



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



**Approved by AICTE, Recognized by UGC & Affiliated to Anna University
Accredited by NBA-AICTE, NAAC-UGC with 'A+' Grade**

Saravanampatti , Coimbatore -641035

**CURRICULA AND SYLLABI
REGULATION 2019
CHOICE BASED CREDIT SYSTEM**

**DEPARTMENT OF AGRICULTURE
ENGINEERING**

B.E. – AGRICULTURE ENGINEERING



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

DEPARTMENT OF AGRICULTURE ENGINEERING

R 2019

SUGGESTED CURRICULUM AND SYLLABI

B.E – AGRICULTURE ENGINEERING



Description / Semester	AICTE	SNSCT – AGRI Suggested	Sem 1	Sem 2	Sem 3	Sem 4	Sem 5	Sem 6	Sem 7	Sem 8
Humanities , Social Science and Management Courses (HSMC)	12	21	3	2	4	4	4	2	2	
Basic Science Courses (BSC)	25	24	8	8	3	3			2	
Engineering Science Courses (ESC)	24	22	8	9	2	2			1	
Professional Core Courses (PCC)	48	63		2	14	17	14	8	6	2
Professional Elective Courses (PEC)	18	9					3	3	3	
Open Elective Courses (OEC)	18	6						3	3	
Project/Seminar/Internship (EEC)	15	24	3	1	1	2	1	2	2	12
Mandatory Courses (MC)	Non Credit									
TOTAL	160	169	22	22	24	28	22	18	19	14

SEMESTER I											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	
Theory Courses											
1.	19MAT101	Linear Algebra and Calculus	3	1	0	0	4	4	50/50	BSC	
2.	19MET101	Engineering Drawing	1	0	4	0	5	3	50/50	ESC	
3.	19EET101	Basics of Electrical and Electronics Engineering	3	0	0	0	3	3	50/50	ESC	
Theory Integrated Practical Courses											
4.	19CHB101	Chemistry for Engineers	3	0	2	0	5	4	60/40	BSC	
5.	19ENB101	Communicative English	2	0	2	0	4	3	60/40	HSMC	
6.	19GEB101	Design Thinking and Innovation	1	0	0	4	5	3	100/0	EEC	
Practical courses											
7.	19GEP101	Workshop Practices Laboratory	0	0	4	0	4	2	60/40	ESC	
Mandatory Course											
8.	19HST103	Indian Constitution	2	0	0	0	2	0	100/0	MC	
9.	19HST101	Induction Program									
Total			15/1/12/4			32	22	800			

SEMESTER II											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	
Theory Courses											
1.	19ITT101	Programming in C and Data Structures	3	0	0	0	3	3	50/50	ESC	
2.	19MET102	Engineering Mechanics	3	1	0	0	4	4	50/50	ESC	
3.	19AGT101	Principles of Agricultural Engineering	2	0	0	0	2	2	50/50	PCC	
Theory Integrated Practical Courses											
4.	19MAB102	Integral Calculus and Laplace Transforms	3	0	2	0	5	4	60/40	BSC	
5.	19PYB103	Physics for Engineers	3	0	2	0	5	4	60/40	BSC	
Practical courses											
6.	19ENP101	Professional Communication	0	0	4	0	4	2	60/40	HSMC	
7.	19ITP101	Programming in C and Data Structures Laboratory	0	0	4	0	4	2	60/40	ESC	
8.	19AGP101	Mini Project – I	0	0	0	2	2	1	100/0	EEC	
Mandatory Course											
9.	19HST102	Environmental Science	2	0	0	0	2	0	100/0	MC	
Total			16/1/12/2			31	22	900			

SEMESTER III											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19MAT201	Transforms and Partial Differential Equations	3	0	0	0	3	3	50/50	BSC	19MAT101
2.	19MET201	Engineering Thermodynamics	3	0	0	0	3	3	50/50	PCC	
3.	19AGT201	Fundamentals of Soil Science	3	0	0	0	3	3	50/50	PCC	
4.	19GET275	VQAR-I	2	0	0	0	2	2	50/50	HSMC	
Theory Integrated Practical Courses											
5.	19MEB201	Fluid Mechanics and Machinery	3	0	2	0	5	4	60/40	PCC	
6.	19AGB201	Surveying and Leveling	3	0	2	0	5	4	60/40	PCC	
Practical Courses											
7.	19ITP202	Python Programming	0	0	4	0	4	2	60/40	ESC	
8.	19AGP201	Mini Project – II	0	0	0	2	2	1	100/0	EEC	
9.	19GEP275	Personality Development	1	0	2	0	3	2	60/40	HSMC	
Total			18/0/10/2			30	24	900			

SEMESTER IV											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19MAT202	Statistics and Numerical Methods	3	0	0	0	3	3	50/50	BSC	19MAT201
2.	19AGT202	Machine Design	3	0	0	0	3	3	50/50	PCC	
3.	19AGT203	Automation Techniques in Agriculture Engineering	2	0	0	0	2	2	50/50	PCC	
4.	19GET276	VQAR-II	2	0	0	0	2	2	50/50	HSMC	
5.		Language Elective	1	0	2	0	3	2	60/40	HSMC	
Theory Integrated Practical Courses											
6.	19AGB202	Crop Production Technology	3	0	2	0	5	4	60/40	PCC	
7.	19AGB203	Unit Operations in Food Process Engineering	3	0	2	0	5	4	60/40	PCC	
8.	19AGB204	Biomass Conversion	3	0	2	0	5	4	60/40	PCC	
Practical Courses											
9.	19AGP203	SOLID WORKS	0	0	4	0	4	2	60/40	ESC	

Mandatory Course								
10.	19AGP202	Internship - I	2 Weeks		2	100/0	EEC	
Total			20/0/12/0	32	28	1000		

SEMESTER V											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19AGT301	Heat Power Engineering	3	0	0	0	3	3	50/50	PCC	
2.	19AGT302	GIS and Remote Sensing	2	0	0	0	2	2	50/50	PCC	
3.		Professional Elective - I	3	0	0	0	3	3	50/50	PEC	
4.		Career Course -I & II						4		HSMC	
Theory Integrated Practical Courses											
5.	19AGB301	Farm Tractors	2	0	2	0	4	3	60/40	PCC	
6.	19AGB302	Farm Implements and Machinery	2	0	2	0	4	3	60/40	PCC	
Practical Courses											
7.	19AGP301	Mini Project –III	0	0	0	2	2	1	100/0	EEC	
8.	19AGP302	GIS	0	0	4	0	4	2	60/40	PCC	
9.	19AGP303	Heat Power Engineering Lab	0	0	2	0	2	1	60/40	PCC	
Total			16/0/10/2			28	22	800			

SEMESTER VI											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19AGT303	Dairy and Food Engineering	2	0	0	0	2	2	50/50	PCC	
2.	19AGT304	Precision Farming	2	0	0	0	2	2	50/50	PCC	
3.		Professional Elective - II	3	0	0	0	3	3	50/50	PEC	
4.		Open Elective - I	3	0	0	0	3	3	50/50	OEC	
5.		Career Course -III						2		HSMC	
Theory Integrated Practical Courses											
6.	19AGB303	Irrigation and Drainage Engineering	2	0	2	0	4	3	60/40	PCC	
Practical Courses											
7.	19AGP304	Dairy and Food Engineering Lab	0	0	2	0	2	1	60/40	PCC	
Mandatory Course											
8.	19HST105	Essence of Indian Traditional Knowledge	2	0	0	0	2	0	100/0	MC	
9.	19AGP305	Internship - II	2 Weeks					2	100/0	EEC	
Total			16/0/4/0			20	18	800			

SEMESTER VII

S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES	
Theory Courses												
1.	19GET277	Biology for Engineers	2	0	0	0	2	2	50/50	BSC		
2.	19GET201	Professional Ethics and Human Values	2	0	0	0	2	2	50/50	HSMC		
3.	19AGT401	Post Harvest Engineering	2	0	0	0	2	2	60/40	PCC		
4.		Professional Elective - III	3	0	0	0	3	3	50/50	PEC		
5.		Open Elective - II	3	0	0	0	3	3	50/50	OEC		
Theory Integrated Practical Courses												
6.	19AGB401	Solar and wind Energy	2	0	2	0	4	3	60/40	PCC		
Practical courses												
7.	19AGP401	Project - I	0	0	0	4	4	2	60/40	EEC		
8.	19AGP402	CATIA	0	0	2	0	2	1	60/40	ESC		
9.	19AGP403	Post Harvest Engineering Lab	0	0	2	0	2	1	60/40	PCC		
Total			14/0/6/4				24	19	900			

SEMESTER VIII

S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES	
Courses												
1.		MOOC / NPTEL	2	0	0	0	2	2	50/50	PCC		
Mandatory Course												
2.	19AGP404	Project - II	0	0	0	24	24	12	60/40	EEC		
Total			2/0/0/24				26	14	200			

Humanities and Social Science Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19ENB101	Communicative English	2	0	2	0	3	I
2.	19ENP101	Professional Communication	0	0	4	0	2	II
3.	19GET275	VQAR-I	2	0	0	0	2	III
4.	19GEP275	Personality Development	1	0	2	0	2	III
5.	19GET276	VQAR-II	2	0	0	0	2	IV
	Language Elective							
6.	19GEB202	Hindi	1	0	2	0	2	IV
7.	19GEB203	Japanese						
8.	19GEB204	German						
9.	19GEB205	French						
10.		Career Course- I	4	0	0	0	4	V
11.		Career Course – II						V
12.		Career Course – III						VI
13.	19GET201	Professional Ethics and Human Values	2	0	0	0	2	VII
TOTAL							21	

Basic Science Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19MAT101	Linear Algebra and Calculus	3	1	0	0	4	I
2.	19CHB101	Chemistry for Engineers	3	0	2	0	4	I
3.	19MAB102	Integral Calculus and Laplace Transforms	3	0	2	0	4	II
4.	19PYB103	Physics for Engineers	3	0	2	0	4	II
5.	19MAT201	Transforms and Partial Differential Equations	3	0	0	0	3	III
6.	19MAT202	Statistics and Numerical Methods	3	0	0	0	3	IV
7.	19GET277	Biology for Engineers	2	0	0	0	2	VII
TOTAL							24	

Engineering Science Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19MET101	Engineering Drawing	1	0	4	0	3	I
2.	19EET101	Basics of Electrical and Electronics Engineering	3	0	0	0	3	I
3.	19GEP101	Workshop Practices Laboratory	0	0	4	0	2	I
4.	19ITT101	Programming in C and Data Structures	3	0	0	0	3	II
5.	19MET102	Engineering Mechanics	3	1	0	0	4	II
6.	19ITP101	Programming in C and Data Structures Laboratory	0	0	4	0	2	II
7.	19ITP202	Python Programming	0	0	4	0	2	III
8.	19AGP203	SOLID WORKS	0	0	4	0	2	IV
9.	19AGP402	CATIA	0	0	2	0	1	VII
		TOTAL					22	

Professional Core Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19AGT101	Principles of Agricultural Engineering	2	0	0	0	2	I
2.	19MET201	Engineering Thermodynamics	3	0	0	0	3	III
3.	19AGT201	Fundamentals of Soil Science	3	0	0	0	3	III
4.	19MEB201	Fluid Mechanics and Machinery	3	0	2	0	4	III
5.	19AGB201	Surveying and Leveling	3	0	2	0	4	III
6.	19AGT202	Machine Design	3	0	0	0	3	IV
7.	19AGT203	Automation Techniques in Agriculture Engineering	2	0	0	0	2	IV
8.	19AGB202	Crop Production Technology	3	0	2	0	4	IV
9.	19AGB203	Unit Operations in Food Process Engineering	3	0	2	0	4	IV
10.	19AGB204	Biomass Conversion	3	0	2	0	4	IV
11.	19AGT301	Heat Power Engineering	3	0	0	0	3	V
12.	19AGT302	GIS and Remote Sensing	2	0	0	0	2	V
13.	19AGB301	Farm Tractors	2	0	2	0	3	V
14.	19AGB302	Farm Implements and Machinery	2	0	2	0	3	V
15.	19AGP302	GIS	0	0	4	0	2	V
16.	19AGP303	Heat Power Engineering Lab	0	0	2	0	1	V
17.	19AGT303	Dairy and Food Engineering	2	0	0	0	2	V

18.	19AGT304	Precision Farming	2	0	0	0	2	V
19.	19AGB303	Irrigation and Drainage Engineering	2	0	2	0	3	VI
20.	19AGP304	Dairy and Food Engineering Lab	0	0	2	0	1	VI
21.	19AGT401	Post Harvest Engineering	2	0	0	0	2	VII
22.	19AGB401	Solar and wind Energy	2	0	2	0	3	VII
23.	19AGP403	Post Harvest Engineering Lab	0	0	2	0	1	VII
24.		MOOC / NPTEL	2	0	0	0	2	VIII
		TOTAL					63	

Professional Electives

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.		Professional Elective – I	3	0	0	0	3	V
2.		Professional Elective – II	3	0	0	0	3	VI
3.		Professional Elective – III	3	0	0	0	3	VII
		TOTAL					9	

S.No	Course Code	Courses Offered	L	T	P	J	C
Professional Elective - I							
1.	19AGE301	Design of Agricultural processing machinery	3	0	0	0	3
2.	19AGE302	Organic Farming	3	0	0	0	3
3.	19AGE303	Hydrology and Water Resource Engineering	3	0	0	0	3
4.	19AGE304	Water and Wastewater Engineering	3	0	0	0	3
5.	19AGE305	Storage and Packaging Technology	3	0	0	0	3
Professional Elective – II							
1.	19MEE304	Total Quality Management	3	0	0	0	3
2.	19AGE306	Advancement in Seed Processing Technology	3	0	0	0	3
3.	19AGE307	Ergonomics of Farm machinery and Implements	3	0	0	0	3
4.	19AGE308	Watershed Planning and Management	3	0	0	0	3
5.	19AGE309	Agro-Energy Audit and Management	3	0	0	0	3
Professional Elective – III							
1.	19AGE401	Climate Change and Adaptation	3	0	0	0	3
2.	19AGE402	Disaster Management	3	0	0	0	3
3.	19AGE403	Energy Conservation in Agro Industry	3	0	0	0	3
4.	19AGE404	Human Engineering and Safety in Agriculture	3	0	0	0	3
5.	19AGE405	Agricultural Economics and Farm Management	3	0	0	0	3

Open Electives

S.No	Course Code	COURSES OFFERED	L	T	P	J	C
1.	19AGO301	Farm Mechanization	3	0	0	0	3
2.	19AGO302	Quality Management in Food Industry	3	0	0	0	3
3.	19AGO303	Forest Resource Management	3	0	0	0	3
4.	19AGO304	Energy Management in Agriculture	3	0	0	0	3
		TOTAL					6

Employability Enhancement Courses [EEC]

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19GEB101	Design Thinking and Innovation	1	0	0	4	3	I
2.	19AGP101	Mini Project – I	0	0	0	2	1	II
3.	19AGP201	Mini Project – II	0	0	0	2	1	III
4.	19AGP202	Internship - I	2 Weeks				2	IV
5.	19AGP301	Mini Project –III	0	0	0	2	1	V
6.	19AGP305	Internship - II	2 Weeks				2	VI
7.	19AGP401	Project - I	0	0	0	4	2	VII
8.	19AGP404	Project - II	0	0	0	24	12	VIII
		TOTAL					24	

Career Courses (UG)

S.No	Course Code	Courses Offered	Sem	L	T	P	J	C
Track 1 Job (6 Credits)	19GEP375	Technical Interviewing	V Semester	0	0	4	0	2
	19GEB375	Personnel Psychology	V Semester	1	0	2	0	2
	19GEB379	Employable Skill Development	VI Semester	1	0	2	0	2
Track 2 Entrepreneurship (6 Credits)	19GEB376	Entrepreneurship & Business Canvas Model	V Semester	2	0	4	0	4
	19GET376	Economics, Finance & Accounting	VI Semester	1	0	0	0	1
	19GET377	Intellectual Property Rights	VI Semester	1	0	0	0	1
Track 3 Higher Education	19GEB377	Advanced Verbal Quantitative Aptitude & Reasoning	V Semester	2	0	2	0	3

(6 Credits)	19GET375	Networking	V Semester	1	0	0	0	1
	19GEB380	Higher Studies in Abroad & India	VI Semester	1	0	2	0	2
Track 4 Govt. /RRB/ Bank (6 credits)	19GEB378	Foundation Course on Competitive Exams	V Semester	2	0	4	0	4
	19GEB381	Personnel Psychology for Govt Jobs	VI Semester	1	0	2	0	2

Mandatory Non Credit Courses (UG)

Course Code	Course Title
19GEP101	Workshop practices Laboratory
19GEB101	Design Thinking and Innovation
19HST105	Essence of Indian Traditional Knowledge
19HST103	Indian Constitution
19HST101	Induction Programme
19HST102	Environmental Sciences
19GET275	VQAR– I
19GEP275	Personality Development
19GET276	VQAR – II
19GEB202	Additional Language -Hindi
19GEB203	Additional Language – Japanese
19GEB204	Additional Language – German
19GET201	Professional Ethics and Human Values
19GET277	Biology for Engineers

ONE CREDIT COURSES

S.No	Course Code	COURSES OFFERED	CONTACT PERIODS	L	T	P	C
1.	19AGOC1	Hands on Training in Seed processing Machinery	15	-	-	-	1
2.	19AGOC2	Green Technologies and Environmental Protection	15	-	-	-	1
3.	19AGOC3	Plastic Applications in Agriculture	15	-	-	-	1

SEMESTER I

19MAT101	LINEAR ALGEBRA & CALCULUS	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	3	1	0	0	4
UNIT I	MATRIX EIGEN VALUE PROBLEM					9+3
Determining Eigen values and Eigenvectors – Properties of Eigen values and Eigenvectors - Some applications of Eigen value problems – Eigen value problems arising from population models (Leslie model) – Elastic deformations – Cayley Hamilton Theorem (statement only) and its applications.						
UNIT II	ORTHOGONAL TRANSFORMATION OF REAL SYMMETRIC MATRIX					9+3
Diagonalization of a real symmetric matrix–Quadratic form– Canonical form – Nature of the quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation – Some Applications: Transformation to Principal axes- Conic sections – Solving first order linear system using diagonalization.						
UNIT III	APPLICATIONS OF DIFFERENTIAL CALCULUS					9+3
Radius of Curvature in Cartesian co-ordinates – Centre and circle of curvature in Cartesian co-ordinates – Evolutes – Envelopes.						
UNIT IV	FUNCTIONS OF SEVERAL VARIABLES					9+3
Partial derivatives –Total derivatives – Jacobians – Taylor’s expansion of functions of two variables – Errors and Approximations – Maxima and Minima of functions of two variables – Lagrange’s method of undetermined multipliers.						
UNIT V	SECOND ORDER LINEAR ORDINARY DIFFERENTIAL EQUATIONS					9+3
Homogeneous Linear ODEs with constant coefficients – Linear ODE with variable coefficients - Cauchy’s and Legendre’s Equations – Method of variation of parameters – Methods of undetermined coefficients - Applications: Modelling of Free Oscillations of a Mass-Spring system.						
L : 45 T:15 P: 0 J: 0 Total: 60 PERIODS						

TEXT BOOKS

- 1 B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.
2. James Stewart, Calculus, 7th Edition, Cengage Learning, 2012.

REFERENCES

- 1 Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2018.
- 2 Howard Anton, Elementary Linear Algebra, 11th Edition, Wiley, 2013.
- 3 David C Lay, Linear Algebra and its applications, Pearson, 2018.
- 4 G.B.Thomas, Calculus, 12th Edition, Pearson Education India, 2015.
- 5 T.Veerarajan, Engineering Mathematics, 3rd Edition, Tata McGraw-Hill, New Delhi, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about Eigen values and Eigen vectors and its role in the system of equations.
- CO2** Transform the real symmetric matrix from quadratic form to canonical form by means of orthogonal transformation.
- CO3** Determine the radius, centre and circle of curvature of any curve.
- CO4** Expand the given function as series and locate the maximum and minimum for multivariate function and also using mathematical software.
- CO5** Solve the second order linear differential equations with various methods and apply them in some physical situations.

19MET101

ENGINEERING DRAWING
(Common to all Non Circuit Branches)

L T P J C
1 0 4 0 3

UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES 3+12

Projection of points - Projection of straight lines located in the first quadrant -Determination of true lengths and true inclinations - Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT II PROJECTION OF SOLIDS 3+12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method

UNIT III SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 3+12

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other -Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids -Prisms, pyramids, cylinders and cones.

UNIT IV PICTORIAL PROJECTIONS AND FREE HAND SKETCHING 3+12

Principles of isometric projection -isometric scale -isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method (Not for Examination).

Free hand sketching:

Representation of Three Dimensional objects -Need for importance of multiple views and their placement -First angle projection -layout views -Developing visualization skills through free hand sketching of multiple views from pictorial drawing.

UNIT V BUILDING DRAWING 3+12

Drawing of a plan, Elevation and sectioning of security room and residential building (Two bed rooms, kitchen, hall, etc.)

L : 15 T: 0 P: 60 J: 0 Total: 75 PERIODS

TEXT BOOKS

1. N.D. Bhatt and V.M. Panchal, "Engineering Drawing", Charotar Publishing House, 53rd Edition,2016.
2. K. R. Gopalakrishnan, "Engineering Drawing" (Vol.I & II), Subhas Publications,2014.

REFERENCES

- 1 K.V.Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai ,2015.
- 2 M.S.Kumar, "Engineering Graphics", D.D. Publications, 2011.
- 3 K.Venugopal & V.Prabhu Raja, "Engineering Graphics", New Age International (P) Limited ,2014.
- 4 M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education ,2011.
- 5 K.L. Narayanan and P. Kannaiah, "Engineering Drawing" SciTech Publications, 2nd edition, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Sketch the projections of a points, straight lines and plane surfaces.
- CO2** Illustrate top view and front view of the solids
- CO3** Sketch sectioned views and develop area required.
- CO4** Demonstrate knowledge about isometric, perspective and orthographic projections
- CO5** Design simple buildings with detailed plan and sectional elevation.

19EET101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	J	C
	(Common to all Non circuit branches)	3	0	0	0	3
UNIT I	ELECTRICAL CIRCUITS & MEASUREMENTS				9	
Elementary concepts of electric circuits - Ohm's Law – Kirchoff's Laws – Introduction to AC Circuits – Peak value and RMS values – Power and Power factor						
Operating Principles of Moving coil and Moving iron instruments (Ammeters and Voltmeters), Dynamometer type wattmeter, Energy meter						
UNIT II	ELECTRICAL MACHINES				9	
Construction, Principle of operation, Basic equations and applications of DC Generator, DC Motor- Elementary treatment of Single phase Transformer , Single and three phase Induction Motors						
UNIT III	WIRING, GROUNDING AND SAFETY				9	
Wiring: General Rules, materials and accessories, Types of wiring - Conduit wiring – Wiring layout of Residential building, Grounding: Importance of grounding, Types of grounding - Safety: Causes of accidents, Accident prevention.						
Design of residential wiring using DT concept.						
UNIT IV	ANALOG ELECTRONICS				9	
Construction, working principle and VI characteristics of Diode, Zener diode, BJT, MOSFET, Applications: Half wave and Full wave Rectifiers , Voltage regulators, UPS						
UNIT V	LINEAR AND DIGITAL ELECTRONICS				9	
Ideal OP-AMP characteristics, Inverting and Non-inverting Amplifiers, Applications: summer, clipper and clamper						
Boolean Algebra-Theorems-Logic Gates - Half Adder and Full Adders - Flip flops, A/D and D/A Conversion (Any one concept)						

L : 45 T: 0 P:0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Muthusubramanian R, Salivahanan S, “Basic Electrical and Electronics Engineering”, Tata McGraw Hill Publishers,(2009).
2. Bhattacharya. S.K, “Basic Electrical and Electronics Engineering”, Pearson Education, (2017).

REFERENCES

- 1 V. Mittle “Basic Electrical Engineering”, Tata McGraw Hill Publishers, (2017)
- 2 Mehta V K, Mehta Rohit, “Principles of Electrical Engineering and Electronics”, S.Chand & Company Ltd, (2010)
- 3 Black & Decker , “The complete guide to Electrical Wiring” , S.Chand & Company Ltd,(2012)
- 4 Nagrath. I.J, “Electronics: Analog and Digital”, Prentice Hall India Pvt. Ltd., (2013),
- 5 Mehta V K, Mehta Rohit, “Principles of Electronics”, S.Chand & Company Ltd, (2005)

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Familiarize the elementary concept of electric circuits and measuring instruments
- CO2** Understand the construction , operation and applications of electrical machines
- CO3** Apply the concept of wiring and acquire the importance of grounding and safety
- CO4** Gain knowledge on electronic devices and its applications
- CO5** Acquire knowledge on basics of linear and digital electronics

10. Estimation of Iodine in common sail by Iodometry

L :45 T: 0 P: 30 J: 0 T:75 PERIODS

TEXT BOOKS

- 1 O.G.Palanna, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi.2017.
2. Wiley, "Engineering Chemistry", John Wiley & Sons, Inc, USA (2014]

REFERENCES

- 1 B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2009).
- 2 R. Sivakumar and N Sivakumar, "Engineering Chemistry" Tata McGraw-Hill, Pub.Co.Ltd. New Delhi.2009
- 3 Dr.Sivanesan and Nandagopal, "Engineering Chemistry-I" V.K.Pub.Pvt.Ltd. 2011.
- 4 P.C.Jain & Monicka Jain, "Engineering Chemistry" ,Dhanapat Rai Publishing Company Pvt.Ltd. 2017.
- 5 Engineering chemistry (NPTEL e-Web book) by B.L.Tembe, Kamaluddin and M.S.Krishnan

COURSE OUTCOMES :

At the end of the course student should be able to:

- CO1** Develop new strategy for protection of metals and to improve engineering design
- CO2** Design environmentally benign method for nanoparticle synthesis
- CO3** Acquire knowledge on various types of fuels and applications of engineering materials.
- CO4** Develop innovative and eco-friendly method for water purification .
- CO5** Develop analytical proficiency through lab skill sets to demonstrate in professional practice

19GEP101	WORKSHOP PRACTICES LABORATORY	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	0	0	4	0	2

LIST OF EXPERIMENTS

GROUP A (CIVIL & MECHANICAL) 30

CIVIL ENGINEERING 12

Study of plumbing tools and Components

Preparation of threads in pipes

Preparation of single and multi-tap connections for domestic

Study of carpentry tools and its applications

Preparation of Cross Lap and Dove Tail Joints.

MECHANICAL ENGINEERING 18

Study of different types of Welding and its applications

Preparation of Butt, Lap and Tee joints

Study of sheet metal and its applications

Preparation of Rectangular, Square Trays and Funnel

Demonstration of Lathe and Drilling Operations

Demonstration of Smithy and Foundry tools.

GROUP B (ELECTRICAL AND ELECTRONICS) 30

ELECTRICAL ENGINEERING PRACTICE 18

Residential house wiring using switches, fuse, miniature circuit breaker, indicator, Lamp and energy meter.

Fluorescent lamp wiring.

Stair-case wiring.

Measurement of electrical quantities –voltage, current, power & power factor in RL Circuit.

Measurement of energy using single phase energy meter.

Measurement of insulation resistance to earth of electrical equipment.

Measurement of single and three phase voltages.

Study of Iron Box, Emergency Lamp and Fan.

ELECTRONICS ENGINEERING PRACTICE 12

Study of Electronic components and equipments –Resistor, color coding, measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.

Verification of logic gates: AND, OR, Ex-OR and NOT.

Generation of Clock Signal.

Soldering practice –Components Devices and Circuits Using general purpose PCB.

Characteristics of a PN Junction diode

L : 0 T: 0 P: 60 J: 0 Total:60 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Demonstrate plumbing system and Carpentry for the required applications.

CO2 Relate the basic machining operations with engineering problems.

CO3 Apply different types of Welding processes and Sheet metal processes for the Industrial applications.

CO4 Illustrate Residential House wiring and simple wiring circuits.

CO5 Employ knowledge on measuring electrical quantities and usage of energy meters.

19HST103	INDIAN CONSTITUTION	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	0	0	0

UNIT I INTRODUCTION 6

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT 6

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III STRUCTURE AND FUNCTION OF STATE GOVERNMENT 6

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV CONSTITUTION FUNCTIONS 6

Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries – Assessment of working of the Parliamentary System in India.

UNIT V ELECTION COMMISSION 6

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

L :30 T: 0 P: 0 J: 0 T:30 PERIODS

TEXT BOOKS

- 1 Durga Das Basu, “Introduction to the Constitution of India”, Prentice Hall of India, New Delhi.
- 2 R.C.Agarwal, “Indian Political System”, S.Chand and Company, New Delhi. (1997)

REFERENCES

- 1 Maciver and Page, “ Society: An Introduction Analysis “, Mac Milan India Ltd., New Delhi.
- 2 K.L.Sharma, “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi. (1997)
- 3 Sharma, Brij Kishore, “Introduction to the Constitution of India”, Prentice Hall of India, New Delhi.
- 4 U.R.Gahai, “Indian Political System”, New Academic Publishing House, Jalaendhar.
- 5 R.N. Sharma, “Indian Social Problems”, Media Promoters and Publishers Pvt. Ltd.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the functions of the Indian government
- CO2** Know the structure and functioning of central government.
- CO3** Understand functioning of Indian constituent.
- CO4** Analyze the functions of the Indian government
- CO5** Summarize the functioning of election commission.

STRUCTURE FOR STUDENT INDUCTION PROGRAM**STUDENT INDUCTION PROGRAM - PURPOSE & CONCEPT**

Purpose of the Student Induction Program is to help new students adjust and feel comfortable in the new environment, inculcate in them the ethos and culture of the institution, help them build bonds with other students and faculty members, and expose them to a sense of larger purpose and self exploration. The term induction is generally used to describe the whole process whereby the incumbants adjust to or acclimatize to their new roles and environment. In other words, it is a well planned event to educate the new entrants about the environment in a particular institution, and connect them with the people in it. Student Induction Program engages with the new students as soon as they come into the institution; regular classes start only after that. At the start of the induction, the incumbants learn about the institutional policies, processes, practices, culture and values, and their mentor groups are formed. Then the different activities start, including those which are daily.

Here is a list of activities:

- Physical Activity
- Creative Arts and Culture
- Mentoring & Universal Human Values
- Familiarization with College, Dept./Branch
- Literary Activity
- Proficiency Modules
- Lectures & Workshops by Eminent People
- Visits in Local Area
- Extra-Curricular Activities in College
- Feedback and Report on the Program

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. These are included under Proficiency Modules.

There will be a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

DAILY ACTIVITY

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

PHYSICAL ACTIVITY

This would involve a daily routine of physical activity with games and sports. There would be games in the evening or at other suitable times according to the local climate. These would help develop team work besides health. Each student could pick one game and learn it for the duration of the induction program and hopefully, continue with it later.

CREATIVE ARTS

Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, music, dance, pottery, sculpture etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.

MENTORING AND UNIVERSAL HUMAN VALUES

Mentoring and connecting the students with faculty members is the most important part of student induction. Mentoring takes place in the context and setting of *Universal Human Values*. It gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer pressure and take decisions with courage, be aware of relationships and be sensitive to others, understand the role of money in life and experience the feeling of prosperity. Need for character building has been underlined by many thinkers, universal human values provide the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but by getting the students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values.

The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Experiments in this direction at IIT(BHU) are noteworthy and one can learn from them. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the Induction program. Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

OTHER ACTIVITY

Activities that are not there on a daily basis, but are conducted for 3-4 days (typically in the afternoons) and change thereafter.

FAMILIARIZATION WITH COLLEGE, DEPARTMENT/BRANCH

The incoming students should be told about the credit and grading system, and about the examinations. They should be informed about how study in college differs from study in school. They should also be taken on a tour of the college and shown important points such as library, canteen, and other facilities. They should be shown their department, and told what it means to get into the branch or department. Describe what role the technology related to their department plays in society and after graduation what role the student would play in society as an engineer in that branch. A lecture by an alumnus of the Dept. would be very helpful in this regard. They should also be shown the laboratories, workshops and other facilities. The above should be done right in the first two days, and then over the afternoons thereafter, as appropriate.

LITERARY ACTIVITY

Literary activity would encompass reading a book, writing a summary, debating, enacting a play etc.

PROFICIENCY MODULES

The induction program period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.

LECTURES & WORKSHOPS BY EMINENT PEOPLE

Lectures by eminent people should be organized, say, once a week. It would give the students exposure to people who are eminent, in industry or engineering, in social service, or in public life. Alumni could be invited as well. Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, Vivekananda Kendra's, S-VYASA, etc. may be organized. Workshops which rejuvenate or bring relief to students would also be welcome, such as, Art of Living workshops (3 sessions, 9 hours).

VISITS IN LOCAL AREA

A couple of visits to the local landmarks including historical monuments should be organized. This would familiarize the students with the area together with bonding with each other, like in a picnic. Visits should also be organized to a hospital, orphanage or a village. These would expose them to people in suffering or to different lifestyles. This might also sensitize them to engineering needs in these areas.

EXTRA-CURRICULAR ACTIVITIES IN COLLEGE

The new students should be introduced to the extra-curricular activities at the college university. They should be shown the facilities and informed about activities related to different clubs etc. This is when selected senior students involved in or leading these activities can give presentations, under faculty supervision.

FEEDBACK AND REPORT ON THE PROGRAM

Students should be asked to give their mid-program feedback. They should be asked to write their opinions about the program at the end of the first week or so. The feedback should be used to make any mid-course correction, if any. Finally, at the end of the program, each group (of 20 students) should be asked to prepare a single report on their experiences of the program. On the second last day, each group should present their report in front of other groups. Immediately after their presentation, they should submit their written report. This will also serve as a closure to the program. Finally, a formal written or online anonymous feedback should be collected at the end of the program.

SEMESTER II

19ITT101	PROGRAMMING IN C AND DATA STRUCTURES	L	T	P	J	C
	(Common to Aero, Agri, Auto, Civil, FT, Mech, MCT)	3	0	0	0	3
UNIT I	INTRODUCTION TO C					8
	Basic blocks of computers – Algorithm, Pseudo code, Flowchart - Structure of C program- Data types - Variables - Constants, Operators - Input and Output Statements					
UNIT II	DECISIONS STATEMENTS AND FUNCTIONS					11
	Decision making and Branching statements - Looping statements, Functions, Call by value, Call by reference					
UNIT III	ARRAYS AND INTRODUCTION TO DATA STRUCTURES					10
	Arrays - One dimensional arrays - Two dimensional Arrays - Structures – Pointers Introduction to Data structures - Types of Data structures - ADT					
UNIT IV	STACK AND QUEUE					9
	Stack ADT - Queue ADT - Array implementation of Queue and Stack ADT - Infix to Postfix conversion - Postfix expression evaluation					
UNIT V	TREES					7
	Trees - Binary Tree - Binary Search Tree - Insertion and Deletion Operation - Tree Traversal					
	L : 45 T: 0 P:0 J: 0 Total: 45 PERIODS					

TEXT BOOKS

- 1 Kamthane Ashok, "Programming in C, Pearson Education India 3/e, 3rd Edition, 2015.
- 2 Aaron M. Tenenbaum, Yedidiah Langsam, Moshe Augenstein, "Data Structures Using C", Prentice-Hall of India, 2003

REFERENCES

- 1 A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2nd Edition, 2007. (Unit III-V)
- 2 A. M. Tenenbaum, Y. Langsam and M. J. Augenstein, "Data Structures using C", Pearson Education, 2nd Edition, 1998.(Unit III-V)
- 3 E. Balagurusamy, "Fundamentals of Computing and Computer Programming", Tata McGraw-Hill Publishing Company Limited, (2011). (UNIT I, II)

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand and describe the role of front-end development in modern web applications
- CO2** Act like a professional front-end developer.
- CO3** Able to analyze problems, seek for needed information, apply a solution, verify it
- CO4** See the alternative ways for creating a front-end
- CO5** Able to discuss and take into use more front-end technologies.

19MET102	ENGINEERING MECHANICS	L	T	P	J	C
	(Common to All Non Circuit Branches)	3	1	0	0	4
UNIT I	BASICS & STATICS OF PARTICLES					9+3
Introduction -Units and Dimensions -Vectorial representation of forces and moments -Coplanar Forces -Laws of Mechanics -Lame's theorem, Parallelogram and triangular Law of forces - Resolution and Composition of forces -Equilibrium of a particle - Principle of transmissibility - Single equivalent force - Free body diagram						
UNIT II	EQUILIBRIUM OF RIGID BODIES					9+3
Types of supports and their reactions -requirements of stable equilibrium -Moments and Couples- Moment of a force about a point and about an axis -Vectorial representation of moments and couples - Scalar components of a moment -Varignon's theorem -Equilibrium of Rigid bodies in two dimensions -Forces in space -Equilibrium of a particle in space - Equivalent systems of forces - Equilibrium of Rigid bodies in three dimensions -Examples						
UNIT III	PROPERTIES OF SURFACES AND SOLIDS					9+3
Determination of centroid of areas, volumes and mass - Pappus and Guldinus theorems - moment of inertia of plane and areas- Parallel axis theorem and perpendicular axis theorem, radius of gyration of area- product of inertia- mass moment of inertia.						
UNIT IV	DYNAMICS OF PARTICLES					9+3
Displacements, Velocity and acceleration, their relationship - Relative motion -Curvilinear motion - Newton's law -Work Energy Equation of particles -Impulse and Momentum -Impact of elastic bodies.						
UNIT V	FRICTION AND RIGID BODY DYNAMICS					9+3
Friction force - Laws of sliding friction - equilibrium analysis of simple systems with sliding friction - wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.						
		L : 45	T: 0	P: 15	J: 0	Total: 60 PERIODS

TEXT BOOKS

1. Ferdinand P.Beer, E.Russell Johnston Jr "Vector Mechanics for Engineers", 11th Edition, McGraw-Hill Education, (India) Pvt Ltd, 2016.
2. J.L.Meriam & L.G. Karidge, "Engineering Mechanics: Dynamics", 8th edition, Wiley student edition, 2016.

REFERENCES

- 1 Vela Murali, "Engineering Mechanics", Oxford University Press ,2010
- 2 D.P.Sharma "Engineering Mechanics", Dorling Kindersley (India) Pvt. Ltd, New Delhi,2010.
- 3 Dr.I.S Gujral "Engineering Mechanics",Second edition, , Lakshmi Publication (P).Ltd,2011.
- 4 Arthur P.Boresi and Richard J.Schmidt, "Engineering Mechanics : Statics and Dynamics",Thomson Asia Private Limited, Singapore, 2010.
- 5 Hibbeler, R.C., "Engineering Mechanics", 14th edition, Prentice hall ,2016.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Recognize the basics of equilibrium of particles in 2D and 3D
- CO2** Review the requirements of equilibrium of rigid bodies in 2D and 3D
- CO3** Compute the center of mass and moment of inertia of surfaces and solids
- CO4** Predict displacement, velocity and acceleration of dynamic particles
- CO5** Solve for friction force and rigid body dynamics

19AGT101

**PRINCIPLES OF AGRICULTURAL
ENGINEERING**

L T P J C

2 0 0 0 2

UNIT I INTRODUCTION TO AGRICULTURAL ENGINEERING 6

Introduction to Agriculture – Impact of green revolution on food production- Contribution of Agriculture to the GDP of the nation – Introduction to Agriculture Engineering and its branches-organic agriculture-precision farming.

UNITII SOIL AND WATER CONSERVATION ENGINEERING 6

Soil & water – Soil health - Soil quality- Soil health and crop production relationship-Soil conservation methods – Climate - Agro meteorology – Instruments used for measuring different parameters of climate -Sources of water – Tanks – Wells & Reservoirs –Overview of irrigation methods.

UNIT III FARM STRUCTURES, FARM MACHINERY & EQUIPMENT 6

Farm structures- Farm Roads, Cattle sheds, Stanchion barn, Poultry shed, Hog housing, Machinery and implement shed, Storage structures for food grain, feed & forage - Structures for Plant environment - Green houses, Poly houses – Shade net- Farm Machinery -Tractor and Power Tiller – Farm operations using implements

UNIT IV AGRICULTURAL PROCESS ENGINEERING 6

Post harvest losses of crops - Role of processing in minimizing losses - Importance of value addition of farm produce -Unit operations in agricultural processing – Equipments used for processing, handling and packaging of agricultural produces – Processing of Milk and dairy products.

UNIT V AGRO ENERGY 6

Types of Energy used in the farms-energy requirement in agricultural operations – Application of renewable energy in Agriculture- Solar, Wind Biogas and biomass energy –Utilization of Agro residues using improved chulas and biomass gas stove

L : 30 T: 0 P: 0 J: 0 Total: 30 PERIODS

TEXT BOOKS

- 1 Michael, A.M. & Ojha, T.P. “Principles of Agricultural Engineering Vol. I & II”, Seventh Edition, Jain Brothers, New Delhi, 2011
- 2 Jagdishwar Sahay. “Elements of Agricultural Engineering”, Standard Publishers Distributors, 2010

REFERENCES

- 1 Harry L. Field, John B. Solie, Introduction to Agricultural Engineering Technology – A problem solving approach, Springer Science, NY, USA, 2007.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Describe about basics of Agri Engg.
- CO2** Display about the fundamentals of Soil and water Conservation Engg.
- CO3** Describe the different farm structures and farm equipments
- CO4** Explain about the agricultural processing operations and machinery
- CO5** Summarize the applications of renewable energy in agriculture

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Evaluate area and volume in Cartesian coordinates using double and triple integrals and also using mathematical software.
- CO2** Evaluate gradient, divergence and curl and solve engineering problems involving cubes, rectangular parallelepipeds by applying various integral theorems. Apply mathematical software to find gradient, divergence and curl.
- CO3** Test the analyticity, construct the analytic function and transform complex functions from z-plane to w-plane graphically by using conformal mapping.
- CO4** Evaluate real and complex integrals over suitable closed path using various integral theorems.
- CO5** Apply Laplace transform techniques, transform functions in time domain to frequency domain and solve ordinary differential equation by using mathematical software.

UNIT I CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures.

UNIT II QUANTUM PHYSICS 9

Black body radiation – Planck’s theory (derivation) – Deduction of Wien’s displacement law and Rayleigh – Jean’s Law from Planck’s theory – Compton effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment-Physical significance of wave function - Schrödinger’s wave equation – Time independent and time dependent equations– Particle in a one dimensional box –Electron microscope-Tunnelling electron microscope.

UNIT III ELASTICITY 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT IV NON-DESTRUCTIVE TESTING 9

Introduction- Types of defects-Methods of NDT-Visual inspection- Liquid/Dye penetrant testing- Magnetic particle testing-Eddy current testing- Ultrasonic inspection method-Advantages-X-Ray radiography- X-ray fluoroscopy-Comparison of conventional and real time radiography.

UNIT V VACUUM TECHNOLOGY 9

Introduction-Units of Vacuum- Vacuum ranges- Production of Vacuum- Classification of Vacuum pumps-Rotary Oil pumps-Diffusion oil pump-turbomolecular pump-cryopumps-Vacuum gauges-thermocouple gauge- vacuum technology-Application of vacuum-High vacuum systems- Thin film deposition.

LIST OF EXPERIMENTS(ANY FIVE)

1. Determination of Young’s modulus of the material – uniform bending.
2. Tensional Pendulum - determination of rigidity modulus of wire and moment of inertia of disc.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
4. Determination of viscosity of liquid – Poiseuille’s method.
5. Determination of thickness of a thin wire – Air wedge method.
6. Determination of Band gap of semiconductor material.

L :45 T: 0 P: 30 J: 0 T: 75 PERIODS**TEXT BOOKS**

- 1 Gaur R.K. And Gupta S.L, “Engineering Physics”, Dhanpat Rai publishers, 2013
- 2 Dr.M.N.Avandhanulu, Dr.P.G.Kshirsagar, “A Text book of Engineering Physics”, S.Chand,

REFERENCES

- 1 Rajendran.V, Engineering Physics,Tata Mcgraw-Hill Publishing Company Limited, New Delhi.2017
- 2 Engineering Physics, Wiley, 2013
- 3 A.S.Vasudeva, “Modern Engineering Physics”, S.Chand, 2001
- 4 B.K.Pandey Chaturvedi, “Engineering Physics”, Cengage Learning, 2012
- 5 Charles Kittel, “Solid State Physics”, Wiley(2009),

COURSE OUTCOMES :

At the end of the course student should be able to:

- CO1** Understand the properties of the crystalline materials.
- CO2** Understand the basics of quantum mechanics
- CO3** Analyze the elastic properties of the materials.
- CO4** Understand various Non-Destructive testing methods.
- CO5** Understand various Non-Destructive testing methods.

19ENP101	PROFESSIONAL COMMUNICATION	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	0	0	4	0	2
UNIT I	INTRODUCTION TO COMMUNICATION					10
	Introduction to communication, The process of communication, Barriers to communication – Verbal & Nonverbal communication, Body language.					
UNIT II	READING AND LISTENING SKILLS					10
	Reading and Summarizing – Precis writing – Phrase Reading – Listening to TED Talks – Listening to conversations.					
UNIT III	PROFESSIONAL WRITING					10
	Resume & cover letter – Proposal writing (Project/Business proposal) - Business Letter (Quotations, Clarification, Placing orders & Complaint letter).					
UNIT IV	SPEAKING					15
	Persuasive Speaking – Public Speaking – Negotiation Skills – Telephone Etiquettes – Group Discussion - Team building – Interview skills.					
UNIT V	SOFT SKILLS					15
	Time Management - Stress Management – Inter & Intra personal skills – Professional ethics - Professional Networking & Social Skill.					

L : 0 T: 0 P:60 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.
2. Professional Communication - Aruna Koneru—Oxford University Press, New Delhi.

REFERENCES

- 1 A Modern Approach to Verbal and Non-verbal Reasoning-R.S.Agarwal- S.Chand & Co., New Delhi.
- 2 Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007.
- 3 Mitra K. Barun, “ Effective Technical Communication – A Guide for Scientists and Engineers”, Oxford University Press, New Delhi, 2006.
- 4 Jeff Butterfield, “Soft skills for everyone”, Cengage Learning, New Delhi, 2011.
- 5 Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Perceive the importance of verbal and non-verbal communication in the professional world along with its uses.
- CO2** Develop reading skills and listening skills by familiarizing them with different strategies.
- CO3** Acquire letter writing skills for effective communication both in formal and informal situations.
- CO4** Speak clearly, confidently, comprehensively, and communicate with one or many listeners using appropriate communicative strategies.
- CO5** Face the challenges of the globalized world with confidence and with the best communicative skills.

19ITP101	PROGRAMMING IN C AND DATA STRUCTURES LABORATORY	L	T	P	J	C
	(Common to Aero, Agri, Auto, Civil, FT, Mech,MCT)	0	0	4	0	2

LIST OF EXPERIMENTS

1. Algorithms and Flow Chart
 - i) Sequential
 - ii) Branching and Looping
2. Operators & Expressions
 - i) Arithmetic
 - ii) Logical
 - iii) Relational
3. Condition Statements
 - i) Nested if else
 - ii) Else-if Ladder
4. Looping
 - i) For
 - ii) While
 - iii) Do-while
5. Functions
 - i) With and without arguments
 - ii) With and without return type
 - iii) Call by value and Call by reference
6. Arrays
 - i) Searching element in one dimensional array
 - ii) Matrix multiplication
7. Structures
8. Pointers
9. Implementation of Stack ADT
10. Implementation of Queue ADT
11. Implementation of Tree Traversal
12. Implementation of Binary Search Tree ADT

L : 0 T : 0 P : 60 J : 0 Total:60 PERIODS

HARDWARE / SOFTWARE REQUIRED

(For a Batch of 30 Students)

- | | |
|-----------------|---|
| Hardware | <ul style="list-style-type: none"> • 30 PCs with Processor-2.0 GHz orHigher • RAM-1 GB orHigher • Hard disk-20 GB orHigher |
| Software | <ul style="list-style-type: none"> • TURBO C version 3 (or) GCC version3.3.4 • OS-Windows2000/WindowsXP/NT |

COURSE OUTCOMES

At the end of the course students should be able to

CO 1: develop algorithm and draw flow chart to solve problem.

CO 2: write simple programs using basic concepts and control statements in C language.

CO 3: write programs using arrays, structures and pointers.

CO 4: implement stack and queue data structure

CO 5: implement binary search tree ADT

19AGP101

MINI PROJECT -I

L	T	P	J	C
0	0	0	2	1

LIST OF EXPERIMENTS

A batch of four students will carry out the mini project on emerging areas of Agriculture Engineering under the guidance of a faculty. The project outlines the involvement of the students to utilize the knowledge of Mathematics, Science and Engineering for different applications in agriculture. Three reviews will be conducted throughout the semester and a combined project report to be submitted along with a viva voce for the end semester evaluation.

L : 0 T: 0 P: 0 J: 30 Total:30 PERIODS

SEMESTER III

19MAT201	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	3	0	0	0	3
UNIT I	FOURIER SERIES					9
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.						
UNIT II	FOURIER TRANSFORMS					9
Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem– Parseval's identity.						
UNIT III	PARTIAL DIFFERENTIAL EQUATIONS					9
Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second order with constant coefficients (Homogeneous Problems).						
UNIT IV	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS					9
Classification of partial differential equations -Solutions of one dimensional wave equation – One dimensional equation of heat Conduction – Steady state solution of two-dimensional equation of heat conduction (Excluding Infinite plate & Insulated edges).						
UNIT V	Z -TRANSFORMS					9
Z-transforms – Elementary properties – Inverse Z - Transform – Convolution theorem –Formation of difference equation –Solution of difference equations using z-transforms.						
		L : 45	T:0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 Grewal, B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017.
2. Ramana, B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2014.

REFERENCES

- 1 Bali, N.P. and Manish Goyal, "A Textbook of Engineering Mathematics", Fifth Edition, Laxmi Publications (P) Ltd., 2014.
- 2 Glyn James, "Advanced Modern Engineering Mathematics", Fourth Edition, Pearson Education, 2013.
- 3 Erwin Kreyszig, "Advanced Engineering Mathematics", Tenth Edition, Wiley India, 2015.
- 4 Dr. Sanjay Sharma., "Signals and Systems", S.K.Kataria & Sons, Publisher of Engineering & Computer Books, New Delhi, 2012.
- 5 Whlie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics" Tata Mcgraw Hill Education Pvt.Ltd, 6th Edition, New Delhi, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- CO2** Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- CO3** Form partial differential equations and solve certain types of partial differential equations.
- CO4** Know how to solve one dimensional wave equation, one dimensional heat equation and two dimensional heat equation in steady state using Fourier Series.
- CO5** Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

19MET201	ENGINEERING THERMODYNAMICS	L	T	P	J	C
	(Use of approved Steam tables is permitted)					
	(Common to Mech, Agri & FT)	3	0	0	0	3
UNIT I	BASIC CONCEPTS AND FIRST LAW					9
	Basic concepts - concept of continuum - comparison of microscopic and macroscopic approach - Path and point functions - Intensive and extensive - total and specific quantities - System and their types - Thermodynamic Equilibrium State - path and process - Quasi - static - reversible and irreversible processes - Heat and work transfer - definition and comparison - sign convention - Displacement work and other modes of work - P - V diagram - Zeroth law of thermodynamics - First law of thermodynamics –application to closed and open systems -steady flow processes and its applications.					
UNIT II	PROPERTIES OF PURE SUBSTANCE					9
	Formation of steam and its thermodynamic properties - P-V, P-T, T-V, T-s, h-s diagrams. P -V-T surface - Use of Steam Table and Mollier Chart - Determination of dryness fraction using Throttling, Separating and Throttling - Application of I law for pure substances.					
UNIT III	SECOND LAW					9
	Second law of Thermodynamics - Statements of second law and its corollaries - Carnot cycle - Reversed Carnot cycle - Performance - Carnot theorem - Clausius equality – inequality. Qualitative Treatment only: Concept of Entropy -T-s diagram -entropy change for pure substance - ideal gases - different processes - principle of increase in entropy - Applications of II Law –exergy analysis and its applications					
UNIT IV	STEAM POWER CYCLES					9
	Ideal and actual Rankine cycles - Cycle Improvement Methods - Reheat and Regenerative cycles, Qualitative Treatment only: Economiser - preheater – Superheater- Condenser- Cogeneration Introduction - Binary and Combined cycles.					
UNIT V	IDEAL AND REAL GASES, GAS MIXTURE, THERMODYNAMIC RELATIONS					9
	Mole and Mass fraction - Dalton’s. Properties of gas mixture -Molar mass - gas constant - density. Properties of Ideal gas - Ideal and real gas comparison - Equations of state for ideal and real Gases - Reduced Properties - Compressibility Factor - Maxwell relations - Tds Equations - Difference and ratio of heat Capacities - Energy Equation -Joule -Thomson Coefficient - Clausius - Clapeyron equation and its applications.					
		L : 45	T: 0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

1. Nag.P.K., “Engineering Thermodynamics”, 5th Edition, Tata McGraw - Hill, New Delhi, 2013.
2. Cengel. Y and M.Boles, "Thermodynamics - An Engineering Approach", 8th Edition, Tata McGraw Hill 2014.

REFERENCES

- 1 Moran, Shapiro, Boettner & Bailey "Principles of Engineering Thermodynamics:" Wiley & Sons, 2015.
- 2 Holman.J.P. "Thermodynamics", 3rd Edition, McGraw - Hill, 1995.
- 3 Rathakrishnan. E., "Fundamentals of Engineering Thermodynamics", 2nd Edition, Prentice - Hall of India Pvt. Ltd, 2006
- 4 Arora C.P, “Thermodynamics”, Tata McGraw - Hill, New Delhi, 2007.
- 5 Kau - Fui Vincent Wong, "Thermodynamics for Engineers", CRC Press, 2010 Indian Reprint.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Describe the laws of thermodynamics and their application to a open and closed of systems.
- CO2** Determine dryness fraction of pure substances undergoing processes using Mollier entropy in real time applications.
- CO3** Demonstrate Carnot, Clausius equality and Inequality theorems and apply the principles of entropy in real time applications
- CO4** Illustrate the principles of various steam power cycles and to solve problems related to steam undergoing various processes
- CO5** Analyze the properties of ideal, real and its gas mixtures and apply the knowledge of mathematical relations in thermodynamic equations.

UNIT I CLASSIFICATION AND FORMATION OF SOILS**9**

Pedological and edaphological concepts - Definition of soil, rocks and minerals-Soil formation - Factors affecting soil formation processes –Weathering - Physical, chemical and biological weathering of soil

UNIT II PHASE RELATIONSHIP OF SOIL**9**

Soil texture and textural classes – Soil textural classification - Soil structure and classification – Gradation analysis- Soil consistency- Major types of soils in Tamil Nadu - Major soil types of India.

UNIT III PROPERTIES OF SOIL**9**

Properties of Soil – Physical physical properties of soil and their significance – Bulk density, particle density and porosity

UNIT IV SOIL WATER AND SOIL ORGANISMS**9**

Soil water - Soil water potentials – Soil moisture constants- Water movement -Infiltration, hydraulic conductivity, percolation, permeability and drainage – Soil pH, Soil EC – Soil Micro organisms - Beneficial and harmful effects.

UNIT V SOIL FERTILITY**9**

Soil organic matter – C : N ratio, Carbon cycle – Nitrogen cycle – Humus formation - Soil fertility - Soil nutrients - significance of macro and micro nutrients – Soil testing – Water testing - Soil test and water test report

L : 45 T : 0 P : 0 J : 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 T.D. Biswas and S.K. Mukherjee, Text Book of Soil Science, 2nd Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2001.
- 2 Dilip Kumar Das, Introductory Soil Science, 3rd Edition, Kalyani Publishers, Ludhiana, 2013.

REFERENCES

- 1 Indian Society of Soil Science, Fundamentals of Soil Science, ISSS Publication, IARI, New Delhi, 2012.
- 2 Brady, N.C.,2002 The Nature and Properties of Soils (13th Edition) McMillan Co., New York.
- 3 Indian Publisher – Eurasia Publishing House (P) Ltd., Ramnagar, New Delhi
- 4 Daji A.J., (1970) A Text Book of Soil Science - Asia Publishing House, Madras.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know the various processes involved in soil formation
- CO2** Possess the knowledge on different methods and procedures to test the important properties of soil
- CO3** Get the knowledge about soil, water and plant relationship.
- CO4** Know the properties of soil colloids
- CO5** Apply the knowledge on soil nutrients for the cultivation of crops

UNIT-I FLUID PROPERTIES AND FLOW CHARACTERISTICS 9 + 6

Units and dimensions - Properties of fluids - mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, surface tension and capillarity. Pascal's law and hydrostatic law. Absolute, gauge and vacuum pressures. Pressure measurement devices - U-tube manometers, pressure gauges. Flow characteristics -concept of control volume - application of continuity equation, energy equation and momentum equation.

Lab Experiments:

- Verification of Bernoulli's equation
- Determination of the coefficient of discharge of given Orifice meter/Venturimeter.

UNIT-II FLOW THROUGH CIRCULAR CONDUITS 9 + 6

Hydraulic and energy gradient - Laminar flow through circular conduits - Boundary layer concepts - types of boundary layer thickness -Darcy Weisbach equation -friction factor - Moody diagram commercial pipes - minor losses -Flow through pipes in series and parallel.

Lab Experiments:

- Determination of friction factor for a given set of pipes
- Determination of major and minor losses in pipes

UNIT-III DIMENSIONAL ANALYSIS AND SIMILITUDE 9

Need for dimensional analysis -dimensional analysis by using Buckingham's π theorem method-Similitude -types of similitude - Dimensionless parameters - Reynold's Number - Froude's Number - Euler's Number - Weber's Number - Mach's Number - application of dimensionless Parameters-Model analysis.

UNIT-IV PUMPS 9 + 6

Impact of jets -Euler's equation - Theory of rotodynamic machines- various efficiencies-velocity components at entry and exit of the rotor - velocity triangles -Centrifugal pumps-working principle - work done by the impeller - Reciprocating pump - working principle. Rotary pumps - classifications.

Lab Experiments:

- Performance studies on centrifugal pump
- Performance studies on reciprocating pump

UNIT-V TURBINES 9 + 10

Classification of turbines -heads and efficiencies -velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines - working principles - work done by water on the runner -draft tube. Specific speed - unit quantities - performance curves for turbines - governing of turbines

Lab Experiments:

- Performance studies on Pelton wheel
- Performance studies on Francis turbine
- Performance studies on of Kaplan turbine

L : 45 T: 0 P: 30 J: 0 Total: 45 PERIODS

TEXT BOOKS

1. Yunus A. Çengel, John M. Cimbala., Fluid Mechanics: Fundamentals and Applications, McGraw - Hill Higher Education, 2010, 2nd edition.
2. Bansal, R.K., Fluid Mechanics and Hydraulics Machines, Laxmi Publications (P) Ltd., New Delhi. 2011. 10th Edition.

REFERENCES

- 1 Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House, New Delhi 2013. 19th Editon
- 2 Robert W. Fox, Alan T. McDonald, Philip J. Pritchard, "Fluid Mechanics and Machinery", 2011

- 3 Kumar. K.L., Engineering Fluid Mechanics, Eurasia Publishing House (P) Ltd., New Delhi, 2010. 8th Edition
- 4 Streeter. V. L., and Wylie, E.B., Fluid Mechanics, McGraw Hill, 2010. 9th Edition
- 5 Rajput. R. K, "A text book of Fluid Mechanics and Hydraulic Machines", S. Chand & Company Ltd., New Delhi, sixth edition, 2010

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Explain the fundamental concepts of fluid mechanics with different properties of fluids.
- CO2** Analyse and calculate major and minor losses associated with pipe flow in piping networks.
- CO3** Predict the nature of physical quantities and to predict the behavior of the prototype/model by applying model laws
- CO4** Analyse the performance of pumps.
- CO5** Analyse the performance of hydraulic turbines.

UNIT I PRINCIPLES OF SURVEYING**9+6**

Introduction - Principles and basic concepts and uses of surveying - classification and basic methods of surveying- Types of chains, Ranging rod, Ranging - Direct and Indirect methods –Method of Chaining on level and sloping ground - Obstacles in chaining.

Lab Experiments:

- Linear measurement and offset setting
- Use of Dumpy of level - limitation - handling – shifting- Simple levelling - temporary adjustments

UNIT II CHAIN SURVEYING**9+6**

Introduction – Principles of chain surveying - selection of survey stations and lines - Offsets - types, Measurement - cross staff and optical square - Steps involved in Chain Survey - Reconnaissance, Index sketch, Reference sketch, Booking entries in field book - Plan and Map, Scale - Plain and Diagonal - Testing of Chain, Degree of accuracy in chaining, Errors and compensation - cumulative, mistakes - Determination of limiting length of offset and problems.

Lab Experiments:

- Chain traversing of cropped area and error correction.
- Contouring – Direct / Grid method-Plotting of contour - preparation of map - Computation of volume

UNIT III COMPUTATION OF AREA AND VOLUME**9+6**

Introduction – Formulae for calculation of cross sectional area – calculation of volume - Area computation, Mid-Ordinate rule, Average ordinate rule, Trapezoidal rules, Simpson rule and Coordinate method of finding area-Computation of volume.

Lab Experiments:

- Area computation by plane table survey - radiation method
- Computation of Area from field notes and plot plan

UNIT IV COMPASS TRAVERSING**9+6**

Basic terminologies of Compass traversing – Prismatic and Surveyors Compass - Checking the accuracy of traverse - Errors and mistakes in Compass survey - Plane tabling - instruments and accessories - Radiation, Traversing, Orientation - Intersection and Resection.

Lab Experiments:

- Closed compass traversing, Plotting and correction of closing error
- Open compass traversing-Problems on Compass traversing

UNIT V LEVELLING AND CONTOURING**9+6**

Levelling - definition - Benchmarks - different types of levels - Basic principles of leveling - Theory of simple, compound, cross sectional and reciprocal levelling -Contouring - definition - contour characteristics - direct and indirect methods -gradient contour - uses – Minor instruments, Hand level - Clinometer - Abney level– Theodolite types – adjustments – setting up – reading angles – measurements – Area and elevation determination. Data station-working principle-applications

Lab Experiments:

- Traversing with a Theodolite - Plotting theodolite survey
- Area and elevation determination using Theodolite.

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

- 1 Punmia. B.C “Surveying (Vol- I & Vol-II)” Laxmi publications, New Delhi. 1991.
- 2 Basak. V.N, “Surveying and Levelling”, Tata McGraw hill publications, New Delhi.

REFERENCES

- 1 Kanetkar, T.P. & Kulkarni, S.V., “Surveying & leveling”. Part –I, A.V.G. Prakashan,Poona. 1984.
- 2 A Text Book of Surveying and Levelling, R. Agor, 2013, Khanna Publs., New Delhi.
- 3 S.K. Roy, 2014,Fundamentals of Surveying, Khanna Publs., New Delhi
- 4 R. Subramanian,2014, Surveying and Levelling, Oxford University Press

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Become acquainted with principle and basic concepts of surveying
- CO2** Know about different aspects of chain surveying
- CO3** Calculate area and volume of earth work needed in the construction of farm structures.
- CO4** Know about compass traversing
- CO5** Conduct leveling and contouring.

UNIT I INTRODUCTION TO PYTHON**12**

Features of Python- Fundamentals of Python – Variables – Data Types

Suggested Experiments

1. Use interactive Shell to print the Hello Example : print ‘Hello World’
2. Write a Python Program Using String Variable
3. Write a Python program to store data in list and then try to print them
4. Write a Python Program to display the following messages “Hello World, Python is High level, General-purpose Programming language”

UNIT II CONTROL FLOW & ARRAYS**12**

Conditional Statements – Iteration - List and Arrays

Suggested Experiments

1. Write a Python program to find SUM and MULTIPLICATION of any three numbers.
2. Write a Python program to find the average of any five numbers.
3. Write a Python program to find simple interest.
4. Scenario: A courier company has number of items to be delivered to its intended customers through its salesman. The salesman visits following cities to deliver the respective items:

S. NO.	CITIES	NO. OF ITEMS
1	Aligarh	18
2	Agra	25
3	Baroda	13
4	Banaras	43
5	Chennai	8
6	New Delhi	67
7	New Jalpaiguri	29
8	Howrah	11
9	Kolkata	56
10	Mumbai	33

Solve the following problems based on the above mentioned scenario using Python:

- a) Write a Python program to store and display the above mentioned cities and corresponding items using arrays.
- b) Write a Python program to display name of cities where salesman has delivered maximum and minimum number of items.
- c) Write a Python program to search the number of items to be delivered for a user
- d) Suppose the cover price of a book is Rs 240.95, but bookstores get a 40% discount. Shipping costs Rs 30 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies? Calculate using Python Code.

Classes – Built-in Functions – Type Conversion – User Defined Functions – Flow of Execution

Suggested Experiments

Scenario: A university has different entities such as Department, Programs and Student whose data members and member functions are given below:

Teacher- { **Data Members:** Name, department, hours, programs Taught; **Member Function:** setDetails(), getDetails() }

Program- {**Data Members:** Name, department, duration; **Member Functions:** setDetails(), getDetails() }

Student- {**Data Members:** Name, RollNo, Program, Department; **Member Function:** setDetails(), getDetails() }

Solve the following problems based on the above mentioned scenario using Python:

1. Write a Python program to create Teacher, Program and Student Classes with above mentioned data members and member functions.
2. Add following functionalities in the above program, the default department of Teacher, Program and Student should be Computer Science; however a different department could be assigned at run time.
3. Write a Python program to overload “+” operator to add the hours of two teachers.
4. Write a Python program to create two subclasses Residential Student and Non Residential Student inherited from Student class. Residential Student would have a data member Hall of Residence and Non-Residential Student would have Address as its data member.

UNIT IV FILE HANDLING

12

Files and exception: text files, reading and writing files, handling exceptions

Suggested Experiments

1. Write a Python program to print number of days in a month.
2. Write a Python program to find the area of triangle
3. Write a Python program which takes a character as input from the keyboard and convert it into capital letter, if it is a small letter and Vice-Versa.
4. Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700 (both included)
5. Write a Python program that asks the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user

UNIT V TEMPLATES

12

Function Template – Class Template – Infinite Recursion in Python

1. Write a function in Python to swap two numbers using function template. The numbers could be Integer or float that depends on the user inputs
2. Create a class Matrix with data members and member functions. Write a program in Python to perform Matrix operations (2-D array implementation), Add and Multiplication using class template
3. Write a Program Python to check whether the given number is Armstrong number or not
4. Write a Python Program to print factorial of a number
5. Write a Python Program to generate first n Fibonacci terms recursively
6. Write a Python Program to compute factorial of an integer n recursively

L:0 T:0 P:60 J:0 Total:60 Periods

COURSE OUTCOMES

At the end of the course the student should be able to :

- CO 1** Write clear and effective python code
- CO 2** Create applications using python programming
- CO 3** Define Python functions and call them
- CO 4** Use Python data structures -- lists, tuples, dictionaries
- CO 5** Understand the object oriented features using Python

19AGP201

MINI PROJECT - II

L T P J C

0 0 0 2 1

LIST OF EXPERIMENTS

A batch of four students will carry out the mini project on emerging areas of Agriculture Engineering under the guidance of a faculty. The project outlines the involvement of the students to get exposed to the different skills in the domains of Agriculture Engineering such as Soil mechanics, Renewable Energy, Crop production technology, Farm Implements, Harvesting methods, food processing methods etc. and their applications. Three reviews will be conducted throughout the semester and a combined project report to be submitted along with a viva voce for the end semester evaluation

L : 0 T: 0 P: 0 J: 30 Total:30 PERIODS

SEMESTER IV

19MAT202	STATISTICS AND NUMERICAL METHODS (Common to Agri, Auto, Food Technology, Mech)	L	T	P	J	C
UNIT I	TESTING OF HYPOTHESIS	3	0	0	0	3
	Sampling distributions – Statistical hypothesis – Tests for single mean and Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.					9
UNIT II	DESIGNS OF EXPERIMENTS					9
	Completely randomized design – Randomized block design – Latin square design-Applications of ANOVA.					
UNIT III	SOLUTIONS OF EQUATIONS					9
	Newton Raphson method – Pivoting Gauss Jordan methods – Iterative methods of Gauss – Seidal – Matrix Inversion by Gauss – Jordan method.					
UNIT IV	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION					9
	Lagrange’s interpolation – Newton’s forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal and Simpson’s 1/3 rd rule.					
UNIT V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS					9
	Single step methods: Taylor’s series method – Euler’s method – Modified Euler’s Method – Fourth order Runge-Kutta method for solving first order equations – Multi step methods: Milne’s predictor-corrector methods for solving first order equations.					
		L : 45	T:0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 Johnson, R.A. and Gupta, C.B., Miller and Freund’s, “Probability and statistics for Engineers”, Pearson Education Asia, 8th Edition, 2011.
2. Grewal, B.S and Grewal, J.S, “Numerical methods in Engineering and Science”, 9th Edition, Khanna Publishers, New Delhi, 2012.

REFERENCES

- 1 Spiegel M.R , Schiller J and Srinivasan R.A , "Schaum's Outlines Probability and Statistics", Tata McGraw Hill edition, 3rd Edition, 2011.
- 2 Chapra S.C and Canale R.P. “Numerical Methods for Engineers”, 6th Edition, Tata McGraw Hill Edition, 2014.
- 3 Gerald C.F. and Wheatley P.O. “Applied Numerical Analysis”, 8th Edition, Pearson Education, Asia, New Delhi, 2014
- 4 Walpole R.E., Myers. R.H., Myers. S.L., and Ye. K., “Probability and Statistics for Engineers and Scientists”, 8th Edition, Pearson Education, Asia, 2007.
- 5 Kandasamy P, Thilagavathy K and Gunavathy K., "Numerical Methods", 3rd Edition, S. Chand & Company Pvt. Ltd, 2013.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Apply the statistical concepts and tools for engineering applications and to use different types of research methodology techniques for decision making under uncertainty.
- CO2** Perform the ANOVA calculation which is needed for engineering research and project management.
- CO3** Solve a set of algebraic equations representing steady state models formed in engineering problems.
- CO4** Find the trend information from discrete data set through numerical differentiation and summary information through numerical integration.
- CO5** Predict the system dynamic behaviour through solution of ODEs modeling the system.

19AGT202

MACHINE DESIGN

L T P J C

(Use of PSG Data Book is permitted)

3 0 0 0 3

UNIT I FUNDAMENTALS OF MACHINE DESIGN

10

General consideration in machine design-strength properties of engineering materials. Limits and tolerances- types of fits-simple stresses in machine elements-tension-compression-shear and bearing stresses. Torsional and bending stresses in machine parts-torsional stresses in shafts, bending stresses in beams. Theories of failure-Rankine's theory, Guest theory, Saint Venants theory and Von Mises theory.

UNIT II DESIGN OF FASTENERS

9

Design of permanent joints-welded joints-types of welded joints-transverse and parallel strength of fillet welds-design of butt joints-design of threaded fasteners-stresses in screwed fastening due to static loading.

UNIT III DESIGN OF MACHINE ELEMENTS

8

Keys and couplings-strength of sunk keys- shaft couplings-design of sleeve coupling and flange coupling. Design of cotter and knuckle joints-design of shafts-shafts subjected to torsion,bending and combined stresses.

UNIT IV FUNDAMENTALS OF THEORY OF MACHINES

9

Linkages-basic definitions-different types of mechanisms and their applications-instantaneous center of rotation for four bar mechanisms-determination of velocities in 4 bars and slider crank mechanism-acceleration in mechanisms. Flywheel -fluctuation of speed and energy- energy stored in flywheel.

UNIT V DESIGN OF TRANSMISSION SYSTEM COMPONENTS

9

Gears-classification-gear terminology-law of gearing-design of spur and bevel gear based on Lewis and Buckingham equation.Springs-types of springs-design of helical springs. Belt drives-flat belts-Euler's formula-V-belt design-power calculation and selection-chain drive-components-design.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Kannaiah,P.2003. Machine Design Scitech Publishers (India) Pvt. Ltd. Chennai.
- 2 Khurmi, R.S. and Gupta, J.S.2001, A textbook of machine design. Eurasia Publi. House, Delhi.

REFERENCES

- 1 Gill, P.S. 1992. A textbook of machine drawing. S.K. Kataria and sons, New Delhi.
- 2 Siddeswar, N, P.Kannaiah and V.V.S Sastry. 1993.Machine drawing. Tata McGraw- Hill pub
- 3 Narayana, K.L. and P.Kannaiah. 1992. Engineering graphics. Tata McGraw-Hill pub.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about the basics of machine design
- CO2** Know the design of fastenings
- CO3** Know the design of machine elements
- CO4** Know about the fundamentals of theory of machines
- CO5** Know about the design of transmission system component

19AGT203 AUTOMATION TECHNIQUES IN AGRICULTURE L T P J C
ENGINEERING

2 0 0 0 2

UNIT-I ADVANCED MACHINERY/EQUIPMENT IN AGRICULTURAL 6
ENGINEERING- I

Introduction to farm machinery: precision farming concepts - precision machinery and equipments-laser guided leveler- vacuum operated precision planters - straw baler/ chopper, harvester - Introduction to soil and water conservation: automation of surface and pressurized irrigation system- sprinkle and micro irrigation systems – protected cultivation.

UNIT-II ADVANCED MACHINERY/EQUIPMENT IN AGRICULTURAL 6
ENGINEERING- II

Introduction to food process engineering: thermal, non-thermal, extrusion and freezing processing- Introduction to biochemical conversion systems, thermochemical conversion systems, and solar energy.

UNIT-III SENSORS AND THEIR APPLICATIONS 6

Types of sensor- principle and concept of different sensors like ultrasonic, proximity, PIR, IR, radar, pressure, gas, temperature, moisture, strain /weight, colour sensors used in agriculture-microcontroller-actuator - Basic input circuits and signal conditioning systems – amplifiers and filters

UNIT-IV VARIABLE RATE TECHNOLOGY 6

User Interface Analysis and Design – Design Concepts - Interface Analysis - Interface Design Steps- WebApp Interface Design – Agile UX – best practices – Ux workflow - Integrating UX and Agile development.

UNIT-V DRONE AND IoT IN AGRICULTURE 6

Drone and IoT - crop yield estimates- threat identification- crop insurance-pesticides spraying, environmental monitoring- protected cultivation- food quality monitoring, etc.

L : 30 T: 0 P: 0 J: 0 Total: 30 PERIODS

TEXT BOOKS

- 1 Kepner, R.A., Bainer, R. and Berger, E.L. 1978. Principles of Farm Machinery. AVI Publ.
- 2 Sahay, K.M. and Singh, K.K. 1994. Unit Operations of Agricultural Processing. Vikas Publ. Hous.
- 3 Michael, A.M. 2007. Irrigation: Theory and Practice. Vikash Publishing House Pvt. Ltd., New Delhi.

REFERENCES

- 1 Srivastava, A K., Carroll E.G., Roger P. R. and Dennis R.B. 2006. Engineering Principles of Agricultural Machines. American Society of Agricultural and Biological Engineers, USA.
- 2 Dutta, S.K. 1987. Soil conservation and land management. International distributors, Dehradun.
- 3 Nichols, H.L. and Day, D.H. 1998. Moving the earth. The work book of excavation. Mcgraw Hill.
- 4 Kuhar, John. E. 1977. The precision farming guide for agriculturalist. Lori J. Dhabalt, USA.
- 5 Krishna, K. R. 2016. Push Button Agriculture Robotics, Drones, Satellite-Guided Soil and Crop Management. Apple Academic Press

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the various advanced equipments used in Agriculture
- CO2** Understand the applications of Bio energy and solar energy in agriculture
- CO3** Analyze the various sensors and their applications in Agriculture
- CO4** Understand the concept of variable rate technology (VRT)
- CO5** Analyze the applications of Drone and IoT in Agriculture.

19GET276	VQAR-II	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	0	0	2
UNIT I	QUANTITATIVE ABILITY III					6

Time, speed & distance-Average speed- Relative speed- Train problems- Boats and streams- Races, Chain rule, Time and work -Pipes and cisterns

UNIT II	QUANTITATIVE ABILITY IV					4
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Permutation & Combination, Probability, Mensuration

UNIT III	VERBAL REASONING II					7
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Machine Input and Output, Coded Inequalities, syllogisms, Problems on Cubes, Data sufficiency.

Critical Reasoning -Statement and Argument, Statement and Assumption, Statement and Conclusion, Cause and effect, Course of action.

UNIT IV	NON- VERBAL REASONING					5
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Figure series, Odd man out, Mirror Image, Water image, Embedded Image, Cubes and Dices, Insert the Missing Characters, Analytical reasoning.

UNIT V	LINGUISTICS SKILLS III					8
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Sentences - Simple, Compound, Complex & Mixed sentences, Sentence Rearrangement, Idioms & Phrases, Reading Comprehension at higher level, Word Substitution, Synonyms & Antonyms, Error Spotting.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited.
- 3 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Learn the time and distance for solving application orientated concepts in quantitative aptitude
- CO2** Apply the financial ability for solving application orientated concepts in quantitative aptitude
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude.
- CO4** Analyze the non-verbal reasoning in verbal aptitude applications
- CO5** Apply appropriate LSRW skills

19GEB202

LANGUAGE ELECTIVE- HINDI

L T P J C
1 0 2 0 2

UNIT I INTRODUCTION

3+6

Importance of Hindi Language- Devanagari Alphabet (Read/Write) – Numbers (Read & Write) - Vowels & their abbreviated forms-consonants-Conjuncts- Parts of speech- Gender

UNIT II WORDS

3+6

Pronoun-Adjective-Verb-Tenses-Voice- Secondary verbs- Indeclinable- Cardinal numerals- Daily life words

UNIT III CLASSIFIED SENTENCES

3+6

Expressions- Useful Expressions- Imperative sentences-Past tense- Present tense-Future tense- Interrogative sentences and negative sentences

UNIT IV SITUATIONAL SENTENCES

3+6

Situational Sentences: At home-Shopping- Craftsman-Food & Drink- Hotel & Restaurant- Post office/Telephone/Bank- While Travelling- Health & Hygiene- Weather-Time.

UNIT V CONVERSATION

3+6

Conversation between friends- About money- On the bus- Asking the way- Making a Trunk Call- About a Trips- The villager and the urban- The doctor & the patient- Self Introduction.

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

TEXT BOOKS

- 1 Hindi for beginners by Sunita Narain mathur “ Tuttle Publisher”
- 2 Learn hindi through English in 30 Days by Krishna gopal vikal “ Diamond Pocket books”

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about the language Hindi and parts of speech
- CO2** Understand the verbs and tenses of Hindi language
- CO3** Experience the expression and classified sentences in Hindi Language.
- CO4** Practice the Hindi speaking at suitable situations.
- CO5** Converse in Hindi with your friends & neighbours.

EXERCISES PROCEDURE FOR PRACTICALS			
		Assessment (Mandatory)	
S.No	Exercises	Based on Report Submission	Based on Exercises/Presentation
1	Alphabets –Read & Write	5	5
2	Numbers-Read & Write	5	5
3	Vowels-Read & Write	5	5
4	Consonant Conjuncts		10
5	Parts of Speech & Gender		10
6	Verbs, tenses & Daily Life words		10
7	Verbs, tenses & Daily Life words		10
8	Tenses-Past Present & Future		10
9	Interrogative & negative sentences		10
10	Conversation practices 1 (Different cases to different batch)		10
11	Conversation practices 2 (Different cases to different batch)		10
12	Conversation practices 3 (Different cases to different batch)		10

19GEB203

LANGUAGE ELECTIVE- JAPANESE

L T P J C

1 0 2 0 2

**UNIT I SELF INTRODUCTION AND BASIC CONVERSATION, 3+6
JAPANESE SCRIPTS AND NUMBERS**

Introduction to Japanese Syllables (phonetic alphabet), greetings & Self-introduction, Identifying things, point objects and listening to their names, Listen to things and places etc. Creating shopping lists. Numbers. Three Different types of Japanese Scripts : Hiragana, Katakana, Kanji.

**UNIT II TIME, DAY, MONTH AND YEARS, TRAVEL , WORK 3+6
ENVIRONMENT, PARTICLES**

Introduction to Time, day of the week, simple inquiries on telephone, Means of transport, Basic conversations of everyday life., Office Environment, Japanese Particles

**UNIT III LOCATION AND OBJECTS ALONG WITH EXPRESSIONS , 3+6
PRESENT / PAST FORMS**

Frame questions in Japanese. Vocabulary of giving and receiving objects, Stating impressions/things surrounding us, Expressing likes and dislikes, good/bad, possessions, Talking about the country, town and the environment

**UNIT IV COUNTERS , DIRECTIONS, COLORS, FAMILY & 3+6
RELATIONSHIP**

Quantity, number of people, time, period etc., Stating thoughts and impressions, Conveying movement (e.g. go / come). Colors, Family and Relationship.

**UNIT V BASIC AND DAY TO DAY CONVERSATIONS WITH 3+6
MULTIPLE SCENARIOS**

Conversational practices: Between Friends, Customer and Seller, & Business Conversation

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

REFERENCE BOOKS

1. MINNA NO NIHONGO 1-1 Translation & Grammatical notes in English elementary
2. SHIN NIHONGO NO KISO 1 (Grammatical Notes in English)

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about the language Japanese and parts of speech
- CO2** Understand the Japanese language on time and travel
- CO3** Experience the Conversation about location and expression.
- CO4** Practice Conversation about family and relationship
- CO5** Converse in Japanese in day to day conversations

EXERCISES PROCEDURE FOR PRACTICALS

EXERCISES PROCEDURE FOR PRACTICALS			
		Assessment (Mandatory)	
S.No	Exercises	Based on Report Submission	Based on Exercises/Presentation
1	Alphabets –Read & Write	5	5
2	Numbers-Read & Write	5	5
3	Vowels-Read & Write	5	5
4	Consonant Conjuncts		10
5	Parts of Speech & Gender		10
6	Verbs, tenses & Daily Life words		10
7	Verbs, tenses & Daily Life words		10
8	Tenses-Past Present & Future		10
9	Interrogative & negative sentences		10
10	Conversation practices 1 (Different cases to different batch)		10
11	Conversation practices 2 (Different cases to different batch)		10
12	Conversation practices 3 (Different cases to different batch)		10

19GEB204

LANGUAGE ELECTIVE- GERMAN

L T P J C

1 0 2 0 2

UNIT I

INTRODUCTION

3+6

Introduction to German Language- Alphabets-Greetings and goodbye - Introduce yourself and others - numbers -how to give your telephone number and email address -Speak about countries- languages - words.-Vowels-Read & Write-Tenses.

UNIT II

CONVERSATIONS WITH FRIENDS COLLEAGU

3+6

Speaking about hobbies - fixing meetings and appointments - name days of the week - about work. Speak about Professions and working hours

UNIT III

CONVERSATION ABOUT CITY

3+6

Name places and buildings - Ask questions about places - Assigning texts to a picture story - Enquire about things - Name means of transport - ask for directions and describe a way -understand texts with international words - learn articles

UNIT IV

CONVERSATION ABOUT FOOD AND SHOPPING

3+6

Speak about food - plan for shopping - conversations while shopping - conversations while eating - Understand texts with W questions -Organize and learn words

UNIT V

CONVERSATION ABOUT TIME WITH FRIENDS

3+6

Understanding and saying the time -Specify times - to talk about family -To plan something together n to talk about birthdays - Understand and write an invitation -to Order and pay in the restaurant n to talk about an event

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

TEXT BOOKS

1. Netzwerk Deutsch als fremdsprache A1.1 Kursbuch
2. Netzwerk Deutsch als fremdsprache A1.1 Arbeitsbuch

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about the German language and parts of speech.
- CO2** Understand the Conversations with Friends Colleagues
- CO3** Experience the Conversation about city
- CO4** Practice Conversation about food and shopping
- CO5** Converse in German about time with friends

EXERCISES PROCEDURE FOR PRACTICALS			
		Assessment (Mandatory)	
S.No	Exercises	Based on Report Submission	Based on Exercises/Presentation
1	Alphabets –Read & Write	5	5
2	Numbers-Read & Write	5	5
3	Vowels-Read & Write	5	5
4	Consonant Conjuncts		10
5	Parts of Speech & Gender		10
6	Verbs, tenses & Daily Life words		10
7	Verbs, tenses & Daily Life words		10
8	Tenses-Past Present & Future		10
9	Interrogative & negative sentences		10
10	Conversation practices 1 (Different cases to different batch)		10
11	Conversation practices 2 (Different cases to different batch)		10
12	Conversation practices 3 (Different cases to different batch)		10

19GEB205

LANGUAGE ELECTIVE - FRENCH

L T P J C

1 0 2 0 2

UNIT I INTRODUCTION

3+6

Introduction to the French Language- Alphabets -Consonants-Greetings and goodbye –Daily life words- Introduce yourself and others - numbers -how to give your telephone number and email address -Speak about countries- languages - words.-Vowels-Read & Write-Tenses

UNITII CONVERSATIONS WITH FRIENDS COLLEAGUES

3+6

Speaking about hobbies - fixing meetings and appointments - name days of the week - about work. Speak about Professions and working hours

UNIT III CONVERSATION ABOUT CITY

3+6

Name places and buildings - Ask questions about places - Assigning texts to a picture story - Enquire about things - Name means of transport - ask for directions and describe a way -understand texts with international words - learn articles

UNIT IV CONVERSATION ABOUT FOOD AND SHOPPING

3+6

Speak about food - plan for shopping - conversations while shopping - conversations while eating - Understand texts with W questions -Organize and learn words

UNIT V CONVERSATION ABOUT TIME WITH FRIENDS

3 +6

Understanding and saying the time -Specify times - to talk about family -To plan something together n to talk about birthdays - Understand and write an invitation -to Order and pay in the restaurant n to talk about an event

L: 15 T: 0 P: 30 J: 0 TOTAL :45

REFERNCE BOOKS

- 1 G.Mauger Cours DE Languet De Civilisation Francaises
- 2 Annie Heminway, Complete French all in one Premium Second Edition, Tata McGraw Hill Education.
- 3 Diamond French-Aprenons Le Francois New Saraswathi House (India)Private Limited
- 4 A.Monnerie Beinvenue En France. Documentation Marrie Franchoise Boullet

COURSE OUTCOMES

At the end of the course, students should be able to

CO1: Know about the French language and parts of speech.

CO2: Understand the Conversations with Friends Colleagues

CO3: Experience the Conversation about the city

CO4: Practice Conversation about food and shopping.

CO5: Converse in French about time with friends

EXERCISES PROCEDURE FOR PRACTICALS			
		Assignment (Mandatory)	
S.No	Exercises	Based on Report Submission	Based on Exercises/Presentation
1	Alphabets –Read & Write	5	5
2	Numbers-Read & Write	5	5
3	Vowels-Read & Write	5	5
4	Consonant Conjuncts		10
5	Parts of Speech & Gender		10
6	Verbs, tenses & Daily Life words		10
7	Verbs, tenses & Daily Life words		10
8	Tenses-Past Present & Future		10
9	Interrogative & negative sentences		10
10	Conversation practices 1 (Different cases to different batch)		10
11	Conversation practices 2 (Different cases to different batch)		10
12	Conversation practices 3 (Different cases to different batch)		10

UNIT I PRINCIPLES OF AGRONOMY

Definition of agriculture and agronomy - Factors affecting crop growth - climate and weather parameters - Soil fertility and productivity - tillage and tilth - objective and principles - different kinds of tillage - Organic farming - principles and practices

Lab Experiments:

- Acquiring skill on the organizational setup of the agricultural farm and studying basic requirements of crop production
- Studies of climatic factors on crop growth - meteorological instruments

UNIT II AGRONOMIC INPUTS AND CROPPING SYSTEM

9+6

Seeds of varieties or hybrids - seed treatment - sowing and planting methods - Manures and fertilizers - source, nutrient contents and methods of application - Irrigation techniques for different soils and crops - Weeds - classification of weeds - principles and methods of weed management - Intensive cultivation - monoculture and multiple cropping - inter, mixed, relay, strip and multitier cropping.

Lab Experiments:

- Practicing different sowing / planting methods; fertilizers and irrigation methods
- Practicing different weed management practices; cropping system in intensive or organic farming

UNIT III PLANT PROTECTION

9+6

Group of pests and diseases - Methods of control - Cultural, Physical, Chemical and Biological - Pest management in major crops - Organic way of plant protection. complex problems in plant protection

Lab Experiments:

- Study the integrated pest and diseases management practices

UNIT IV AGRONOMY OF FIELD CROPS I

9+6

Package of practices for important field crops - rice, maize, sorghum, finger millet and small millets - Pulses - red gram, black gram, green gram, soybean.

Lab Experiments:

- To identify the damage symptoms of pest and diseases
- Practicing cultivation operations of major cereal crops
- Practicing cultivation operations of major pulse crops

UNIT V AGRONOMY OF FIELD CROPS II

9+6

Package of practices for groundnut, gingelly and sunflower, cotton, sugarcane. Modern techniques used to cultivate the major field crops and organic way of food production-Mode of spread of pest and diseases, Prophylactic measures to manage pests - mode of action of pesticides

Lab Experiments:

- Practicing cultivation operations of major oil seed crops
- Practicing cultivation operations of cotton and sugarcane crop

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS

TEXT BOOKS

- 1 SP. Palaniappan, and S. Sivaraman. 1998. Cropping systems in the tropics- Principles and Management, New Age international publishers, New Delhi, (2nd edition), 1998.
- 2 P.Balasubramain and SP. Palniappan. 2001. Principles and Practices of Agronomy, Agrobios publishers, Ludhiana.

REFERENCES

- 1 T. Yellamanda Reddy and G.H. Sankara Reddi. 2014. Principles of Agronomy, Kalyani publishers, Ludhiana
- 2 B.Chandrasekaran, B., K. Annadurai and E. Somasundaram. 2007. A Text book of Agronomy, Scientific publishers, Jodhpur.
- 3 N. Dhandapani and S. Uthamasamy. 2000. Integrated pest Management. TNAU Publications, Coimbatore.p.181.
- 4 K. Justin. 2004. Crop protection. TNAU, petchiparaai, kanyakumari Dt.p.379

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the concepts and principles of crop growth, climate influence, soil fertility and tillage to increase the crop productivity
Apply the various agronomic inputs for raising different crops under organic or intensive cultivation
- CO2** through use of improved varieties or hybrids and the liberal use of irrigation, fertilizers and weed management to increase the food production.
- CO3** Identify the major insects, diseases and their damage symptoms to suggest the better management practices
- CO4** Apply the various cultivation practices for major cereals, millets, minor millets and pulse crops
- CO5** Apply the various cultivation practices for major oil seeds, cotton and sugarcane

UNIT I EVAPORATION AND CONCENTRATION**6+6**

Unit operations in food processing –conservation of mass and energy – overall view of an engineering process-dimensions and units – dimensional and unit consistency – dimensionless ratios-evaporation – definition – liquid characteristics – single and multiple effect evaporation- types of evaporators-performance of evaporators and boiling point elevation – capacity – economy and heat balance-- evaporation of heat sensitive materials.

List of Experiments:

- Determination of thermal efficiency and economy of single effect evaporator

UNIT II MECHANICAL SEPARATION**8+6**

Filtration – definition –filter media – types and requirements-constant rate filtration – constant pressure filtration – filter cake resistance-filtration equipment – rotary vacuum filter – filter press-sedimentation – gravitational sedimentation of particles in a fluid – Stoke’s law, sedimentation of particles in gas-cyclones – settling under sedimentation and gravitational sedimentation-centrifugal separations – rate of separations – liquid-liquid separation – centrifuge equipment.

List of Experiments:

- Determination of separation efficiency of centrifugal separator
- Determination of efficiency of liquid-solid separation by filtration

UNIT III SIZE REDUCTION, MIXING AND BLENDING**9+12**

Size reduction – grinding and cutting – principles of comminuting – characteristics of comminuted products – particle size distribution in comminuted products-energy and power requirements in comminuting – crushing efficiency – Rittinger’s, Bond’s and Kick’s laws for crushing-size reduction equipments – crushers – jaw crusher, gyratory crusher-crushing rolls – grinders – hammer mills – rolling compression mills - attrition, rod, ball and tube mills – construction and operation- Mixing-kneading-blending- emulsification-homogenization.

List of Experiments:

- Performance evaluation of a sieve and determination of particle size of granular foods by sieve analysis
- Performance evaluation of pin mill
- Performance evaluation of hammer mill
- Performance evaluation of ball mill

UNIT IV CONTACT EQUILIBRIUM SEPARATION**10**

Contact equilibrium separation processes – concentrations – gas-liquid and solid-liquid equilibrium – gas absorption – rate of gas absorption – stage – equilibrium gas absorption and equipment-properties of tower packing – types – construction – flow through packed towers-extraction – rate of extraction – stage equilibrium extraction-equipment for leaching coarse solids – intermediate solids – basket extractor-extraction of fine material. Decantation systems – extraction towers-washing – equipments.

UNIT V CRYSTALLIZATION, DISTILLATION AND MEMBRANE SEPARATION**12+6**

Crystallization – equilibrium -solubility and equilibrium diagram – rate of crystal growth – equilibrium crystallization-crystallization equipment – classification – construction and operation-tank, agitated batch, Swenson-Walker vacuum crystallizers-distillation – binary mixtures – flash and differential distillation-steam distillation – theory – consumption – continuous distillation with rectification – vacuum distillation - batch distillation – operation and process – advantages and limitations-azeotropic distillation.Membrane separation-osmosis –ultra filtration- reverse osmosis-rate of flow through

membranes.

List of Experiments:

- Performance evaluation of a steam distillation process
- Visit to solvent extraction industry/sugar industry

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS

TEXT BOOKS

- 1 R.L. Earle, Unit Operations in Food Processing, Pergamon Press, Oxford, U.K., 2003.
- 2 K. M. Sahay and K.K.Singh, Unit operations of Agricultural Processing, Vikas Publishing House Pvt. Ltd., New Delhi, 2004.

REFERENCES

- 1 J.M. Coulson and J.F. Richardson, Chemical Engineering, Volume I to V. The Pergamon Press, New York, 1999.
- 2 W.L. McCabe, J.C.Smith and P.Harriot, Unit Operations of Chemical Engineering, McGraw- Hill. Inc. Kosaido Printing Ltd. Tokyo, Japan, 2001.
- 3 C.J.Geankoplis, Transport Process and Unit Operations, Prentice-Hall of India Private Limited, New Delhi. 1999.

COURSE OUTCOMES

At the end of the course student should be able to:

- Become acquainted with different unit operations of processing industries such as evaporation, concentration and mechanical separation, size reduction equipments, distillation, membrane separation, etc.
- CO1** concentration and mechanical separation, size reduction equipments, distillation, membrane separation, etc.
 - CO2** Evaluate the performance of size reduction, mixing and blending equipments
 - CO3** Apply the knowledge gained on crystallisation in industrial processes
 - CO4** Use the knowledge obtained on distillation and membrane separation
 - CO5** Develop new food processes, modify the existing ones and to make the food processes clearly understood by the suppliers of the equipment used.

UNIT I AVAILABILITY AND FUEL PROPERTIES OF BIOMASS**9+6**

Biomass– types– fuels from biomass. Terms and units used in biomass production. Indian Energy scenario and renewable energy status- Biomass properties–physical, chemical and thermal–energy release. Briquetting–types–pelletizing.

Lab Experiments:

- Solving problems on Energy units and Conversions
- Study of briquetting machine
- Determination of proximate analysis of biomass

UNIT II BIOCHEMICAL CONVERSION TECHNOLOGY**9+6**

Biochemical degradation – factors affecting biogas production - types of biogas plants – construction details– operation and maintenance– utilization of biogas- slurry handling, utilization and enrichment. High rate biomethanation process–types and principle-landfills–principle-application.Composting– definition-science of production-methods and machinery.

Lab Experiments:

- Design of KVIC biogas plant.
- Design of Deenabandhu model biogas plant
- Determination of BOD of a liquid effluent
- Determination of COD of a liquid effluent

UNIT III THERMOCHEMICAL CONVERSION BY COMBUSTION**9+6**

Thermo chemical degradation. stoichiometric air requirement–complete and incomplete and combustion -principle. Cofiring of biomass-principle. Incinerators–principle-applications. Combustion of wastes and MSW. Wood burning stoves-types-principle-uses.

Lab Experiments:

- Evaluation of thermal efficiency of biogas stove
- Determination of thermal efficiency of wood burning stoves

UNIT IV THERMOCHEMICAL CONVERSION BY GASIFICATION AND PYROLYSIS**9+6**

Gasification–definition-science- different zones in the reactor-chemistry of gasification–types of gasifier–working principle. Producer gas cleaning & conditioning -utilization–commercial gasifiers plants. Pyrolysis– principle-activated carbon manufacture. Biochar production–uses. Bio oil– production–properties and uses of bio-oil.

Lab Experiments:

- Determination of calorific value of solid biomass
- Performance evaluation of agro residue gasifier

UNIT V PRODUCTION OF ETHANOL AND BIODIESEL, AND COGENERATION**9+6**

Bioethanol–feedstock - process–utilization. Biodiesel -feedstock - process and utilization. Cogeneration technologies – cycles – topping – bottoming – problems – applications. Waste heat recovery - plate heat exchangers - waste heat boilers - heat pumps - thermic fluid heaters

Lab Experiments:

- Performance evaluation of biogas run dual fuel diesel engine.

L : 45 T : 0 P : 30 J : 0 Total: 75 PERIODS**TEXT BOOKS**

- 1 Khandelwal K.C. and Mahdi, S.S. Biogas Technology, Tata Mc Graw Hill Pub. Co. Ltd., New Delhi, 1986.
- 2 B. T. Nijaguna, Biogas Technology, New Age International, 2006
- 3 Godfrey Boyle, Renewable Energy: Power for a Sustainable Future, Second edition, Oxford University Press, UK, 2009, ISBN 0-19-926178-4, 13579108642.

REFERENCES

- 1 k Pandey Thallada Bhaskar, Michael Stocker, Rajeev Sukumaran, Recent Advances in Thermo-Chemical Conversion of Biomass, Elsevier, 2015.
- 2 A. Chakraverty, Biotechnology and other alternate technologies for utilization of biomass, Oxford and IBH Publishing Co, New Delhi, 1993.
- 3 G. N. Tiwari, and M K. Ghosal, Fundamentals of Renewable Energy Sources, Alpha Science International Ltd, 2007, 666 pages, ISBN-10: 1842653970, ISBN-13: 978-1842653975
- 4 Ahmed F Zobaa and Ramesh C Bansal, Handbook of Renewable Energy Technology, 876 pages, 2011, ISBN: 978-981-4289-06-1
- 5 Engineering Chemistry By Jain and Jain, Dhanpat Rai Publs, New Delhi

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Possess the knowledge on Indian power and renewable energy scenario, and the biomass characteristics
- CO2** Know about Biochemical conversion technologies of biomass for energy generation
- CO3** Possess the knowledge on the thermochemical conversion technologies for converting biomass into energy
- CO4** Know about combustion and incineration technology
- CO5** Know about fuel alcohol and biodiesel production processes

19AGP203

SOLID WORKS

L T P J C

0 0 4 0 2

LIST OF EXPERIMENTS

1. Introduction to modeling software: Practicing sketching, Dimensioning and Modeling Tools and Creating simple 3D models by using any CAD Modeling Software
2. Create the orthographic projection of Agriculture machinery components using isometric drawings
3. Create two dimensional diagrams of the components of simple Agricultural machines
4. Create a three dimensional assembly model of bearing from detailed orthographic drawings
5. Create a three dimensional assembly model of Tillage implements using the detailed orthographic drawings of components
6. Create a three dimensional assembly model of gear box from detailed orthographic drawings
7. Create a three dimensional assembly model of Tractor drawn implements from detailed orthographic drawings
8. Create a three dimensional assembly model of valves from detailed orthographic drawings
9. Create a three dimensional assembly model of simple mechanism and animate its working in modeling software
10. Create a three dimensional assembly model of simple energy conversion/power transmission system and animate its working using modeling software

L : 0 T: 0 P: 60 J: 0 Total:60 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Draw two dimensional drawings of engineering components using standard CAD Modelling package
- CO2** Develop a three dimensional assembly models of farm implements using detailed orthographic drawings of components with tolerances
- CO3** Generate animations from three dimensional assembly models by applying various motion constraints

19AGP202

INTERNSHIP - I

L T P J C

- - - - 2

LIST OF EXPERIMENTS

A batch of four students will carry out this summer internship under the guidance of a faculty. The internship will be attended during May/ June month for the duration of two weeks in a reputed Agro-based Industry or to work with a farmer in his field to learn field experience and problems faced by the farmers and Industry, and find solutions to them. A project report on the experience gained in the Industry / Farm should be submitted for evaluation.

2 Weeks

SEMESTER V

19AGT301

HEAT POWER ENGINEERING

L	T	P	J	C
3	0	0	0	3

UNIT I FUELS AND COMBUSTION

9

Fuels – types and properties-higher and lower heating values, their determination. Combustion of fuels, stoichiometric air requirement – excess air-gravimetric analysis and volumetric analysis of products of combustion and their conversions-Fuels for IC engines- octane number requirement (ONR)-diesel fuels-cetane rating.

UNIT II CLASSIFICATION AND PRINCIPLES OF IC ENGINES

9

Classification-engine components-Four stroke cycle- principle-valve timing diagram-P-V diagram - two stroke cycle- principle-valve timing diagram-P-V diagram. Spark ignition engine-working principle and thermal efficiency- Compression ignition engine-working principle and thermal efficiency-fuel pump and injector. Gas engine –working principle-turbo charging.

UNIT III IC ENGINE SYSTEMS

7

Carburetion-Fuel injection-Ignition- Engine friction and Lubrication- Engine cooling-Scavenging in two stroke engines- Super charging of SI engines- Comparison between CI and SI engines.

UNIT IV IC ENGINES PERFORMANCE AND AIR COMPRESSORS

10

Engine Testing and performance- Dynamometer types- Performance parameters - Indicated power, Brake power, SFC, Engine efficiencies- Variables affecting performance characteristics- Working principles of Stirling engines, Wankel rotary combustion engine, Variable compression ratio engine test rig- Emission standards. Air compressors- Reciprocating, Rotary and Centrifugal types- Work done and Efficiency-Slip factor.

UNIT V BOILERS

10

Boilers – classification – working principle of fire tube and water tube boilers – vertical and horizontal boilers - Principles, construction and operation - Cochran, Lancashire, Cornish, Scotch, Velox, Locomotive, Babcock and Wilcox boilers –Principles – boiler mountings and accessories – Pressure regulators – Blow off fittings - Boiler performance- Boiler operation, inspection, Safety and Maintenance- ISI codes for boilers- Features of Industrial Boilers-Economics of operation.

L : 45 T : 0 P : 0 J : 0 Total: 45 PERIODS

TEXT BOOKS

- 1 M.C. Mathur and R.P. Sharma, Internal combustion Engines, Dhanpat Rai Publications, 2014.
- 2 Rayner Joel, Basic engineering Thermodynamics, Pearson publishers, 2009.

REFERENCES

- 1 P.K. Nag, Engineering thermodynamics, Tata-McGraw Hill Publishing Co, New Delhi, 1992.
- 2 V.P.Vasandani and D.S.Kumar, Heat Engineering, Metropolitan Book Co Pvt Ltd, 1972.
- 3 C.P.Kothandaraman., S.Domkundwar. and A.V.Domkundwar, A course in Thermal Engineering, Dhanpat Rai & Sons, Fifth edition, 2002.
- 4 J.P.Holman, Thermodynamics, McGraw-Hill, 1985.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about different types of fuels, their characteristics and combustion calculations
- CO2** Know about working principles of IC engines
- CO3** Know about IC engine systems
- CO4** Possess the knowledge on IC engines performance and air compressors
- CO5** Possess the knowledge on different types of boilers

19AGT302

GIS AND REMOTE SENSING

L T P J C
2 0 0 0 2

UNIT I REMOTE SENSING

6

Introduction-Fundamentals of Remote Sensing-Definition, Advantages-Components- Physics of Remote Sensing-Electro Magnetic Spectrum(EMR)-Radiation laws – Wave theory-Stefan-Boltzmann Laws-Interaction of EMR with Atmosphere- Scattering-Rayleigh, Mie and Non-Selective scattering-Absorption-Atmospheric windows- Interaction of EMR with Earth objects-Spectral signature-Spectral reflectance characteristics of vegetation, soil and water.

UNIT II REMOTE SENSING SATELLITES AND SENSORS

6

Platforms-Types-Applications – Sun synchronous and geo synchronous orbits-Active and Passive sensors-Resolution-Spatial, Spectral, Radiometric and Temporal, significance of Resolution-Satellites and Sensors- LANDSAT, SPOT, IRS, RESOURCESAT, CARTOSAT, LISS Images, Thematic Mapper-High Resolution commercial satellites-METEOSAT,NOAA-ERS, RADARSAT.

UNIT III DIGITAL IMAGE INTERPRETATION AND PROCESSING

6

Activities of image interpretation-Elements-Techniques- Digital Data-Ordering- Visual interpretation elements-Rating Scales-Image processing-Image enhancement- Image classification-rectification-Supervised and Unsupervised, maximum likelihood analysis-minimum distance – Vegetation Indices-Applications in soil mapping-problem soil identification- Soil erosion and sedimentation studies- Water quality analysis

UNIT IV GEOGRAPHIC INFORMATION SYSTEM(GIS)

6

Definition-Concepts of GIS –Maps and their influences-Map scale-Projection-Coordinate system- sources of spatial data- basic component - Standard GIS packages- Data types- Raster and Vector-files and their organization-Data Base Management System-digitizer- reclassification-Spatial analysis- Buffering-map overlay-interpolation-Digital Elevation Model-output data-Devices for output

UNIT V GIS APPLICATIONS

6

Land and Water resources Management-Agriculture-Surface and Ground water hydrology-Soil erosion assessment-Pollution abatement-Earth sciences- Watershed management

L : 30 T: 0 P: 0 J: 0 Total: 30 PERIODS

TEXT BOOKS

- 1 M.Anji Reddy, Textbook of Remote Sensing and Geographical Information System, 3rd Edition, BS Publications, 2008.
- 2 Floyd F.Sabins, Remote Sensing: Principles and Interpretation, III edition, Freeman and Company, New York, 1997.

REFERENCES

- 1 Ian Heywood, An Introduction to GIS, Pearson Education, New Delhi, 2001.
- 2 P.A. Burrough, Principle of GIS for land resources assessment, Oxford Publications, 1990.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Realize the importance of remote sensing
- CO2** Know about different remote sensing satellites and sensors
- CO3** Possess knowledge about digital image interpretation and processing
- CO4** Understand the value of GIS
- CO5** Work with GIS and use the applications of GIS

19AGB301

FARM TRACTORS

L T P J C
2 0 2 0 3

UNIT I INTRODUCTION

6+6

Classification of Tractors - History of Engines- Tractor engines – Engine operation-Understanding the working principle of a Diesel engine - 4 Stroke compression- Ignition engine cycle-Inlet and Outlet valves– Valve timing diagram- Engine efficiency - Engine operating cycle -Firing order –Firing interval - Combustion chambers – Construction details of engine blocks, Cylinder head and Crankcase - Features of cylinder, Piston, Connecting rod and Crankshaft.

Lab Experiments:

- Hand tools used in garage-fault diagnosis.
- Study of valve and valve actuation system.

UNIT II TRACTOR ENGINESYSTEMS

6+6

Valve and valve mechanism-Air and fuel supply-air cleaner- Fuel pump- Exhaust– Silencer. Cooling and lubrication system- Starting and electrical system- Transmission system-clutches, brakes, power train- transmission- Gears- Types of high and low gears transmission- Gear box- Differential and final drive mechanism- Engine governing .Steering geometry– Steering systems- Front axle and wheel alignment .Brake– types.

Lab Experiments:

- Study of tractor engine systems using a working model of a tractor engine
- Piston and cylinder-inspection – reconditioning and assembly of cranking system.

UNIT III POWER OUTLETS AND TRACTOR CONTROL

6+6

Tractor PTO, Belt-pulley, properties of Hydraulic fluids- Hydraulic system -hydraulic couplings, Torque convertors- Hydraulic circuits- position and draft control- Weight transfer-theory of traction- Tractive efficiency–Tractor chassis mechanics- Stability- longitudinal and lateral .Controls- visibility–operator’s seat. Tractor steering mechanism-Types- caster camber- king pin inclination- Toe-in and Toe-out- Tractor Hitching.

Lab Experiments:

- Study of fuel system assembly and adjustment
- Study of lubricating system components.

UNIT IV TESTING OF POWER TILLER AND TRACTOR

6+6

Power tiller-Special features-Clutch-Gearbox-Steering and brake. Makes of tractors and power tillers. Types of tests-test procedure- Need for testing & Evaluation of farm tractor–Test codes for performance testing of tractors and power tillers. Cost of operation of tractors and power tillers.

Lab Experiments:

- Study of cooling system components.
- Study of transmission system-assembly of gearbox, differential and final drive

UNIT V ERGONOMICS AND ENVIRONMENTAL PROTECTION

6+6

Ergonomic aspects of tractors and power tillers- Substitution of fossil fuels with Biofuels to protect the environment from GHG pollution-case studies.

Lab Experiments:

- Study of brake and its adjustment-Steering system– assembly and adjustment-wheel tread Adjustment
- Study of Tyres, Rims and Balancing methods of a tractor
- Visit to tractor/power tiller manufacturing companies

L : 30 T : 0 P : 30 J : 0 Total: 60 PERIODS

TEXT BOOKS

- 1 R.K. Veera Selvam, Farm Machinery and Power, Oxford Book Company, 2010, ISBN 10: 9380179634 / ISBN 13: 9789380179636
- 2 A.M. Michael and T. P. Ojha, Principles of Agricultural Engineering, Vol. 1

REFERENCES

- 1 Robert Allen Kepner, Roy Bainer, Edgar Lee Barger, Principle of Farm machinery, AVI Pub. Co., 1978, 527 pages
- 2 Rajeev Kumar, Farm Power and Machinery Engineering (English), First Edition, Standard publishers and distributors, New Delhi. ISBN-10 8180140253, 2008.
- 3 Arun Dahake, An Introduction to Farm Power and Machinery, 2015. ISBN No. 9781312800885, (Standard Copyright License), 1st Edition, 2017, www.lulu.com,
- 4 S.C.Jain and C.R.Rai, Farm tractor maintenance and repair. Standard publishers and distributors, New Delhi, 1999.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Possess the knowledge on the working principle of diesel engine and engine components
- CO2** Know about tractor engine systems
- CO3** Know about taking power output from a tractor and tractor control
- CO4** Know about testing of tractor and power tiller
- CO5** Know about ergonomic aspects of tractors and power tillers

UNIT I INTRODUCTION**6+6**

Farm mechanization–Objectives.Tillage-Objectives-Methods–Primarytillageimplements- Secondary tillage implements -Animal drawn ploughs -Construction. Types of farm implements –Trailed, mounted. Scope and benefits of farm mechanization- Constraints. Different ploughing methods. Mould board plough- Attachments–Mould board Shapes and types. Disc plough- Forcerepresentationondisc– Typesofdiscploughs–Subsoilerplough-Rotaryplough–Spadingmachine- Coir pith applicators.

Lab Experiments:

- Operation of a tractor drawn mould board plough - Adjustments - Determination of field capacity
- Operation of a tractor drawn disc plough - Adjustments - Determination of field capacity

UNIT II PRIMARY AND SECONDARY TILLAGE IMPLEMENTS**6+6**

Cultivators- types-construction. Disc harrows-Bundformer- ridger– Leveller. Basin lister- implements for wetland preparation. Hitch systems and hitching of tillage implements- virtual and real hitching for single point, single axis and double hitch - Mechanics of animal traction- functional requirements, principles of working. Weeding and Interculture equipment- Junior hoe - Guntaka - Blade harrow - Dry land weeders - tractor mounted and engine operated sweeps. Engine operated and Rotary weeders for upland and low land - selection, constructional features and adjustments. - Calculation of performance parameters -field capacity, efficiency, application rate and losses- performance requirements- cost analysis of implements and tractors.

Lab Experiments:

- Hitching of mounted type tillage implements to the tractor and ploughing methods

UNIT III FORCES ACTING ON THE TILLAGE TOOL AND DESIGN ASPECTS OF TILLAGE IMPLEMENTS**6+6**

Soil tillage- Forces analysis of tillage tools and their measurement- Design considerations of tillage implements -Type of Mould board plough and its functions- Theoretical furrow slice inversion- Design of mould board plough bottom- Standard dimensions of plough share and land side. Introduction of disk implements and their design consideration-Design of disk for different tools, spacing in multi disk implements, forces acting on vertical and inclined disk- Cultivators and their application- Design of different soil engaging tools such as shovel and sweep- Design of shank- overload safety devices used in farm machinery-design of safety devices.

Lab Experiments:

- Operation of tractor drawn cultivator - Adjustments- and Determination of field capacity

UNIT IV SOWING EQUIPMENT AND FERTILIZER APPLICATION**6+6**

Crop planting -Methods -Row crop planting systems -Devices for metering seeds–furrow openers– Furrow closers-types–Types of seed drills and planters. Design considerations of seed and fertilizer box and frame- Design of seed metering mechanism -Drill calibration - Application of fertilisers - Metering devices – Seed cum fertiliser drill – application of liquid fertilisers. Paddy and potato planters and sugar cane planter.

Lab Experiments:

- Experiment on Calibration of seed drills
- Operation of seed drill and centrifugal broadcasting device in the field

UNIT V SPRAYERS AND DUSTERS**6+6**

Sprayers – Classifications - Parts and accessories - Atomizers - Agitators - Determination of particle size and distribution. Number Median Diameter (NMD) and Volume Median Diameter (VMD). Sprayer operation – Boom sprayer - Precaution - Coverage - Factors affecting drift. Rotating disc sprayers – Controlled Droplet Application (CDA) - Electrostatic sprayers - Arial spraying. Dusters - types - Mist blower cum duster - Other plant protection devices, care and maintenance.

Lab Experiments:

- Study of paddy Transplanter and drum seeder, Puddlers and Trampers
- Operation and evaluation of Dry Land weeder / Power operated weeder
- Dismantling, parts identification and assembly of different components of knapsack power sprayer and duster.

L : 30 T: 0 P: 30 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 E.L. Barger, R.A. Kepner, Roy Bainer, Principles of Farm Machinery (Third Edition), CBS Publishers & Distributors Pvt. Ltd, ISBN 10 : 8123909772 / ISBN 13 : 9788123909776, 2005.
- 2 Michael and Ojha, Principles of Agricultural Engineering, Jainbrothers, New Delhi, 2005.

REFERENCES

- 1 Harris Pearson Smith and Lambert Henry Wilkes, Farm machinery and equipments, 6th edition, Tata McGraw-Hill, New Delhi, 1990.
- 2 Krutz, Gary, Thompson Lester and Claar, Paul, Design of Agricultural Machinery", John Wiley and Sons, 1984.
- 3 Donnell Hunt , Farm Power and Machinery Management 10th Edition, Waveland Pr Inc , 2007, ISBN-13: 978-1577665731 , ISBN-10: 1577665732
- 4 Richard Lee , Tractors and Farm Machinery, Ipswich, Suffolk, United Kingdom, 2008

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about the concepts of tillage
- CO2** Know how to hitch and use the farm implements
- CO3** Know the design aspects of tillage implements
- CO4** Know about the sowing, plantation equipments and weeders
- CO5** Possess the knowledge on sprayers and dusters

L	T	P	J	C
0	0	0	2	1

LIST OF EXPERIMENTS

1. The scope of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies.
2. Project periods shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
3. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
4. Create a model/fabricate a model/conduct experiment/simulate mechanical system/implement the same. Analyse data, evaluate the results and conclude the appropriate solution, suggestion for future work.
5. The continuous assessment shall be made according to the regulation which is tabulated below.
6. The progress of the project is evaluated based on a minimum of two reviews.
7. The review committee may be constituted by the Head of the Department
8. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details, result and conclusion.
9. This final report shall be typewritten form as specified in the guidelines.
10. Each batch should create a video demonstration of their prototype.

L : 0 T: 0 P: 0 J: 30 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Identify the basic requirements of real world state.
- CO2** Survey on the relevant field of study selected
- CO3** Implement the project with software and hardware
- CO4** Test the results of project with existing models
- CO5** Demonstrate and manage to explicate the work carried out

LIST OF EXPERIMENTS

1. Simple visual display on screen and Screen management of vector data, raster data
2. Use of Index map
3. Preparation of Drainage maps from Remote Sensing Photographs
4. Exercise on digitizer coding point, line and polygon data
5. Point line-Polygon co-ordinate system
6. Digitizer- Digitizing line and polygon data
7. Data Base Management System
8. Data conversion-Vector to Raster, Raster to Vector
9. Overlay and Surface techniques
10. Standard GIS Packages

L : 0 T : 0 P : 60 J : 0 Total:60 PERIODS

TEXT BOOKS

- 1 M.Anji Reddy, Textbook of Remote Sensing and Geographical Information System, 3rd Edition, BS Publications, 2008.
 - 2 Floyd F.Sabins, Remote Sensing: Principles and Interpretation, III edition, Freeman and Company, New York, 1997.
- Develop plant level automation for real process plant control using PLC and SCADA

REFERENCES

- 1 Ian Heywood, An Introduction to GIS, Pearson Education, New Delhi, 2001.
- 2 P.A. Burrough, Principle of GIS for land resources assessment, Oxford Publications, 1990.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Use index maps
- CO2** Prepare drainage maps
- CO3** Know about data base management system
- CO4** Know about data conversions
- CO5** Get acquainted with standard GIS packages

19AGP303

HEAT POWER ENGINEERING LAB

L T P J C

0 0 2 0 1

LIST OF EXPERIMENTS

1. Experiments on Engine Performance using Hydraulic, Mechanical & Electrical dynamometers
2. Morse Test for Engine Performance analysis
3. Assessment of Heat balance in Diesel Engine
4. Performance of Air Compressor
5. Determination of Viscosity of Liquid Fuels using viscometer
6. Dismantling & Assembling of IC engines (Petrol / Diesel)
7. Experiment with two stroke engine for drawing Port timing Diagram
8. Experiment with Four stroke engine for drawing Valve Timing Diagram
9. Determination of Flash Point & Fire point of liquid fuels
10. Performance of Heat Exchangers- Parallel Flow, Counter flow and plate heat exchangers
11. Determination of thermal conductivity, convective heat transfer coefficient and radiation Heat transfer coefficients of heat transfer surfaces

L : 0 T: 0 P: 30 J: 0 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Assess the engine performance using dynamometers
- CO2** Assess the heat balance in diesel engine
- CO3** Determine the different properties of fuels
- CO4** Can assemble and dismantle IC engines
- CO5** Assess the performance of heat exchangers

19AGT304

PRECISION FARMING

L T P J C
2 0 0 0 2

UNIT I INTRODUCTION TO PRECISION AGRICULTURE 6

Scope and Definitions of Precision Agriculture, Overview of Technologies, Global Positioning Overview/How it Works, Factors Influencing GPS Accuracy, Levels of Accuracy, Principles of Differential Correction, Ground-based Correction Systems, Space-based Correction Systems

UNIT II SENSORS APPLICATIONS IN AGRICULTURE 6

Sensing Platforms—Satellite, UAV, Aerial, Proximal, The Electromagnetic Spectrum, How Objects Interact with Electromagnetic Energy, Active vs. Passive Remote Sensing, Spectral, Spatial, and Temporal Resolution, Soil Sensors, Crop Sensors, Weather Sensors and its applications, Sensors to measure irrigation efficiency.

UNIT III SOIL & WATER SPATIAL VARIABILITY 6

Soil Formation and Change Across Landscapes, NRCS Soil Maps, Soil Mapping Technology, Electrical Conductivity, Soil and Slope/Position Factors Influencing Water Differences, Precision Irrigation Systems, Precision Drainage Systems

UNIT IV NUTRIENT SPATIAL VARIABILITY 6

Sampling in Space and Time, Grid and Zone Soil Sampling, Developing Management Zones Using Sensors to Quantify Nutrient Variability, Equipment for Variable Rate Application

UNIT V CROP SPATIAL VARIABILITY 6

Yield Monitor Technology for Grain Combines, Yield Monitor Technology for Non-grain Crops, Calibration of Yield Monitors, Data Cleaning, Displaying Data/Mapping/Legends, Yield Map Interpretation, Yield Stability, Quality Sensors—Protein, Oil, etc, Pest Spatial Variability

L : 30 T: 0 P: 0 J: 0 Total: 30PERIODS

TEXT BOOKS

- 1 Rajesh Singh, Anita Gehlot, Mahesh Kumar Prajapat, Bhupendra Singh, Artificial Intelligence in Agriculture, CRC Press, 2020
- 2 Tulsi ram – Shiv Kumar Lohan – Purushotam Singh – Ranveer Singh, Precision farming a new approach, Scholar's world Publishers, 2019

REFERENCES

- 1 Ancha Srinivasan, Handbook of Precision Agriculture - Principles and Applications, CRC Press, 2006
- 2 Qin Zhang, Precision Agriculture Technology for Crop Farming, 1st Edition, CRC Press, 2021

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about overview of technologies in Precision Agriculture
- CO2** Know about applications of sensors in Agriculture
- CO3** Possess knowledge on Soil & Water Spatial Variability
- CO4** Know about the Nutrient Spatial Variability
- CO5** Possess knowledge on Yield Monitor Technology

REFERENCES

- 1 J.N. Luthin, *Drainage Engineering*, John Wiley and Sons, New York, 2002.
- 2 V.V.N. Murthy, *Land and water management*, Kalyani publishing, New Delhi, 2009.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the importance of soil moisture
- CO2** Clear knowledge on evapo transpiration
- CO3** Calculate the water requirement and irrigation efficiencies
- CO4** Determine the irrigation schedule for different crops and know about different drainage systems
- CO5** Measure the flow of water using different flow measuring devices

19AGP304	DAIRY AND FOOD ENGINEERING LAB	L	T	P	J	C
		0	0	2	0	1

LIST OF EXPERIMENTS

1. Measurement and estimation of some textural parameters of a solid food and properties of parboiled and raw rice
2. Determination of thermal conductivity of food materials
3. Determination of drying of fluid entrainment and rate of drying in a drum dryer
4. Experiment on osmotic dehydration of foods
5. Performance evaluation of food extruder
6. Estimation of thermal processing time and degree of sterilization in canned food using a batch sterilizer
7. Estimation of SNF, TSS, lactic acid content and density of milk
8. Measurement of size of fat globule in milk and determination of homogenization efficiency
9. Determination of the separation efficiency of cream separator
10. Performance evaluation of a spray dryer
11. Visit to a dairy industry

L : 0 T: 0 P: 30 J: 0 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Estimate the properties of food materials and milk
- CO2** Evaluate the performance of dairy equipments
- CO3** Evaluate the performance of drum dryer
- CO4** Evaluate the performance of spray dryer
- CO5** Evaluate the performance of food extruder and microwave oven

19HST105 **ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE** **L T P J C**

(Common to All B.E. / B. Tech. Courses) **2 0 0 0 0**

UNIT I ANCIENT INDIA & STATE POLITY 6

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage.

UNIT II INDIAN LITERATURE, CULTURE, TRADITION, AND PRACTICES 6

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature

UNIT III INDIAN RELIGION, PHILOSOPHY, AND PRACTICES 6

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

UNIT IV INDIAN KNOWLEDGE SYSTEM ON SCIENCES & TRADE 6

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India ,Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Trade in Ancient India

UNIT V INDIAN CULTURAL HERITAGE & ARTS 6

Indian architect, engineering and architecture in ancient India, sculptures, seals, coins, pottery, puppetry, dance, music, theatre, drama, painting, martial arts traditions, fairs and festivals, current developments in arts and cultural, Indian's cultural contribution to the world. Indian cinema, yoga.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS

REFERENCES

- 1 V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
- 2 S. Baliyan, Indian Art and Culture, Oxford University Press, India
- 3 Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
- 4 Romila Thapar, Readings In Early Indian History Oxford University Press , India
- 5 Fritz of Capra, Tao of Physics
- 6 Fritz of Capra, The wave of Life
- 7 V N Jha (English Translation), Tarkasangraha of Annam Bhatta, International Chinmay Foundation,Velliarnad,Amaku,am
- 8 Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
- 9 GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi,2016
- 10 RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016
- 11 R Sharma (English translation), Shodashang Hridayam
- 12 Basham, A.L., The Wonder that was India (34th impression), New Delhi, Rupa & co
- 13 Sharma, R.S., Aspects of Political Ideas and Institutions in Ancient India(fourth edition), Delhi, Motilal Banarsidass,

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** To understand the Ancient India and State Polity
CO2 Understand the Indian Literature, Culture, Tradition, and Practices
CO3 Understand the Indian Religion, Philosophy, and Practices
CO4 Understand the Indian Knowledge System on Sciences & Trade
CO5 Understand the Indian Cultural Heritage & Arts

19AGP305

INTERNSHIP - II

L T P J C

- - - - 2

LIST OF EXPERIMENTS

A batch of four students will carry out this summer internship under the guidance of a faculty. The internship will be attended during May/ June month for the duration of two weeks in a reputed Agro-based Industry or to work with a farmer in his field to learn field experience and problems faced by the farmers and Industry, and find solutions to them. A project report on the experience gained in the Industry / Farm should be submitted for evaluation.

2 Weeks

SEMESTER VII

19GET277	BIOLOGY FOR ENGINEERS	L	T	P	J	C
		2	0	0	0	2

UNIT I INTRODUCTION TO LIFE 6

Characteristics of living organisms-Basic classification-cell theory-structure of prokaryotic and eukaryotic cell-Introduction to biomolecules: definition-general classification and important functions of carbohydrates-lipids-proteins-nucleic acids vitamins and enzymes-genes and chromosome

UNIT II BIODIVERSITY 6

Plant System: basic concepts of plant growth-nutrition-photosynthesis and nitrogen fixation-Animal System: elementary study of digestive-respiratory-circulatory-excretory systems and their functions-Microbial System: history-types of microbes-economic importance and control of microbes

UNIT III GENETICS AND IMMUNE SYSTEM 6

Evolution: theories of evolution - Mendel's cell division-mitosis and meiosis-evidence of e laws of inheritance-variation and speciation-nucleic acids as a genetic material-central dogma immunity-antigens-antibody-immune response

UNIT IV HUMAN DISEASES 6

Definition-causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis

UNIT V BIOLOGY AND ITS INDUSTRIAL APPLICATION 6

Transgenic plants and animals-stem cell and tissue engineering-bioreactors-biopharming-recombinant vaccines-cloning-drug discovery-biological neuralnetworks-bioremediation-biofertilizer-biocontrol-biofilters-biosensors-biopolymers-bioenergy-biomaterials-biochips-basic biomedical instrumentation.

L :30 T: 0 P: 0 J: 0 T:30 PERIODS

TEXT BOOKS

- 1 A Text book of Biotechnology, R.C.Dubey, S. Chand Higher Academic Publications, 2013
- 2 Diseases of the Human Body, Carol D. Tamparo and Marcia A. Lewis, F.A. Davis Company, 2011.
- 3 Biomedical instrumentation, Technology and applications, R. Khandpur, McGraw Hill Professional, 2004

REFERENCES

- 1 Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
- 2 Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning, 2008
- 3 Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers, 2012

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Grasp and apply biological engineering principles, procedures needed to solve real-world problems
- CO2** Apply the concept of plant, animal and microbial systems and growth in real life situations
- CO3** Comprehend genetics and the immune system
- CO4** Know the cause, symptoms, diagnosis and treatment of common diseases
- CO5** Give a basic knowledge of the applications of biological systems in relevant industries

19GET201	PROFESSIONAL ETHICS AND HUMAN VALUES	L	T	P	J	C
		2	0	0	0	2

UNIT I ENGINEERING ETHICS 6

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy– Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 6

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law –Plagiarism- Case studies

UNIT III RESPONSIBILITIES AND RIGHTS 6

Collegiality and loyalty-Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights –Intellectual Property Rights (IPR) – Discrimination.

UNIT IV UNIVERSAL HUMAN VALUES - INTRODUCTION 6

Need, Basic Guidelines, Content and Process for Value Education - Understanding Harmony in the Human Being - Harmony in Myself! - Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

UNIT V UNIVERSAL HUMAN VALUES - HARMONY 6

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Implications of the above Holistic Understanding of Harmony on Professional Ethics

L :30 T: 0 P: 0 J: 0 T:30 PERIODS

TEXT BOOKS

- 1 Mike W. Martin and Roland Schinzinger, Ethics in Engineering, Tata McGraw Hill, New Delhi, 2003
- 2 R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

REFERENCES

- 1 Govindarajan M, Natarajan S, Senthil Kumar V. S, Engineering Ethics, Prentice Hall of India, New Delhi, 2004.
- 2 Charles B. Fleddermann, —Engineering Ethics, Pearson Prentice Hall, New Jersey, 2004.
- 3 Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, —Engineering Ethics – Concepts and Cases, Cengage Learning, 2009.
- 4 Edmund G Seebauer and Robert L Barry, —Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, Oxford, 2001.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Create an awareness on Human Values
- CO2** Understand moral issues and sense of Engineering Ethics
- CO3** Understand code of Ethics and Engineering as Experimentation
- CO4** Study the safety, responsibility and rights
- CO5** Visualize the global issues and code of conduct

19AGT401

POST HARVEST ENGINEERING

L T P J C

2 0 0 0 2

UNIT I THRESHING, MOISTURE MEASUREMENT AND PHYSICAL PROPERTIES OF AGRICULTURAL PRODUCES

6

Post harvest engineering - introduction - objectives - post harvest losses of cereals, pulses and oilseeds - importance - optimum stage of harvest. Threshing - traditional methods mechanical threshers - types-principles and operation-moisture content - measurement - direct and indirect methods - moisture meters - equilibrium moisture content. Engineering properties of agricultural produces.

UNIT II PSYCHROMETRY AND DRYING

6

Psychrometry – importance – Psychrometric charts and its uses – Drying – principles and theory of drying – thin layer and deep bed drying – Hot air drying – methods of producing hot air – Types of grain dryers – selection – construction, operation and maintenance of dryers – Design of dryers

UNIT III CLEANING AND GRADING MACHINES

6

Principles - air screen cleaners – adjustments - cylinder separator-spiral separator – magnetic separator-colour sorter-inclined belt separator – length separators -effectiveness of separation and performance index.

UNIT IV SHELLING AND HANDLING EQUIPMENTS

6

Principles and operation – maize sheller, husker sheller for maize – groundnut decorticator –castor sheller – material handling –belt conveyor –screw conveyor – chain conveyor – bucket elevators –pneumatic conveying.

UNIT V PADDY , PULSES AND OIL SEED PROCESSING

6

Paddy processing – parboiling of paddy – methods – merits and demerits – dehusking of paddy –methods – merits and demerits – rice polishers –types – constructional details – polishing –layout of modern rice mill - wheat milling – pulse milling methods – Millets and Winnowing - oil seed processing.

L : 30 T: 0 P: 0 J: 0 Total: 30 PERIODS

TEXT BOOKS

- 1 Chakraverthy, A ,Third Edition, Post harvest technology for Cereals, Pulses and Oilseeds. Oxford & IBH publication & Co. Pvt. Ltd, New Delhi, 2000.
- 2 Mohsenin, N.N., Physical Properties Of Plant And Animal Materials, Gordon and Breach publishers, New York,pp-1206, 1986.

REFERENCES

- 1 Sahay, K.M., and Singh, K.K. Unit operations of Agricultural Processing. Vikas publishing house Pvt. Ltd., New Delhi, 1994.
- 2 W.L. McCabe and J.C. Smith and P.Harriot Unit Operations in Chemical Engineering, McGraw Hill Inc. Kosaido Printing Ltd. Tokyo, Japan, 2001.
- 3 Pande, P.H. Principles of Agricultural Processing, Kalyani Publishers, Ludhiana,pp-278, 1994.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about threshing methods and determine the properties of cereals, pulses and oil seeds
- CO2** Know about psychrometry and drying
- CO3** Know about shelling and handling equipments
- CO4** Know about the processing of paddy , pulses and oil seed
- CO5** Possess the skills to apply suitable post harvest operation for value addition of farm produces and utilize the post harvest machines to increase the market value of the processed food products

UNIT I SOLAR ENERGY RADIATION AND SOLAR THERMAL COLLECTORS 12

Solar radiation availability - radiation measurement – transmittance - absorptance - flat plate collectors - heat transfer correlations - collector efficiency - heat balance – absorber plate – types - selective surfaces. Solar driers – types – heat transfer - performance of solar driers – agro industrial applications - liquid flat plate collectors - their performance.

List of Experiments:

Experiment on thermal efficiency of natural convection solar dryer

Experiment on thermal efficiency of forced convection solar dryer

Problems on thermal losses and efficiency of flat plate collectors

UNIT II SOLAR CONCENTRATING COLLECTORS AND PV TECHNOLOGY 12

Optically concentrating collectors – types – reflectors - solar thermal power stations – principle and applications - solar stills - types - solar pond - performance – characteristics – applications – solar refrigeration. Photovoltaics - types – characteristics – load estimation - batteries – invertors – operation - system controls. PV system installations – standalone systems - PV powered water pumping – system sizing and optimization - hybrid system - solar technologies in green buildings.

List of Experiments:

Problems on solar time – basic earth sun angles

Experiment on thermal efficiency of solar still

UNIT III WIND MAPPING ANALYSIS AND CHARACTERISTICS OF WIND 12

Nature of wind – wind structure and measurement - wind power laws - velocity and power duration curves - aero foil - tip speed ratio - torque and power characteristics - power coefficients – Betz coefficient.

List of Experiments:

Study of photovoltaic cell characteristics

Study on the performance of wind generator in the lab

UNIT IV WIND POWER GENERATOR AND WIND ENERGY STORAGE 12

Wind mill – classification– power curve. Upwind and downwind systems - transmission rotors –pumps - generators - standalone system - grid system – batteries. Wind energy storage - wind farms - wheeling and banking - testing and certification procedures.

List of Experiments:

Performance evaluation of a SPV water pumping system

Wind Energy conversion calculations for power generation

UNIT V ALTERNATE ENERGY SOURCES 12

Ocean energy- off shore and on shore ocean energy conversion technologies- OTEC principles-open and closed cycles. Tidal energy – high and low tides – tidal power- tidal energy conversion schemes. Geothermal energy – resources – classification and types of geothermal power plants. Nuclear energy – reactions – fusion fission hybrid. Fuel cell – principle and operation – classification and types. Energy storage – pumped hydro and underground pumped hydro – compressed air - battery - flywheel – thermal.

List of Experiments:

Visit to a solar PV power plant

Visit to a wind farm

L : 30 T: 0 P: 30 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 Solanki Chetan Singh, Solar Photovoltaics: Fundamentals, Technologies and Applications, Prentice-Hall Of India Pvt. Limited, 2009.
- 2 J.F.Manwell, J.G. McGswan and A.L.Rogers, Wind Energy Explained – Theory, Design and Application, John Wiley and Sons Ltd, 2004.

REFERENCES

- 1 A.John. Duffie and William A. Beckmann, Solar Engineering of Thermal Processes, 4th Edition ISBN: 978-0-470-87366-3, John Wiley and Sons Ltd, 2013.
- 2 H.P. Garg, Advances in Solar Energy Technology Volume 2, Industrial Applications of Solar Energy, ISBN: 978-94-010-8188-7 (Print), Springer Publications., 1987.
- 3 Jui Sheng Hsieh, Solar Energy Engineering, Prentice Hall, London, 1986.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Possess the knowledge on the basics of solar radiation
- CO2** Know about the kinetics of solar thermal collectors and applications
- CO3** Know about the solar photo voltaics and its applications
- CO4** Know about wind power generators and wind energy storage
- CO5** Possess the knowledge on the working principle of alternate energy sources

19AGP401

PROJECT - I

L T P J C

0 0 0 4 2

GUIDELINES

1. Project periods shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned.
2. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
3. The students will take up research on topics pertaining to agricultural engineering and conduct the research, Analyze data, evaluate the results and conclude the appropriate solution, suggestion for future work.
4. The continuous assessment shall be made as prescribed in the regulations.
5. The progress of the project is evaluated based on a minimum of three reviews.
6. The review committee may be constituted by the Head of the Department.
7. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.
8. This final report shall be typewritten form as specified in the guidelines.

L : 0 T: 0 P: 0 J: 30 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Under the project the students will learn to do research systematically
- CO2** Develop new ideas into practice and develop prototypes
- CO3** They can also take up projects relating to industrial problems and find solutions to them.

LIST OF EXPERIMENTS

1. Sketcher:- Sketch creation & modification tools. Geometry & dimensional constraints. Sketch visualization & sketch analysis.
2. Part Design: - Sketch based features. Dress up features, transformation features. Reference elements & Boolean operations. F(x) formula & design table. Material, measurements & measure inertia.
3. Generative Sheet Metal Design:- Introduction, Walls, Flanges, Bending Cutting, Stamping, Folding & Unfolding Manufacturing Preparation, Fold/Unfold Views
4. Wire frame & Surface Design:- Surface creation & Modification tools. Wire frame & Transformation tools Surface based features
5. Assembly Design: - Bottom up & Top down assembly & Degree of freedom concept Catalogue browser, product structure tools, manipulation, snap & smart move. Assembly constraints, assembly feature, compute clash, space analysis. Exploded views, scene creation, B.O.M., & measure inertia.
6. Drafting: - Generative & Interactive Drafting, Drawing Standards, Generating orthographic views Geometric dimensions, tolerance & annotation. Generation of balloon, Bill of material, title block & printing.
7. Generative Structural Analysis:- Introduction to FEA & FEM Element type, Boundary condition Computation Report generation

L : 0 T: 0 P: 30 J: 0 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the comments for a part design
- CO2** Generate sheet metal design
- CO3** Develop wire frame and surface design of an object
- CO4** Draw the assembled view of the part drawings
- CO5** Evaluate the structural analysis by knowing the concepts of FEA & FEM

19AGP403	POST HARVEST ENGINEERING LAB	L	T	P	J	C
		0	0	2	0	1

LIST OF EXPERIMENTS

1. Determination of moisture content by direct and indirect methods
2. Determination of true density, bulk density, porosity of grains.
3. Experiment on drying characteristics of grains
4. Performance evaluation of separators (Spiral and Specific Gravity)
5. Performance evaluation of fluidized bed dryer
6. Determination of shelling efficiency of groundnut decorticator
7. Determination of the efficiency of bucket elevator and screw conveyer
8. Performance evaluation of paddy parboiling drum
9. Performance evaluation of a grain cleaning cum grading machine
10. Evaluation of shelling efficiency of rubber roll sheller
11. Performance evaluation of seed separators (inclined belt and winnower)
12. Visit to modern rice mill

L : 0 T : 0 P : 30 J : 0 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Determine the moisture content of food grains
- CO2** Determine the different physical properties of grains
- CO3** Evaluate the performance of different grain dryers
- CO4** Evaluate the performance of grain cleaner cum grading machines
- CO5** Evaluate the performance of rice processing machines

SEMESTER VIII

MOOC / NPTEL

L	T	P	J	C
2	0	0	0	2

GUIDELINES

The students should register for any of MOOC courses / NPTEL courses in the domain of Agriculture Engineering which is not covered in the R2019 curriculum. At the time of selecting the course, the student should get approval from the Head of the Department. The course should be minimum of 8 weeks / 12 weeks duration. The student should produce the Grade sheet obtained from NPTEL for awarding the credit. On completion of the course, the student should attend the evaluation conducted by the team of Expert members and Head of the Department.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Select the most appropriate course in the domain.
- CO2** Understand the contents of the selected course.
- CO3** Attend the exam conducted by NPTEL
- CO4** Attend the evaluation conducted by the department.

19AGP404

PROJECT - II

L	T	P	J	C
0	0	0	24	12

GUIDELINES

1. The students will continue the research on topics pertaining to agricultural engineering and conduct the research, develop prototypes and will submit reports.
2. The scope of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies.
3. Every project work shall have a guide who is the member of the faculty of the institution.
4. Shall consist of identification of the project after literature survey.
5. Students should present a review paper and submit it to the internal examiners.
6. Report should summarise the methodology to be adopted, work plan for the proposed project work.
7. The final report shall be type written form as specified in the guidelines.
8. The continuous assessment shall be made as prescribed in the regulations.
9. Awarding Credit value is based on the performance of the above said criteria.
10. 25% of the project work and its methodologies are to be completed.

L : 0 T: 0 P: J: 300 Total:300 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Under the project the students will learn to do research systematically
- CO2** Develop new ideas into practice and develop prototypes
- CO3** They can also take up projects relating to industrial problems and find solutions to them.

19AGE302

ORGANIC FARMING

L T P J C
3 0 0 0 3

UNIT-I INTRODUCTION

9

Need of Organic Farming- Benefits of Organic Farming- Social aspects of Organic Farming- Market aspects of Organic Farming- certification process-steps of certification process- Government subsidies.

UNIT-II ORGANIC FERTILIZERS

9

Need of Organic Fertilizer- Benefits of Organic Fertilizer- Preparation of Organic Fertilizer-& land preparation. Plant Nutrients-Name of plant Nutrients- Functions of Nutrients in plant growth and Development-Nutrient uptake and Utilization by plant- (From Organics) From Inorganic. Sources of nutrients for Organic Agriculture.

Organic Manure – FYM/Rural compost, City compost, Oil cakes, Animal wastes, Vermi composts, etc- Characterization and Nutrients content of the above sources (Data Chart). Green Manure – Green Manure with Leguminous crops in crop rotation. In-situ incorporation of crop residues –benefits- liquid manure

UNIT-III WATER AND SOIL TESTING

9

Soil: Definition- Acidic, Alkaline and Saline soils- How they affect Agriculture-Method of reclamation. Soil productivity-Meaning & Concept. Difference between Soil Fertility and Productivity- Methods of Increasing productivity and fertility. Water Sampling and Quality Control-WHO Guidelines for Physical Parameters-Potential Health Effects-Test Methods-Testing for Chemical Contaminants

UNIT-IV USE OF MICROORGANISMS and PLANT PROTECTION MEASURES

9

Introduction-Need of Microorganism-Benefits of Microorganism-Management of Microorganism. Inter cropping and crop rotation-Importance, benefits and products-Vegetable, Fruits, Flowering plants. Integrated pest & disease managements. Organic pesticides, bio-pesticides. Inorganic pesticides, disadvantages of their use. Seed, seedling and soil Treatment measures-Feasibility of complete dependence on organic sources

UNIT-V BIO FERTILIZERS AND THEIR METHOD OF USE

9

Nitrogenous-phosphatic- potassic-availability of nutrients from above sources-other Nitrogen contributing plants. Preparation of vermin compost- pit construction-raw materials-availability of specific species of earth worm-method of preparation-quality improvement of finished vermin compost.

L : 45 T : 0 P : 0 J : 0 Total: 45 PERIODS

TEXT BOOKS

- 1 The Organic Farming Manual, Ann Larkin Hansen, Storey Publishing, 2018
- 2 Organic Farming Theory and Practices, SP Palaniappan & K Annadurai, Scientific Publishers, 2018

REFERENCES

- 1 Organic Farming – How to raise, certify and Market Organic crops and Livestocks, Peter Fossel, 2019
- 2 Organic Farming – Everything you need to know, Peter V Fossels, 2007
- 3 The Organic Medicinal Herb Farmer: The Ultimate Guide to Producing High-Quality Herbs on a Market Scale, : Melanie Carpenter, Jeff Carpenter, 2015

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the basic concepts of Organic farming
- CO2** Understand the need for organic fertilizer and manure
- CO3** Know the various water and soil testing methods
- CO4** Know the various plant protection measures
- CO5** Understand the usage of bio fertilizers

19AGE303 HYDROLOGY AND WATER RESOURCE ENGINEERING L T P J C

3 0 0 0 3

UNIT-I PRECIPITATION AND ABSTRACTIONS

10

Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation - Rain gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods-Interception - Evaporation. Horton’s equation, pan evaporation measurements and evaporation suppression - Infiltration- Horton’s equation - Double ring infiltrometer, Infiltration indices.

UNIT-II RUNOFF

8

Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Run off estimation using empirical - Strange’s table and SCS methods – Stage discharge relationships flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT-III FLOOD AND DROUGHT

9

Natural Disasters-Flood Estimation- Frequency analysis- Flood control- Definitions of droughts- Meteorological, hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT-IV RESERVOIRS

8

Classification of reservoirs, General principles of design, Site selection, Spillways, Elevation – area - Capacity - Storage estimation, Sedimentation - Life of reservoirs – Rule curve

UNIT-V GROUNDWATER AND MANAGEMENT

10

Origin- Classification and types - Properties of aquifers- Governing equations – Steady and unsteady flow - Artificial recharge - RWH in rural and urban areas

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Subramanya .K. "Engineering Hydrology"- Tata McGraw Hill, 2010
- 2 Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.
- 3 Linsley, R.K. and Franzini, J.B. "Water Resources Engineering", McGraw Hill International Book Company, 1995

REFERENCES

- 1 David Keith Todd. "Groundwater Hydrology", John Wiley & Sons, Inc. 2007
- 2 Ven Te Chow, Maidment, D.R. and Mays, L.W. "Applied Hydrology", McGraw Hill International Book Company, 1998.
- 3 Raghunath .H.M., "Hydrology", Wiley Eastern Ltd., 1998.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understanding of the key drivers on water resources, hydrological processes
- CO2** Ability to construct and apply a range of hydrological models to surface water
- CO3** Integrated behaviour in catchments, groundwater problems including Hydrograph, Flood/Drought management, artificial recharge
- CO4** Ability to conduct Spatial analysis of rainfall data and design water storage reservoirs
- CO5** Understand the concept and methods of ground water management

19AGE304 WATER AND WASTEWATER ENGINEERING L T P J C

3 0 0 0 3
6

UNIT I INTRODUCTION

Water and Wastewater Quantity Estimation-Population forecast- Water demand for various purposes- Estimation of wastewater quantity- Variation in quantity of water and Wastewater - Water Supply/Distribution Systems - Wastewater Collection Systems.

UNIT II WATER/WASTEWATER QUALITY ENHANCEMENT 4

Wastewater characteristics- Philosophy of treatment- Unit operations and processes- Physical, chemical and biological methods- Primary, secondary and tertiary treatment. Physical Unit Processes- Screening, Commutation, Grit Removal, Equilization and Sedimentation.

UNIT III BIOLOGICAL UNIT PROCESSES 12

Introduction to Microbiology- Microbial ecology and Growth kinetics- Types of microorganisms- aerobic vs. anaerobic processes. Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors; Anaerobic treatment; Suspended growth, Attached growth, Fluidized bed and sludge blanket systems; Nitrification, Denitrification; Phosphorus removal.

UNIT IV SLUDGE TREATMENT AND NATURAL WASTEWATER TREATMENT SYSTEMS 12

Thickening, Digestion, Dewatering, Sludge drying and Composting. Wastewater Treatment Plant Characteristics. Sequencing of unit operations and processes; Plant layout; Hydraulic considerations. Natural Wastewater Treatment Systems- Ponds and Lagoons, Wetlands and Root-zone systems. Surface and Ground Water Treatment for Potable Water Supply-Water Characteristics, Sequencing of unit operations, plant layout and Hydraulic considerations and processes.

UNIT V CHEMICAL UNIT PROCESSES 11

Coagulation-Flocculation, Filtration, Disinfections, Aeration and Gas transfer. Precipitation, Softening, Adsorption and Ion exchange, Membrane processes- Rural Water Supply- Low Cost Sanitation- Septic tanks, Soak-pits.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Reynolds, T. D., and P. A. Richards. Unit Operations and Processes in Environmental Engineering. 2nd ed. Boston, MA: PWS Publishing Company, 1996. ISBN: 0534948847.
- 2 Mara, D. Domestic Wastewater Treatment in Developing Countries. London, UK: Earthscan, 2003. ISBN: 1844070190.

REFERENCES

- 1 Viessman, W., Jr., and M. J. Hammer. Water Supply and Pollution Control. 7th ed. Pearson Education, Inc., Upper Saddle River, NJ: Pearson Prentice Hall, 2005, ISBN: 0131409700.
- 2 Tchobanoglous, G., F. L. Burton, and H. D. Stensel. Wastewater Engineering: Treatment and Reuse. 4th ed. MWH Staff. Water Treatment: Principles and Design. 2nd ed. New York, NY: Wiley, 2005, ISBN: 0471110183.
- 3

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Estimate waste water availability and its quality
- CO2** Know how to improve water quality
- CO3** Idea about the biological unit processes
- CO4** Gain knowledge about the sludge treatment and natural waste water treatment and natural wastewater treatment systems
- CO5** Know about the chemical unit processes

19AGE305 STORAGE AND PACKAGING TECHNOLOGY L T P J C

3 0 0 0 3

UNIT I SPOILAGE AND STORAGE 9

Direct damages, Indirect damages of perishable and durable commodities – Control measures - factors affecting storage – Types of storage – Losses in storage and estimation of losses

UNIT II STORAGE METHODS 9

Improved storage methods for grain- Modern storage structures-infestation-temperature and moisture changes in storage structures-CAP storage-CA storage of grains and perishables construction operation and maintenance of CA storage facilities, Problems in Storage.

UNIT III FUNCTIONS OF PACKAGING MATERIALS 9

Introduction – Packaging strategies for various environment – Functions of package – Packaging materials – Cushioning materials – Bio degradable packaging materials – Shrink and stretch packaging materials

UNIT IV FOOD PACKAGING MATERIALS AND TESTING 9

Introduction – Paper and paper boards - Flexible - plastics - Glass containers – Cans – Aluminium foils - Package material testing- Tensile, Bursting and Tear strength.

UNIT V SPECIAL PACKAGING TECHNIQUES 9

Vacuum and gas packaging - Aseptic packaging - Retort pouching – Edible film packaging –Tetra packaging – Antimicrobial packaging – Shrink and stretch packaging.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Sahay, K.M. and K.K.Singh. 1996. Unit operations of agricultural processing. Vikas Publishing House Pvt. Ltd., New Delhi
- 2 Food Packaging Technology, Hand book, 2004. NIIR Board, New Delhi
- 3 Pandey, P.H.2002. Post harvest engineering of horticultural crops through objectives. Saroj Prakasam. Allahabad.

REFERENCES

- 1 M. Mathlouthi (Editor), Food Packaging and Preservation Elsevier Applied Science Publications Essex, UK, 1986.
- 2 Shirley J. VanGarde, Margy J. Woodburn, Food Preservation and Safety: Principles and Practice, 261 pages, Surbhi Publications, Jaipur, 1999.
- 3 NIIR Board. Hand book on modern packaging industries. Asia Pacific Press Inc. Delhi, India 2000.
- 4 Himangshu Barman. 2008, Post Harvest Food grain storage. Agrobios (India), Jodhpur.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Assess of Storage losses in agricultural commodities
- CO2** Learn about the various storage methods
- CO3** Know about the functions of Packaging materials
- CO4** Have knowledge on Food packaging material and testing
- CO5** Learn and use various special packaging techniques

PROFESSIONAL ELECTIVE – II

19MEE304	TOTAL QUALITY MANAGEMENT	L	T	P	J	C
	(Common to Mech, Agri & FT)	3	0	0	0	3

UNIT I INTRODUCTION **9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM – Industrial Examples of Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

UNIT II TQM PRINCIPLES **9**

Leadership - Strategic quality planning - Employee involvement and engagement initiatives in industries - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - Case studies on 5S and Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III STATISTICAL PROCESS CONTROL (SPC) **9**

Statistical fundamentals – Measures of central Tendency and Dispersion - Population and Sample, Control Charts for variables and attributes, Industrial Examples. Process capability. 5's Principles and Six Sigma Process – Case studies – New seven Management tools.

UNIT IV TQM TOOLS **9**

Benchmarking - Reason to benchmark, Best Practices and case studies of Benchmarking process - FMEA - Stages, Types. Quality Function Deployment (QFD) - House of Quality - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures in various industries.

UNIT V QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems - ISO 9001-2015 Quality System - Elements, Implementation of Quality System Documentation, Quality Auditing in industries - QS 9000 – BS-OHSAS 18001: 2007, ISO 20000, ISO 22000 IATF 16949: 2016, ISO 14001:2015, AS9100– Concept, Requirements and Benefits - Case studies.

L: 45 T:0 P:0 J:0 TOTAL: 45 PERIODS

TEXT BOOKS

1. Dale H. Besterfield, "Total Quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2016.
2. Subburaj Ramasamy "Total Quality Management" Tata Mcgraw hill edition, 2015.

REFERENCES

1. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2010.
2. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2016.
4. Dr S. Kumar, "Total Quality Management", Laxmi Publications Ltd., New Delhi 2006.
5. P. N. Muherjee, "Total Quality Management", Prentice Hall of India, New Delhi, 2015.

COURSE OUTCOMES

At the end of the course the student will be able to

CO1 State about the recent techniques followed in quality approach.

CO2 Improve Leadership Skills and raise the employee involvement.

CO3 Implement the Concepts of SPC Tools in Industrial Activity.

CO4 Examine the TQM Tools in Several Engineering fields.

CO5 Explain about the ISO and QS certification process and its need for the industries.

UNIT I SEED PRODUCTION TECHNOLOGY**8**

General Principles- Foundation and certified seed production - Seed production of Food crops, fibre crops, forage crops, sugar crops and their hybrid varieties- physiological and harvestable maturity of different kinds of seeds, Role of Seed Centres in Seed Multiplication

UNIT II SEED PROCESSING TECHNOLOGY**10**

Preparing seed for processing - Seed moisture and drying - Air screen cleaner, shape and size separators, gravity separators, surface texture separators, affinity for liquid separators, colour separators, electrical conductivity separators - seed treatment - seed packaging and handling - seed bins - dust removal, seed blending - seed marketing and distribution- methods for assessment of seed quality, Advanced Seed Drying Technology, Breeder seed production

UNIT III SEED TESTING**10**

Sampling methods - Determination of seed density – Tolerances – heterogeneity – Purity - genuineness of variety – moisture estimation- Germination – equipments –seed scarification - presowing treatment – seed priming - pelleting Viability - Vigour and health, Biological Methods to control Seed Storage Pest, Role of Seed Inspectors

UNIT IV SEED CERTIFICATION AND LEGISLATION**9**

Objectives and concepts of seed certification - seed certification agencies - minimum seed certification standards for breeder's seed - certified seeds - field and seed inspection - methods of inspection - Post harvest inspection- seed legislation laws, ISTA Regulations, Seed Act - ISTA

UNIT V SEED INDUSTRY IN INDIA AND THEIR ROLE IN AGRICULTURAL DEVELOPMENT**8**

Development of Seed industries in India – overview -National seeds corporation - State seeds Development corporation - Five year plans - Private seed industries.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS**TEXT BOOKS**

- 1 R.L Agrawal, A text book on "Seed Technology", Oxford & IBH Publication, Co. Pvt Ltd, New Delhi-2012.
- 2 Vanangamudi et.al, "Recent techniques and participatory approaches on quality seed production" Kaiser graphics Ltd., Coimbatore, 2001

REFERENCES

- 1 Vanangamudi et.al, "Recent techniques and participatory approaches on quality seed production" Kaiser graphics Ltd., Coimbatore, 2001
- 2 B.R Gregg, A.G. Law, S.S Viridi and J.S Balis "Seed Processing", National seed corporation. New Delhi, 1990.
- 3 L.O Copeland and M.B Mc Donald, "Principles of Seed Science and Technology, Chapman and Hall, New York, 1995

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about the basic principles about seed production technology
- CO2** Have ideas about technology
- CO3** Detailed knowledge about Seed Testing
- CO4** Learn about seed certification and their legislation
- CO5** Understand about the seed industry and its role in Agriculture

UNIT I INTRODUCTION

Importance of ergonomics and its application in agriculture; Energy liberation in human body; Assessment of energy expenditure- direct calorimetry, Indirect calorimetry- Assessment by oxygen consumption; Techniques of measuring oxygen consumption; Assessment by heart rate and calibration; Assessment by subjective rating of perceived effort- Overall discomfort score and BPDS; Basal metabolism and work metabolism; Assessment of work load; Assessment of Individual's maximal work capacity.

UNIT II ANTHROPOMETRY

Anthropometry; Anthropometric data and measurement techniques; Anthropometric dimensions and strength parameters; Causes of variability of anthropometric data; Analysis of anthropometric data and use of percentiles

UNIT III BIOMECHANICS OF MOTION

Biomechanics of motion. Vibration- hand arm vibration and whole body vibration, physiological effects; Noise and its physiological effects.

UNIT IV MAINTENANCE OF IMPLEMENTS

Familiarization with tools for general and special maintenance. Introduction to scheduled maintenance after 10, 100, 300, 600, 900 and 1200 hours of operation. Safety hints. Top end overhauling. Fuel saving tips. Preparing the tractor for storage. Care and maintenance procedure of agricultural machinery during operation and off-season. Repair and maintenance of implements – adjustment of functional parameters in tillage implements.

UNIT V REPAIRING OF IMPLEMENTS

Replacement of broken components in tillage implements. Replacement of furrow openers and change of blades of rotavators. Maintenance of cutter bar in a reaper. Adjustments in a thresher for different crops. Replacement of V-belts on implements. Setting of agricultural machinery workshop.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Astrand, P.O and Rodahl, K, Text book of work physiology, McGraw Hill, New York, 1977.
- 2 Bridger, R.S, Introduction to Ergonomics, McGraw Hill, New York, 1995.

REFERENCES

- 1 Dul J and Weerdmeester B, Ergonomics for Beginners. A Quick Reference Guide. Taylor and Francis, London, 1993.
- 2 Kroemer, K.H.E., Kroemer,H.J. and K.E.Kroemer-Elbert, Engineering Physiology: bases of human factors/ergonomics, VAN NOSTRAND REINHOLD, New York.
- 3 Rodal, K.1989.The Physiology of work, Taylor and Francis, London, 1997.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about the importance of Ergonomics of farm machinery
- CO2** Gain knowledge about Anthropometry
- CO3** Information about Biomechanics of motion
- CO4** Knowledge about maintenance of farm implements
- CO5** Know about the repairing and replacement of Implement parts

PROFESSIONAL ELECTIVE – III

19AGE401	CLIMATE CHANGE AND ADAPTATION	L	T	P	J	C
		3	0	0	0	3
UNIT I	EARTH'S CLIMATE SYSTEM					9

Role of ozone in environment – ozone layer – ozone depleting gases – Green House Effect, Radiative effects of Greenhouses Gases – Hydrological Cycle – Green House Gases and Global Warming – Carbon Cycle.

UNIT II	ATMOSPHERE AND ITS COMPONENTS					9
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Importance of Atmosphere – Physical Chemical Characteristics of Atmosphere – Vertical structure of the atmosphere – Composition of the atmosphere – Atmospheric stability – Temperature profile of the atmosphere – Lapse rates – Temperature inversion – effects of inversion on pollution dispersion.

UNIT III	IMPACTS OF CLIMATE CHANGE					9
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Causes of Climate change : Change of Temperature in the environment – Melting of ice Pole-sea level rise-Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions – Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.

UNIT IV	OBSERVED CHANGES AND ITS CAUSES					9
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Climate change and Carbon credits – CDM – Initiatives in India-Kyoto Protocol Intergovernmental Panel on Climate change – Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC- IPCC – Evidences of Changes in Climate and Environment – on a Global Scale and in India.

UNIT V	CLIMATE CHANGE AND MITIGATION MEASURES					9
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Clean Development Mechanism – Carbon Trading – examples of future Clean Technology – Biodiesel – Natural Compost – Eco-Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry – Carbon sequestration – Carbon capture and storage (CCS) – Waste (MSW) & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Adaptation and mitigation of climate – Scientific Technical Analysis, Cambridge University Press, Cambridge, 2006
- 2 Jan C. van Dam, Impacts of “Climate Change and Climate Variability on Hydrological Regimes”, Cambridge University Press, 2003

REFERENCES

- 1 Juha I. Uitto, Jyotsna Puri and Rob D. van den Berg, Evaluating Climate Change Action for Sustainable Development, Springer International Publishing, 2017.
- 2 Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
- 3 Climate Change: Impacts, Vulnerabilities And Adaptation In Developing Countries-UNFCCC Publication, 2007.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Possess knowledge about the earth's climate system
- CO2** Realize the importance of Atmosphere – Physical Chemical Characteristics of Atmosphere
- CO3** Understand the impacts about climate change
- CO4** Interpret the observed changes and its causes
- CO5** Calculate the effects of climate change and know about the mitigation measures to be taken

UNIT I INTRODUCTION TO DISASTERS

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of Disasters – Earthquake, Landslide, Flood, Drought, Fire etc – Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc. – Differential impacts – in terms of caste, class, gender, age, location, disability – Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change – Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)

9

Disaster cycle – Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural – nonstructural measures, Roles and responsibilities of – community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders – Institutional Processes and Framework at State and Central Level – State Disaster Management Authority (SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT

9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. – Climate Change Adaptation – IPCC Scenario and Scenarios in the context of India – Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA

9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy – Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT : APPLICATIONS AND CASE STUDIES AND FIELD WORKS

9

Landslide Hazard Zonation : Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire : Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Govt. of India : Disaster Management Act, Government of India, New Delhi, 2005.
- 2 Government of India, National Disaster Management Policy, 2009.

REFERENCES

- 1 Rajib Shaw and R. R. Krishnamurthy, Disaster Management- Global Challenges and local solutions, Universities press, ISBN : 8173716560, 9788173716560, 2009.
Ashu Pasricha, Kiyanoush Ghalavand and Jai Narain Sharma, Management and Disaster Strategies
- 2 Concept & Methods, Risk Reduction & Insurance, Experiences & Case Studies, ISBN: 8184844069, 9788184844061, 2014
- 3 Parag Diwan, A Manual on Disaster Management, ISBN: 8182744385, 9788182744387, 2010.

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Know about various disasters occurring in the world

CO2 Know about Disaster risk management

CO3 Interpret the relationship between disaster and risk management

CO4 Studied about the disaster risk management in India

CO5 Apply the learnt methods to help the society in disaster management and know about various works at field level

19AGE403 ENERGY CONSERVATION IN AGRO INDUSTRY L T P J C

3 0 0 0 3

UNIT I INTRODUCTION TO ENVIRONMENT 9

Components of the environment- ecosystems, biological interactions, bio nutrient and energy cycle; food industry pollution- an introduction, types of industries, wastes, quantity of wastes generated- Organic and GM Foods- Impacts

UNIT II WASTEWATER MANAGEMENT IN AGRO INDUSTRIES 9

Water pollution- waste water from food industries- sugar, distillery, fruit, vegetable beverage, meat and fish, dairy waste, sago processing industries and oil refiners; waste water from different industries and their advanced treatment systems- Bioremediation- Microbial and phytoremediation- Engineered reed bed system- standards for land and water body disposal.

UNIT III AIR POLLUTION CONTROL 9

Air pollution- global climate change- greenhouse effect- carbon dioxide effect chlorofluorocarbon- methane- Carbon reduction- Methanotrophs and methylotrophs- SPM- indoor air quality- food industry atmosphere- Odor pollution- air quality monitoring and Control

UNIT IV SOLID WASTE MANAGEMENT 9

Solid wastes- types- characteristics- land disposal problems- Pesticide Residues in Food and Drinking Water- Human Exposure and Risks; Value addition- enzymes- pectin and other products- 3R concept, composting- vermicomposting; Bioconversion- aerobic and anaerobic treatment- incineration- pyrolysis

UNIT V ADVANCED WASTE MANAGEMENT OPTIONS 9

Eco friendly products in food industry- Bio colorants- Eco friendly packaging- Eco labeling- GM organisms in waste management- Biosensors- bio indicators. Nanoparticals in food industry waste management- CDM;EMP and Environmental Acts

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Gilbert M. Masters. Treatment of water and wastes. In: Introduction to environmental engineering and science. 2004
- 2 Jogdhand, S.N. Environmental Biotechnology: Industrial Pollution Management. (III ed). Himalaya Publishing House, New Delhi. 2006

REFERENCES

- 1 Metcalf and Eddy. Waste Water Engineering Treatment & Reuse. 4th Edition. TATA McGraw Hill Publications:1818 2003
- 2 Environmental Science and Technology: A Sustainable Approach to Green Science and Technology, Second Edition Stanley E. Manahan CRC Press October 2006
- 3 Pesticide Residues in Food and Drinking Water- Human Exposure and Risks Edited by Hamilton, Denis, Crossley, Stephen John Wiley & Sons November 2003

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Have an introduction to environment
- CO2** Gain knowledge about the waste water management practices
- CO3** Know about air pollution control measures
- CO4** In a position to evaluate solid waste management
- CO5** Able to use advanced waste management practices

UNIT I INTRODUCTION

Importance of ergonomics and its application agriculture; Human biological: digestion and absorption of foodstuffs, liberation and transfer of energy. Concept of indirect, calorimetry, physiological responses and techniques of their measurements. Energetic efficiency of muscular work.

UNIT II ANTHROPOMETRY AND BIO-MECHANICS 9

Structural and functional body dimensions, Instrumentation and their methods of measurement, Analysis and application of anthropometric data. Visual displays; Process of seeing, Horizontal and Vertical fields of hand, Colour discrimination, Quantitative and qualitative visual displays, signals and warning lights.

UNIT III DESIGN OF CONTROLS AND WORK SPACE ENVELOPE 9

Functions of controls, Identification of Controls. Design aspects of hand and foot controls mainly. Steering, clutch, accelerator, brake and pedal design of tractors. Arrangements of controls, work-space envelope. Analysis and design of job requirements. Work physiology in agriculture. Scaling of physiological work. Fatigue allowance and indices, shift work, work-rest scheduling.

UNIT IV PHYSIOLOGICAL FACTORS AFFECTING OPERATOR – MACHINE PERFORMANCE 10

Limitations of human in relation to stresses and demands of working environments. Thermal – heat exchange process and coefficients, physiological mechanics of heat regulation, management of temperature problems, work load and allowance in hot environment. Mechanical – noise and loss of hearing, physiological effects acceptable limits, handling of noise problems, ear protection devices. Vibration – sources of vibration, effects in physiological responses control of vibration on agricultural equipment. Illumination – nature and measurement of light, colour systems, amount of illumination, roadway features influencing visibility, vehicle light.

UNIT V POSTURAL COMFORT AND OPERATOR SAFETY 9

Problems of posture and comfort. Science of seating cushion functional requirements, static and dynamic compatibility of operator-seat machine. Engineering principles applied to industrial and agricultural safety. Road, accidents, road signs and accident prevention. Safety symbols and signs, hand signals, colour codes for agricultural equipment.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Sanders, M.S. and McComack, E.J. Human factors in Engineering and Design. Tata McGraw Hill, New York, 1992
- 2 Obome, David.J. Engineering Work. John Wiley and Sons Ltd., 1982

REFERENCES

- 1 Astand, P.P. and Rodaid, K. Text book of Work Physiology. McGraw Hill Book Company, New York, 1970
- 2 Grandjean, E. Fitting the Track of the Man, Taylor and France Ltd., U.K. 1981

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know the importance of ergonomics and its application agriculture
- CO2** Possess knowledge about anthropometry and bio-mechanics
- CO3** Design of controls and work space envelope
- CO4** Realize the physiological factors affecting operator – machine performance
- CO5** Arrive at the postural comfort and operator safety

19AGE405

**AGRICULTURAL ECONOMICS AND FARM
MANAGEMENT**

L T P J C

3 0 0 0 3

UNIT I FARM MANAGEMENT 9

Agricultural Economics – definition and scope – Farm Management – definition – scope- Classification of farms – Basic concepts in farm management - Relationship between farm management and other basic sciences - Farm layout – Farm records and accounts – Farm appraisal techniques – Farm Inventory - Valuation

UNIT II LAWS OF ECONOMICS 9

Basic laws of economics – demand and supply concepts – law of increasing, diminishing and constant returns – Equi-marginal returns - Product relationship – Production function – definition and types – Production function curves – Optimum level of input use – Economies of scale external and internal economies and diseconomies - Cost concepts – types - Opportunity cost – comparison of costs – Factor relationship – concepts.

UNIT III COST CURVES 9

Principle of substitution – isoquant, isocline, expansion path, ridge line and least cost combination of inputs-Product-product relationship – Production possibility curve, iso revenue line and optimum combination of outputs – Cost curves –Optimum input and output levels – Factor –factor relationship – Least cost combination of inputs – Estimation of cost of cultivation and cost of production of crops - annual and perennial crops – Preparation of interview schedule and farm visit for data collection.

UNIT IV MANAGEMENT OF RESOURCES 9

Concept of risk and uncertainty – causes for uncertainty – Managerial decisions to reduce risks in production process – Management of resources – types of resources- land, labour, capital and measurement of their efficiencies – Mobilization of farm resources- Cost of machinery and maintenance – Break even analysis – Investment analysis – Discounting techniques, GDP in Agricultural Sector.

UNIT V FARM MANAGEMENT AND FINANCIAL ANALYSIS 9

Farm management- need and analysis – Farm financial analysis – Balance sheet – Income statement – Cash flow analysis – Farm investment analysis – Time comparison principles – Farm planning – Elements of farm planning – Whole farm planning and partial planning – Farm level management system – Farm budgeting – whole farm budgeting and partial budgeting – Estimation of credit - examples of farm planning and budgeting.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Johl, S.S., and Kapur, T.R., ‘Fundamentals of Farm Business Management’, Kalyani publishers, Ludhiana, 2007.
- 2 Devi, I., ‘Agricultural Economics’ Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2006.

REFERENCES

- 1 Raju, V.T., “Essentials of Farm Management”, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2002.
- 2 Subba Reddy, S., and Raghu Ram, P. ‘Agricultural Finance and Management’, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2002.
- 3 Sankhayan, P.L. ‘Introduction to Farm Management’, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2001

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about the basic concepts in farm management
- CO2** Possess knowledge about basic laws of economics
- CO3** Understand the concept of cost curves
- CO4** Realize the Concept of risk and uncertainty
- CO5** Possess knowledge on financial analysis

OPEN ELECTIVES

19AGO301	FARM MECHANISATION	L	T	P	J	C
UNIT I	THE SCOPE OF MECHANIZATION INDIAN AGRICULTURE	3	0	0	0	3
Introduction to the concept of mechanization - definition and its impact in the agricultural development of the country and the role of agriculture in the economic progress of the country. Precision farming-its significance-history of farm mechanization in India. Different Sources of Power in agriculture -tractors, power tillers-bulldozers etc. -History of Development of farm tractors in India.						
UNIT II	TILLAGE AND PROBLEMS IN FARM MECHANISATION					6
Major problems in adopting and adapting farm mechanisation inputs suitable to their specific needs-possible solutions to overcome them. Tillage-definition -objectives-types- their functions and applications.						
UNIT III	IMPLEMENTS USED IN FARMING OPERATIONS					10
Types of implements based on usage-primary and secondary-trailed and mounted- functions- applications- animal drawn ploughs. Planting machinery-Intercultural operations-weeders-types and their functions.						
UNIT IV	HARVESTING EQUIPMENTS AND PLANT PROTECTION MACHINERY					10
Different kinds of crop harvesting machinery-features-functions and applications. Basics of knapsack sprayers, foot pedal operated sprayers, power sprayers, boom sprayers and dusters.						
UNIT V	ERGONOMICS AND AUTOMATION					9
Ergonomic aspects of farm implements-automation of agricultural machinery-latest developments in automation- application of electronics in agriculture.						
L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS						

TEXT BOOKS

- 1 J.M. Shippen, C.R.Ellin and C.H. Clover, Basic farm machinery, Pergamon Press Ltd, 1987.
- 2 C.J. Studman, Agricultural and horticultural engineering, Butterworths PVT Ltd, 1990.

REFERENCES

- 1 R.N. Kaul, and C.O. Egbo, Introduction to Agricultural Mechanisation, Macmillan, London, 1985.
- 2 S. Nath, Manual of Practicals in Farm Mechanisation, Unitech Printery, 1988.
- 3 C.P. Crossley, and J. Kilgour, Small Farm Mechanisation for Developing Countries, Wiley, London, 1983.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Develop knowledge modern trends, design considerations, procedures and their applications in tractors
- CO2** Know about the reliability criteria and tractor linkages and stability aspects
- CO3** Design of selected farm implements/equipment
- CO4** Design, selection and matching of power unit.
- CO5** Possess knowledge about the safety devices for tractors & farm implements

19AGO302 **QUALITY MANAGEMENT IN FOOD INDUSTRIES** **L** **T** **P** **J** **C**

3 **0** **0** **0** **3**

UNIT I **FOOD SAFETY AND HYGIENE** **6**

Factors affecting food safety - Food spoilage - Food handling - Special requirements for high-risk foods - Safe food cooking temperature and storage techniques. Hygiene and Sanitation in Food Service Institutions - Cleaning and disinfection. Personal hygiene- Pest control -Waste disposal. Sensory Methods of Food Quality Testing - Sensation of taste, smell, appearance and flavor, sensory evaluation techniques.

UNIT II **FOOD QUALITY MANAGEMENT** **4**

Characteristics of quality - Quality Control -Quality Assurance- Total Quality Management - Quality Management System- Good Manufacturing Practices - Hazard Analysis Critical Control Point System (HACCP).

UNIT III **FOOD LAWS AND REGULATIONS** **12**

Introduction to food acts, laws and standards - National food safety and standard act - International standards, regulatory agencies- Consumer protection act.

UNIT IV **ENTREPRENEURSHIP DEVELOPMENT** **12**

Case studies of successful entrepreneurs -Exercises on ways of sensing opportunities -sources of idea, creating efforts, SWOT Analysis. Entrepreneurial skill assessment test - Techniques of development of entrepreneurial skills, positive self image and locus of control.

UNIT V **FOOD BUSINESS MANAGEMENT** **11**

Case studies of Food Processing Business and its aspects-Business opportunity Identification and Assessment techniques - Business Idea Generation and evaluation exercise - Market Assessment study Analysis of competitive situation - SWOT Analysis for business and for competitors - Preparation of business plan - Preparation of project report - Methods of Arrangement of inputs, finance and material.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 S S Acharya and N L Agarwal, Agricultural Marketing in India, Oxford & ISH Publishing Co, New Delhi, 1987.
- 2 Chandra Prasanna, Projects, Planning, Analysis, Selection, Implementation and Review, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996.

REFERENCES

- 1 D. David and S Erickson, Principles of Agri Business Management, McGraw Hill Book Co, New Delhi, 1987.
- 2 David H. Holt, Entrepreneurship, A new Venture Creation, Prentice Hall of India, New Delhi, 2002.
- 3 Phillip Kotler, Marketing Management, Prentice Hall of India Private Limited, New Delhi, 1994.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Posses the skills of project preparation for food industries
- CO2** Know important food laws and their implications
- CO3** Gain the knowledge on important food quality aspects and safe food storage
- CO4** Possess knowledge on entrepreneurship developments through case studies
- CO5** Know the basic food quality assessment tests

19AGO303 FOREST RESOURCE MANAGEMENT L T P J C

3 0 0 0 3

UNIT I FORESTRY AND FOREST REGENERATION 9

Indian forest – Forestry — Role of forests – Classification of forests -Silvics – silviculture – Locality factors – Regeneration of forests – Natural and artificial regeneration.

UNIT II SILVICULTURAL TECHNIQUES FOR TREE SPECIES 12

Site selection - Choice of species - Modern silvicultural techniques in site preparation – Planting and tending operations – Mechanization in silviculture -Silvicultural packages for Timber species(Teak, Sal, Sandal wood Rosewood and sandal), Pulpwood species (Eucalyptus, Casuarina, Bamboo), Fuel wood species (Acacia's, Prosopis), (Ailanthus, Melia) Tree borne oilseeds (Neem, Pungam, Bassia), Fodder trees (Subabul, White babul).

UNIT III FOREST UTILIZATION 9

Forest utilization – wood and non-wood forest products – Solid Wood- Timber- Wood composites plywood, fibre board and particle boards – Non wood forest products – Forest products like Honey, Guava etc.

UNIT IV AGROFORESTRY 10

Social Forestry concepts and applications –JFM concepts - Agroforestry- Agroforestry classification - Agroforestry systems for different agro climatic zones of Tamil Nadu –Distinction between social forestry and agroforestry.

UNIT V URBAN AND RECREATION FORESTRY 5

Techniques and management of urban forestry and recreation forestry -Ecotourism concepts and applications.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Brown, H, Indian wood technology. IBD Publishers, Dehra Dun, 1989.
- 2 Dwivedi, A.P, Agroforestry – Principles and practices. Oxford and IBH Publishing Co., New Delhi, 1992.

REFERENCES

- 1 Khanna. L.S , Principles and Practice of Silviculture, IBD Publishers, Dehra Dun. 1999
- 2 Negi. S.S, Hand Book of Forestry, IBD Publishers, Dehra Dun II, 2008
- 3 Heygreen, G. and J.L.Bowyer, Forest products and wood science. The Ohio State University Press, Ames, 1982.
- 4 Lal, J.B, India's forest – Myth and reality. Natraj Publishers, Dehra Dun, 1992.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about Forestry and Forest Regeneration
- CO2** Possess knowledge on Silvicultural Techniques for Tree Species
- CO3** Know about Forest Utilization
- CO4** Know about Agroforestry
- CO5** Know about urban and recreation forestry

19AGO304	ENERGY MANAGEMENT IN AGRICULTURE	L	T	P	J	C
		3	0	0	0	3
UNIT I	ENERGY RESOURCES IN THE FARM					10

Conventional and non-conventional forms of energy and their use- Heat equivalents and energy coefficients for different agricultural inputs and products- Pattern of energy consumption and their constraints in production of agriculture- Direct and indirect energy-Commercial and non-commercial energy-renewable and non-renewable energy sources in the farm.

UNIT II	ENERGY AUDIT IN PRODUCTION AGRICULTURE	8
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Energy audit -types-steps in energy audit - energy audit in production agriculture- energy audit in rural living and scope of energy conservation.

UNIT III	ENERGY ANALYSIS TECHNIQUES AND METHODS	9
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Identification of energy efficient machinery systems, energy losses and their management. Energy analysis techniques and methods- energy balance, output and input ratio, resource utilization, conservation of energy sources.

UNIT IV	ENERGY CONSERVATION PLANNING AND PRACTICES	10
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Energy forecasting- energy economics- energy pricing and incentives for energy conservation- factors affecting energy economics. Energy modeling for the farms.

UNIT V	CASE STUDIES	8
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Case studies conducted on energy audit in agricultural farms and comparative study.

L : 45 T: 0 P: 0 J: 0 Total: 45PERIODS

TEXT BOOKS

- 1 Kennedy WJ Jr. & Wayne C Turner, Energy Management, Prentice Hall, 1984.
- 2 Pimental D, Handbook of Energy Utilization in Agriculture, CRC Press, Boca Raton, FL, 1980.

REFERENCES

- 1 CRC Fluck & Baird CD, Agricultural Energetics, AVI Publs, 1984.
- 2 JW Twindal & Anthony D Wier, Renewable Energy Sources, E & F.N. Spon Ltd, 1986.
- 3 SR Verma, JP Mittal and Surendra Singh, Energy Management and Conservation in Agricultural Production and Food Processing, USG Publ, Dist, Ludhiana, 1994.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure
- CO2** Know the gradient, divergence and curl, related theorems useful for engineering applications
- CO3** Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically
- CO4** Evaluate real and complex integrals over suitable closed paths or contours
- CO5** Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique

19GEB375

PERSONNEL PSYCHOLOGY

L T P J C

(Common to All B.E. / B. Tech. Courses)

1 0 2 0 2

UNIT I

FRAMEWORK OF PERSONNEL PSYCHOLOGY

3+6

Nature and scope of personnel psychology-Functions of personnel psychologist-Importance of human Resource Management- Role in Providing for Equal Employment Opportunity-Objectives of personnel management.

UNIT II

JOB ANALYSIS

3+6

Introduction to Job analysis-Job Descriptions- Job Specifications-Sources of Job Information-Position Analysis Questionnaire - Fleishman Job Analysis System -Importance of Job Analysis-Self-Managing Work Teams - Flexible Work Schedules - Job sharing-Selection & Interview Process- Psychometric Test.

UNIT III

PERFORMANCE ANALYSIS

3+6

Methods for Measuring Performance: Making Comparisons-Rating Individuals -Rating Behaviors - Behaviorally anchored rating scale -Behavioral observation scale.

Measuring Results: Management by objectives (MBO)-Total Quality Management, Sources of Performance Information-Managers-Peers- Subordinates- Self.

UNIT IV

RESUME BUILDING

3+6

Introduction - SWOT- Online learning -Preparing to Write, Writing a Winning Resume, Choosing a Resume Format, Writing a Winning Cover Letter, Professional objective and Educational section, - Canva Resume, Video Resume.

UNIT V

JOB SEARCH & NETWORKING

3+6

Introduction to Job search-Job search platforms- Social Media Job Search- Introduction to job analysis- Job Evaluation- Self Screening- Importance of Networking-Types of Networking - Networking platforms.

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

REFERENCES

- 1 Dr.Nishi Goyal "Industrial Psychology" Krishna's Educational Publisher.
- 2 Dr.S.S Khanka, Human Resource Management, S.Chand Publications
- 3 Parul Singh 'Writing Effective resume for effective resume for job applications" Fortune Institute of International Business"
- 4 Andrea R Nirenberg" Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
- 5 Miriam Salpter "Social Networking for career success "Learning express, New York
- 6 Joshua Waldman, Job searching with social media, John Wiley & Sons, Inc

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about the framework of Personnel Psychology
- CO2** Understand the job analysis for Job search
- CO3** Understand the performance analysis in job
- CO4** Know about resume building qualities
- CO5** Experience the job search and networking

List of Exercises

S.No	Exercises
1	Mock Interview
2	Portfolio creation
3	Psychometric test
4	Video Resume
5	Cover letter and thank you letter
6	Attending business career fair
7	Empathy on Job Analysis/Search
8	Business card creation
9	Networking –Online/offline
10	Online Image & Branding
11	Exercises in career portals

19GEB379

EMPLOYABLE SKILL DEVELOPMENT

L T P J C

1 0 2 0 2

UNIT I QUANTITATIVE ABILITY III

3+6

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams

UNIT II QUANTITATIVE ABILITY IV

3+6

Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT III VERBAL REASONING II

3+6

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multidimensional arrangement

UNIT IV NON- VERBAL REASONING

3+6

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT V LINGUISTICS SKILLS III

3+6

Sentence improvement, Subject-Verb agreement, Speech & voices, Preposition & Conjunctions, Selection words, Comprehension ordering

L :15 T: 0 P: 30 J: 0 T:45 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.(Unit V)
- 5 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited.
- 6 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the time and distance for solving application oriented concepts in quantitative aptitude
- CO2** Apply the financial ability for solving application oriented concepts in quantitative aptitude
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude
- CO4** Analyze the non-verbal reasoning in verbal aptitude applications
- CO5** Apply appropriate LSRW skills

List of Exercises

S.No	Exercises
1	Business Model Analysis 1
2	Business Model Analysis 2
3	Idea Generation & Validation
4	BMC Value Proposition Pitch
5	BMC- Customer Segments Pitch
6	BMC- Channels Pitch
7	BMC- Revenue Model and Streams Pitch
8	BMC- Key Resources & Key Activities Pitch
9	BMC- Key Partners & Cost Structure Pitch
10	BMC- Customer Relationships Pitch
11	Final BMC Pitch
12	Report on Investors/Funding agency
13	Report on Business License & Permits
14	Digital Marketing Exercises
15	Case study on Business Process Automation

19GET376	ECONOMICS, FINANCE & ACCOUNTING	L	T	P	J	C
	TRACK 2 (ENTREPRENEURSHIP)	1	0	0	0	1

UNIT I Managerial Economics **3**

Introduction to Engineering Economics – Scope of Engineering Economics - Break Even Analysis- Elementary economic analysis- Demand and Supply

UNIT II Financial Accounting **3**

Introduction to Financial Accounting-Book Keeping-Journal-Ledger- Trial Balance- Trading Account- Profit and Loss Account- Balance sheet statement - Working capital management

UNIT III Cost Accounting **3**

Introduction to Cost Accounting- Elements of cost- Types of cost -Cost Accounting systems: Job costing-Process costing

UNIT IV Budget **3**

Introduction to budgeting- Characteristics of a sound budget-Fixed budget-Production. Budget- Sales budget-Flexible budgets- Zero base budgeting and budgetary control-ROI

UNIT V Purchase Management **3**

Role of Purchase department-Vendor selection- Purchase- Documents related to Purchase: Invoice Generation-Material Inward & Outward-Introduction to ERP & SAP

L :15 T: 0 P: 0 J: 0 T:15 PERIODS

REFERENCES

- 1 R.V.Praveen, “Quantitative Aptitude and Reasoning” PHI Publication.
- 2 M.K.Panday, “Analytical Reasoning”, Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to “Reasoning Verbal, Non-Verbal & Analytical”, Arihant Publications.
- 4 S.P.Bakshi, “Objective English” Arihant Publications.(Unit V)
- 5 R.S.Agarwal, “Quantitative Aptitude for Competitive Examinations”, S.Chand& Company Pvt Limited.
- 6 R.S.Agarwal, “A modern approach to Verbal & Non-verbal reasoning”, S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand about Managerial economics for Entrepreneurship
- CO2** Learn about Financial accounting for Entrepreneurship
- CO3** Know about Cost accounting for Entrepreneurship
- CO4** Understand Budget for Entrepreneurship
- CO5** Apply the Purchase Management for Entrepreneurship

UNIT I INTRODUCTION

3

Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge - Trade Secret - IPR in India– IPR in abroad

UNIT II PATENTS

3

Patents - Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board

UNIT III**COPYRIGHT**

3

Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

UNIT IV**TRADEMARK**

3

Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

UNIT V**OTHER FORMS OF IP**

3

Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection

Geographical Indication (GI): meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection

L :15 T: 0 P: 0 J: 0 T:15 PERIODS

TEXT BOOKS

- 1 Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
- 2 Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

REFERENCES

- 1 Deborah E. Bouchoux, Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets, Cengage Learning, Third Edition, 2012.
- 2 Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.
- 3 Prabuddha Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, McGraw Hill Education, 2011
- 4 Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: LexisNexis.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about Intellectual property rights and classification.
- CO2** Understand about Patents, Registration & Procedure and other information
- CO3** Learn about Copyrights, Registration & Procedure and other information
- CO4** Understand about Trademark, Registration & Procedure and other information
- CO5** Know about other forms of IP, Registration & Procedure and other information

19GEB377	ADVANCED VERBAL QUANTITATIVE APTITUDE REASONING	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	2	0	3
UNIT I	QUANTITATIVE ABILITY III					6+6
	Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams					
UNIT II	QUANTITATIVE ABILITY IV					6+6
	Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations					
UNIT III	VERBAL REASONING II					6+6
	Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multi dimensional arrangement					
UNIT IV	NON- VERBAL REASONING					6+6
	The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning					
UNIT V	LINGUISTICS SKILLS III					6+6
	Agile Entrepreneurship, Business Process Management & Automation, Taking Business to Digital World via Digital Marketing & e Commerce, HRM and Keeping it lean with Freelancers					

L :30 T: 0 P: 30 J: 0 T: 60 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.
- 5 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited
- 6 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the time and distance for solving application orientated concepts in quantitative aptitude
- CO2** Apply the financial ability for solving application orientated concepts in quantitative aptitude
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude
- CO4** Analyze the non-verbal reasoning in verbal aptitude applications
- CO5** Apply appropriate LSRW skills

List of Exercises

S.No	Exercises
1	Assessment 1 from Quantitative Ability III
2	Assessment 2 from Quantitative Ability III
3	Assessment 3 from Quantitative Ability III
4	Assessment 1 from Quantitative Ability IV
5	Assessment 2 from Quantitative Ability IV
6	Assessment 3 from Quantitative Ability IV
7	Assessment 1 from Verbal Reasoning II
8	Assessment 2 from Verbal Reasoning II
9	Assessment 3 from Verbal Reasoning II
10	Assessment 1 from Non Verbal Reasoning II
11	Assessment 2 from Non Verbal Reasoning II
12	Assessment 3 from Non Verbal Reasoning II
13	Assessment 1 from Linguistics Skills III
14	Assessment 2 from Linguistics Skills III
15	Assessment 3 from Linguistics Skills III

19GET375

NETWORKING

L T P J C

(Common to All B.E. / B. Tech. Courses)

1 0 0 0 1

UNIT I INTRODUCTION

3

Networking, Benefits, Quality vs Quantity in Networking, Networking for new opportunities, Networking for Professional Partnership, Local and In-person networking

UNIT II DIGITAL NETWORKING

3

Tools for Online Networking – LinkedIn, Facebook, Twitter, Google+, LMS, Open Learning Networks

UNIT III EMPATHIZING

3

Art of Listening, Empathy, Listening Models, Networking etiquette, Digital Storytelling, Lead Generation

UNIT IV COMMUNICATION

3

Interpersonal Skills, Personality and Emotional Intelligence, Business Communication, Copyrights, Networking Plan

UNIT V DIGITAL FOOTPRINTS

3

Introverts & Extroverts, Maintain Your Connections, Long-Term Networking Strategies, Case Studies- Scholarship for higher education in various countries –Case study

L :15 T: 0 P: 0 J: 0 T: 15 PERIODS

REFERENCES

- 1 Andrea R Nirenberg "Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
- 2 Miriam Salpeter "Social Networking for career success "Learning express, Newyork
- 3 Andrea R Nirenberg "Network like you means it" handbook for business and personal networking.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.
- 5 Peter W Cardon "Business Communication" Tata Mcgraw Hill Publications, Third edition
- 6 Elizabeth A Segal "Social Empathy-Art of understanding others" Columbia University press, New York

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the networking and its significance
- CO2** Apply the digital tools for networking with overseas professors
- CO3** Empathize the need and prepare themselves for overseas education
- CO4** Apply the communication skills for the overseas education
- CO5** Apply the networking strategies for scholarship in overseas education

19GEB380

HIGHER STUDIES IN ABROAD & INDIA

L T P J C

1 0 2 0 2

UNIT I OVERVIEW OF HIGHER STUDIES

3+6

Higher education in India & Examinations- Higher Education in abroad:Introduction-Admission process- Identification & Procedure - SOP-LOR-Desirable Characteristics - Introduction to Proficiency test

UNIT II SELECTION & SCHOLARSHIP

3+6

Top Universities in world- Cost of overseas education- Funding & Scholarships-Case studies
Higher Education in USA, UK, France, Singapore, Germany, Norway, Sweden, Australia & Netherland

UNIT III GRE & GMAT

3+6

GRE & GMAT: Importance of GRE & GMAT- Syllabus- Assessment pattern- Analytical reasoning- Quants-Verbal-Integrated Reasoning-Analytical writing assessment

UNIT IV TOEFL & IELTS

3+6

Importance of TOEFL & IELTS - Syllabus-Assessment Pattern-Reading-Speaking -Writing

UNIT V GATE

3+6

Importance of GATE- Syllabus -Assessment Pattern- Weightages in the different domain-General Aptitude- Candidate selected subject

L :15 T: 0 P: 30 J: 0 T:45 PERIODS

REFERENCES

- 1 B.S.Warrier “Studying Abroad” Tata Mcgraw Hill Education Private Limited, New Delhi
- 2 Dr.T.P.Sethumadhavan “Study abroad” iRank publishers , India
- 3 General Aptitude & Engineering Mathematics 2022 , Pearson Education

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about the Indian constitution and Government services
- CO2** Understand about the civil services post and selection process
- CO3** Understand about the RRB & Public sector banks post and selection process
- CO4** Understand about the central and state public sector companies post and selection process
- CO5** Experience the resume building and networking

19GEB378	FOUNDATION COURSE ON COMPETITIVE EXAMS	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	3	0	2	0	4

UNIT I QUANTITATIVE ABILITY III 6+12

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams, Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT II VERBAL REASONING II 6+12

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multi dimensional arrangement

UNIT III NON- VERBAL REASONING II 6+12

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT IV GENERAL AWARENESS FOR CIVIL SERVICE EXAMS 6+12

Current events of National & International importance, History of India & Indian National Movement, Indian & World Geography – Physical, Social, Economic Geography of India & the World, Indian Polity & Governance – Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, Economic & Social Development – Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, Environmental ecology, Bio-diversity & climate change, General Science.

UNIT V GENERAL AWARENESS FOR BANKING SECTORS 6+12

Current Affairs (National and International), Major Financial/Economic News, Budget and Five Year Plans, Who's Who, Sports, Books and Authors, Awards and Honors, Science – Inventions and Discoveries, Abbreviations, Important Days, International and National Organizations

L :30 T: 0 P: 60 J: 0 T:90 PERIODS

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.
- 5 NIOS course books for classes XI and XII on - Ancient India, Medieval India, Modern India, National Movement & Contemporary World and Culture of India.
- 6 The Story of Civilization, Part 2 by Arjun Dev, NCERT

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the quantitative ability for competitive exams.
- CO2** Apply the verbal reasoning for competitive exams
- CO3** Apply the non-verbal reasoning for competitive exams.
- CO4** Apply the general awareness in the civil service exams
- CO5** Apply the general awareness in the banking exams

List of Exercises

S.No	Exercises
1	Assessment 1 from Quantitative Ability III
2	Assessment 2 from Quantitative Ability III
3	Assessment 3 from Quantitative Ability III
4	Assessment 1 from Verbal Reasoning II
5	Assessment 2 from Verbal Reasoning II
6	Assessment 3 from Verbal Reasoning II
7	Assessment 1 from Non Verbal Reasoning II
8	Assessment 2 from Non Verbal Reasoning II
9	Assessment 3 from Non Verbal Reasoning II
10	Assessment 1 from General Awareness for Civil Service
11	Assessment 2 from General Awareness for Civil Service
12	Assessment 3 from General Awareness for Civil Service
13	Assessment 1 from General Awareness for Banking
14	Assessment 2 from General Awareness for Banking
15	Assessment 3 from General Awareness for Banking

List of Exercises

S.No	Exercises
1	Assessment for Group A Services
2	Assessment for Group B Services
3	Assessment for Group C Services
4	Assessment for Uniformed Services
5	Assessment 1 for RRB
6	Assessment 2 for RRB
7	Assessment 1 for Banking Exams
8	Assessment 2 for Banking Exams
7	Assessment for Public sector company 1
8	Assessment for Public sector company 2
9	Resume Preparation for Government Jobs
10	Video Resume for Government Jobs
11	Networking Exercises using Linked In

ONE CREDIT COURSES

19AGOC1 HANDS ON TRAINING IN SEED PROCESSING MACHINERY

1. Scalper
2. Debearders
3. Huller – scarifier
4. Maize sheller
5. Air-Screen cleaner cum grader
6. Cleaning and Grading - Vibratory separator, Spiral separator, Disk / Indented cylinder separator, Electrostatic separator, Electronic colour sorters, Inclined draper, Magnetic separator, Roll mill & Gravity separator or Destone
7. Upgrading
8. Specific gravity separation
9. Indented cylinder
10. Magnetic separator
11. Colour separator
12. Friction cleaning
13. Spiral separator

L : 15 T: 0 P: 0 J: 0 Total: 15 PERIODS

**19AGOC2 GREEN TECHNOLOGIES AND ENVIRONMENTAL
PROTECTION**

1. Fundamentals of Green Chemistry and Technology and Enviro tech
2. Principles of Green Chemistry and technology
3. Green chemistry metrics (atom economy, atom efficiency, E-factor, and other green chemistry metrics)
4. Industrial Safety and Hazard analysis- Introduction to ISO standards
5. Hazard identification, life cycle analysis
6. Safety aspects related to transport, handling and storage of hazardous chemicals, Clean tech
7. Green technologies for addressing the problems of Water, Energy, Health, Agriculture and Biodiversity
8. WEHAB (eco-restoration/ phyto-remediation, ecological sanitation, renewable energy technologies, industrial ecology, agro ecology and other appropriate green technologies)
9. Global warming; greenhouse gas emissions
10. Impacts, mitigation and adaptation
11. Green processes- Microwave assisted reactions
12. Ultra-sonification assisted reactions
13. Ionic liquids as solvent, water as reaction medium
14. Solvent free reactions, super critical solvents
15. Safe product and process design, case studies

L : 15 T: 0 P: 0 J: 0 Total: 15 PERIODS

19AGOC3

PLASTIC APPLICATIONS IN AGRICULTURE

1. Introduction of plasticulture
2. Types and quality of plastics used in soil and water conservation
3. Production agriculture and post harvest management
4. Quality control measures of tunnel
5. Present status and future perspective of plasticulture in India
6. Water management- use of plastics in in-situ moisture conservation and rain water harvesting
7. Plastic film lining in canal, pond , reservoir, plastic reservoir and irrigation system
8. Plastic pipes for irrigation water management, bore-well casing and subsurface drainage
9. Mulching and Drip and sprinkler irrigation systems
10. Use of polymers in control of percolation losses in fields
11. Soil conditioning - soil solarisation, effects of different colour plastic mulching in surface covered cultivation
12. Nursery management - Use of plastics in nursery raising, nursery bags, trays etc
13. Controlled environmental cultivation - plastics as cladding material, green / poly / shade net houses, wind breaks, poly tunnels and crop covers
14. Plastic nets for crop protection - anti insect nets, bird protection nets
15. Plastic fencing. Plastics in drying, preservation, handling and storage of agricultural produce, innovative plastic packaging solutions for processed food products

L : 15 T: 0 P: 0 J: 0 Total: 15 PERIODS