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| **3RD YEAR** | **V SEM** | 1. | **Weed & Water Management** (Core subject) | 4+2=6 |
| | | 2. | **Farm power & Machinery** (Core subject) | 4+2=6 |
| | | 3. | **Rain fed Agriculture & Water shed Management** (Core subject) | 4+2=6 |
| | | 4. | **Pests of Horticultural Crops & Productive Entomology** (Core subject) | 4+2=6 |
| | | 5. | **Fungicides & Plant disease Management** (Core subject) | 4+2=6 |
| | | 6. | **Production Technology for Fruits and Vegetables**(Core subject) | 4+2=6 |
| | | | | **Credits 24+12=36** |

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**III Year – Semester V**

## WEED AND WATER MANAGEMENT(CREDITS 4+2=6)

**UNIT–I :** Weed Biology and Ecology Weeds:

Introduction, Definitions; harmful and beneficial effects, classification, propagation, disseminationandweedseeddormancy;Weedbiologyandecology;Criticalperiodsofcrop weed competition and allelopathy. Principles of Weed Management Concepts of weed prevention, control and eradication; Methods of weed management: cultural, mechanical, chemical, biological and biotechnological methods; Integrated weedmanagement.

**UNIT–II** : Herbicides

Herbicides: Definition – advantages and limitation of herbicide usage in India; Herbicide classification,formulations,methodsofapplication;IntroductiontoAdjuvantsandtheiruse in herbicides. Weed management in field crops; aquatic, problematic, invasive alien weeds and theirmanagement.

**UNIT–III :** Importance and History of Irrigation

Role of water in plant growth – Importance of irrigation – Water resources and irrigation potential of India – History and development of irrigation in India – Irrigation systems of India. Soil – water– plant relationship – Soil Plant Atmospheric Continuum (SPAC) – Hydrologicalcycle–Moistureextractionpattern–Absorptionofwater–Evapotranspiration – Plant water stress and its effect and methods to overcome stress.

**UNIT–IV** : Crop Water Requirement and Management

Crop water requirement – Potential evapotranspiration (PET) and consumptive use – Definitionandestimation–Factorsaffectingwaterrequirement–Effectiverainfall–Critical stagesforirrigation–Waterrequirementofcrops–Watermanagementformajorfieldcrops.

**UNIT–V :** Methods of Irrigation

Scheduling of irrigation – Different approaches – Methods of irrigation: surface, sub – surface, sprinkler and drip irrigation – Micro irrigation: layout, suitability, merits and demerits – Fertigation – Water use efficiency – Methods to improve WUE – Conjunctive use of surface and ground water. Quality of irrigation water – Agronomic practices for use of poor quality water (saline, effluent and sewage water) for irrigation**.**

**WEED AND WATER MANAGEMENT (PRACTICAL)**

1. Identification, classification and characterization of terrestrialweeds.
2. Identification, classification and characterization of aquatic weeds and parasiticweeds.
3. Estimation of soil weed seedbank.
4. Identification, classification and characterization of herbicides.
5. Herbicide residue determination by bioassaytechniques.
6. Practicing Skill development on herbicide application techniques and sprayequipments.
7. Calculation on irrigation water based on source, water flow, soil moisture status and depth of irrigation andWUE.
8. Land leveling and land shaping – Beds and channels – check basin – ridges and furrows-border strips – broad bed furrow method ofirrigation.
9. Operation and maintenance of sprinkler irrigation systems and drip irrigationsystems.
10. Scheduling of irrigation based on simple techniques anddevices.
11. Weed herbarium collection.

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**III Year – Semester V**
**FARM POWER AND MACHINERY**
**(CREDITS 4+2=6)**

**UNIT I:**

FarmPowerinINDIA–Introduction-Differentsourcesoffarmpower-Meritsanddemerits offarmsources-statusoffarmpowerinIndia.Farmmechanization-Scope-Conceptoffarm mechanization Classifications of energy sources- Renewable- Non- renewable- Need of renewableenergysources-Typesofrenewableenergysources-Solarenergy-Windenergy-Biogas

**UNIT II:**

Heat engines- Introduction- Types- External combustion engine- Internal combustion engine- Classification of IC engine - Two stroke and Four stroke engine- Diesel engine-Petrol engine, Components of IC engine. Valve working and valve timing diagram.

**UNIT III:**

Tillage- Objectives- Classification- Primary Tillage and Secondary tillage implements, Types of tillage.Primary tillage implements- Mouldboard Plough, Disc Plough, Chisel Plough, Subsoiler, Components and Functions, Types, Advantages and Disadvantages.

**UNIT IV:**

Secondary Tillage implement– Harrows- Types- Animal drawn harrow- Tractor drawn harrow, cultivators- Types Land Forming Equipment-Wetland Equipment –Puddlers and Green Manure Tramplers - cage wheels.

**UNIT V:**

Planting and fertilizing equipments- Methods of sowing- study of animal drawn seed cum ferti drill- study of tractor drawn seed cum ferti drill. Planters- potato, sugarcane planter, study of intercultivation equipments- weeders.

**FARM POWER AND MACHINERY (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-Hydrauliccontrolsystemofengine-Learningoftractordriving-Familiarizationwith operation of power tiller - Implements for hill agriculture - Familiarization with different types of primary and secondary tillage implements - Mould plough - Disc plough and disc harrow - Familiarization with seedcum-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 threshingmachinery.

**TEXT BOOKS**:


1. JagdishwarSahay (1977), Elements of Agricultural Engineering, Standard Publications, New Delhi.
2. PakirappaandNareshV(2014),Energysourcesandpowerplantengineering,radiantPublishing House,Hyderabad.
3. Michel A.M, and Ojha T.P, Principles of Agricultural Engineering, Vol.I, Jain Brothers, New Delh

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**III Year – Semester V**
**RAIN FED AGRICULTURE ANDWATERSHED MANAGEMENT**
**(CREDITS 4+2=6)**

**UNIT - I**

1. Rainfedagriculture–introductionanddefinition–dimensionsoftheproblem–areaand production from dry lands in India and Andhra Pradesh –History of rainfed agriculture and watersheds inIndia.
2. Problems and prospects of rainfed agriculture in India – climate – rainfallpattern – distribution – variabilities of rainfall – short rainy season – high intensity rainfall
3. ProblemsandprospectsofrainfedagricultureinIndia-soilcharacteristics–soilfertility status–soilmoisturestorageandretentioncapacity –heavyweedinfestation-soilcrust and their effect on crop growth and soils-itsmanagement.

**UNIT - II**

4. Drought – definition – types of drought – effect of water deficits on physio- morphological characteristics of the plants- mechanism of crop adaptation under moisture deficitcondition - management strategies for drought.
5. Tillage for rainfed crops – off-season tillage – primary tillage –secondary tillage – year round tillage – sub soiling – setline cultivation – modern concepts of tillage- minimum tillage and zerotillage.
6. Soil erosion – definition – losses due to erosion – types of water and winderosion –natureandextentofwindandwatererosion–factorsaffectingerosion–universalsoilloss equation

**UNIT - III**

7. Management of crops in rainfed areas - Agronomic measures of soil and water conservation – choice of crop – crop geometry – tillage – contour cultivation – strip cropping–covercropping–mulching–croppingsystemsandweedcontrol - Mechanical measures of soil and water management.
8. Watershed – definition – concept— objectives and principles of water shed management components of watershed development programme – factors affecting watershed management.
9. Water harvesting – importance, its techniques- Water harvesting structures – arid region – runofffarming–waterspreading–micro catchments – semi arid region – farm ponds, check dams – percolation tank – dug wells – life savingirrigation

**UNIT - IV**

10. *In-situ* moisture conservation measures – bund forming – bunding, ridge and furrowsystem – conservationfurrows-interplotwaterharvesting,mulching–BroadBedandFurrow(BBF) andleveling.
11. Fertilizeruseinrainfedareas–useoforganicmanures–introductionoflegumesincrop rotation–organicrecyclingandbio-fertilizeruseinrainfedagriculture–timeandmethod of fertilizerapplication
12. Efficient crops and varieties – cropping systems in rainfed areas– intercropping – advantages – efficient inter cropping systems in different rainfed regions of Andhra Pradesh

**UNIT - V**

13. Contingent crop planning for aberrant weather conditions in red and blacksoils.
14. Evapotranspiration – measures to reduce evapotranspiration – weeding, use of mulches, chemicals, windbreaks andshelterbelts
15. Landcapabilityclassification–alternatelandusesystem
16. Efficient utilization of water through soil and crop management practices - agronomic measures - mechanical measures for soil and water conservation – gully control – bench terraces – contour terracing – gradedbund

**RAIN FEDAGRICULTURE ANDWATERSHED MANAGEMENT (PRACTICAL)**

1. Climateclassification.
2. Rainfallanalysis-Mean,standarddeviation,varianceandCV.
3. Onsetandwithdrawalofmonsoonsanddeterminationoflengthofgrowingcropseason.
4. Studyoncroppingpatternofdifferentdrylandareas.
5. Mapping of dryland areas inIndia.
6. Interpretationofmeteorologicaldataforrainfallvariability.
7. SchedulingofsupplementalirrigationbasedoncropETdemand.
8. Critical analysis of rainfall and calculation of wet spells, dry spells ,and length of growingseason.
9. Calculation of effectiverainfall.
10. Determination of moisture availabilityindex.
11. Studyofculturalpracticesformitigatingmoisturestress(mulching,plantdensity,depth of sowing, thinning and leafremoval).
12. Visit towatershed.
13. Fielddemonstrationonsoil&moistureconservationmeasures.
14. Field demonstration of water harvestingstructures.
15. Studyoffarmpondsasasourceofsupplementalirrigation.
16. Visit to rainfed researchstation.

**References**


1. Reddy, S. R. and Prabhakar Reddy, G. 2015. Dryland Agriculture. KalyaniPublishers.
2. Arnon,I.1972.CropProductioninDryRegions(Vol.I),LeonardHillPub.Co,London.
3. DhruvaNarayana,V.V.,Sastry,G.S.andPatnaiak,V.S.1999.WatershedManagementin India. ICAR, NewDelhi.
4. Jeevananda Reddy,S.2002. Dryland Agriculture in India: An agro-climatological and agro-meteorological perspective. B Spublications.

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**AGRICULTURE**
**2020-21 Admitted Batch**
**III Year Semester – V**
**PESTS OF HORTICULTURAL CROPS & PRODUCTIVE ENTOMOLOGY**
**(CREDITS 4+2=6)**

**UNIT I**

Importance and history of sericulture – organizations involved in sericulture – silkworm types-mulberry cultivation – varieties - morphology of mulberry plant – identification of popular mulberry genotypes – methods of propagation – nursery and main field preparation – planting methods – identification of nutrient deficiency symptoms – identification of weeds – herbicide application methods – irrigation methods and management practices

**UNIT II**

Rearing house – types – disinfection – room and bed disinfectants – egg incubation methods – chawki rearing – feeding, cleaning and spacing – rearing of late age worms – feeding, cleaning, spacing and moulting care different stages – spinning – mountages – harvesting. Visit to sericulture farms – interaction with sericulturists- visit to grainage and cocoon market-economics of mulberry silkworm rearing Pests and diseases of silkworm and their management – post cocoon technology – stifling to weaving. By products of sericulture - non –mulberry silkworms – eri, tasar and muga silkworms.

**UNIT III**

Apiculture-Beespecies–comparison-castesofbees,beebehaviourandbeedance;Apiary management practices – bee pasturage, foraging, seasonal variations; Bee products, properties and uses; Effect of agricultural inputs on bee activity – pesticide poisoning; Lac insect- biology-strains-natural enemies of lac insect and lacproducts;

**UNIT IV**

Pests of vegetable crops – Distribution, bionomics, symptoms of damage and management strategies for insect, pest and integrated management of solanaceous, cucurbits, crucifers, root crops, leafy vegetables and bhendi

**UNIT IV**

Pests of fruit crops – Distribution, bionomics, symptoms of damage and management strategies for insect, pest and integrated management of mango, citrus, banana, guava, sapota, papaya, pomegranate, apple

**PESTS OF HORTICULTURAL CROPS & PRODUCTIVE ENTOMOLOGY (PRACTICAL)**

2. Morphology of mulberry plant – description – distinguishing characters of promising mulberry genotypes. Nursery bed preparation – care in selection of planting materials – Biofertilizertreatment innursery.

3. Main field preparation – methods of planting, methods of irrigation - Identification of nutrient deficiency symptoms – correctivemeasures.

4. Identificationofweeds–Herbicideapplicationmethod.Pruningmethods–leaf/shootharvest–

preservation of leaves.

5. Identification of pests of mulberry and damagesymptoms.
6. Identification of symptoms of diseases and nematodes ofmulberry.
7. Morphology of silkworm – different stages – Identification of races by cocoon shape, colour and larval marking –Dissection of mouth parts and silkglands.
8. Rearing house and appliances – Methods of disinfection. Incubation of eggs – methods – Chawki rearing – brushing –feeding.
9. Silkworm rearing – shelf and shoot rearing – skill involved in brushing – feeding moulting care – bed cleaning – spacing –mountages — spinning and cocoon harvest.
10. Identification of pests and diseases of silkworm – damage – symptoms - Mass multiplication of hyperparasitoid.
11. Integrated Farm System with Sericulture in Integrated Farming system – Mechanization in sericulture.
12. Eri silkworm – morphology – food plants – methods of rearing – methods of spinning – Tasar silkworm – morphology – food plants – early and late instar larvalrearing.
13. Apiculture - Bee species – comparison- castes of bees, bee behaviour and bee dance; Apiary management practices – bee pasturage, foraging, seasonal variations; Bee products – properties and uses; Effect of agricultural inputs on bee activity – pesticidepoisoning;
14. Lac insect- biology-strains-natural enemies of lac insect and lacproducts;

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**III Year Semester – V**
**FUNGICIDES AND PLANT DISEASE MANAGEMENT**
**(CREDITS 4+2=6)**

**UNIT I**

Infection process – pre-penetration, penetration and post-penetration. Role of enzymes in pathogenesis. Role of toxins in pathogenesis.Defense mechanism in plants – structural, induced defense in plants. Plant disease epidemiology.

**UNIT II**

Principles of plant disease management. Physical methods and biological methods. Protection – Classification of fungicides based on chemical nature and method of application.Host plant resistance. Integrated disease management.

**UNIT III**

Diseases of Cereals, Millets and their Management- Rice, Wheat, Maize, Sorghum, Bajra and Ragi.

Diseases of Pluses and their Management- Red Gram, Bengal Gram, Black Gram and Green Gram.

**UNIT IV**

Diseases of Fruits and Vegetables and their Management- Ground nut, Sun Flower, Castor, Sesamum, Cotton and Sugar cane.

**UNIT V**

**FUNGICIDES AND PLANT DISEASE MANAEMENT (**PRACTICAL)

1. Survey and assessment of important plantdiseases
2. Seeds health tests – dry seed examination, seed washing, blottertest
3. Preparation of bordeaux mixture
4. Methods of application offungicides
5. Special methods of application – acid delinting, pseudostem injection, root feeding, pairing and pralinage, trunkinjection
6. Mass multiplication of Trichodermasppand method ofapplication
7. Crossprotection
8. Preparation of leafextracts

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**III Year Semester – V**
**PRODUCTION TECHNOLOGY FOR FRUITS AND VEGETABLES(CREDITS 4+2=6)**

**UNIT – I**

Mango, Banana, Citrus and Grape - Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seed production.

**UNIT – II**

Guava, Sapota, Papaya and Pomegranate -Botanicalname– Family-Origin-Area-Production-Improvedvarieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Disease and pest control and seedproduction.

**UNIT – III**

Importanceofvegetablesandspicesinhumannutritionandnationaleconomy–Classification of vegetables - 1) Botanical 2) Based on Hardiness 3) Parts Used 4) Method of culture 5) Season.

Tomato, BrinjalandChilli- Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seed production

**UNIT – IV**

Okra and Leafy vegetables (Amaranthus and Gogu) - Botanical name – Family - Origin - area - Production - Improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation

Weed management - Harvesting - Yield - Storage - Disease and pest control and seed production.

Cucurbits – Flowering, sex expression, sex ratio - Cucumber, Ridge gourd, Bitter gourd, Bottle gourd- Botanical name – Family - Origin - Area - Production - improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seedproduction.

Melons – Watermelon and Muskmelon - Botanical name – Family - Origin - Area - Production - Improved varieties and cultivation practices such as time of sowing

Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting – Yield – Production of seedless watermelons - Storage

Physiological disorders - Disease and pest control and seed production.

**UNIT – V**

Cole crops- Cabbage and Cauliflower -Botanical name – Family - Origin - Area -

production - Improved varieties and cultivation practices such as time of sowing

Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield –Storage - Physiological disorders - Disease and pest control and seed production.

Peas and beans (Cluster bean, French bean, Dolichos) - Botanical name – Family - Origin - Area - Production - Improved varieties and cultivation practices such as time of Sowing - sowing - Planting distance - Fertilizer requirements - Irrigation

Weed management - Harvesting - Yield –Storage - Physiological disorders - Disease and pest control and seed production.
Root crops (Carrot and Radish) - Botanical name – Family - Origin - Area - Production

Improvedvarietiesandcultivationpracticessuchastimeofsowing-Sowing-Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting -Yield -Storage-Physiologicaldisorders(splitting,forkingandcavityspot)-Diseaseandpest control and seedproduction.

**UNIT – VI**

Tapioca and Sweet potato - Botanical name – Family - Origin - Area - Production

Improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seed production.

Perennial vegetables – Drumstick and Curry Leaf- Botanical name – Family - Origin

Area - Production - Improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seedproduction.

Bulb crops – Onion and Garlic - Botanical name – Family - Origin - Area - Production

Improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seed production.

**PRODUCTION TECHNOLOGY FOR FRUITS AND VEGETABLES (PRACTICAL)**

1. Identificationofvegetablesandtheirseeds.
2. IdentificationofFruitcropsandtheirseeds.
3. Nursery raising techniques of vegetablecrops.
4. Direct seed sowing andtransplanting.
5. Studyofmorphologicalcharactersofdifferentvegetables.
6. StudyofmorphologicalcharactersofdifferentFruits.
7. Physiological disorders of vegetablecrops.
8. Intercultural operations in vegetablecrops.
9. Fertilizers applicationmethods.
10. Seed extraction methods invegetables.
11. Seed extraction methods inFruits.

12. Harvestindicesandmaturitystandardsofvegetablecrops.
13. Harvesting and preparation formarket.
14. Economics of vegetables and Fruitscultivation.
15. Visit to vegetable farmerfields.
16. Visit to vegetable markets to study marketingproblems.

**References**


1. PranabHazra,A.Chattopadhyay,K.KarmakarandS.Dutta.2010.*ModernTechnologyin Vegetable Production.* New India Publishing Agency, NewDelhi.
2. Neeraj Pratap Singh, .2007. *Basic Concepts of Vegetable Science*. International Book Distributing Co. New Delhi.Academic Press, New Delhi.
3. Nempal Singh, Singh, D.K., Singh, Y.K. and Virendra Kumar. 2006. *Vegetable Seed Production Technology.* International Book Distributing Co.Lucknow.
4. Prem Singh Arya and S. Prakash 2002. *Vegetables Growing in India*. Kalyani publishers, NewDelhi