Name of Programme: M.Sc. (Ag.) Soil conversation and water management

Academic eligibility for admission: - B.Sc. (Ag.)/ Soil conservation

Curriculum and Syllabus

Semester	Course Code & No.	Course Title	Credit Hrs.	Mid Exam.	Final Exam		Total
					Theory	Practical	
I[st] Sem.	SCW-501	SOILS AND THEIR PHYSICAL PROPERTIES	3 (2+1)	20	40	40	100
	SCW-502	PROBLEM SOIL AND THEIR MANAGEMENT	3 (2+1)	20	40	40	100
	SCW-503	HYDROLOGY	3 (2+1)	20	40	40	100
	AST-501	Statistical Methods	3 (2+1)	20	40	40	100
		Total	12				
II[nd] Sem	SCW-504	METEOROLOGY	3 (2+1)	20	40	40	100
	SCW-505	CONSERVATION IRRIGATION AND DRAINAGE	3(2+1)	20	40	40	100
	SCW-506	CONSERVATION PROBLEMS AND THEIR CONTROL MEASURE	3 (2+1)	20	40	40	100
	AST-502	Design of Experiments	3(2+1)	20	40	40	100
		Total	12				
III[rd] Sem	SCW-507	CONSERVATION FARMING AND WATERSHED MANAGEMENT	3(2+1)	20	40	40	100
	SCW-508	AGROFORESTRY AND WATERSHED MANAGEMENT	3(2+1)	20	40	40	100
	SCW-509	GRASS LAND AND WATERSHED MANAGEMENT	3(2+1)	20	40	40	100
	SCW-510	CONSERVATION FORESTRY	3(2+1)	20	40	40	100
			12				
IV[th] Sem	SCW-511	WATERSHED & WASTELAND MANAGEMENT	3(2+1)	20	40	40	100
	SCW-512	RAIN WATER HARVESTING AND DRY LAND FARMING	3(2+1)	20	40	40	100
	SCW-599	Seminar	1	Satisfactory/Unsatisfactory			
	Optional (any one from two)						
	SCW-513	GENERAL SILVI-CULTURE	12(9+3)	20	40	40	100
	or						
	SCW-598	Thesis Research	12	40 % Internal +60% External)			100
		Total	19				
		Grand Total	55				

SCW 501: SOILS AND THEIR PHYSICAL PROPERTIES

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Elementary knowledge of Soils:

Modern concepts of soil; definition, rocks and minerals wheathering of rocks and weathering indices; factors of soil formation; soil farming processes; evolution of soil body in nature: soil profile and concept of soil predors; soil classification, U.s.: soil taxonomy, its advantages and limitations. Soil of India and Uttar Pradesh and their distribution soil surveys - objectives and types. Physical Properties of soils-

Physical properties of soil characteristics of the dispersed phase, viscosity and swelling of soil colloids; dynamic properties of soil; soil texture and structure; soil aeration; the thermal regime of soils; soil water retention; soil water movement; field moisture regime soil water plant relations. Soil water management.

Practical: related with the Course:

SEW 502: PROBLEM SOIL AND THEIR MANAGEMENT

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Acid and salt affected soils - their origin, distribution, classification, reclamation and management practices, waste land soils and their management practices fertility problems in eroded soils of plane, gullied and revine land and their management.

Water logged soils - their distribution, changes in soil pH, electrical conductivity, redox potential and transformation of important plant nutrients during water logging, management of waterlogged soil for crop production

Legal aspects of soil conservation; knowledge of command area authorities and land development boards and financial implication. Interstate projects and their functionaries, command area management. Peoples participation, agencies and organization of soil conservation. Soil conservation research, education and training land development machinery and maintenance of development land.

Practical: Related with the Course.

SEW 503: HYDROLOGY

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Hydrology - Hydrologic cycle, definition, processes, and components of hydrologic cycle, precipitation, origin, process, forms and clouds and their formation. Air masses and stores. Measurement of rainfall, calculation of average rainfall in a field, water

budget, surface and ground water hydrology and aquifers.

Runoff types, factors affecting, method of computation, runoff hydrograph. Surface and ground water, factors affecting the shape of hydrograph, computation of runoff using unit hydrograph. Runoff computation by infiltration and imperial formulae. Hydrograph and stream gauging. Use of remote sousing in data collection, water resource management

Practical: Related with the Course.

SEW 504: METEOROLOGY

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Meteorology, definition, meal1lng and scope in agriculture, relation between meteorology and crop production and its scope on agriculture climate and weather definition, role in crop production and water management use of meteorological instruments' in measurement of climate weather, evaporation, evapotranspiration, factors affecting evapotranspiration. Techniques for reducing evaporation and evapotranspiration. Solar radiation, definition, constants reflection, transmission and absorption, factors affecting radiation. Atmospheric temperature humidity, using velocity measurement distribution and factors affecting temperature and humidity study of ralnguages and measurement of rainfall, dry and wet spells.

Practical: Related with the Course.

SCW 505: CONSERVATION IRRIGATION AND DRAINAGE

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Water resources and irrigation development in India, water convegance and control. hydraulics of open channels, design of farm channels, conveyance losses, lining of channels of water courses, hydroclic principle of water _measurement, of irrigation water velocity, area methods, water meter, weirs parshall flumes, orifices etc. water application methods irrigations system and their design pump and tube wells comparative efficiency and economics of different methods of irrigation. irrigability classification and its use in irrigation planning. Conservation drainage - Necessity, methods and design of surface and substance drainage, drainages of irrigated lands, interceptor relief drains and tile drains and their design, drainage requirements of crops, drainage in relation salinity control

Practical: Related with the Course.

SCW 506: SOIL CONSERVATION PROBLEMS AND THEIR CONTROL MEASURE

(Credit Hours: 2+1 = 3) **(MARKS : MID 20 + THE 40 + PRA. 40 = 100)**

Conservation problems - History of soil erosion and land degradation in India and abroad, soil erosion process, erosiviaty and availability, erosion types and its effects on natural resources, public work and other economic aspects, methods of assessing erosion loss and identifying degree of soil erosion in field sedimentation problems rivers, reservaries ponds and river valley projects and its control and estimation. Soil loss and their estimation by various methods. Classification of eroded fails and classifying criteria. Soil conservation regions and research and training centres in India. Soil conservation under five year plan.

Interpretation of soil data for watershed management to reduce runoff and. erosions and increase water yield. River valley projects, suiting .of reservoives, dams and their protection causes of floods and head water flow control.

Control measures - Soil conservation survey: classification of mapping units; land use capability classification . Planning, designing and construction of contour bunds and terraces. Vegetative water courses, strip cropping, contour cultivation, grass water ways and diversion ditches, gully control - vegetative measures, temporary and permanent structures of gully control, farm ponds and resources design and construction. Land cleaning and levelling and earth work estimation. Water and wind erosion control.

Practical: related with the Course.

SCW 507: CONSERVATION FARMING AND WATERSHED MANAGEMENT

(Credit Hours :2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Agronomical practices - Role of agronomy in soil conservation. Principles of scientific land management for soils conservation viz. (i) soil and water loss (ii) soil drainage (iii) soil structure and organic matter (iv) tillage and (v) soil fertility and fertilizer programmes. conservation cropping systems, soil depleting and soil building system, basis for selecting crop rotations for different soil & climatic zones. Mixed & cover cropping.

Strip cropping - functions and types, methods of laying out strips, selecting crops for strips and inter-culture, procedure to fix strip wildthes and strips ratios of erosion permitting to erosion resisting crops for different soil climatic belts.

Dryland farming principles and practices - Principles of conservation farming in dry and irrigated lands dry land farming choice of crops and cropping, tillage and manuring practices, seeding, mulching for moisture conservation, moisture judging for irrigation, high intensity cropping and fertilizer use, consumptive use of water. Water requirement

of crops, water use efficiency and evapotranspiration ratios. Root distribution of crops and moisture extraction. Moisture stresses in root zone and plant growth curve and yield relations.

Practical: Related with the Course

SCW 508: AGROFORESTRY AND WATERSHED MANAGEMENT

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Agroforestry - Definition scope and needs of agroforestry, role of agroforestry in evergreen revolution environment management and soil and water conservation. Agroforestry and agro-based industries. Role of agroforestry in maintaining soil fertility of waste land. Systems of agroforestry, agroforestry on hills. Arable and non arable land and as entire farming management of different types of problems land by adopting agroforestry systems. Characteristics of tree species for agroforestry, concept of multipurpose trees (MPT) in agroforestry, choice of tree species.

Watershed management - Definition, objectives and concepts of watershed management, classification of watersheds. Watershed hydrology, estimation of rainfall and runoff, runoff harvesting and recycling. Appropriate technology inputs for watershed development. Management of thills and mined watershed. Watershed management in drought prone areas water shed management for environmental security, relevance of peoples participation. Watershed management for conservation of resources and enhancing productivity in problem lands, management of river valley projects watershed socioeconomic evaluation of watershed management projects.

Practical: Related with the Course.

SEW 509: GRASS LAND AND WATERSHED MANAGEMENT

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Grassland - Definition of grassland, range land and pasture land and their classification, selection of land and grass species, preparations of seed bed and sowing of seeds, fertilizer application and weed control. Major grass cover of India. Management of grassland. Grassland legumes for tropics and temperate areas, their identification, grass legumes association and natural succession, grassland and grazing lands of India establishment methods of grassland and waste lands and eroded areas on plains of hills, management of grass land, range and pasture to improve and maintain them and watershed management, carrying capacity of grassland range and pastures. Controlled grazing, rotational and deferred grazing management of grasses and legumes for special problem sites. Studies on cultivated grasses. Drainage of pasture land.

Grasses and watershed management - Watershed definition, need and scope of

watershed management. agrostology and water shed management for reservis protection and runoff control, special agrostological practices for hills watershed management. Cover efficiency hydrological rating of crop factors and management factors and their runoff producing values in a watershed. Animal and tractor drawn equipments and implements used for grass land management. Socioeconomic aspects of soil conservation, educational programme in watershed management. Peoples participation in watershed management.

Practical: Related with the Course.

SCW 510: CONSERVATION FORESTRY

(Credit Hours: 2+1 = 3) (MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Forest needs of the country, extent of forest in India. Role of forests in National economy. Forest influences national forest policy plant, succession, growth and morphology of trees and crops. Broad forest types of India and Uttar Pradesh. Natural and artificial regeneration of forest. Tending of rations, of some important conifers and broad leaved species and bamboos forest conservation organization and rules regulation in U.P. and India. Propagation methods of forest species. Nursery techniques, soil working tending operations. Identification of forest species and herbarium collection.

Practical: Related with the Course.

SCW 511: WATERSHED & WASTELAND MANAGEMENT

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Watershed management - Concept need, principles & components of watershed management integrated watershed management. Factors effecting watershed management runoff & soil loss management in a watershed socio-economic concept of watershed. Peoples participation in watershed management. Application of remote sensing, GIS & isolope technology in survey & problem identification for planning & management watershed. Policy approaches & management plan, problems of watershed management.

Wasteland management - Definition, concept & types of degraded & wasteland. Distribution & extent of watershed in India & Uttar Pradesh, factors responsible for land degradation, characteristics of different types of degradation & wasteland. Problems of degraded land in Uttar Pradesh. Appropriate techniques for management of different types of degraded & wasteland.

Practical: Related with the Course.

SCW 512: RAIN WATER HARVESTING AND DRY LAND FARMING

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 :- PRA. 40 = 100)**

Problems, characteristics and dynamics of soil productivity in dryland and rainfed areas. Damages caused by soil erosion and strategies for soil conservation by adopting rain water harvesting practices rain water harvesting techniques in dry land and rainfed areas for crop production. Vegetative cover conservation tillage mulching, cover for crops production, vegetative cover conservation tillage mulching cover crops. Alley cropping, vegetative barriers in site- water conservation and runoff harvesting techniques - tillage, graded border strips, inter plot and inter row water harvesting, water harvesting techniques in difficult sites - ravinous areas, stream bank control, torrent control land strips and land slides. Construction and designs of ponds and reservoires. Use of rain harvested water for life sovina irrigation in dryland and rainfed areas for crop production, rainwater harvesting technique and water recharging into the substance and down ward for drinking irrigation purposes.

Practical: Related with the Course.

SCW 513 : GENERAL SILVI-CULTURE

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Locality factors, forest influences, plant succession, treat plantation, techniques, artificial reproduction in the hills, classification for regular forests, classification of species in respect of their light requirement. Classification of species in respect of their copping power. List of species suitable for afforesting dry land arid areas, lopping rules, land categories tending operational, silvi-culture of some important centre breed leaved species and bamboos, silvi-cultural systems.

Practical: Related with the Course.