

## Syllabus for B.Sc. (Hons) Agriculture Year – III (Sem. VI)

**Subject Code:** 16AS1607

**Subject Short Name:** GPB 6.4

**Subject Name:** Crop Improvement (*Rabi* crops) - II

### Objective:

1. To provide knowledge about Self-pollinated and cross pollinated *rabi* crops
2. To learn about origin and distribution of *rabi* crops
3. To design breeding objectives of major *rabi* crops
4. To impart information on different crop varieties for *rabi* season

**Credits Earned:** 2 Credits (1+1)

**Course Outcomes:** After completion of this course, Students will be able to

- Remember the evolutionary history of important field crops along with their center of origin, its wild species and wild relatives that can be utilized in crop improvement.
- Develop the understanding of germplasm conservation, utilization, and center of origin of various *rabi* field crops, genetics of qualitative and quantitative characters, and their inheritance.
- Apply breeding procedures and objectives in different crop important for the development of improved varieties.
- Differentiate seed production technology in different classes of *rabi* field crop.

| Teaching Scheme (Hours) |          |           | Credits | Theory Marks |             |                             | Tutorial/ Practical Marks |                | Total Marks |
|-------------------------|----------|-----------|---------|--------------|-------------|-----------------------------|---------------------------|----------------|-------------|
| Theory                  | Tutorial | Practical |         | ESE (E)      | Mid Sem (M) | Progressive Assessment (PA) | Viva (V)                  | Term work (TW) |             |
| 1                       | 0        | 2         | 2       | 40           | 20          | 20                          | 10                        | 10             | 100         |

### Theory Content:

| Unit | Topics                                                                                                                                                 | Contact Hours |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1    | Centres of origin, distribution of species, wild relatives in different cereals, pulses, oilseed, fibers, fodders and cash crops of <i>rabi</i> season | 2             |

|   |                                                                                                                                                                                    |           |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 2 | Centres of origin, distribution of species, wild relatives in different vegetables and horticultural crops of <i>rabi</i> season                                                   | 2         |
| 3 | Plant genetic resources, its utilization and conservation,                                                                                                                         | 1         |
| 4 | Study of genetics of qualitative and quantitative characters                                                                                                                       | 1         |
| 5 | Important concepts of breeding self-pollinated, cross-pollinated and vegetatively propagated crops                                                                                 | 2         |
| 6 | Breeding approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional) | 3         |
| 7 | Hybrid seed production technology in wheat, oat, chickpea, rapeseed and mustard <i>etc.</i>                                                                                        | 2         |
| 8 | Ideotype concept                                                                                                                                                                   | 1         |
| 9 | Climate Resilient Crop Varieties for future                                                                                                                                        | 1         |
|   | <b>Total</b>                                                                                                                                                                       | <b>15</b> |

### Practical Content:

| Unit | Topics                                                                                                  | Contact Hours |
|------|---------------------------------------------------------------------------------------------------------|---------------|
| 1    | Botany of crops, floral biology, emasculation and hybridization techniques in different crop species    | 2             |
| 2    | Maintenance breeding of different <i>rabi</i> crops                                                     | 2             |
| 3    | Handling of germplasm and segregating populations by different methods (Pedigree, Bulk and SSD methods) | 4             |
| 4    | Study of field techniques for seed production and hybrid seed production in <i>rabi</i> crops           | 2             |
| 5    | Estimation of heterosis, inbreeding depression and heritability                                         | 2             |
| 6    | Layout of field experiments                                                                             | 2             |
| 7    | Study of quality characters, donor parents for different characters                                     | 2             |
| 8    | Visit to seed production plots                                                                          | 2             |

|   |                                                  |           |
|---|--------------------------------------------------|-----------|
| 9 | Visit to AICRP breeding plots of different crops | 2         |
|   | <b>Total</b>                                     | <b>20</b> |

### Reference Books:

- Chopra, V. L. (2001). Breeding Field Crops -I, Oxford & Ibh Publisher, Delhi, India.
- Singh, C. B. and Khare, D. (2001). Genetic Improvement of Field Crops, Scientific Publisher, Rajasthan, India.
- Singh, D. P. (2014). Genetics and Breeding of Pulse Crops, Kalyani Publishers, New Delhi, India.
- Ram, Hari Har (2024). Vegetable Breeding – Principles and Practices (4<sup>th</sup> Edn.), Kalyani Publishers, New Delhi, India.
- Yadav, R. K. (2023). Practical Manual on Crop Improvement II (*Rabi* crops), Bhavya Books publication, New Delhi, India.

### Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

| Distribution of Theory for course delivery and evaluation |            |       |         |          |        |
|-----------------------------------------------------------|------------|-------|---------|----------|--------|
| Remember                                                  | Understand | Apply | Analyze | Evaluate | Create |
| 25%                                                       | 25%        | 20%   | 10%     | 10%      | 10%    |

### Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the class-rooms.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory/ field.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.