

# **SHIVAJI UNIVERSITY, KOLHAPUR.**



Accredited By NAAC with 'A' Grade

**Faculty of Interdisciplinary Studies**

**Structure, Scheme and Syllabus For**

**Bachelor of Vocation (B.Voc.)**

**AGRICULTURE**

**Part-III SemV & VI**

**Syllabus to be implemented from June, 2020 onwards.**

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**STRUCTURE AND SYLLABUS OF B.VOC.**

**Bachelor of Vocation (B.Voc.)– Agriculture**

**TITLE:** B.Voc.(Agriculture) Syllabus ( Semester Pattern) Under Faculty of Science

**YEAR OF IMPLEMENTATION:** Syllabus will be implemented from August 2018

**DURATION** : B. Voc. Part I, II and III ( Three Years)  
B. Voc. Part I - Diploma ( One Year )  
B. Voc. Part II - Advanced Diploma ( Second Year )  
B. Voc. Part III – Degree ( Third Year )

**PATTERN OF EXAMINATION** : Semester Pattern

**Theory Examination**– At the end of semester as per Shivaji University Rules

**Practical Examination**–

- i) In the 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> semester of B.Voc. there will be internal assessment of practical record, related report submission and project reports at the end of semester.
- ii) In the second semester of B. Voc. I, there will be internal practical examination at the end of semester.
- iii) In the 4<sup>th</sup> and 6<sup>th</sup> semester of B. Voc. there will be external practical examination at the end of semester.

**MEDIUM OF INSTRUCTION** : English

**STRUCTURE OF COURSE** : B. Voc. Part – I, II and III

Two Semester Per Year

Two General Papers per year / semester

Three Vocational Papers per Year /

Semester Three Practical papers per Year  
/ Semester

One Project / Industry Visit/ Study Tour / Survey

**SCHEME OF EXAMINATION**

**A) THEORY**

- The theory examination shall be at the end of the each semester.
- All theory paper shall carry 40 marks and all vocational papers shall carry 50 marks.
- Evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above.
- Question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.
- **Nature of question paper for Theory examination** (Excluding Business Communication Paper)–
  - i. There will be seven questions carrying equal marks.
  - ii. Students will have to solve any five questions.  
Q. No. 1 : Short answer type question with internal choice (Two out of Three )  
Q. No. 2 to Q. No. 6 : Long answer type questions  
Q. No. 7 : Short Notes with internal choice (Two out of Three )

**B )PRACTICAL**

Evaluation of the performance of the students in practical shall be on the basis of semester examination ( Internal assessment at the end of Semester I, II and III and V and external examination at the end of Semester IV and VI as mentioned separately in each paper.

**Standard of Passing :**

As per the guidelines and rules for B. Voc. (Attached Separately – Annexure I)

**Structure of the Course****B. Voc. – III (Degree) Semester – V**

Sr. No	Paper No.	Title	Theory /Practical /Project	Marks (Total)	Distribution of Marks	
					Theor y	Practica l
1	XXXVII	Genetics	Theory /Practical	50	40	10
2	XXXVII I	Seed Technology	Theory /Practical	50	40	10
3	XXXIX	Organic farming and Sustainable Agriculture	Theory	50	50	--
4	XXXX	Post harvest management and Value Addition of Fruits and Vegetables	Theory	50	50	--
5	XXXXI	Crop physiology	Theory	50	50	--
6	XXXXII	Laboratory Work : Organic farming and Sustainable Agriculture	Practical	50	-	50
7	XXXXII I	Laboratory Work: Post harvest management and Value Addition of Fruits and Vegetables	Practical	50	-	50
8	XXXXI V	Laboratory Work : Crop physiology	Practical	50	-	50
9	XXXXV	Project	-	50	-	50

**B. Voc. – I ( Degree) Semester – VI )**

Sr. No.	Paper No.	Tit le	Theory /Practical /Project	Marks (Total)	Distribution of Marks	
					Theory	Practical
1	XXXXVI	Plant Breeding	Theory /Practical	50	40	10
2	XXXXVI I	Agricultural Economics and Extension	Theory /Practical	50	40	10

3	XXXXVI II	Farming system and Watershed Management	Theory	50	50	--
4	XXXXVI V	Spices, Condiments, Aromatic and Medicinal plants	Theory	50	50	--
5	XXXXX	Agriculture Engineering	Theory	50	50	--
6	XXXXXI	Laboratory Work : Farming system and Watershed Management	Practical	50	--	50
7	XXXXXI I	Laboratory Work: Spices, Condiments, Aromatic and Medicinal plants	Practical	50	--	50
8	XXXXXI II	Laboratory Work : Agriculture Engineering	Practical	50	--	50
9	XXXXXI V	Rawe and Study Tour	-	50	--	50

#### **Scheme of Teaching : B. Voc. – Part III ( Degree ) Semester – V**

Sr. No.	Paper No.	Title	Distribution of Workload (Per Week)		
			Theory	Practical	Total
1	XXXVII	Genetics	4	2	6
2	XXXVIII	Seed Technology	4	2	6
3	XXXIX	Organic farming and Sustainable Agriculture	4	-	4
4	XXXX	Post harvest management and Value Addition of Fruits and Vegetables	4	-	4
5	XXXXI	Crop physiology	4	-	4
6	XXXXII	Laboratory Work : Organic farming and Sustainable Agriculture	-	4	4
7	XXXXIII	Laboratory Work: Post harvest management and Value Addition of Fruits and Vegetables	-	4	4
8	XXXXIV	Laboratory Work : Crop physiology	-	4	4
9	XXXXV	Project	-	-	-
		Total --	<b>20</b>	<b>16</b>	<b>36</b>

**B. Voc. – Part III ( Degree ) Semester –VI**

Sr. No.	Paper No.	Title	Distribution of Workload (Per Week)		
			Theory	Practical	Total
1	XXXXVI	Plant Breeding	4	2	6
2	XXXXVII	Agricultural Economics and Extension	4	2	6
3	XXXXVIII	Farming system and Watershed Management	4	-	4
4	XXXXXIV	Spices, Condiments, Aromatic and Medicinal plants	4	-	4
5	XXXXX	Agriculture Engineering	4	-	4
6	XXXXXI	Laboratory Work : Farming system and Watershed Management	-	4	4
7	XXXXXII	Laboratory Work: Spices, Condiments, Aromatic and Medicinal plants	-	4	4
8	XXXXXIII	Laboratory Work : Agriculture Engineering	-	4	4
9	XXXXXIV	Rawe and Study Tour	-	-	-
		Total-	<b>20</b>	<b>16</b>	<b>36</b>

**Eligibility for Admission :** 10 + 2 from any faculty or equivalent Diploma /Advanced Diploma in any related stream.

**Eligibility for Faculty :** 1) M. Sc. (Agri., Horti, Agri. Economics, Plant Pathology, Agri. Engineering, Agri. Extension) with NET / SET/Ph.D.  
2) M. A (English) with NET/SET for Business Communication

**Eligibility for Laboratory Assistant:** B.Sc. (Agri) / Diploma in Agriculture

**Staffing Pattern:**

**Teaching:**

- One full time Assist.prof purely temporary basis.
- Visiting faculty as per the requirement subject and workload.

**Lab Assistant:** Lab Assistant

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**  
**Paper – XXXVII : Genetics**

Work Load-6  
Theory – 4 Lectures/Week  
Practical – 2 Lectures/Week/Batch

Total Marks – 50  
Theory - 40 Marks  
Practical – 10 Marks

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**Objectives:**

- To enable students-
  - 1) To study the concept of heredity
  - 2) To study the cell division

**Course Content:**

**Theory -**

**Unit I – Pre and Post mendelian concept of heredity**

Pre and post mendelian concept of heredity, mendelian principles of heredity, chromosome- Architecture of chromosome, chromonemata, chromosome matrices, chromomeres, centeromeres, secondary constriction and telomere.

**Unit II – Cell cycle and cell division**

Cell division- Mitosis and meiosis, probability and chi-square, dominance relationship, DNA and its structure RNA and its structure.

**Unit III – Multiple Alleles**

Multiple alleles, phototropism and pseudoalleles, sex determination and sex linkage, blood group genetics, linkage and its estimation, crossing over mechanism, chromosome mapping.

**Unit IV – Mutation**

Mutation, classification of mutation, methods of inducing mutation and CIB techniques, mutagenic agents and induction of mutation.

**References:**

Peter K.V 1998, Genetics and breeding of vegetables, ICAR New Delhi, Singh, B. D 2001- Fundamentals of genetics, kalyani publishers, New Delhi

**Practical-**

- ❖ Study of microscope
- ❖ Study of cell structure
- ❖ Mitosis and Meiosis cell division
- ❖ Experiments on monohybrid ratio
- ❖ Experiments on di-hybrid ratio
- ❖ Experiments on tri-hybrid ratio
- ❖ Experiments on test cross and back cross

**Scheme of Internal Practical Evaluation**

1. Submission of Record book
2. Viva-Voce

**10 marks**

5marks

5marks

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**  
**Paper – XXXVIII : Seed Technology**

Work Load-6

Theory – 4 Lectures/Week

Practical – 2 Lectures/Week/Batch

Total Marks – 50

Theory - 40 Marks

Practical – 10 Marks

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**Objectives:**

- To enable students-
  - 2) To study the seed production of cereals, pulses and oil seed crops
  - 3) To study the drying, processing, testing and treatments of seed

**Course Content:**

**Theory –**

**Unit I – Seed and seed technology**

Introduction, definition, importance, losses of crop varieties and their control, characters of good quality seed, maintenance of genetic purity during seed production and seed quality.

**Unit II – Study of different classes of seeds**

Foundation seed, certified seed, nuclear seed, breeder seed, seed certification, phases of certification, procedure for seed certification, field inspection and seed act.

**Unit III – Seed production of cereals, pulses, oil seeds, fodder and vegetable crops**

Introduction, seeds and sowing, soil and climate, varieties, major pests and diseases, special cultivation practices, threshing, harvesting and storage.

**Unit IV – Post harvest practices of seed production**

Seed drying, processing, testing for quality assessment, seed treatment, method of application, seed packing, seed storage, major pests and diseases during storage and seed marketing.

**References:**

Seed technology, R.L. Agrawal; Oxford and IBH Publishing company, New Delhi.

Principle of seed technology, Phundan Singh; Kalyani Publication, New Delhi.

**Practical-**

- ❖ Seed production in cereals (bajra, maize, sorghum).
- ❖ Seed production in pulses (green gram, pea, gram).
- ❖ Seed production in oil seeds (groundnut, soybean).
- ❖ Seed sampling and testing (purity, germination, viability).
- ❖ Visit to seed production plot.

**Scheme of Internal Practical Evaluation**

1. Submission of Record book

2. Viva-Voce

**10 marks**

5 marks

5 marks

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**

**Paper NoXXXIX: Organic Farming and Sustainable Agriculture**

Work Load–4

Total Marks –50

Theory – 4 Lectures / Week

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**Objectives:**

To enable student –

- 1) To acquire knowledge of practices of organic farming and sustainable agriculture.
- 2) To know the importance of organic farming and sustainable agriculture.

**Course content:**

**Theory-**

**Unit I – Principle and Scope of Organic Farming**

Introduction, scope, advantages and disadvantages of organic farming, Initiative taken by govt., NGO's and other organizations.

**Unit II – Components and methods of organic farming**

Components of organic farming, organic manures and methods of organic manure production (Vermi-compost, compost, FYM, green manure, bio-fertilizer, sewage, sludge and night soil), Certification process and standards of organic farming.

**Unit III – Principles, scope and introduction of sustainable agriculture**

Introduction, advantages and disadvantages, difference between modern and sustainable agriculture and problems of modern agriculture.

**Unit IV – Sustainable agriculture - problems and its indicators.**

Indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability.

**References:**

Havlin, J. L., Beaton, J. D., Tisdale, S.L., and Nelsothn, W.L. 2006. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management* (7 ed.), Pearson Education, ICAR 2006, *Handbook of Agriculture*, ICAR, New Delhi, De, G. C. 1989. *Fundamentals of Agronomy*, Oxford & IBH Publishing Co., New Delhi, Balasubramaniyan, P and Palaniappan, S.P. 2001, *Principles and Practices of Agronomy* Agro Bios (India ) Ltd., Jodhpur.



**B. Voc. Part – III  
Agriculture  
Semester V**

**Paper No. XXXX: PHM and Value Addition of Fruits and Vegetables**

Work Load-4

Total Marks –50

Theory – 4 Lectures / Week

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**Objectives:**

To enable students –

- 1) To study the post harvest management practices of fruit crops.
- 2) To study the value addition of fruits and vegetable.

**Course Content:**

**Unit I – History, factors, introduction and importance of PHM**

History, pre-harvest factors (Cultural operations, pre harvest treatment and maturity indices), post-harvest factors (Curing, degreening, pre-cooling, disinfection, waxing, ripening, packaging, transportation, storage and irradiation)

**Unit II – Post harvest management of horticultural crops**

Potato, tuber crops, Cassava, Sweet potato, Cut flowers, Coconut, Leafy vegetable, Spices and other horticultural crops

**Unit III – Introduction and Concept of value addition**

Introduction, scope, concept, importance of value addition, principle and methods of preservation.

**Unit IV – Processing of fruits and vegetables**

Jam, jelly, marmalade, preserve, candy, fermented and non fermented beverages and tomato products.

**Reference:**

Denixon, RI. 1979. *Principles of Horticulture*. Mac Millan, New York, Hartmann, HT. and Kester, DE, 1986. *Plant propagation - Principles and practices*, Prentice-Hall, New Delhi. Chadha, K. L. 2003, *Handbook of Horticulture*, ICAR, New Delhi, Choudhury, B. 1983. *Vegetables*, National Book Trust, New Delhi.

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**  
**Paper No. XXXXI : Crop Physiology**

Work Load – 4Total  
Theory – 4 Lectures / Week

Marks – 50

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**Objectives:**

To enable students –

1. To study the plant water relationship.
2. To study the physiological process in a plant .

**Course Content:**

**Unit I – Plant water relations**

Introduction, importance of crop physiology in agriculture, role and significance of water- diffusion, imbibition and osmosis, absorption of water- active and passive absorption and factors affecting absorption, translocation, transpiration and guttation.

**Unit II – Photosynthesis and respiration**

Photosynthesis, its requirement- light, CO<sub>2</sub>, pigments and water, mechanism of photosynthesis, light reaction, cyclic and noncyclic photophosphorylation, photosynthetic pathways- C<sub>3</sub>, C<sub>4</sub> and CAM, respiration- glycolysis, TCA and pentose phosphate pathway

**Unit III – Nutrient physiology**

Mineral nutrition, criteria of essentiality- macro, secondary and micro elements, sand and soil less culture, hydroponics, physiological role of nutrients, foliar nutrition and fertigation

**Unit IV – Growth physiology**

Growth- growth curve, phases of growth, factors affecting growth, photoperiodism, growth regulators, growth hormones, physiological role of auxins, GA, cytokinins, ethylene and ABA, synthetic growth regulators and their use, application of growth regulators

**References:**

Jain, J.K. 2007, Fundamentals of plant physiology, S. Chand and company Ltd., New Delhi, Pandey, S. N. and Sinha, B. K. 2006, Plant physiology, Vikas publishing house Pvt. Ltd., New Delhi, Purohit, S. S. 2005, Plant Physiology, student edition, Jodhpur.

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**

**Paper No. XXXXII : Laboratory work: Organic Farming and Sustainable**  
**Agriculture**

Work Load-4

Total Marks –50

Practical – 4 Lectures /Week/Batch

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**Practicals :**

1. Visit of organic farms to study the various components and their utilization.
2. Preparation of compost and their methods.
3. Preparation of vermi-compost and their methods.
4. To study the biofertilizers.
5. To study the green manuring crops.
6. To study the sustainable agriculture problems and its impact on agriculture.

**Scheme of practical evaluation**

<b>Internal practical evaluation</b>	<b>50 marks</b>
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- |                                  |          |
|----------------------------------|----------|
| 1. Identify the Specimen         | 10 marks |
| a) -----                         |          |
| b) -----                         |          |
| 2. Draw the Diagram              | 10 marks |
| a) -----                         |          |
| b) -----                         |          |
| 3. Answer the Following question | 10 marks |
| a) -----                         |          |
| b) -----                         |          |
| 4. Field Work -----              | 10 marks |
| 5. Journal and Viva-voce         | 10 marks |

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**

**Paper No. XXXXIII : Laboratory work: PHM and Value Addition of Fruits and Vegetables**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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**Practicals :**

1. Applications and use of different types of packaging materials
2. To study the different grades of fruits and vegetables
3. Preparation of RTS, squash, nectar and cordial
4. Preparation of jam and jelly
5. Preparation of marmalade and fruit candy
6. Preparation of tomato sauce and ketchup

**Scheme of practical evaluation**

**Internal practical evaluation**

**50marks**

- |                                  |          |
|----------------------------------|----------|
| 1. Identify the Specimen         | 10 marks |
| a) -----                         |          |
| b) -----                         |          |
| 2. Draw the Diagram              | 10 marks |
| a)-----                          |          |
| b)-----                          |          |
| 3. Answer the Following question | 10 marks |
| a)-----                          |          |
| b)-----                          |          |
| 4. Field Work -----              | 10 marks |
| 5. Journal and Viva-voce         | 10 marks |

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**

**Paper No. XXXXIV : Laboratory work: Crop Physiology**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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**Practicals :**

1. Study of anatomical structure of plant body
2. Identification of physiological disorder
3. Measurement of leaf area by different methods
4. Measurement of transpiration and study of structure of stomata
5. Study of growth analysis
6. Application of growth regulators to plant

**Scheme of practical evaluation**

**Internal practical evaluation**

**50marks**

1. Identify the Specimen

10 marks

a)-----

b)-----

2. Draw the Diagram

10 marks

a)-----

b)-----

3. Answer the Following question

10 marks

a)-----

b)-----

4. Field Work -----

10 marks

5. Journal and Viva-voce

10 marks

**B. Voc. Part – III**  
**Agriculture**  
**Semester V**  
**Paper No. XXXXV : Project**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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Students must submit detailed project report related topics on agriculture crop cultivation aspects of cereal, vegetable, fruit, pulses planning including land preparation, seed treatment, sowing, water management,, identification of weeds and weed management, identification of insect pest and control, harvest and post harvest handling of products, storage and marketing of produce etc.

**B. Voc. Part – III**  
**Agriculture**  
**Semester VI**  
**Paper – XXXXVI : Plant Breeding**

Work Load-6

Theory – 4 Lectures/Week

Practical – 2 Lectures/Week/Batch

Total Marks – 50

Theory - 40 Marks

Practical – 10 Marks

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**Objectives:**

- To enable students-
  - 4) To study the plant breeding
  - 2) To study the breeding methods in pollinated crops

**Course Content:**

**Theory -**

**Unit I – Concept, nature and role of plant breeding**

Historical development, concept, nature and role of plant breeding, measure achievements and future prospects, genetics in relation to plant breeding, modes of reproduction and apomixes.

**Unit II – Breeding methods in self pollinated crops**

Genetic basis and breeding methods in self pollinated crops-mass selection and pure line selection, hybridization techniques and handling of segregating population, multiline concept.

**Unit III – Breeding methods in cross pollinated crops**

Genetic basis and methods of breeding in cross pollinated crops, mode of selection, population improvement scheme-ear to row method, modified ear to row method, recurrent selection scheme, heterosis and inbreeding depression, development of inbred lines and hybrids.

**Unit IV – Breeding methods in asexually propagated crops**

Breeding methods in asexually propagated crops, clonal selection and hybridization, maintenance of breeding record and data collection.

**References:**

Choudhari, T. C. 1982, Introduction to plant breeding, Sharma, J. R. 1989, Principles and practices of plant breeding, Singh, B. D. 2001- Fundamentals of genetics, kalyani publishers. New Delhi, Singh, B. D. 2003, Plant breeding principles and methods, kalyani publishers. New Delhi.

**Practical-**

- ❖ Study of floral structure of self pollinated crops
- ❖ Study of floral structure of cross pollinated crops
- ❖ Emasculation and hybridization techniques in self pollinated crops
- ❖ Emasculation and hybridization techniques in cross pollinated crops
- ❖ Study of male sterility system
- ❖ To work out the mode of pollination in a given crop and extent of natural out-crossing

**Scheme of Internal Practical Evaluation**

**10 marks**

1.Submission of Record book

5marks

2.Viva-Voce

5marks

B. Voc. Part – III

**Agriculture  
Semester VI**

**Paper No. XXXXVII : Agricultural economics and extension**

Work Load-6

Theory – 4 Lectures/Week

Practical – 2 Lectures/Week/Batch

Total Marks – 50

Theory - 40 Marks

Practical – 10 Marks

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**Objectives:**

To enable students-

1. To study the fundamentals of agricultural economics.
2. To study the production function and marketing of commodities.
3. To study fundamentals of agricultural extension.

**Course content:**

**Unit I – Fundamentals of agric. Economics and financial co-operation**

Meaning, scope, subject matter, definitions, of economics, micro and macro economics, basic concept: goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare, Agriculture finance meaning, scope and significance, credit analysis, four “R” and three “C” of credit, introduction to higher financial institution- RBI, NABARD, IMF, RRB, commercial bank, institutional and non institutional sources.

**Unit II – Production function and marketing of commodities.**

Concept of production function and its type, use of production function in decision making, factor-product, factor-factor, product-product relationship, law of equi-marginal, or principle of opportunity cost, law of comparative advantage, least cost combination, Law of marginal return, elasticity of production, concept, definition of agricultural marketing, market structure, classification and characteristics of agricultural marketing, marketing functionaries and channels, marketing cost, margin and price spread, risk in co-operative marketing, role of government in agriculture marketing and problems in marketing of agriculture commodities.

**Unit III – Fundamentals of agriculture extension education**

Meaning, definition and types, objectives, principles of extension education, various agriculture development programs launched by ICAR & govt. of India (IADP, HYVP, KVK, IVLP, etc.).

**Unit IV – Rural development**

Concept, meaning, definition of rural development, various rural development programs launched by govt. of India, Community development, meaning, definition, concept & its principles.



**References :**

A Text Book of Soil Science – Indian Society of Soil Science, ICAR.2006,  
*Handbook of Agriculture*, ICAR, New Delhi.

**Practical :**

- ❖ Study the subject matter of agriculture economics.
- ❖ Analysis of progress and performance of commercial banks and RRBs.
- ❖ Visit to a commercial bank and cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures.
- ❖ Determination of cost of cultivation.
- ❖ Computation of marketable and marketed surplus of important commodities.
- ❖ Visit to local market to study various marketing functions performed by different agencies.
- ❖ Identification of marketing channels for selected commodities.
- ❖ Visit to APMC
- ❖ Preparation of extension literature- leaflet, booklet, folder, pamphlet news stories and success stories.
- ❖ Visit to KVK and acquire firsthand knowledge of their management, schemes and crop production technologies.
- ❖ A visit to village to understand the problems being encountered by the villagers/ farmers.

**Scheme of Internal Practical Evaluation****10 marks**

- |    |                           |        |
|----|---------------------------|--------|
| 1. | Submission of Record book | 5marks |
| 2. | Viva–Voce                 | 5marks |

**B. Voc. Part – III  
Agriculture  
Semester VI**

**Paper No. XXXXVIII : Farming system and watershed management**

Work Load–4

Total Marks –50

Theory – 4 Lectures / Week

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**Objectives:**

To enable student –

- 1) To acquire knowledge of farming system
- 2) To know the importance of watershed management.

**Course content:**

**Unit I- Scope, importance and concept of farming system**

Scope, importance, concept, types of farming system, factors affecting types of farming system, components of farming system and their maintains.

**Unit II – Study the cropping scheme and pattern**

Cropping system and pattern, multiple cropping system, efficient cropping system and their evaluation, allied enterprises and their importance, tools for determining production and efficiencies in cropping and farming system.

**Unit III – Rainfed agriculture**

Introduction, types, history of rainfed agriculture, problems and prospects of rainfed agriculture in India, soil and climatic conditions in rainfed areas, management of crops in rainfed areas, and drought and its types.

**Unit IV – Watershed management practices**

Water harvesting, importance, its techniques, efficient utilization of water through soil and crop management practices, contingent crop planning, concept, objective, principle and components of watershed management, factors affecting watershed management.

**Reference:**

De, G.C.1989.*Fundamentals of Agronomy*. Oxford & IBH Publishing Co., New Delhi, ICAR.2006. *Hand book of Agriculture*, ICAR, New Delhi, Reddy.T.Y and Reddy, G.H.S.1995.*Principles of Agronomy*, Kalyani Publishers, Ludhiana, K. S. Yawalkar, J. P. Agrawal and S. Bokde, Manures and Fertilizers, Cox, G.W and Atkins, M.D. 1979. *Agricultural Ecology: An Analysis of World Food Production Systems*. W.H. Freeman and Company, San Francisco, Grigg, D.B. 1974. *The Agricultural Systems of the World: An Evolutionary Approach*. Cambridge University Press, Cambridge.

**B. Voc. Part – III**  
**Agriculture**  
**Semester VI**  
**Paper No. XXXXVIV : Spices, Condiments, Aromatic and**  
**Medicinal plants**

Total Marks – 50

Work Load - 4

Theory – 4 Lectures / Week

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**Objectives:**

To enable students –

- 1) To understand plantation management practices.
- 2) To know the various operations carried out in plantation.
- 3) To study the medicinal and aromatic plants.

**Course content :**

**Theory**

**Unit I - Scope and Importance**

Introduction, importance, scope, classification of spices and condiments

**Unit II- Plantation practices of spices and condiments**

Uses, Botanical distribution, plantation practices, soil and climate, varieties, and harvesting of following crops (Black pepper, Small cardamom, Ginger, Turmeric, Clove, Nutmeg, Cinnamon, Fenugreek, Coriander, Cumin, Chilli.)

**Unit III- Scope and Importance of Medicinal and Aromatic plants**

Introduction, importance, scope, classification of medicinal and aromatic plants

**Unit IV- Plantation practices of Medicinal and Aromatic Plants**

Uses, Botanical distribution, plantation practices, soil and climate, varieties, and harvesting of following crops Medicinal (Aloe, Belladonna, Senna, Ashwagandha, Sarpagandha, Safed musali, Neem, Periwinkle,) and Aromatic plants (Davana, Lemon Grass, Rose geranium, Japanese mint, java citronella)

**References :**

Denixon, R.I. 1979. *Principles of Horticulture*. Mac Millan, New York, Hartmann, H.T. and Kester, D.E. 1986. *Plant propagation - Principles and practices*. Prentice-Hall, New Delhi, Chadha, K. L. 2003. *Handbook of Horticulture*, ICAR, New Delhi. Choudhury, B. 1983. *Vegetables*. National Book Trust, New Delhi.

**B. Voc. Part – III**  
**Agriculture**  
**Semester VI**  
**Paper No. XXXXX : Agriculture Engineering**

Work Load–4  
Theory – 4 Lectures / Week

Total Marks –50

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**Objectives:**

To enable student –

1. To acquire knowledge of soil and water conservation.
2. To study the green house technology.
3. To study the seed drying and processing.

**Course content:**

**Unit I- Study soil and water conservation**

Introduction, definition and agents of soil erosion, causes of soil erosion, water erosion, forms of water erosion, gully classification, and control measures, introduction to contouring, strip cropping, contour bund, graded bund and bench terracing, wind erosion, its mechanism, principles of wind erosion and its control measures.

**Unit II – Study of green house technology**

Introduction, types of green houses, plant responses to green house environment, planning and design of green house, equipments, and materials for construction of traditional and low cost green houses, irrigation system in green houses, cost estimation and economic analysis.

**Unit III – Farm power and machineries**

Introduction, sources of farm power, IC engine, its working principle, comparison of two stroke and four stroke cycle engine, different components of IC engine, air cleaning, cooling, lubrication, fuel supply and hydraulic control system of tractor engine.

**Unit IV – Tools and tillage implements.**

Primary and secondary tillage implements, implements for intercultural operation, familiarization with sowing and planting equipments, calibration of seed drill, and solved example, familiarization with plant protection equipments, familiarization with harvesting and threshing equipments.

**References:**

De, G.C.1989.*Fundamentals of Agronomy*. Oxford & IBH Publishing Co., New Delhi,  
ICAR.2006. *Hand book of Agriculture*, ICAR, New Delhi.

**B. Voc. Part – III  
Agriculture  
Semester VI**

**Paper No. XXXXXI: Farming system and watershed management**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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**Practicals:**

- ❖ To study of cropping scheme
- ❖ Preparation of cropping scheme for irrigated situation
- ❖ Preparation of cropping scheme for dry land situation
- ❖ Study of existing farming system in nearby villages
- ❖ Preparation of integrated farming system model for wet land
- ❖ Preparation of integrated farming system model for irrigated land
- ❖ Preparation of integrated farming system model for dry land
- ❖ Studies on cultural practices for mitigating moisture stress.
- ❖ Field demonstration on soil and moisture conservation measures.
- ❖ Field demonstration on construction of water harvesting structures.
- ❖ Visit to rainfed research station/ water shed.

**Scheme of practical evaluation**

<b>Internal practical evaluation</b>	<b>50marks</b>
1. Identify the Specimen	10 marks
a)-----	
b)-----	
2. Draw the Diagram	10 marks
a)-----	
b)-----	
3. Answer the Following question	10 marks
a)-----	
b)-----	
4. Field Work -----	10 marks
5. Journal and Viva-voce	10 marks

**B. Voc. Part – III**  
**Agriculture**  
**Semester VI**  
**Paper No. XXXXVIV : Laboratory Work Spices, Condiments,**  
**Aromatic and Medicinal plants**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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**Practicals :**

- ❖ Identification of Spice crops and their seeds.
- ❖ Identification of Medicinal crops and their seeds.
- ❖ Identification of Aromatic crops and their seeds.
- ❖ Study of morphological characters of Spice crops.
- ❖ Study of morphological characters of Medicinal crops.
- ❖ Study of morphological characters of Aromatic crops.
- ❖ Fertilizer application methods in Spices and Condiments crops.
- ❖ Fertilizer application methods in Medicinal and aromatic crops.

**Scheme of practical evaluation**

<b>Internal practical evaluation</b>	<b>50marks</b>
1. Identify the Specimen	10 marks
a)-----	
b)-----	
2. Draw the Diagram	10 marks
a)-----	
b)-----	
3. Answer the Following question	10 marks
a)-----	
b)-----	
4. Field Work -----	10 marks
5. Journal and Viva-voce	10 marks

**B. Voc. Part – III  
Agriculture  
Semester VI**

**Paper No. XXXXXIII: Laboratory work Agriculture Engineering**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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**Practicals:**

- ❖ Problems and control measures of soil erosion.
- ❖ Problems and control measures of water erosion.
- ❖ Problems and control measures of wind erosion.
- ❖ Study of different types of green houses based on shape.
- ❖ Study of green house equipments.
- ❖ Study of different components of IC engine.
- ❖ Study of air cleaning and cooling system of engine.
- ❖ Study of primary and secondary tillage implements.
- ❖ Study of seed-cum-fertilizer drills, their seed metering mechanism and calibration.
- ❖ Study of different inter cultivation equipments.
- ❖ Study of different types of sprayer and duster.
- ❖ Study of harvesting and threshing machineries.

**Scheme of practical evaluation**

<b>Internal practical evaluation</b>	<b>50marks</b>
1. Identify the Specimen	10 marks
a)-----	
b)-----	
2. Draw the Diagram	10 marks
a)-----	
b)-----	
3. Answer the Following question	10 marks
a)-----	
b)-----	
4. Field Work -----	10 marks
5. Journal and Viva-voce	10 marks

**B. Voc. Part – III**  
**Agriculture**  
**Semester VI**  
**Paper No. XXXXXIV : Rawe and Study Tour**

Work Load-4

Total Marks –50

Practical – 4 Lectures/Week/Batch

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Students must submit detailed Rawe (4 week) as well as study tour (1 week) report related topics on industrial, field, KVK , agricultural institute, horticulture nursery and dairy technology visit in a specific manner on a project paper.

**Scheme of practical evaluation**

**Internal practical evaluation**

**50 Marks**