

# SYLLABUS

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## DR. K N MODI UNIVERSITY, NEWAI STUDENT EVALUATION SYSTEM

### Examination Process

#### Continuous Assessment

All courses undertaken by students are evaluated during the semester using internal system of continuous assessment. The students are evaluated on class /tutorial participation, assignment work, lab work, class tests, mid-term tests, quizzes and end semester examinations, which contribute to the final grade awarded for the subject. Students will be notified at the commencement of each courses about the evaluation methods being used for the courses and weightages given to the different assignments and evaluated activities.

In order to make the evaluation system as similar and transparent with any of the globally reputed educational institutions like N.I.Ts, I.I.Ts etc. the Dr. K. N. Modi University Academic Council has adopted the grading practices. Here marks obtained in the continuous assessment and end semester examination are added together and a 10-point grading system will be used to award the student with on overall letter grade for the course (subject).

#### Distribution of Marks

##### (i) Courses without Practical Components

(a) Attendance Class participation, Class Tests, Quizzes, Projects, Seminar etc. - 10 Marks	} 40
(b) Two Assignments of 5 marks each (for each subject) - 10 Marks	
(c) Midterm Test I - 10 Marks	
(d) Midterm Test II - 10 Marks	
Marks	
(e) End –Term Examination - 60 Marks	} 60 Marks

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**Total : 100**

##### (ii) Courses with Practical Components only

Internal Practical Examination and Continuous Progress-	50
End –Term Examination (Practical) -	50
<b>Total :</b>	<b>100</b>

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## Letter Grading System

Final evaluation of course is carried out on a TEN POINT grading system. Performance Grade and Grade Points are as shown below:

**Table 1**

Marks	Grade Value	Grade	Description
91 to 100	10	AA	Out Standing
81 to 90	9	A+	Excellent
71 to 80	8	A	Very Good
61 to 70	7	B+	Good
51 to 60	6	B	Above Average
41 to 50	5	C	Satisfactory
Less than 41	0	F	Exposed
Absent in the University Final Examination	0	I	Incomplete

**Note:** In order to convert the SGPA and CGPA into percentile, multiply the same with the Conversion factor of 10.

A student who earns a minimum of 5 grade Point (C grade) in a course (subject) is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. A course successfully completed cannot be repeated.

A student should have appeared for the end semester examination of the prescribed course of study (mere appearance in the continuous assessment test is not sufficient) to be eligible for the award of the degree in the course.

If a student is eligible for but-fails to appeared in the end semester examination, he/she will be awarded an 'I grade (in complete) on the grade sheet. For all practical purposes an 'I' Grade is treated as an 'F'.

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If a student is not eligible to appear in the end semester examination owing to his/her not fulfilling the minimum attendance requirements, he may be permitted to re-register for those courses in which he/she had attendance shortage, at the next available opportunity.

## Grade Point Average (SGPA) & Cumulative Grade Point Average (CGPA)

Each course grade will be converted into a specific number of points associated with the grade as mentioned in above Table 1. Here points are weighted with the number of credits assigned to a course. The Grade Point Average (GPA) is the weighted average of grade points awarded to a student. The Grade Point Average for each semester will be calculated only for those students who have passed all the courses of that semester. The weighted average of GPA's of all semester that the student has completed at any point of time is the Cumulative Grade Point Average (CGPA) at that point of time.

**CGPA** up to any semester will be calculated only for those students who have passed all the courses up to that semester.

A student of student has to earn minimum of 244 credits to gets his B. Tech. Degree on completion of eight semesters.

## Calculation of SGPA and CGPA:

### Example:

**Table 2**

Courses	Credits	Letter Grade	Grade Value	Credit Value	Grade Points
Mathematics	3	B+	7	3x7	21
Chemistry	3	A	8	3x8	24
Physics	3	A+	9	3x9	27
Language Lab	2	A	8	2x8	16
TOTAL	11			TOTAL	88

$$\text{In this case GPA} = \frac{\text{Total Grade Points}}{\text{Credits}} = \frac{88}{11} = 8.0$$

Suppose the GPAS in two successive semesters are 7.0 and 8.0 with 26 and 24 respective course credits, then the

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$$\text{CGPA} = \frac{7 \times 26 + 8 \times 24}{26 + 24} = \frac{374}{50} = 7.48$$

After the results are declared, grade cards will be issued to each student which will contain the list of courses for that semester and the grades obtained by the student, as well as GPA of that semester. However, a conversion factor of “10”, will be included, enabling students and future employers for transforming CGPA into percentage of marks at par with the existing practices of I.I.Ts, N.I.Ts and A.I.C.T.E.

### **Minimum Eligibility Requirements in Dr. K. N. Modi University for proceeding to the next academic year of study.**

A First year Student of Dr. K. N. Modi University satisfying the below mentioned requirements is eligible to study in the 3rd Semester of next academic year.

“Pass with Minimum C Grade in Four Theory Papers & Pass in Four Laboratory Papers in the I & II Semester ( Combined)”

A Second year Student of Dr. K. N. Modi University satisfying the below mentioned requirements is eligible to study in the Vth Semester of the next academic year.

“Pass with Minimum C Grade in Four Theory Papers & Pass in Four Laboratory Papers in the IIIrd& IV Semester (Combined)”

A Third year Student of Dr. K. N. Modi University satisfying the below mentioned requirements is eligible to study in the VIIth Semester of the next academic year.

“Pass with Minimum C Grade in Four Theory Papers & Pass in Four Laboratory Papers in the Vth& VI Semester (Combined)”

### **Proficiencies:**

Extra-curricular activities as listed below will be offered to students of all programs. These activities will run in both semesters and evaluated. Activities will be graded as outstanding/Excellent/Very Good/Good/Above Average/ Satisfactory/Exposed/Incomplete.

The extracurricular activities are sports, cultural:

1.	Tennis	2.	Athletics	3.	Table Tennis
4.	Badminton	5.	Gymnastics	6.	Chess
7.	Throw Ball	8.	Gardening	9.	Organization & Management
10.	Football	11.	Electronics	12.	Fine Arts & Paintings
13.	Cricket	14.	Social Service Club	15.	Rovers & Rangers
16.	Volleyball	17.	Music and Dramatics	18.	Model and Sculptures
19.	Basketball	20.	Debate	21.	Equestrian Race

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22.	Kho - Kho	23.	Robotics	24.	Yoga & Meditation
25.	Art & Photography Club	26.	Cultural Club	27.	Any other activity with prior approval of the President.

### Guideline for submission of assignment

#### A. Assignments (Theory)

Following are the guidelines of assignments, their evaluation.

Assignment means a set of work, tasks and/or numerical problems given to the student, on the basis of topics recently covered in the class as homework to be solved and submitted, within the time frame given by the faculty and the examination cell. Each assignment should require 5 – 6 hours work to be done by the student. The Date of Submission (DOS) duly announced on the Date of Allotment (DOA) to the student and duly mentioned in the Academic Calendar.

1. In a multiple-section course, the preparation, duplication and distribution is the responsibility of the Course Coordinator.
  - a. Allotment of an assignment should be made in the academic calendar of the semester.
  - b. The Date of Submission (DOS) of an assignment should be the tutorial in the prescribed week wherever applicable. Where tutorials are not scheduled, submission should be in the first lecture of the subsequent week.
2. Assignment should NOT have any descriptive questions (that can be directly copied from a book or from the internet). However, in those course(s) where only descriptive problems are feasible, prior approval for the same is to be sought from the President in writing mentioning the justification for the same.
3. The effective teaching for semester is generally of 14 weeks. The minimum number of assignments to be given throughout the semester is two. No assignment should be due in the last week of the semester.
4. The assignment is to be submitted on or before the Date of Submission (DOS) as announced.
5. The evaluation of numerical assignment will be done through a test based on the assignment. The test would comprise of one of the questions from the assignment to be solved in the class. The following process may be adopted for the purpose:
  - a) Ask students to bring the assignment sheets to the class (along with calculators, if required).
  - b) Take 60 sheets of A4 sheets. On each sheet write the roll number of a student and the question number from the assignment that he/she has to solve. Different question for adjacent students. Make student sit roll-number-wise, so that no two adjacent students are given the same problem.
  - c) Give student just sufficient time to solve the problem assuming that they have done the assignment at home.

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- d) Make sure they have submitted the assignment before the start of the test and that they are not copying.
6. Marks to be awarded in these assignment-quizzes only if the assignment is submitted in time.
7. For non-numeric assignments the rest could have questions based on the assignment. Make sure that there are multiple shuffled sets for these tests to prevent copying. The comments on the assignments are mandatory. The marks are to be allotted to submission and test separately.
8. Minimal time to be given to the students to attempt the said tests because they should not require any thinking for solving these as they have already solved these problems earlier.
9. The evaluated assignments/tests are to be shown to the student (as done in scrutiny of the End Term Examination answer sheets) and are to be retained by the instructor. The evaluated assignments/test should be retained till the next assignment is evaluated. This is to permit checking by designated authority at any instance.
10. The assignment-based tests should be given on the Date of Assignment (DOS). Only the students who have submitted the assignment on time should be allowed to take the test, otherwise, the student should be awarded ZERO marks for the same.
11. This procedure is to be announced and explained to the students in the very first class. The importance of timely submission of assignments should be explained.
12. No deviation from this policy is permitted except with a written prior approval from the president.

## **B. Laboratory Assessments**

Following are the guidelines for the conduct and evaluation of practical in all courses with laboratory components:

1. A practical is where a student is taken to a laboratory and is asked to perform a set of task on the given computer, equipment or on a setup comprising of devices or components. This includes on-the spot conduct of an activity to derive desired results and to report the findings.
2. A student will have to maintain record of the experiments performed in the labs in the bound lab notebook.
3. The lab notebook should be maintained in the format of a lab journal, where (in general) the aim of the experiment, the observations, calculations, results and discussions are reported. These should not have any description like 'method' etc, unless the method itself is the aim of the experiment. Error analysis forms an essential part of the lab journal.
4. Each lab work performed is to be verified by the respective teachers in the next class.
5. A student will be evaluated on every experiment/lab performed. The components of practical assessment are to be re-defined, notified to the student and to be strictly adhered to.

The records of the students attendance in the lab is to be maintained. The lab file record is evaluated for 10 marks and the attendance weightage will be again 10 Marks.

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# DR. K. N. MODI UNIVERSITY

### Study and Evaluation Scheme (Year-I Semester-1<sup>st</sup>) B.Sc. (Hons.) Agriculture

S. No	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1.	01BAG101	Professional Communication	3	1	0	40	60	100	4
2.	01BAG102	Fundamentals of Genetics	3	1	0	40	60	100	4
3.	01BAG106	Agriculture Meteorology	3	1	0	40	60	100	4
4.	01BAG107	Environmental Science & Ecology	3	1	0	40	60	100	4
5.	01BAG109	Fundamentals of Soil Science	3	1	0	40	60	100	4
6.	01BAG110	Fundamentals of Rural Sociology & Educational Psychology	3	1	0	40	60	100	4
7.	01BAG111	Introductory Agriculture & Principle of Agronomy	3	1	0	40	60	100	4
8.	01BAG112	Introduction to Computer Application	3	1	0	40	60	100	4
<b>LAB</b>									
9.	01BPAG101	Professional Communication Lab	0	0	2	50	50	100	1
10.	01BPAG102	Genetics Lab	0	0	2	50	50	100	1
11.	01BPAG106	Agriculture Meteorology Lab	0	0	2	50	50	100	1
12.	01BPAG109	Soil Science Lab	0	0	2	50	50	100	1
13.	01BPAG110	Rural Sociology & Educational Psychology Lab	0	0	2	50	50	100	1
14.	01BPAG111	Agronomy Lab	0	0	2	50	50	100	1
15.	01BPAG112	Computer Application Lab	0	0	2	50	50	100	1
16.	01BPAG1010	Seamless Learning	0	0	4	100		100	1
17.	01BPAG1011	Co-Curricular Activities	0	0	4	100		100	1
	<b>Total</b>		<b>24</b>	<b>8</b>	<b>22</b>				<b>41</b>



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## DR. K. N. MODI UNIVERSITY

### Study and Evaluation Scheme (Year-I Semester-II<sup>nd</sup>) B.Sc. (Hons.) Agriculture

S. No	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1.	01BAG201	Principles of Plant Breeding	3	1	0	40	60	100	4
2.	01BAG202	Introductory Entomology	3	1	0	40	60	100	4
3.	01BAG203	Introduction To Statistical Methods	3	1	0	40	60	100	4
4.	01BAG204	Introductory Plant Pathology	3	1	0	40	60	100	4
5.	01BAG205	Fundamentals Of Horticulture	3	1	0	40	60	100	4
6.	01BAG209	Fundamentals of Agriculture Economics	3	1	0	40	60	100	4
7.	01BAG210	Agricultural Microbiology	3	1	0	40	60	100	4
8.	01BAG211	Soil Chemistry, Soil Fertility & Nutrient Management	3	1	0	40	60	100	4
<b>LAB</b>									
9.	01BPAG201	Plant Breeding Lab	0	0	2	50	50	100	1
10.	01BPAG202	Entomology Lab	0	0	2	50	50	100	1
11.	01BPAG203	Statistics Lab	0	0	2	50	50	100	1
12.	01BPAG204	Plant Pathology Lab	0	0	2	50	50	100	1
13.	01BPAG205	Horticulture Lab	0	0	2	50	50	100	1
14.	01BPAG210	Agricultural Microbiology	0	0	2	50	50	100	1
15.	01BPAG2010	Seamless Learning	0	0	4	100		100	1
16.	01BPAG2011	Co-Curricular Activities	0	0	4	100		100	1

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<b>Total</b>		<b>24</b>	<b>8</b>	<b>20</b>				<b>40</b>
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<b>S.N</b>	<b>Sub Code</b>	<b>Subject Name</b>	<b>Period</b>	<b>Evaluation Scheme</b>	<b>Credit</b>
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**Study and Evaluation Scheme Year-II Semester-III  
B.Sc.(Hons.) Agriculture**

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B.Sc. (Hons.) Agriculture

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			L	T	P	Continuou s Assessmen t	Final Exam	Total	
1.	02BAG301	Field Crops-I (Kharif)	3	1	0	40	60	100	4
2.	02BAG302	Elementary Crop Physiology	3	1	0	40	60	100	4
3	02BAG303	Manures, Fertilizers & Agro-chemicals	3	1	0	40	60	100	4
4.	02BAG304	Computer Application	3	1	0	40	60	100	4
5.	02BAG305	Principles of Seed Technology	3	1	0	40	60	100	4
6	02BAG306	Plant Biochemistry	3	1	0	40	60	100	4
7.	02BAG307	Weed Management	3	1	0	40	60	100	4
8.	02BAG308	Live Stocks Production & Management	3	1	0	40	60	100	4
<b>LAB</b>									
9.	02BPAG301	Field Crops-I (Kharif) Lab	0	0	2	50	50	100	1
10.	02BPAG302	Crop Physiology Lab	0	0	2	50	50	100	1
11.	02BPAG303	Manures, Fertilizers & Agro-chemicals Lab	0	0	2	50	50	100	1
12.	02BPAG304	Computer Application Lab	0	0	2	50	50	100	1
13.	02BPAG305	Seed Technology Lab	0	0	2	50	50	100	1
14.	02BPAG306	Plant Biochemistry Lab	0	0	2	50	50	100	1
15.	02BPAG307	Weed Management Lab	0	0	2	50	50	100	1
16.	02BPAG308	Live Stocks Production & Management Lab	0	0	2	50	50	100	1
17.	02BPAG301 0	Seamless Learning	0	0	4	100		100	1
18.	02BPAG301 1	Co-Curricular Activities	0	0	4	100		100	1
	<b>Total</b>		<b>24</b>	<b>8</b>	<b>24</b>				<b>42</b>

## DR. K. N. MODI UNIVERSITY

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## Study and Evaluation Scheme (Year-II Semester-IV<sup>th</sup>) B.Sc.. (Hons.) Agriculture

S. No	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1.	02BAG401	Field crops –II (Rabi)	3	1	0	40	60	100	4
2.	02BAG402	Irrigation & Water Management	3	1	0	40	60	100	4
3.	02BAG403	Soil Survey, Land use Planning & Remote sensing	3	1	0	40	60	100	4
4.	02BAG404	Production Technology of Vegetables & Flowers	3	1	0	40	60	100	4
5.	02BAG405	Agricultural Finance & Cooperation	3	1	0	40	60	100	4
6.	02BAG406	Insect Ecology and Integrated Pest Management including Beneficial Insects	3	1	0	40	60	100	4
7.	02BAG407	Introductory Nematology	3	1	0	40	60	100	4
8.	02BAG408	Farm Power and Machinery	3	1	0	40	60	100	4
<b>LAB</b>									
9.	02BPAG401	Field crops Lab	0	0	2	50	50	100	1
10.	02BPAG402	Irrigation & Water Management Lab	0	0	2	50	50	100	1
11.	02BPAG403	Soil Survey, Land use Planning & Remote sensing Lab	0	0	2	50	50	100	1
12.	02BPAG404	Production Technology of Vegetables & Flowers Lab	0	0	2	50	50	100	1
13.	02BPAG405	Agricultural Finance & Cooperation Lab	0	0	2	50	50	100	1
14.	02BPAG406	Insect Ecology and IPM including Beneficial Insects Lab	0	0	2	50	50	100	1
15.	02BPAG407	Nematology Lab	0	0	2	100		100	1
16.	02BPAG408	Farm Power and Machinery Lab	0	0	2	100		100	1
17.	02BPAG4010	Seamless Learning	0	0	4	100		100	1
18.	02BPAG4011	Co-Curricular Activities	0	0	4	100		100	1
	<b>Total</b>		<b>24</b>	<b>8</b>	<b>24</b>				<b>42</b>

**DR. K. N. MODI UNIVERSITY**

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## Study and Evaluation Scheme (Year-III Semester-V<sup>th</sup>) B.Sc. (Hons.) Agriculture

S. No	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1.	03BAG501	Dairy Chemistry & Animal Nutrition	3	1	0	40	60	100	4
2.	03BAG502	Production Economics & Farm Management	3	1	0	40	60	100	4
3.	03BAG503	Principles of Biotechnology	3	1	0	40	60	100	4
4.	03BAG504	Crop and stored grain pests and their management	3	1	0	40	60	100	4
5.	03BAG505	Breeding of Field and Horticultural Crops	3	1	0	40	60	100	4
6.	03BAG506	Diseases of Field Crops and their management	3	1	0	40	60	100	4
7.	03BAG507	Production technology of Spices, Aromatic and Medicinal crops	3	1	0	40	60	100	4
8.	03BAG508	Production Technology of Fruits and Plantation Crops	3	1	0	40	60	100	4
<b>LAB</b>									
9.	03BPAG501	Dairy Chemistry & Animal Nutrition Lab	0	0	2	50	50	100	1
10.	03BPAG502	Production Economics & Farm Management Lab	0	0	2	50	50	100	1
11.	03BPAG503	Principles of Biotechnology Lab	0	0	2	50	50	100	1
12.	03BPAG504	Crop and stored grain pests and their management Lab	0	0	2	50	50	100	1
13.	03BPAG505	Breeding of Field and Horticultural Crops Lab	0	0	2	50	50	100	1
14.	03BPAG506	Diseases of Field Crops and their management Lab	0	0	2	50	50	100	1
15.	03BPAG507	Production technology of Spices, Aromatic and Medicinal crops Lab	0	0	2	100		100	1
16.	03BPAG508	Production Technology of Fruits and Plantation Crops Lab	0	0	2	100		100	1
17.	03BPAG5010	Seamless Learning	0	0	4	100		100	1
18.	03BPAG5011	Co-Curricular Activities	0	0	4	100		100	1
	<b>Total</b>		<b>24</b>	<b>8</b>	<b>24</b>				<b>42</b>

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## Study and Evaluation Scheme (Year-III Semester-VI<sup>th</sup>) B.Sc. (Hons.) Agriculture

S. No	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1.	03BAG601	Protected cultivation and Post-harvest Technology	3	1	0	40	60	100	4
2.	03BAG602	Post-Harvest Management of Fruits and Vegetables	3	1	0	40	60	100	4
3.	03BAG603	Rainfed Farming	3	1	0	40	60	100	4
4.	03BAG604	Dimensions of Agricultural Extension	3	1	0	40	60	100	4
5.	03BAG605	Farming Systems, Sustainable Agriculture and Organic Farming	3	1	0	40	60	100	4
6.	03BAG606	Diseases of Horticultural Crops and their management	3	1	0	40	60	100	4
7.	03BAG607	Agricultural Marketing, trade and Prices	3	1	0	40	60	100	4
8.	03BAG608	Social and Farm Forestry	3	1	0	40	60	100	4
<b>LAB</b>									
9.	03BPAG601	Protected cultivation and Post harvest Technology Lab	0	0	2	50	50	100	1
10.	03BPAG602	Post-Harvest Management of Fruits and Vegetables Lab	0	0	2	50	50	100	1
11.	03BPAG603	Rainfed Farming Lab	0	0	2	50	50	100	1
12.	03BPAG604	Dimensions of Agricultural Extension Lab	0	0	2	50	50	100	1
13.	03BPAG605	Farming Systems, Sustainable Agriculture and Organic Farming Lab	0	0	2	50	50	100	1
14.	03BPAG606	Diseases of Horticultural Crops and their management Lab	0	0	2	50	50	100	1
15.	03BPAG607	Agricultural Marketing, trade and Prices Lab	0	0	2	100		100	1
16.	03BPAG608	Social and Farm Forestry Lab	0	0	2	100		100	1
17.	03BPAG6010	Seamless Learning	0	0	4	100		100	1
18.	03BPAG6011	Co-Curricular Activities	0	0	4	100		100	1
	<b>Total</b>		<b>24</b>	<b>8</b>	<b>24</b>				<b>42</b>

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## Study and Evaluation Scheme (Year-IV Semester-VII<sup>th</sup>) B.Sc. (Hons.) Agriculture

S. No	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1.	03BAG701	Extension Methodologies for Transfer of Agricultural Technology	3	1	0	40	60	100	4
2.	03BAG702	Fundamentals of soil water conservation and engineering	3	1	0	40	60	100	4
3.	03BAG703	Fishery Science	3	1	0	40	60	100	4
4.	03BAG704	Ornamental Horticulture	3	1	0	40	60	100	4
5.	03BAG705	Mushroom Cultivation	3	1	0	40	60	100	4
6.	03BAG706	Health & Disease of Livestock	3	1	0	40	60	100	4
7.	03BAG707	Dairying	3	1	0	40	60	100	4
<b>LAB</b>									
9.	03BPAG701	Extension Methodologies for Transfer of Agricultural Technology Lab	0	0	2	50	50	100	1
10.	03BPAG702	Soil water conservation and engineering Lab	0	0	2	50	50	100	1
11.	03BPAG703	Fishery Science Lab	0	0	2	50	50	100	1
12.	03BPAG704	Ornamental Horticulture Lab	0	0	2	50	50	100	1
13.	03BPAG705	Mushroom Cultivation Lab	0	0	2	50	50	100	1
14.	03BPAG706	Health & Disease of Livestock Lab	0	0	2	50	50	100	1
15.	03BPAG707	Dairying Lab	0	0	2	100		100	1
16.	03BPAG7010	Seamless Learning	0	0	4	100		100	1
17.	03BPAG7011	Co-Curricular Activities	0	0	4	100		100	1
	<b>Total</b>		<b>24</b>	<b>8</b>	<b>22</b>				<b>37</b>

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## DR. K. N. MODI UNIVERSITY

### Study and Evaluation Scheme (Year-IV Semester-VIII<sup>th</sup>) B.Sc. (Hons.) Agriculture

04BAG801	Rural Agricultural Work Experience (RAWE) (To be taught jointly by Agronomy, Agricultural Economics and Extension Education)	<b>20</b>
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## PROFESSIONAL COMMUNICATION (01BAG101)

### Theory:

**Unit 1:** Definition of communication, Channels of communication, Barriers to communication, types of communication, levels of communication, importance of communication, oral presentation.

**Unit 2:** Grammar and usage: Tenses, sequence of tenses Determiners Modals Prepositions Connectors Passives Indirect Speech.

**Unit 3:** Composition, Paragraph writing, Paragraph on Legal Topics, Preparing a debate (For and against).

**Unit 4:** Phrasal Verbs, Letter writing (formal, informal, business), Essay Writing, Report writing.

**Unit 5:** Text Book (For detailed Study): “Ten Mighty Pens” (Stories and Essays only) edited by K.A. Kalia Publisher, by Oxford University Press Poems: All The world a Stage by William Shakespeare, The Road not Taken by Robert Frost.

**PRACTICALS-** 1.Synonyms and antonyms 2.Mis-spelt words 3. One word substitution 4.Group Discussions 5.Listening Skills 6.Extempore 7.Role play.

**REFERENCES** 1.English Language and Indian Culture – Tribhuvan Nath Shukla 2.English Conversation Practice – Grant Taylor 3.A Course in Phonetics and Spoken English– J. Sethi and P.V. Dhamija 4.Objective English – Hari Mohan Prasad 5.High School English Grammar – Wren and Martin.

## FUNDAMENTALS OF GENETICS[01BAG102]

### Theory:

**Unit 1:** History of Genetics, ultra-structure of cell. Cell organelles and their function.Chromosomes structure, function and their chemical composition-karyotype and ideogram.

**Unit 2:** Cell division: types and their significance. Mendel’s law of inheritance.Gene interaction and their types.Multiples alleles and some classical examples.

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**Unit 3:** Inheritance of qualitative and quantitative characters and difference between them. Multiple factor hypothesis. Pleiotropism, penetrance and expressivity. Mechanism of crossing over and cytological proof of crossing over. Linkage types and importance. Estimation of linkage.

**Unit 4:** DNA and its structure, function, types, mode of replication and repair. RNA and its structure, function and its types, transcription, translation, genetic code and protein synthesis. cytoplasmic inheritance-its characteristics features and difference between chromosomal and cytoplasmic inheritance.

**Unit 5:** Structural chromosomal aberrations. Numerical chromosomal aberrations (polyploidy) and evolution of different crop species like cotton, wheat, tobacco and brassicas. Mutation - characteristics, classification and induction.

**Practical:** Introduction to microscopy-simple and compound microscope. study of typical plant cell. Preparation and use of fixatives and stains. Preparation of micro slides and identification of various stage of cell division. Monohybrid ratio and its modification. Test of goodness of fit of genetic ratio. Study of different types of gene interaction and modifications of typical dihybrid  $f_2$  ratio. Study and detection of linkage in  $f_2$  and test cross progeny. Demonstration of structural aberrations and polyploidy

### References:

1. Gupta P.K. 2004. Cytology, Genetics and evolution. Rastogi Publications, Meerut. (Hindi Edition)
2. Kaushik, M.P. 2003. A text Book of Modern Botany. Prakash publications, Muzaffarnagar (UP)
3. Klug, W.W. and Cummings, M.R. 2005. Concepts of genetics Pearson Education (Singapore) pvt. Ltd., Indian Branch, Pratap Ganj, New Delhi.
4. Singh, B.D. 2001. Kalyani Publishing House, New Delhi.
5. Strickberger, M.W. 2001. Genetics. Prentice Hall of India. Pvt. Ltd., New Delhi.
6. Shekhawat, A.S. and Tripathi, B.K., 2009. A practical manual on Element of Genetics. Publish by College of Agriculture, Bikaner.

## AGRICULTURAL METEOROLOGY (01BAG106)

### Theory:

**Unit 1:** Atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Daily and seasonal variation of wind speed and direction, cyclones, anticyclones and air masses.

**Unit 2:** Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave and thermal radiation, net radiation, albedo; Atmospheric temperature, daily and seasonal variations of temperature.

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**Unit 3:** Heat balance of earth and global warming; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, mist, frost, snow.

**Unit 4:** Rain and hail; Precipitation, cloud formation and movement; Agriculture and weather relations; Introduction to monsoon; Use of weather data for irrigation scheduling.

**Unit 5:** Pesticide sprays, fertilizer application; Climatic normals for crop production, Basics of weather forecasting.

**Practical:** Agro-meteorological observatory – its site selection, installation and exposure of instruments, weather data recording; Measurement of total solar radiation, short wave and long wave radiation, albedo and sunshine duration; Maximum and minimum air temperature, soil temperature, dew point temperature; Determination of vapor pressure, relative humidity, atmospheric pressure, wind speed and wind direction; Measurement of rain, open pan evaporation and evapo-transpiration; Processing, tabulation and presentation of weather data.

### References:

1. Sacheti, A.K. 1985. Agricultural Meteorological Instructional Cum Practical Manual (Ed.) NCERT Publication, New Delhi.
2. Mavi, H.S. 1994, Introduction to Agrometeorology, Oxford & IBH Publishing Co., New Delhi.
3. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad.
4. Barry, R.G. and Chorley, R.C. 1985. Atmosphere Weather and Climate. English Language Book Soc. Publication.
5. Varshneya, M.C. and Balakrishna, Pillai, 2003. Text book of Agricultural Meteorology. ICAR, New-Delhi.
6. Sahu, D.D., 2003. Agrometeorology and Remote sensing: Principles and Practices, Agrobios (India), Jodhpur.
7. Murthy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology, Kalyani Publishers, New-Delhi.

## ENVIRONMENTAL SCIENCE & ECOLOGY (01BAG107)

### Theory:

**Unit 1:** Scope and importance of environmental studies, natural resources: renewable and non-renewable resources, forest, water, food, energy and land resources;

**Unit 2:** Ecosystems: definition, concept, structure and functions, producers, consumers and decomposers of an ecosystem; energy flow in the ecosystem and types of ecosystems; biodiversity: definition, classification, threats of biodiversity and its conservation.

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**Unit 3:**Global warming and role of plantation forestry in environment protection; awakening movements for tree protection; waste land development through tree plantation; agroforestry, farm forestry and social forestry plantations;

**Unit 4:**Environmental pollution: causes, effects and control of air, water, soil, thermal, noise and marine pollution; causes, effects and management of soil nuclear hazards and industrial wastes; disaster management: floods, earthquakes, cyclones and landslides; social issues and the environment, unsustainable to sustainable development;

**Unit 5:**Environment protection Act, the air Act, the water Act, the wildlife protection Act and forest conservation Act; woman and child welfare.

### References:

1. Bamanayha B.R., Verma, L.N. and Verma A (2005). Fundamentals of Environmental Sciences, Yash Publishing House, Bikaner
2. Dhaliwal G.S., Sangha G.S. and Ralhan P.K. (2000) Fundamentals of Environmental Sciences, Kalyani Publishers, New Delhi
3. Odum E.P. and Barrett G.W. (2007) Fundamentals of Ecology, Brooks/Cole, Akash Press, New Delhi
4. Agrawal, K.C. (1999) Environmental Biology, Agro Botanica, Bikaner
5. Kumar, H.D. (1997) Modern concepts of Ecology, Vikash Publishing House Pvt. Ltd. New Delhi
6. Brij Gopal, and N. Bhardwaj (2004) Elements of Ecology. Vikash Publishing House, Pvt. Ltd., New Delhi.
7. Kudesta, V.P. (1990). Pollution Everywhere, Pragatgi Prakashan, Meerut
8. Nemerov, R.L. 1976. Industrial Water Pollution. Addison Wesley
9. Mishra, P.C. (2001). Soil pollution and Soil Organism, Ashish Publishing House, 8/81, Punjab Bagh, New Delhi – 110026.

## FUNDAMENTAL OF SOIL SCIENCE(01BAG109)

### Theory:

**Unit 1:** Soil: Pedological and edaphological concepts. Origin of the earth, Earth's crust, Composition,

**Unit 2:** Rocks and minerals. Weathering, Soil formation factors and processes, Components of soils. Soil profile, Soil physical properties, Soil texture, Textural classes, Particle size analysis, Soil structure,

**Unit 3:** Classification, Soil aggregates, significance, Soil consistency, Soil crusting, Bulk density and particle density of soils & porosity and their significance and manipulation. Soil colour, Soil

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water, Retention and potentials, Soil moisture constants, Movement of soil water, Infiltration, Percolation, Permeability, Drainage.

**Unit 4:** Methods of determination of soil moisture. Thermal properties of soils, Soil temperature, Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth. Soil colloids: Properties, nature, types and significance; Layer silicate clays, and sources of charges. Adsorption of ions, Ion exchange, CEC & AEC, Soil reaction and buffering capacity.

**Unit 5:** Factors influencing ion exchange and its Significance. Problem soils – acid, salt affected and calcareous soils, 11 characteristics. Reclamation – mechanical, chemical and biological methods. Irrigations water – Quality of irrigation water and its appraisal. Indian standards for water quality. Use of saline water for agriculture.

**Practical:** Collection and processing of soil sample. Identification of rocks and minerals. Determination of bulk density and particle density, Soil moisture determination, Soil moisture constants – Field capacity, permanent wilting point, Water holding capacity Infiltration rate, Soil texture and mechanical analysis, Soil temperature, Soil analysis for CEC, pH, EC, soluble cations & anions.

### References:-

1. Sharma, N.L. & Singh, T.B. (1996) Soil Science ( Hindi ed.) Rama pub. House, BarotMerrut( U.P )
2. Baver, L.D. Gardener, W.H. and gardener W.R.(1976) Soil Physics Wiley Eastern Ltd, New Delhi
3. Biswas, T.D. and Mukherjee, S.K. (2006) Text book of soil science.Tata McGraw Hill publishing Co. Ltd, New Delhi
4. Brady, N.C. and Weil, R.R. (2002) The nature and properties of soils, prentice hall of India Pvt. Ltd, M-97, Connaught Circus, New Delhi
5. Das, D.K. (2002) Introductory Soil Science, Kalyani publisher, New Delhi
6. Rai, M.M. (2002) Principal of Soil Science Mac Millan India Ltd, New Delhi
7. Mehra R.K. (2004) Text book of Soil Science, ICAR, New Delhi
8. ISSS (2002) Fundamentals of Soil Science, Div. of Soil Science, IARI, New Delhi
9. Chopra S.L. and Kanwar, J.S. ( 1991) Analytical Agricultural Chemistry, Kalyani publisher, Ludhiana
10. Jackson, M.L. (1973 ) Soil chemical analysis, Prentice Hall of India, Pvt. Ltd New Delhi
11. Piper, C.S. (1950) Soil and plant analysis. .Hans publications, Bombay
12. Richards, L.A. (1960) Diagnosis and improvement of saline and alkali soils., USDA agriculture Hand book 60, Washington D.C., USA
13. Gupta, I.C. & Sharma, S.K. (1988) Crop production in salt affected soils, Oxford and IBH Publication, New Delhi.
14. Agrawal, R.R., Yadav, J.S.P. & Gupta, R.N. (1982) Saline and alkali soils of India. ICAR, New Delhi.

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### FUNDAMENTALS OF RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY (01BAG110)

#### Theory:

**Unit 1:** Sociology and Rural Sociology- Meaning, Definition, Scope, Importance of rural sociology in Agricultural Extension and Interrelationship between Rural Sociology and Agricultural Extension.

**Unit 2:** Indian Rural Society, Important characteristics, differences & Relationship between Rural and Urban societies. Social Groups: Meaning, Definition, Classification, Factors considered in formation and organization of groups.

**Unit 3:** Social Stratification – Meaning, Definition, Functions, Forms of Social stratification. Cultural concepts - Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions - Meaning, Definition and their role in Agricultural Extension. Social Values and Attitude - Meaning, Definition, Types and Role of social values and Attitudes in Agricultural Extension.

**Unit 3:** Social Institutions - Meaning, Definition, Major institutions in Rural society, Functions. Social Control - Meaning, Definition, Need and Means of Social control. Social change - Meaning, Definition, Nature of Social change and factors of social change

**Unit 4:** Leadership- Meaning, Definition, Classification, Roles of Leader, Methods of selection of leaders. Psychology and Educational psychology- Meaning, Definition, Scope and Importance of Educational Psychology in Agricultural Extension. Intelligence - Meaning, Definition, Types, Factors affecting intelligence.

**Unit 5:** Personality- Meaning, Definition, Types, Factors influencing the Personality and Role of Personality in Agricultural Extension. Teaching- Learning process- Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics

#### References:

1. Bhatia, H.R. 1965. A Text Book of Educational Psychology, Asia Publishing House, New Delhi.
2. Chitamber, J.B., 1990. Introductory Rural Sociology: Willey Easter Ltd. New Delhi.
3. Dhama, O.P. & Bhatnagar, O.P., 1985. Education & Communication for Development, Oxford and IBH Publishing Company, New Delhi,
4. Desai, A.R. 1953. Rural Sociology in India, Vora & Co. Publisher Pvt. Ltd., Bombay.
5. Pujari, D. 2002 Educational Psychology in Agriculture, Agrotech Publishing Academy, Udaipur (Raj.)



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## INTRODUCTORY AGRICULTURE AND PRINCIPLES OF AGRONOMY (01BAG111)

### Theory:

**Unit 1:** Definition and importance of Agriculture; Meaning and scope of Agronomy; Plant growth and development– concept and differences; general growth curves, factors affecting crop production. Classification of crops; Meaning and types of tillage and tith; Soil fertility and productivity.

**Unit 2:** Introduction: forests in India, forest influences, forest policy and law, gap between demand and supply of forest products; principles of general silviculture; social forestry: need, objectives and scope,

**Unit 3:** Soil erosion- nature, extent and types; Soil conservation- meaning , agronomic and common mechanical practices; Agro-climatic zones of Rajasthan and India and National, International Agricultural Research Institutes in India and abroad.

**Unit 4:** Art, science and business of crop production; Agricultural heritage; Chronological agricultural technology development in India; Ancient Indian Agriculture in Civilization Era; Conversion of man from food gatherer to food producer.

**Unit 5:** Development of Agriculture through Kautilya`s work; Tools to predict monsoon rain; Plant protection in ancient and medieval India; Forest management and products, history of some indigenous trees.

**Practical:** Identification of crop seeds and plants; Identification of fertilizers and manures; Acquaintance with farm tools and implements; Methods of ploughing and sowing; Preparation of seed beds of crops; Calculation on plant population ; Calculation of soil and water losses from runoff plots ; Identification of grasses, legumes and trees for soil conservation.

### References:

1. De, Gopal Chandra 1989, Fundamentals of Agronomy. Oxford & IBH Publishing Co., New-Delhi.
2. ICAR 1989 Handbook of Agriculture, Indian Council of Agricultural Research, New-Delhi
3. Michael, A.M. and Ojha, T.P. 1986. Principles of Agricultural Engineering, Vol.II Jain Brothers, New Delhi.
4. Morachan, Y.B. 1986, Crop production and management, Oxford & IBH Publishing Co., New-Delhi.

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5. Porwal, B.L. and Sharma, D.D. 1991. SashyaVigyanKeAdhunicSiddhant (Hindi) Alka Publishers, Ajmer.
6. Darashikoh – Nuskha Dar Fanni – Falahat (The Art of Agriculture). Translated from Persian to English by Razia Akbar (2000) with commentaries by K.L. Mehra, K.L. Chadhan, J.S. Kanwar and Y.L. Nene. Asian Agri- History Foundation, Secunderabad, Bull No. 3, pp : 136.
7. Kashyapa – KashuliyaKrishisukti (A Treatise on Agriculture by Kashyapa). Translated from Sanskrit to English by S.M. Ayachit (2002) with commentaries by NaliniSadhale and Y.L. Nene, Asian Agri-History Foundation, Secunderabad, Bull No. 4.pp : 168.
8. NCA (1976), Reports of the National Commission on Agriculture, Govt. of India, New Delhi. Ojha, Madhusudan (1942), Kadambini (Sanskrit), Pub. PradyumnaSarmaOjha, Jaipur.
9. Parashara – KrishiParashara (Agriculture by Parashara). Translated from Sanskrit to English by NaliniSadhale (1999) with commentaries by H.V. Balkundi and Y.L. Nene. Asian Agri-History Foundation, Secunderabad, Bull No. 2, pp : 104.
10. Rapala – Vrikshayurveda (The Science of Plant life). Translated from Sanskrit to English by NaliniSadhale (1996) with commentaries by K.L. Mehra, S.M. Virmani and Y.L. Nene. Asian Agri-History Foundation, Secunderabad, Bull No. 1, pp : 104.
11. Nene, Y.L. and Choudhary, S.L. 2002. Agricultural Heritage in India. Asian Agri-History Foundation (AAHF), Secunderabad, Rajasthan Chapter of AAHF, Udaipur.
12. Nene, Y.L. 2007. Glimpses of the Agricultural Heritage of India. Asian Agri- History Foundation, Secunderabad, Andhra Pradesh.
13. Choudhary, S.L., Sharma, G.S. and Nene, Y.L. 2000. Ancient and Medieval History of Indian Agriculture. Rajasthan College of Agriculture, Udaipur, Rajasthan.

### INTRODUCTION TO COMPUTER APPLICATIONS (01BAG112)

#### Theory:

**Unit 1:** Introduction, characteristics of a computers; evolution and classification of computer; limitations of computer; application of computer in agriculture and related fields.

**Unit 2:** computer hardware and software; Input and output devices; memory and storage devices, typical specifications of a computer.

**Unit 3:** Operating System; types and functions; classification of programming languages; language translators; computer viruses.

**Unit 4:** Microsoft windows; Microsoft world; power points; spreadsheet applications in agriculture, database application in agriculture; expert systems in agriculture, analysis and forecasting with examples.

**Unit 5:** Internet- World Wide Web (WWW); web browsing and electronic mail; blue tooth

#### References:

1. Sinha, P.K. Computer Fundamentals (BPB Publications).
2. NiranjanaMansal and JayshriSaraogi Computer Made Easy For Beginners (Hindi)



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- 3 Satish Jain, Shashank Jain and Madhullika Jain. It Tools and Applications (BPB Publications)  
4 MS Office 2000. Joe Habraken  
5 Rapidex Computer Course (Pustak Mahal)  
6 Davinder Singh Minhas- Dynamic Memory Computer Course (Fusin Books), New Delhi.

## **FIELD CROPS-I (KHARIF) [02BAG301]**

### **Theory:**

**Unit 1.** Origin, geographic distribution, importance.

**Unit 2.** Soil and climatic requirement, varieties; cultural practices viz. seed and sowing, intercultural operations, fertilizer and irrigation.

**Unit 3.** Weed management, plant protection ; harvesting and yield of – rice, maize, sorghum, (grain and forage), pearl millet (grain and forage); pigeonpea, groundnut, soybean and cotton.

**Unit 4.** Package of practices of mungbean ,urdbean, cowpea, mothbean, clusterbean, sunhemp, castor, sesame, minor millets and napier .

**Unit 5.** Acquaintance about Panicum, Lasiurus and Cenchrus.

**Practical:** Rice nursery preparation ,seed bed preparation and sowing of kharif crops; Calculations on seed rate; Sowing of mungbean, pearl millet, and cotton; Effect of seed size on germination and seedling vigour ; Identification of weeds in pearl millet and other crops ; Fertilizer application and top dressing of nitrogen in pearl millet and study on fertilizer experiments ; Study of yield contributing characters, yield calculations, harvesting and yield estimation ; Study of crop varieties and important agronomic experiments.

### **References:**

- Singh, Chhidda; Singh P. and Singh, R. 2003. Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co., New Delhi.  
Singh, S.S. 1998, Crop Management: Under irrigated and rainfed conditions.  
Singh, S.S. 1993, Principles and Practices of Agronomy, Kalyani Publishers, New Delhi.  
Reddy, T.Y. and Reddi, G.H.S. 1993. Principles of Agronomy, Kalyani Publishers, New Delhi.  
Maiti, S. ,Hedge, M.R. and Chhattopadhyay, S.B. 1988. Handbook of Annual Oil Seed Crops. Oxford & IBH Publishing Co., New Delhi.  
Jaiswami, L.H. and Baldeo, B. 1990. Advances in Pulse Production Technology, ICAR, New Delhi.  
Thakur, C. 1979. Crop Production, Vol. I & II. Metropolitan Book Pvt. Ltd., New Delhi.  
Ahlawat, I.P.S. , Sharma, O.P. & Saini., G.S. 1998 Scientific Crop Production in India. Aman Publishing House, Madhu Market, Budhana gate, Meerut.

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Rathore, P.S. 1999-2000. Techniques and Management of Field Crop Production. Agrobios (India), Jodhpur.

Rathore, P.S. and Sharma, S.K. 2003. Scientific Pulse Production. Yash Publishing House, Bikaner.

Sharma, Kalicharan 1990. Bharat Kipromokhfaslea. G.B. Pant Agricultural & Technology University, Nanital.

Reddy, S.R. 2004. Agronomy of Field Crops. Kalyani Publishers, New Delhi.

### ELEMENTARY CROP PHYSIOLOGY (02BAG302)

#### Theory:

**Unit 1: PLANT WATER RELATIONS:** Introduction – review on plant anatomy - Importance of crop physiology in agriculture, Role and significance of water - diffusion, imbibitions, osmosis and its significance, plasmolysis, Definitions - field capacity, water holding capacity of soil and permanent wilting point, Absorption of water - mode of water absorption – active and passive absorption and factors affecting absorption, Translocation of solutes - phloem and xylem transport, Transpiration - types - Steward's theory of mechanism - significance, factors affecting transpiration and guttation - antitranspirants.

**Unit 2: NUTRITION PHYSIOLOGY:** Mineral nutrition - introduction - criteria of essentiality of elements - macro, secondary and micronutrients - sand and soil less culture- hydroponics, Mechanism of uptake - physiological role of nutrients, Foliar diagnosis - nutritional and physiological disorders - foliar nutrition and fertigation .

**Unit 3: PHOTOSYNTHESIS & RESPIRATION:** Photosynthesis - requirements of photosynthesis - light, CO<sub>2</sub>, pigments and water, Mechanism of photosynthesis - light reaction - cyclic and non-cyclic photophosphorylation - Red drop - Emerson Enhancement Effect, Photosynthetic pathways - C<sub>3</sub>, C<sub>4</sub> and CAM, Differences between C<sub>3</sub>, C<sub>4</sub> and CAM pathways - Factors affecting photosynthesis, Photorespiration - photorespiration process and significance of photorespiration, Respiration - Glycolysis, TCA and Pentose Phosphate Pathway, Oxidative phosphorylation - differences between oxidative phosphorylation and photophosphorylation. Respiratory quotient and energy budgeting in respiration.

**Unit 4: GROWTH PHYSIOLOGY:** Growth - growth curve, phases of growth and factors influencing growth, Growth analysis - LAI, LAD, SLW, SLA, LAR, NAR, RGR and CGR in relation to crop productivity, - Source sink relationship - Photoperiodism - Role of phytochrome in flowering and regulation of flowering. Transmission of stimulus - theories of flowering- Vernalisation – devernalisation Protein and fat synthesis- Plant growth regulators - growth hormones - definition and classification - physiological role of auxins and GA, Physiological role

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of Cytokinin, Ethylene and ABA - synthetic growth regulators and their uses in crop productivity, Practical application of Plant Growth Regulators in crop productivity

**Unit 5: STRESS PHYSIOLOGY:** Environmental stresses - water stress - physiological changes - adaptation to drought and amelioration, Temperature stress - Physiological changes - low and high temperature - chilling injury - tolerance – alleviation, Low light and UV radiation stresses - salt stress - physiological changes and alleviation, Global warming – Carbon Sequestration physiological effects on crop productivity, Seed germination - physiological changes during seed germination,. Abscission – senescence- ripening - types, causes, physiological and biochemical changes and regulation.

**Practical:** Preparation of solutions. Growth analysis: Calculation of growth parameters. Methods of measuring water status in roots, stems and leaves. Estimation of water potential by Chardakov's method. Measurement of absorption spectrum of chloroplastic pigments and fluorescence. Measurement of leaf area by various methods. Stomatal frequency and index. Leaf anatomy of C<sub>3</sub> and C<sub>4</sub> plants (Demonstration by already prepared slides). Respirometer – measurement of respiration. Measurement of transpiration by different methods. Measurement of respiratory quotient (RQ). Optimum conditions for seed germination. Breaking seed dormancy (a.) Chemical method (b.) Mechanical method. Yield analysis. Seed viability and vigour tests. Effect of ethylene on regulation of stomata.

### References:

1. N.K. Gupta & Sunita Gupta, 2004. Plant Physiology. Oxford & IBH Publication, New Delhi
2. R.L. Agarwal, 1995. Seed Technology, Oxford & IBH Publication, New Delhi
3. G.R. Noggle and G.J. Fritz, 1986. Plant Physiology, Prentice Hall of India Pvt. Ltd.
4. J.B. Salisbury and C.W. Ross (1992). Plant Physiology, Wadsworth Publishing Company, Belmont, California
5. S.N. Pandey & B.K. Sinha (1995). Vikas Publishing House Pvt. Ltd., New Delhi

## MANURES, FERTILIZERS & AGRO-CHEMICALS(02BAG303)

### Theory:

**Unit 1:** Manures: Definition – types – composition and value – sources and production of manures – Compost- Different composting technologies- Mechanical compost plants Vermicomposting- Green manures- Oilcakes- Sewage sludge- Biogas plant slurry- Plant and animal refuges.

**Unit 2:** Fertilizers- classification- Nitrogenous, phosphatic and potassic fertilizers Nitrogenous fertilizers: Organic N forms, Synthetic N fertilizers – Manufacturing of ammonium sulphate, ammonium chloride, ammonium nitrate and urea. Phosphatic fertilizers: P fertilizer sources – processing rock phosphate, bones for bone meal preparation – basic slag – preparation of single,

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triple super phosphate and thermo-phosphate. Potassic fertilizers: K fertilizer – natural sources – manufacturing of potassium chloride, potassium sulphate and potassium nitrate.

**Unit 3:** Mixed and complex fertilizers: Sources and compatibility – preparation of major, secondary and micronutrient mixtures. Complex fertilizers – manufacturing of ammonium phosphates, nitro phosphates and NPK complexes. Bio-fertilizers and their advantage-Fertilizer control order and fertilizer storage.

**Unit 4:** Organic chemistry as prelude to agrochemicals-Diverse type of agrochemicals - Botanical insecticides-Pyrethrum-Synthetic pyrethroids- Synthetic organic insecticides-Major classes- synthesis and properties of some important insecticides under each class.

**Unit 5:** Herbicides-Major classes-Synthesis and properties of 2,4-D,atrazine,glyphosate, butachlor and benthocarb.- Fungicides- Major classes- synthesis and properties of Carbendazim, carboxin, captantridemorph and copper oxy chloride- Insecticides act and plant growth regulators.

**Practical** Determination of organic carbon and microbial biomass C, N and P. Total nitrogen and phosphorus in manures / composts – Ammoniacal and nitrate nitrogen – Water soluble P<sub>2</sub>O<sub>5</sub>, potassium, calcium, sulphur and zinc contents of fertilizers, Adulteration in fertilizer.

## References:

1. Yawalkar, K.S. and Agarwal. J.P. (1992).Manure and fertilizers.Agriculture- Horticulture Publishing House, Nagpur.
2. Tisdale, S.L. and Nelson, W.L. (1990). Soil Fertility and fertilizers, McMillan Pub. Co. N.Y. pp.754.
3. Sanchalli, V.K. (1960). Chemistry and Technology of Fertilizers.Reinhebl publishing corporation, New York,USA.
4. Chopra, S.L. and Kanwar, J.S. (1991). Analytical Agriculture, Chemistry, Kalyani Publishers, New Delhi.
5. Tandon, H.L.S. (1989). Soil water and fertilizers analysis, Fertilizer Development and Consultant organization, New Delhi
6. FAI. (1999). Fertilizer (Control) Order, 1985 and the essential commodities Act, 1995. FAI, New Delhi, pp. 203.
7. Kanwar, J.S. (1976). Soil Fertility: theory and practice. (ed) ICAR, New Delhi pp. 583. 8. McVicker, M.H. (1952). Using commercial fertilizers, Interstate Danvilc, US.

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## COMPUTER APPLICATIONS (02BAG304)

### Theory:

**Unit 1:** Introduction, characteristics of a computers; evolution and classification of computer; limitations of computer; application of computer in agriculture and related fields.

**Unit 2:** computer hardware and software; Input and output devices; memory and storage devices, typical specifications of a computer.

**Unit 3:** Operating System; types and functions; classification of programming languages; language translators; computer viruses.

**Unit 4:** Microsoft windows; Microsoft world; power points; spreadsheet applications in agriculture, database application in agriculture; expert systems in agriculture, analysis and forecasting with examples.

**Unit 5:** Internet- World Wide Web (WWW); web browsing and electronic mail; blue tooth

### References:

1. Sinha, P.K. Computer Fundamentals (BPB Publications).
- 2 NiranjanMansal and JayshriSaraogi Computer Made Easy For Beginners (Hindi)
- 3 Satish Jain, Shashank Jain and Madhullika Jain. It Tools and Applications (BPB Publications)
- 4 MS Office 2000. Joe Habraken
- 5 Rapidex Computer Course (Pustak Mahal)
- 6 Davinder Singh Minhas- Dynamic Memory Computer Course (Fusin Books), New Delhi.

## PRINCIPLES OF SEED TECHNOLOGY (02BAG305)

### Theory

**Unit 1:**Importance of improved seed in agriculture. Seed technology-definition, objective, relationship with other sciences.Seed quality-definition, characters of good quality seed and classes of seed.

**Unit 2:**Seed policy, seed demand forecasting and planning of certified, foundation and breeder seed production. Determination of crop seed varieties, factors affecting deterioration and their control; Maintenance of genetic purity during seed production. Steps involved in development of seed programme and seed multiplication.

**Unit 3:**Production of nucleus of & breeder seed, Maintenance and multiplication of pre-release and newly released varieties in self and cross pollinated crops. Seed production- foundation and certified seed production of Maize,Bajra, Sorghum (hybrids,synthetics and composites), Rice, Cotton, Tomato and hybrids: Chilies and cucurbits(varieties and hybrids) :

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**Unit 4:**Seed production of wheat,barley, gram and rape seed mustard. Seed certification phases of certification, procedure for seed certification and field inspection, fields counts. Seed act 1966 and Seed act enforcement, Central seed committee, Central Seed Certification Board, State Seed Certification Agency.Central and State Seed Testing Laboratories;Duties and powers of seed inspectors,offences and penalties.

**Unit 5:**Seed control order:Seed control order 1983.Intellectual Properties Rights, Patenting,WTO,Plant Breeders Rights and Farmers Right.Seed drying-Forced air seed drying,principle,properties of air and their effect on seed drying,moisture equilibrium between seed and air.Seed processing-planning and establishment of seed processing plant;air screen machine and its working principle, different upgrading equipment and their use. Principles of seed treatment , Seed storage; stages of seed storage, factors affecting seed longevity storage and conditions required for good storage, general principles of seed storage. Seed marketing-marketing structure, marketing organization.

### **Practical:**

Seed sampling principles and procedures. Physical purity analysis of field and horticultural crops; Moisture testing; Germination analysis and viability test of field and horticultural crops; Vigor test of field and horticultural crops; KOH and NaOH test for varietal identification; Visit of GOT field at University farms; Varietal identification in seed production plots; Planting ratio, Minimum seed certification standards of important crops in the vicinity.

### **References:**

1. Agarwal, R.L.1991.Seed Technology, Oxford & IBH Publishing Co. Delhi
2. Agarwal, P.K. 1999. Seed Technology, ICAR, New Delhi.
3. Subir Sen and Nabinanda Ghosh.1999. Seed Science and Technology, Kalyani Publishers. New Delhi.
4. DhirenraKhare and Mohan S. Bhale.2000.Seed Technology. Scientific Publishers(India), Jodhpur.
5. Maloo,S.R., Intodia, S.K. and Pratap Singh.2008. BeejPradyogiki.Agrotech Publishing Academy.
6. A.K. Joshi and B.D. Singh.2005.Seed Technology.Kalyani Publishers, New Delhi.

## **PLANT BIOCHEMISTRY (02BAG306)**

### **Theory:**

**Unit 1:**Biochemistry – Introduction and importance. Plant cell, cell wall and its role in livestock, food and paper industries. Structure, properties & applications of biomolecules: amino acids, peptides and proteins.

**Unit 2:**Plant proteins and their quality. Enzymes – classification, factors affecting the activity, immobilization and other industrial applications.



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**Unit 3:**Lipids – classification, properties and their industrial application in soaps, paints, lubricants, plastics including biodegradable plastics, bio-diesel etc. Carbohydrates – classification, structure and functions.

**Unit 4:**Nucleotides and nucleic acids. Metabolism – basic concepts, glycolysis, citric acid cycle, pentose phosphate pathway, oxidative phosphorylation and fatty acid oxidation. General reactions of amino acids.

**Unit 5:**Biosynthesis – carbohydrates, lipids, proteins and nucleic acids. Metabolic regulation. Secondary metabolites - terpenoids, alkaloids, phenolics and their applications in food and pharmaceutical industries.

## **Practical:**

Preparation of standard solutions and buffers. Determination of pH. Qualitative tests for carbohydrates, lipid, amino acids and proteins. Identification of plant pigments by paper chromatography. Thin layer chromatography of lipids. Assay of enzyme and effect of pH. Demonstration of column chromatography. Extraction of oil from oil seeds. Quantitative determination of carbohydrates (sugars), proteins and phenols. Extraction of nucleic acids

## **References:**

1. Lehninger AL (2004). Principles of Biochemistry, Freeman and Company, USA
2. Conn EE, Stumpf PK, Bruining G and Doi RH ( 2007). Outlines of Biochemistry. John Wiley and Sons, New York
3. Nelson DL and Cox MM (2000). Lehninger Principles of Biochemistry 3rd edn, Printed in India by Replica Press Pvt. Ltd., New Delhi for Worth Publishers, New York.
4. Goodwin, TW and Mercer EI (1998). Introduction to Plant Biochemistry, Progamon Press Inc. Deffered UK
5. De Robertis EDP and De Robertis EMF (2006). Cell and Molecular Biology, B I Publications Pvt Ltd, New Delhi
6. Sahney SK and Singh RR (2002). Introductory Practical Biochemistry, Narosa Publishing House, New Delhi
7. Yadav VK and Yadav N (2007). Biochemistry and Biotechnology-A Laboratory Manual, Pointer Publishers, Jaipur

## **WEED MANAGEMENT (02BAG307)**

### **Theory:**

**Unit 1:**Weeds- introduction, harmful and beneficial effects, classification, propagation and dissemination.

**Unit 2:**Weed biology and ecology, crop weed association, crop weed competition and allelopathy.

**Unit 3:**Concepts of weed prevention, control and eradication; Methods of weed control- physical, cultural, chemical and biological methods; Integrated weed management; Herbicides- advantages and limitation of herbicide usage in India.

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**Unit 4:**Herbicide classification, formulations, methods of application; Introduction to Adjuvants and their use in herbicides; Introduction to selectivity of herbicides;

**Unit 5:**Compatibility of herbicides with other agro chemicals; Weed management in major field crops. Aquatic weeds and their management.

**Practical:**

Identification of weeds; Preparation of herbarium of weeds; Study of crop weed competition ; Herbicide label information; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Preparation of list of commonly available herbicides; Study of phytotoxicity symptoms of herbicides in different crops; Biology of nut sedge, bermuda grass, Partheniumand Celosia; Economics of weed control practices; visits of problem areas (field).

**References:**

1. Gupta , O.P. 2005. Weed Management: Principles and Practices (2nd Ed) Agribios (India) Jodhpur.
2. Gupta, O.P. 2002 . Modern Weed Management ,Agribios (India) Jodhpur.
3. Rao, V.S. 2000. Principles of Weed Science (2nd Ed) , Oxford & IBH Publishing Co., New-Delhi.
4. Saraswat, V.N., Bhan, V.M. and Yaduraju, N.T. 2003. Weed Management , ICAR, New-Delhi.

## LIVESTOCK PRODUCTION AND MANAGEMENT (02BAG308)

**Theory:**

**Unit 1:**Place of livestock in the national economy. Different livestock development programs of Government of India.

**Unit 2:**Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factor affecting fertility in livestock. Reproductive behaviors like puberty, estrus, pregnancy and parturition.

**Unit 3:**Milk secretion, milking of animal and factor affecting milk yield and composition. Selection and breeding of livestock for higher milk and meat production.Feeding and management of calves, growing heifers and milch animals.

**Unit 4:**Housing principles, space requirements for different species of livestock. Disease control measures, sanitation and care. Breeding, feeding and production records.

**Unit 5:**Breed characteristics of poultry. Systems of housing, feeding and management.Incubation, hatching and brooding.Vaccination and prevention of diseases, Preservation and marketing of eggs, its economics and keeping quality. Cost of production of milk.

**Practical:**



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Identification, handling and restraining of farm animals. Judging and culling of dairy cattle and poultry. Feeding and ration formulation for categories of livestock. Housing and management of poultry. Visit to livestock farms. Economics of livestock production.

### **References:**

1. Banerjee, G. C. 2011. A Text Book of Animal Husbandry VIII ed. Oxford and IBH Publications. New Delhi.
2. ICAR. 2011. Hand Book of Animal Husbandry published by DIPA, ICAR, New Delhi.
3. Ranjan, SK. 1994. Animal Nutrition and Feeding Practices. Vikash Publications. New Delhi.
4. Sukumar, De. 2000. Outlines of dairy technology. Oxford University Press, New Delhi.
5. Thomas C.K., Sastry NSR and Singh, RA. 1982. Farm Animal Management and Poultry Production. Vikash Publications. New Delhi.