and marketing of important horticultural crops. Agencies involved in promoting production, marketing and export of major horticultural crops. Scope for foreign trade in horticultural crops. Problems in domestic and export trade of major horticultural crops. Remedial measures for trade promotion. Importance of livestock in the economy. Production scenario of livestock and livestock products and their utilization. Livestock marketing in India and other important countries. Marketing of cattle, sheep, poultry, goat and swine. Marketing of livestock products: marketing of milk, eggs, wool and meat. Export trade in livestock and their products. Problems in the marketing of livestock and their products. Remedial measures. Cooperatives engaged in production and marketing of livestock and their products. Organizations for promotion of trade in livestock and their products. National Dairy Development Board (NDDDB) and Karnataka State Milk Producer's Cooperative Marketing Federation (KMF) and their operation flood programmes. Karnataka Sheep and Wool Development Corporation. Fisheries resources in India and world – Inland and Marine. Fish

and fish products – their uses and importance. Fish marketing scenario in the country. Fisheries Co-operatives. Fisheries Development Corporation and other organizations engaged in promoting fisheries sector. Export trade in fisheries. Problems in fish marketing and remedial measures Importance of sericulture in economy. Preparation of cocoons for marketing. Systems of cocoon marketing in the country. Marketing of cocoons in filature and seed markets. Import and export of silk and silk products. Problems and corrective measures.

Practicals: Estimation of marketing costs and margins in major food crops, non-food crops, horticultural crops. Visit to primary markets and secondary markets and terminal markets for crop produce. Visits to specialized trade promotion organizations for crop produce, TAPCOMS, HOPCOMS, Cotton Corporation of India etc. Estimation of marketing costs and margins in milk and milk products. Visits to KMF, organized dairy units in private sector, slaughter house, poultry units, poultry cooperatives. Estimation of marketing costs and margins in eggs. Visit to wool weavers cooperatives. Estimation of marketing costs and margins in fisheries. Visit to fisheries cooperatives, fish market, commercial silkworm rearing unit. Exercise on economics of cocoon production, preparation of cocoons for marketing. Visit to sericulture growers cooperatives. Estimation of marketing costs and margins in silk cocoons, visit to cocoon market.

Suggested references: 1. Acharya, S. S. and Agarwal, N. L., Agricultural Marketing in India 2. Agricultural Economics, Kalyani Publications 3. Richard L. Kohls, Marketing of Agricultural Products 4. Ruddra Dutt and Sundharam K.P.M., Indian Economics

5. Agricultural Input Marketing AMR-203 2 (1+1)

Theory: Importance, scope and characteristics of input marketing. Derived demand. Input marketing V/s output marketing. Input demand and commercial agriculture. Factor Pricing. Meaning of rent, types of rent (economic rent, contract rent, quasi rent, scarcity rent), theories of rent (Ricardian theory of rent, Modern theory of rent), Meaning of wages, methods of wage payment (cash, kind, time, piece, task), types of wages (money wage, real wage), theories of wages (subsistence theory, wage fund theory, residual claimant theory, marginal productivity theory, modern theory), Meaning of Interest: Theories of interest (Productivity theory, Subsistence theory, Austrian theory, Time preference theory). Theories of interest rate determination (classical theory, loanable fund theory, liquidity preference theory) Meaning of Profit: Theories of Profit (Rent theory, wage

theory, Dynamic theory, risk theory, uncertainty bearing theory, innovations theory, monopoly theory) Seed marketing -Importance, consumption, supply of seeds, agencies involved in marketing channels of distribution, MNC's - marketing strategies. Government agencies- KSSC, NSC. Government policy on seed marketing. Fertilizer marketing – importance, consumption, regional disparity in consumption, demand and supply for fertilizers. Agencies involved in fertilizer marketing- Public, Private, Co-operative sectors. Channels of marketing. Partial decontrol. Pricing policies and subsidies. Marketing of agricultural credit products. Farm machinery and implements. Types of pre and post harvest farm machinery. Marketing of farm machinery- agencies, demand and supply. Plant protection chemicals - importance, crop wise utilization, size of Indian pesticide market. Demand and supply of pesticides. Agencies in marketing. Channels of marketing. Market share. Land market reforms – tenancy, ceiling, elasticity and pricing. Labor markets - productivity, heterogeneity, wage differentials - skill differentials. Theory of supply and demand. Ground water marketing - importance and emergence of ground water markets - rationale, pricing. Factors affecting ground water markets - economic, political, and institutional. Equity and sustainability of groundwater markets. Existing practices. Government policy. Legislation on groundwater marketing. Energy- demand and supply, pricing and disturbing policies. IT applications in agri- input marketing. E- Marketing. Role of IT in decision support system- private information shops/ kiosks- emergence of agri-web-portals. Emerging IT needs in agri-input marketing Government policy regarding agril. inputs (subsidy, custom hiring units etc.). Estimation and forecasting of demand for and supply of agricultural inputs

Practical: Study of marketing channels for seeds, Study of marketing channels of fertilizers, Study of marketing channels of plant protection chemicals, Study of marketing channels of farm machinery and implements , Study of groundwater marketing , Study of supply of farm energy, Estimation of demand for seeds, Estimation of demand for fertilizers, Estimation of demand for plant protection chemicals, Estimation of demand for land and labour, Estimation of demand for farm machinery and implements, Visit to Agricultural Implement Manufacturing Unit, Visit to RSK, Visit to IFFCO/ KRIBCO, Visit to fertilizer and PPC marketing agencies, Visit to NSC and KSSC outlets, Visit to implement custom hiring unit

Suggested references: 1. Acharya, S.S. and Agarwal, N.L., Agricultural Marketing in India 2. Agricultural Economics, Kalyani Publications 3. Ruddra Dutt and Sundharam K.P.M., Indian Economics

6. Marketing Management AMR-204

2 (2+0)

Marketing – definitions, modern marketing- selling v/s marketing. Management- nature, characteristics. Functions of management – planning, organizing, influencing, controlling. Roles of marketing managers. Decisions making. Future of management- Tasks and challenges. Marketing Management-Management process, opportunities, environment and external uncontrollable forces. Technological change and marketing. Trends in marketing environment. 4 P's of marketing mix. Customer demand. Personal characteristics- customer response. Market segmentation- basis, requisites for good segmentation. Market structure. Market conduct. Market performance. Market integration. Sales forecasting – role of forecasting, market potential, sales potential, steps in forecasting. Marketing planning – marketing strategies, branding, franchising, product positioning, packing, labeling Product development – product diversification, product cycle, market penetration. Product pricing – importance, role in marketing strategy, methods. Promotion-process, types, advertisement. Social aspects of marketing- ecological aspects of marketing, eco-marks. Marketing of services- classification, service marketing model. Global marketing- scope, importance, challenges.

Suggested references:

1. Andrew J. Dubrin, 2012, Essentials of Management, Thomson Southwestern, 9 th edition
2. Chabra and Grover, 2012, Marketing Management, Dhanpatrai and Co, New Delhi
3. Chandrasekar, K.S., 2010, Marketing management-Text and Cases, Tata McGrawHill-Vijaynicole
4. Charles W.L Hill and Steven L McShane, 2007, Principles of Management, McGraw Hill Education, Special Indian Edition
5. Harold Koontz and Heinz Wehrich, 2012, Essentials of management: An International and Leadership Perspective, 9th edition, Tata McGraw-Hill Education
6. Philip Kortler and Kevin Lane Keller, 2012, Marketing Management, PHI 14th Edition
7. Rajan Sexena, 2005, Marketing Management, Tata Mcgraw-Hill Education
8. Samuel C. Certo and Tervis Certo, 2012, Modern management:

concepts and skills, Pearson education, 12th edition9.
 Sherlekar, 2013, Marketing Management, Himalaya Publishing House,
 New Delhi10. Sontakki, 2005, Marketing Management , Kalyani
 Publishers, New Delhi

7. Consumer Behaviour and Market Research AMR-301 2 (1+1)

Theory: Concepts of consumer and consumer behavior – consumer behaviour v/s user behavior. Importance of consumer behavior study. Factors affecting purchases. Impact of distribution of consumers – age, sex, location, income.. Consumer buying motives - types-internal, external. Product motives – patronage motives, rational motives, emotional motives. Factors influencing consumer behaviour - cultural, social, personal, psychological. Consumer’s perception - learning, attitudes. Importance of motivation to marketers. Consumer decision process - recognition, information search, evolution of alternatives, involvement, purchase intentions, post purchase behavior. Introduction to market research, research process, steps in market research, exploratory and descriptive research. Approaches to economic analysis - basic and applied research. Identification of market research problems. Research design. Sources of data. Methods of data collection. Preparation of questionnaires. Analysis of data using analytical techniques using computer packages. Writing of reports.

Practicals: Identification of market research problems, Formulation of objectives & hypothesis, Review of literature, Preparation of questionnaires, Study of sampling designs, Selection of samples, Collection of primary and secondary data, Analytical tools commonly used in the study of consumer behaviour and market research, Analysis, Report writing, Presentation of results.

Suggested references:

1. Aaker, David, V. Kumar and George Day, 1995, Marketing Research, 8th edition, John Wiley & Sons.
2. Kerlinger, Fred N., 1986, Foundations of Behavioral Research, 3rd edition
3. Kotler P., 2001, Marketing management. Grada, Praha, 10th edition.
4. Koudelka J., 1997, Consumer behaviour and marketing. Grada, Praha.
5. Michael A. Kamins, 1993, Secondary Research: Information, Sources and Methods, Applied Social Research Methods, Volume 4, Sage Publications.

6. Mobley, 1993, Handbook of Marketing Scales: Multi-Item Measures for Marketing and Consumer Behavior Research, Sage Publications.
7. Schiffman L.G., Kanuk L., 2004, Purchasing behaviour. Computer Press, Brno.
8. Solomon M.R., 2004, Consumer Behavior. Buying, Having, and Being. Pearson Prentice Hall. Saddle River.
9. Stewart, David W., 1981, The Application and Misapplication of Factor Analysis in Marketing Research, Journal of Marketing Research, Vol. XVIII.

8. Recent Advances in Agricultural Marketing AMR-302 2 (1+1)

Theory: Marketing methods – meaning, evolution and development. Importance of web pages in modern marketing for advertisement, sales, collection of data, customer feedback. Concept of direct marketing: personal selling, Raitha santhe, niche marketing etc. Contract farming – concepts, agencies, regulations and present status. E-marketing methods: E-choupals, online marketing, spot exchanges. E-tendering. Trade in commodity exchanges. Net marketing: meaning, advantages and disadvantages. Study of web portals in agricultural marketing. Self Help Groups and Producer Companies and their marketing arrangements.

Practicals: Access to web portals relating to agricultural marketing, Visit to Retail Chains, Visit to SHG, Visit to contract farming agencies, Visit to Commodity Exchange brokerage firms, Visit to E-Choupals, Visit to Chain marketing agencies, Visit to Thursday Markets , Visit to Spot Exchange, Visit to Regulated Markets with E-tendering Practice, Visit to Export Oriented Units (EOU), Visit to Agri-Export Zones (AEZ), Visit to Trade Promotion Organization

Suggested references:

1. Acharya S.S., 1988 Agricultural Production, Marketing and price policy- A study on Pulses, Mittal Publications, Delhi
2. Acharya, S.S., and Agarwal N.L., 1994, Agricultural prices- Analysis and policy, Oxford and IBH, New Delhi
3. Gupta, A.P., 1975, Marketing of agricultural production India, Voro and Co-Publishers Pvt. Limited, Bombay
4. Jagadish Prasad, 1966, Encyclopedia of Agricultural Marketing, Mittal Publishers Pvt. Limited, Bombay

5. Kahlon, A.S. and George, M.V., 1965, Agricultural marketing and Price Policies, Allied Publishers Private Limited, New Delhi
6. Nayyar, H. and Ramaswamy, P., 1995, Globalization and Agricultural Marketing, Rawat Publications, Jaipur
7. Prasad, A. Shivarama, Agricultural Marketing in India, Mittal Publications, Delhi. Singhal, A.K., 1989, Agricultural Marketing in India, Anmol Publications, New Delhi

9. International Trade and Export Management AMR-303 3 (2+1)

Theory: Nature and scope of International Trade- Meaning and importance of International trade. Trade in domestic and International markets. Advantages and disadvantages of International trade. Salient features of International trade. Theories of International Trade- Theory of Absolute Cost Advantage, Theory of Comparative Cost Advantage and Modern theory of International Trade. Terms of trade – meaning and classifications. Free trade -Meaning, Advantages and Disadvantages. Protection - Meaning, Arguments for protection, Methods of protection: Dumping, Tariffs, Subsidies, Import quotas, cartels, Commodity Agreements. Balance of Payments- Meaning, structure and India's balance of payments position. Foreign Exchange- Foreign exchange rate, types of foreign exchange rate, mechanisms of determining foreign exchange. Instruments of international payments. Foreign Exchange Market – meaning and functions. Exchange control. Devaluation. Foreign exchange reserves. WTO-establishment and functioning. Agreement on Agriculture. Impact of AOA on agricultural trade. Export Management-Commodities exported from India. Important importing countries. Trends in exports. Types of export- Direct and indirect exports. Export Houses – their terms and conditions to facilitate export. Procedure to become an exporter. Export licensing. Steps involved in export. Agricultural export promotion agencies- APEDA, KAPPEC, MPEDA, Commodity Boards. EXIM policies. Locating the foreign importers, SPS stipulations of importing countries for agricultural products. Importance of LC, Bank guarantee & insurance.

Practicals: Study of exports of food grains, Study of exports of commercial crops, Study of exports of spices Study of exports of plantation crops, Study of exports of processed crops, Study of exports of CODEX Standards, Study of exports of procedures, Study of procedure for acquiring exporter's license. Analysis of different forms and documents required in exporting a commodity, Estimation of Balance of Payments, Estimation of trend in

international prices and its comparison with domestic prices, Identification of exporters and importers for various agric. Products, Exercises on determination of foreign exchange rates, Presentation of outcomes of various rounds of WTO summits, Estimation of Terms of Trade

Suggested references:

1. Cherunilam and Dominick Salvatore, International Economics
2. Haberler, G., Theory of International Trade
3. Jain, Arunkumar, International Business
4. Jhingan, M.L., International Economics
5. Mithani, D.M., Money, Banking, International Trade and Public Finance.
6. Prancis Cherunilam, International Trade and Export Management
7. Riad A. Ajami, International Business- Theory and Practices
8. Vaish, M.C., and Sudhamsingh, International Economics
9. Venkateshwaran, N., International Business Management

10. Market Information System and Futures Trading AMR-304 2 (2+0)

Importance of market information and market intelligence in marketing of agricultural commodities. Essential characteristics of good marketing information. Source and means of collection of data. Compilation, analysis and dissemination of market information and intelligence in India. Deficiencies, problems, reliability of market information, remedial measures. E-trading, e- choupals, websites and IT tools for marketing. Futures trading – meaning and features. Differences between spot and future markets. Commodities covered under futures trading. Options, derivatives and functionaries. Speculation, hedging and risk management mechanisms of commodity in future trading. Institutions involved in futures trading- NCDEX, NMCE, MCX. Use of print media for generation of market information, Use of Reports and Periodicals, Use of Electronics Media, Use of internet and IVRS, Analysis of Market Information for presentation, Use of moving averages, Use of trends, Use of seasonal index numbers, Use of cyclical index numbers, Use of irregular index numbers, Study of web portals relating to market information, Preparation of Audio- visual aids for presentation, Demonstration of e-trading.

Suggested references:

1. Acharya, S.S., 1988, Agricultural Production, Marketing and price policy- A study of Pulses, Mittal Publications, Delhi
2. Acharya, S.S., and Agarwal, N.L., 1994, Agricultural prices- Analysis and policy, Oxford and IBH, New Delhi
3. Alexander, Market Intelligence
4. Fox, Market Information system
5. Gupta, A.P., 1975, Marketing of agricultural production India, Voro and Co-Publishers Pvt. Limited, Bombay
6. Jagadish Prasad, 1966, Encyclopedia of Agricultural Marketing, Mittal Publishers Pvt. Limited, Bombay
7. Kahlon, A.S. and George, M.V., 1965, Agricultural marketing and Price Policies, Allied Publishers Private Limited, New Delhi
8. Nayyar, H. and Ramaswamy, P., 1995, Globalization and Agricultural Marketing, Rawat Publications, Jaipur
9. Prasad, A. Shivarama, Agricultural Marketing in India, Mittal Publications, Delhi
10. Singhal, A.K., 1989, Agricultural Marketing in India, Anmol Publications, New Delhi

11. Agricultural Price Analysis AMR-305 2 (1+1)

Theory: Meaning and concepts of agricultural prices: FOB price, C&F price, CIF price, farm harvest price, futures and spot prices, producer price, price spread. Functions and importance of prices. Market prices and administrated prices. Sources of price statistics. Price and output determination under perfect competition, monopolistic competition, oligopoly and monopoly markets. Simultaneous pricing issues in perfect competition. Cobb web models – convergent, divergent and perpetually oscillating models. Pricing methods – skimmed pricing, cost-plus pricing, penetration pricing. Estimation of demand for and Supply of agricultural commodities. Price, income, cross price and promotional elasticity of demand and supply. Point and Arc elasticity concepts. Temporal and spatial fluctuations in agricultural prices: types and their causes. Analysis of price movements: estimation of trend, seasonal, cyclical and irregular movements in prices over time. Analysis of spatial price variations and market integration. Types, construction

and uses of price relatives and weighted index numbers. General price level and inflation. Types of inflation. Retail and wholesale price index based inflation measures. Commission on Agricultural Costs and Prices (CACP) and State Agricultural Price Commissions. Minimum Support Price Scheme and Market Intervention Scheme. Price stabilization measures. Price forecasting methods: simple trend analysis, use of seasonal index, exponential smoothing, and Delphi method.

Practicals: Collection of data on arrivals and prices of agricultural produce from APMCs, Study of farm harvest prices, Study of administrated prices for agricultural produce, Study of wholesale prices, Construction of simple index numbers for prices, Construction of Laspeyre's index, Paasche's index Fisher's index, Exercises on the methodology used for constructing wholesale and retail price index numbers in the country, Exercises on the calculation of inflation rate using wholesale and retail price index numbers, Calculation of demand and supply elasticities with different methods, Estimation of demand and its forecasting, Estimation of supply and its forecasting, Estimation of trend in time series of agril. Prices, Estimation of Cyclical fluctuations in time series of agril. Prices, Estimation of Seasonal variations in time series of agril. Prices, Estimation of Irregular price movement in time series of agril. Prices, Price forecasting exercises, Price forecasting exercises, Exercises on spatial price variation and market integration.

Suggested references:

1. Acharya, S.S. and Agarwal, N.L., Agricultural Marketing in India
2. Acharya, S.S. and Agarwal, N.L., Agricultural Prices Analysis and Policy
3. Bansil, P.C., Agricultural Statistics in India
4. Croxton, F.E., D.J. Cowden and S. Klein, Applied General Statistics
5. Ghosh, A.B., Price trends and policies in India
6. Satish Gupta, Food Prices in India

2. Cooperation

1. Theory and Practice of Cooperation COP-101 2 (1+1)

Theory: Meaning and Significance of Co-operation. Historical development of Co-operative movement. Co-operation and other forms of Business enterprises – Sole Proprietorship, Partnership, Joint stock Company. Alternative to Co-operatives in group action. Principles of Co-operation,

Philosophy of Co-operation. Development of co-operative movement in the world . Growth of co-operative movement in India and Karnataka. Recent trends and developments. Structure of Co-operatives. International Co-operative Alliance (ICA). Role of ILO and FAO in co-operative development. The concept of Autonomy. State support to Co-operative Movement – merits and demerits. Organization and functions of the Department of co-operation at the State and the centre. Co-operative Education and Training – NCUI, NCCE, NCCT, VMNICM, Co-operative Training Colleges, Co-operative Training Centers. (Institute of cooperative Management) Role of RBI, NABARD, NCDC in the promotion and development of Co-operative Movement

Practicals: Review of reports on working of agricultural and non-agricultural co-operatives. Case studies on (1) Credit co-operatives, (2) Marketing co-operatives, (3) Processing co-operatives, (4) Fisheries co-operatives, (5) Consumer co-operatives, (6) Industrial co-operatives, (7) Housing co-operatives, (8) Fertilizer co-operatives, Visits to (a) PACCB/ Sauhard Cooperative Bank, (b) TAPCMS, (c) Agro-Processing co-operatives society, (d) Consumer/Housing co-operatives Society, (e) Weavers co-operatives, (f) Women's/ Labor Cooperatives. Case studies on rural indebtedness, Estimation of credit requirements of members in different types of co-operative banks, Development of scale of finance, Preparation of normal credit statement by PACCB and DCCB, Study of financing by Apex Bank, Study of financing by NABARD, Study of monitoring procedures in co-operatives Banks, Study of loan recovery procedures in Co-Operative Banks. Study of over dues and Non-Performing Assets (NPA's) in co-operatives Banks. Visit to Cooperative Banking Institutions.

Suggested references:

1. Bedi Raghubans Dev., History and Practice of Co-operation
2. Dubhashi, P.R., Principles and Philosophy of Co-operation
3. Kulkarni, K.R., Theory and Practice of Co-operation in India and Abroad, Vol. I-III
4. Mathur. B.S., Co-operation in India
5. Nakkiran, S., Co-operative Banking in India
6. Suresh, K.A. and Molly Joseph, Co-operatives and Rural Development in India
7. Tyagi, R.B., Recent trends in the Co-operative Movement in India

2. Management of Cooperatives COP-201 2 (2+0)

Cooperative management-distinctive features- Relevance of cooperative law in the management of cooperatives-Organizational set up of the Department of cooperation in Karnataka. Evolution of cooperative law- History of cooperative legislation in India and Karnataka.

Study of important provisions of Karnataka State Cooperative Societies Act, 1959 and Rules 1960: Procedure for Registration of Co-operative Societies- Byelaws- Amalgamation and Division of cooperative societies.

Member of co-operative societies and their rights and liabilities-qualification and disqualifications for membership.

Management of co-operative societies- Final Authority- Annual general and special general meetings- Managing committee- Disqualifications for membership of the committee. Privileges of co-operative societies- Promotion of co-operative movement-State aid to co-operative societies.Properties and funds of co-operative societies-Investment of funds. Audit inquiry, Inspection and Surcharge- settlement of disputes-winding up of cooperative Societies.

The Karnataka Souharda Sahakari Act, 1997/2000: Procedure for Registration of a cooperative society-Members of cooperative societies-Management of cooperative societies- Final Authority- Properties and funds-Audit Inspection and Inquiry-Winding up of cooperative societies-The Federal Cooperative-functions-The Board of Federal Cooperative.

Study of important provisions of Multi State Cooperative Societies Act, 2002: Registration of a Cooperative society - Management of cooperative societies-Audit Inspection and Inquiry- Winding up of cooperative societies.

Suggested references:

1. Acharya, S.S. and Agarwal, N.L., Agricultural Marketing in India
2. Akmat, J.S., 1978, New Dimensions of Cooperative Management, Himalaya Publ. House.
3. Ansari, A.A., 1990, Cooperative Management Patterns. Anmol Publ.
4. Badi, R.V. and Badi, N.V., Rural Marketing
5. Gopala Rao, H.S., and D. Shrijay Devraj Urs, Farmers Markets in Karnataka
6. Sah, A.K., 1984, Professional Management Patterns. Anmol Publ.

3. Agricultural Finance

1. Monetary Theory and Public Finance AFN-101 3 (3+0)

Money - Meaning, definition and evolution of money. Functions of money. Demand for and supply of money. Value of money. Monetary standards. Inflation and deflation - meaning and definition. Types of inflation. Causes and Characteristics of inflation. Effects of inflation on economic activities and remedial measures. Nature and scope of public finance- Meaning and definition. Public finance v/s Private finance. Subject matter of public finance-Public revenue-Meaning and importance. Source of revenue. Tax revenue and Non-Tax revenue. Canons of taxation. Tax base and tax rate. Types of taxes -proportional, progressive, regressive, digressive. Single and Multiple taxes, Specific and Advalorem taxes. Indian Tax structures. Direct taxes: income tax, wealth tax, capital gains tax, gift tax; their meaning, merits and demerits. Indirect taxes: VAT, custom duties, excise duty - meaning, merits and demerits. Taxable capacity. Public expenditure-meaning and classification of public expenditure. Canons of public expenditure. Reasons for growth of public expenditure. Effect of public expenditure on economic activities. Public debt- Meaning, Sources, Types and forms. Causes of increase in public debt. Debt trap. Government budget and deficit financing.

Suggested references:

1. Agarwala, S.N., Indian public finance
2. Bernard P. Herber., Modern public finance the study of public sector economics
3. Dalton, H., Principles of public finance
4. Das, D.K., Inflation in Indian economy under five year plans
5. Krishna Aiyar, P.R., Monetary and Fiscal economics (Money, Banking, Trade & Finance)
6. Mithani, D.M., Fundamentals of Public Finance
7. Mithani, D.M., Monetary economics and Growth
8. Mithani, D.M., Money, Banking, International Trade and Public Finance.
9. Prest, A.R., Public finance in theory and practice
10. Sheth, C.S., Theory and Practice of public finance

11. Singh, J.P., Agricultural finance theory and practice
12. Sinha, V.C., and E. Zacharia, Monetary economics
13. Sundaram, K.P.M., Money, Banking, Trade and Finance
14. Vaish, M.C., and Agarwal, H.S., Public Finance

2. Theory and Practice of Banking AFN-201 3 (2+1)

Theory: Financial markets. Bank - meaning, definition, functions. Types of banking- Commercial, developmental and central. Systems of banking- Unit, branch, holding company, chain. Liquidity and profitability. Sound principles of banking. Credit creation by banks. Development banking institutions. Central banking - functions. Credit control- qualitative and quantitative measures. Bankers' clearing house. Functioning of stock exchange. Indian banking system. Banker - his functions and relationship with customer. Deposit accounts and their operations. Negotiable instruments- bills of exchange, cheque and bank drafts. Loans and advances and their operations. Securities and modes of charges- lien, mortgage, hypothecation, pledge etc Investment Banking: Meaning, functions, importance, operational issues. Recent reforms in banking sector in India.

Practicals:

Opening and operation of Savings Bank Account and Current Account, opening and operation of Fixed Deposit Account, Recurring Deposit Account and Cumulative Deposit Account. Study of bank drafts, pay orders and letter of credit. Study of bills of exchange and promissory note. Operation of mobile banking and SMS banking. Opening and operation of net banking. Operation of credit card and debit card. Assignments on Banking Regulation Act. Study of proxy banking in India. Opening and operation of loan, cash credit, over draft, lien and pledge accounts. Opening and operation of hypothecation account and mortgage loan account. Study of recovery procedures and interest calculation of different loans and advances. Visits to commercial bank to study the actual operation of deposit accounts, loan procedures and recovery aspects.

Suggested references:

1. Baligar, G.B., Banking Law and Practice, Ashok Prakashan, Hubli
2. Basava, K.D., Banking Theory, Law and Practice, Vidyavahini Prakashan, Hubli

3. Lallingham, D.M., Banking Law and Practice
4. Maheshwari C.N., Banking Law and Practices
5. Satyanarayana, G, and Subramanyam, G., Theory and Practice of Banking, Apolle Publishers, Markapur
6. Varshney, P.N., Banking Law and Practice
7. Raman, B.S., Banking Law and Practice, Kalyani Publishers, New Delhi

3. Agricultural Finance and Insurance AFN-301 2 (1+1)

Theory: Agricultural finance - Nature and scope. Agricultural credit - Meaning, definition, need and classification. Credit analysis- 4 R's, 5 C's and 7 P's of credit. Financial Statements: Meaning, types, analysis and uses. Repayment plan - single end payment, amortization, balloon payment. Time value of money - compounding and discounting. History of financing agriculture in India. Commercial banks, nationalization of commercial banks, lead bank scheme, regional rural banks, micro-financial institutions, scale of finance, security for loans. Banking Schemes for agricultural finance: Village Adoption Schemes, Lead Bank Schemes, DRI scheme, Kisan Credit Card Scheme. Financial inclusion - Jan-Dhan Scheme, Financial literacy, Business Correspondents Models. Higher financing agencies - RBI, NABARD, AFC, ADB, World bank, Insurance and Credit Guarantee Corporation of India. Assessment of crop losses, determination of compensation. Insurance - Crop insurance, National Agricultural Insurance Scheme, Livestock Insurance, Weather based crop insurance, FasalBima Yojana. Advantages of crop insurance. Limitations in application and estimation of crop yields.

Practicals: Exercises on time value of money - compounding and discounting. Estimation of credit needs for crop enterprises, livestock enterprises, hi-tech agriculture/ horticulture. Determination of scales of finance. Repayment plan for short term loans, amortization of loan - estimation of annuity factors. Repayment plans - decreasing payment plan, even payment plan. Study of weather parameters defining yield risk. Estimation of risk in crops/ livestock. Estimation of premium amount for insurance. Visits to financial inclusion branch of commercial bank, regional rural bank, insurance agency in public and private sectors. Visit to weather station

Suggested references:

1. Agarwal, R.N., 1996, Financial Liberalization in India- A study of Banking System and Stock markets
2. Bagchi, A.K., 1987, The Evolution of the State Bank of India (Part I and II)
3. Bhasin, Niti, 2007, Banking and Financial Markets in India 1947 to 2007
4. Desai, D.K., and Tambad, S.B., 1973, Farm Finance by a Commercial Bank
5. Gulati Ashok and Seema Bathla, 2002, Institutional Credit to Indian Agriculture: Defaults and Policy Options NABARD Occasional Paper-23
6. Karthykeyan, T.K., 1990, Long-term Financing of Agriculture Land Development Banks in a Multi-Agency System
7. Mathur, B.L., 1989, Indian Banking- Performance, Problems and Challenges
8. Mishra, R.K., 2005, Banking Sector Reforms and Agricultural Finance
9. Murray, William, G., 1947, Agricultural Finance- Principles and Practices of Farm Credit
10. Nakkiran, S., 1980, Agricultural Financing and Rural Banking in India- An evaluation
11. Pandey, U.K., 1990 An Introduction to Agricultural Finance
12. Subba Reddy, S., and Raghuram P., 2005, Agricultural Finance and Management

4. Agricultural Project Analysis AFN-302 3 (2+1)

Theory: Meaning, importance, need, objectives of project analysis; features of agricultural project. Private vs. public projects. Strategies for planning agricultural projects. Concepts of projects, search for and identification of agricultural projects, project formulation, project planning. Project analysis. Project operation. Project risk. Project design. Externalities, divergence between private and social costs and benefits of a project. Project feasibility- Technical feasibility, economic feasibility, financial feasibility, management feasibility. Financial analysis of agricultural projects- Variable analysis. Ratio

analysis- Quantitative approach, classification. Types of ratios- liquidity ratios: current ratio, quick ratio etc. Profitability ratios: profit margin, return on investment etc. Capital structure ratios: Debt-equity ratio, debt-asset ratio etc. Funds flow analysis- cash flow management- measurement. Discounting technique and compounding technique. Break even analysis. Sensitivity analysis. Probability analysis. Appraisal of projects- ex-ante and ex-post evaluation. Discounting techniques of analysis - B:C ratio, NPV, IRR. Non-discounting techniques - Payback period and Accounting rate of return (ARR). PERT/ CPM, SWOT analysis. Project finance- sources, management, analysis, incentives, subsidies.

Practicals:

Exercises on compounding and discounting techniques, Estimation of cash flows in agricultural projects, Exercises on computing B:C ratio, Exercises on computing NPV, Exercises on computing IRR, Exercises on computation of Payback Period, Exercises on computation of Accounting Rate of Return, Exercises on ratio analysis, Exercises on Breakeven analysis, Exercises on PERT/CPM analysis. Exercises on SWOT analysis, Study of Detailed Project Reports (DPR's) in agriculture and allied enterprises, Preparation of project proposal - Crop enterprise, Preparation of project proposal - Dairy enterprise, Preparation of project proposal - Fisheries enterprise, Exercises on Project appraisal, Presentation of projects by students.

Suggested references:

1. Gittinger, J.P., Economic Analysis of Agricultural Projects, Johns Hopkins University Publications
2. Jagadish R. Raiyani and R.B. Bhatasna, Financial ratios and financial statement analysis.
3. Prasanna Chandra, Planning, Analysis, Selection, Financing, Implementation and review.
4. Subba Reddy, S., P. Raghu Ram, T.V. Neelakanta Sastry and I. Bhavani Devi, Agricultural Economics, Oxford and IBH Publishing Co. Ltd., New Delhi
5. Vasant Desai, Project Management, Himalaya Publishing House, New Delhi.

4. Grading Technology

1. Standardization, Grading and Quality Control in Crop Produce GTC-101 3 (2+1)

Theory: Meaning and definition of grading and standardization. Role of grading in agricultural products. Criteria for grade standards, advantages of grading. Types of grading. The Agricultural Produce (Grading and Marking) Act, 1937.

Standardization and Grading as per AGMARK, FAQ, FPO, BIS, ISO, HACCP, Eurepgap, CODEX, Eco-mark. Spot Exchange Grade Requirements. General characteristics and grade designations for crops as per different methods: Food grains- jowar, maize, rice, wheat, red gram, bengal gram, black gram, green gram field peas; Oilseeds - groundnut, sunflower; Commercial crops - cotton, chilli, tobacco, areca nut, copra. Grading of Fruit and Fruit Products. General characteristics and grade designations of processed foods - jaggery, instant foods, fruit and vegetable products.

Practicals:

Study of laboratory equipments: sampling equipments, scientific grading instruments and other apparatus and equipments in the process of grading. Estimation of quality characters of cereals such as jowar, wheat, maize, bajra etc; pulses such as chick pea, tur, green gram etc; oil seeds such as groundnut, sunflower etc; commercial crops such as cotton, chilli, areca nut etc; and oil seeds, fruits and vegetables. Estimation of quality characters of Instant foods. Visit to APMC to study the eye-sight grading at field conditions of important crops. Visit to Ghee and Honey Grading Laboratory

Suggested references:

1. Acharya, S.S. and Agarwal, N.L., 2000, Agricultural Marketing in India
2. Chakravarty, A. and De, D.S., 1981, Post harvest technology of cereals and pulses, Oxford and IBH, Calcutta.
3. Jambunathan, L.R., 1984, Grading of cotton for quality: A scoring system of instrumental evaluation for Cotton Hybrid-4.
4. Mamoria C.B., 1976, Agricultural Problems of India, Kitab Mahal, Allahabad.
5. Manual on Grading and Standardization, Directorate of Marketing and Inspection (DMI), Nagpur.

balance, Preparation of final accounts- trading, profit and loss accounts and balance sheet, Preparation of profit and loss account and balanced sheet under single entry system. Preparation of non trading accounts- receipts and payment accounts. Preparation of non trading accounts - income and expenditure accounts and balance sheet. Practical problems to be solved on liquidity and solvency ratio, Practical problems to be solved on activity & profitability ratios, Preparation of cash flow statement- sources and application of cash, Calculation of cash from operation. Preparation of cash flow statement.

Suggested references:

1. Jain, S.P., Advanced Accountancy
2. Kadakol, M.B., Accountancy for PUC-I and II
3. Raman, B.S., Accountancy

2. Advanced Accounting and Auditing CAC-201 3 (2+1)

Theory: Single Entry System of Accounts: meaning, definition, merits and demerits. Application of single entry system and its relevance and suitability. Preparation of statement of affairs, profit or loss statements and conversion of single entry system of accounting to double entry system of accounting, guidelines for conversion. Prospective and retrospective conversion. Preparation of total debtors account, total creditors account, bills receivable and payable accounts and finding missing values of different ledger accounts. Preparation of final accounts after conversion.

Accounts of Non-Trading Organisations: Meaning, definition, objectives, application and scope, establishment, sources of funds and their application. Preparation of accounts pertaining to Non-Trading Organisations. viz. Associations - Clubs -Hospitals-Charitable Institutions etc. preparation of Receipts and Payments A/c. Income and Expenditure A/c and Balance Sheet, Concepts of Revenue and Capital receipts and Revenue and Capital Expenditure. Distinctive features of Income & Expenditure A/c and Profit & loss A/c.

Partnership accounts: Meaning, definition, advantages and disadvantages partnership. Incorporation of partnership firm, preparation of partnership deed. Rights and duties of partners. General partnership accounts-preparation of profit & loss appropriation a/c, capital accounts under fixed and fluctuating methods. Goodwill, meaning, definition, reasons for existence of goodwill. Valuation of Goodwill-methods of valuation- Average profit method, super

profit method and capitalization of profit method. Treatment of Goodwill on admission of partner - Death of partner, Retirement of partner and Dissolution of partnership. Preparation of partnership accounts- Admission of partner, Retirement of partner and death of partner.

Company Accounts: Formation of Company, meaning, definition, types of companies Viz., private Ltd., companies, public Ltd., companies, public sector companies, government companies, multinational companies. Incorporation of companies under Indian companies Act of 1956. Memorandum of Association, Articles of Association, Shares, types of shares, IPO- Issue of Shares and debentures, issue at premium and discount, forfeiture of shares. Preparation of company balance sheet after issue of capital.

Practicals:

Preparation of single entry system of accounts, statement of affairs and profit and loss statement - Preparation of accounts relating to conversion of single entry to double entry system.

Preparation of accounts relating to non-trading organizations, revenue and capital accounts - Preparation of Receipts and Payments A/c, Preparation of income and expenditure accounts and Balance sheet of non-trading organisations. Debtors and creditors accounts and accounts relating missing values and preparation of final accounts after conversion into double entry.

Preparation of General Partnership Accounts with profit and loss appropriation A/c. - Preparation of fixed capital and fluctuating capital accounts in general partnership - Preparation of partnership accounts on admission. Accounts relating to prior to and after the admission of new partner into business. Accounts relating retirement, death of partners and accounts of Dissolution of partnership- realization account and bank account a/c's. Preparation Company accounts relating to - Issues of share capital and balance sheet after issue capital.

Suggested references:

1. Jain, S.P., Advanced Accountancy
2. Khan, N,Y. and P.K. Jain, Cost Accounting and financial management
3. Tondon, B.N., Hand book of practical auditing

6. Agronomy

1. Introduction to Agronomy AGR-104 2 (1+1)

Theory: Agronomy and its scope, seeds and sowing, tillage and tith, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging, drainage. Weeds- importance, classification, crop weed competition, concepts of weed management-principles and methods, herbicides. Growth and development of crops, factors affecting growth and development, crops and cropping systems, crop rotation and its principles, crop management technologies, harvesting and threshing of crops.

Practicals:

Identification of crops, seeds, fertilizers, herbicides and tillage implements, Effect of sowing depth on germination and seedling vigour, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Methods of irrigation.

Suggested references:

1. Balasubramaniyan, P., and Palaniappan, S.P., 2001, Principles and Practices of Agronomy, Agrobios.
2. Gupta, O.P., 2007, Weed Management - Principles and Practices. Agrobios.
3. Michael, A.M., 1978, Irrigation: Theory and Practice. Vikas Publications
4. Prihar, S.S., and Sandhu, B.S., 1987, Irrigation of Food Crops - Principles and Practices, ICAR.
5. Rao, V.S., 2000, Principles of Weed Science. Oxford & IBH.
6. Sankaran, S., and Mudaliar, T.V.S., 1997, Principles of Agronomy, The Bangalore Printing & Publ.
7. Singh, S.S., 2006, Principles and Practices of Agronomy. Kalyani Publishers.

2. Crop Production Technology - I (*Kharif* crops) AGR-201 3 (2+1)

Theory: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops. Cereals - rice, maize, sorghum, pearl millet, finger millet and other minor millets pulses-pigeonpea, mungbean, cowpea, moth bean, horsegram and urdbean; oilseeds- groundnut, soybean, sesamum, niger and castor; forage crops-maize, sorghum, and cowpea.

Practicals:

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.

Suggested references:

1. Das, N.R., 2007, Introduction to Crops of India, Scientific Publ.
2. Hand book of Agriculture, 6th Revised edition, ICAR Publication, New Delhi.
3. Prasad, Rajendra, 2002, Text Book of Field Crop Production, ICAR
4. Reddy, S.R., 2009, Agronomy of Field Crops, Kalyani Publishers
5. Singh, C., Singh. P. and Singh, R., 2003, Modern Techniques of Raising Field Crops, Oxford & IBH.
6. Singh, S.S., 1998, Crop Management, Kalyani Publishers

3. Practical Crop Production - I (*Kharif* crops) AGR-202 1 (0+1)

Crop planning, raising field crops 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.

Suggested references:

1. Chidda Singh, Modern techniques of field crop production, Oxford and IBH publishers, Delhi
2. Das, N. R., 2011, Tillage and Crop production, Scientific publisher
3. Rathore, P.S., Techniques and Management of field crop production. Ag (India) Publisher
4. **Crop Production Technology - II (*Rabi* crops) AGR-203 2 (1+1)**

Theory: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; cereals - sorghum, wheat and barley, pulses-chickpea, lentil, oilseeds-safflower, linseed, rapeseed, mustard and sunflower; commercial crops-sugarcane, sugarbeet; cotton, tobacco, chilli, Forage crops-berseem, lucerne oat, napier hybrid, guinea, and para grass.

Practicals:

Sowing methods of different crops, identification of weeds in rabi season 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 rabi forage experiments, visit to research stations and industries of related crops.

Suggested references:

1. Das, N.R., 2007, Introduction to Crops of India, Scientific Publ.
2. Hand book of Agriculture, 6th Revised edition, ICAR Publication, New Delhi.
3. Panda, S.C., 2006, Crop Management and Integrated Farming
4. Prasad, Rajendra, 2002, Text Book of Field Crop Production, ICAR
5. Reddy, S.R., 2009, Agronomy of Field Crops, Kalyani Publisher
6. Singh. C., Singh, P. and Singh, R., 2003, Modern Techniques of Raising Field Crops, Oxford & IBH.
7. Singh, S.S., 1998, Crop Management, Kalyani Publishers.

7. Genetics and Plant Breeding

1. Fundamentals of Genetics and Plant breeding GPB-102 2 (1+1)

Theory: History of Genetics & Plant Breeding, Study of Chromosome-Structure, functions. Mendel's laws of inheritance, Gene interaction, Linkage and Multiple alleles. Mode of inheritance-monogenic, polygenic, cytoplasmic. DNA and Its structure. Modes of reproduction: sexual and asexual, differences between self and cross pollinated crops. Self-incompatibility, male sterility and their significance in plant breeding. Centres of origin of crop plants. Breeding for self-pollinated (Mass, pureline, pedigree and bulk methods), cross pollinated (Ear to row, Backcross, Development of synthetic, composites and hybrids), vegetatively propagated crops viz., Clonal selection.

Practicals:

Microscopy, study of mitosis and meiosis. Mendelian ratios- Monohybrid and dihybrid, and problems related to segregation and gene interaction. Study of linkage, crossing over percentage, map distance. Study of floral biology and structure of a model flower, study of floral structure and biology of important cereals, pulses, oilseeds and commercial crops. Study of Plant breeders kits, selfing and crossing techniques. Methods of selection in self and cross pollinated crops. Male sterility: A, B and R lines and their utility. Pollen fertility study and its importance. Layout of field experiments, principles, data recording and elementary statistics and analysis of data. Visit to different crop breeding schemes.

Suggested references:

1. Allard, R.W., Principles of plant breeding, John Wiley & Sons, New York
2. Briggs, F.N., and Knowles, Introduction to plant breeding, Reihold Publishing corporation, New York
3. Briggs, W.A., Introduction to plant breeding, Reihold Publishing corporation, New York
4. Chopra, V.L., Plant breeding: Theory and Practice, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
5. Falconer, D.S., Introduction to quantitative genetics, Longman Scientific & Technical, Longman Group, UK, Ltd., England

6. Gardner, E.J. and Snustad, D.P., 1991, Principles of Genetics, John Willey & Sons
7. Hays, Immer and Smith, Methods of plant breeding, McGraw Hill Publications, New York
8. Klug, W.S. and Cummings, 2003, Concepts of Genetics, M.R., Peterson Edu.
9. Lewin, B., 2008, Genes IX, Jones and Bartlett
10. Mather, K., and Jinks, J.L., Introduction to Biometrical genetics, Chapman and Hall, London
11. Robert H. Tamarin, 1996, Principles of Genetics, Tata McGraw-Hill Edition
12. Strickberger, M.W., 2005, Genetics (III Ed), Prentice Hall, New Delhi India
13. Snustad, D.P. and Simmons M.J., 2006, Genetics (IV Ed), John Wiley & Sons
14. Sharma, J.R., Principles and practices of plant breeding, Tata McGraw Publishing Company Ltd., New Delhi
15. Singh, B.D., Plant breeding : principles and methods, Kalyani Publishers, Ludhiana
16. Singh, R.K., and Chaudhary, B.D., Biometrical methods in quantitative genetic analysis, Kalyani Publishers, Ludhiana

8. Seed Science and Technology

1. Principles of Seed Technology SST-201 3 (1+2)

Theory: Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed. Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983, Varietal Identification through Grow Out Test and Electrophoresis,

Molecular and Biochemical test. Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production.

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, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Practicals:

Varietal and hybrid seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra Ragi and other minor millets; major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea; major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut, Safflower, Castor and Mustard and important vegetable crops.

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.

Suggested references:

1. Agarwal, P.K. and M. Dadlani, 1987, Techniques in Seed Science and Technology, South Asian Publishers, New Delhi.
2. Agrawal, R.L., 1996, Seed Technology, Oxford and IBH Publicity Company, New Delhi.
3. Agarwal, V.K., 2003, Seed health, International Book Distributing Co.
4. Bhale, M.S., 2013, A hand book of seed certification, Vardhman Books and Periodicals
5. Joshi, A.K., and Singh, B.D., 2003, Seed Science and Technology, Kalyani Publishers, Ludhiana.
6. Khare, D.P., 1994, Stored Grain Pests and their Management, Kalyani Publishers, Ludhiana.

7. Kulkarni, G.N., 2002, Principles of Seed Technology, Kalyani Publishers, Ludhiana.
8. Nema, N.P., 1986, Principles of Seed Certification and Seed Testing, Allied Publishers Private limited, New Delhi.
9. Paul Neergaard, 1977, Seed Pathology, Vol.-I and II, McMillan Press, London.
10. Sen Subip and Ghosh Nabinanda, 2002, Seed Science and Technology, Kalyani Publishers, Ludhiana.
11. Singhal, N.C., 2002, Hybrid Seed Production, Kalyani Publishers, Ludhiana.
12. Tunwar, N.S., and Singh, S.V., 1988, Indian Minimum Seed Certification Standards. Central Seed Certification Board, New Delhi.

9. Soil Science and Agricultural Chemistry

1. Introduction to Soil Science SAC-102 3 (2+1)

Theory: Soil as a natural body, soil forming factors and soil genesis, soil profile, components of soil. Soil physical properties: texture, structure, color, porosity, density, soil water, its movement in soils and availability to plant/s growth, soil air, composition, gaseous exchange, soil temperature: significance of temperature and its effect on germination and plant growth, important soil physical constraints for crop production and their management.

Soil chemical properties: soil reaction, pH, EC, OC, CEC, base saturation and their importance on nutrient availability and plant growth, important beneficial soil organisms, solubilizers, nutrient fixers.

Soil types: Broad soil types of Karnataka and India. Problematic soils: Salt affected soils, acid soils, calcareous soils, acid sulphate soils, water logged soils and their characteristic properties, diagnosis, constraints for crop production and their management. Water quality parameters: pH, EC, RSC, SAR, Boron etc. and management of poor quality waters in agriculture.

Practicals:

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Determination of soil density, moisture content and porosity. Determination of soil texture.

Determination of soil pH and electrical conductivity. Determination of soil colour. Estimation of organic matter content of soil. Determination of aggregate stability, Determination of infiltration rate. Characteristics of problematic soils. Determination of gypsum requirements and lime requirement. Evaluation of water quality parameters

Suggested references:

1. Bressler, McNeal and Carter, Saline and sodic soils
2. Buckman, Harry, O. and Nyle C. Brady, The Nature and Properties of Soils
3. Daji, J.A., J.R. Kadam and N.D. Patil, A Text Book of Soil Science
4. Dilipkumar Das, 1997, Introductory Soil Science
5. Donhe, R.L., Miller, R.W. and Shickluna, J.C., Soils-An Introduction to Soils and Fundamental of Soil Science - ISSS, New Delhi
6. Gupta, I.C., and Gupta, S.K., Use of saline water in agriculture
7. Jacob S. Joffe, 1965, The ABC of Soils
8. Kolay, A.K., 2000, Basic Concepts of Soil Science, 2 edition
9. Mehra, R.K., Text Book of Soil Science, ICAR, New Delhi
10. Mehta, K.K., Reclamation of alkali soils in India
11. Plant Growth, Printice Hall of India
12. Ranbir Chhabra, Soil salinity and water quality
13. Sahai, V.N., 2000, Fundamentals of Soil
14. Ulrich and Summer, Soil acidity

2. Manures, Fertilizers and Soil Fertility Management SAC-301 3 (2+1)

Theory: Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.

Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendmets, Fertilizer Storage, Fertilizer Control Order.

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. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. 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. Soil fertility and productivity - definitions. Mixed fertilizers advantages, disadvantages, methods of preparation Law of minimum, growth equations. Different approaches for fertilizer recommendation.

NOTE : Topics on organic manures has to be after chemical fertilizers. History of soil fertility and elements in plant nutrition and criteria of essentiality has to be at the beginning of the course

Practicals:

Estimation of available P in soils. Estimation of available K. Estimation of available S in soils. Estimation of available Ca and Mg in soils. Estimation of available Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants. Determination of organic matter. Estimation of available micronutrient cations and boron. Plant sampling and preparation of samples for analysis. Estimation of micronutrients in plants. Rapid tissue testing Estimation of NPK in fertilizers and manures.

Suggested references:

1. Biswas, T.D., and S.K. Mukherjee, 1987, Textbook of Soil Science
2. Das, D.K., 1997, Introductory Soil Science
3. Das, P.C., Manures and Fertilizers
4. Fundamentals of Soil Science, 2002, Published by The Indian Society of Soil Science
5. Gupta, P.K., 2003, A Hand book of Soil, Fertilizer and Manure
6. Havlin, J.L., J.D. Beaton, S.O. Tisdale and W.L. Nelson, 2003, Soil Fertility and Fertilizers, 6th Edition
7. Kaleeswari, R.K., R. Rajeswari and J. Prabhakaran, 2016, Soil Fertility

8. Kitchen, H.B., 2015, Soils and Crops
9. Macself, A.J., 2015, Soils and Fertilizers
10. Mariakulandai, A., and T.S. Manickam, 1975, Chemistry of fertilizers and manures
11. Miller, Soil Fertility
12. Nyle C. Brady , The Nature and Properties of Soils
13. Rajan K. Basak, Fertilizers
14. Rajakumar, G.R. and S.V. Patil, 2016, Soil Chemistry, Fertility and Fertilizers
15. Sahai, V.N., 1999, Fundamentals of Soil, 2nd edition
16. The Fertiliser (Control) Order, 1985 and The Essential Commodities Act, 1995
17. Yawlkar, K.S., Agarwal, J.P., and Bokde, S., Manures and Fertilizers, Agri-Horticulture Publishing House, Nagpur

10. Agricultural Entomology

1. Fundamentals of Entomology AET-101 3 (2+1)

History of Entomology in India. Factors for insect's abundance. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and moulting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

Systematics: Taxonomy -importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of

Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Miridae, Reduviidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleyrodidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae, Hemerobidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Nymphalidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae, Encyrtidae; Bethyidae, Formicidae, Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae, Tabanidae, Syrphidae.

Practicals:

Methods of collection and preservation of insects including immature stages; External features of Cockroach / Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper/ Cockroach); Dissection of male and female reproductive systems in insects (Grasshopper/ Cockroach); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Suggested references:

1. Chapman, R.F., Insects structure and function.
2. Mani, M.S., 1968, General Entomology.
3. Nayar, K.K., Ananth Krishnan, T.N. and David, B.V., 1976, General and Applied Entomology.
4. Olderoyd, H., 1958, Collecting, preserving and studying insects, Autchinson, London
5. Richard, O.W. and Davies, R.G., 1977, Imm's general text book of Entomology, 10th edition, Vol-I & II
6. Romoser, W.S., 1973, The Science of Entomology.
7. Triplehorn, C.A. and Johnson. N.F., 2005, Borer and Delongs- Introduction to the study of insects (7th Edition)

2. Pests of Crops and Stored Grain and their Management

AET-301

3 (2+1)

Theory: 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 major pests of various field crops, vegetable crops, fruit crops, plantation crops, ornamental crops, spices and condiments. Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

Practicals:

Identification of different types of damage. Identification of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control 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 nearest FCI godowns and ware houses.

Suggested references:

1. Anonymous, 2009, Cultivation Practices for Horticultural Crops, UAS, Dharwad and KSDA, Bangalore
2. Anonymous, 2009, Package of Practices for Higher Yields (All regions), UAS, Dharwad and KSDA, Bangalore.
3. Jha, L.K., 1987, Applied Agricultural Entomology
4. Nayar, K.K., Ananthkrishnan, T.N. and David, B.V., 1986, General and Applied Entomology
5. Ramakrishna Ayyar, T.V., 1984, Hand Book of Economic Entomology for South India
6. Regupathy, A., Palanisamy, S., Chandramohan, N., and Gunathilagaraj, K., 1994, A Guide on Crop Pests. TNAU Coimbatore

7. Shaha, L.R., 1990, A Hand Book of Plant Protection
8. Srivastava, K.P., 1993, Text Book of Applied Entomology-II
9. Vasantaraj David, B. and Kumaraswami, T., 1984, Elements of Economic Entomology
10. Zakladnoi, G.A. and Ratanova, V.F., 1987, Stored Grain Pests and Their Control

3. Management of Productive Insects AET-302 1 (0+1)

Honey bee species, castes of bees. Beekeeping appliances their use, bee enemies and disease. Beekeeping products and their uses. Types of silkworm, voltinism, silkworm breeds and biology of silkworm. Mulberry cultivation, mulberry varieties, harvesting and preservation of leaves, pests and disease of mulberry, silkworm rearing, silkworm egg production and silk reeling techniques. Pests and disease of mulberry silkworm. Species of lac insect. Visit to research and training institutions devoted to beekeeping, sericulture and lac culture.

Suggested references:

1. Dandin, S.B., Jayant Jayaswal and Giridhar, K., Hand book of sericulture technologies, Central Silk Board, Bangalore
2. Govindaiah, Gupta, V.P., Sharma, D.P., Rajadurai, S. and Nishitha Naik, V., Mulberry crop protection.
3. Jolly, M.S., Sen, S.K. and Ahsan, M.M., Tasarculture, Central Silk Board, Bangalore
4. Kumaresan, P. and Srinivasa, G., Sericulture extension management and economics.
5. Nataraju, B., Sathyaprasad, K., Manjunath, D. and Aswani Kumar, C., Silkworm crop protection.
6. Rajan, R.K. and Himantharaj, M.T., Silkworm rearing technology.
7. Rajanna, L., Das, P.K., Ravindran, S., Bhogेशha, K., Mishra, R.K., Singhvi, N.R., Katiyar, R.S. and Jayram, Mulberry cultivation and Physiology.
8. Sarkar, D.C., Sericulture in India, Central Silk Board, Bangalore
9. Thangavelu, K., Chakrabarty, A.K. and Bhagawati, A.K., Hand Book of Mugaculture, Central Silk Board, Bangalore

11. Agricultural Economics

1. Macro Economics ECN-101 2 (1+1)

Theory: Nature and significance of Macro-Economics. Macro economic paradoxes. National income: meaning, concepts of national income and GNP deflator, its estimation, the difference between nominal GDP and real GDP. Classical V/s Keynesian aggregative economics-Say's law of markets. Keynesian theory of consumption. Consumption, savings and investment functions. Theory of income determination, two sector, three sector and four sector models. Concept of Multiplier-Injections and Leakages -Marginal efficiency of capital. Business cycles-policies for economic stabilization-Inflationary and Deflationary gaps Phillips curve. The circular flow of the resource market (income) and the product market (goods and services). Adjustment in market and price mechanisms during economic downturns and depressions, use of public policies and government intervention in macroeconomic management. Unemployment and Inflation- frictional unemployment, structural unemployment and cyclical unemployment. Main forces affecting growth, inflation, and unemployment by aggregating or totaling output (via the GDP) and prices. Labor markets in order to determine optimum levels of employment and identify the strategies that make the best use of all available resources. Economic Growth and Development.

Practicals:

Preparation of National Income Accounts; Derivation of Aggregate demand and Aggregate supply curves; Theory of determination in two sector model; Theory of determination in three sector model; Calculation of multiplier and Marginal Efficiency of Capital (MEC).

Suggested references:

1. Dewett, K.K., Modern Economic Theory.
2. Keynes, J.M., General Theory of Employment, Interest and Money
3. Mithani, D.M., Modern economic analysis.
4. Mitra, J.K., Economics (Micro and Macro).
5. Seth, M.L., Macro economics.
6. Vaish, M.G., Macro-economic theory

2. Fundamentals of Agricultural Economics AEC-101 2 (2+0)

Economics: Meaning, definitions (wealth, welfare, scarcity and growth), Scope and subject matter- Science & an art, Social Science & Positive and normative science. Approaches to economic analysis: Meaning-Inductive and deductive, Micro and Macro economics; Nature of economic theory: Assumptions of economics: Rationality assumptions, concept of equilibrium, *Ceteris paribus*. Economic laws as generalization of human behavior; Basic concepts: Goods and services, desire and want, demand, utility, value and price, wealth and welfare, capital and income; Agricultural economics: Meaning, definition, characteristics of agriculture. Importance of agriculture and its role in economic development; Agricultural Planning: Concept of planning, elements of economic planning, Five Year Plans- General Objectives and allocation to agricultural sector during different plans; Utility theory: law of diminishing marginal utility, equi-marginal utility principle, concept of consumer' surplus; Demand: meaning, law of demand, demand schedule and demand curve, Extension and contraction, Increase & decrease in demand. Determinants of demand, Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity; Production: Meaning and characteristics of factors of production; Supply: Meaning of Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply; Market structure: Meaning and types market structures (Perfect and Imperfect); Distribution theory: Meaning and functional and personal distributions, 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, Meanings-Malthusian and Optimum population theories. Current policies and programmes on population control; Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, Meaning of General price index, inflation and deflation; Public finance: Public revenue and public expenditure, Meaning of budget. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT and GST; Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies.

Suggested references:

1. Agrawal, A.N., Indian Agriculture-problems, progress and prospects
2. Ahuja, H.L., Advanced Economic Theory: Micro economic Theory.
3. Basava, K.D., Elements of Economics.

4. Basava, K.D., Principles of Economics.
5. Chinna, S.S., Agricultural Economics and Indian Agriculture.
6. Dewet, K.K., and others, 2005, Modern Economic Theory.
7. Dewett, K.K. and Verma J.D, Elementary Economic Theory.
8. Jingan, M.L., Advanced Economic Theory-Micro and Macro Economics
9. Jingan, M.L., Principles of Economics.
10. Subbareddy, S. et. al., Agricultural Economics.

3. Farm Management, Production and Resource Economics AEC-201 2 (1+1)

Theory: Farm Management: Meaning, definitions and Concepts of farm management: Nature and scope, objectives and relationship with other sciences, decisions making process; Meaning and definition of farms sizes: Based on holding and ownership, Types of farming and their characteristics, factors determining types and size of farms; Production economics and farm management principles: Meaning definition of production economics, concept of production function and its types, use of production function in decision-making on a farm, factor-product, factor-factor and product-product relationships. Law of equi-marginal returns or principles of opportunity cost and law of comparative advantage; Cost principle: Meaning and concept of costs, types of costs-Seven costs and applied cost concepts, and their interrelationships, importance of cost in managing farm business; Farm records: Types and importance of farm records and accounts in managing a farm; Farm planning and budgeting: Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming; Risk and uncertainty: Concept of risk and uncertainty in agriculture production, types/sources of risks and their management strategies. Crop/livestock/machinery insurance: Weather based crop insurance (WBCIS) and Pradhan Mantri Fasal Bhima Yojana (PMFBY), their features; Resource economics: Meaning of resource economics, differences between NRE and agricultural economics, unique properties of natural resources, positive and negative externalities in agriculture, inefficiency and welfare loss, solutions, management of common property resources of land, water, pasture, fishery and forest resources.

Practicals:

Basic concepts in production economics & farm management; Study and visit to different farm layouts and appraisals of farm resources; Analysis of costs and revenue concepts; Computation of depreciation cost of farm assets; 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 equi-marginal returns/opportunity cost principle in allocation of farm resources; Application of the principle of comparative advantage; Estimation of cost and returns using CACP cost concepts for crop, horticulture and live stock enterprises; Farm inventory analysis; Preparation of optimum farm plan using budgeting technique using partial and complete budgeting; Visit to farms to study farm records and accounts; Preparation of profit and loss accounts and balance sheet; Study of farm efficiency measures; Determinants of compensation for crop loss; Collection and analysis of data on various resources in India;

Suggested references:

1. Chinna, S.S., Agricultural Economics and Indian Agriculture
2. Heady, E.O and Dhillon, J.L., Agricultural Production Functions.
3. Jhon, P. Doll and Frank Orezen, Production Economics: Theory with Applications.
4. Johl, S.S. and Kapoor, T.R., Fundamentals of Farm Business Management.
5. Memoria, C.B., Agricultural Problems of India.
6. Raju, V.T. and Vishwashankar Rao, Economics of Farm Production and Management
7. Sadhu and Singh, Fundamentals of Agricultural Economics.
8. Sankhyan, P.L., Introduction to Economics of Agricultural Production.
9. Subba Reddy et. al., Agricultural Economics.
10. Spinger., Natural resource management and policy

12. Agricultural Engineering**1. Farm Machinery and Power AEG-201 2 (1+1)**

Theory: 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 , Study of different components of I.C. engine, I.C. engine terminology and solved problems, 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 and attached implement, Familiarization with Primary and Secondary Tillage implement, implement for intercultural operations, Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, 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, Familiarization with operation of power tiller, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow . Familiarization with seed-cum-fertilizer drills their seed metering mechanism and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment, Familiarization with harvesting and threshing machinery.

Suggested references:

1. Farm Machinery and Equipments- C.P. Nakra Dhanpat Rai and sons, New Dehli
2. Jagadishwar Sahay, Elements of Agricultural Engineering, Standard Publishers Distributors, New Dehl
3. Michael A.M., and T.P. Ojha, Principles of Agricultural Engineering (Vol-I), Tata Mcgraw Hill Publishing Co Ltd, New Dehli
4. Singhal, O.P., Elements of Agricultural Engineering, Merath Aman public house, Meerut

2. Protected Cultivation and Secondary Agriculture

AEG-202

2 (1+1)

Theory: 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. Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air green house heating systems, green house drying. 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. 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). Material handling equipment; conveyer and elevators, their principle, working and selection.

Practicals: Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of green house equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

Suggested references:

1. Aruprathan Ghosh, Green house technology, Kalyani Publishers, New Dehli
2. Pandey, P.H., Principles and Practices of Post Harvest Technology, Kalyani Publishing, Ludhiana
3. Prasad, S., and U. Kumar, Greenhouse Management for Horticultural Crops, Agrobios, Agro house, Jodhpur
4. Radha Manohar, K., and C. Igathinathane, Green House Technology and Management, BS Publications, Hyderabad
5. Sahay, K.M., and Singh, K.K., Unit Operations of Agricultural Processing, Vikas Publishing House Pvt Limited, New Dehli

13. Plant Pathology

1. Fundamentals of Plant Pathology PAT-101

3 (2+1)

Theory: Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Causes / factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes.

Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes.

Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction.

Viruses: nature, structure, replication and transmission. Study of phanerogamic plant parasites.

Nematodes: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina, Radopholus etc.)

Growth and reproduction of plant pathogens. Liberation / dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants. Epidemiology: Factors affecting disease development.

Practicals:

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of phanerogamic plant parasites.

Study of morphological features and identification of plant parasitic nematodes. Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting.

Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations.

Suggested references:

1. Agrios, G.N., 2005, Plant Pathology. 5th Ed. Academic Press, New York.
2. Alexopoulos, C.J., Mims, C.W. and Blackwell, M., 2000, Introductory Mycology, 4th Ed. John Wiley & Sons, New York.
3. Chaube, H.S., and Ramji Singh., 2001, Introductory Plant Pathology, IBDCO, Lucknow.
4. Dropkin, V.H., 1980, An Introduction to Plant Nematology, John Wiley & Sons, New York.
5. Jayaraman, J. and Verma, J. P., 2002, Fundamentals of Plant Bacteriology, Kalyani Publ., Ludhiana.
6. Maggenti, A.R., 1981, General Nematology. Springer-Verlag, New York.
7. Mehrotra R.S. and Agarwal, A. 2003, Plant Pathology II Edition Tata Mc Graw Hill Publication New Delhi.
8. Mehrotra, R.S. and Aneja, K.R., 1990, An Introductory Mycology, Wiley Eastern, New Delhi.
9. Singh, R.S., 1982, Plant Pathogens- The fungi. Oxford & IBH, New Delhi.

2. Post-harvest Diseases and their Management PAT-304 2 (1+1)

Theory: Economic significance of post-harvest diseases and seed borne diseases. Historical development in seed pathology and post-harvest diseases. Objectives of seed pathology and post-harvest diseases. Study of important Post-Harvest Diseases (transport, storage & market) of vegetables, fruits, oilseeds etc. Important post-harvest diseases. Storage/ Field fungi responsible for production of toxins and their effects on consumption. Mycotoxins and Aflatoxin.

Identification and detection of plant pathogens carried through seeds, vegetatively propagating material. Seed processing, treatment and storage.

Seed transmission, Seed contamination, accompanying pathogens, false seed transmission. Processing, seed treatment, seed packaging, packaging materials. Functional requirement of packing materials. Epidemiology, Factors affecting disease development, Assessment of disease severity and crop losses. Principles of plant disease management viz., Avoidance, Exclusion, Eradication, Protection, Immunization-HPR and Biological control. Pesticides. Classification of fungicides. Mode of application. Management of post-harvest diseases. Biotechnological approaches of diseases management. IPR and related issues. IDM concepts and importance. IDM module for important post-harvest diseases.

Practicals:

Study of post-harvest disease symptoms caused by fungi, bacteria, virus, nematodes etc., Methods of diagnosis of various post-harvest diseases. Methods of estimation of disease severity and losses; Seed health testing techniques. Methods of detection and identification of seed borne pathogens; Isolation of biocontrol agents; Testing the efficacy of biocontrol agents by dual culture technique. Mass multiplication and methods of application of bioagents; Study of fungicides, bactericides, nematocides and their formulations. Study of pesticide compatibility and their safe-use. Study of plant protection equipments. Bioassay of fungicides; Seed treatment techniques for the control of seed borne diseases; Biocontrol of post-harvest diseases. Study of seed packaging & storage techniques. Visit to vegetable and fruit markets, bio-pesticide/ Pesticide firms. Visit to processing warehouse and testing laboratories.

Suggested references:

1. Barkai, Golan R., 2001, Post-harvest diseases of fruits and vegetables, Development and control, Elsevier Science
2. Gupta, V.K., and Sharma, S.K., 2000, Diseases of fruit crops, Kalyani Publishers, New Delhi
3. Narayanaswamy, P., 2005, Post-harvest pathogens and disease management, John Wiley & Sons, Inc, New Jersey
4. Singh, R.S., 1989, Plant Pathogens- The Viruses, Oxford & IBH, New Delhi
5. Snowden, Anna L., 2008, Post-harvest diseases and disorders of fruits and vegetables, Vol.I: General introduction and Fruits, CRC Press
6. Thind, T.S., 2005, Diseases of fruits and vegetables and their management, Kalyani Publishers

14. Horticulture

1. General Horticulture HRT- 102 2 (1+1)

Theory: Horticulture- Definition, branches, importance and scope. Methods of plant propagation - sexual and asexual. General principles and practices of cultivation of important fruits-mango, banana, citrus, grape, guava, sapota. Importance of vegetables, kitchen garden, etc. General principles and practices involved in cultivation of important vegetables solanaceous, cole crops, cucurbits, peas and beans. Importance of floriculture and different components of ornamental garden and cultivation of important flower crops. Medicinal and aromatic plants: active principle, medicinal properties and aromatic principles.

Practicals: Visit to orchards and gardens; Plant propagation methods; Study of varieties, cultural practices, plant protection of important fruits; Study of varieties, cultural practices, plant protection of important vegetables; Study of culture of medicinal plants; Study of culture of aromatic plants; Study of different components of ornamental garden - annuals, shrubs, trees, climbers, hedges and edges; Study of culture of flower crops.

Suggested references:

1. Chadha, K.L., 2001, Handbook of Horticulture, ICAR, New-Delhi
2. Farooqi, A.A. and B.S. Sreeramu, 2001, Cultivation of medicinal and aromatic crops, Universities Press (India) Limited, Hyderabad.
3. Gopalakrishanan, T.R., 2007, Vegetable Crops (Horticulture Science Series-4), India Publishing Agency, New Delhi.
4. Hudson T. Hartmann., Dale E. Kester., Fred T. Davies and Robert L. Geneve, 2002, Plant propagation: principles and Practices. Prentice-Hall of India Private Limited, New-Delhi.
5. Kumar, N., Md. Abdul Khader, J.B.M., Rangaswami, P and Irulappan, I., 1997, Introduction to Spices, Plantation Crops, Medicinal and aromatic plants, Oxford & IBH Publishing Co., New Delhi.
6. Manibhushan Rao, K., 2005, Text book of horticulture, Mc Millan India Ltd., New Delhi
7. Radha, T. and Mathew, L., 2007, Fruit crops, New India Publishing Agency, New Delhi.

8. Randhawa, G.S. and Mukhopadhyay, A., 1986, Floriculture in India, Allied Publishers Ltd., New Delhi.
9. Thamburaj, S. and Singh Narendra, 2001, Vegetables, Tuber Crops and Spices, ICAR Publication, New-Delhi.
10. UHS, Bagalkot., 2014, Package of Practices for Horticulture Crops.

2. Post-harvest Management and Value Addition of Fruits and Vegetables HRT-302 2 (1+1)

Theory: Fresh form of fruits and Vegetables: - Post- harvest technology - definition and importance, causes of perishability, possible causes of post harvest losses; Pre-harvest factors affecting postharvest quality. Maturity, ripening and changes occurring during ripening; Ways and means of reducing losses during post harvest handling: 1) Start with good quality fruits and vegetables; 2) Avoid physical damage; 3) Control environmental factors; 4) Use proper procedures- harvesting, trimming, grading, treatments, pre-cooling, packaging, transportation, ripening: Extending shelf life of fruits and vegetables in fresh form; Processed form of fruits and vegetables :Value addition concept-history, importance, and scope of processing industries; Principles of preservation- by physical methods, moisture limitation, application of heat, chemical preservatives and fermentation.

Practicals: Pre-harvest treatments of fruits and vegetables. Applications of different types of packaging containers for shelf life extension. Effect of temperature on shelf life and quality of produce. Cold storage and ZECC. Demonstration of chilling and freezing injury in vegetables and fruits. Instruments / equipments commonly used in food preservation. Containers used in preservation. Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, squash, and candy and tomato products, canned products. Visit to processing unit/ industry. Visit to cold storage units and local market yards.

Suggested references:

1. Bhutani, R.C., 2003, Fruit and Vegetable Preservation, Biotech Books
2. Mitra, S.K., 1997, Post Harvest Physiology and Storage of Tropical and Sub-tropical Fruits, CABI
3. Ranganna S., 1997, Hand Book of Analysis and Quality Control for Fruit and Vegetable Products, Tata McGraw-Hill.

4. Sudheer, K.P., and Indira, V., 2007, Post Harvest Technology of Horticultural Crops, New India Publ. Agency.
5. Willis, R., McGlassen, W.B., Graham, D. and Joyce, D., 1998, Post Harvest: An Introduction to the Physiology and Handling of Fruits, Vegetables and Ornamentals, CABI

15. Food Science and Nutrition

1. Principles of Food Science and Nutrition FSN-101 1 (1+0)

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions); Functions and sources of water, carbohydrates, proteins, fats, vitamins, minerals; Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.); Relationship between food, nutrition and agriculture, Malnutrition (over and under nutrition), nutritional deficiencies (PEM, IDA, IDD VAD and fluorosis) and nutritional disorders (diabetes mellitus and CVD), Energy metabolism, (carbohydrate, fat, proteins); RDA; Balanced/modified diets, Menu planning, New trends in food science and nutrition (nutraceuticals, antioxidants, nanotechnology, functional foods)

Suggested references:

1. Mahtab, S., 1996, Text book of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Srilakshmi, B., 2006, Food Science, New Age International (Ltd) Pulishers, New Delhi.
3. Srilakshmi, B., 2007, Nutrition Science, New Age International (Ltd) Pulishers, New Delhi.
4. Swaminathan, M., 1997, An advanced text book on Food and Nutrition, Volume I & II, The Bangalore printing and Publishing Co. Ltd., Bangalore.

16. Agricultural Extension Education

1. Constitution of India, Rural Sociology and Educational Psychology AEX-101 2 (1+1)

Theory: Constitution of India- meaning, preamble and characteristics. Fundamental rights, duties, directives and principles of state policy; provisions for welfare of SCs and STs, minorities, women and children; powers and functions of Union executive, president, vice-President, Prime Minister, Council of Ministers, Parliament and Supreme court of India. Powers and functions of state executive, Governor, Chief minister, Council of ministers, Legislature and Judiciary; electoral process and human rights commission.

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development.

Practicals:

Test of attitude towards agriculture; types of personality; effect of meaning on learning; achievement motivation; levels of needs and motives; verbal test of intelligence; non-verbal test of intelligence; emotional intelligence; study habits; abstract reasoning; verbal reasoning; and test of anxiety.

Suggested references:

1. Basu Durga Das, 2007, Introduction to the constitution of India, Wadhwa & Company Law Publishers, Agra
2. Bakshi, P.M., 2008, Constitution of India, Ed.8. University Law, Publishing co.pvt. Limited New Delhi
3. Bhatnagar Sukhbir, 2008, Constitutional Law and the Governance, Mittal Publication, New Delhi
4. Braj Kumar Mishra, 2008, Psychology- The study of Human Behaviour, PHI Learning Private limited, New Delhi
5. Guy Rocher, 2004, A General Introduction to Sociology, Academic publisher, Kolkata
6. Loomis, C.P., and Beegle, J.A., 1957, Rural Sociology, Prentice Hall, Inc. Englewood Cliffs, New Jersey.

7. Mangal, S.K., 2009, An Introduction to Psychology, Sterling Publishers Pvt. Ltd.
8. Mohan Rao, B., 1991, Study of Indian Society, Karnatak Printing Press, Bank Road, Gadag
9. Seacord and Backman, 1974, Social Psychology, McGraw-Hill Publishers.
10. Shankar Rao, C.N., 1993, Sociology. S. Chand and Company Limited, New Delhi

2. Fundamentals of Agricultural Extension Education

AEX-103

3 (2+1)

Theory: 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.); 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.

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. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel Communication: meaning and definition; models and barriers to communication. extension teaching methods: meaning, classification, individual, group and mass contact methods, media mix strategies; Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practicals: To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments 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; Study of 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.

Suggested references:

1. Addison, H.M., 1973, Agricultural Extension: A Reference Manual, Food and Agricultural Organization of the United Nations, Rome,
2. Adivi Reddy, A., 2001, Extension Education, Sree Laxmi Press, Bapatla, (AP)
3. Dahama, O.P. and Bhatnagar, O.P., 2005, Education and Communication for Development, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Jalihal, K.A., and Veerabhadraiah V., 2007, Fundamentals of Extension Education and Management in Extension, Concept Publ. Co.
5. Ray, G.L., 1999, Extension Communication and Management, Noya Prakash, Calcutta

3. Communication Skills and Personality Development

AEX-202

2 (1+1)

Theory: Communication Skills: Structural and functional grammar; meaning and process of communication, encoding and decoding skills, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences; personality development, personality theories, attitudes, motivation, and perception.

Practicals:

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations.

Suggested references:

1. Adair, John, 2003, Effective Communication, Pan Macmillan Ltd., London
2. Anjali Ghanekar, Communication Skills for Effective Management, Everest Publishing House, New Delhi
3. Chandan, J.S., 1994, Organizational Behaviour, Vikas Publishing House Pvt. Ltd.
4. Cattell, R.B., 1966, The scientific analysis of personality, Aldine Pub. Co., Chicago
5. Raman, Meenakshi and Sangeeta Sharma, 2011, Technical Communication: Principles and Practice, Second Edition. Oxford University Press, New Delhi
6. Sharma, R.C. and Krishna Mohan, 2007, Business Correspondence and Report Writing, Third Edition, Tata McGraw-Hill Publishing company Limited, New Delhi

4. Entrepreneurship Development and Business Communication
AEX-301 **2 (1+1)**

Theory: Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; Assessment of entrepreneurship skills, SWOT Analysis & achievement motivation, Entrepreneurial behavior, Government policy and programs and institutions for entrepreneurship development, Entrepreneurial Development Process; Business Leadership Skills; Communication skills for entrepreneurship development, Developing organizational skills, Developing Managerial skills, Problem solving skills, Achievement motivation; time management; Supply chain management and Total Quality Management, Project Planning Formulation and report preparation; Opportunities for entrepreneurship and rural entrepreneurship.

Practicals:

Assessing entrepreneurial potential, problem solving ability, managerial skills

and achievement motivation, exercise in creativity, time audit, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

Suggested references:

1. Guffey, M., 2007, Essentials of business communication, (7th ed.), Mason, OH: Thomson/Wadsworth.
2. Hisrich, 2001, Entrepreneurship, Tata McGraw Hill, New Delhi
3. Kaleel, F.M.H., and Krisnamurthy, J., 2007, Market Led Extension Dimensions and Tools, Agro Tech Publ. Academy.
4. Kaliyamoorthy, S. and Chandrasekhar, K., 2007, Entrepreneurship Training Theory and Practice, Kanishka publishers Distribution
5. Khanka, S.S., 1999, Entrepreneurial Development, S. Chand & Co.
6. Mohanty, S.K., 2009, Fundamentals of Entrepreneurship, Prentice Hall of India Pvt. Ltd., New Delhi.
7. Prasad, R., 2003, Entrepreneurship- Concepts and Cases, ICFAI Publications, Hyderabad.
8. Robert D. Hisrich, Michael P. Peters, and Dean A. Shepherd, 2008, Entrepreneurship, Tata McGraw-hill Publishing co. Ltd. New Delhi.

17. Agricultural Microbiology

1. Agricultural Microbiology **AMB-201** **3 (2+1)**

Theory: Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposon.

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

Practicals:

Introduction to microbiology laboratory and its equipments; Microscope-parts, principles of microscopy, resolving power and numerical aperture.

Methods of sterilization. Nutritional media and their preparations. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes. Methods of isolation and purification of microbial cultures. Isolation of Rhizobium from legume root nodule. Isolation of Azotobacter from soil. Isolation of Azospirillum from roots. Isolation of BGA. Staining and microscopic examination of microbes.

Suggested references:

1. Atlas Bartha, Microbial Ecology- Fundamentals and Application, Pearson Publishers
2. Mark S. Coyne, 2004, Soil Microbiology- An Exploratory Approach, Delmar Publishers
3. Michael Madigan, John Martinko, David Stahl and David Clark Brock, Biology of Microorganisms, Pearson Publishers
4. Nicklin, J., Graeme-Cook, K., Paget, T., and R. Killington, Instant notes in Microbiology, Viva Publishers

18. Forestry

1. Introduction to Forestry FOR-101 2 (1+1)

Theory: Introduction - definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. 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. Tending operations - weeding, cleaning, thinning - mechanical, ordinary, crown and advance thinning. Forest mensuration - objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; 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. Agroforestry - definitions, importance, criteria of selection of trees in agroforestry, 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.

Practicals: 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.

Suggested references:

1. Champion and Seti, General Silviculture for India
2. Chaturvedi, A.N., and Khanna, L.K., Forest Mensuration
3. Dwedi, A.P., Principles and practices of Agroforestry
4. Khanna, L.S., Principles and Practices of Silviculture
5. Nair, P.K., Agroforestry
6. Negi, S.S., Elements of General Silviculture, IBD Publishers
7. Negi, S.S., Hand book of Forestry
8. Patnaik, P.S., and Ramnewaj, Agroforestry Potentials and Opportunities.

19. Environmental Science

**1. Environmental Studies and Disaster Management
ENS-202 2 (1+1)**

Theory: Multidisciplinary nature of environmental studies, Definition, scope and importance.

Natural Resources: Renewable and non-renewable resources. Natural resources and associated problems. Discussion on Use and over-exploitation of forest, water, mineral, food, energy and land resources. World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems,

Ecosystems: concept, structure and function of an ecosystem. o Producers, consumers and decomposers. o Energy flow in the ecosystem. o Ecological succession. o Food chains, food webs and ecological pyramids. o Introduction, types, characteristic features, structure and function of different ecosystems

Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Environmental Pollution: definition, cause, effects and control measures of :-

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

Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Pollution prevention- case studies.

Social Issues and the Environment:

From Unsustainable to Sustainable development

Urban problems related to energy

Water conservation, rain water harvesting, watershed management

Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents

Consumerism and waste products.

Environment Protection Acts. Air (Prevention and Control of Pollution) Act.

Water (Prevention and control of Pollution) Act

Wildlife Protection Act

Forest Conservation Act

Issues involved in enforcement of environmental legislation.

Public awareness.

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves.

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, 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 disaster management framework

Practicals:

Visit to food and beverage industries/ effluent treatment plants: collection of samples for pollution study; Visit to Municipal sewage flow sites and collection of samples for pollution study; Visit to disaster affected sites; Determination of pH & EC, of sewage/effluent waters; Estimation of DO and BOD of sewage; Estimation of COD of industrial effluent water samples; Estimation of phosphates in polluted water samples; Determination of Total Solids (TS) and Total Dissolved Solids (TDS) in Effluent samples; Estimation of heavy metal contents in sewage irrigated soil; Estimation of drinking water parameters; Visit to Regional office of pollution control board (KSPCB) and their air pollution monitoring stations; Estimation of Nitrate contamination in Groundwater; Analysis of Temporary and Total Hardness of Water samples; Estimation of phosphates in polluted water samples; TSS, TDS, Acidity/ alkalinity of sewage/effluent waters; Determination of Chlorides in polluted water; Estimation of Particulate Matter/ Dust in Air; Microbial population of polluted air and water; Microbiological analysis of sewage and industrial effluents.

Suggested references:

1. Anjaneyalu, Y., and Valli Manickam, Environmental Impact Assessment Methodologies, 2/e PB (English), 2nd Edition, BS Publications
2. Arvind Kumar, A text book of environmental Science, APH Publishing Corporation
3. Bala Krishnamoorthy, Environmental management: Text and cases, PHI Learning Pvt. Ltd
4. Dibyendu Sarkar, Rupali Dutta, Avinandan Mukherjee and Robbyn Hannigan, An integrated approach to environmental management, Wiley
5. F. Stuart Chapin III, Gary P. Kofinas, Carl Folke (Editors), Principles of ecosystem stewardship- Resilience based natural resource management in a changing world, Springer

6. Hansen, P.E., and Sven Erik Jørgensen, Introduction to environmental management, Elsevier
7. John Houghton, Global warming: A complete briefing, 4th edition, Cambridge University Press
8. Sahu, D.D., Mathukia, R.K., and P.K. Chovatia, Sustainable Environmental Science, Nipa

20. Biotechnology

1. Fundamentals of Plant Biotechnology BTH-302 1 (1+0)

Introduction: Concepts and applications of plant biotechnology

Plant Tissue Culture for crop Improvement

Organogenesis and Embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; Somatic hybridization and Cybrids; Somaclonal variation and its use in crop improvement' Cryopreservation

Introduction to recombinant DNA Technology for crop Improvement

Gene cloning steps, common enzymes used as molecular tools, vectors, transformation and selection of recombinants, construction of genomic libraries, isolation and cloning of coding parts of eukaryotic genes-cDNA cloning. Gene transfer methods? Transgenics and its importance

Introduction to Marker Assisted Breeding in Crop Improvement:

PCR Techniques and its applications, Molecular markers, RAPD,RFLP, SSR, SNP

Suggested references:

1. Brown, T.A., 2006, Gene cloning and DNA analysis: An introduction, Blackwell Publishing, Oxford, UK.
2. Chawla, H.S, 2002, Introduction to Plant Biotechnology, Science Publishers
3. Gardener, E.J., Simmons, M.J. and Snustad, D.P., 1991, Principles of Genetics, John Singh, B.D., 2013, Biotechnology, Kalyani Publishers
4. Wiley & Sons, Inc, New York, USA

21. Crop Physiology

1. Post Harvest Physiology of Market Produce CPH-103 1 (1+0)

Pre-harvest factors in produce marketing: Pre-harvest influences on post-harvest performance; Market factors for the produce; Influence of production practices; Criteria for harvest. Perishability and produce losses: Principal causes of losses; Physiological changes during produce deterioration and their control; Mechanical damage (physical injury); types of fresh produce and their post-harvest physiology; Factors associated with weight loss; Respiration and water loss; Ripening of fruits: climactic and non-climactic fruits; effect of ethylene on post-harvest fresh produce. Assessment of value of produce: Food grains- Changes in storage conditions:loss of nutrients and other compositional parameters; Physiological practices to enhance storability, retention of quality etc; Mechanistic explanation of the causes of deterioration Fresh fruits and vegetables - Changes in storage conditions:loss of nutrients and other compositional parameters; Physiological practices to enhance storability, retention of moisture status quality etc.

Cut flowers and ornamentals - Changes in storage conditions: loss of nutrients and other compositional parameters; Physiological practices to enhance storability, retention of turgidity, moisture status etc.

Seeds and propagules - Differences between a propagule and food grains; Factors contributing to seed longevity and viability; Germination and its relevance in crop establishment. Issues relating to Post-harvest handling.

Suggested re ferences:

1. Kumar and Purohit, Plant Physiology: Fundamentals and Application
2. Mohr and Scopfer, Plant Physiology
3. Noggel and Fritz, Introductory Plant Physiology
4. Pande and Sinha, Plant Physiology
5. Salisbury and Ross, A Text Book of Plant Physiology
6. Taiz and Zeiger, Plant Physiology

22. Statistics, Computer Application and IPR

1. Agri-informatics AST-201 1 (0+1)

Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory, Operating System, definition and types, Applications of

MS-Office for creating, Editing and Formatting a Document, Data presentation, tabulation and graph creation statistical analysis, mathematical expression, Database, concepts and types, creating database, uses of DBMS in Agriculture, Internet and World Wide Web (WWW), Concepts, components and creation of web HTML, XML coding.

e - Agriculture, concepts, design and development. Application of innovative ways to use information and communication technologies in agriculture. ICT for Data collection, formation of development programmes, monitoring and evaluation of programmes. Computer Models in Agriculture; Statistical weather analysis and crop simulation models, concepts, structure, inputs-outputs files, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation. IT application for computation of water and nutrient requirement of crops, computer-controlled devices for Agri-input management, Smartphone mobile apps in agriculture for farm advises, market price, post-harvest management etc., Geospatial technology, concepts, techniques, components and uses for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning and crop calendars using IT tools.

Suggested references:

1. Agricultural and Environmental Informatics, Governance and Management, Zacharoula Andreopoulou Aristotle University of Thessaloniki, Greece.
2. Anita Goel, Computer Fundamentals.
3. Balagurusamy, E., Fundamentals of Computers
4. Englewood Cliffs, N.J., 1997, Introduction to Scientific Computing: A Matrix Approach Using MATLAB, Prentice Hall
5. Ram, B., Computer Fundamentals, Architecture and Organisation
6. Ramesh Bangia, Computer Fundamentals and Information Technology
7. Rohit Khurana, Computer Fundamentals and Internet Basics
8. Sushila Madan, Computer Fundamentals
9. Thomas C. Bartee, Digital Computer Fundamentals
10. Thomas M. Connolly, Database System

2. Statistical Methods

AST-202

3 (2+1)

Theory: Introduction to Statistics and its Application in Agriculture, Frequency distribution and cumulative frequency distribution, frequency curve, Graphical Representation of Data, Measures of Central Tendency: Arithmetic Mean, Median, Mode, GM & HM- merits, demerits and properties of each, Dispersion: Range, QD, MD, Standard deviation: merits, demerits and properties of each and Relative measures of Dispersion- CV, Moments, Skewness and Kurtosis, Definition of Probability, Addition and Multiplication Theorem. Simple Problems Based on Probability Theory, Binomial, Poisson and Normal Distribution and their Properties, Definition of Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation. Linear Regression Equations, Introduction to Test of Significance, One Sample, Two Sample Test for Means (Large Sample, Small sample), test for proportions, Chi Square Test of Goodness of Fit, Chi-Square Test of Independence of Attributes in 2 2 Contingency Table, Introduction to Analysis of Variance, Analysis of One Way and Two Way Classification, Introduction to Sampling Methods, Sampling Versus Complete Enumeration., Simple Random Sampling with and without Replacement, Use of Random Number for Selection of Simple Random Sample.

Practicals:

Examples on Frequency distribution and cumulative frequency distribution, Graphical Representation of Data, Histogram, Frequency Polygon, Frequency curve, Ogives, Measures of Central Tendency Problems on Arithmetic Mean, Median, Mode, GM & HM (Ungrouped Data and Grouped data) with Calculation of Quartiles, Deciles and Percentiles, Measures of Dispersion- Range, QD, MD, Standard deviation and Relative measures of Dispersion- CV (Ungrouped Data), Measures of Dispersion: Range, QD, MD, Standard deviation and Relative measures of Dispersion- CV (Grouped Data), Moments, Measures of Skewness and Kurtosis (Ungrouped Data), Moments, Measures of Shewness and Kurtosis (Grouped Data), Simple Problems Based on Probability Theory, Problems on Binomial, Poisson and Normal Distribution. Correlation and Regression Analysis. Application of One Sample t-Test, Application of Two Sample Fisher's t--Test, One sample Z-Test, Two sample Z-test, test for proportions, Chi-Square Test of Goodness of Fit, Chi-Square Test of Independence of Attributes. For 2 2 Contingency Table, Analysis of Variance One Way Classification, Analysis of Variance Two Way Classification, Selection of Random Sample Using Simple Random Sampling.

Suggested references:

1. Anderson, D.R., Sweeney, D.J., and Williams, T.A., Introduction to Statistics: An application approach
2. Elhance, D.N., Fundamentals of Statistics
3. Gupta, S.C., and Kapoor, V.K., Fundamentals of Mathematical Statistics
4. Gupta, S.P., Advanced Practical Statistics
5. Gupta, S.P., Statistical Methods
6. Kailasam, C., and R. Gangai Selvi, Applied Statistics
7. Kapur, S.K., Elements of Practical Statistics
8. Nageshwar Rao, G., Statistics for Agricultural Sciences
9. Rajmohan, Basic Statistics- Vol. I
10. Rangaswamy, R., A Textbook of Agril. Statistics

3. Intellectual Property Rights AST-302 1 (0+1)

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc.

Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights,

Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.

Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Suggested references:

1. Erbisch, F.H. and Maredia, K., 1998, Intellectual Property Rights in Agricultural Biotechnology, CABI.
2. Ganguly P., 2001, Intellectual Property Rights- Unleashing the knowledge economy, Tata McGraw Hill
3. Rothschild, M. and Scott, N., (Ed.) 2003, Intellectual Property Rights in Animal Breeding and Genetics, CABI.
4. The Indian Acts- Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000;PPV and FR Act 2001, and Rules 2003; National Biological Diversity Act, 2003.
5. Saha R. (Ed), 2006, Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies, Daya Publ. House. WIPO Intellectual Property Handbook: Policy, Law and Use. Fields of Intellectual Property Protection WIPO 2008
6. Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol V. Technology Generation and IPR Issues. Academic Foundation.

23. Animal Sciences

1. Livestock, Poultry and Fish Production Management ASC-202

3 (2+1)

Theory: Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry. Management of calves, growing heifers and milch animals. Management of sheep and goat. Incubation, hatching and brooding. Broiler production. Management of growers and layers. Important Indian and exotic breeds of cattle, buffalo, sheep, goat and poultry. Improvement of farm animals and poultry. Importance of Indigenous Livestock and Poultry species. Feeding principles of livestock and poultry. Feed ingredients, Feed supplements and additives for livestock and poultry ration. Study of livestock and poultry diseases. Prevention, vaccination schedule and control of important diseases of livestock and poultry. Marketing and Economics of Livestock & Poultry. Fisheries resources of India & Importance of Inland fisheries. Commercial cultivation & important fishes and their production.

Practicals:

External body parts of cattle, buffalo, sheep, goat 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 and poultry. Computation of rations for livestock. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments. Management of chicks, growers and layers. De-beaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat and poultry production. Field visit to Fish farm to study fish production technology.

Suggested references:

1. Banarjee, D.C., Text book of Animal Husbandry
2. Felix, S., T.V. Anna Mercy and S.K. Sawain, Ornamental Aquaculture Technology and Trade in India
3. Hand book of Animal Husbandry-ICAR
4. Jadhav, N.V., and M.F. Siddiqui, Hand book of poultry production and management
5. Jagadish Prasad, Animal Husbandry and Dairy Science
6. Jagadish Prasad, Principles and Practices of Dairy farm management
7. Jagadish Prasad, Sheep, goat and swine production
8. Jagadish Prasad, Poultry and rabbit production
9. Shreenivashaiah, P.V., Scientific poultry production
10. Sastry, N.S.R., and C.K. Thomas, Livestock production management
11. Satiyadas, R., Narayankumar, R., and Aswathy, N., Marine fish marketing in India
12. Srivastava, U.K., Inland fish marketing in India
13. Sukumar De, Outline of Dairy Technology

24. English**1. Comprehension and Spoken English ENG-101 2 (1+1)**

Theory: War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English- Spoken English and broken English G.B. Shaw.

Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

Practicals:

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.

Suggested references:

1. English Grammar and Composition by Wren and Martin
2. Practical English Grammar (PEG) by Thomas & Martinet
3. Business Communication by Sathya Swaroop Debasish & Bhagban Das

II. Electives (any three)**1. WTO and Agriculture AMR 311 3 (3+0)**

Introduction - The Agriculture Agreement - Agricultural trade, Trade policies prior to WTO-Uruguay round agricultural negotiations - Introduction to the Agreement on Agriculture, Relationship with other WTO Agreements - Product coverage - rules and commitments, Implementation period, Committee on Agriculture.

Market access - The conceptual framework - Schedule of tariff concessions and tariff quota commitments. The prohibition of non-tariff border measures - special treatment. The special safeguard provisions - notification obligations.

Domestic support - The conceptual framework - The green box, Government service programmes - direct payments to producers - other exempt measures - developmental measures - Blue box - "De minimis" - reduction commitments - aggregate measurement of support - equivalent measure of support, notification obligations. Export subsidies - The conceptual framework - reduction commitments - definition of measures, product categories - rates of cut - products with no specific reduction commitment - anti-circumvention - notification obligations.

Other provisions - Export restrictions - peace clause - resolving disputes - continuation clause. Doha round - Bali package on Agriculture 2013 - Nairobi package 2015.

2. Food Safety and Standards AMR 312 3 (2+1)

Theory: Food Safety - Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control. Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards- Indian Food Regulatory Regime, FSSAI. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Practicals:

Water quality analysis physico-chemical and microbiological. Preparation of different types of media. Microbiological Examination of different food samples. Assessment of surface sanitation by swab/rinse method. Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

3. Retailing Management AMR 313 3 (3+0)

Introduction to Retail management Evolution of retailing, meaning, retailing and retail management, Retailing in India. Types of retailers-stores formats by location, store formats by ownership, store formats by merchandise categories, store formats by size, store formats by price, store formats and non - store formats. Organized retailing and unorganized retailing, trends in retailing - special- convenience, growing diversity of retailing formats, e-commerce, franchise, mail order catalog, etc. Retail location and retail layout - importance of location decision, selection of city/area, selection of a specific site. Types of location - free standing location, neighborhood services, highway stores, business associated location, cost factor in location decision. Types of consumer goods - shopping goods, specialty goods, (FMCGS) - Fast Moving Consumer Goods. Retail layout patterns - layout guidelines, external factors and internal factors, building interiors. Retail market, segmentation - market and market segmentation, market approaches, benefits of market segmentation - marketing mix, merchandising decision, promotion campaign. Criteria for market segmentations dimension of segmentation, demographic segmentation, psychographic segmentation. Retail strategies - develop vision and mission statements, operational excellence, produce differentiation, customer intimacy, growth strategy, market expansion strategy, market penetration, market development, product range development, diversification. Retail merchandising - merchandising planning, merchandising hierarchy, SKU, range planning, planogram, buying function - advantages of an open to buy plan. Category management - category vision, definition, category role, assessment strategies, balanced score card, tactics, category implementation, markups and markdowns in merchandise management, shrinkage in retail merchandise management, Gross Margin Return on Inventory (GMROI).

Supply chain management in retailing definition, ISC, vendor management, EDI, warehouse management. Retail marketing and advertising - retail marketing strategies, retail marketing mix, Customer Relationship Management (CRM). Direct marketing - direct mail, catalogues and mail order, telemarketing, electronic retailing, micro-marketing advertising in retailing - advantages, types of advertising, advertising campaign. Brand management - branding, brand management of retail outlets. Merchandise management - target market and competition, analysis, planning, merchandise budget plan, inventory plan, and criteria for selection of suppliers. Pricing and Communication - Introduction, Concept of Retail Price,

Retailing Pricing Strategies - Demand Oriented Pricing, Market Skimming, Penetration Pricing, Price Bundling, Leader Pricing, Multi Unit Pricing, Every Day Low Pricing and its benefits, Odd Pricing, Single Pricing, Multiple Pricing, Prestige Pricing. Methods for setting Retail Prices - Cost based method, Competition based method, Demand oriented pricing method. Pricing Adjustments, Retail Promotion Strategy - Introduction, Selection of Promotion Mix-Control, Flexibility, Credibility, Cost. The Retail Marketing Mix- Product, Price, Place, Promotion, Presentation, Customer Service, People. Advertising-objectives, Significance, Benefits. Types of Advertising- Persuasive Advertising, Informative Advertising, Corporate Advertising, Financial Advertising, Classified Advertising. Steps involved in Retail Advertising Campaigns - Selecting Advertisement objectives, Retail operations - Areas of retail operations, Stores operating parameters, Customer conversion ratio, Returns of net sales, Transaction per hour, Sales per transaction, Hourly customer traffic. Stocks - Average selling price, average stock price, Stock turnover / inventory turnover, Franchising in retailing - franchising, types of franchise agreement. Retail Information System and Advantages of retail data base of RIS.

4. Value Chain in Agriculture AMR 314 3 (2+1)

Theory: Meaning of value and value chain. Concept of value chain. Components of value chain-Grading, Processing, Storage, Transportation, Packaging and Delivery. Value chain from farm gate to consumer's plate. Processing- Meaning and functions. Processing of important commodities like food grains, oilseeds, commercial and horticultural crops. Economics of processing. Storage- Meaning and functions. Different storage structures. Storage methods for food grains, oilseeds, commercial and horticultural crops. Economics of storage. Transportation- Meaning and functions. Modes of transport, transportation of food grains, oilseeds, commercial and horticultural crops. Economics of transportation. Packaging- Meaning and functions. Materials used for packaging of food grains, oilseeds, commercial and horticultural crops. Economics of packaging. Special requisites for marketing of livestock and its products- Processing, Storage, Transportation and Packaging. Economics of marketing of livestock and its products. Special requisites for marketing of fish- Processing, Storage, Transportation and Packaging. Economics of marketing of fish. Special requisites for marketing of cocoons- Processing, Storage, Transportation and Packaging. Economics of marketing of cocoons.

Practicals:

Economics of value addition at different stages for different products, visits to processing units, logistics, godowns, ware houses, etc.

5. E-Commerce in Agribusiness AMR 315 3 (2+1)

Theory: Introduction- meaning and forces behind E-commerce, industry framework, brief history of E-commerce, advantages of E-commerce, Inter-organizational E-commerce, Intra organizational E-commerce, Pure v/s Partial E-commerce. Network infrastructure for E-commerce, the internet, intranets and extranets as E-commerce infrastructure. Encryption- WWW and security, encryption, transaction security, secret key encryption, public key encryption, virtual private network, implementation management issues; Electronic payments- overview of E-payments, digital token based electronic payment system, smart cards, credit cards / debit cards based electronic payment system, emerging financial instruments, home banking and online banking. Electronic Data Interchange (EDI), Development of EDI, Application of EDI in business, legal requirements in E-commerce. Introduction of E-commerce in supply chain management (SCM) and customer relationship management (CRM). E-commerce standards- Introduction, types of standards, document translation standards. E-commerce law- introduction, E-commerce transaction, electronic fund transaction act and regulation, forms of agreement, legal issues in Indian scenario. Mobile commerce- introduction to M-commerce, mobile computing applications, wireless application protocols, WAP technology. Web Security- Introduction to web security, firewalls and transaction security, client server network, emerging client server security threats, firewalls and network security

Practicals:

E-commerce- case studies of which include six success stories like Indiatimes. com, Rediff. com, Baazee. com, SAIL, ITC- E-choupal, AMUL, Digital Marketing- Introduction, the effects of E-business technologies on marketing strategy, First generation marketing tools- Email marketing, online marketing, search marketing, affiliate marketing. Second generation digital marketing tools and viral marketing, Future challenges and opportunities of E-commerce.

6. Recent Advances in Banking AFN 311 3 (2+1)

Theory: Definition of Banking, meaning, Evolution of Banking Institutions, History of banking system in India, list of public and private sector banks in India, Indian Banks operation abroad, functions of a bank, difference between organized and unorganized banking sector. Central

banking- Functions of a Central bank, Monopoly of Note Issue, Monetary policy, Qualitative instruments of monetary policy and recent trends in Central banking. Reserve Bank of India- Genesis, Nature and functions of RBI, Role of RBI, Departments of RBI, difference between central bank and other banks. Commercial banks- functions of commercial banks and the services rendered by them, General structure and methods of commercial banking, Mechanism of Credit Creation, The Clearing House System, Systems of banking-Group v/s Chain banking, Unit v/s Branch banking, Mixed v/s Investment banking, Universal banking, Merchant banking, Virtual banking, Green banking.

Cooperative bank- Structure of Cooperative banking sector, Urban Cooperative banks, Rural Cooperatives banks, Banker and Customer, Relationship between Banker and Customer- General Features of the Relationship National Bank for Agriculture and Rural Development (NABARD)- Functions and resources, Kissan Credit Card Scheme, Role of NABARD in rural credit. Precautions to be taken while opening a bank account, Different types of accounts- Hindu Undivided Family, Married Women, Pardashin Lady, Illiterate Person, Blind Person, Insolvent Person, Insane Person, Intoxicated, Executors and Administrators, Liquidators, Trust, Societies and Clubs, Minors, Agents, Joint Accounts, Partnership Firms, Joint Stock Companies.

Cheques-Requisites of a cheques, Dating of cheques, Crossing of cheques, Endorsements, Marking of cheques, Holder and Holder in Due Course, Liability of the drawer for dishonor of cheques. Promissory notes- definition, kinds and legal decisions. Customers pass book-Entries in the pass book, effect of errors favorable to the banker and those favorable to the customers, closing an account. Customer service in banks- customer service guidelines, banking ombudsman scheme, customer service nomination facility and improvement of customer services. KYC norms and Anti-money laundering-policy on Know Your Customer (KYC) standards/ Anti-money Laundering (AML) measures. Payment and settlement system- New Age Clearing-Payment and settlement systems in Banks, Electronic fund transfer (EFT), Electronic Clearing Service (ECS), MICR clearing, Core banking solution (CBS), National gateways- Real time gross settlement, RTGS operations, International gateways- Society for Worldwide Interbank Financial Telecommunications (SWIFT). Changing profile of Indian banking- from Security orientation to purpose orientation, the challenges ahead. Technology in banks-Technology, E- banking, Internet banking, Tele banking, M banking, Risks associated with internet banking. Banking products- Introduction,

Deposit products, Remittance products, IT products and loan products. Bank marketing- Introduction, Bank- A marketing organization, Marketing the banking products in India, Characteristics of Bank Marketing, Impact of Economic Reforms and the IT revolution, Emerging issues in Indian Banking. Banking sector- Corporate banking, Retail banking, International banking, Rural banking, Regional Rural Banks.

Foreign exchange-Meaning and Significance, Rate of Exchange, Exchange Controls- aims of exchange control, devaluation of rupee , Methods of Exchange Controls- intervention and restrictions. Loans and advances-Principles of Bank Lending, Methods of Granting Advances, Secured Advances. Priority sector lending- Background, Small scale industries-RBI guidelines, Sub-targets for all scheduled commercial banks. Non Performing Assets-Definition, Impact of NPAS, consequence of NPAS, identification of NPAS. Latest in banking- Autonomy package for banks, Tax matters, 12 hour banking, Dematerialization, Mutual fund, Insurance business by Banks.

Practicals:

Practical exposure visit to commercial bank, lead bank and visits to different cooperative banks like PACS, DCC Banks. Solving problems related to banking sector.

III. Rural Agri-Institutional Work Experience and Agro-Industrial Attachment (RAIWE & AIA)- Student READY Programme

RAIWE & AIA	20
Experiential Learning (EPL)/ HOT	20

Details of RAIWE and AIA Courses

SRP411 (0+14)

(A) Village Attachment Training Programme (8 weeks)

Activity	Duration
Orientation and Survey of Village	1 week
Agronomical Interventions	1 week
Plant Protection Interventions	1 week
Soil Improvement Interventions (Soil sampling and testing)	1 week

Food Processing and Storage interventions	1 week
Animal Production Interventions	1 week
Extension and Transfer of Technology activities	1 week
Attachment to PACS, RRBs and Milk producers society	1 week
Total	8 Weeks

(B) Unit attachment to University / KVKs/ Research Stations/ Other institutions (5 weeks)

Activity	Duration
KVK attachment	1 Week
Research Station attachment	1 Week
Attachment to APMC	1 Week
Attachment to SWC	1 Week
Attachment TAPCMS and PCARDB	1 Week
Total	5 Weeks

SRP 412 (0+6)

(A) Plant Clinic: Two Weeks

(B) Agro Industrial Attachment (3 weeks)

Activity	Duration
Cattle feed manufacturing unit, KMF and DCC Banks	1 Week
Attachment to Apex Level Institutions such as KSAMB, Apex Coop. Bank, NABARD, APEDA, BIS, Coop. Marketing Federation, Flower Auction Centre, HPCOMS etc.	2 Weeks
Total	3 Weeks

Activities and Tasks during Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry

- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the industry
- Documentation of the activities and task performed by the students
- Performance evaluation, appraisal and ranking of students

IV. Non-Gradiual Courses

NCC / Physical Education & Yoga Practices* 2 (0+2)*

1. National Cadet Corps	2 (0+2)
National Cadet Corps	NCC-101 1 (0+1)

Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline; Drill- aim, general words of command, attention, stands at ease, stand easy and turning; Sizing, numbering, forming in three ranks, open and close order march and dressing; Saluting at the halt, getting on parade, dismissing and falling out; Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear; Turning on the march and wheeling. Saluting on the march; Marking time, forward march and halt; Changing step, formation of squad and squad drill; Command and control, organization, badges of rank, honours and awards; Nation Building- cultural heritage, religions, traditions and customs of India. National integration; Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen; Leadership traits, types of leadership. Character/personality development; Civil defense organization, types of emergencies, fire fighting, protection; Maintenance of essential services, disaster management, aid during development projects; Basics of social service, weaker sections of society and their

needs, NGO's and their contribution, contribution of youth towards social welfare and family planning; Structure and function of human body, diet and exercise, hygiene and sanitation; Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health; Adventure activities; Basic principles of ecology, environmental conservation, pollution and its control; Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self defense.

2. National Cadet Corps **NCC-102** **1 (0+1)**

Arms Drill- Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms; Shoulder from the order and vice-versa, present from the order and vice-versa; Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa; Guard mounting, guard of honour, Platoon/Coy Drill; Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning and sight setting; Loading, cocking and unloading. The lying position and holding; Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight; Theory of groups and snap shooting. Firing at moving targets. Miniature range firing; Characteristics of Carbine and LMG; Introduction to map, scales and conventional signs. Topographical forms and technical terms; The grid system. Relief, contours and gradients. Cardinal points and finding north. Types of bearings and use of service protractor; Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map; Knots and lashings, Camouflage and concealment, Explosives and IEDs; Field defenses obstacles, mines and mine lying. Bridging, watermanship; Field water supplies, tracks and their construction; Nuclear, Chemical and Biological Warfare (NCBW); Judging distance. Description of ground and indication of landmarks; Recognition and description of target. Observation and concealment. Field signals. Section formations; Fire control orders. Fire and movement. Movement with/without arms. Section battle drill; Types of communication, media, latest trends & developments.

1. Physical Education and Yoga Practices **2 (0+2)**

Physical Education and Yoga Practices -I **PED-101** **1 (0+1)**

Teaching of skills of Football - demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit); Teaching of

advance skills of Football - involvement of all the skills in game situation with teaching of rules of the game; Teaching of skills of Basketball - demonstration, practice of the skills, correction of skills, involvement in game situation; Teaching of skills of Basketball - involvement of all the skills in game situation with teaching of rule of the game; Teaching of skills of Kabaddi - demonstration, practice of the skills, correction of skills, involvement in game situation; Teaching of advance skills of Kabaddi - involvement of all the skills in game situation with teaching of rule of the game; Teaching of skills of Ball Badminton - demonstration, practice of the skills, correction of skills, involvement in game situation, involvement of all the skills in game situation with teaching of rule of the game; Teaching of some of Asanas - demonstration, practice, correction and practice; Teaching of skills of Table Tennis - demonstration, practice of skills, correction and practice and involvement in game situation, involvement of all the skills in game situation with teaching of rule of the game; Meaning, Scope and importance of Physical Education; Definition, Type of Tournaments; Physical Fitness and Health Education; Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).

2. Physical Education and Yoga Practices-II **PED-102** **1 (0+1)**

Teaching of advance skills of Hockey - demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game; Teaching of advance skills of Kho-Kho - demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game; Teaching of different track events - demonstration practice of the skills and correction with competition among them; Teaching of different field events - demonstration practice of the skills and correction with competition among them; Teaching of different asanas - demonstration practice and correction; Teaching of different asanas - demonstration practice and correction; Teaching of circuit training - demonstration practice and correction; Teaching of calisthenics - demonstration practice and correction.

3. National Service Scheme **NSS -201** **1(0+1)***

Theory: Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

Following activities are to be taken up under the NSS course:

Introduction, basic components of NSS: Orientation; NSS programmes and activities; Understanding youth; Community mobilization; Social harmony & national integration; Volunteerism & shramdan; Citizenship, constitution & human rights; Family and society; Importance & role of youth leadership; Life competencies; Youth development programmes; Health, hygiene and sanitation; Youth health, lifestyle, HIV AIDS and first aid; Youth and yoga; Vocational skill development; Issues related environment; Disaster management; Entrepreneurship development; Formulation of production oriented project; Documentation & data reporting; Resource mobilization; Additional life skills; Activities directed by the Central and State Government.

All the activities related to the National Service Scheme course is distributed under four different courses viz., National Service Scheme I, National Service Scheme II, National Service Scheme III and National Service Scheme IV each having one credit load. The entire four courses should be offered continuously for two years. A student enrolled in NSS course should put in at least 60 hours of social work in different activities in a semester other than five regular one day camp in a year and one special camp for duration of 7 days at any semester break period in the two year. Different activities will include orientation lectures and practical works. Activities directed by the Central and State Government have to be performed by all the volunteers of NSS as per direction.

Practicals:

Introduction and basic components of NSS;

Orientation: history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

NSS programmes and activities: Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary

Understanding youth: Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

Community mobilization: Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

Social harmony and national integration: Indian history and culture, role of youth in nation building, conflict resolution and peace-building

Volunteerism and shramdan: Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

Citizenship, constitution and human rights: Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information

Family and society: Concept of family, community (PRIs and other community based organisations) and society

4. Human Values and Ethics* AEX 102 1(1+0)*

Universal human aspirations: Happiness and prosperity; Human values and ethics: Concept, definition, significance and sources; Fundamental values: Right conduct, peace, truth, love and non-violence; Ethics: professional, environmental, ICT; Sensitization towards others particularly senior citizens, developmentally challenged and gender.

Spirituality, positive attitude and scientific temper; Team work and volunteering; Rights and responsibilities; Road safety; Human relations and family harmony; Modern challenges and value conflict: Sensitization against drug abuse and other social evils; Developing personal code of conduct (SWOT Analysis); Management of anger and stress.

Suggested references:

Gaur, R.R., Sangal, R. and Bagaria, G.P., 2011, A Foundation Course in Human Values and Professional Ethics. Excel Books

Mathur, S.S., 2010, Education for Values, Environment and Human Rights. RSA International.

Sharma, R.A., 2011, Human Values and Education - Axiology, Inculcation and Research, R. Lall Book Depot

Sharma, R.P., and Sharma, M., 2011, Value Education and Professional Ethics, Kanishka Publishers

Srivastava, S., 2011, Human Values and Professional Ethics, S.K. Kataria & Sons

Srivastava, S., 2011, Environmental Science, S.K. Kataria & Sons

Tripathi, A.N., 2009, Human Values, New Age International (P) Ltd Publishers.

5. Study Tour*

TOR 401

1 (0+1)*

6.	Kannada Krishi Bhaga-1/ Kannada Bhashe*	KAN-101/ KNK-101	1 (0+1)*
KAN-101			
ಸಂಸ್ಕೃತಿ ಪರಿಚಯ	ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿಯ ಒಂದು ಚಿತ್ರ-ರಹಮತ್ ತರೀಕೆರೆ		
ವಿಮರ್ಶೆ	ಹುಲ್ಲು - ಕಣವಿಯವರ ಕವನ ವಿಮರ್ಶೆ - ಗೌರೀಶ ಕಾಯ್ಕಿಣಿ		
ನುಡಿ ಚಿತ್ರ	ವಂಶವಾಹಿ ಮಹಾಮೋಚಣಿ-ನಾಗೇಶ್ ಹೆಗಡೆ		
ವೃತ್ತಿ ಬದುಕು	ಎರಡನೇ ಅಜಾತುರ್ಯ		
ಅಂಕಣ ಸಾಹಿತ್ಯ	ಆಹಾರ-ಈಶ್ವರ ದೈತೋಟ		
ವಚನ ಸಾಹಿತ್ಯ	ಪ್ರಮುಖ ವಚನಕಾರರ ವಚನಗಳು		
ಸರ್ವಜ್ಞ ಸಾಹಿತ್ಯ			
ಕವನ	ಅವ್ವ-ಲಂಕೇಶ್		
ವ್ಯಕ್ತಿ ಪರಿಚಯ			
ಕಥೆ	ಗಾಂಧಿ-ಬೆಸಗರಹಳ್ಳಿ ರಾಮಣ್ಣ		
ಕುವೆಂಪು ಸಾಹಿತ್ಯ			
ವಿಜ್ಞಾನ/ ಪರಿನರ-ಬರಹ	ಶಿವರಾಮ ಕಾರಂತ/ ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ		
ಸಾಹಿತಿ ಪರಿಚಯ			
KNK-101			
ಪರಸ್ಪರ ಪರಿಚಯ	Introducing each other		
ಸ್ನೇಹಿತರ ನಡುವೆ ಸಂಭಾಷಣೆ	Conversation between friends		
ಕುಟುಂಬದ ಬಗೆಗೆ ವಿಚಾರಣೆ	Enquiring about family		
ಸಿನೆಮಾಕ್ಕೆ ಹೋಗಲು ಸಿದ್ಧತೆ	Plan to go for a movie		
ವಿದ್ಯಾರ್ಥಿಯ ದೈನಂದಿನ ಚಟುವಟಿಕೆಗಳು	Routine activities of a student		
ಪುಸ್ತಕದಂಗಡಿಯಲ್ಲಿ	In a book shop		
ಕೃಷಿ ಕುರಿತು	About agriculture		
ಕಾಲೇಜು/ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಪರಿಚಯ	Introducing College/ University		
ರೈತ ಮತ್ತು ವಿಜ್ಞಾನಿಯ ನಡುವೆ ಸಂಭಾಷಣೆ	Conversation between a farmer and a Scientist		
ಹಳ್ಳಿಯಲ್ಲಿ ಮಾಹಿತಿ ಸಂಗ್ರಹಣೆ	Data Collection in a village		
ಪ್ರವಾಸ ಹೊರಡುವುದು	Going on a tour		
7.	Kannada Krishi Bhaga-2/ Kannada Sanskriti*	KAN-102/ KNK-102	1 (0+1)*
KAN-102			
ಕೃಷಿ ಹಬ್ಬಗಳು			
ಜನಪದ ಕಥೆ			
ಜನಪದ ಗೀತೆ			
ಕೃಷಿ ಗಾದೆ			
ಪುಸ್ತಕ ಪರಿಚಯ	ಕೃಷಿ ಜ್ಞಾನ ಪ್ರದೀಪಿಕೆ		
ಕೃಷಿ ವಿಜ್ಞಾನ ಲೇಖನ			
ಪ್ರಬಂಧ	ಜೇನು ಕೃಷಿ-ಮುರಿಗೆಪ್ಪ ಶ್ರೇಷ್ಠಿ		
ಸ್ವಗತ	ನಾನೇಕೆ ಬರೆಯುತ್ತೇನೆ-ಡಾ.ಎಸ್.ಜಿ.ಎಸ್.		
ನಾಟಕ	ತಬ್ಬಲಿಗಳು-ಡಾ.ಮಿರ್ಜಾಬಷೀರ್		

ಹಳೇ ಸಾಹಿತ್ಯ ಹೊಸ ಸಂವಹನ	ಕೆರೆಗೆ ಹಾರ
ಕನ್ನಡ ಕೃಷಿ ವಿಜ್ಞಾನ ಸಾಹಿತ್ಯ ಪರಿಚಯ	
ವ್ಯಕ್ತ್ಯಾಯುರ್ವೇದ	
ಶತಮಾನದ ಕೃಷಿ ವಿಜ್ಞಾನ ಸಾಧನೆ	
ಕೃಷಿ ತಂತ್ರಜ್ಞಾನ ವರ್ಗಾವಣೆಯಲ್ಲಿ ಭಾಷೆಯ ಪಾತ್ರ	
ಮಾಧ್ಯಮಗಳು	
ಅಂತರ್ಜಾಲ	
KNK-102	
ವರ್ಣಮಾಲೆ ಪರಿಚಯ	Introducing alphabets
ಪದರಚನೆ	Word construction
ವಾಕ್ಯರಚನೆ	Sentence construction
ಬರಹ ಕೌಶಲ್ಯ - ಸರಳ ವಾಕ್ಯಗಳ ಅನುವಾದ	Writing skills - translation of simple sentences
ಬರಹ ಕೌಶಲ್ಯ - ನಿಬಂಧ	Writing skills - Essay
ಆಶುಭಾಷಣ; ನಾಡಗೀತೆ; ಕರ್ನಾಟಕದ ಚರಿತ್ರೆ ಪರಿಚಯ	Extempore; Nada Geethe; Introduction to History of Karnataka
ಕರ್ನಾಟಕದ ಪ್ರೇಕ್ಷಣೀಯ ಸ್ಥಳಗಳು	Tourist spots of Karnataka
ಕರ್ನಾಟಕದ ಹಬ್ಬಗಳು	Festivals of Karnataka
ಕನ್ನಡ ಕವಿ, ಕಲಾವಿದರು	Kannada Poets and Artists
ಕರ್ನಾಟಕದ ವಿಜ್ಞಾನಿಗಳು ಹಾಗೂ ತಂತ್ರಜ್ಞರು	Scientists and technocrats of Karnataka

V. Remedial Courses (Any One)

1 Introductory Biology GPB 111

2 (1+1)**

Theory : Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division. Morphology of flowering plants. Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Practicals

Morphology of flowering plants - root, stem and leaf and their modifications. Inflorescence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants - Brassicaceae, Fabaceae and Poaceae.

Suggested Readings

Dutta A.C. , 1998 Botany for Degree Students Pub : Oxford; 6 edition

2. Elementary Mathematics**

MAT 111

2 (2+0)**

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) , Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$. Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it).

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Suggested Readings

1. Shanti Narayan, 2010, Differential Calculus, Pub.by S.Chand & Co., New Delhi