STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

III RD SEMESTER DIPLOMA IN AGRICULTURAL ENGINEERING

(Effective from Session 2020-21 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test (CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Applied Mathematics	2000301	04	3	10	20	70	100	28	40	03
2.	Computer Programming Through 'C'	2000302	03	3	10	20	70	100	28	40	03
3.	Surveying and Levelling	2011303	03	3	10	20	70	100	28	40	03
4.	Refrigeration & Air-Conditioning	2011304	03	3	10	20	70	100	28	40	03
5.	Principles of Agricultural Production	2011305	03	3	10	20	70	100	28	40	03
	Total: -		**16**				**350**	**500**			15

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Computer Programming Through 'C' Lab.	2000306	6 50% Physical 50% Virtual	3	15	35	50	20	03
7.	Surveying & Levelling Lab.	2011307	4 50% Physical 50% Virtual	3	15	35	50	20	02
	Total: -		**10**				**100**		**05**

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Refrigeration & Air-Conditioning (TW)	2011308	2	15	35	50	20	01
9.	Principles of Agricultural Production (TW)	2011309	3	23	52	75	30	02
10.	**Python / Others** (TW)	2000310	2	07	18	25	10	01
	Total: -		**07**			**150**		**04**
Total Periods per week Each of duration One Hours = 33						**Total Marks = 750**		**24**

APPLIED MATHEMATICS

		Theory			No. of Period in one Session-48			Credits
Subject Code **2000301**		**No. of Periods Per Week**			**Full Marks**	:	100	03
		L	T	P/S	ESE	:	70	
		04	—	—	TA	:	10	
		—	—	—	CT	:	20	

	Contents:	Hrs.	Marks
Unit -1	Integration: 2.1 Definition of integration as anti-derivative. Integration of standard function. 2.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 2.3 Methods of Integration. • Integration by substitution • Integration of rational functions. • Integration by partial fractions. • Integration by trigonometric transformation. • Integration by parts. 2.4 Definite Integration. • Definition of definite integral. • Properties of definite integral with simple problems. 2.5 Applications of definite integrals. • Area under the curve. • Area between two curves. • Mean and RMS values	12	20
Unit -2	Differential Equation 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations. 2.3 Applications of Differential equations. 2.3.1 Laws of voltage and current related to LC, RC, and LRC Circuits.	10	15
Unit - 3	Laplace Transform 3.1 Definition of Laplace transform, Laplace transform of standard functions. 3.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by t^n, division by t. 3.3 Inverse Laplace transforms. Properties- linearly first shifting, second shifting. Method of partial fractions, 3.4 Convolution theorem. 3.5 Laplace transform of derivatives, 3.6 Solution of differential equation using Laplace transform (up to second order equation).	08	14
Unit - 4	Fourier Series 4.1 Definition of Fourier series (Euler's formula). 4.2 Series expansion of continuous functions in the intervals $(0,2l),(-l,l),(0,2\pi),(-\pi,\pi)$ 4.3 Series expansions of even and odd functions. 4.4 Half range series.	08	07

Unit - 5	Numerical Methods		
	5.1 **Solution of algebraic equations** Bisection method. Regula-falsi method. Newton – Raphson method.	05	07
	5.2 Solution of simultaneous equations containing 2 and 3 unknowns Gauss elimination method. Iterative methods- Gauss seidel and Jacobi's methods.	05	07
	Total	48	70

Text /Reference Books:

Name of Authors	Titles of the Book	Name of the Publisher
Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith	Tata McGraw Hill
Laplace Transform	Lipschitz	Schamus outline series.
Fourier series and boundary value problems	Brown	Tata McGraw Hill
Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Delhi
Introductory Methods of Numerical analysis	S. S. Sastry	Prentice Hall Of India, New Delhi
Numerical methods for scientific & engineering computations	M. K. Jain & others	Wiley Eastern Publication.

COMPUTER PROGRAMMING THROUGH 'C'

Subject Code 2000302	Theory			No of Period in one session: 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Course Learning Objective:

Computers play a vital role in present day life, more so, in the professional life of technician engineers. In order to enable the students, use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various engineering applications of computers.

Objective:

The objectives of this course are to make the students able to:

- Develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language viz. conditional, iteration and recursion.
- Implement the algorithms in "C" language.
- Use simple data structures like array, stacks and linked list solving problems.
- Handling File in "C".

	Contents: Theory	Hrs	Marks
Unit -1	**Introduction to computer software:** Classification of computer software. System software. Application software. Programming languages. Machine languages. Assembly languages. High level programming languages. Algorithms and flowchart.	[03]	
Unit -2	**Fundamental of C languages.** Introduction. Background. Characteristics of C. Uses of C. Structure of a C program. Writing the first C program. Files used in a C program. Source code files. Header files. Object files. Binary executable files. Compiling and Executing C programs. Using comments. Characters used in C. Identifier. Keyword or Reserved words. Tokens. Constants.	[08]	

	Numeric constant. String Character constant. Variables. Variable Declaration. Basic Data Types. Additional Data types. Operators and Expressions. Operator Precedence and Associativity. Type conversion and Type casting. Input/ Output statements in C.		
Unit -3	**Decision Control and Looping Statements:** Introduction to Decision control statements. Conditional Branching statements. If statement. If-else statement. If-else-if statement. Switch case. Iterative statements. While loop. Do-while loop. For loop. Nested loops. Break and continue statements. Break statement. Continue statement. Goto statement.		
Unit -4	**Functions in 'C'.** Uses of functions. User defined functions. Function Declaration. Calling a function. Actual and formal Arguments. Rules to call a function. Function prototype. Recursion. Use of Recursive function. Local or Internal variables. Global or External variables. Void function. Storage classes in C. Auto or Automatic Storage class. Static Storage class. Extern Storage class. Register Storage class.	[07]	

Unit -5	**Arrays.** Introduction. Declaration of Arrays. Accessing the Elements of an Array. Calculating the address of Array elements. Calculating the length of an Array. Storing values in Arrays. Initializing Arrays during Declaration. Inputting values from the keyboard. Assigning values to Individual Elements. Operations on Arrays. Traversing an Array. Inserting an Element in an Array. Deleting an Element from an Array. Merging Two Arrays. Searching for a value in an Array. Passing Arrays to functions. Two dimensional Arrays. Declaring Two-dimensional Arrays. Initializing Two-dimensional Arrays. Accessing the Elements of two dimensional Arrays. Operations on Two-dimensional Arrays.	[07]	
Unit -6	**Pointers.** Understanding the Computer's Memory. Introduction to pointers. Declaring pointer variables. Pointer Expressions and pointer Arithmetic. Null pointers. Passing Arguments to function using pointer. Pointers and Arrays. Passing an Array to a Function. Dynamic Memory Allocation. Malloc ( ) function. Calloc ( ) function. Realloc ( ) function. Free ( ) function.	[07]	
Unit -7	**Structures and Unions.** Structures. Structure variables and Arrays. Initialization of structure variable and Array. Dot (•) Operator. Assigning value of a structure to Another structure. Structure within structures. Site of ( ) of a structure. Unions. Site of ( ) unions. Difference between a structure and an union. Enum Data Type. Typedef Declaration.	[04]	

Text / Reference Books -

1. Programming with C. Second Edition. Tata McGraw-Hill, 2000   - Byron Gottfried

2. How to solve by Computer, Seventh Edition, 2001, Prentice hall of India.   - R.G. Dromey

3. Programming with ANSI-C, First Edition, 1996, Tata McGraw hill.   - E. Balaguruswami

4. Programming with ANSI & Turbo C. First Edition, Pearson Education.   - A. Kamthane

5. Programming with C. First Edition, 1997, Tara McGraw hill.   - Venugopla and Prasad

6. The C Programming Language, Second Edition, 2001, Prentice Hall of India.   - B. W. Kernighan & D.M. Ritchie

7. Programming in C, Vikash Publishing House Pvt. Ltd., Jungpura, New Delhi.   - R. Subburaj

8. Programming with C Language, Tara McGraw Hill, New Delhi.   - C. Balagurswami

9. Programming in C, Galgotia Publications Pvt. Ltd. Dariyaganj, New Delhi.   - Kris A. Jamsa

10. The Art of C Programming, Narosa Publishing House, New Delhi.   - Jones, Robin & Stewart

11. Problem Solving and Programming. Prentice Hall International.   - A.C. Kenneth

12. C made easy, McGraw Hill Book Company, 1987.   - H. Schildt

13. Software Engineering, McGraw Hill, 1992.   - R.S. Pressman

14. Pointers in C, BPB publication, New Delhi.   - Yashwant Kanetkar

SURVEYING AND LEVELLING

Subject Code 2011303	Theory			No of Period in one session :42			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:
The course content of surveying has been designed to provide adequate information to develop competency in a learner to enable prepare maps by conducting chain & compass surveying and prepare land by levelling.

Objective:
Surveying is an essential component of the day-to-day work of an Agricultural Engineering Technician. The job includes detailed surveying, plotting of survey data, preparation of survey maps etc. The course content of surveying includes the basic concept horizontal linear and angular measurements and conducting surveys involving horizontal linear and angular measurement with stress on familiarization with various equipment used. It also includes vertical linear measurements to indicate the profile of the land surface by leveling has also been covered in details.

	Contents: Theory	Hrs.	Marks
Unit -1	**INTRODUCTION** 1.1 Definition, Aims and Objectives of Surveying 1.2 Classification of Surveying. 1.3 Principles of Surveying. 1.4 Precision And Accuracy of Measurements	[02]	[03]
Unit -2	**LINEAR MEASURMENTS** 2.1 Methods of Measuring Distance, Their Merits And Demerits, Suitability. 2.2 Instruments for Measuring Distance: Tape, Chain And Accessories, Their Merits and Demerits, Suitability.	[03]	[05]
Unit -3	**Chaining** 3.1 Equipment And Accessories for Chaining Description (Demonstration In Class/Lab), Use And Purpose. 3.2 Method of chaining, Raging, chaining on slope. 3.3 Field Problems-Setting perpendicular with chain & Tape, Chaining Across Different Types of Obstacles: Numerical Problems. 3.4 Errors And Mistakes In linear Measurement-Classification, Sources of Errors And Remedies. 3.5 Correction To measured lengths Due To-Incorrect Length, Temperature Variation, pull, sag, Numerical problem Applying corrections. 3.6 Precaution During Chaining, Maintenance of Equipment.	[05]	[08]
Unit -4	**CHAIN SURVEYING** 4.1 Purpose of chain surveying, Principles of chain Surveying-Well Conditioned And III Conditioned Triangles. 4.2 Method of chaining, Ranging, Chaining on slope. 4.3 Reconnaissance Survey-Method, Index Map, Reference Sketch. 4.4 Selection of Survey station, Base Line, Tie Lines, Check Lines. 4.5 Offsets- Necessity, Perpendicular And Oblique Offsets, Setting Offsets with chain & Tape, (Demonstration In Field), Merits & Demerits, Suitability, Sources of Error & Remedies, Limiting Length of offsets. 4.6 Method of Chain Surveying, Locating Objects, Recording, Entry In field Book. 4.7 Plotting- Selection of Scale, Conventional Signs, Plotting on Drawing sheet from field Book Data. 4.8 Errors In chain surveying-causes & Remedies, Precautions During Chain Surveying.	[05]	[08]

Unit -5	ANGULAR MEASUREMENT:	[05]	[08]
	5.1 Measurement of Angles with chain & tape, with compass.		
	5.2 Compass- Types-Surveyor's Compass, Prismatic Compass, Features, Parts (Detailed Description to be Covered in Practical), Merits & Demerits, Suitability of Different Types, Testing & Adjustment of Compass.		
	5.3 Designation of Angles-Concept of Meridians-Magnetic, True Arbitrary Concept of Bearing-Whole Circle Bearing, Quadrantal Bearing, Reduced Bearing, Suitability of Application, and Numerical Problems on Conversion of Bearings.		
	5.1 Effects of Earths Magnetism.		
	5.2 Errors In Angle Measurement with Compass- Sources & Remedies, Precaution During Use of Compass, Maintenance of Compass.		
Unit -6	CHAIN AND COMPASS SURVEYING:	[05]	[08]
	6.1 Principles of Traversing-Open & Closed Traverse, Advantages & Disadvantages Over Chain Surveying.		
	6.2 Methods of Traversing-locating objects, Field Book Entry.		
	6.3 Local Attraction-Causes, Detection, Errors Correction, Numerical Problems on Application of Correction Due To Local Attraction.		
	6.4 Plotting of Traverse-Check of Closing Error In Closed & Open traverse, Bowditch's Correction.		
	6.5 Errors In Chain & Compass Surveying-Sources & remedies, Precaution During Chain & Compass Surveying.		
	6.6 Computation of Area From Plotted Survey Map-Planimeter, Features, Use of Mensuration Techniques-Average Ordinate Rule, Trapezoidal Rule, Simpson's Rule.		
Unit -7	LEVELLING:	[08]	[10]
	7.1 Purpose of Levelling.		
	7.2 Definition of Terms Used In Levelling- Concepts of Level Surface, Horizontal Surface, Vertical Surface, Datum, R.L, B.M.		
	7.3 Description of Essential Features And Uses of Different Types of Leveling Instruments.		
	7.4 Concepts of Line of Collimation, Axis of Bubble Tube, Axis of Telescope, Vertical Axis.		
	7.5 Leveling Staff-Types, Features And Use.		
	7.6 Temporary Adjustments of Level, Taking Reading with Level.		
	7.7 Concept of Bench Mark, BS, IS, FS, CP, Hi.		
	7.8 Principles of Levelling-Simple Levelling, Differential Levelling.		
	7.9 Field Data Entry- Level Book-Height of Collimation Method And Rise & Fall Method, Comparison, Numerical Problems on Reduction of Levels Applying Both Methods, Arithmetic Checks.		
	7.10 Different Types of Levelling, Use And Methods-Fly Leveling, Check Levelling, Profile Levelling-Longitudinal Section And Cross-Sections.		
	7.11 Plotting of Profiles.		
	7.12 Effects of Curvature And Refraction.		
	7.13 Reciprocal Leveling-Principles, Methods, Precise Leveling.		
	7.14 Difficulties in leveling, Errors In Leveling And Precaution.		
	7.15 Sensitiveness of Bubble Tube, Determination of Sensitiveness.		
	7.16 Permanent Adjustments of Different Types of Levels.		
	7.17 Setting Grades And Stakes, Out Grades of Sewers And Related Problems.		

Unit -8	**PLANE TABLE SURVEYING**	[03]	[08]
	Principle		
	Accessories of plane table.		
	Orientation.		
	Procedure of Setting up plane table over a station.		
	Methods of plane tabling.		
	Errors and precautions.		
	Procedure of plane table traversing.		
	Advantages and disadvantages of plane tabling.		
Unit -9	**COMPUTATION OF AREA AND VOLUME:**	[02]	[05]
	Introduction		
	Computation		
	Problems on computing area from field notes		
	Computation of area from field plan		
	The mid ordinate rule		
	Simpson's rule		
	Formula for calculation of volume		
	Worked-Out problems		
Unit -10	**THEODULITE SURVEY**	[04]	[07]
	Parts of transit theodolite		
	Temporary setting of theodolite		
	Permanent setting of theodolite		
	Measurement of horizontal & Vertical Angles		
	Method of repetition		
	Method of reiteration		
	Total	42	70

Text / Reference Books -

SL. NO.	NAME OF BOOK	WRITER'S NAME	UBLISHER'S NAME
1.	Surveying & Levelling Vol.I	**P**	Griha Prakash, Pune
2.	Surveying Vol.I	B.C Punmia	Laxmi Publications, Delhi-6
3.	A text book of surveying and leveling	R. agor; Khanna	Khanna Publishers, Delhi-6
4.	Surveying & Levelling	Hussain & Nagraj	S.Chand & Co, Delhi
5.	Ground Water	H.M Raghunath	
6.	Surveying & Levelling	S.C Rangwala	Charotar Book Stall, Pune
7.	Plane Surveying.	A.De	S. Chand & Co.

REFRIGERATION AND AIR-CONDITIONING

Subject Code **2011304**	Theory			No of Period in one session: 42			Credits
	No. of Periods Per Week			**Full Marks**	:	100	**03**
	L	**T**	**P/S**	**ESE**	:	70	
	03	—	—	**TA**	:	10	
				CT	:	20	

Rationale & Objective:

Keeping in view the recent developments in science and present needs of Agriculture, the curriculum of Refrigeration & Air-Conditioning has been revised so that the Engineers or Technicians may have a better knowledge of Refrigeration & Air-Condition, especially regarding the application of the subject in various fields of Agriculture. An emphasis, in this direction, has been made in the curriculum.

The following topics are so chosen that through their contents the students become able to develop knowledge, skill and technical attitude. It will enable them to distinguish, differentiate, analyse and solve the refrigeration and air-conditioning problems.

Contents: Theory

Group (A) REFRIGERATION			Hrs	Marks
Unit -1	**PRINCIPLE OF THERMODYNAMICS**		[04]	[10]
	01.01	Pressure		
	01.02	Thermodynamic systems		
	01.03	Property, state, path and process		
	01.04	Internal energy, Flow energy and work		
	01.05	Specific heat, sensible heat and latent heat		
	01.06	Quality of vapors		
	01.07	Enthalpy and Entropy		
Unit -2	**METHOD OF REFRIGERATION**		**[05]**	**[08]**
	02.01	Ice refrigeration		
	02.02	Refrigeration by expansion of air		
	02.03	Unit of refrigeration		
Unit -3	**AIR REFRIGERATION SYSTEMS**		**[07]**	**[10]**
	03.01	Reversed Carnot Cycle		
	03.02	Bell-Coleman refrigeration system (simple numerical)		
	03.03	Advantages and disadvantages of Bell-Coleman Cycle		
Unit -4	**SIMPLE VAPOUR COMPRESSION SYSTEM**		**[07]**	**[10]**
	04.01	Block diagram of Vapour Compression System		
	04.02	Vapour Compression System		
	04.03	Wet Compression		
	04.04	Dry Compression single stage only		
Unit -5	**REFRIGERANTS**		**[04]**	**[06]**
	06.01	Classification of refrigerants. e.g., NH_3, F_{-11}, F_{12}-F_{22} and its physical properties only		

Group–B (AIR-CONDITIONING)		
Unit -6 **PSYCHROMETRY**	**[05]**	**[08]**
01.01 Meaning of air-conditioning		
01.02 Psychrometric chart and study of different curves or lines		
01.03 Summer Air-conditioning ⎤ line diagram only		
01.04 Winter Air-conditioning ⎦		
Unit -7 **REQUIREMENTS OF COMFORT AIR-CONDITIONING (INTRODUCTION ONLY)**	**[04]**	**[08]**
03.01 Elements of comfort air-conditioning		
03.02 Thermodynamics human body-Metabolic heat only		
Unit -8 **HOUSEHOLD REFRIGERATORS, COLD STORAGE, AIR COOLER AND WINDOWS AIR-CONDITIONERS:**	**[06]**	**[10]**
06.01 Household Refrigerator, line diagram only		
06.02 Cold Storage line diagram only		
06.03 Air Cooler		
06.04 Window Air-Conditioner's line and schematic diagram only		
Total	**42**	**70**

Text / Reference Books -

1. Refrigeration Air-Conditioning   -   S.C. Arora
                                               S. Domkundwar
2. Refrigeration Air-Conditioning   -   R.S. Khurmi
3. Refrigeration Air-Conditioning   -   P.L. Ballaney

PRINCIPLES OF AGRICULTURAL PRODUCTION

Subject Code 2011305	Theory			No of Period in one session: 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

From Mechanisation is the application of engineering and technology in agricultural operations to do a job in a better way to

improve productivity. This includes development, application and management of all mechanical aids for field production, Water control, material holding, storing and processing. Before knowing these, diploma students are required to know about agricultural operations, procedures and practices.

	Contents: Theory	Hrs.	Marks
Unit -1	**INTRODUCTION**	[02]	[06]
	1.1 Introductory idea about Agricultural Engineering and its relation to crop production		
	1.2 Basic information about Agricultural operations with Agricultural Implements and Machineries		
Unit -2	**SOIL**	[03]	[06]
	2.1 Classification of soils		
	2.2 Soil formation		
	2.3 Composition of soil		
	2.4 Soil fertility and plant nutrients		
Unit -3	**CROP ROTATION AND SYSTEM OF CROPPING**	[04]	[08]
	3.1 Crop rotation		
	3.1.1 Principles of crop rotation		
	3.1.2 Advantages of crop rotation		
	3.2 System of cropping		
	3.2.1 Mixed cropping		
	3.2.2 Multiple cropping		
	3.2.3 Inter cropping		
	3.2.4 Their principles and advantages		
Unit -4	**TECHNIQUES OF RAISING FIELD CROPS**	[16]	[16]
	4.1 Cereals		
	4.1.1 Paddy		
	4.1.2 Wheat		
	4.1.3 Maize		
	4.2 Legumes		
	4.2.1 Soyabean		
	4.2.2 Moong		
	4.2.3 Arhar		
	4.2.4 Gram		
	4.3 Cash Crops		
	4.3.1 Sugar cane		
	4.3.2 Potato		
	4.4 Oil Seeds		
	4.4.1 Rape seed and Mustard		
	4.4.2 Sunflower		
	4.4.3 Groundnut		

Unit -5	**TECHNIQUES OF RAISING HORTICULTURAL CROPS**	[07]	[16]
	5.1 Fruit crops		
	5.1.1 Mango		
	5.1.2 Papaya		
	5.1.3 Guava		
	5.1.4 Banana		
	5.1.5 Litchi		
	5.2 Vegetable crops		
	5.2.1 Cole Crops		
	5.2.2 Root-Crops		
	5.2.3 Lady's finger		
	5.2.4 Tomato		
	5.2.5 Brinjal		
	5.3 Flowering crops		
	5.3.1 Rose		
	5.3.2 Dhalia		
	5.3.3 Chrysanthemum		
Unit -6	**WEEDS AND THEIR CONTROL**	[04]	[08]
	6.1 Characteristics of weeds		
	6.2 Harmful effects of weeds		
	6.3 Usefulness of weeds		
	6.4 Classification of weeds		
	6.5 Medium of weeds seed dispersal		
	6.6 Method of weed control		
Unit -7	**MISCELLANEOUS**	[06]	[10]
	7.1 Methods of irrigation		
	7.2 Water management practices		
	7.3 Soil management practices		
	7.4 Seed		
	7.4.1 Characteristics of good seed		
	7.4.2 Types of seeds		
	7.4.3 Seed treatment		
	7.5 Methods of fertilizer application		
	Total-	**42**	**70**

Text / Reference Books -

1	Modern Techniques of Raising Field Crops	-	Chidda Singh.
2	Principles and practices of Agronomy	-	S.S.Singh.
3	Handbook of Agricultural Science	-	S.S.Singh
4	Weed and Weedicide	-	Dr. Rao
5	Principles and practices of Horticulture	-	Pujari Lal
6	Principles of Agricultural Engineering	-	Dr. J. Sahay
7	Principles of Agricultural Engineering	-	Irshad Ali
8	A text book of soil science	-	T.D.Biswas and .K. Mukherjee
9	Nature and properties of soil	-	N.C.Brady
10	Hand Book of Agriculture	-	I.C.A.R. Publication.

COMPUTER PROGRAMMING THROUGH 'C' LAB

Subject Code **2000306**	Practical			No. of Period in one session: 72			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Course Learning Objectives:

This Lab course is intended to practice what is taught in theory class of 'Computer Programming' and become proficient in computer programming. Computer programming is all about regular practice. Students should work on solved and unsolved problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below.

Course outcomes:

Student should be able to write code snippets, and then compile, debug and execute them.

	Content: Practical	Hrs	Marks
Unit – 1	Familiarization with programming environment (Editor, Compiler, etc.)		
Unit – 2	Programs using, I/O statements and various operators		
Unit – 3	Programs using expression evaluation and precedence		
Unit – 4	Programs using decision making statements and branching statements		
Unit – 5	Programs using loop statements		
Unit – 6	Programs to demonstrate applications of n dimensional arrays		
Unit – 7	Programs to demonstrate use of string manipulation functions		
Unit – 8	Programs to demonstrate parameter passing mechanism		
Unit – 9	Programs to demonstrate recursion		
Unit – 10	Programs to demonstrate use of pointers		
Unit – 11	Programs to demonstrate command line arguments		
Unit – 12	Programs to demonstrate dynamic memory allocation		
Unit – 13	Programs to demonstrate file operations		

The language of choice will be C. This is a skill course. More you practice, better it will be.

Reference Books:

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.

SURVEYING & LEVELLING LAB.

Subject Code **2011307**	Practical			No of Period in one session: 40			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rational:

The course content of surveying has been designed to provide adequate information to develop competency in a learner to enable prepare maps by conducting chain & compass surveying and prepare land by levelling.

Objective:

Surveying is an essential component of the day-to-day work of an Agricultural Engineering Technician. The job includes detailed surveying, plotting of survey data, preparation of survey maps etc. The course content of surveying includes the basic concept horizontal linear and angular measurements and conducting surveys involving horizontal linear and angular measurement with stress on familiarization with various equipment used. It also includes vertical linear measurements to indicate the profile of the land surface by levelling has also been covered in details.

	Contents: Practical Eight experiments to be performed in the laboratory:	Hrs	Marks
Unit -1	**LINER MEASUREMENTS** 1.1 Study of Essential features of different types of chain and tapes with neat sketch, Aims and Objectives of Surveying.	[02]	
Unit-2	**CHAINING** 2.1 Testing and adjusting of a matric chain 2.2 Measurements of distance between two points with chain including direct ranging. 2.6 Setting out of different types of triangles with chain and tape. 2.4 Measurement of distance between two points by chaining across a sloping ground by using stepping method and by a Clinometer. 2.5 Measurement of distance by chaining across obstacles on the chain line-A. Pond 2. Building. 3. Stream/River	[08]	
Unit-3	**CHAIN SURVEYING** 3.1 Setting Perpendicular offsets to various object from a chain line using- Tape, 2. Cross Staff, 3 Optical Square 3.2 Setting /Offsets from a chain line using tape	[04]	
Unit-4	**ANGULAR MEASUREMENTS** 4.1 Study of features and parts of a prismatic compass and a surveyor compass by drawing neat sketches. 4.2 Testing and Adjustment of Prismatic Compass and Surveyors Compass. 4.3 Measurement of bearings of lines and Determination of included angles using prismatic compass and surveyor compass.	[06]	
Unit-5	**CHAIN AND COMPASS SURVEYING** 5.1 Setting out of a closed traverse of five sides using prismatic compass given bearing of one line and included angles and lengths of sides. 5.2 Conducting Chain and Compass traverse surveying in a given plot of area and recording data in the field book. 5.3 Preparation of Survey map by plotting individually and to find the plotted area.	[06]	

Unit-6	**LEVELLING**	[08]	
	6.1 Study of Essential features and parts of different types of levels.		
	6.2 Study of different types of leveling staffs.		
	6.3 Making temporary adjustment of levels.		
	6.4 Determining reduced levels of five given points taking staff reading with level .		
	6.5 Determining the difference of level between two points the readings are filled in level books and to apply arithmetic check.		
	6.6 Conduct fly leveling between two distant point with respect to RL of a given bench mark by both height of collimation and rise and fall method and applying arithmetic check.		
	6.7 Finding RL of 1. Rood, 2. Chajja with reference to given bench mark.		
	6.8 Conduct profile leveling along the given alignment for road/Canal for 150 meter length.		
	6.9 Plotting of the profile of the alignment surveyed in 6.8 and drawing the grade of alignment.		
Unit -7	**THEODOLITE SURVEY**	[06]	
	8.1 Study of different parts of a transit theodolite with neat sketch.		
	8.2 Temporary adjustment of a transit theodolite.		
	8.3 Measure of horizontal angle with theodolite by method of reiteration.		
	8.3 Measurement of vertical angles to know the height of an elevated ground.		
	Total	**40**	

Text / Reference Books -

Sl. No.	Name of Book	Writer's Name	Publisher's Name
1.	Surveying & Levelling Vol.I	T.P. Kanetkar & S.V.Kulkarni	Griha Prakash, Pune
2.	Surveying Vol.I	B.C Punmia	Laxmi Publications, Delhi-6
3.	A text book of surveying and levelling	R.agor; Khanna	Khanna Publisher's Delhi-6
4.	Surveying & Levelling	Hussain & Nagraj	S.Chand & Co, Delhi
5.	Ground Water	H.M Raghunath	
6.	Surveying & Levelling	S.C Rangwala	Charotar Book Stall, Pune
7.	Plane Surveying	A.De	S. Chand & Co.

REFRIGERATION AND AIR-CONDITIONING -TW

Subject Code	Term Work			No of Period in one session: 24			Credits
2011308	**No. of Periods Per Week**			**Full Marks**	:	50	**01**
	L	T	P/S	Internal	:	15	
	—	—	02	External	:	35	

Rationale & Objective:

Keeping in view the recent developments in science and present needs of Agriculture, the curriculum of Refrigeration & Air- Conditioning has been revised so that the Engineers or Technicians may have a better knowledge of Refrigeration & Air- Condition, especially regarding the application of the subject in various fields of Agriculture. An emphasis, in this direction, has been made in the curriculum.

The following topics are so chosen that through their contents the students become able to develop knowledge, skill and technical attitude. It will enable them to distinguish, differentiate, analyse and solve the refrigeration and air-conditioning problems.

S.No.   Topics
GROUP A
(REFRIGERATION)

1   Principles of Thermodynamics

2   Method of Refrigeration

3   Air Refrigeration Systems

4   Simple Vapour Compression System

5   Refrigerants

S.No.   Topics
        GROUP B (AIR-CONDITIONING)

1   Introduction to Psychrometry

2   Different Psychrometric Processes

3   Requirements of Comfort Air-conditioning (only introduction)

4   Air-conditioning Systems (introduction only)

5   Household Refrigerators, Cold Storage, Air cooler and Window Air-conditioners

Contents: Term Work

	Group- A (REFRIGERATION)		Hrs.	Marks
Unit -1	**PRINCIPLE OF THERMODYNAMICS** 1.1 Pressure 1.2 Thermodynamic systems 1.3 Property, state, path and process 1.4 Internal energy, Flow energy and work 1.5 Specific heat, sensible heat and latent heat 1.6 Quality of vapours 1.7 Enthalpy and Entropy		[02]	
Unit -2	**METHOD OF REFRIGERATION** 2.1 Ice refrigeration 2.2 Evaporative refrigeration 2.3 Refrigeration by expansion of air 2.4 Steam jet refrigeration system 2.5 Dry ice refrigeration system 2.6 Unit of refrigeration		[02]	
Unit -3	**AIR REFRIGERATION SYSTEMS** 3.1 Reversed Carnot Cycle 3.2 Bell-Coleman refrigeration system (simple numerical) 3.3 Advantages and disadvantages of air refrigeration system		[02]	
Unit -4	**SIMPLE VAPOUR COMPRESSION SYSTEM** 4.1 Ideal Vapour compression 4.2 Vapour Compression System 4.3 Wet Compression 4.4 Dry Compression single stage only 4.5 Superheated compression (simple numerical only)		[04]	
Unit -5	**REFRIGERANTS** 6.1 Classification of refrigerants. 6.2 Different properties of NH_3, CO_2, SO_2 refrigerants.		[03]	
	Group-B (AIR-CONDITIONING)			
Unit -6	**PSYCHROMETRY** 1.1 Meaning of air-conditioning 1.2 Psychrometry and psychrometric properties 1.3 Psychrometric relations 1.4 Psychrometric chart		[02]	
Unit -7	**DIFFERENT PSYCHROMETRIC PROCESSES** 2.1 Sensible cooling and heating 2.2 Adiabatic humidification and dehumidification (simple numerical) 2.3 Summer air-conditioning, winter air-conditioning and year round conditioning		[03]	
Unit -8	**REQUIREMENTS OF COMFORT AIR-CONDITIONING (INTRODUCTION ONLY)** 3.1 Elements of comfort air-conditioning 3.2 Thermodynamics human body 3.3 Ventilation and Ventilation standard		[02]	
Unit -9	**AIR-CONDITIONING SYSTEM (INTRODUCTION ONLY)** 4.1 Central air-conditioning system 4.2 Unitary air-conditioning system 4.3 Problems in air-conditioning system		[02]	

| Unit -10 | HOUSEHOLD REFRIGERATORS, COLD STORAGE, AIR COOLER AND WINDOWS AIR-CONDITIONERS
6.1   Household Refrigerator
6.2   Cold Storage line diagram only
6.3   Air Cooler
6.4   Window Air-Conditioners | [02] | |
| | Total | **24** | |

Text / Reference Books -

1	Refrigeration Air-Conditioning	-	S.C. Arora S. Domkundwar
2	Refrigeration Air-Conditioning	-	R.S. Khurmi
3	Refrigeration Air-Conditioning	-	P.L. Ballaney

PRINCIPLES OF AGRICULTURAL PRODUCTION -TW

Subject Code	Term Work			No of Period in one session : 36			Credits
2011309	**No. of Periods Per Week**			**Full Marks**	**:**	**75**	**02**
	L	**T**	**P/S**	**Internal**	**:**	**23**	
	-	**-**	**03**	**External**	**:**	**52**	

Rationale:

A diploma student of Agricultural Engineering has to install and maintain agricultural and irrigational equipment's. He is required to know about cropping patterns, prevailing in the state and country. He is also required to assess the water and fertilizer requirements, about different crop diseases, insects and pests, methods of seedbed preparation and sowing etc.

Objective:

The subject has been designed to develop the skill in an Agricultural Engineering student, so that he is able to:

- identify weeds

- protect plants from insects, pests and diseases

- know about the package practices for crop plants.

	Contents: Term Work	Hrs.	Marks
Unit-1	Study about scientific names of major crops of cereals, pulses, oil seeds, fiber crops, sugar cane, tuber and root crops, spices and condiments, forage grasses, forage legumes and plantation crops.	[02]	
Unit-2	Study about characteristics and suitability of various fertilizer for various crops.	[02]	
Unit-3	Study about methods of fertilizer application.	[02]	
Unit-4	Study about plant deficiencies symptoms.	[02]	
Unit-5	Study about schedule for seed treatment of major crops.	[02]	
Unit-6	Study about main diseases, its symptoms and control measures for major crops.	[02]	
Unit-7	Study about major pests of stored products.	[02]	
Unit-8	Study about main insects and its control measures for major crops.	[02]	
Unit-9	Study about weed control practices for important crops.	[02]	
Unit-10	Study about the schedule of important agro-techniques for major crops .	[02]	
Unit-11	Study about most prominent varieties for major crops.	[02]	
Unit-12	Study about crop rotation for major crops.	[02]	
	Total	**24**	

Books Recommended:

1	Handbook of Agricultural Science	-	S.S.Singh Kalyani Publishers, New Delhi
2	Hand Book of Agriculture	-	I.C.A.R. Publication.
3	Principles and practices of Agronomy	-	S.S.Singh Kalyani Publishers, New Delhi
4	Modern Techniques of Raising Field Crops	-	Chhida Singh Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

PYTHON / Others -TW

Subject Code 2000310	Term Work				Credits
	No. of Periods Per Week		**Full Marks**	:	25	01
	L	**T**	**P/S**	**Internal**	:	07
	-	-	02	**External**	:	18

	CONTENTS	Hrs.	Marks
UNIT – 01	Write a program to demonstrate basic data type in python.		
UNIT – 02	Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)		
UNIT – 03	Write a python program Using for loop, write a program that prints out the decimal equivalent of $1+\frac{1}{2}+1/3\ldots.1/n$		
UNIT – 04	Write a Python program to find first n prime numbers. Write a program to demonstrate list and tuple in python.		
UNIT – 05	Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number and prints a countdown from that number to zero.		
UNIT – 06	Write a Python Program to add matrices. Write a Python program to multiply matrices.		
UNIT – 07	Write a Python program to check if a string is palindrome or not.		
UNIT – 08	Write a Python program to Extract Unique values dictionary values		
UNIT – 09	Write a Python program to read file word by word Write a Python program to Get number of characters, words.		
UNIT – 10	Write a Python program for Linear Search		