Savitribai Phule Pune University

(Formerly University of Pune)

Vocational Course in Seed Technology

(Faculty of Science & Technology)

F.Y.B.Sc. Seed Technology (Vocational)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

INFORMATION ABOUT THE VOCATIONAL COURSE
FYBSc Seed Technology (Vocational)

Semester-I	Paper-I (ST 1.1): Morphology	Paper-II (ST 1.2): Plant Breeding and Testing for Cultivar Genuineness	Practical (ST 1.3) Based on ST 1.1 and ST 1.2
Semester-II	Paper-III (ST 1.4): Seed Physiology	Paper-IV (ST 1.5): Seed Production	Practical (ST 1.6) Based on ST 1.4 and ST 1.5

Semester Exam Pattern

A. Theory

- Internal Exam : 15 M
- Theory Exam : 35 M
- Total : 50 M
- Duration : 2 hours for theory and 40 minutes for internal exam

B. Practical

- Internal Exam : 15 M
- Practical Exam : 35 M
- Total : 50 M
- Duration : 4 hours

Semester-I, Paper-I (ST 1.1): Morphology

Credit-I:

Chapter-1: Introduction to Flower **2L**

- Definition
- Parts of Typical Flower
- L. S. of Typical Flower

Chapter-2: Study of flowers of respective families **5L**

- Malvaceae (*Gossypium arboreum/ Abelmoschus esculentus*)
- Fabaceae (*Glycine max/ Cajanus cajan*)
- Solanaceae (*Solanum melongena/ Lycopersicum esculentum*)
- Liliaceae (*Allium cepa/ Allium sativum*)
- Poaceae (*Zea mays* and *Triticum aestivum*)

Chapter-3: Microsporangium **2L**

- Definition
- Structure (T.S of typical anther)
- Development of microspore
- Development of male gametophyte

Chapter-4: Megasporangium **2L**

- Definition
- Structure (L.S of Ovule) and types of ovules
- Development of megaspore
- Development of female gametophyte

Chapter-5: Reproduction **4L**

- Definition
- Vegetative propagation (Natural-Tuber, Bulb and Sucker; Artificial- Cutting, Budding, Layering and Grafting)
- Sexual reproduction
- Apomixis

Credit-II:

Chapter-6: Pollination **3L**

- Definition
- Types of pollination (Autogamy and Allogamy)
- Agencies of allogamy
- Self and cross pollinated crop species
- Advantages and Disadvantages of both self and cross pollination

Chapter-7: Fertilization **3L**

- Definition
- Process of fertilization in angiosperm

Chapter-8: Endosperm and Embryo **3L**

- Definition
- Types of endosperm and embryo

Chapter-9: Seed **3L**

- Definition
- Difference between Seed and Grain
- Concept of Seed Quality (Genetic purity, physical purity, germination percentage, seed moisture, seed health)
- Types (based on life span) of seed (Recalcitrant and Orthodox)

Chapter-10: Fruit **3L**

- Definition
- Study of fruits:
    1. Achene- Strawberry
    2. Cypsella- Sunflower
    3. Caryopsis- Maize
    4. Legume-Tur
    5. Capsule- Okra
    6. Berry- Tomato
    7. Pepo- Cucumber
    8. Cremocarp- Coriander
    9. Schizocarp- Carrot
    10. Silique- Raddish

Semester-I, Paper-II (ST 1.2): Plant Breeding and Testing for Cultivar Genuineness

Credit-I:

Chapter-1: General Introduction to Plant Breeding **3L**

- Definition
- Scope and objectives
- History of Plant breeding in India

Chapter-2: Activities in Plant Breeding **2L**

- Creation of variation
- Selection
- Evaluation
- Multiplication
- Distribution

Chapter-3: Pureline Selection **4L**

- Definition
- Characters of Pureline selection
- General scheme for Pureline selection
- Advantages and disadvantages of Pureline selection
- Achievements

Chapter-4: Mass Selection **3L**

- Definition
- Procedure for mass selection
- Advantages and disadvantages of mass selection
- Achievements

Chapter-5: Clonal Selection **3L**

- Definition
- Characters of clone
- Procedure for clonal selection
- Advantages and disadvantages of clonal selection
- Achievements

Credit-II:

Chapter-6: Plant Introduction **3L**

- Definition
- Types (Primary and Secondary)
- Procedure
- Merits and Demerits
- Important Achievements

Chapter-7: Hybridization **3L**

- Definition
- Objectives
- Types: Intervarietal and Distant
- Procedure -Cotton, Bajara (Use of male sterile lines) and Maize
- Difficulties in hybridization

Chapter-8: Mutation for Crop Improvement **3L**

- Definition
- Introduction
- Mutagens (Physical and Chemical)
- Mutants
- Types of mutation (Spontaneous and Induced)
- Application of mutation breeding
- Limitations of mutation breeding

Chapter-9: Advanced techniques in Plant Breeding **3L**

- Advanced techniques: Tissue, Embryo and Anther Culture
- Totipotency
- Application of tissue, embryo and anther culture
- Somaclonal variations

Chapter-10: Testing for Cultivar Genuineness **3L**

- Examination of seed
    1. Morphological characters
    2. Chemical tests (Phenol Colour and Peroxidase test)
    3. Biochemical tests (Electrophoresis)
    4. Examination of seedling
    5. Grow Out Test

Semester-II, Paper-III (ST 1.4): Seed Physiology

Credit-I:

Chapter-1: Structure and Composition of Seed **4L**

- Introduction
- Seed structure (Embryo, endosperm and seed coat)
- Physiology of seed development

Chapter-2: Seed Germination **5L**

- Definition
- Introduction
- Types of germination (Hypogeal, Epigeal and Viviparous)

Chapter-3: Seed Pelleting and Artificial Seed **6L**

- Definition
- Process of pelleting
- Material
- Types of coating
- Advantages and precaution
- Production of artificial seed (synthetic seed)

Credit-II:

Chapter-4: Seed Dormancy **5L**

- Definition and Introduction
- Types of dormancy
- Factors affecting dormancy
- Methods of breaking seed dormancy

Chapter-5: Seed Storage and Longevity **5L**

- Definition and Introduction
- Seed Deterioration
- Factors affecting seed storage and longevity
- Cold Storage
- Sanitation
- Fumigation

Chapter-6: Seed Vigour and Seed Viability **5L**

- Introduction
- Factors affecting on seed vigour
- Seed Viability Concept and Quick viability test (TZ)

Semester-II, Paper-IV (ST 1.5): Seed Production

Credit-I:

Chapter-1: General Introduction **4L**

- Seed as a basic input in agriculture
- Classes of seed
    1. Nucleus
    2. Breeder
    3. Foundation
    4. Certified

Chapter-2: Seed Production Organization in India **2L**

- Introduction
- National Seed Corporation (NSC) and its objectives
- State Seed Corporation (SSC) and its objectives

Chapter-3: Release of New Variety **4L**

- Introduction
- Evaluation
    i. Station trail
    ii. Multilocation trail
    iii. Disease and Insect pest
    iv. Quality test
- Identification of entries for release
- Release of a variety

Chapter-4: Seed Production Methodology **5L**

- Location and Season
- Land requirement
- Importance of soil and water testing
- Cultural practices
- Isolation distance
- Plant protection
- Weed Control
- Rouging
- Harvesting
- Threshing
- Processing

Credit-II:

Chapter-5: Sowing **3L**

- Definition
- Time of sowing
- Calculation for seed rate
- Methods of sowing

Chapter-6: Land Preparation **2L**

- Definition
- Steps in land preparation for different crops-Cotton/ wheat/ chilli
- Types of nursery beds

Chapter-7: Irrigation and Drainage **3L**

- Definition
- Methods of irrigation
- Sources of irrigation
- Loss due to excess irrigation
- Importance of drainage

Chapter-8: Genetic Purity and its Maintenance **4L**

- Definition
- Steps for maintenance of genetic purity
- Checking seed source
- Isolation distance
- Roughing
- Precaution during crossing program
- Care during harvesting and threshing

Chapter-9: Introduction to Crop Diseases w.r.t. causal organism, symptoms and control measures **3L**

- Definition
- Tikka- Groundnut
- Rust- Wheat
- Early blight- Tomato

Semester-I: Practical (ST 1.3) Based on ST 1.1 and ST 1.2

Credit: 1.5

1. Study of flower morphology of respective families
    - Malvaceae (*Gossypium arboreum/ Abelmoschus esculentus*)
    - Fabaceae (*Glycine max/ Cajanus cajan*)
    - Solanaceae (*Solanum melongena/ Lycopersicum esculentum*)
    - Liliaceae (*Allium cepa/ Allium sativum*)
    - Poaceae (*Zea mays* and *Triticum aestivum*)
2. Study of vegetative propagation methods- Tuber, Bulb and Sucker with suitable example
3. Study of artificial vegetative propagation methods- Cutting, Budding, Layering and Grafting with suitable examples
4. Study of Crop Fruits (any six)
    - Achene- Strawberry
    - Cypsella- Sunflower
    - Caryopsis- Maize
    - Legume-Tur
    - Capsule- Okra
    - Berry- Tomato
    - Pepo- Cucumber
    - Cremocarp- Coriander
    - Schizocarp- Carrot
    - Silique- Raddish
5. Study of different types of embryo
6. To study Grow Out Test
7. Study of hybridization technique in cotton and maize
8. Study of varietal descriptors (Cotton)
9. Varietal identification in wheat by using phenol colour test
10. Admixture testing in soyabean seed by using peroxidase test

Semester-II: Practical (ST 1.6) Based on ST 1.4 and ST 1.5

Credit: 1.5

1. Study different types seed germination
2. To identify types of dormancy and methods of breaking dormancy
3. To study quick viability test (TZ)
4. Preparation of Nursery beds
5. Study of crop diseases w.r.t. causual organism, symptoms and control measures- Tikka, Rust and Early Blight
6. To study the given water sample w.r.t. pH, Turbidity and TDS
7. To analyze the given soil sample for pH and Moisture content
8. To demonstrate different methods of irrigation
9. Seed Industry/ Plant Breeding Research Centre visit is compulsory for the students and submit the visit report at the time of practical examination
10. Submission- Seed samples (minimum 10) along with their botanical names, family, variety etc. to the department at the time of final practical examination