Rama University, Kanpur

Ref: RU/FASAI/HOR/01 **Dated: 03-06-2016**

Minutes of Meeting
Boards of Studies M.Sc. (Ag.) Horticulture
Department of Horticulture

A meeting of Boards of Studies of Faculty of Agricultural Sciences and Allied Industries was held on 03-06-2016 in Director's Office. The following members were present:

1. Dr. H.S. Muker - Chairperson
2. Dr. Amit Kumar - Member
3. Dr. Tapashya Chaudhary - Member

The following members agreed to review the minutes in Kanpur.

1. Dr. V.K. Tripathi - External Member
2. Dr. A.K. Tiwari - External Member

Agenda:

1. To consider and approve the syllabus and evaluation scheme of for M. Sc. (Ag.) Horticulture

S. No.	Item No.	Existing	Recommendation /Action Taken
1.	RU/BOS/FASAI To consider and approve the syllabus and evaluation scheme of for M.Sc Agriculture (Horticulture) for students admitted in the session 2016-17	N/A	The BOS considered and approved the syllabus and evaluation scheme of for M.Sc Agriculture (Horticulture) for students admitted in the session 2016-17 **Attached: Curriculum, syllabus and Evaluation Scheme (Annexure:1)**

2. Recommendation on New courses under the Institute

S. No.	Item No.	Feedback from Faculty/Student	Recommendation /Action Taken
1	N/A	N/A	N/A

3. Consideration of the curricula of the new programs prepared by the faculty

S. No.	Item No.	Feedback from Faculty/subject experts/Industries	Recommendation /Action Taken
1	N/A	N/A	N/A

5. Review of Teaching Process

S. No.	Item No.	Existing	Recommendation /Action Taken
1	N/A	N/A	N/A

6. Result Analysis: N/A

7. Any other issue with the permission of the Chair: N/A

The meeting concluded with a vote of thanks to the chair.

Date of the Next Meeting: to be decided and conveyed later

(Chairman)

Encl.: Recommended Curriculum, syllabus and evaluation scheme is attached for consideration and approval.

CC:
1. Dean Academics Office
2. Registrar Office

M. Sc. (Agriculture) Horticulture

Programme outcomes (PO):

Students graduating with the M.Sc. Ag. Horticulture degree should be able to acquire the followings:

PO-1: To understand the botany of different fruit and vegetable crops.

PO-2: To understand the crop improvement practices in different horticultural crops.

PO-3: To understand and analyze the current events and issues that are occurring in horticulture and how they affect futuristic horticulture.

PO-4: Able to recognize and examine the relationships between inputs and outputs in their horticultural field to make effective and profitable decisions.

PO-5: Understand how all aspects of horticulture combine and are used by scientists, marketers, producers and understand how employer characteristics and decision-making at various levels enhance the success of an enterprise.

PO-6: To understand the floriculture and landscaping aspects.

PO-7: To understand the export and import opportunities in horticultural crops.

Programme Specific Outcomes:

PO-1:To develop in accordance with high standards of academic integrity (ethics and moral) both in the profession and in society as a whole.

PO-2: Demonstrate knowledge and understanding in horticulture section: Basic horticulture biology: taxonomy, anatomy, morphology, and physiology. Current applications of horticultural principles and practices: propagation, pest management, production, maintenance, and business practices. Comprehensive knowledge of horticultural production.

PO-3: This programme will also help students to enhance their employability for jobs in different sectors.

Programme Educational Outcome: M.Sc. (Ag.) Horticulture

Students will understand how the environment influences plant growth and crop yields, and ways to modify the environment to improve plant growth and yields. Students will understand how to identify weeds and sustainably manage them in various plant production systems. Introduce students to occupations within the green industry. Prepare students for successful employment through classroom and practical experiences while encouraging them to take pride in their work and establish a high standard of professionalism. Encourage students to be responsible stewards of the environment by demonstrating and valuing sustainable practices. Demonstrate the safe use of equipment, chemicals and tools used in the industry. Identify and explain benefits of professional organizations in the green industry. Maintain strong industry contacts and link classroom knowledge with the industry through field trips and guest speakers.

The anticipated knowledge, skills and/or attitude to be developed by the student are:

1. Identify and research career opportunities in the Sustainable Urban Agriculture industry as well as emerging trends.
2. Identify and practice safe use of tools, equipment and supplies used in sustainable urban agriculture careers
3. Demonstrate an understanding of the composition, fertility and biology of soil and how they relate to good plant growth
4. Describe basic green roof design, construction and maintenance techniques
5. Apply an understanding of sustainable horticultural aspects to the development of landscape design to promote green living environments.
6. Apply an understanding of modern technology and its application to growing plants, with emphasis being placed on hydroponic production of commercially valuable crops
7. Identify the relationships between soil, water, insects, diseases and weeds in agricultural systems
8. Apply agricultural practices that are environmentally sound and productive, and provide a positive social impact on individuals and the community
9. Identify the major food producing plant families commonly found in the Midwest and niche market opportunities for urban agriculture
10. Identify common biotic and abiotic plant pests and disorders and develop strategies to manage them in an environmentally safe and sustainable manner.

RAMA UNIVERSITY

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

ORDINANCE

For

M.Sc. (Ag.) Horticulture
PROGRAMME

ORDINANCE GOVERNING THE DEGREE OF MASTER OF SCIENCE (AGRICULTURE) IN HORTICULTURE (M.SC. (Ag.) HORTICULTURE) PROGRAM

1. **DEFINITIONS OF KEY WORDS:**

(i) **University:** Rama University, Kanpur U.P.,

(ii) **Academic Year:** Two consecutive (one odd followed by one even) semesters constitute one academic year.

(iii) **Semester:** Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.

(iv) There shall be subjects of studies for the Master of Science in Agriculture i.e. M. Sc. (Ag.) in Horticulture at Rama University, Kanpur (Faculty of Agricultural Sciences & Allied Industries). Introduction of any new subject(s) of studies in PG Level at the Institute will be made in due course without modification of the ordinance.

(v) The Post-graduate Degree courses of two-year duration comprising four semesters will run under "Course and Credit System".

(vi) A candidate seeking admission to M. Sc. (Ag.) Horticulture Programme is required to produce a certificate that he / she has passed the four-year B. Sc. (Ag.) Honours degree examination of Rama University or equivalent examination recognized by the ICAR and/or the UGC. The other eligibility criteria like percent of marks, OGPA etc. will be decided as per University guidelines, which may vary from time to time.

(vii) The candidate admitted for admission to the M.Sc. (Ag.) Horticulture Programme shall abide by the regulations regarding the course curricula and the academic standards as prescribed by the University from time to time.

(viii) The medium of instruction and examination shall be in English.

Department and major field of specialization: Faculty of Agricultural Sciences & Allied Industries, Rama University, Kanpur offers Master's degree in the Horticulture programmes with major studies in:

M. Sc. (Ag.)	Major subject(s)
Horticulture	Fruit Science/Vegetable Science

2. **Standing Committee (PG Programme):**

a. A Standing Committee (PG Programme) shall be formed for examining the issues related to M. Sc. (Ag.) Horticulture Programme of the Faculty.

b. **The composition of the Standing Committee (PG Programme) shall be**

i. **Chairman:** A Senior Professor appointed by the Dean of the Faculty.

ii. Head of the Department.

iii. PG Coordinator of each M. Sc. (Ag.) Horticulture Programme.

c. **Function of Standing Committee (M.Sc. (Ag.) Horticulture Programme) may include:**

i. Looking after the general work of M. Sc. (Ag.) Programme of the Bhavana.

ii. Reviewing academic standards including syllabus, examinations etc.

iii. Looking after matters related to examinations, evaluation etc.

3. **PG Coordinator:**

a. BOS/Departmental Committee of the Department offering M. Sc. (Ag.) Horticulture Programme, may select a faculty member as a PG Coordinator for course.

b. The Course Coordinator will look after smooth running of M. Sc. (Ag.) Programme of the

Department.

4. Academic Session and Semester Calendar:

a. The duration of M. Sc. (Ag.) Horticulture Programme shall be of two academic years consisting of four semesters. The maximum allowable semesters for completion of M. Sc. (Ag.) Horticulture Programme is eight (8).

b. The academic year of M. Sc. (Ag.) Horticulture Programme shall be in terms of two semesters in a year. The odd semesters (i.e. First and Third) shall run in the first half of an academic year and even semesters (i.e. Second and Fourth) shall run in the second half of the same academic year. The broad schedule of two semesters is:

Odd semesters (I & III)	July to December
Even semesters (II & IV)	January to June

c. The commencement of each semester in a particular academic year shall be decided by the Standing Committee (PG Programme) from time to time.

d. There shall be no semester break but summer and autumn recesses and enlisted holidays will be followed as prescribed by the University.

5. Courses:

a. Code: Each course shall bear a distinguishing code (three letters and three digits) that identifies the discipline from which it is being offered.

b. **Code numbers:**

i. Course seminar shall be designated by Code No. MSH-380

ii. Master's research (Thesis) shall be designated by Code No. MSH-399

c. There shall be two types of courses, "credit courses" and "non-credit courses". Grade points obtained only in 'credit courses' will be considered for the classification of results. Performance in non-credit courses including Thesis will be as "Satisfactory/No satisfactory"

d. There shall be four types of credit courses, "only theory courses", "only practical courses", "composite courses" and "credit seminar". The composite courses will consist of both theory and practical components.

e. The distribution of marks in various courses of M. Sc. (Ag.) shall be:

i.	**For 'only theory courses'** Semester Terminal Examination Internal Assessment **Total**	 80 20 **100**
ii.	**For 'only practical courses'** Semester Terminal Practical Examination Internal Assessment **Total**	 80 20 **100**
iii.	**For 'Composite courses' i.e. Theory & Practical (60:40)** Semester Terminal Theory Examination Internal Assessment (Theory) Semester Terminal Practical Examination **Total**	 50 20 30 **100**
iv.	**For 'Credit seminar'**	100

f. **Internal assessment:**

Internal assessment will be done in the form of Continuous Evaluation having at least two tests of different forms (tutorial, class test as objective, essay, viva-voce, quiz type, assignment/term paper, class seminar, group discussion, interaction, small projects etc.) per course. The tests should be spread throughout the Semester but 15 days before the commencement of Terminal Examination. At

least 50 % weightage should be on written form of tests. In case of the student who fails to appear in the Terminal examination of a given semester but appears in Internal Assessment (continuous evaluation) of the courses, marks of internal assessment of the student will remain valid during his/her next chances but if a student remains absent or scores low or nil marks even in internal assessment, he/she will not be permitted to reappear for internal assessment after the semester is over.

Within 15 days of conducting the Tests, the Course Instructors will submit marks in the prescribed form in duplicate to the HoD who will sign on both the copies, keep one copy for office use and forward the other copy to the Controller Examinations. The marks of the Internal Assessment should be displayed in the Department for at least seven days before forwarding the same to the Controller Examination. Once the marks of the Internal Assessment are submitted to the Controller Examination by the Department, the marks cannot be corrected or changed.

g. Marks scored in Internal Assessment are to be mentioned separately in the Mark sheet.

h. Courses:

i) **Major courses:** The discipline in which the student shall pursue major study in his/her Master Programme.

ii) **Minor courses:** The discipline closely related to a student's major discipline. Split minors will be permissible.

iii) **Supporting courses:** It could be any discipline excluding major considered relevant for student's research work or necessary for building his/her overall competence.

iv) **Non-credit compulsory courses:** Courses are of general nature and are compulsory for M. Sc. (Ag.) Horticulture Programme. Students' require completing six courses as stated below:

CODE	COURSE TITLE	CREDITS
	Library and Information Services	0+1
	Computer Science	

i. One credit hour indicates one hour lecture or two hours practical work per week for the entire semester.

6. **Credit Requirements:**

a. A student is required to complete a minimum of 60 credits of which 40 credits shall be of course work and 20 credits shall be allocated for the research (Thesis) work.

b. A student's programme of studies shall not be more than 25 credits in any semester.

c. The total course and credit requirements for obtaining Degree shall be:

Particulars	Minimum Credits
i) Course Work	
Major courses	25
Minor courses	09
Supporting courses	05
Non-credit Compulsory courses	06
Seminar	01
Total	46
ii) Comprehensive Examination	Non-Credit
iii) Thesis	20

d. In addition to above a candidate may be permitted to opt for required number of credits from optional major courses and minor or supporting courses as suggested the Chairman of Advisory Committee.

7. **Course Regulation:**

a. The courses to be offered in a particular academic year or semester shall be decided by the

BOS/HOD based on available facilities and faculty strength.

b. Allotment of courses, designating faculties as Course Instructors and Course Associates shall be decided by the BOS/HOD well in advance of the commencement of a semester. The Course Leader will be in rotation considering the workload of each teacher associated with a particular course.
c. Towards introduction of a new course or revision of course, University rules will be followed.
d. There shall be no rigid rule or guideline regarding the minimum number of students required for offering a course. The course will be offered even for a single student.
e. There shall be the provision of inviting the Guest Lecturers to deliver lecture on some highly specialized topics if required.

8. **Course Registration:**

The students will have to submit their choices for course(s) for a particular Semester in writing (in prescribed format) to the HOD through the Major Advisor and PG Coordinator of Department at least one week before the commencement of classes of the said Semester. Students intending to change the Course opted for once will be allowed to do so in the same process within 15 days after the initial Registration.

.9. **Advisory Committee:**

a. The Advisory Committee consisting of at least three members from both major and minor subjects shall be constituted for each student.
b. Every student shall have a Major Advisor who shall be from the Major Field to which the student has been admitted. The Major Advisor shall function as the Chairman of the Advisory Committee.
c. The nomination for Chairman of the Advisory Committees of all newly admitted students shall be completed within four weeks of the first Semester by the HoD.
d. The Advisory Committee of the student should meet frequently to monitor the progress of the student.
e. A proposal for the formation of the students' Advisory Committee along with the Plan of Post-graduate Work shall be forwarded in the prescribed proforma to the HoD for approval within six weeks from the date of admission of the student.
f. The Major Advisor will select other members of the student's Advisory Committee (with the knowledge and consent of the members concerned). Co-advisor shall be from the major field of study/specialization of the Department; Member(s) one each from the Department(s) offering Minor Courses; and Member(s), from any discipline, if Major Advisor feels it necessary for the student's Thesis work.
g. Co-advisor will act as the Major Advisor of the concerned student if the original Chairman is not available due to one or more reasons (death, leaving the university, prolonged absence, ill health etc.)
h. Replacement of members of the Advisory Committee: The Chairman of the concerned student after consultation with the HoD can replace any member of the Advisory Committee due to one or more reasons as stated in Para 9. g above.
i. In case of newly admitted students, the HoD will discharge the functions of the Chairman of the Advisory Committee till the Chairman is selected as per procedure prescribed above.
j. A faculty member having a minimum of one year teaching/ research experience or Doctoral degree can be the Chairman of the Advisory Committee.

10. **Plan of Post-graduate Work (PPW):**

a. The programme of studies indicating the PPW of each student in prescribed format shall be finalized by his/her Advisory Committee to provide considerable latitude in the choice of courses, taking into account the requirement for research in that particular field.

b. The broad research topic of every student will be mentioned at the time of preparation of PPW. The Advisory Committee should finalize PPW within six weeks of the first Semester.

11. **The Outline of Research Work (ORW):**

a. The ORW in prescribed format will have to be approved by the Advisory Committee and forwarded by the Chairman of the Committee to the HoD through the PG Coordinator.

b. The ORW will be presented in the Departmental Seminar for discussion and suggestions.

12. **Attendance:**

Candidates should have an average attendance of 75% in every Semester to be eligible to appear for the Terminal Examination of a given Semester. Candidates having 60% and more but less than 75% attendance may be allowed to appear in the Semester Examination after paying the requisite fine as decided by the University from time to time.

13. Paper setting and Evaluation:

a. In the Semester Terminal examination question papers for fifty percent of the major courses in each semester shall be set externally and evaluated externally. But for only practical courses evaluation will jointly be made by the external and internal(s) examiners. For minor course(s) concerned BoS will make appropriate arrangement.

b. In case any external examiner fails to arrive in the practical examination, the concerned HoD may exercise the option to appoint himself or any other teacher of the University or an expert available in the vicinity other than internal examiner(s).

c. For all the non-credit compulsory courses the paper setting as well as evaluation will be made internally.

14. **Examination and Regulation:**

a. Semester Terminal examinations for odd Semesters shall ordinarily be held in December while for even Semesters be held in the month of June in every academic year. Standing Committee (PG Programme) will fix the period of every Semester Terminal examination preferably at the beginning of the semester. It is also expected that the Semesters of M. Sc. (Ag.) Horticulture Programme in the Faculty will commence at the same time.

b. The candidates shall be required to pass all the courses mentioned in his/her PPW. He/she also needs to complete required Thesis credit hours within the stipulated period i.e. not more than eight (8) Semesters.

c. Before appearing in the end semester theory and/or practical examinations (both theory and practical examinations for composite courses) the student must pass all the backlog paper(s).

d. There shall be the provision for Review System and the evaluation will be done internally. The BoS will recommend the names of three members (HoD and other two members excluding the first examiner) for Review Examination. In case the HoD has evaluated the course, Adhyksha will act as a member in the Board replacing the HoD.

e. The duration for semester Terminal examination of different courses shall be as follows:

i) For theory courses: 3 hours

ii) For practical courses: 3 hours

f. The candidates appearing in each Semester Terminal examination of M.Sc. (Ag.) Horticulture Programme shall: (i) produce a certificate from the HoD that he/she has attended at least 75 % of the in-campus classes. Relaxation, if any, will be guided by the University Ordinance; (ii) produce a certificate from HoD that his/her conduct has been good and that he/she is fit and proper candidate for the examination.

g. A student found adopting unfair means at the examination will be treated heavily and stringent action will be taken as per University rules.

h. No 'make up' examination shall be permitted in lieu of the missed Terminal theory and/or practical examination.

i. If a student fails to appear in any final theory and /or practical examination or does not secure pass marks in any course, he/she requires fresh registration for the course during the next available Semester with that course but the candidate has to complete the degree programme including all the repeat courses within eight (8) Semesters.

j. If a candidate is compelled to drop a Semester on medical ground he/she will be allowed to repeat in the next available Semester. However, he/she has to complete all the courses within eight (8) Semesters.

k. If a student has to drop a course on medical ground but having less than 75 % attendance the student shall be given 'I' grade, i.e. "incomplete", and will be allowed to repeat the course in the next available Semester. The 'I' grade shall be entered in the transcript also. In all other cases dropping of course will be declared 'Fail' in the course.

15. Fees and other Charges:

Student admitted to M.Sc. (Ag.) Horticulture Programme shall pay examination fees (as per University guidelines) for each Semester Terminal Examination at the time of filling up of form for the purpose.

16. **Moderation:**

a. A Moderation Committee consists of at least three members may be appointed as per University rule but excluding an external moderator, shall do moderation of question papers for the Terminal Theory Examinations.

b. Separate Moderation Committee shall be formed for each M. Sc. (Ag.) Programme and that may act under the Chairmanship of HoD.

17. **Scrutiny:**

a. There shall be a Scrutiny Committee consisting of HoD and two other teachers of the Department to scrutinize the results of internal assessment, Terminal as well as Review examinations before finalization. The BoS of the concerned Department will approve the Committee.

b. M.Sc. (Ag.) Horticulture Programme will have separate Scrutiny Committee that will act independently.

18. **Credit Seminar:**

a. Each student shall be required to deliver a Seminar during the course of studies on a topic relevant to the concerned discipline.

b. Code No. 380 shall be assigned for Course Seminar.

c. PG Coordinator shall act as Seminar Leader. Otherwise, HoD of Department himself or may select any faculty member as Seminar Leader.

d. Departmental students' Credit Seminar will be an open Seminar.

e. The Seminar Leader in consultation with the HoD shall fix the schedule for the Seminars.

f. The Seminar topic shall not be within the purview of the student's Thesis instead should cover a subject of topical interest.

g. Each student will prepare and distribute copies of 'Abstract' to the persons attending the Seminar. The Abstract (within 300 words) should precisely state the main theme of the talk.

h. Seminar write-up: The student shall prepare a full account (not normally exceeding 3000 words) on the topic covered in the seminar and submit to the Seminar Leader on or before the date of presentation of the Seminar.

i. Seminar evaluation: Seminar Leader and the members of the Advisory Committee will evaluate the performance of the students, taking into account all the relevant factors like, Introduction, Review of Literature, presentation of subject, capacity to draw general conclusion from literature and ability to answer questions raised and will award marks to the student.

19. **Comprehensive:**

a. Every student has to appear at Comprehensive Examination to be conducted by the Advisory Committee.
b. A candidate should be allowed for comprehensive examination after completion of 75% course work separately in major and minor subject(s) but before the submission of Thesis.
c. Written comprehensive examination consists of one paper in major courses and one paper in minor courses each of three hours duration having 100 marks.
d. Paper setting and evaluation will be done internally.
e. Qualifying marks will be 50% and grading will be Satisfactory/Unsatisfactory. If the performance of a student becomes unsatisfactory he/she has to appear again to a maximum of three more attempts within eight (8) Semesters. Repeat comprehensive test (s) shall be conducted at least with a gap of 30 days of the previous test.
f. The results of comprehensive examination shall be forwarded by the HoD to the Examination Section for record. The grade obtained will not be reflected in the Final transcript.

20. **Thesis:**

a. The thesis for the Master's Degree shall indicate student's potentialities for conducting research.
b. The topic of Thesis will be within the Major Field of specialization under the Code No. 399.
c. The subject of the Thesis should be approved by the student's Advisory Committee and the HoD at the time of formation of the student's PPW and then ORW.
d. The Thesis shall be based on the results of the student's own work. A certificate to this effect from the Major Advisor shall accompany the Thesis.
e. The Thesis shall preferably follow the following: chapters on Introduction, Review of literature, Materials and Methods, Results, Discussion, Conclusion and Summary, Future scope of research and References.
f. **Thesis Seminar:** A student shall deliver a seminar on the research problem before the submission of Thesis and all the faculty members may be invited to participate in the discussion and make constructive suggestions on the Thesis.
g. Thesis submission: After fulfilling the prescribed courses, residential requirements and minimum semester requirements (4 Semesters) and successfully completing the research work to the level of full satisfaction, a student shall submit the Thesis.
h. The Chairman of the student's Advisory Committee shall ensure that all members of the Advisory Committee are duly consulted before submission of the manuscript of the Thesis.
i. Each student shall submit three copies of the Thesis within the date notified by concerned HOD, one copy to deposit to the Institute Library, another to the Departmental Library, third to the Major Advisor.
j. The Thesis shall accompany a certificate to the effect that the work has not been submitted in part or full for any other degree or diploma.
k. The candidate shall submit the Thesis to the concerned HoD along with "no dues certificate" and other formalities.
l. **Thesis Viva-Voce**: An External Examiner shall examine the Thesis. An arrangement for viva voce shall be made by the concerned Department by an Examination Committee consisted of External Examiner, HoD and the members of the Advisory Committee of the candidate. The student shall be awarded "Satisfactory" (i.e. pass) or "non-satisfactory" (i.e. fail) in Thesis Viva-Voce.
m. The grade obtained (i.e. Satisfactory/Non-satisfactory) shall be shown in the final transcript but shall not be included for the purpose of calculation of OGPA.
n. In case, the External Examiner suggests modification/re-submission, the student may be permitted to defend his/her thesis in final viva-voce, and as such of modifications as are finally agreed upon may be carried out after the viva-voce.

o. Re-examination: If a student fails (i.e. non-satisfactory) in Thesis he/she may be permitted to continue the work and/or rewrite the Thesis as per comments of the Examination Committee and resubmit it to the HoD with the recommendation of the Chairman of the Advisory Committee for permission to appear a second time. Re-examination shall not take place earlier than three months after the final semester examination but within eight (8) Semesters and as far as possible the Committee as previously constituted, will conduct it. No further reexamination is permissible and a student failing to secure 'satisfactory' grade a second time shall not qualify for the degree

21. **Rights on Thesis:**

a. The Thesis submitted by a student shall become the property of the Institute.

b. Whenever, an extract from the Thesis is published, there should be an acknowledgement in the form of footnote stating that the results are from the Thesis submitted for the degree from the Faculty of Agricultural Sciences & Allied Industries, Rama University.

c. All patents, designs and inventions derived from the Thesis research work shall belong to the Faculty which may, at its discretion, allow or direct any benefit thereon to be retained by or given to the author of the Thesis.

d. Copies of the Thesis submitted to the University Library or in the Departmental Library shall not be issued on loan for a period of two years from the date of submission.

e. In case where student does not take care to publish the Thesis work even after three years of completion of the degree, there stands no objection of the student to publish papers/articles by the Chairman, Advisory Committee of the concerned student.

22. **Grading System:**

a. There will be a ten point grading system of evaluation with grade point (GP) equals to percent marks obtained divided by 10.

b. **The conversion formula will be**: Percent of marks = 10 x OGPA

c. Minimum requirement: Grade point (GP) of 5.00 for passing a course and an Overall Grade Point Average (OGPA) of 5.00 for completing the M. Sc (Ag.) Horticulture Programme. A candidate failing to secure minimum OGPA (5.00) will not be considered for the award of degree and shall be declared as 'failed'. If a candidate fails to secure 40 % marks in Practical examination of composite course he /she will be declared as 'fail' in the concerned course.

d. A candidate failing to obtain minimum GP (5.00) in not more than three courses, in a Semester, will be allowed to repeat the failed course(s) afresh not more than two times in next available Semesters. A candidate failing in more than three courses in a Semester has to repeat the Semester. In any circumstance the student is to complete the degree Programme including all the repeat courses within the maximum of 08 Semesters.

e. Symbols to be used in the Semester Transcript:

I = Incomplete
S = Satisfactory
NS = Non-Satisfactory
R = Repeat

Specialization of the candidate needs to be mentioned in the Semester Mark sheet/Transcript.

23. **Residential Norms:**

a. Residential requirement shall mean presence of the student continuously in working days/hours in the Institute/University (class room for classes, laboratories for practical and/or research, farm for field work, library for collecting information or placed somewhere on duties etc.).

b. The minimum residential requirement shall be of four Semesters from the date of admission to the University. However, with the prior written permission of the HoD, PSB through the Chairman a student may be allowed to discontinue after completion of two consecutive

Semesters and renew studies even after two Semesters. Completion of semester shall mean clearing of all examinations as scheduled. He/she has to pay annual fees for the University for Retention of the studentship.

c. A student may be allowed for discontinuance only by one break and he/she shall have to complete all courses including submission of Thesis within eight semesters from the date of admission to the University, failing which his/her studentship shall be treated as cancelled.

d. A student appealing discontinuance for one or two semester(s) has to vacate hostel accommodation.

Date: 03.06.2016

Faculty of Agriculture & Allied Sciences

Rama University Uttar Pradesh, Kanpur

Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)

M.Sc.(Ag.) Horticulture FIRST YEAR (SEMESTER-I)

S.N.	Subject Code	Subject Name	Period			Evaluation Scheme			Subject Total	Credit Hours
			L	T	P	CE	MTE	ETE		
Theory subjects										
1	MSH-101	Medicinal and Aromatic Plants	3	0	0	20	20	60	100	3
2	MSH- 102	Plant propagation and nursery management	3	0	0	20	20	60	100	3
3	MSH- 103	Tropical ans Dryland fruit production	3	0	0	20	20	60	100	3
4	MSR-101	Research Methodology	3	0	0	20	20	60	100	3
5	MAS-104	Computer Application	3	0	0	20	20	60	100	3
Practicals / Project										
6	MSH-151	Medicinal and Aromatic Plants	0	0	2	30	20	50	100	2
7	MSH- 152	Plant Propagation and Nursery Management	0	0	2	30	20	50	100	2
8	MAS-153	Computer Application	0	0	2	30	20	50	100	2
Total			**15**	**0**	**6**	**190**	**160**	**450**	**800**	**13**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

1 Attendance: 5 Marks

2 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Date: 03.06.2016

Convener
Signature: .....
Name : Dr. H.S. Muker
Date :

Internal Members
Signature: 1..... 2.....
Name: Dr. Amit Kumar Dr. Tapashya Chaudhary
Date:

External Members
Signature: 1..... 2.....
Name: Dr. V.K. Tripathi Dr. A.K. Tiwari
Date:

Date: 03.06.2016

Faculty of Agriculture & Allied Sciences

Rama University Uttar Pradesh, Kanpur

Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)

M.Sc.(Ag.) Horticulture FIRST YEAR (SEMESTER-II)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory subjects										
1	MSH-201	Plantation crop production	3	0	0	20	20	60	100	3
2	MSH-202	Seed Production technology of vegetable crops	3	0	0	20	20	60	100	3
3	MSH-203	Principals of fruit production	3	0	0	20	20	60	100	3
4	MSH-204	Production technology of ornamental plants	3	0	0	20	20	60	100	3
5	MAS-205	Experimental Design	3	0	0	20	20	60	100	3
Practicals / Project										
6	MSH-251	Plantation crop production Lab	0	0	2	30	20	50	100	2
7	MSH-252	Seed Production technology of vegetable crops Lab	0	0	2	30	20	50	100	2
8	MSH-253	Principals of fruit production Lab	0	0	2	30	20	50	100	2
9	MSH-254	Production technology of ornamental plants Lab	0	0	2	30	20	50	100	2
10	MAS-255	Experimental Design Lab	0	0	2	30	20	50	100	2
11	MSH-280	Master Seminar	0	0	1	0	0	100	100	1
Total			**15**	**0**	**11**	**250**	**200**	**650**	**1100**	**26**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

3 Attendance: 5 Marks

4 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

Date: 03.06.2016

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice
MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Convener
Signature: .....
Name : Dr. H.S. Muker
Date :

Internal Members
Signature: 1..... 2.....
Name: Dr. Amit Kumar Dr. Tapashya Chaudhary
Date:

External Members
Signature: 1..... 2.....
Name: Dr. V.K. Tripathi Dr. A.K. Tiwari
Date:

Faculty of Agriculture & Allied Sciences

Rama University Uttar Pradesh, Kanpur
Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)

M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-III)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-301	Production technology of warm season vegetable crops	3	0	0	20	20	60	100	3
2	MSH- 302	Tropical and sub tropical fruit production	3	0	0	20	20	60	100	3
3	MSH- 303	Production technology of Under exploited vegetable crops	3	0	0	20	20	60	100	3
4	MSH- 304	Techniques in plant protection	3	0	0	20	20	60	100	3
5	MSH-305	Principles of integrated pest management	3	0	0	20	20	60	100	3
Practicals / Project										
6	MSH-351	Production technology of Under exploited vegetable crops	0	0	2	30	20	50	100	2
7	MSH-352	Techniques in plant protection	0	0	2	30	20	50	100	2
8	MSH-380	Master Seminar	0	0	1	0	0	100	100	1
Total			**15**	**0**	**5**	**160**	**140**	**500**	**800**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5 Attendance: 5 Marks

6 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice
MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Convener
Signature: .....
Name : Dr. H.S. Muker
Date :

Internal Members
Signature: 1..... 2.....
Name: : Dr. Amit Kumar Dr. Tapashya Chaudhary
Date:

External Members
Signature: 1..... 2.....
Name: Dr. V.K. Tripathi Dr. A.K. Tiwari
Date:

Dated: 07-06-2017

Faculty of Agricultural Sciences & Allied Industries
Rama University Uttar Pradesh, Kanpur
Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)

M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-IV)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-401	Comprehensive	2	0	0	0	0	200	200	0
2	MSH-402	Master's Research (Research Work & Thesis)	0	0	2	0	0	300	300	16
Total			2	**0**	**2**	**0**	**0**	**500**	**500**	**16**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

7 Attendance: 5 Marks

8 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Convener

Signature: .....
Name : Dr. H.S. Muker
Date :

Date: 03.06.2016

Faculty of Agriculture & Allied Sciences

Rama University Uttar Pradesh, Kanpur

Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)

M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-IV)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-401	Master's Research (Research Work & Thesis)	0	0	2	200	0	300	500	20
Total			0	**0**	**2**	**200**	**0**	**300**	**500**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

7 Attendance: 5 Marks

8 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Convener

Signature: .....

Name : Dr. H.S. Muker

Date :

Internal Members

Signature: 1..... 2.....

Name: Dr. Amit Kumar Dr. Tapashya Chaudhary

Date:

External Members

Signature: 1..... 2.....

Name: Dr. V.K. Tripathi Dr. A.K. Tiwari

Dated: 07-06-2017

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences and Allied Industries

EVALUATION SCHEME

&

SYLLABUS

Dated: 07-06-2017

[Effective from the Session 2017-18]

M.Sc. (Ag.) Horticulture

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

MSH-101 Medicinal and Aromatic Plants	L	T	P	CR
	3	1	2	4

Course objective:- To impart comprehensive knowledge about the production technology of medicinal and aromatic crops.

Detail Contents

Unit 1:	**30%**
Unit 2:	**35%**
Unit 3:	**35%**

UNIT I

History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance of medicinal and aromatic plants in human health, national economy and related industries, classification of medicinal and aromatic plants according to botanical characteristics and uses.

UNIT II

Climate and soil requirements; cultural practices; yield and important constituents of medicinal plants (Isabgol, Rauwolfia, Poppy, Aloe vera, Satavar, Stevia, Safed Musli, Kalmegh, Asaphoetida, Nux vomica, Rosadle etc).

UNIT III

Climate and soil requirements; cultural practices; yield and important constituents of aromatic plants (Citronella, Palmarosa, Mentha, Basil, Lemon grass, Rose, Patchouli, Geranium etc.).

Practical

- Identification of crops based on morphological and seed characteristics

Dated: 07-06-2017

- Raising of herbarium of medicinal, aromatic and under-utilized plants
- Quality characters in medicinal and aromatic plants
- Methods of analysis of essential oil and other chemicals of importance in medicinal and aromatic plants

Course Learning Outcomes (CLO)

- Identify the importance of medicinal plant crops.
- Identify the importance of aromatic plant crops.
- Apply knowledge of intercultural practices for improving yield of medicinal and aromatic plants.
- Identify the export potential and industrial support for medicinal and aromatic plants.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	2	3	1	-	-	-	-	2	-	-
CO_2	-	2	-	3	-	3	3	-	1	2
CO_3	2	1	3	-	-	3	3	1	1	3
CO_4	3	-	1	2	-	-	-	3	1	2
Average	2.33	2.00	2.00	2.5	-	3	3	3	1	2.33

Text books:-

N. Kumar, Introduction to spices, plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-

Jain SK. 2000. Medicinal Plants. National Book Trust.

Atal CK & Kapur BM. 1982. Cultivation and Utilization of Aromatic Plants. RRL, CSIR, Jammu.

Kurian A & Asha Sankar M. 2007. Medicinal Plants. Horticulture Science Series, New India Publ. Agency.

Signature:-

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Dated: 07-06-2017

MSH-102 Plant Propagation and Nursery Management

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production of new plants and nursery management for horticultural crops

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

UNIT I

Introduction, life cycle in plants, cellular basis for propagation, apomixes, polyembrony, germination process and environmental factors affecting it, quality of seeds, seed dormancy, treatments to facilitate germination, seed testing, diseases control during germination.

UNIT II

Clone and phase variation, genetic variation in asexually propagated plants, production and maintenance of pathogen free clones, cutting- anatomical, physiological and biochemical aspects of root initiation in cuttings, types of cuttings, use of bioregulators, mist systems of rooting cuttings, planting and care, layering- principles and methods.

UNIT III

Reasons for grafting and budding, categories of root-stock, formation of graft and bud union, factors influencing the healing of graft union, limits of grafting, graft incompatibility, scion-stock relationship, techniques of grafting, budding and layering.

UNIT IV

Micro propagation: Introduction, objectives, merits and demerits, facilities and equipments, aseptic techniques and use of antibiotics, media preparation, micro propagation techniques- clonal propagation, direct orgamagenesis, embryogenesis, meristem culture culture, micro grafting, hardening, packing and transport of micropropagules.

UNIT V

Nursery Management: types of nursery, location, components planning and layout of a commercial nursery, structures, media mixtures, nursery management practices

Practical-

Practice of grafting, budding, cutting and layering, anatomical studies ofrooting of cuttings and grafting union, planning and layout for commercial nursery, sample seed testing, use of bioregulators in propagation, sterilization of equipments and laboratory, media preparation, selection and preparation of explants, meristem culture and micro grafting, planning and layout of experiments on various aspects of propagation. Visit to tissue culture labs and nurseries.

Dated: 07-06-2017

Course Learning Outcomes (CLO)

- State cellular basis of fruit propagation.
- Identify basis of seed dormancy regulation.
- Describe various types of propagation techniques of fruit crops.
- Describe micro-propagation techniques for mass multiplication of fruit crops.
- Develop nursery plan for the propagation of different fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	2	1	-	-	3	3	1	1	2
CO_3	3	1	3	-	-	3	3	1	1	3
CO_4	3	-	2	2	-	2	-	3	1	2
CO_5	3	1	2	1	2	2	-	-	2	3
Average	3	1.5	1.8	1.5	2	2	3	1.75	1.25	2.50

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Singh S, Shivankar VJ, Srivastava AK & Singh IP. (Eds.). 2004. Advances in Citriculture. Jagmander Book Agency.

Signature:-

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2. .....
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Dated: 07-06-2017

MSH-103 TROPICAL AND DRY LAND FRUIT PRODUCTION

L	T	P	CR
2	1	2	3

Course objective:- To impart basic knowledge about the importance and management of tropical and dry land fruits grown in India.

Detail Contents

Unit 1: **20%**

Unit 2: **20%**

Unit 3: **20%**

Unit 4: **20%**

Unit 5: **20%**

Theory

Commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bioregulators, abiotic factors limiting fruit production, physiology of flowering, pollination fruit set and development, honeybees in cross pollination, physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones(AEZ) and industrial supports

UNIT I

Mango and Banana

UNIT II

Citrus and Papaya

UNIT III

Guava, Sapota and Jackfruit Aonla, Pomegranate

UNIT IV

Pineapple, Annonas and Avocado

UNIT V

Phalsa and Ber, minor fruits of tropics

Practical

Identification of important cultivars, observations on growth and development, practices in growth regulation, malady diagnosis, analyses of quality attributes, visit to tropical and arid zone orchards, Project preparation for establishing commercial orchards.

Course Learning Outcomes (CLO)

- Identify the importance of tropical and dry land fruit crops.
- Describe production practices for commercial tropical and dry land fruits.
- Describe various management practices for tropical and dryland fruits.
- Define the physiology of tropical and dryland fruit crops.
- Enumerate post harvest management practices in various tropical and dryland fruits.

Dated: 07-06-2017

- Identify the export potential and industrial support for tropical and dryland fruits

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	-	3	2	-	2	2	1	-
CO_2	-	2	1	-	-	3	3	-	1	2
CO_3	3	1	3	-	-	2	3	1	-	-
CO_4	3	-	-	2	-	-	-	3	1	2
CO_5	1	-	2	-	2	-	-	-	2	3
CO_6	-	2	-	-	1	-	-	2	-	-
Average	2.00	1.66	2.00	2.5	1.66	2.5	2.66	2	1.25	2.33

Text books:-

Fruits -Tropical and Subtropical. Naya Udyog. Chadha KL & Pareek OP. 1996. (Eds.).

Reference books:

Bose TK, Mitra SK & Rathore DS. (Eds.). 1988. Temperate Fruits - Horticulture. Allied Publ. Bose TK, Mitra SK & Sanyal D. 2001. (Eds.).
Advances in Horticulture. Vols. II-
IV. Malhotra Publ. House. Nakasone HY & Paul RE. 1998. Tropical Fruits. CABI.
Peter KV. 2008. (Ed.). Basics of Horticulture. New India Publ. Agency.
Pradeepkumar T, Suma B, Jyothibhaskar & Satheesan KN. 2008.
Management of Horticultural Crops. Parts I, II. New India Publ. Agency.
Radha T & Mathew L. 2007.

Signature:-

1. .....

Dated: 07-06-2017

2. .....

3. .....

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MSR-101 Research Methodology

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge about the research programmed.

Detail Contents

Unit 1: **30%**

Unit 2: **30%**

Unit 3: **40%**

UNIT I

Project formulation, Problem identification, formulation of objectives and technical program.

UNIT II

Data collection, data interpretation and deriving inferences and conclusions.

UNIT III

Literature collection, Review writing, Research article writing, Technical report preparation, Research abstracting, Research Scheme proposal.

Course Learning Outcomes (CLO)

- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	2	1	2	3	-	3	3	1	1	2

Dated: 07-06-2017

CO_3	3	1	-	1	-	1	3	-	1	3
Average	2.6	1.33	1.5	2	2	2	2	1.5	1	2.5

•

Text books:-

Agarwal. S.K. 2003. Research Methodology. International Book Distributors, Dehradun.

References

Gupta. R.K. 2001. Research Methodology. IBH publications, New Delhi.

Gopal Lal Jain. 2003. Research Methodology – Methods, tools and techniques. Mangal Deep Publication, Jaipur

Singh, V.P. 2003. Research Methodology. Scientific for Publication, New Delhi.

Kothari, C.R. 1997. Research Methodology – Methods and Teaching. Pub: Wishwa Prakashm, New Delhi.

Signature:-

1. ……..

2. ……

3. ……

4. ……

MSA- 104: Computer Orientation

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge of computer about the research programmed.
Detail Contents

Unit 1: **50%**

Unit 2: **50%**

Theory

Unit 1

Introduction to multi programming and time sharing computers - Login and creation of files - Introduction to structured programming with reference to BASIC - Variables and constants, complex, double precision, logical, character –

Unit 2

Dated: 07-06-2017

Arithmetic expressions, arrays, control statements (DO, IF, Computed GOTO) - Functions and subroutines - I/O statements - Elementary programming of algorit

Practical

Loading Windows and other features in Windows. MS Word – creation, editing of a document. Using features like underlining, bold, italics, spell check etc. and printing. Creation of excel sheet and processing for statistical analysis. Creation of a database in access - Mstat – creation of a data file. Internet – getting connected and email Internet – retrieval of information.

Course Learning Outcomes (CLO)

- Apply the computer system in agricultural experimental designs.
- To option basic output from the computer.
- TO Option knowledge about MS office.
- TO Option knowledge about DOS.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	-	-	1	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	3.5	1.33	1	2	2	2	2.5	2	1.33	2

Text books:- Chris Lewis, Essential Tips: Using the Internet

References

Chris Lewis, Essential Tips: Using the Internet
Gene Weisskopf, ABCs of Excel 97
Kenneth N.Berk, Introductory Statistics with Systat
Kris N, Advanced Data Analysis with Systat

Signature:-

1. .....
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Dated: 07-06-2017

4. .....

MSH- 201 Plantation crop production

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the importance and production technology of plantation crops grown in India.

Detail Contents

Unit 1: **35%**

Unit 2: **30%**

Unit 3: **35%**

Theory:- Detailed study of origin and distribution, economic importance, taxonomy, classification, varieties, climatic and soil requirements, propagation and nursery techniques, selection of mother plant, seed selection, maintenance of nursery. Methods of planting , cultural practices, nutrition and water requirements, plant protection and managements, factors affecting growth, flowering etc; harvest indices and harvesting; quality evaluation and grading of.

Unit 1: coconut, arecanut, rubber

Unit 2: oil palm, cocoa, tea

Unit 3: cashewnut, coffee

Practical:-Studies on botanical characters, propagation aspects, layout and planting, cultural aspects, visit to important plantations, identification of pests, diseases and other problem.

Course Learning Outcomes (CLO)

- Discuss production technology of plantation crops..
- Discuss the postharvest management of plantation crops.
- Understand the industrial and export potential of fruit crops.

Dated: 07-06-2017

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	2	-	3	-	-	1	3
Average	2	1.33	1.0	2.5	2	3	3	1.5	1	2.5

Text books:- :-N. Kumar, Introduction to spices,plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-Kurian A & Peter KV. 2007. Commercial Crops Technology. New India Publ. Agency

Signature:-

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MSH-202: Seed Production Technology of Vegetable Crops

L	T	P	Cl
3	0	2	4

Course objective:- To educate principles and methods of quality seed and planting material production in vegetable crops.

Detail Contents

Dated: 07-06-2017

Unit 1:	**15%**
Unit 2:	**45%**
Unit 3:	**20%**
Unit 4:	**20%**

Theory:

Unit 1

History, importance and scope of seed production and seed industry in India

Unit 2

Seed production technology encompassing land requirement, isolation requirement, cultural practices, plant protection measures, removal of off types, diseased and insect pest infested plants, harvesting and extraction of seeds) for different categories of seeds *viz.* breeder seed, foundation seed, certified seed and truthfully labeled seed of O. P. variety for cole corps, solanaceous vegetables, leguminous crops, leafy vegetables, cucurbitaceous vegetables, okra and onion.

Unit 3

Hybrid seed production technology for tomato, brinjal, chilli, okra, cucumber, bottle gourd, bitter gourd, sponge gourd, ridge gourd, pumpkin etc.

Unit 4

Post harvest management in seed production of vegetable crops including cleaning, drying, screening, grading, packing and storage of seeds. Economics of seed production technology

Practical

Demonstration of various practices in seed production technology of vegetable crops. Handling of various equipments and machinery for seed production Visit of seed processing and storage units.

Course Learning Outcomes (CLO)

- Describe the production technology of Vegetables seed.
- Analyze the difference between seed and grain..
- Devise cropping scheme and plan for commercial vegetable seed production.
- Describe the production technology of hybrid seed production Vegetables.

- **Mapping of course outcome with programme outcome and programme specific outcome**

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	2	3	3	1	1	2
CO_3	3	1	-	3	-	1	-	-	1	3
CO_4	1	-	-	2	1	-	2	2	2	1

Dated: 07-06-2017

Average	**1.66**	**1.66**	**1.0**	**1.66**	**1.66**	**2**	**2.5**	**2.5**	**1.33**	**2**

Text books:-

Agrawal PK & Dadlani M. (Eds.). 1992. Techniques in Seed Science and Technology. South Asian Publ.

Reference books:-

Fageria MS, Arya PS & Choudhary AK. 2000. Vegetable Crops: Breeding and Seed Production. Vol. I. Kalyani.

Rajan S & Baby L Markose. 2007. Propagation of Horticultural Crops. New India Publ. Agency.

Signature:-

1. .....
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MSH-203 Principals of fruit production

L	T	P	CR
3	0	1	4

Course objective:- Understanding the principles of biodiversity and strategies in germplasm conservation of fruit crops.

Detail Contents

Unit 1: **25%**
Unit 2: **25%**
Unit 3: **25%**
Unit 4: **25%**

Theory:

Unit 1

Importance of fruit production. Soil and climate in relation to fruit production. Water requirement, uptake, movement and influence on root distribution, response of plants to varying soil moisture regimes, pathological conditions associated with excess and deficiencies in soil moisture;

Unit 2

Irrigation methods. Soil management methods and techniques of moisture conservation. Temperature relations, winter injury and hardiness. Light relations- thermal, photosynthetic and phototropic influences. Plant nutrients, absorption, role, deficiencies and surpluses, application of fertilizers. Phases of plant growth- initiation of reproductive processes and fruiting habits.

Unit 3

Dated: 07-06-2017

Systems of planting, high density orcharding and inter and cover cropping in fruit production. Concepts in Hi-tech horticulture. Pruning and training methods, season and physiology. Flowering physiology and factors involved in fruit-set, unfruitfulness, fruit-growth and development. Important physiological disorders and their management.

Unit 4

Alternate bearing – causes and remedies. Maturity indices, harvesting, packing, transport and marketing systems of major fruit and plantation crops.

Practical

Study of soil characters in relation to growing of fruits and plantation crops. Soil moisture determination. Root distribution pattern of major crops. Systems of irrigation. Methods and placement of plant nutrients. Methods of pruning and training adopted in different crops. Floral biology, fruit-set, fruit-growth and fruit drop. Studies on maturity indices and techniques of harvesting. Physiological disorders of major fruit and plantation crops. Survey of local fruit markets to study grading, packing and marketing of different crops.

Course Learning Outcomes (CLO)

- Identify the importance of fruit crops.
- Describe system of planting fruit crops.
- Describe various post harvest management practices for fruit crops .
- Define the physiology of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	-	3	-	3	3	3	1	2
CO_3	3	1	3	2	2	1	-	2	-	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.00	2	2.5	2.00	2	2.5	2	1.5	2.00

Text books

Ranganna S. 1997. Hand Book of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

Reference books:-

Bose TK, Mitra SK & Sanyol D. (Eds.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog

Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

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Dated: 07-06-2017

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MSH-204: PRODUCTION TECHNOLOGY OF ORNAMENTAL PLANT

L	T	P	CR
2	0	1	3

Course objective:- To impart basic knowledge about the importance and produc flower grown in India.

Detail Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Theory:-

Unit 1

Present status of Floriculture in India and its potential in the global market. Photoperiod, vernalization and growth regulators in floriculture.

Unit 2

Commercial production of field flowers, bulbous, foliage and pot plants. Specific problems concerning production of roses, chrysanthemum, carnation, jasmine, marigold and other minor cut flower crops. Orchid and anthurium culture.

Unit 3

Production of essential oil yielding flowers. Project formulation and evaluation.

Practical:-Identification of commercial cultivars. Cultural practices, harvesting, grading, packing and marketing of cut flowers, foliage and pot plants including roses, chrysanthemum, orchid, anthurium and marigold. Project formulation.

Course Learning Outcomes (CLO)

- Identify the important flower crops.
- Discuss production technology of flower crops.
- Apply knowledge of intercultural practices for improving yield of flower plants.
- Identify the export potential and industrial support for flower cops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-

Dated: 07-06-2017

CO_2	-	3	3	3	-	3	3	3	1	2
CO_3	3	1	-	3	-	1	-	2	3	3
CO_4	1	-	2	2	2	2	2	2	2	1
Average	2.33	2.00	2.00	2.66	2	2.00	2.5	2.25	2.00	2.00

Text books

Bose TK, Maiti RG, Dhua RS & Das P. 1999. Floriculture and Landscaping. Naya Prokash.

Reference books

Randhawa GS & Mukhopadhyay A. 1986. Floriculture in India. Allied Publ. Valsalakumari *et al*. 2008. Flowering Trees. New India Publ. Agency. Woodrow MG.1999.
Gardening in India. Biotech Books.

Signature:-

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MAS -205 Experimental Design

L	T	P	CR
3	1	2	4

Course objective:- To impart basic knowledge about the importance and use of it in research program.

Detail Contents

Unit 1: 35%
Unit 2: 35%
Unit 3: 30%

UNIT I

Need for designing of experiments, characteristics of a good design. Basic principles of designs-randomization, replication and local control, Uniformity trials, size and shape of plots and blocks.

UNIT II

Analysis of variance; Completely randomized design, randomized block design and Latin square design, Factorial experiments, (symmetrical as well as asymmetrical), orthogonality and partitioning of degrees of freedom, Confounding in symmetrical factorial experiments, Factorial experiments with control treatment, Split plot and strip plot designs.

UNIT III

Dated: 07-06-2017

Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications concepts, randomisation procedure, analysis and interpretation of results. Response surfaces. Experiments with mixtures.

Practical

1. Uniformity trial data analysis, formation of plots and blocks.
2. Fairfield Smith Law; Analysis of data obtained from CRD, RBD, LSD.
3. Analysis of factorial experiments without and with confounding.
4. Analysis with missing data; Split plot and strip plot designs; Transformation of data.
5. Analysis of resolvable designs; Fitting of response surfaces.

Course Learning Outcomes (CLO)

- Define the basics of statistical theory used in agriculture.
- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.33	1.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books

Cochran WG & Cox GM. 1957. Experimental Designs.

Reference Books

1. 2nd Ed. John Wiley. 2. Dean AM & Voss D. 1999. Design and Analysis of Experiments. Springer.
2. Federer WT. 1985. Experimental Designs. MacMillan.
3. Fisher RA. 1953. Design and Analysis of Experiments. Oliver & Boyd.
4. Nigam AK & Gupta VK. 1979. Handbook on Analysis of Agricultural Experiments. IASRI Publ.
5. Pearce SC. 1983. The Agricultural Field Experiment: A Statistical Examination of Theory and Practice. John Wiley.
6. Design Resources Server: www.iasri.res.in/design

Dated: 07-06-2017

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MSH- 301 PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS

L	T	P	CR
3	1	2	4

Course objective:- To teach production technology of warm season vegetables.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Factors affecting quality seed production. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybirds, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, economics of crop production and seed production of :

UNIT - I

Tomato, eggplant, hot and sweet peppers

UNIT - II

Okra, beans (French bean, Indian bean and cluster bean), cowpea

UNIT - III

Cucurbitaceous crops

UNIT - IV

Tapioca, sweet potato and colosia,

UNIT - V

Dated: 07-06-2017

Green leafy warm season vegetables

Practical

Cultural operations (fertilizer application, sowing, mulching, irrigation, weed control) of summer vegetable crops and their economics; study of physiological disorders and deficiency of mineral elements, preparation of cropping schemes for commercial farms; experiments to demonstrate the role of mineral elements, physiological disorders; plant growth substances and herbicides; seed extraction techniques; identification of important pests and diseases and their control; maturity standards; economics of warm season vegetable crops.

Course Learning Outcomes (CLO)

- Discuss the importance and production technology of warm season vegetables.
- Enumerate physiological disorders and their management of warm season vegetables.
- Experiment different intercultural operations in warm season vegetables.
- Describe harvesting indices and methods in warm season vegetables.
- Identify and manage biotic and abiotic factors causing problems in crop production.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	3	3	-	3	3	1	1	2
CO_3	3	3	1	1	-	2	3	-	3	3
CO_4	2	2	-	2	3	3	2	3	2	1
CO_5	2	1	3	-	2	-	-	3	-	-
Average	**2.5**	**1.8**	**2.00**	**2.00**	**2.33**	**2.66**	**2.66**	**2.25**	**2.00**	**2.00**

Text books:- Bose TK & Som MG. (Eds.). 1986. Vegetable Crops in India. Naya Prokash.

Reference books:-

• Bose TK & Som MG. (1986) Vegetable Crops in India. Naya Prokash, Calcutta

• Bose TK. Kabir J. Maity TK, Parthasarathy VA & Som MG. (2003). Vegetable Crops. Vols. I- III. Naya udyog.

• Bose TK, Som MG & Kabir J. (2002). Vegetable Crops. Naya Prokash, Kolkata.

• Brown HD & Hutchison CS. Vegetable Science. JB Lippincott Co.

• Chadha KL & Kalloo G. (1934-94), Advances in Horticulture Vols. V-X, Malhotra Publ. House, New Delhi

• Chadha KL. (2002). Hand Book of Horticulture. ICAR, New Delhi.

Dated: 07-06-2017

- Chauhan DVS. (1986). Vegetable Production in India. Ram Prasad & Sons.
- Decoteau DR. (2000). Vegetable Crops. Prentice Hall. New Delhi.
- Edmond JB, Musser AM & Andrews FS. (1964). Fundamentals of Horticulture. Blakiston Co.

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MSH- 302 Tropical and Sub-Tropical Fruits

L	T	P	CF
3	1	2	4

Course objective:- To impart basic knowledge about the importance and management of subtropical and temperate fruits grown in India

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**30%**
Unit 4:	**30%**

Theory:

UNIT - I

Horticultural classification of fruits including genome classification. Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning.

UNIT - II

Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Physiological disorders. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, bael, banana, grapes, citrus, papaya, sapota, guava, pineapple, jackfruit, avocado, mangosteen, litchi, carambola, durian and passion fruit.

UNIT – III

Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures. Seediness and kokkan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production.

UNIT - IV

Dated: 07-06-2017

Rainfed horticulture, importance and scope of arid and semi-arid zones of India. Characters and special adaptation of crops: ber, aonla, annona, jamun, wood apple, bael, pomegranate, carissa, date palm, phalsa, fig, west Indian cherry and tamarind.

Practical:

Description and identification of varieties based on flower and fruit morphology in above crops. Training and pruning of grapes, mango, guava and citrus. Selection of site and planting system, pre-treatment of banana suckers, desuckering in banana, sex forms in papaya. Use of plastics in fruit production. Visit to commercial orchards and diagnosis of maladies. Manure and fertilizer application including bio-fertilizer in fruit crops, preparation and application of growth regulators in banana, grapes and mango. Seed production in papaya, latex extraction and preparation of crude papain. Ripening of fruits, grading and packaging, production economics for tropical and sub-tropical fruits. Mapping of arid and semi-arid zones of India. Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa, wood apple, West Indian cherry, tamarind, aonla, bael and annona.

Course Learning Outcomes (CLO)

- Describe the importance of tropical and subtropical fruit crops.
- Understand production management of tropical and subtropical fruit crops.
- Identify and resolve major biotic and abiotic factors limiting production of crops.
- Discuss the postharvest management of fruit crops.
- Understand the industrial and export potential of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	-	2	1	3	2	-	3	2	3	-
CO_2	2	2	-	3	-	3	3	3	1	2
CO_3	3	3	3	1	3	2	2	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	2
Average	2.00	2.00	2.33	1.5	2.5	2.5	2.50	2.00	2.25	2.33

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Chadha KL & Shikhamany SD. 1999. The Grape: Improvement, Production and Post-Ha
Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

Dated: 07-06-2017

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MSH- 303 PRODUCTION TECHNOLOGY OF UNDEREXPLOITEDVEGETABLE CROPS

L	T	P	CR
2		1	2

Course objective:- To impart basic knowledge about the Underexploited vegetable.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Introduction, botany and taxonomy, climatic and soil requirements,commercial varieties/hybrids, sowing/planting times and methods, seed rateand seed treatment, nutritional and irrigation requirements, interculturaloperations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and seed production of:

UNIT I

Asparagus, artichoke and leek

UNIT II

Brussels's sprout, Chinese cabbage, broccoli, kale and artichoke.

UNIT III

Amaranth, celery, parsley, parsnip, lettuce, rhubarb, spinach, basella, bathu(chenopods) and chekurmanis.

UNIT IV

Elephant foot yam, lima bean, winged bean, vegetable pigeon pea, jackbean and sword bean.

UNIT V

Sweet gourd, spine gourd, pointed gourd, Oriental pickling melon and littlegourd (kundru).

Practical

Identification of seeds; botanical description of plants; layout and planting;cultural practices; shortterm experiments of underexploited vegetables.

Course Learning Outcomes (CLO)

- Describe the importance of minor vegetables crop.
- Discuss the production technology of UNDEREXPLOITED VEGETABLE CROPS
- Discuss about post harvest operation of minor vegetables.
- Describe the plant protection.

Dated: 07-06-2017

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	3	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.00	2.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books:- Bhat KL. 2001. Minor Vegetables - Untapped Potential. Kalyani. lndira P & Peter KV. 1984.

Reference books:-

Unexploited Tropical Vegetables. KeralaAgricultural University, Kerala. Peter KV. (Ed.). 2007-08. Underutilized and UnderexploitedHorticulturalCrops. Vols. I-IV. New India Publ. Agency. Rubatzky VE & Yamaguchi M. (Eds.). 1997. World Vegetables:Principles, Production and Nutritive Values. Chapman & Hall Srivastava U, Mahajan RK, Gangopadyay KK, Singh M &Dhillon BS.2001.Minimal Descriptors of Agri-Horticultural Crops. Part-II:Vegetable Crops. NBPGR, New Delhi.

Signature:-

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MSH- 304 TECHNIQUES IN PLANT PROTECTION 3+0

L	T	P	CR
2	1	0	3

Course objective:- To keep abreast with latest developments and plant protection.

Detail Contents

Unit 1: 20%
Unit 2: 20%
Unit 3: 20%
Unit 4: 20%
Unit 5: 20%

Dated: 07-06-2017

Theory

UNIT I Pest control equipments, principles, operation, maintenance, selection, application of pesticides and biocontrol agents, seed dressing, soaking, root-dip treatment, dusting, spraying, application through irrigation water.

UNIT II

Soil sterilization, solarization, deep ploughing, flooding, techniques to check the spread of pests through seed, bulbs, corms, cuttings and cut flowers.

UNIT III

Use of light, transmission and scanning electron microscopy.

UNIT IV

Protein isolation from the pest and host plant and its quantification using spectrophotometer and molecular weight determination using SDS/PAGE.

UNIT V

Use of tissue culture techniques in plant protection. Computer application for predicting/forecasting pest attack and identification.

Course Learning Outcomes (CLO)

Understand how to control the pest population in field crop.
The application of pesticides and bio control agents.
Discuss about how to option molecular weight determination using SDS/PAGE.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
Average	3.00	2.00	1.00	2.00	2.50	2.50	3	2.50	2.33	2.50

Text books:- Alford DV. 1999. A Textbook of Agricultural Entomology.

Reference books:-

Blackwell Science, London. Crampton JM & Eggleston P. 1992.
Insect Molecular Science. Academic Press, London.

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Dated: 07-06-2017

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MSH- 305 PRINCIPLES OF INTEGRATED PEST MANAGEMENT 2+1

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the insect pest management in horticultural crops.

Detail Contents

Unit 1: 25%
Unit 2: 25%
Unit 3: 25%
Unit 4: 25%

Theory

UNIT I

History and origin, definition and evolution of various related terminologies.

UNIT II

Concept and philosophy, ecological principles, economic threshold concept, and economic consideration.

UNIT III

Tools of pest management and their integration- legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys;

UNIT IV

Political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost-benefit ratios and partial budgeting; case studies of successful IPM programmes.

Practical

Characterization of agro-ecosystems; sampling methods and factors affecting sampling; population estimation methods; crop loss assessmentdirect losses, indirect losses, potential losses, avoidable losses, unavoidable losses. Computation of EIL and ETL; crop modeling; designing and implementing IPM system.

Course Learning Outcomes (CLO)

Discuss about IPM for high production.
Discuss about tools of pest control.
Discuss about types of surveys.

Mapping of course outcome with programme outcome and programme specific outcome

Dated: 07-06-2017

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	2	-	2	3	-
CO_2	1	1	-	3	-	3	3	3	1	2
CO_3	3	3	2	1	3	1	-	2	4	3
Average	**2.33**	**2.00**	**1.50**	**2.00**	**2.50**	**3.00**	**3**	**3.5**	**2.66**	**2.50**

Text books:- Dhaliwal GS & Arora R. 2003. Integrated Pest Management – Concepts and Approaches. Kalyani Publ., New Delhi.

Reference books:-

Dhaliwal GS, Singh R & Chhillar BS. 2006. Essentials of Agricultural Entomology. Kalyani Publ., New Delhi.

Flint MC & Bosch RV. 1981. Introduction to Integrated Pest Management. 1st Ed., Springer, New York.

Horowitz AR & Ishaaya I. 2004. Insect Pest Management: Field and Protected Crops. Springer, New Delhi.

Ignacimuthu SS & Jayaraj S. 2007. Biotechnology and Insect Pest Management. Elite Publ., New Delhi.

Metcalf RL & Luckman WH. 1982. Introduction of Insect Pest Management. John Wiley & Sons, New York.

Pedigo RL. 2002. Entomology and Pest Management. 4th Ed. Prentice Hall, New Delhi.

Norris RF, Caswell-Chen EP & Kogan M. 2002. Concepts in Integrated Pest Management. Prentice Hall, New Delhi.

Subramanyam B & Hagstrum DW. 1995. Integrated Management of Insects in Stored Products. Marcel Dekker, New York.

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Rama University, Kanpur

Ref: RU/FASAI/HOR/03 **Dated: 12-06-2018**

Minutes of Meeting
Boards of Studies M.Sc. (Ag.) Horticulture
Department of Horticulture

A meeting of Boards of Studies of Faculty of Agricultural Sciences and Allied Industries was held on 12-06-2018 in Director's Office. The following members were present:

1. Dr. Rajendra Prasad - Chairperson
2. Dr. Amit Kumar - Member
3. Dr. K. K. Mishra - Member

The following members agreed to review the minutes in Kanpur.

1. Dr. V.K. Tripathi - External Member
2. Dr. A.K. Tiwari - External Member

Agenda:

1. Action Taken Report (ATR) on Minutes of Previous Meeting.

The BOS committee confirmed the minutes of the BOS meeting held on 07-06-2017.

2. Review of the existing programs and their curricula

S. No.	Item No.	Existing	Recommendation /Action Taken
1.		No change in syllabus because present time credit hours in syllabus are sufficient.	Syllabus is reviewed by external members there is no changes in syllabus.

3. Recommendation on New courses/Short term training

S. No.	Item No.	Feedback from Faculty/Student	Recommendation /Action Taken
1		N/A	N/A

4. Consideration of the curricula of the new programs

S. No.	Item No.	Feedback from Faculty/subject experts/Industries	Recommendation /Action Taken
		N/A	N/A

5. Review of Teaching Process/Pedagogy

S. No.	Item No.	Existing	Recommendation /Action Taken
1	---	Classical modes of teaching and evaluating.	Conduction of online lectures and online quizzes was suggested.

6. Result Analysis: --- Summary of Result Analysis of the students' performance in the semester examination was presented and it was suggested that the course instructors should conduct remedial classes for the students whose performance was not found satisfactory.

7. Feedback Analysis: --- Analysis was performed based on summary of already collected feedback from students regarding programme objective and programme outcome. It was suggested that feed back should also be taken from the concerned parents.

8. Any other issue with the permission of the Chair: ----N/A

The meeting concluded with a vote of thanks to the chair.

Date of the Next Meeting: to be decided and conveyed later

(Chairman)

Encl.: Recommended Curriculum, syllabus and evaluation scheme is attached for consideration and approval.

CC:
1. Dean Academics Office
2. Registrar Office

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

Program: M.Sc. (Ag.) Horticulture

Report on Feedback on Curriculum by Stakeholders (2018-2019)

- Capacity building programmes may be organized for staff.
- Library facilities must be augmented to meet the current requirement of the students to enable efficient learning.
- The faculty suggested that research quality may be enhanced by collaborative research with other institutions in India.

Approved

BoS Chairman

Approved

Dean

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

Program: M.Sc. (Ag.) Horticulture

Action Taken Report based on Feedback at BoS held on 16.06.2018

- Capacity building programme were organized for teaching staff.
- Our library was equipped with SCOPUS knowledge portal, NAAS rated Journals, Reference books and reprography facilities.
- MoUs/agreements were signed with ICAR Institutions to enrich research experience and facilitate staff and students exchange programme.

BoS Chairman

Dean

Date-12-06-2018

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences and Allied Industries

EVALUATION SCHEME

&

SYLLABUS

Date-12-06-2018

MSH-101 Medicinal and Aromatic Plants

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production technology of medicinal and aromatic crops.

Detail Contents

Unit 1:	**30%**
Unit 2:	**35%**
Unit 3:	**35%**

UNIT I

History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance of medicinal and aromatic plants in human health, national economy and related industries, classification of medicinal and aromatic plants according to botanical characteristics and uses.

UNIT II

Climate and soil requirements; cultural practices; yield and important constituents of medicinal plants (Isabgol, Rauwolfia, Poppy, Aloe vera, Satavar, Stevia, Safed Musli, Kalmegh, Asaphoetida, Nux vomica, Rosadle etc).

UNIT III

Climate and soil requirements; cultural practices; yield and important constituents of aromatic plants (Citronella, Palmarosa, Mentha, Basil, Lemon grass, Rose, Patchouli, Geranium etc.).

Practical

- Identification of crops based on morphological and seed characteristics
- Raising of herbarium of medicinal, aromatic and under-utilized plants
- Quality characters in medicinal and aromatic plants
- Methods of analysis of essential oil and other chemicals of importance in medicinal and aromatic plants

Course Learning Outcomes (CLO)

- Identify the importance of medicinal plant crops.
- Identify the importance of aromatic plant crops.
- Apply knowledge of intercultural practices for improving yield of medicinal and aromatic plants.
- Identify the export potential and industrial support for medicinal and aromatic plants.

Mapping of course outcome with programme outcome and programme specific outcome

Date-12-06-2018

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	2	3	1	-	-	-	-	2	-	-
CO_2	-	2	-	3	-	3	3	-	1	2
CO_3	2	1	3	-	-	3	3	1	1	3
CO_4	3	-	1	2	-	-	-	3	1	2
Average	2.33	2.00	2.00	2.5	-	3	3	3	1	2.33

Text books:-

N. Kumar, Introduction to spices, plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-

Jain SK. 2000. Medicinal Plants. National Book Trust.

Atal CK & Kapur BM. 1982. Cultivation and Utilization of Aromatic Plants. RRL, CSIR, Jammu.

Kurian A & Asha Sankar M. 2007. Medicinal Plants. Horticulture Science Series, New India Publ. Agency.

Signature:-

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MSH-102 Plant Propagation and Nursery Management

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production of new plants and nursery management for horticultural crops

Detail Contents

Date-12-06-2018

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

UNIT I

Introduction, life cycle in plants, cellular basis for propagation, apomixes, polyembrony, germination process and environmental factors affecting it, quality of seeds, seed dormancy, treatments to facilitate germination, seed testing, diseases control during germination.

UNIT II

Clone and phase variation, genetic variation in asexually propagated plants, production and maintenance of pathogen free clones, cutting- anatomical, physiological and biochemical aspects of root initiation in cuttings, types of cuttings, use of bioregulators, mist systems of rooting cuttings, planting and care, layering- principles and methods.

UNIT III

Reasons for grafting and budding, categories of root-stock, formation of graft and bud union, factors influencing the healing of graft union, limits of grafting, graft incompatibility, scion-stock relationship, techniques of grafting, budding and layering.

UNIT IV

Micro propagation: Introduction, objectives, merits and demerits, facilities and equipments, aseptic techniques and use of antibiotics, media preparation, micro propagation techniques- clonal propagation, direct orgamagenesis, embryogenesis, meristem culture culture, micro grafting, hardening, packing and transport of micropropagules.

UNIT V

Nursery Management: types of nursery, location, components planning and layout of a commercial nursery, structures, media mixtures, nursery management practices

Practical-

Practice of grafting, budding, cutting and layering, anatomical studies ofrooting of cuttings and grafting union, planning and layout for commercial nursery, sample seed testing, use of bioregulators in propagation, sterilization of equipments and laboratory, media preparation, selection and preparation of explants, meristem culture and micro grafting, planning and layout of experiments on various aspects of propagation. Visit to tissue culture labs and nurseries.

Course Learning Outcomes (CLO)

- State cellular basis of fruit propagation.
- Identify basis of seed dormancy regulation.
- Describe various types of propagation techniques of fruit crops.
- Describe micro-propagation techniques for mass multiplication of fruit crops.
- Develop nursery plan for the propagation of different fruit crops.

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PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	2	1	-	-	3	3	1	1	2
CO_3	3	1	3	-	-	3	3	1	1	3
CO_4	3	-	2	2	-	2	-	3	1	2
CO_5	3	1	2	1	2	2	-	-	2	3
Average	3	1.5	1.8	1.5	2	2	3	1.75	1.25	2.50

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Singh S, Shivankar VJ, Srivastava AK & Singh IP. (Eds.). 2004. Advances in Citriculture. Jagmander Book Agency.

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Date-12-06-2018

MSH-103 TROPICAL AND DRY LAND FRUIT PRODUCTION

L	T	P	CR
2	1	2	3

Course objective:- To impart basic knowledge about the importance and management of tropical and dry land fruits grown in India.

Detail Contents

Unit 1: **20%**

Unit 2: **20%**

Unit 3: **20%**

Unit 4: **20%**

Unit 5: **20%**

Theory

Commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bioregulators, abiotic factors limiting fruit production, physiology of flowering, pollination fruit set and development, honeybees in cross pollination, physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones(AEZ) and industrial supports

UNIT I

Mango and Banana

UNIT II

Citrus and Papaya

UNIT III

Guava, Sapota and Jackfruit Aonla, Pomegranate

UNIT IV

Pineapple, Annonas and Avocado

UNIT V

Phalsa and Ber, minor fruits of tropics

Practical

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Abhishek

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Identification of important cultivars, observations on growth and development, practices in growth regulation, malady diagnosis, analyses of quality attributes, visit to tropical and arid zone orchards, Project preparation for establishing commercial orchards.

Course Learning Outcomes (CLO)

- Identify the importance of tropical and dry land fruit crops.
- Describe production practices for commercial tropical and dry land fruits.
- Describe various management practices for tropical and dryland fruits.
- Define the physiology of tropical and dryland fruit crops.
- Enumerate post harvest management practices in various tropical and dryland fruits.
- Identify the export potential and industrial support for tropical and dryland fruits.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	-	3	2	-	2	2	1	-
CO_2	-	2	1	-	-	3	3	-	1	2
CO_3	3	1	3	-	-	2	3	1	-	-
CO_4	3	-	-	2	-	-	-	3	1	2
CO_5	1	-	2	-	2	-	-	-	2	3
CO_6	-	2	-	-	1	-	-	2	-	-
Average	2.00	1.66	2.00	2.5	1.66	2.5	2.66	2	1.25	2.33

Text books:-

Fruits -Tropical and Subtropical. Naya Udyog. Chadha KL & Pareek OP. 1996. (Eds.).

Reference books:

Bose TK, Mitra SK & Rathore DS. (Eds.). 1988. Temperate Fruits - Horticulture. Allied Publ. Bose TK, Mitra SK & Sanyal D. 2001. (Eds.).
Advances in Horticulture. Vols. II-
IV. Malhotra Publ. House. Nakasone HY & Paul RE. 1998. Tropical Fruits. CABI.
Peter KV. 2008. (Ed.). Basics of Horticulture. New India Publ. Agency.
Pradeepkumar T, Suma B, Jyothibhaskar & Satheesan KN. 2008.
Management of Horticultural Crops. Parts I, II. New India Publ. Agency.
Radha T & Mathew L. 2007.

Date-12-06-2018

Signature:-

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MSR-101 Research Methodology

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge about the research programmed.

Detail Contents

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**40%**

UNIT I

Project formulation, Problem identification, formulation of objectives and technical program.

UNIT II

Data collection, data interpretation and deriving inferences and conclusions.

UNIT III

Literature collection, Review writing, Research article writing, Technical report preparation, Research abstracting, Research Scheme proposal.

Course Learning Outcomes (CLO)

- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

Date-12-06-2018

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	2	1	2	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	3	-	1	3
Average	2.6	1.33	1.5	2	2	2	2	1.5	1	2.5

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Text books:-

Agarwal. S.K. 2003. Research Methodology. International Book Distributors, Dehradun.

References

Gupta. R.K. 2001. Research Methodology. IBH publications, New Delhi.

Gopal Lal Jain. 2003. Research Methodology – Methods, tools and techniques. Mangal Deep Publication, Jaipur

Singh, V.P. 2003. Research Methodology. Scientific for Publication, New Delhi.

Kothari, C.R. 1997. Research Methodology – Methods and Teaching. Pub: Wishwa Prakashm, New Delhi.

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MSA- 104: Computer Orientation

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge of computer about the research programmed.

Date-12-06-2018

Detail Contents

Unit 1: **50%**

Unit 2: **50%**

Theory

Unit 1

Introduction to multi programming and time sharing computers - Login and creation of files - Introduction to structured programming with reference to BASIC - Variables and constants, complex, double precision, logical, character –

Unit 2

Arithmetic expressions, arrays, control statements (DO, IF, Computed GOTO) - Functions and subroutines - I/O statements - Elementary programming of algorit

Practical

Loading Windows and other features in Windows. MS Word – creation, editing of a document. Using features like underlining, bold, italics, spell check etc. and printing. Creation of excel sheet and processing for statistical analysis. Creation of a database in access - Mstat – creation of a data file. Internet – getting connected and email Internet – retrieval of information.

Course Learning Outcomes (CLO)

- Apply the computer system in agricultural experimental designs.
- To option basic output from the computer.
- TO Option knowledge about MS office.
- TO Option knowledge about DOS.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	-	-	1	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	3.5	1.33	1	2	2	2	2.5	2	1.33	2

Text books:- Chris Lewis, Essential Tips: Using the Internet

References

Chris Lewis, Essential Tips: Using the Internet

Date-12-06-2018

Gene Weisskopf, ABCs of Excel 97
Kenneth N.Berk, Introductory Statistics with Systat
Kris N, Advanced Data Analysis with Systat
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MSH- 201 Plantation crop production

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the importance and production technology of plantation crops grown in India.

Detail Contents

Unit 1: **35%**

Unit 2: **30%**

Unit 3: **35%**

Theory:- Detailed study of origin and distribution, economic importance, taxonomy, classification, varieties, climatic and soil requirements, propagation and nursery techniques, selection of mother plant, seed selection, maintenance of nursery. Methods of planting , cultural practices, nutrition and water requirements, plant protection and managements, factors affecting growth, flowering etc; harvest indices and harvesting; quality evaluation and grading of.

Unit 1: coconut, arecanut, rubber

Unit 2: oil palm, cocoa, tea

Unit 3: cashewnut, coffee

Practical:-Studies on botanical characters, propagation aspects, layout and planting, cultural aspects, visit to important plantations, identification of pests, diseases and other problem.

Course Learning Outcomes (CLO)

- Discuss production technology of plantation crops..
- Discuss the postharvest management of plantation crops.
- Understand the industrial and export potential of fruit crops.

S P Singh
Abhishek
Krishna

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Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	2	-	3	-	-	1	3
Average	2	1.33	1.0	2.5	2	3	3	1.5	1	2.5

Text books:- :-N. Kumar, Introduction to spices,plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-Kurian A & Peter KV. 2007. Commercial Crops Technology. New India Publ. Agency

Signature:-

1. ..... S.P. singh
2. ..... Krishnan
3. ..... Abhishek
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Date-12-06-2018

MSH-202: Seed Production Technology of Vegetable Crops

L	T	P	Cl
3	0	2	4

Course objective:- To educate principles and methods of quality seed and planting material production in vegetable crops.

Detail Contents

Unit 1:	**15%**
Unit 2:	**45%**
Unit 3:	**20%**
Unit 4:	**20%**

Theory:

Unit 1

History, importance and scope of seed production and seed industry in India

Unit 2

Seed production technology encompassing land requirement, isolation requirement, cultural practices, plant protection measures, removal of off types, diseased and insect pest infested plants, harvesting and extraction of seeds) for different categories of seeds *viz.* breeder seed, foundation seed, certified seed and truthfully labeled seed of O. P. variety for cole corps, solanaceous vegetables, leguminous crops, leafy vegetables, cucurbitaceous vegetables, okra and onion.

Unit 3

Hybrid seed production technology for tomato, brinjal, chilli, okra, cucumber, bottle gourd, bitter gourd, sponge gourd, ridge gourd, pumpkin etc.

Unit 4

Post harvest management in seed production of vegetable crops including cleaning, drying, screening, grading, packing and storage of seeds. Economics of seed production technology

Practical

Demonstration of various practices in seed production technology of vegetable crops. Handling of various equipments and machinery for seed production Visit of seed processing and storage units.

Course Learning Outcomes (CLO)

- Describe the production technology of Vegetables seed.
- Analyze the difference between seed and grain..
- Devise cropping scheme and plan for commercial vegetable seed production.
- Describe the production technology of hybrid seed production Vegetables.

Mapping of course outcome with programme outcome and programme specific outcome

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PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	2	3	3	1	1	2
CO_3	3	1	-	3	-	1	-	-	1	3
CO_4	1	-	-	2	1	-	2	2	2	1
Average	1.66	1.66	1.0	1.66	1.66	2	2.5	2.5	1.33	2

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Text books:-

Agrawal PK & Dadlani M. (Eds.). 1992. Techniques in Seed Science and Technology. South Asian Publ.

Reference books:-

Fageria MS, Arya PS & Choudhary AK. 2000. Vegetable Crops: Breeding and Seed Production. Vol. I. Kalyani.

Rajan S & Baby L Markose. 2007. Propagation of Horticultural Crops. New India Publ. Agency.

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MSH-203 Principals of fruit production

L	T	P	CR
3	0	1	4

Course objective:- Understanding the principles of biodiversity and strategies in germplasm conservation of fruit crops.

Detail Contents

Unit 1: 25%
Unit 2: 25%
Unit 3: 25%

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Unit 4: **25%**
Theory:

Unit 1

Importance of fruit production. Soil and climate in relation to fruit production. Water requirement, uptake, movement and influence on root distribution, response of plants to varying soil moisture regimes, pathological conditions associated with excess and deficiencies in soil moisture;

Unit 2

Irrigation methods. Soil management methods and techniques of moisture conservation. Temperature relations, winter injury and hardiness. Light relations- thermal, photosynthetic and phototropic influences. Plant nutrients, absorption, role, deficiencies and surpluses, application of fertilizers. Phases of plant growth- initiation of reproductive processes and fruiting habits.

Unit 3

Systems of planting, high density orcharding and inter and cover cropping in fruit production. Concepts in Hi-tech horticulture. Pruning and training methods, season and physiology. Flowering physiology and factors involved in fruit-set, unfruitfulness, fruit-growth and development. Important physiological disorders and their management.

Unit 4

Alternate bearing – causes and remedies. Maturity indices, harvesting, packing, transport and marketing systems of major fruit and plantation crops.

Practical

Study of soil characters in relation to growing of fruits and plantation crops. Soil moisture determination. Root distribution pattern of major crops. Systems of irrigation. Methods and placement of plant nutrients. Methods of pruning and training adopted in different crops. Floral biology, fruit-set, fruit-growth and fruit drop. Studies on maturity indices and techniques of harvesting. Physiological disorders of major fruit and plantation crops. Survey of local fruit markets to study grading, packing and marketing of different crops.

Course Learning Outcomes (CLO)

- Identify the importance of fruit crops.
- Describe system of planting fruit crops.
- Describe various post harvest management practices for fruit crops.
- Define the physiology of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	-	3	-	3	3	3	1	2
CO_3	3	1	3	2	2	1	-	2	-	3

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CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.00	2	2.5	2.00	2	2.5	2	1.5	2.00

Text books

Ranganna S. 1997. Hand Book of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

Reference books:-

Bose TK, Mitra SK & Sanyol D. (Eds.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog

Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

1. .... S.P. Singh

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Abhishek

MSH-204: PRODUCTION TECHNOLOGY OF ORNAMENTAL PLANT

L	T	P	CR
2	0	1	3

Course objective:- To impart basic knowledge about the importance and produc flower grown in India.

Detail Contents

Unit 1: **25%**
Unit 2: **25%**
Unit 3: **25%**
Unit 4: **25%**

Theory:-

Unit 1

Present status of Floriculture in India and its potential in the global market. Photoperiod, vernalization and growth regulators in floriculture.

Unit 2

Commercial production of field flowers, bulbous, foliage and pot plants. Specific problems concerning production of roses, chrysanthemum, carnation, jasmine, marigold and other minor cut flower crops. Orchid and anthurium culture.

Unit 3

Production of essential oil yielding flowers. Project formulation and evaluation.

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Practical:-Identification of commercial cultivars. Cultural practices, harvesting, grading, packing and marketing of cut flowers, foliage and pot plants including roses, chrysanthemum, orchid, anthurium and marigold. Project formulation.

Course Learning Outcomes (CLO)

- Identify the important flower crops.
- Discuss production technology of flower crops.
- Apply knowledge of intercultural practices for improving yield of flower plants.
- Identify the export potential and industrial support for flower cops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	3	3	-	3	3	3	1	2
CO_3	3	1	-	3	-	1	-	2	3	3
CO_4	1	-	2	2	2	2	2	2	2	1
Average	2.33	2.00	2.00	2.66	2.00	2.00	2.5	2.25	2.00	2.00

Text books

Bose TK, Maiti RG, Dhua RS & Das P. 1999. Floriculture and Landscaping. Naya Prokash.

Reference books

Randhawa GS & Mukhopadhyay A. 1986. Floriculture in India. Allied Publ. Valsalakumari *et al*. 2008. Flowering Trees. New India Publ. Agency. Woodrow MG.1999.

Gardening in India. Biotech Books.

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MAS -205 Experimental Design

L	T	P	CR
3	1	2	4

Date-12-06-2018

Course objective:- To impart basic knowledge about the importance and use of it in research program.

Detail Contents

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**30%**

UNIT I

Need for designing of experiments, characteristics of a good design. Basic principles of designs-randomization, replication and local control, Uniformity trials, size and shape of plots and blocks.

UNIT II

Analysis of variance; Completely randomized design, randomized block design and Latin square design, Factorial experiments, (symmetrical as well as asymmetrical), orthogonality and partitioning of degrees of freedom, Confounding in symmetrical factorial experiments, Factorial experiments with control treatment, Split plot and strip plot designs.

UNIT III

Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications concepts, randomisation procedure, analysis and interpretation of results. Response surfaces. Experiments with mixtures.

Practical

1. Uniformity trial data analysis, formation of plots and blocks.
2. Fairfield Smith Law; Analysis of data obtained from CRD, RBD, LSD.
3. Analysis of factorial experiments without and with confounding.
4. Analysis with missing data; Split plot and strip plot designs; Transformation of data.
5. Analysis of resolvable designs; Fitting of response surfaces.
6. Analysis of field data using statistical software.

Course Learning Outcomes (CLO)

- Define the basics of statistical theory used in agriculture.
- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-

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CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	**2.33**	**2.33**	**1.00**	**2.00**	**2.50**	**2.50**	**2.50**	**1.50**	**2.25**	**2.00**

Text books

Cochran WG & Cox GM. 1957. Experimental Designs.

Reference Books

1. 2nd Ed. John Wiley. 2. Dean AM & Voss D. 1999. Design and Analysis of Experiments. Springer.
2. Federer WT. 1985. Experimental Designs. MacMillan.
3. Fisher RA. 1953. Design and Analysis of Experiments. Oliver & Boyd.
4. Nigam AK & Gupta VK. 1979. Handbook on Analysis of Agricultural Experiments. IASRI Publ.
5. Pearce SC. 1983. The Agricultural Field Experiment: A Statistical Examination of Theory and Practice. John Wiley.
6. Design Resources Server: www.iasri.res.in/design

Signature:-

1. ..... S.P. Singh
2. ..... Krishna
3. ..... Vaw
4. ..... Abhishek

MSH- 301 PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS

L	T	P	CR
3	1	2	4

Course objective:- To teach production technology of warm season vegetables.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Date-12-06-2018

Factors affecting quality seed production. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybirds, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, economics of crop production and seed production of :

UNIT - I

Tomato, eggplant, hot and sweet peppers

UNIT - II

Okra, beans (French bean, Indian bean and cluster bean), cowpea

UNIT - III

Cucurbitaceous crops

UNIT - IV

Tapioca, sweet potato and colosia.

UNIT - V

Green leafy warm season vegetables

Practical

Cultural operations (fertilizer application, sowing, mulching, irrigation, weed control) of summer vegetable crops and their economics; study of physiological disorders and deficiency of mineral elements, preparation of cropping schemes for commercial farms; experiments to demonstrate the role of mineral elements, physiological disorders; plant growth substances and herbicides; seed extraction techniques; identification of important pests and diseases and their control; maturity standards; economics of warm season vegetable crops.

Course Learning Outcomes (CLO)

- Discuss the importance and production technology of warm season vegetables.
- Enumerate physiological disorders and their management of warm season vegetables.
- Experiment different intercultural operations in warm season vegetables.
- Describe harvesting indices and methods in warm season vegetables.
- Identify and manage biotic and abiotic factors causing problems in crop production.

Mapping of course outcome with programme outcome and programme specific outcome

S.P. Singh

Date-12-06-2018

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	3	3	-	3	3	1	1	2
CO_3	3	3	1	1	-	2	3	-	3	3
CO_4	2	2	-	2	3	3	2	3	2	1
CO_5	2	1	3	-	2	-	-	3	-	-
Average	2.5	1.8	2.00	2.00	2.33	2.66	2.66	2.25	2.00	2.00

Text books:- Bose TK & Som MG. (Eds.). 1986. Vegetable Crops in India. Naya Prokash.

Reference books:-

- Bose TK & Som MG. (1986) Vegetable Crops in India. Naya Prokash, Calcutta
- Bose TK. Kabir J. Maity TK, Parthasarathy VA & Som MG. (2003). Vegetable Crops. Vols. I- III. Naya udyog.
- Bose TK, Som MG & Kabir J. (2002). Vegetable Crops. Naya Prokash, Kolkata.
- Brown HD & Hutchison CS. Vegetable Science. JB Lippincott Co.
- Chadha KL & Kalloo G. (1934-94), Advances in Horticulture Vols. V-X, Malhotra Publ. House, New Delhi
- Chadha KL. (2002). Hand Book of Horticulture. ICAR, New Delhi.
- Chauhan DVS. (1986). Vegetable Production in India. Ram Prasad & Sons.
- Decoteau DR. (2000). Vegetable Crops. Prentice Hall. New Delhi.
- Edmond JB, Musser AM & Andrews FS. (1964). Fundamentals of Horticulture. Blakiston Co.

Signature:-

1. ..... G.P. singh
2. ..... Krishnadev
3. ..... Ambedkar
4. ..... Abhishek

MSH- 302 Tropical and Sub-Tropical Fruits

L	T	P	CR
3	1	2	4

Date-12-06-2018

Course objective:- To impart basic knowledge about the importance and management of subtropical and temperate fruits grown in India

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**30%**
Unit 4:	**30%**

Theory:

UNIT - I

Horticultural classification of fruits including genome classification. Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning.

UNIT - II

Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Physiological disorders. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, bael, banana, grapes, citrus, papaya, sapota, guava, pineapple, jackfruit, avocado, mangosteen, litchi, carambola, durian and passion fruit.

UNIT – III

Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures. Seediness and kokkan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production.

UNIT - IV

Rainfed horticulture, importance and scope of arid and semi-arid zones of India. Characters and special adaptation of crops: ber, aonla, annona, jamun, wood apple, bael, pomegranate, carissa, date palm, phalsa, fig, west Indian cherry and tamarind.

Practical:

Description and identification of varieties based on flower and fruit morphology in above crops. Training and pruning of grapes, mango, guava and citrus. Selection of site and planting system, pre-treatment of banana suckers, desuckering in banana, sex forms in papaya. Use of plastics in fruit production. Visit to commercial orchards and diagnosis of maladies. Manure and fertilizer application including bio-fertilizer in fruit crops, preparation and application of growth regulators in banana, grapes and mango. Seed production in papaya, latex extraction and preparation of crude papain. Ripening of fruits, grading and packaging, production economics for tropical and sub-tropical fruits. Mapping of arid and semi-arid zones of India. Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa, wood apple, West Indian cherry, tamarind, aonla, bael and annona.

Date-12-06-2018

Course Learning Outcomes (CLO)

- Describe the importance of tropical and subtropical fruit crops.
- Understand production management of tropical and subtropical fruit crops.
- Identify and resolve major biotic and abiotic factors limiting production of crops.
- Discuss the postharvest management of fruit crops.
- Understand the industrial and export potential of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	-	2	1	3	2	-	3	2	3	-
CO_2	2	2	-	3	-	3	3	3	1	2
CO_3	3	3	3	1	3	2	2	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	2
Average	2.00	2.00	2.33	1.5	2.5	2.5	2.50	2.00	2.25	2.33

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Chadha KL & Shikhamany SD. 1999. The Grape: Improvement, Production and Post-Ha
Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

1. ..... S. P. Singh
2. ..... Krishnan
3. ..... Abhishek
4. .....

MSH- 303 PRODUCTION TECHNOLOGY OF UNDEREXPLOITEDVEGETABLE CROPS

L	T	P	CR
2		1	2

Course objective:- To impart basic knowledge about the Underexploited vegetable.

Date-12-06-2018

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Introduction, botany and taxonomy, climatic and soil requirements,commercial varieties/hybrids, sowing/planting times and methods, seed rateand seed treatment, nutritional and irrigation requirements, interculturaloperations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and seed production of:

UNIT I

Asparagus, artichoke and leek

UNIT II

Brussels's sprout, Chinese cabbage, broccoli, kale and artichoke.

UNIT III

Amaranth, celery, parsley, parsnip, lettuce, rhubarb, spinach, basella, bathu(chenopods) and chekurmanis.

UNIT IV

Elephant foot yam, lima bean, winged bean, vegetable pigeon pea, jackbean and sword bean.

UNIT V

Sweet gourd, spine gourd, pointed gourd, Oriental pickling melon and littlegourd (kundru).

Practical

Identification of seeds; botanical description of plants; layout and planting;cultural practices; shortterm experiments of underexploited vegetables.

Course Learning Outcomes (CLO)

- Describe the importance of minor vegetables crop.
- Discuss the production technology of UNDEREXPLOITED VEGETABLE CROPS
- Discuss about post harvest operation of minor vegetables.
- Describe the plant protection.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	3	1	3	2	-	2	3	3

S.P. Singh Abhishek

Date-12-06-2018

CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.00	2.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books:- Bhat KL. 2001. Minor Vegetables - Untapped Potential. Kalyani. lndira P & Peter KV. 1984.

Reference books:-

Unexploited Tropical Vegetables. KeralaAgricultural University, Kerala. Peter KV. (Ed.). 2007-08. Underutilized and Underexploited HorticulturalCrops. Vols. I-IV. New India Publ. Agency. Rubatzky VE & Yamaguchi M. (Eds.). 1997. World Vegetables:Principles, Production and Nutritive Values. Chapman & Hall Srivastava U, Mahajan RK, Gangopadyay KK, Singh M &Dhillon BS.2001.Minimal Descriptors of Agri-Horticultural Crops. Part-II:Vegetable Crops. NBPGR, New Delhi.

Signature:-

1. .....
2. .....
3. .....
4. .....

MSH- 304 TECHNIQUES IN PLANT PROTECTION 3+0

L	T	P	CR
2	1	0	3

Course objective:- To keep abreast with latest developments and plant protection.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

UNIT I Pest control equipments, principles, operation, maintenance, selection, application of pesticides and biocontrol agents, seed dressing, soaking, root-dip treatment, dusting, spraying, application through irrigation water.

UNIT II

Soil sterilization, solarization, deep ploughing, flooding, techniques to check the spread of pests through seed, bulbs, corms, cuttings and cut flowers.

Date-12-06-2018

UNIT III

Use of light, transmission and scanning electron microscopy.

UNIT IV

Protein isolation from the pest and host plant and its quantification using spectrophotometer and molecular weight determination using SDS/PAGE.

UNIT V

Use of tissue culture techniques in plant protection. Computer application for predicting/forecasting pest attack and identification.

Course Learning Outcomes (CLO)

Understand how to control the pest population in field crop.
The application of pesticides and bio control agents.
Discuss about how to option molecular weight determination using SDS/PAGE.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
Average	**3.00**	**2.00**	**1.00**	**2.00**	**2.50**	**2.50**	**3**	**2.50**	**2.33**	**2.50**

Text books:- Alford DV. 1999. A Textbook of Agricultural Entomology.

Reference books:-

Blackwell Science, London. Crampton JM & Eggleston P. 1992.
Insect Molecular Science. Academic Press, London.

Abhishek
A.P.Singh

Date-12-06-2018

Signature:-

1. .....
2. .....
3. .....
4. .....

MSH- 305 PRINCIPLES OF INTEGRATED PEST MANAGEMENT 2+1

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the insect pest management in horticultural crops.

Detail Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Theory

UNIT I

History and origin, definition and evolution of various related terminologies.

UNIT II

Concept and philosophy, ecological principles, economic threshold concept, and economic consideration.

UNIT III

Tools of pest management and their integration- legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys;

UNIT IV

Political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost-benefit ratios and partial budgeting; case studies of successful IPM programmes.

Practical

Characterization of agro-ecosystems; sampling methods and factors affecting sampling; population estimation methods; crop loss assessmentdirect losses, indirect losses, potential losses, avoidable losses, unavoidable losses. Computation of EIL and ETL; crop modeling; designing and implementing IPM system.

S.P. Singh

Date-12-06-2018

Course Learning Outcomes (CLO)

Discuss about IPM for high production.
Discuss about tools of pest control.
Discuss about types of surveys.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	2	-	2	3	-
CO_2	1	1	-	3	-	3	3	3	1	2
CO_3	3	3	2	1	3	1	-	2	4	3
Average	2.33	2.00	1.50	2.00	2.50	3.00	3	3.5	2.66	2.50

Text books:- Dhaliwal GS & Arora R. 2003. Integrated Pest Management – Concepts and Approaches. Kalyani Publ., New Delhi.

Reference books:-

Dhaliwal GS, Singh R & Chhillar BS. 2006. Essentials of Agricultural Entomology. Kalyani Publ., New Delhi.

Flint MC & Bosch RV. 1981. Introduction to Integrated Pest Management. 1st Ed., Springer, New York.

Horowitz AR & Ishaaya I. 2004. Insect Pest Management: Field and Protected Crops. Springer, New Delhi.

Ignacimuthu SS & Jayaraj S. 2007. Biotechnology and Insect Pest Management. Elite Publ., New Delhi.

Metcalf RL & Luckman WH. 1982. Introduction of Insect Pest Management. John Wiley & Sons, New York.

Pedigo RL. 2002. Entomology and Pest Management. 4th Ed. Prentice Hall, New Delhi.

Norris RF, Caswell-Chen EP & Kogan M. 2002. Concepts in Integrated Pest Management. Prentice Hall, New Delhi.

Subramanyam B & Hagstrum DW. 1995. Integrated Management of Insects in Stored Products. Marcel Dekker, New York.

Signature:-

1. ..... S. P. Singh
2. ..... Abhishek

Rama University, Kanpur

Ref: RU/FASAI/HOR/04 **Dated:17-06-2019**

Minutes of Meeting

Boards of Studies M.Sc. (Ag.) Horticulture

Department of Horticulture

A meeting of Boards of Studies of Faculty of Agricultural Sciences and Allied Industries was held on 17-06-2019 in Director's Office. The following members were present:

1. Dr. S. P. Singh - Chairperson
2. Dr. K. K. Mishra - Member
3. Mr. Abhishek Tiwari - Member

The following members agreed to review the minutes in Kanpur.

1. Dr. V.K. Tripathi - External Member
2. Dr. A.K. Tiwari - External Member

Agenda:

1. Action Taken Report (ATR) on Minutes of Previous Meeting.

The BOS committee confirmed the minutes of the BOS meeting held on 12-06-2018.

2. Review of the existing programs and their curricula

S. No.	Item No.	Existing	Recommendation /Action Taken
1.	**Unit-1:MSH-101 Medicinal and Aromatic Plants**	The topic -History, -scope, -opportunities -and constraints in the cultivation and maintenance of medicinal and aromatic plants in India was not included into the syllabus.	The topic- History, - scope, -opportunities -and constraints in the cultivation and maintenance of medicinal and aromatic plants in India was included into the syllabus.
2.	**a. Practical: MAS -205 Experimental Design**	The topic- Analysis of field data using statistical software was not included into the syllabus	The topic- Analysis of field data using statistical software was included into the syllabus.
3.	**a. Unit IV: MSH 301 PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS**	The topic- -Toro and -cassava cultivation was not included into the syllabus.	The topic- -Toro and -cassava cultivation was included into the syllabus.

3. Recommendation on New courses/Short term training

S. No.	Item No.	Feedback from Faculty/Student	Recommendation /Action Taken
1		N/A	N/A

4. Consideration of the curricula of the new programs

S. No.	Item No.	Feedback from Faculty/subject experts/Industries	Recommendation /Action Taken
		N/A	N/A

5. Review of Teaching Process/Pedagogy

S. No.	Item No.	Existing	Recommendation /Action Taken
		N/A	N/A

6. Result Analysis: --- Summary of Result Analysis of the students' performance in the semester examination was presented and it was suggested that the course instructors should conduct remedial classes for the students whose performance was not found satisfactory.

7. Feedback Analysis: --- Analysis was performed based on summary of already collected feedback from students regarding programme objective and programme outcome. It was suggested that feed back should also be taken from the concerned parents.

8. Any other issue with the permission of the Chair: ----N/A

The meeting concluded with a vote of thanks to the chair.

Date of the Next Meeting: to be decided and conveyed later

(Chairman)

Encl.: Recommended Curriculum, syllabus and evaluation scheme is attached for consideration and approval.

CC:
1. Dean Academics Office
2. Registrar Office

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

Program: M.Sc. (Ag.) Horticulture

Report on Feedback on Curriculum by Stakeholders (2019-2020)

- The external experts reviewed the syllabus and suggested that more focus should be given on research based teaching. Learning strategies to expose the students the latest developments in research.
- Well equipped laboratory equipped with advanced equipment can be made available.
- The faculty suggested that Research activities must be strengthened by exchanging the ideas by conducting conferences.

S.P. Singh

BoS Chairman

S.P. Singh

Dean

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

Program: M.Sc. (Ag.) Horticulture

Action Taken Report based on Feedback at BoS held on 18.06.2019

- Departments organized talks by industrial experts and alumni. Industrial and research exposure in various research institutions were provided.
- A research outcome of the institution was enhanced by use of Advanced Research Laboratories, Department of Biotechnology.
- Enhanced research activities by conducting conference in the topics- National Conference on Technological Approaches for Enhancement of Employment and Income in Agriculture.

S. P. Singh

BoS Chairman

S. P. Singh

Dean

Dated: 17-06-2019

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences and Allied Industries

EVALUATION SCHEME

&

SYLLABUS

Dated: 17-06-2019

MSH-101 Medicinal and Aromatic Plants

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production technology of medicinal and aromatic crops.

Detail Contents

Unit 1:	**30%**
Unit 2:	**35%**
Unit 3:	**35%**

UNIT I

History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance of medicinal and aromatic plants in human health, national economy and related industries, classification of medicinal and aromatic plants according to botanical characteristics and uses.

UNIT II

Climate and soil requirements; cultural practices; yield and important constituents of medicinal plants (Isabgol, Rauwolfia, Poppy, Aloe vera, Satavar, Stevia, Safed Musli, Kalmegh, Asaphoetida, Nux vomica, Rosadle etc).

UNIT III

Climate and soil requirements; cultural practices; yield and important constituents of aromatic plants (Citronella, Palmarosa, Mentha, Basil, Lemon grass, Rose, Patchouli, Geranium etc.).

Practical

- Identification of crops based on morphological and seed characteristics
- Raising of herbarium of medicinal, aromatic and under-utilized plants
- Quality characters in medicinal and aromatic plants
- Methods of analysis of essential oil and other chemicals of importance in medicinal and aromatic plants

Course Learning Outcomes (CLO)

- Identify the importance of medicinal plant crops.
- Identify the importance of aromatic plant crops.
- Apply knowledge of intercultural practices for improving yield of medicinal and aromatic plants.
- Identify the export potential and industrial support for medicinal and aromatic plants.

S. P. Singh

Dated: 17-06-2019

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	2	3	1	-	-	-	-	2	-	-
CO_2	-	2	-	3	-	3	3	-	1	2
CO_3	2	1	3	-	-	3	3	1	1	3
CO_4	3	-	1	2	-	-	-	3	1	2
Average	2.33	2.00	2.00	2.5	-	3	3	3	1	2.33

Text books:-

N. Kumar, Introduction to spices, plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-

Jain SK. 2000. Medicinal Plants. National Book Trust.

Atal CK & Kapur BM. 1982. Cultivation and Utilization of Aromatic Plants. RRL, CSIR, Jammu.

Kurian A & Asha Sankar M. 2007. Medicinal Plants. Horticulture Science Series, New India Publ. Agency.

Signature:-

1. ..... B.P.Singh
2. ..... Krishna
3. ..... Abhishek
4. ..... V. Kumar

MSH-102 Plant Propagation and Nursery Management

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production of new plants and nursery management for horticultural crops

Detail Contents

Dated: 17-06-2019

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

UNIT I

Introduction, life cycle in plants, cellular basis for propagation, apomixes, polyembrony, germination process and environmental factors affecting it, quality of seeds, seed dormancy, treatments to facilitate germination, seed testing, diseases control during germination.

UNIT II

Clone and phase variation, genetic variation in asexually propagated plants, production and maintenance of pathogen free clones, cutting- anatomical, physiological and biochemical aspects of root initiation in cuttings, types of cuttings, use of bioregulators, mist systems of rooting cuttings, planting and care, layering- principles and methods.

UNIT III

Reasons for grafting and budding, categories of root-stock, formation of graft and bud union, factors influencing the healing of graft union, limits of grafting, graft incompatibility, scion-stock relationship, techniques of grafting, budding and layering.

UNIT IV

Micro propagation: Introduction, objectives, merits and demerits, facilities and equipments, aseptic techniques and use of antibiotics, media preparation, micro propagation techniques- clonal propagation, direct orgamagenesis, embryogenesis, meristem culture culture, micro grafting, hardening, packing and transport of micropropagules.

UNIT V

Nursery Management: types of nursery, location, components planning and layout of a commercial nursery, structures, media mixtures, nursery management practices

Practical-

Practice of grafting, budding, cutting and layering, anatomical studies ofrooting of cuttings and grafting union, planning and layout for commercial nursery, sample seed testing, use of bioregulators in propagation, sterilization of equipments and laboratory, media preparation, selection and preparation of explants, meristem culture and micro grafting, planning and layout of experiments on various aspects of propagation. Visit to tissue culture labs and nurseries.

Course Learning Outcomes (CLO)

- State cellular basis of fruit propagation.
- Identify basis of seed dormancy regulation.
- Describe various types of propagation techniques of fruit crops.
- Describe micro-propagation techniques for mass multiplication of fruit crops.
- Develop nursery plan for the propagation of different fruit crops.

V.K. S.P. Singh Abhishek

Dated: 17-06-2019

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	2	1	-	-	3	3	1	1	2
CO_3	3	1	3	-	-	3	3	1	1	3
CO_4	3	-	2	2	-	2	-	3	1	2
CO_5	3	1	2	1	2	2	-	-	2	3
Average	3	1.5	1.8	1.5	2	2	3	1.75	1.25	2.50

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Singh S, Shivankar VJ, Srivastava AK & Singh IP. (Eds.). 2004. Advances in Citriculture. Jagmander Book Agency.

Signature:-

1. ..... S.P. Singh
2. .....
3. .....
4. ..... Abhish

Dated: 17-06-2019

MSH-103 TROPICAL AND DRY LAND FRUIT PRODUCTION

L	T	P	CR
2	1	2	3

Course objective:- To impart basic knowledge about the importance and management of tropical and dry land fruits grown in India.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bioregulators, abiotic factors limiting fruit production, physiology of flowering, pollination fruit set and development, honeybees in cross pollination, physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones(AEZ) and industrial supports

UNIT I

Mango and Banana

UNIT II

Citrus and Papaya

UNIT III

Guava, Sapota and Jackfruit Aonla, Pomegranate

UNIT IV

Pineapple, Annonas and Avocado

UNIT V

Phalsa and Ber, minor fruits of tropics

Practical

Identification of important cultivars, observations on growth and development, practices in growth regulation, malady diagnosis, analyses of quality attributes, visit to tropical and arid zone orchards, Project preparation for establishing commercial orchards.

Course Learning Outcomes (CLO)

- Identify the importance of tropical and dry land fruit crops.
- Describe production practices for commercial tropical and dry land fruits.

S.P. Singh Abhishek

Dated: 17-06-2019

- Describe various management practices for tropical and dryland fruits.
- Define the physiology of tropical and dryland fruit crops.
- Enumerate post harvest management practices in various tropical and dryland fruits.
- Identify the export potential and industrial support for tropical and dryland fruits.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	-	3	2	-	2	2	1	-
CO_2	-	2	1	-	-	3	3	-	1	2
CO_3	3	1	3	-	-	2	3	1	-	-
CO_4	3	-	-	2	-	-	-	3	1	2
CO_5	1	-	2	-	2	-	-	-	2	3
CO_6	-	2	-	-	1	-	-	2	-	-
Average	2.00	1.66	2.00	2.5	1.66	2.5	2.66	2	1.25	2.33

Text books:-

Fruits -Tropical and Subtropical. Naya Udyog. Chadha KL & Pareek OP. 1996. (Eds.).

Reference books:

Bose TK, Mitra SK & Rathore DS. (Eds.). 1988. Temperate Fruits - Horticulture. Allied Publ. Bose TK, Mitra SK & Sanyal D. 2001. (Eds.).
Advances in Horticulture. Vols. II-
IV. Malhotra Publ. House. Nakasone HY & Paul RE. 1998. Tropical Fruits. CABI.
Peter KV. 2008. (Ed.). Basics of Horticulture. New India Publ. Agency.
Pradeepkumar T, Suma B, Jyothibhaskar & Satheesan KN. 2008.
Management of Horticultural Crops. Parts I, II. New India Publ. Agency.
Radha T & Mathew L. 2007.

Signature:-

1. .....
2. .....
3. .....

Dated: 17-06-2019

4. .....

MSR-101 Research Methodology

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge about the research programmed.

Detail Contents

Unit 1: **30%**

Unit 2: **30%**

Unit 3: **40%**

UNIT I

Project formulation, Problem identification, formulation of objectives and technical program.

UNIT II

Data collection, data interpretation and deriving inferences and conclusions.

UNIT III

Literature collection, Review writing, Research article writing, Technical report preparation, Research abstracting, Research Scheme proposal.

Course Learning Outcomes (CLO)

- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	2	1	2	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	3	-	1	3
Average	2.6	1.33	1.5	2	2	2	2	1.5	1	2.5

Text books:-

G.P. Singh

Krishnan

Abhishek

Dated: 17-06-2019

Agarwal. S.K. 2003. Research Methodology. International Book Distributors, Dehradun.

References

Gupta. R.K. 2001. Research Methodology. IBH publications, New Delhi.

Gopal Lal Jain. 2003. Research Methodology – Methods, tools and techniques. Mangal Deep Publication, Jaipur

Singh, V.P. 2003. Research Methodology. Scientific for Publication, New Delhi.

Kothari, C.R. 1997. Research Methodology – Methods and Teaching. Pub: Wishwa Prakashm, New Delhi.

Signature:-

1. ..... S.P. Singh
2. ..... Krishnakar
3. ..... Abhishek
4. ..... V. Kumar

MSA- 104: Computer Orientation

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge of computer about the research programmed.

Detail Contents

Unit 1: **50%**

Unit 2: **50%**

Theory

Unit 1

Introduction to multi programming and time sharing computers - Login and creation of files - Introduction to structured programming with reference to BASIC - Variables and constants, complex, double precision, logical, character –

Unit 2

Arithmetic expressions, arrays, control statements (DO, IF, Computed GOTO) - Functions and subroutines - I/O statements - Elementary programming of algorit

Practical

Loading Windows and other features in Windows. MS Word – creation, editing of a document. Using features like underlining, bold, italics, spell check etc. and printing. Creation of excel sheet and processing for statistical analysis. Creation of a database in access - Mstat – creation of a data file. Internet – getting connected and email Internet – retrieval of information.

Course Learning Outcomes (CLO)

- Apply the computer system in agricultural experimental designs.

Dated: 17-06-2019

- To option basic output from the computer.
- TO Option knowledge about MS office.
- TO Option knowledge about DOS.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	-	-	1	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	3.5	1.33	1	2	2	2	2.5	2	1.33	2

Text books:- Chris Lewis, Essential Tips: Using the Internet

References

Chris Lewis, Essential Tips: Using the Internet
Gene Weisskopf, ABCs of Excel 97
Kenneth N.Berk, Introductory Statistics with Systat
Kris N, Advanced Data Analysis with Systat

Signature:-

1. ..... S. P. Singh
2. ..... Krishnan
3. ..... Abhishek
4. .....

MSH- 201 Plantation crop production

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the importance and production technology of plantation crops grown in India.

Detail Contents

Dated: 17-06-2019

Unit 1: 35%

Unit 2: 30%

Unit 3: 35%

Theory:- Detailed study of origin and distribution, economic importance, taxonomy, classification, varieties, climatic and soil requirements, propagation and nursery techniques, selection of mother plant, seed selection, maintenance of nursery. Methods of planting , cultural practices, nutrition and water requirements, plant protection and managements, factors affecting growth, flowering etc; harvest indices and harvesting; quality evaluation and grading of.

Unit 1: coconut, arecanut, rubber

Unit 2: oil palm, cocoa, tea

Unit 3: cashewnut, coffee

Practical:-Studies on botanical characters, propagation aspects, layout and planting, cultural aspects, visit to important plantations, identification of pests, diseases and other problem.

Course Learning Outcomes (CLO)

- Discuss production technology of plantation crops..
- Discuss the postharvest management of plantation crops.
- Understand the industrial and export potential of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	2	-	3	-	-	1	3
Average	2	1.33	1.0	2.5	2	3	3	1.5	1	2.5

Text books:- :-N. Kumar, Introduction to spices,plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-Kurian A & Peter KV. 2007. Commercial Crops Technology. New India Publ. Agency

Signature:-

1. ..... S.P. Singh

Abhishek V.

Dated: 17-06-2019

2. .....

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4. .....

MSH-202: Seed Production Technology of Vegetable Crops

L	T	P	Cl
3	0	2	4

Course objective:- To educate principles and methods of quality seed and planting material production in vegetable crops.

Detail Contents

Unit 1:	**15%**
Unit 2:	**45%**
Unit 3:	**20%**
Unit 4:	**20%**

Theory:

Unit 1

History, importance and scope of seed production and seed industry in India

Unit 2

Seed production technology encompassing land requirement, isolation requirement, cultural practices, plant protection measures, removal of off types, diseased and insect pest infested plants, harvesting and extraction of seeds) for different categories of seeds *viz.* breeder seed, foundation seed, certified seed and truthfully labeled seed of O. P. variety for cole corps, solanaceous vegetables, leguminous crops, leafy vegetables, cucurbitaceous vegetables, okra and onion.

Unit 3

Hybrid seed production technology for tomato, brinjal, chilli, okra, cucumber, bottle gourd, bitter gourd, sponge gourd, ridge gourd, pumpkin etc.

Unit 4

Post harvest management in seed production of vegetable crops including cleaning, drying, screening, grading, packing and storage of seeds. Economics of seed production technology

Practical

Demonstration of various practices in seed production technology of vegetable crops. Handling of various equipments and machinery for seed production Visit of seed processing and storage units.

Course Learning Outcomes (CLO)

- Describe the production technology of Vegetables seed.
- Analyze the difference between seed and grain..
- Devise cropping scheme and plan for commercial vegetable seed production.
- Describe the production technology of hybrid seed production Vegetables.

S. P. Singh
Abhishek

Dated: 17-06-2019

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	2	3	3	1	1	2
CO_3	3	1	-	3	-	1	-	-	1	3
CO_4	1	-	-	2	1	-	2	2	2	1
Average	1.66	1.66	1.0	1.66	1.66	2	2.5	2.5	1.33	2

Text books:-

Agrawal PK & Dadlani M. (Eds.). 1992. Techniques in Seed Science and Technology. South Asian Publ.

Reference books:-

Fageria MS, Arya PS & Choudhary AK. 2000. Vegetable Crops: Breeding and Seed Production. Vol. I. Kalyani.

Rajan S & Baby L Markose. 2007. Propagation of Horticultural Crops. New India Publ. Agency.

Signature:-

1. ..... S.P Singh
2. ..... Abhishek
3. .....

MSH-203 Principals of fruit production

L	T	P	CR
3	0	1	4

Course objective:- Understanding the principles of biodiversity and strategies in germplasm conservation of fruit crops.

Detail Contents

Unit 1: 25%
Unit 2: 25%
Unit 3: 25%
Unit 4: 25%

Dated: 17-06-2019

Theory:

Unit 1

Importance of fruit production. Soil and climate in relation to fruit production. Water requirement, uptake, movement and influence on root distribution, response of plants to varying soil moisture regimes, pathological conditions associated with excess and deficiencies in soil moisture;

Unit 2

Irrigation methods. Soil management methods and techniques of moisture conservation. Temperature relations, winter injury and hardiness. Light relations- thermal, photosynthetic and phototropic influences. Plant nutrients, absorption, role, deficiencies and surpluses, application of fertilizers. Phases of plant growth- initiation of reproductive processes and fruiting habits.

Unit 3

Systems of planting, high density orcharding and inter and cover cropping in fruit production. Concepts in Hi-tech horticulture. Pruning and training methods, season and physiology. Flowering physiology and factors involved in fruit-set, unfruitfulness, fruit-growth and development. Important physiological disorders and their management.

Unit 4

Alternate bearing – causes and remedies. Maturity indices, harvesting, packing, transport and marketing systems of major fruit and plantation crops.

Practical

Study of soil characters in relation to growing of fruits and plantation crops. Soil moisture determination. Root distribution pattern of major crops. Systems of irrigation. Methods and placement of plant nutrients. Methods of pruning and training adopted in different crops. Floral biology, fruit-set, fruit-growth and fruit drop. Studies on maturity indices and techniques of harvesting. Physiological disorders of major fruit and plantation crops. Survey of local fruit markets to study grading, packing and marketing of different crops.

Course Learning Outcomes (CLO)

- Identify the importance of fruit crops.
- Describe system of planting fruit crops.
- Describe various post harvest management practices for fruit crops .
- Define the physiology of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	-	3	-	3	3	3	1	2
CO_3	3	1	3	2	2	1	-	2	-	3
CO_4	1	-	-	2	-	-	2	1	2	1

S. P. Singh Krishna Abhishek

Dated: 17-06-2019

Average	2.33	2.00	2	2.5		2	2.5	2	1.5	2.00

Text books

Ranganna S. 1997. Hand Book of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

Reference books:-

Bose TK, Mitra SK & Sanyol D. (Eds.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog

Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

1. ............S.P. Singh
2. ....[illegible]
3. ....[illegible]
4. ....Abhishek

MSH-204: PRODUCTION TECHNOLOGY OF ORNAMENTAL PLANT

L	T	P	CR
2	0	1	3

Course objective:- To impart basic knowledge about the importance and produc flower grown in India.

Detail Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Theory:-

Unit 1

Present status of Floriculture in India and its potential in the global market. Photoperiod, vernalization and growth regulators in floriculture.

Unit 2

Commercial production of field flowers, bulbous, foliage and pot plants. Specific problems concerning production of roses, chrysanthemum, carnation, jasmine, marigold and other minor cut flower crops. Orchid and anthurium culture.

Unit 3

Production of essential oil yielding flowers. Project formulation and evaluation.

Practical:-Identification of commercial cultivars. Cultural practices, harvesting, grading, packing and marketing of cut flowers, foliage and pot plants including roses, chrysanthemum, orchid, anthurium and marigold. Project formulation.

Dated: 17-06-2019

Course Learning Outcomes (CLO)

- Identify the important flower crops.
- Discuss production technology of flower crops.
- Apply knowledge of intercultural practices for improving yield of flower plants.
- Identify the export potential and industrial support for flower cops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	3	3	-	3	3	3	1	2
CO_3	3	1	-	3	-	1	-	2	3	3
CO_4	1	-	2	2	2	2	2	2	2	1
Average	2.33	2.00	2.00	2.66	2	2.00	2.5	2.25	2.00	2.00

Text books

Bose TK, Maiti RG, Dhua RS & Das P. 1999. Floriculture and Landscaping. Naya Prokash.

Reference books

Randhawa GS & Mukhopadhyay A. 1986. Floriculture in India. Allied Publ. Valsalakumari *et al*. 2008. Flowering Trees. New India Publ. Agency. Woodrow MG.1999.
Gardening in India. Biotech Books.

Signature:-

1. ..... S.P. Singh
2. ..... Krishna
3. ..... Abhishek
4. .....

Dated: 17-06-2019

MAS -205 Experimental Design

L	T	P	CR
3	1	2	4

Course objective:- To impart basic knowledge about the importance and use of it in research program.

Detail Contents

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**30%**

UNIT I

Need for designing of experiments, characteristics of a good design. Basic principles of designs-randomization, replication and local control, Uniformity trials, size and shape of plots and blocks.

UNIT II

Analysis of variance; Completely randomized design, randomized block design and Latin square design, Factorial experiments, (symmetrical as well as asymmetrical), orthogonality and partitioning of degrees of freedom, Confounding in symmetrical factorial experiments, Factorial experiments with control treatment, Split plot and strip plot designs.

UNIT III

Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications concepts, randomisation procedure, analysis and interpretation of results. Response surfaces. Experiments with mixtures.

Practical

1. Uniformity trial data analysis, formation of plots and blocks.
2. Fairfield Smith Law; Analysis of data obtained from CRD, RBD, LSD.
3. Analysis of factorial experiments without and with confounding.
4. Analysis with missing data; Split plot and strip plot designs; Transformation of data.
5. Analysis of resolvable designs; Fitting of response surfaces.
6. Analysis of field data using statistical software

Course Learning Outcomes (CLO)

- Define the basics of statistical theory used in agriculture.
- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

S.P. Singh
Abhishek
Krishna
V. Kumar

Dated: 17-06-2019

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.33	1.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books

Cochran WG & Cox GM. 1957. Experimental Designs.

Reference Books

1. 2nd Ed. John Wiley. 2. Dean AM & Voss D. 1999. Design and Analysis of Experiments. Springer.
2. Federer WT. 1985. Experimental Designs. MacMillan.
3. Fisher RA. 1953. Design and Analysis of Experiments. Oliver & Boyd.
4. Nigam AK & Gupta VK. 1979. Handbook on Analysis of Agricultural Experiments. IASRI Publ.
5. Pearce SC. 1983. The Agricultural Field Experiment: A Statistical Examination of Theory and Practice. John Wiley.
6. Design Resources Server: www.iasri.res.in/design

Signature:-

1. ..... S. P. Singh
2. ..... Krishnan
3. .....
4. .....

Dated: 17-06-2019

MSH- 301 PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS

L	T	P	CR
3	1	2	4

Course objective:- To teach production technology of warm season vegetables.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Factors affecting quality seed production. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties /hybirds, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, economics of crop production and seed production of :

UNIT - I

Tomato, eggplant, hot and sweet peppers

UNIT - II

Okra, beans (French bean, Indian bean and cluster bean), cowpea

UNIT - III

Cucurbitaceous crops

UNIT - IV

Tapioca, sweet potato and colosia,Taro and cassava

UNIT - V

Green leafy warm season vegetables

Practical

Cultural operations (fertilizer application, sowing, mulching, irrigation, weed control) of summer vegetable crops and their economics; study of physiological disorders and deficiency of mineral elements, preparation of cropping schemes for commercial farms; experiments to demonstrate the role of mineral elements, physiological disorders; plant growth substances and herbicides; seed extraction

S.P. Singh

Abhishek

Dated: 17-06-2019

techniques; identification of important pests and diseases and their control; maturity standards; economics of warm season vegetable crops.

Course Learning Outcomes (CLO)

- Discuss the importance and production technology of warm season vegetables.
- Enumerate physiological disorders and their management of warm season vegetables.
- Experiment different intercultural operations in warm season vegetables.
- Describe harvesting indices and methods in warm season vegetables.
- Identify and manage biotic and abiotic factors causing problems in crop production.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	3	3	-	3	3	1	1	2
CO_3	3	3	1	1	-	2	3	-	3	3
CO_4	2	2	-	2	3	3	2	3	2	1
CO_5	2	1	3	-	2	-	-	3	-	-
Average	**2.5**	**1.8**	**2.00**	**2.00**	**2.33**	**2.66**	**2.66**	**2.25**	**2.00**	**2.00**

Text books:- Bose TK & Som MG. (Eds.). 1986. Vegetable Crops in India. Naya Prokash.

Reference books:-

• Bose TK & Som MG. (1986) Vegetable Crops in India. Naya Prokash, Calcutta

• Bose TK. Kabir J. Maity TK, Parthasarathy VA & Som MG. (2003). Vegetable Crops. Vols. I- III. Naya udyog.

• Bose TK, Som MG & Kabir J. (2002). Vegetable Crops. Naya Prokash, Kolkata.

• Brown HD & Hutchison CS. Vegetable Science. JB Lippincott Co.

• Chadha KL & Kalloo G. (1934-94), Advances in Horticulture Vols. V-X, Malhotra Publ. House, New Delhi

• Chadha KL. (2002). Hand Book of Horticulture. ICAR, New Delhi.

• Chauhan DVS. (1986). Vegetable Production in India. Ram Prasad & Sons.

• Decoteau DR. (2000). Vegetable Crops. Prentice Hall. New Delhi.

• Edmond JB, Musser AM & Andrews FS. (1964). Fundamentals of Horticulture. Blakiston Co.

Signature:-

1. ..... G. P. Singh
2. .....
3. .....
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Dated: 17-06-2019

MSH- 302 Tropical and Sub-Tropical Fruits

L	T	P	CF
3	1	2	4

Course objective:- To impart basic knowledge about the importance and management of subtropical and temperate fruits grown in India

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**30%**
Unit 4:	**30%**

Theory:

UNIT - I

Horticultural classification of fruits including genome classification. Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning.

UNIT - II

Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Physiological disorders. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, bael, banana, grapes, citrus, papaya, sapota, guava, pineapple, jackfruit, avocado, mangosteen, litchi, carambola, durian and passion fruit.

UNIT – III

Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures. Seediness and kokkan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production.

UNIT - IV

Rainfed horticulture, importance and scope of arid and semi-arid zones of India. Characters and special adaptation of crops: ber, aonla, annona, jamun, wood apple, bael, pomegranate, carissa, date palm, phalsa, fig, west Indian cherry and tamarind.

Practical:

Description and identification of varieties based on flower and fruit morphology in above crops. Training and pruning of grapes, mango, guava and citrus. Selection of site and planting system, pre-treatment of banana suckers, desuckering in banana, sex forms in papaya. Use of plastics in fruit production. Visit to commercial orchards and diagnosis of maladies. Manure and fertilizer application including bio-fertilizer in fruit crops, preparation and application of growth regulators in banana, grapes and mango. Seed production in papaya, latex extraction and preparation of crude papain. Ripening of

Dated: 17-06-2019

fruits, grading and packaging, production economics for tropical and sub-tropical fruits. Mapping of arid and semi-arid zones of India. Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa, wood apple, West Indian cherry, tamarind, aonla, bael and annona.

Course Learning Outcomes (CLO)

- Describe the importance of tropical and subtropical fruit crops.
- Understand production management of tropical and subtropical fruit crops.
- Identify and resolve major biotic and abiotic factors limiting production of crops.
- Discuss the postharvest management of fruit crops.
- Understand the industrial and export potential of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	-	2	1	3	2	-	3	2	3	-
CO_2	2	2	-	3	-	3	3	3	1	2
CO_3	3	3	3	1	3	2	2	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	2
Average	2.00	2.00	2.33	1.5	2.5	2.5	2.50	2.00	2.25	2.33

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Chadha KL & Shikhamany SD. 1999. The Grape: Improvement, Production and Post-Ha
Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

1. ..... S.P. singh
2. ..... V.
3. .....
4. .....

Dated: 17-06-2019

MSH- 303 PRODUCTION TECHNOLOGY OF UNDEREXPLOITEDVEGETABLE CROPS

L	T	P	CR
2		1	2

Course objective:- To impart basic knowledge about the Underexploited vegetable.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Introduction, botany and taxonomy, climatic and soil requirements,commercial varieties/hybrids, sowing/planting times and methods, seed rateand seed treatment, nutritional and irrigation requirements, interculturaloperations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and seed production of:

UNIT I

Asparagus, artichoke and leek

UNIT II

Brussels's sprout, Chinese cabbage, broccoli, kale and artichoke.

UNIT III

Amaranth, celery, parsley, parsnip, lettuce, rhubarb, spinach, basella, bathu(chenopods) and chekurmanis.

UNIT IV

Elephant foot yam, lima bean, winged bean, vegetable pigeon pea, jackbean and sword bean.

UNIT V

Sweet gourd, spine gourd, pointed gourd, Oriental pickling melon and littlegourd (kundru).

Practical

Identification of seeds; botanical description of plants; layout and planting;cultural practices; shortterm experiments of underexploited vegetables.

Course Learning Outcomes (CLO)

- Describe the importance of minor vegetables crop.
- Discuss the production technology of UNDEREXPLOITED VEGETABLE CROPS
- Discuss about post harvest operation of minor vegetables.
- Describe the plant protection.

Dated: 17-06-2019

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	3	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.00	2.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books:- Bhat KL. 2001. Minor Vegetables - Untapped Potential. Kalyani. lndira P & Peter KV. 1984.

Reference books:-

Unexploited Tropical Vegetables. KeralaAgricultural University, Kerala. Peter KV. (Ed.). 2007-08. Underutilized and Underexploited HorticulturalCrops. Vols. I-IV. New India Publ. Agency. Rubatzky VE & Yamaguchi M. (Eds.). 1997. World Vegetables:Principles, Production and Nutritive Values. Chapman & Hall Srivastava U, Mahajan RK, Gangopadyay KK, Singh M &Dhillon BS.2001.Minimal Descriptors of Agri-Horticultural Crops. Part-II:Vegetable Crops. NBPGR, New Delhi.

Signature:-

1. ..... S.P. Singh
2. ..... Krishnan
3. .....
4. ..... Abhishek

MSH- 304 TECHNIQUES IN PLANT PROTECTION 3+0

L	T	P	CR
2	1	0	3

Course objective:- To keep abreast with latest developments and plant protection.

Detail Contents

Unit 1: 20%
Unit 2: 20%
Unit 3: 20%
Unit 4: 20%
Unit 5: 20%

Theory

Dated: 17-06-2019

UNIT I Pest control equipments, principles, operation, maintenance, selection, application of pesticides and biocontrol agents, seed dressing, soaking, root-dip treatment, dusting, spraying, application through irrigation water.

UNIT II

Soil sterilization, solarization, deep ploughing, flooding, techniques to check the spread of pests through seed, bulbs, corms, cuttings and cut flowers.

UNIT III

Use of light, transmission and scanning electron microscopy.

UNIT IV

Protein isolation from the pest and host plant and its quantification using spectrophotometer and molecular weight determination using SDS/PAGE.

UNIT V

Use of tissue culture techniques in plant protection. Computer application for predicting/forecasting pest attack and identification.

Course Learning Outcomes (CLO)

- Understand how to control the pest population in field crop.
- The application of pesticides and bio control agents.
- Discuss about how to option molecular weight determination using SDS/PAGE

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
Average	3.00	2.00	1.00	2.00	2.50	2.50	3	2.50	2.33	2.50

Text books:- Alford DV. 1999. A Textbook of Agricultural Entomology.

Reference books:-

Blackwell Science, London. Crampton JM & Eggleston P. 1992.

Insect Molecular Science. Academic Press, London.

Signature:-

1. ..... S.P. Singh
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4. .....

Dated: 17-06-2019

MSH- 305 PRINCIPLES OF INTEGRATED PEST MANAGEMENT 2+1

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the insect pest management in horticultural crops.

Detail Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Theory

UNIT I

History and origin, definition and evolution of various related terminologies.

UNIT II

Concept and philosophy, ecological principles, economic threshold concept, and economic consideration.

UNIT III

Tools of pest management and their integration- legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys;

UNIT IV

Political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost-benefit ratios and partial budgeting; case studies of successful IPM programmes.

Practical

Characterization of agro-ecosystems; sampling methods and factors affecting sampling; population estimation methods; crop loss assessmentdirect losses, indirect losses, potential losses, avoidable losses, unavoidable losses. Computation of EIL and ETL; crop modeling; designing and implementing IPM system.

Course Learning Outcomes (CLO)

Discuss about IPM for high production.
Discuss about tools of pest control
Discuss about types of surveys

Dated: 17-06-2019

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	2	-	2	3	-
CO_2	1	1	-	3	-	3	3	3	1	2
CO_3	3	3	2	1	3	1	-	2	4	3
Average	2.33	2.00	1.50	2.00	2.50	3.00	3	3.5	2.66	2.50

Text books:- Dhaliwal GS & Arora R. 2003. Integrated Pest Management – Concepts and Approaches. Kalyani Publ., New Delhi.

Reference books:-

Dhaliwal GS, Singh R & Chhillar BS. 2006. Essentials of Agricultural Entomology. Kalyani Publ., New Delhi.

Flint MC & Bosch RV. 1981. Introduction to Integrated Pest Management. 1st Ed., Springer, New York.

Horowitz AR & Ishaaya I. 2004. Insect Pest Management: Field and Protected Crops. Springer, New Delhi.

Ignacimuthu SS & Jayaraj S. 2007. Biotechnology and Insect Pest Management. Elite Publ., New Delhi.

Metcalf RL & Luckman WH. 1982. Introduction of Insect Pest Management. John Wiley & Sons, New York.

Pedigo RL. 2002. Entomology and Pest Management. 4th Ed. Prentice Hall, New Delhi.

Norris RF, Caswell-Chen EP & Kogan M. 2002. Concepts in Integrated Pest Management. Prentice Hall, New Delhi.

Subramanyam B & Hagstrum DW. 1995. Integrated Management of Insects in Stored Products. Marcel Dekker, New York.

Signature:-

1. ..... S. P. Singh
2. .....
3. .....
4. .....

Abhishek

Rama University, Kanpur

Ref: RU/FASAI/HOR/05 **Dated:16-03-2020**

Minutes of Meeting

Boards of Studies M.Sc. (Ag.) Horticulture

Department of Horticulture

A meeting of Boards of Studies of Faculty of Agricultural Sciences and Allied Industries was held on 17-03-2020 in Director's Office. The following members were present:

1. Dr. S. P. Singh - Chairperson
2. Dr. K. K. Mishra - Member
3. Mr. Abhishek Tiwari - Member

The following members agreed to review the minutes in Kanpur.

1. Dr. V.K. Tripathi - External Member
2. Dr. H. S. Shukla - External Member

Agenda:

1. Action Taken Report (ATR) on Minutes of Previous Meeting.

The BOS committee confirmed the minutes of the BOS meeting held on 12-06-2018.

2. Review of the existing programs and their curricula

S. No.	Item No.	Existing	Recommendation /Action Taken
1.	**Unit-1:MSH-101 Medicinal and Aromatic Plants**	The topic -History, -scope, -opportunities -and constraints in the cultivation and maintenance of medicinal and aromatic plants in India was not included into the syllabus.	The topic- History, - scope, -opportunities -and constraints in the cultivation and maintenance of medicinal and aromatic plants in India was included into the syllabus.
2.	**a. Practical: MAS -205 Experimental Design**	The topic- Analysis of field data using statistical software was not included into the syllabus	The topic- Analysis of field data using statistical software was included into the syllabus.
3.	**a. Unit IV: MSH 301 PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS**	The topic- -Toro and -cassava cultivation was not included into the syllabus.	The topic- -Toro and -cassava cultivation was included into the syllabus.

3. Recommendation on New courses/Short term training

S. No.	Item No.	Feedback from Faculty/Student	Recommendation /Action Taken
1		N/A	N/A

4. Consideration of the curricula of the new programs

S. No.	Item No.	Feedback from Faculty/subject experts/Industries	Recommendation /Action Taken
		N/A	N/A

5. Review of Teaching Process/Pedagogy

S. No.	Item No.	Existing	Recommendation /Action Taken
		N/A	N/A

6. Result Analysis: --- Summary of Result Analysis of the students' performance in the semester examination was presented and it was suggested that the course instructors should conduct remedial classes for the students whose performance was not found satisfactory.

7. Feedback Analysis: --- Analysis was performed based on summary of already collected feedback from students regarding programme objective and programme outcome. It was suggested that feed back should also be taken from the concerned parents.

8. Any other issue with the permission of the Chair: ----N/A

The meeting concluded with a vote of thanks to the chair.

Date of the Next Meeting: to be decided and conveyed later

(Chairman)

Encl.: Recommended Curriculum, syllabus and evaluation scheme is attached for consideration and approval.

CC:
1. Dean Academics Office
2. Registrar Office

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

Program: M.Sc. (Ag.) Horticulture

Report on Feedback on Curriculum by Stakeholders (2020-2021)

- The external experts suggested that Students need to be aware of industry exposure.
- As extension activities are part of the curriculum, more activities suiting the current needs were to be organized.
- The faculty suggested that Remote access can be provided to e-Journals.

S.P. Singh

BoS Chairman

S.P. Singh

Dean/Principal

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences & Allied Industries

Department of Horticulture

Program: M.Sc. (Ag.) Horticulture

Action Taken Report based on Feedback at BoS held on 16.03.2020

- Invited resource persons from industries were made to address the students.
- Observation of International Yoga Day, SWACCH BHARAT was carried out Techniques of Urban Agriculture, Personal Development, Skill Development, Self Defense Training and Disaster Management, General and Reproductive Health for Women.
- Proxy mediated remote access to e-Campus, e-Journals/database/e-books were provided.

BoS Chairman

Dean/Principal

Dated: 12-06-2020

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural Sciences and Allied Industries

EVALUATION SCHEME

&

SYLLABUS

Dated: 12-06-2020

MSH-101 Medicinal and Aromatic Plants

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production technology of medicinal and aromatic crops.

Detail Contents

Unit 1: **30%**

Unit 2: **35%**

Unit 3: **35%**

UNIT I

History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance of medicinal and aromatic plants in human health, national economy and related industries, classification of medicinal and aromatic plants according to botanical characteristics and uses.

UNIT II

Climate and soil requirements; cultural practices; yield and important constituents of medicinal plants (Isabgol, Rauwolfia, Poppy, Aloe vera, Satavar, Stevia, Safed Musli, Kalmegh, Asaphoetida, Nux vomica, Rosadle etc).

UNIT III

Climate and soil requirements; cultural practices; yield and important constituents of aromatic plants (Citronella, Palmarosa, Mentha, Basil, Lemon grass, Rose, Patchouli, Geranium etc.).

Practical

- Identification of crops based on morphological and seed characteristics
- Raising of herbarium of medicinal, aromatic and under-utilized plants
- Quality characters in medicinal and aromatic plants
- Methods of analysis of essential oil and other chemicals of importance in medicinal and aromatic plants

Course Learning Outcomes (CLO)

- Identify the importance of medicinal plant crops.
- Identify the importance of aromatic plant crops.
- Apply knowledge of intercultural practices for improving yield of medicinal and aromatic plants.
- Identify the export potential and industrial support for medicinal and aromatic plants.

S.P. Singh
Krishnan
Abhishek

Dated: 12-06-2020

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	2	3	1	-	-	-	-	2	-	-
CO_2	-	2	-	3	-	3	3	-	1	2
CO_3	2	1	3	-	-	3	3	1	1	3
CO_4	3	-	1	2	-	-	-	3	1	2
Average	2.33	2.00	2.00	2.5	-	3	3	3	1	2.33

Text books:-

N. Kumar, Introduction to spices, plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-

Jain SK. 2000. Medicinal Plants. National Book Trust.

Atal CK & Kapur BM. 1982. Cultivation and Utilization of Aromatic Plants. RRL, CSIR, Jammu.

Kurian A & Asha Sankar M. 2007. Medicinal Plants. Horticulture Science Series, New India Publ. Agency.

Signature:-

1. ..... S. P. Singh
2. ..... Brahmdeo
3. ..... V.
4. ..... Abhisha

MSH-102 Plant Propagation and Nursery Management

L	T	P	CR
3	1	2	4

Course objective:- To impart comprehensive knowledge about the production of new plants and nursery management for horticultural crops

Detail Contents

Dated: 12-06-2020

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

UNIT I

Introduction, life cycle in plants, cellular basis for propagation, apomixes, polyembrony, germination process and environmental factors affecting it, quality of seeds, seed dormancy, treatments to facilitate germination, seed testing, diseases control during germination.

UNIT II

Clone and phase variation, genetic variation in asexually propagated plants, production and maintenance of pathogen free clones, cutting- anatomical, physiological and biochemical aspects of root initiation in cuttings, types of cuttings, use of bioregulators, mist systems of rooting cuttings, planting and care, layering- principles and methods.

UNIT III

Reasons for grafting and budding, categories of root-stock, formation of graft and bud union, factors influencing the healing of graft union, limits of grafting, graft incompatibility, scion-stock relationship, techniques of grafting, budding and layering.

UNIT IV

Micro propagation: Introduction, objectives, merits and demerits, facilities and equipments, aseptic techniques and use of antibiotics, media preparation, micro propagation techniques- clonal propagation, direct orgamagenesis, embryogenesis, meristem culture culture, micro grafting, hardening, packing and transport of micropropagules.

UNIT V

Nursery Management: types of nursery, location, components planning and layout of a commercial nursery, structures, media mixtures, nursery management practices

Practical-

Practice of grafting, budding, cutting and layering, anatomical studies ofrooting of cuttings and grafting union, planning and layout for commercial nursery, sample seed testing, use of bioregulators in propagation, sterilization of equipments and laboratory, media preparation, selection and preparation of explants, meristem culture and micro grafting, planning and layout of experiments on various aspects of propagation. Visit to tissue culture labs and nurseries.

Course Learning Outcomes (CLO)

- State cellular basis of fruit propagation.
- Identify basis of seed dormancy regulation.
- Describe various types of propagation techniques of fruit crops.
- Describe micro-propagation techniques for mass multiplication of fruit crops.
- Develop nursery plan for the propagation of different fruit crops.

Dated: 12-06-2020

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	2	1	-	-	3	3	1	1	2
CO_3	3	1	3	-	-	3	3	1	1	3
CO_4	3	-	2	2	-	2	-	3	1	2
CO_5	3	1	2	1	2	2	-	-	2	3
Average	3	1.5	1.8	1.5	2	2	3	1.75	1.25	2.50

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Singh S, Shivankar VJ, Srivastava AK & Singh IP. (Eds.). 2004. Advances in Citriculture. Jagmander Book Agency.

Signature:-

1. ..... S.P. Singh
2. .....
3. ..... Abhishek
4. .....

Dated: 12-06-2020

MSH-103 TROPICAL AND DRY LAND FRUIT PRODUCTION

L	T	P	CR
2	1	2	3

Course objective:- To impart basic knowledge about the importance and management of tropical and dry land fruits grown in India.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bioregulators, abiotic factors limiting fruit production, physiology of flowering, pollination fruit set and development, honeybees in cross pollination, physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones(AEZ) and industrial supports

UNIT I

Mango and Banana

UNIT II

Citrus and Papaya

UNIT III

Guava, Sapota and Jackfruit Aonla, Pomegranate

UNIT IV

Pineapple, Annonas and Avocado

UNIT V

Phalsa and Ber, minor fruits of tropics

Practical

Identification of important cultivars, observations on growth and development, practices in growth regulation, malady diagnosis, analyses of quality attributes, visit to tropical and arid zone orchards, Project preparation for establishing commercial orchards.

Course Learning Outcomes (CLO)

- Identify the importance of tropical and dry land fruit crops.
- Describe production practices for commercial tropical and dry land fruits.

Abhishek S.P. Singh Abhishek

Dated: 12-06-2020

- Describe various management practices for tropical and dryland fruits.
- Define the physiology of tropical and dryland fruit crops.
- Enumerate post harvest management practices in various tropical and dryland fruits.
- Identify the export potential and industrial support for tropical and dryland fruits.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	-	3	2	-	2	2	1	-
CO_2	-	2	1	-	-	3	3	-	1	2
CO_3	3	1	3	-	-	2	3	1	-	-
CO_4	3	-	-	2	-	-	-	3	1	2
CO_5	1	-	2	-	2	-	-	-	2	3
CO_6	-	2	-	-	1	-	-	2	-	-
Average	2.00	1.66	2.00	2.5	1.66	2.5	2.66	2	1.25	2.33

Text books:-

Fruits -Tropical and Subtropical. Naya Udyog. Chadha KL & Pareek OP. 1996. (Eds.).

Reference books:

Bose TK, Mitra SK & Rathore DS. (Eds.). 1988. Temperate Fruits - Horticulture. Allied Publ. Bose TK, Mitra SK & Sanyal D. 2001. (Eds.).
Advances in Horticulture. Vols. II-
IV. Malhotra Publ. House. Nakasone HY & Paul RE. 1998. Tropical Fruits. CABI.
Peter KV. 2008. (Ed.). Basics of Horticulture. New India Publ. Agency.
Pradeepkumar T, Suma B, Jyothibhaskar & Satheesan KN. 2008.
Management of Horticultural Crops. Parts I, II. New India Publ. Agency.
Radha T & Mathew L. 2007.

Signature:-

1. ..... B.P. Singh
2. ..... Krishna
3. ..... Abhishek

Dated: 12-06-2020

4. .....

MSR-101 Research Methodology

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge about the research programmed.

Detail Contents

Unit 1: **30%**

Unit 2: **30%**

Unit 3: **40%**

UNIT I

Project formulation, Problem identification, formulation of objectives and technical program.

UNIT II

Data collection, data interpretation and deriving inferences and conclusions.

UNIT III

Literature collection, Review writing, Research article writing, Technical report preparation, Research abstracting, Research Scheme proposal.

Course Learning Outcomes (CLO)

- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	2	1	2	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	3	-	1	3
Average	2.6	1.33	1.5	2	2	2	2	1.5	1	2.5

Text books:-

S.P. Singh

Dated: 12-06-2020

Agarwal. S.K. 2003. Research Methodology. International Book Distributors, Dehradun.

References

Gupta. R.K. 2001. Research Methodology. IBH publications, New Delhi.

Gopal Lal Jain. 2003. Research Methodology – Methods, tools and techniques. Mangal Deep Publication, Jaipur

Singh, V.P. 2003. Research Methodology. Scientific for Publication, New Delhi.

Kothari, C.R. 1997. Research Methodology – Methods and Teaching. Pub: Wishwa Prakashm, New Delhi.

Signature:-

1. ..... S.P. Singh
2. .....
3. ..... Abhishek
4. .....

MSA- 104: Computer Orientation

L	T	P	CR
3	1	0	4

Course objective:- To impart basic knowledge of computer about the research programmed.

Detail Contents

Unit 1: **50%**

Unit 2: **50%**

Theory

Unit 1

Introduction to multi programming and time sharing computers - Login and creation of files - Introduction to structured programming with reference to BASIC - Variables and constants, complex, double precision, logical, character –

Unit 2

Arithmetic expressions, arrays, control statements (DO, IF, Computed GOTO) - Functions and subroutines - I/O statements - Elementary programming of algorit

Practical

Loading Windows and other features in Windows. MS Word – creation, editing of a document. Using features like underlining, bold, italics, spell check etc. and printing. Creation of excel sheet and processing for statistical analysis. Creation of a database in access - Mstat – creation of a data file. Internet – getting connected and email Internet – retrieval of information.

Course Learning Outcomes (CLO)

- Apply the computer system in agricultural experimental designs.

Dated: 12-06-2020

- To option basic output from the computer.
- TO Option knowledge about MS office.
- TO Option knowledge about DOS.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	1	-	1	-	-	1	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	3.5	1.33	1	2	2	2	2.5	2	1.33	2

Text books:- Chris Lewis, Essential Tips: Using the Internet

References

Chris Lewis, Essential Tips: Using the Internet
Gene Weisskopf, ABCs of Excel 97
Kenneth N.Berk, Introductory Statistics with Systat
Kris N, Advanced Data Analysis with Systat

Signature:-

1. ..... S.P. Singh
2. ..... Krishna
3. ..... V.K.
4. ..... Abhishek

MSH- 201 Plantation crop production

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the importance and production technology of plantation crops grown in India.

Detail Contents

Dated: 12-06-2020

Unit 1: 35%

Unit 2: 30%

Unit 3: 35%

Theory:- Detailed study of origin and distribution, economic importance, taxonomy, classification, varieties, climatic and soil requirements, propagation and nursery techniques, selection of mother plant, seed selection, maintenance of nursery. Methods of planting , cultural practices, nutrition and water requirements, plant protection and managements, factors affecting growth, flowering etc; harvest indices and harvesting; quality evaluation and grading of.

Unit 1: coconut, arecanut, rubber

Unit 2: oil palm, cocoa, tea

Unit 3: cashewnut, coffee

Practical:-Studies on botanical characters, propagation aspects, layout and planting, cultural aspects, visit to important plantations, identification of pests, diseases and other problem.

Course Learning Outcomes (CLO)

- Discuss production technology of plantation crops..
- Discuss the postharvest management of plantation crops.
- Understand the industrial and export potential of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	1	-	2	-	3	-	-	1	3
Average	2	1.33	1.0	2.5	2	3	3	1.5	1	2.5

Text books:- :-N. Kumar, Introduction to spices,plantation and aromatic plants 2001, oxford publication New Delhi

Reference books:-Kurian A & Peter KV. 2007. Commercial Crops Technology. New India Publ. Agency

Signature:-

1. ..... Dr. P. Singh

Dated: 12-06-2020

2. .....

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MSH-202: Seed Production Technology of Vegetable Crops

L	T	P	Cl
3	0	2	4

Course objective:- To educate principles and methods of quality seed and planting material production in vegetable crops.

Detail Contents

Unit 1:	**15%**
Unit 2:	**45%**
Unit 3:	**20%**
Unit 4:	**20%**

Theory:

Unit 1

History, importance and scope of seed production and seed industry in India

Unit 2

Seed production technology encompassing land requirement, isolation requirement, cultural practices, plant protection measures, removal of off types, diseased and insect pest infested plants, harvesting and extraction of seeds) for different categories of seeds *viz.* breeder seed, foundation seed, certified seed and truthfully labeled seed of O. P. variety for cole corps, solanaceous vegetables, leguminous crops, leafy vegetables, cucurbitaceous vegetables, okra and onion.

Unit 3

Hybrid seed production technology for tomato, brinjal, chilli, okra, cucumber, bottle gourd, bitter gourd, sponge gourd, ridge gourd, pumpkin etc.

Unit 4

Post harvest management in seed production of vegetable crops including cleaning, drying, screening, grading, packing and storage of seeds. Economics of seed production technology

Practical

Demonstration of various practices in seed production technology of vegetable crops. Handling of various equipments and machinery for seed production Visit of seed processing and storage units.

Course Learning Outcomes (CLO)

- Describe the production technology of Vegetables seed.
- Analyze the difference between seed and grain..
- Devise cropping scheme and plan for commercial vegetable seed production.
- Describe the production technology of hybrid seed production Vegetables.

Abhishek S.P. singh

Dated: 12-06-2020

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	1	2	1	-	2	-	-	2	-	-
CO_2	-	1	-	3	2	3	3	1	1	2
CO_3	3	1	-	3	-	1	-	-	1	3
CO_4	1	-	-	2	1	-	2	2	2	1
Average	1.66	1.66	1.0	1.66	1.66	2	2.5	2.5	1.33	2

Text books:-

Agrawal PK & Dadlani M. (Eds.). 1992. Techniques in Seed Science and Technology. South Asian Publ.

Reference books:-

Fageria MS, Arya PS & Choudhary AK. 2000. Vegetable Crops: Breeding and Seed Production. Vol. I. Kalyani.

Rajan S & Baby L Markose. 2007. Propagation of Horticultural Crops. New India Publ. Agency.

Signature:-

1. .....
2. .....
3. .....

MSH-203 Principals of fruit production

L	T	P	CR
3	0	1	4

Course objective:- Understanding the principles of biodiversity and strategies in germplasm conservation of fruit crops.

Detail Contents

Unit 1: 25%
Unit 2: 25%
Unit 3: 25%
Unit 4: 25%

Dated: 12-06-2020

Theory:

Unit 1

Importance of fruit production. Soil and climate in relation to fruit production. Water requirement, uptake, movement and influence on root distribution, response of plants to varying soil moisture regimes, pathological conditions associated with excess and deficiencies in soil moisture;

Unit 2

Irrigation methods. Soil management methods and techniques of moisture conservation. Temperature relations, winter injury and hardiness. Light relations- thermal, photosynthetic and phototropic influences. Plant nutrients, absorption, role, deficiencies and surpluses, application of fertilizers. Phases of plant growth- initiation of reproductive processes and fruiting habits.

Unit 3

Systems of planting, high density orcharding and inter and cover cropping in fruit production. Concepts in Hi-tech horticulture. Pruning and training methods, season and physiology. Flowering physiology and factors involved in fruit-set, unfruitfulness, fruit-growth and development. Important physiological disorders and their management.

Unit 4

Alternate bearing – causes and remedies. Maturity indices, harvesting, packing, transport and marketing systems of major fruit and plantation crops.

Practical

Study of soil characters in relation to growing of fruits and plantation crops. Soil moisture determination. Root distribution pattern of major crops. Systems of irrigation. Methods and placement of plant nutrients. Methods of pruning and training adopted in different crops. Floral biology, fruit-set, fruit-growth and fruit drop. Studies on maturity indices and techniques of harvesting. Physiological disorders of major fruit and plantation crops. Survey of local fruit markets to study grading, packing and marketing of different crops.

Course Learning Outcomes (CLO)

- Identify the importance of fruit crops.
- Describe system of planting fruit crops.
- Describe various post harvest management practices for fruit crops .
- Define the physiology of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	-	3	-	3	3	3	1	2
CO_3	3	1	3	2	2	1	-	2	-	3
CO_4	1	-	-	2	-	-	2	1	2	1

S. P. Singh

Dated: 12-06-2020

Average	2.33	2.00	2	2.5		2	2.5	2	1.5	2.00

Text books

Ranganna S. 1997. Hand Book of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

Reference books:-

Bose TK, Mitra SK & Sanyol D. (Eds.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog

Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

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MSH-204: PRODUCTION TECHNOLOGY OF ORNAMENTAL PLANT

L	T	P	CR
2	0	1	3

Course objective:- To impart basic knowledge about the importance and produc flower grown in India.

Detail Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Theory:-

Unit 1

Present status of Floriculture in India and its potential in the global market. Photoperiod, vernalization and growth regulators in floriculture.

Unit 2

Commercial production of field flowers, bulbous, foliage and pot plants. Specific problems concerning production of roses, chrysanthemum, carnation, jasmine, marigold and other minor cut flower crops. Orchid and anthurium culture.

Unit 3

Production of essential oil yielding flowers. Project formulation and evaluation.

Practical:-Identification of commercial cultivars. Cultural practices, harvesting, grading, packing and marketing of cut flowers, foliage and pot plants including roses, chrysanthemum, orchid, anthurium and marigold. Project formulation.

Dated: 12-06-2020

Course Learning Outcomes (CLO)

- Identify the important flower crops.
- Discuss production technology of flower crops.
- Apply knowledge of intercultural practices for improving yield of flower plants.
- Identify the export potential and industrial support for flower cops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	3	3	3	-	3	3	3	1	2
CO_3	3	1	-	3	-	1	-	2	3	3
CO_4	1	-	2	2	2	2	2	2	2	1
Average	2.33	2.00	2.00	2.66	2.00	2.00	2.5	2.25	2.00	2.00

Text books

Bose TK, Maiti RG, Dhua RS & Das P. 1999. Floriculture and Landscaping. Naya Prokash.

Reference books

Randhawa GS & Mukhopadhyay A. 1986. Floriculture in India. Allied Publ. Valsalakumari *et al*. 2008. Flowering Trees. New India Publ. Agency. Woodrow MG.1999.
Gardening in India. Biotech Books.

Signature:-

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Dated: 12-06-2020

MAS -205 Experimental Design

L	T	P	CR
3	1	2	4

Course objective:- To impart basic knowledge about the importance and use of it in research program.

Detail Contents

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**30%**

UNIT I

Need for designing of experiments, characteristics of a good design. Basic principles of designs-randomization, replication and local control, Uniformity trials, size and shape of plots and blocks.

UNIT II

Analysis of variance; Completely randomized design, randomized block design and Latin square design, Factorial experiments, (symmetrical as well as asymmetrical), orthogonality and partitioning of degrees of freedom, Confounding in symmetrical factorial experiments, Factorial experiments with control treatment, Split plot and strip plot designs.

UNIT III

Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications concepts, randomisation procedure, analysis and interpretation of results. Response surfaces. Experiments with mixtures.

Practical

1. Uniformity trial data analysis, formation of plots and blocks.
2. Fairfield Smith Law; Analysis of data obtained from CRD, RBD, LSD.
3. Analysis of factorial experiments without and with confounding.
4. Analysis with missing data; Split plot and strip plot designs; Transformation of data.
5. Analysis of resolvable designs; Fitting of response surfaces.
6. Analysis of field data using statistical software

Course Learning Outcomes (CLO)

- Define the basics of statistical theory used in agriculture.
- Calculate and apply measures of location and measures of dispersion of data.
- Use the different hypothesis testing methods.
- Apply the statistical techniques in agricultural experimental designs.

S.P. Singh

Abhishek

Dated: 12-06-2020

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.33	1.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books

Cochran WG & Cox GM. 1957. Experimental Designs.

Reference Books

1. 2nd Ed. John Wiley. 2. Dean AM & Voss D. 1999. Design and Analysis of Experiments. Springer.
2. Federer WT. 1985. Experimental Designs. MacMillan.
3. Fisher RA. 1953. Design and Analysis of Experiments. Oliver & Boyd.
4. Nigam AK & Gupta VK. 1979. Handbook on Analysis of Agricultural Experiments. IASRI Publ.
5. Pearce SC. 1983. The Agricultural Field Experiment: A Statistical Examination of Theory and Practice. John Wiley.
6. Design Resources Server: www.iasri.res.in/design

Signature:-

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Dated: 12-06-2020

MSH- 301 PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS

L	T	P	CR
3	1	2	4

Course objective:- To teach production technology of warm season vegetables.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Factors affecting quality seed production. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties /hybirds, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, economics of crop production and seed production of :

UNIT - I

Tomato, eggplant, hot and sweet peppers

UNIT - II

Okra, beans (French bean, Indian bean and cluster bean), cowpea

UNIT - III

Cucurbitaceous crops

UNIT - IV

Tapioca, sweet potato and colosia, *Taro and cassava*

UNIT - V

Green leafy warm season vegetables

Practical

Cultural operations (fertilizer application, sowing, mulching, irrigation, weed control) of summer vegetable crops and their economics; study of physiological disorders and deficiency of mineral elements, preparation of cropping schemes for commercial farms; experiments to demonstrate the role of mineral elements, physiological disorders; plant growth substances and herbicides; seed extraction

Dated: 12-06-2020

techniques; identification of important pests and diseases and their control; maturity standards; economics of warm season vegetable crops.

Course Learning Outcomes (CLO)

- Discuss the importance and production technology of warm season vegetables.
- Enumerate physiological disorders and their management of warm season vegetables.
- Experiment different intercultural operations in warm season vegetables.
- Describe harvesting indices and methods in warm season vegetables.
- Identify and manage biotic and abiotic factors causing problems in crop production.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	-	-
CO_2	-	1	3	3	-	3	3	1	1	2
CO_3	3	3	1	1	-	2	3	-	3	3
CO_4	2	2	-	2	3	3	2	3	2	1
CO_5	2	1	3	-	2	-	-	3	-	-
Average	**2.5**	**1.8**	**2.00**	**2.00**	**2.33**	**2.66**	**2.66**	**2.25**	**2.00**	**2.00**

Text books:- Bose TK & Som MG. (Eds.). 1986. Vegetable Crops in India. Naya Prokash.

Reference books:-

- Bose TK & Som MG. (1986) Vegetable Crops in India. Naya Prokash, Calcutta
- Bose TK. Kabir J. Maity TK, Parthasarathy VA & Som MG. (2003). Vegetable Crops. Vols. I- III. Naya udyog.
- Bose TK, Som MG & Kabir J. (2002). Vegetable Crops. Naya Prokash, Kolkata.
- Brown HD & Hutchison CS. Vegetable Science. JB Lippincott Co.
- Chadha KL & Kalloo G. (1934-94), Advances in Horticulture Vols. V-X, Malhotra Publ. House, New Delhi
- Chadha KL. (2002). Hand Book of Horticulture. ICAR, New Delhi.
- Chauhan DVS. (1986). Vegetable Production in India. Ram Prasad & Sons.
- Decoteau DR. (2000). Vegetable Crops. Prentice Hall. New Delhi.
- Edmond JB, Musser AM & Andrews FS. (1964). Fundamentals of Horticulture. Blakiston Co.

Signature:-

1. ..... U.P. Singh
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Abhishek V.

Dated: 12-06-2020

MSH- 302 Tropical and Sub-Tropical Fruits

L	T	P	CF
3	1	2	4

Course objective:- To impart basic knowledge about the importance and management of subtropical and temperate fruits grown in India

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**30%**
Unit 4:	**30%**

Theory:

UNIT - I

Horticultural classification of fruits including genome classification. Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning.

UNIT - II

Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Physiological disorders. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, bael, banana, grapes, citrus, papaya, sapota, guava, pineapple, jackfruit, avocado, mangosteen, litchi, carambola, durian and passion fruit.

UNIT – III

Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures. Seediness and kokkan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production.

UNIT - IV

Rainfed horticulture, importance and scope of arid and semi-arid zones of India. Characters and special adaptation of crops: ber, aonla, annona, jamun, wood apple, bael, pomegranate, carissa, date palm, phalsa, fig, west Indian cherry and tamarind.

Practical:

Description and identification of varieties based on flower and fruit morphology in above crops. Training and pruning of grapes, mango, guava and citrus. Selection of site and planting system, pre-treatment of banana suckers, desuckering in banana, sex forms in papaya. Use of plastics in fruit production. Visit to commercial orchards and diagnosis of maladies. Manure and fertilizer application including bio-fertilizer in fruit crops, preparation and application of growth regulators in banana, grapes and mango. Seed production in papaya, latex extraction and preparation of crude papain. Ripening of

Dated: 12-06-2020

fruits, grading and packaging, production economics for tropical and sub-tropical fruits. Mapping of arid and semi-arid zones of India. Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa, wood apple, West Indian cherry, tamarind, aonla, bael and annona.

Course Learning Outcomes (CLO)

- Describe the importance of tropical and subtropical fruit crops.
- Understand production management of tropical and subtropical fruit crops.
- Identify and resolve major biotic and abiotic factors limiting production of crops.
- Discuss the postharvest management of fruit crops.
- Understand the industrial and export potential of fruit crops.

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	-	2	1	3	2	-	3	2	3	-
CO_2	2	2	-	3	-	3	3	3	1	2
CO_3	3	3	3	1	3	2	2	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	2
Average	2.00	2.00	2.33	1.5	2.5	2.5	2.50	2.00	2.25	2.33

Text books:-

Bose TK, Mitra SK & Sanyol D. (Ed.). 2002. Fruits of India – Tropical and Sub-tropical. 3rd Ed. Vols. I, II. Naya Udyog.

Reference books:-

Chadha KL & Shikhamany SD. 1999. The Grape: Improvement, Production and Post-Ha

Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.

Signature:-

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Abhishek

Dated: 12-06-2020

MSH- 303 PRODUCTION TECHNOLOGY OF UNDEREXPLOITEDVEGETABLE CROPS

L	T	P	CR
2		1	2

Course objective:- To impart basic knowledge about the Underexploited vegetable.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Introduction, botany and taxonomy, climatic and soil requirements,commercial varieties/hybrids, sowing/planting times and methods, seed rateand seed treatment, nutritional and irrigation requirements, interculturaloperations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and seed production of:

UNIT I

Asparagus, artichoke and leek

UNIT II

Brussels's sprout, Chinese cabbage, broccoli, kale and artichoke.

UNIT III

Amaranth, celery, parsley, parsnip, lettuce, rhubarb, spinach, basella, bathu(chenopods) and chekurmanis.

UNIT IV

Elephant foot yam, lima bean, winged bean, vegetable pigeon pea, jackbean and sword bean.

UNIT V

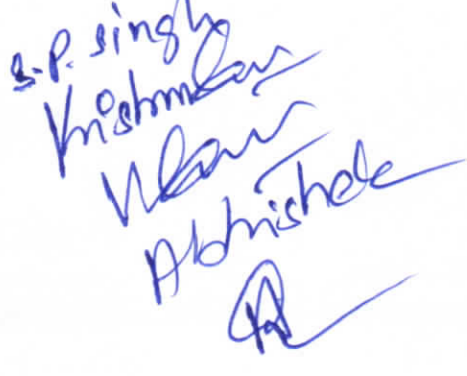
Sweet gourd, spine gourd, pointed gourd, Oriental pickling melon and littlegourd (kundru).

Practical

Identification of seeds; botanical description of plants; layout and planting;cultural practices; shortterm experiments of underexploited vegetables.

Course Learning Outcomes (CLO)

- Describe the importance of minor vegetables crop.
- Discuss the production technology of UNDEREXPLOITED VEGETABLE CROPS
- Discuss about post harvest operation of minor vegetables.
- Describe the plant protection.



Dated: 12-06-2020

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	3	1	3	2	-	2	3	3
CO_4	1	-	-	2	-	-	2	1	2	1
Average	2.33	2.00	2.00	2.00	2.50	2.50	2.50	1.50	2.25	2.00

Text books:- Bhat KL. 2001. Minor Vegetables - Untapped Potential. Kalyani. lndira P & Peter KV. 1984.

Reference books:-

Unexploited Tropical Vegetables. KeralaAgricultural University, Kerala. Peter KV. (Ed.). 2007-08. Underutilized and Underexploited HorticulturalCrops. Vols. I-IV. New India Publ. Agency. Rubatzky VE & Yamaguchi M. (Eds.). 1997. World Vegetables:Principles, Production and Nutritive Values. Chapman & Hall Srivastava U, Mahajan RK, Gangopadyay KK, Singh M &Dhillon BS.2001.Minimal Descriptors of Agri-Horticultural Crops. Part-II:Vegetable Crops. NBPGR, New Delhi.

Signature:-

1. ..... S.P. Singh
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MSH- 304 TECHNIQUES IN PLANT PROTECTION 3+0

L	T	P	CR
2	1	0	3

Course objective:- To keep abreast with latest developments and plant protection.

Detail Contents

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Theory

Dated: 12-06-2020

UNIT I Pest control equipments, principles, operation, maintenance, selection, application of pesticides and biocontrol agents, seed dressing, soaking, root-dip treatment, dusting, spraying, application through irrigation water.

UNIT II

Soil sterilization, solarization, deep ploughing, flooding, techniques to check the spread of pests through seed, bulbs, corms, cuttings and cut flowers.

UNIT III

Use of light, transmission and scanning electron microscopy.

UNIT IV

Protein isolation from the pest and host plant and its quantification using spectrophotometer and molecular weight determination using SDS/PAGE.

UNIT V

Use of tissue culture techniques in plant protection. Computer application for predicting/forecasting pest attack and identification.

Course Learning Outcomes (CLO)

- Understand how to control the pest population in field crop.
- The application of pesticides and bio control agents.
- Discuss about how to option molecular weight determination using SDS/PAGE

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	-	-	2	3	-
CO_2	-	1	-	3	-	3	3	1	1	2
CO_3	3	3	-	1	3	2	-	2	3	3
Average	3.00	2.00	1.00	2.00	2.50	2.50	3	2.50	2.33	2.50

Text books:- Alford DV. 1999. A Textbook of Agricultural Entomology.

Reference books:-

Blackwell Science, London. Crampton JM & Eggleston P. 1992.
Insect Molecular Science. Academic Press, London.

Signature:-

1. ..... S.P. Singh
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3. ..... Krishna
4. ..... Abhishek

Dated: 12-06-2020

MSH- 305 PRINCIPLES OF INTEGRATED PEST MANAGEMENT 2+1

L	T	P	CR
2	1	0	3

Course objective:- To impart basic knowledge about the insect pest management in horticultural crops.

Detail Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Theory

UNIT I

History and origin, definition and evolution of various related terminologies.

UNIT II

Concept and philosophy, ecological principles, economic threshold concept, and economic consideration.

UNIT III

Tools of pest management and their integration- legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys;

UNIT IV

Political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost-benefit ratios and partial budgeting; case studies of successful IPM programmes.

Practical

Characterization of agro-ecosystems; sampling methods and factors affecting sampling; population estimation methods; crop loss assessmentdirect losses, indirect losses, potential losses, avoidable losses, unavoidable losses. Computation of EIL and ETL; crop modeling; designing and implementing IPM system.

Course Learning Outcomes (CLO)

Discuss about IPM for high production.
Discuss about tools of pest control
Discuss about types of surveys

S P Singh
Krishna
Abhishek

Dated: 12-06-2020

Mapping of course outcome with programme outcome and programme specific outcome

PO & PSO / CO	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PSO_1	PSO_2	PSO_3
CO_1	3	2	1	-	2	2	-	2	3	-
CO_2	1	1	-	3	-	3	3	3	1	2
CO_3	3	3	2	1	3	1	-	2	4	3
Average	2.33	2.00	1.50	2.00	2.50	3.00	3	3.5	2.66	2.50

Text books:- Dhaliwal GS & Arora R. 2003. Integrated Pest Management – Concepts and Approaches. Kalyani Publ., New Delhi.

Reference books:-

Dhaliwal GS, Singh R & Chhillar BS. 2006. Essentials of Agricultural Entomology. Kalyani Publ., New Delhi.

Flint MC & Bosch RV. 1981. Introduction to Integrated Pest Management. 1st Ed., Springer, New York.

Horowitz AR & Ishaaya I. 2004. Insect Pest Management: Field and Protected Crops. Springer, New Delhi.

Ignacimuthu SS & Jayaraj S. 2007. Biotechnology and Insect Pest Management. Elite Publ., New Delhi.

Metcalf RL & Luckman WH. 1982. Introduction of Insect Pest Management. John Wiley & Sons, New York.

Pedigo RL. 2002. Entomology and Pest Management. 4th Ed. Prentice Hall, New Delhi.

Norris RF, Caswell-Chen EP & Kogan M. 2002. Concepts in Integrated Pest Management. Prentice Hall, New Delhi.

Subramanyam B & Hagstrum DW. 1995. Integrated Management of Insects in Stored Products. Marcel Dekker, New York.

Signature:-

1. ..... S.P. Singh
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Dated: 07-06-2017

Faculty of Agricultural Sciences & Allied Industries
Rama University Uttar Pradesh, Kanpur
Course Detail and Evaluation Scheme
(Effective from the Session 2017-18)
M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-III)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-301	Production technology of warm season vegetable crops	3	0	0	20	20	60	100	3
2	MSH- 302	Tropical and sub tropical fruit production	3	0	0	20	20	60	100	3
3	MSH- 303	Production technology of Under exploited vegetable crops	3	0	0	20	20	60	100	3
4	MSH- 304	Techniques in plant protection	3	0	0	20	20	60	100	3
5	MSH-305	Principles of integrated pest management	3	0	0	20	20	60	100	3
Practical/Project										
5	MSH-351	Production technology of Under exploited vegetable crops	0	0	2	30	20	50	100	2
6	MSH-352	Techniques in plant protection	0	0	2	30	20	50	100	2
9	MSH-380	Master Seminar	0	0	1	0	0	100	100	1
Total			**15**	**0**	**5**	**160**	**140**	**500**	**800**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5 Attendance: 5 Marks

6 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

Date-12-06-2018

Faculty of Agricultural Sciences & Allied Industries
Rama University Uttar Pradesh, Kanpur
Course Detail and Evaluation Scheme
(Effective from the Session 2018-19)

M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-III)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-301	Production technology of warm season vegetable crops	3	0	0	20	20	60	100	3
2	MSH- 302	Tropical and sub tropical fruit production	3	0	0	20	20	60	100	3
3	MSH- 303	Production technology of Under exploited vegetable crops	3	0	0	20	20	60	100	3
4	MSH- 304	Techniques in plant protection	3	0	0	20	20	60	100	3
5	MSH-305	Principles of integrated pest management	3	0	0	20	20	60	100	3
Practical/Project										
5	MSH-351	Production technology of Under exploited vegetable crops	0	0	2	30	20	50	100	2
6	MSH-352	Techniques in plant protection	0	0	2	30	20	50	100	2
9	MSH-380	Master Seminar	0	0	1	0	0	100	100	1
Total			**15**	**0**	**5**	**160**	**140**	**500**	**800**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5 Attendance: 5 Marks

6 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Faculty of Agricultural Sciences & Allied Industries
Rama University Uttar Pradesh, Kanpur
Course Detail and Evaluation Scheme
(Effective from the Session 2019-20)
M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-III)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-301	Production technology of warm season vegetable crops	3	0	0	20	20	60	100	3
2	MSH- 302	Tropical and sub tropical fruit production	3	0	0	20	20	60	100	3
3	MSH- 303	Production technology of Under exploited vegetable crops	3	0	0	20	20	60	100	3
4	MSH- 304	Techniques in plant protection	3	0	0	20	20	60	100	3
5	MSH-305	Principles of integrated pest management	3	0	0	20	20	60	100	3
Practical/Project										
5	MSH-351	Production technology of Under exploited vegetable crops	0	0	2	30	20	50	100	2
6	MSH-352	Techniques in plant protection	0	0	2	30	20	50	100	2
9	MSH-380	Master Seminar	0	0	1	0	0	100	100	1
Total			**15**	**0**	**5**	**160**	**140**	**500**	**800**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5 Attendance: 5 Marks

6 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

Faculty of Agricultural Sciences & Allied Industries
Rama University Uttar Pradesh, Kanpur
Course Detail and Evaluation Scheme
(Effective from the Session 2020-21)

M.Sc.(Ag.) Horticulture SECOND YEAR (SEMESTER-III)

S.N.	Subject Code	Subject Name	Period			EVALUATION SCHEME			Subject Total	Credit
			L	T	P	CE	MTE	ETE		
Theory Subjects										
1	MSH-301	Production technology of warm season vegetable crops	3	0	0	20	20	60	100	3
2	MSH- 302	Tropical and sub tropical fruit production	3	0	0	20	20	60	100	3
3	MSH- 303	Production technology of Under exploited vegetable crops	3	0	0	20	20	60	100	3
4	MSH- 304	Techniques in plant protection	3	0	0	20	20	60	100	3
5	MSH-305	Principles of integrated pest management	3	0	0	20	20	60	100	3
Practical/Project										
5	MSH-351	Production technology of Under exploited vegetable crops	0	0	2	30	20	50	100	2
6	MSH-352	Techniques in plant protection	0	0	2	30	20	50	100	2
9	MSH-380	Master Seminar	0	0	1	0	0	100	100	1
Total			**15**	**0**	**5**	**160**	**140**	**500**	**800**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5 Attendance: 5 Marks

6 Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks