4 Year Degree Program

Syllabus & Study Scheme- Ist Semester

DEGREE PROGRAM IN COMPUTER SCIENCE AND ENGINEERING

Semester-I							
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	CY-411	Applied Chemistry	3	0	2	5	4
3	HU-411	Communication Skills/ Professional Communication	2	0	2	4	3
4	WS-412	Workshop Technology & Practice	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	CS-412	Computer Fundamentals and Information Technology	3	0	0	3	3
		Total	17	0	14	31	24

DEGREE PROGRAM IN CHEMICAL ENGINEERING

Semester-I							
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	PH-411	Applied Physics	3	0	2	5	4
3	HU-411	Communication Skills/ Professional Communication	2	0	2	4	3
4	WS-411	Workshop Technology & Practice-I	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	CH-411	Introduction to Chemical Engineering	3	0	0	3	3
		Total	17	0	14	31	24

DEGREE PROGRAM IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester-I							
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	CY-411	Applied Chemistry	3	0	2	5	4
3	HU-411	Communication Skills/ Professional Communication	2	0	2	4	3
4	WS-412	Workshop Technology & Practice	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	EC-411	Electronics Measurement & Instrumentation	3	0	0	3	3
		Total	17	0	14	31	24

DEGREE PROGRAM IN ELECTRICAL ENGINEERING

Semester-I							
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	CY-411	Applied Chemistry	3	0	2	5	4
3	HU-411	Communication Skills/ Professional Communication	2	0	2	4	3
4	WS-412	Workshop Technology & Practice	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	EE-411	Principles of Electrical Engineering	3	0	0	3	3
		Total	17	0	14	31	24

DEGREE PROGRAM IN FOOD TECHNOLOGY

		Semester-I					
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	PH-411	Applied Physics	3	0	2	5	4
3	HU-411	Communication Skills/ Professional Communication	2	0	2	4	3
4	WS-411	Workshop Technology & Practice-I	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	FT-411	Introduction to Food Processing	3	0	0	3	3
		Total	17	0	14	31	24

DEGREE PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING

		Semester-I					
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	CY-411	Applied Chemistry	3	0	2	5	4
3	HU-411	Communication Skills/ Professional Communication	2	0	2	4	3
4	WS-412	Workshop Technology & Practice	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	IE-411	Measurement Science	3	0	0	3	3
		Total	17	0	14	31	24

DEGREE PROGRAM IN MECHANICAL ENGINEERING (MANUFACTURING)

		Semester-I					
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	PH-411	Applied Physics	3	0	2	5	4
3	HU-411	Communication Skills	2	0	2	4	3
4	WS-411	Workshop Technology & Practice-I	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	MC-411	Environmental Studies	2	0	0	2	2
		Total	16	0	14	30	23

DEGREE PROGRAM IN MECHANICAL ENGINEERING (WELDING)

		Semester-I					
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-411	Engineering Mathematics	4	0	0	4	4
2	PH-411	Applied Physics	3	0	2	5	4
3	HU-411	Communication Skills	2	0	2	4	3
4	WS-411	Workshop Technology & Practice-I	2	0	4	6	4
5	ME-411	Engineering Drawing	0	0	4	4	2
6	CS-411	Elements of Computer Programming	3	0	2	5	4
7	MC-411	Environmental Studies	2	0	0	2	2
		Total	16	0	14	30	23

Title of the course : **Engineering Mathematics**
Subject Code : **AM - 411**
Weekly load : 4 Hrs.   LTP   4-0-0
Credit : 4 (Lecture 4; Tutorial 0; Practical 0)

Unit	Course outlines	Lecture(s)
Unit-1	**Matrices** Elementary transformations. Row reduced Echelon forms. Rank of a matrix. Normal form. Linearly dependent and independent vectors. System of linear equations. Linear transformations. Eigen values and eigenvectors. Properties of eigenvalues. Reduction to diagonal form. Verification of Cayley-Hamilton Theorem and its use for finding inverse of a matrix. Idempotent matrices. Complex matrices.	15
	Solid geometry Cartesian co-ordinate system. Distance formula. Section formulae. Direction ratios and direction cosines. Equation of a plane. Equations of a straight line. Condition for a line to lie in a plane. Coplanar lines. Shortest distance between two lines. Intersection of three planes. Equation of a sphere. Tangent plane to a sphere. Equations of a cone and a cylinder.	15
Unit-2	**Differential equation** Solution of differential equation by variable separable method, homogeneous differential equation of first order and their solution, Exact differential equation.	14
	Linear differential equations Solution of linear differential equation of first order. Reducible to linear differential equation. Higher order linear differential equation with constant coefficients, complementary function and particular integral. Method of variation of parameters. Cauchy's and Legendre's equations.	16

Recommended Books:
1. R.K. Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishers.
2. Denial a Murray, Elementary Course in Differential Equations, Longman.
3. Erwin KreyszigAdvanced Engineering Mathematics, Wiley Eastern Limited.
4. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill.

Title of the course : **Applied Chemistry**
Subject Code : **CY-411**
Weekly load : 5   LTP 3-0-2
Credit : 4 (Lecture 3; Practical 1)

Unit	Course Description	Lecture(s)
Unit-I	**Electro-analytical Chemistry** Conductivity of electrolytes- Specific, molar and equivalent conductivity, Nernst equation for electrode potential, EMF series, hydrogen electrode, calomel electrode, glass electrode, Electrolytic and galvanic cells, cell EMF, its measurement and applications, reversible and irreversible cells, concentration cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference. Potentiometry: Principle, instrumentation and applications.	**09**
	Fuels Classification, examples, relative merits, Solid Fuels: Coal, Proximate and Ultimate analysis of coal. Gross and Net Calorific Value, Determination of calorific value by Bomb Calorimeter Carbonization process, Low and High Temperature Carbonization. Liquid fuels: Cracking, Thermal and Catalytic Cracking, Synthetic petrol, Knocking, Antiknocking, Octane number, Cetane Number. Antiknocking agents. Gaseous fuels: Biogas, LPG and CNG. Determination of calorific value by Junker's Calorimeter. Flue gas analysis by Orsat's apparatus, problems.	**10**
	Surface Chemistry Adsorption, chemisorption and physisorption, application of adsorption of gases on solids. Langmuir's adsorption isotherm, Freundllch's adsorption isotherm, BET theory of multi-layer adsorption (qualitative), adsorption chromatography. Colloidal particles, surfactants, micelles. Enzyme catalysis, Criteria for choosing catalyst for industrial processes.	**09**
Unit-II	**Engineering Materials** Abrasives – Moh's scale of hardness – natural abrasives (diamond, corundum, emery, garnets and quartz) – synthetic abrasives (silicon carbide, boron carbide) – refractories – characteristics – classification (acidic, basic and neutral refractories) – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina magnesite and zirconium bricks.	**10**
	Lubricants Classification of lubricant, lubricating oils, semisolid lubricants, solid and synthetic lubricants. Properties of lubricating oils (viscosity, flash and fire points, cloud and pour points, Iodine Value, Acid Value, R. M. Value, mechanical stability and saponification number).	**07**

Recommended Books:
Text Books

Author	Title	Publisher
P. C. Jain & M. Jain	Engineering Chemistry	DhanpatRai Publishing Company
B.R. Puri, L.R. Sharma, M.S. Pathania	Principles of Physical Chemistry	Vishal Publishing Company
F.W. Billmayer	Textbook of Polymer Science 3rd Edn	Wiley. N.Y
C. N. Banwell& E.M. McCash	Fundamentals of Molecular Spectroscopy, 4th Edn	Tata McGraw-Hill Edition
S. S. Dara, S. S. Umare	a Text Book of Engineering Chemistry	S. Chand Publishing
J. D. Lee	Concise Inorganic Chemistry, 5th Edn	Chapman and Hall, London
B. Sivasankar	Engineering Chemistry	Tata Mcgraw Hill
A. Mallick	Engineering Chemistry	Viva Books
J. Clayden, Nick Greeves, S. Warren	Organic Chemistry	Oxford Press
Levine,	Physical Chemistry, 5/e (7th reprint)	Tata McGraw Hill
J.E. Huheey, E.A. Keitler, R.L. Keita, O.K. Medhi	Inorganic Chemistry, Principle, structure and reactivity	Pearson Education
J.E. Mcmerry and R.C. Fay	Chemistry 5th Ed	Pearson Education

List of Experiments: (CY-411)

1. Determination of strength of unknown solution of Mohr's salt using $KMnO_4$ and standard oxalic acid solution.
2. Determination of ferrous, ferric and total iron in a given sample using standard $K_2Cr_2O_7$.
3. Determination of copper in a given solution by iodometric method using $Na_2S_2O_3$ and standard $K_2Cr_2O_7$
4. To find out the cell constant of a conductivity cell.
5. To find out the strength of the given hydrochloric acid solution by titrating it against sodium hydroxide using pH meter.
6. To prepare and describe a titration curve for phosphoric acid-sodium hydroxide titration using pH-meter.
7. Determine the strength of the given hydrochloric acid solution by titrating it against sodium hydroxide conductometrically.
8. Determination of EMF/oxidation/reduction potential of a given metal/metal ion in different conditions.
9. Determination of equilibrium constant of a reaction by potentiometric method.
10. To determine moisture and volatile contents in a given coal sample by proximate analysis.
11. To determine fixed carbon and ash contents in a given coal sample by   proximate analysis.
12. To study the adsorption of acetic acid on active charcoal and to verify the Freundlich and Langmuir isotherm.
13. To study the adsorption of Iodine from alcoholic solution by charcoal.
14. Determination of viscosity of heavy oil by means of Redwood Viscometer.
15. Determination of coefficient of viscosity of the given liquids by Ostwald's Viscometer method.
16. Determination of Flash point of a given sample.
17. Determination of Fire point of a given sample.
18. Determination of acid value and saponification value of an oil.
19. Determination of aniline point of a lubricatingoil.
20. Determination of Iodine value of an oil.
21. To determine the cloud and pour points of a lubricating oil.

(Any twelve to be performed)

Title of the course : **Communication Skills**
Subject Code : **HU-411**
Weekly load : 4   LTP   2-0-2
Credit : 3 (Lecture 2; Practical 1)

Unit	Course Description	Lecture(s)
Unit- I	**Communication Techniques** Importance of Communication, One-way and Two-way Communication, Essentials of Good and effective Communication, Barriers to Communication, Techniques to Overcome Barriers	08
	Writing Skills Précis- writing; Essay- writing, Official e-mail writing	08
Unit- II	**Report Writing** Reports and their importance, Types of Routine Reports along with their formats- Annual Confidential Report, Progress Report, Inventory Report, Inspection Report, Lab Report, Structure of Reports; Bibliography & References	08
	Grammar & Vocabulary Tenses, Change of Voice, Change of Narration, Words often confused, Correct use of Prepositions, Use of Idioms and Phrases	08

Recommended Books:
1. Bhattacharya, Indrajit**.** *An Approach to Communication Skills.*DhanpatRai& Co.
2. Gibaldi, Joseph. *MLA Handbook for Writers of Research Papers*.MLA.
3. Sinclair, John.*Collins Cobuild English Grammar.* Collins.
4. Wren, P.C. &H. Martin. *High School English Grammar & Composition*. S. Chand & Company Ltd.
5. Sharma, R.C. & Krishna Mohan. *Business Correspondence and Report Writing*. Tata McGraw-Hill.

List of Experiments (10-14):

1. Introducing yourself.
2. Observing and analyzing your environment/ surroundings.
3. Collecting and Using Library Resources.
4. Giving Individual Presentations.
5. English Conversation Skills.
6. Group Discussions.
7. Extempore.
8. Debates.
9. Summarizing newspaper reports.
10. Role Plays.
11. Grammar exercises.
12. Finalization of Team Project Work.
13. Collecting Materials for Project Work & Finalization of Project.
14. Presentation of Project.

Title of the course : **Elements of Computer Programming**
Subject Code : **CS-411**
Weekly load : 6   LTP   2-0-4
Credit : 4 (Lecture 2, Practical 2)

Unit	Course outline	Lecture(s)
Unit-1	**Introduction** Elements of computer processing, Hardware and software, Introduction and feature wise comparison of various Operating Systems, Including DOS, Windows and Linux, Problem solving-algorithms and flowcharts. Structured Programming vs. Object Oriented Programming.	04
	C Programming Basics Basic program construction, Structure of a C program, Compilation process, preprocessor directives, Comments, Data types, Type conversions, Operators - arithmetic, Relational, Logical, Conditional, Increment/decrement, Library functions, Header files.	04
	Loops and Decision Statements *For* loop, *while* loop, *do* loop, Various forms of ifstatement, *switch* statement, *break* statement, *continue* statement, *and go to* statement.	03
	Arrays arrays and strings, Declaring an array, Initializing arrays, Accessing the array elements, Working with multidimensional arrays, Declaring and initializing string variables, Arithmetic operations on characters, String handling functions.	04
Unit-2	**Functions** Defining functions, Passing arguments to functions, Returning values from functions, Reference arguments, Variables and storage classes, Static functions.	05
	Pointers Pointers, Pointers to pointers, Declaring and initializing pointers, Pointer expressions, Pointer increment and scale factor, Pointers and arrays, Pointers and strings.	05
	Structures and Union Declaring and initializing a structure, Accessing the members of a structure, Nested structures, Array of structures, Using structures in functions, Pointers and structures, Declaring and initializing a union.	03
	Files Reading and writing to text and binary files, Character I/O, String I/O, File pointers, Error handling, Redirection, Command line arguments.	04

Recommended Books:
1. Kernighan Brian W. and Ritchie, Dennis M, The C Programming language, Dorling Kingsley.
2. Balagurusamy, E., Programming in ANSI C, TMH Publications

LIST OF PRACTICALS:

1. WAP to find multiplication of two numbers.
2. WAP to swap two numbers without using third variable.
3. WAP to calculate temperature in Fahrenheit to Celsius using formula C= (F- 32)/1.8.
4. WAP to calculate Sum and Average of N numbers using sequence of statements.
5. WAP to convert integer arithmetic to a given number of day and month using switch case.
6. WAP to find maximum out of 3 numbers a, b &c using Control Statements (if, else, nested if, nested else).
7. WAP to find minimum out of 3 numbers a, b & c using Control Statements (if, else, nested if, else)
8. WAP to find whether entered number is palindrome or not.
9. WAP to check entered number is even or odd.
10. WAP to find whether entered year is leap year or not.
11. WAP to find factorial of positive integer using for loop.
12. WAP to print all the number between 1 to 100 which are divisible by7 using the concept of loops.
13. WAP to generate Fibonacci series up to n using loops.

14. Write a program to calculate area of circle using function.

15. Write an iterative function to calculate factorial of given number.

16. Write a recursive function to calculate factorial of given number

17. WAP to find even & odd up to a given limit using the concept of array and loops.

18. WAP to reverse a string.

19. WAP to find addition of two matrix of n*n order using the concept of 2 dimensional array

20. WAP to find multiplication of two matrix of n*n order using the concept of 2 dimensional array.

21. WAP program to study the concept of structure.

22. WAP to implement the concept of switch and break statements.

23. WAP to implement the concept of continue statements.

24. WAP to create a data file, retrieve data from the file.

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Title of the course : **Computer Fundamental & Information Technology**
Subject Code : **CS-412**
Weekly load : 3   LTP   3-0-0
Credit : 3   (Lecture 3; Practical 0)

Unit	Course outline	Lecture(s)
Unit-1	**Introduction** Introduction and Characteristics, Generations, Classifications, Applications, Central Processing Unit and Memory, Communication between various units, Processor speed, Multiprocessor system	04
	Memory and various input and output devices Introduction to Memory, Memory hierarchy, Primary memory and its types, Secondary Memory, Classification of Secondary memory, Various secondary storage devices and their functioning, their Merits and demerits	06
	Number System Introduction and type of Number system, Conversion between number system, Arithmetic operations on number system, Signed and unsigned number system	04
	Software Computer Languages and Computer Program Classification, Examples, Introduction of operating system, Evolution, type and function of OS, Various Examples and comparison, Unix commands, Evolution and classification of programming language, Generation of programming language, Feature and selection of good programming language, Development of program, algorithm and flowchart, Program testing and debugging, Program documentation and Paradigms, Characteristics of good program	10
Unit-2	**Internet Basics** Evolution and basic internet term, Getting connected to internet and Internet application, Email and its working, Searching the web,Languages of internet, Internet and viruses	06
	Data communication Data communication and transmission media, Multiplexing and Switching, Computer network and network topology, Communication protocols and Network Devices	06
	Applications of IT Business through Computer, Computer for Education, Scientific use, Medicine &Health care, Engineering, Manufacturing & Computer for Home, Theatre, Film & Television. Legal practice & Law Enforcement.	06
	Social impacts of Information Technology Introduction, Privacy, Security and Integrity of Information, Disaster Recovery, Intellectual property rights, career opportunities in the field of IT	06

Recommended Books:

1. V. Raja Raman, Fundamentals of Computers, PHI.
2. Harley Hahy, AxexBLeoh, internet Complete Reference Fundamentals of IT, Mc-GrawHill.
3. MandeepHanda,Fundamentals of IT & Windows based computer courses,ABS Publications

Title of the course : Introduction to Chemical Engineering
Subject Code : CH-411
Weekly load : 3   LTP   3-0-0
Credit : 3   (Lecture 3; Practical 0)

Unit	Course outline	Lecture(s)
Unit-1	**Introduction of Chemical Engineering**	10
	Definition of chemical engineering, History and scope of chemical engineering, professional societies of chemical engineering in India and world. Chemical engineering- past, present and future. Branches of chemical engineering, area of employment for chemical engineers, areas of research for chemical engineers. Introduction of emerging fields of chemical engineering like Energy technology, Bio-technology and Nano-technology.	
	Components of Chemical Engineering Education : An overview	11
	Importance of following subjects in Chem. Engg. Education: Fluid Mechanics, Heat transfer, Mass transfer, Chemical Reaction Engg., Chem. Engg. Thermodynamics, Chem. Process calculations, Process dynamics & control, Instrumentation, Process equipment design, chemical process industries, Process Plant Design, Economics, Humanities and Management, Plant Utilities, Engg. Mathematics etc.	
	Use of Computers in Chemical Engg. Introduction and importance of basic computer knowledge and applications in chemical engineering education, Major software (name and their application) for Chem. Engg. Available in India and world.	04
	Flow Sheets and Plant layouts	05
	Symbols used for various components/ equipments/ operations, Classification and Importance of flow sheet and plant layout	
Unit-II	**Unit Operations**	05
	Unit Operations - Definition. Basic types, introduction, application and scope of unit operations.	
	Unit Processes	05
	Unit processes - Definition. Basic types of unit processes with introduction: esterification, polymerization, alkylation, oxidation, hydrogenation.	
	Units & Dimensions	04
	Units and dimension, conversion of units, system of units, dimensionless equation, dimensional equation, Dimensional analysis.	
	Steady state and equilibrium	04
	Concept and importance of steady state and equilibrium in different Operations.	

Books recommended:
1. Bedger&Banchero, Introduction to Chem. Engg., TMH
2. McCabe Smith &Harriott , Unit Operations of chemical engineering, Tata McGraw Hill
3. M.GopalaRao, Marshall Sitting, Outlines of Chemical Technology, East West Press
4. Mickley, Applied Mathematics for Chem.Engg., Tata McGraw Hill
5. Felder, Elementary Process Calculations, Wiley Eastern

Title of the course : **Principles of Electrical Engineering**
Subject Code : **EE-411**
Weekly load : 3   L T P-3 0 0
Credit : 3 (Lecture 3; Practical 0)

Unit	Course outlines	Lecture(s)
Unit-1	**Basic Elements** Concepts of Electric Charge, Current and Electromotive force, Potential and Potential Difference; conductor, semiconductor insulator and dielectric, Electrical Power and Energy; Basics of Instruments used for Measuring Current, Voltage, Power and Energy, Methods and precautions in use of these and other instruments e.g. digital multimeters, oscilloscopes, signal generators etc.; Basics of various protection and safety devices e.g. Fuses, Earthing, MCBs and ELCBs	04
	Concepts of DC Ohm's Law, Resistance, and color coding; Capacitance and Inductance, their ratings; Effects of Temperature on Resistance, Series and Parallel Connection of Resistances and capacitances, Kirchoff's Laws and Their Applications.	04
	AC Fundamentals Concept of Alternating Voltage and Alternating Current, Difference between AC and DC, Various Terms Related with AC Waves; RMS and Average Values, Concept of Phase Difference and Phasor, Single Phase and Three Phase Supply; Alternating Voltage applied to Pure Resistance, Pure Inductance, Pure Capacitance and their combinations, Concept of Impedance and Power in AC Circuit.	07
	Three phase AC Phasor representation of three phases, Star and Delta connections, Inter-Relation between phase and line values of voltage/current, power measurement in three phase system;	06
Unit-2	**Electromagnetic Induction** Concept of Magnetic Field, Magnetic Flux, Reluctance, Magneto Motive Force (MMF), Permeability; Self and Mutual Induction, Basic Electromagnetic laws, Effects on a Conductor Moving in A Magnetic Field, various losses in magnetic circuits;	04
	Electrical Machines Elementary concepts of an electrical machine, Basic principle of a motor and a generator, Torque due to interaction of two magnetic fields and the concept of torque angle, Common features of rotating electrical machines, Classification of Electrical machines; Principles, Construction and Working of various machines; Starters: Need, Construction and Operation.	09
	Transformers Need of a transformer, classification, Principles, Construction and Working of a Transformer, Applications of Transformers	04
	Basic Troublshooting Basic Testing and faults diagnosis in electrical systems, various tools and their applications, replacement of different passive components e.g. fuses, lamps and lamp holders, switches, cables, cable connectors, electromagnetic relays.	04

Recommended Books:

Title	Author	Publisher
Electrical Technology	Edward Hugh	Pearson Education
Basic Electrical Engineering	D P Kothari & I J Nagrath	TMH
Electrical Machines	D P Kothari & I J Nagrath	TMH
Electrical Machines	S K Bhattacharya	TMH

Title of the course : Electronics Measurement & Instrumentation
Subject Code : EC-411
Weekly load : 3   LTP 3-0-0
Credit : 3 (Lecture 3; Practical 0)

Unit	Course outline	Lecture(s)
Unit-1	**Fundamentals**	05
	Generalized instrumentation system–Units and Standards, Calibration Methods,Standards of measurements, Classification of errors, error analysis. Static Characteristics- Accuracy, Precision, sensitivity, linearity, resolution, hysteresis, threshold, input impedance, loading effects etc. Dynamic Characteristics. .	
	Electronic Meters	08
	Electronic Analog voltmeter: DC voltmeters-Choppers type-DC amplifier, solidstate voltmeter, Resolution and sensitivity of digital meters, general specification of a DVM. CRO's study of various stages in brief, measurement of voltage, current phase and frequency, special purpose oscilloscope.	
	Measuring Instruments	06
	Principle of operation of galvanometer, PMMC, Moving Iron instruments,Resistance measurements using Wheatstone bridge, Kelvin Double Bridge, Ohm meter, AC bridges: Maxwell bridge, Maxwell wein bridge, Hey's Bridge, Schering Bridge, Anderson Bridge, Campbell Bridge.	
	Instrumentation for Generation and Analysis of Waveforms	08
	Signal generators: Fixed and variableAF oscillators, AF sine and square wave generator, Function generator: Square and pulse generator, Sweep generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, spectrum analysis.	
Unit-2	**Storage and Display Devices**	10
	Necessity of recorders, recording requirements, graphic recorders, stripchart recorders, magnetic tape recorders, digital tape recorders. Electronic indicating instruments, seven segment display, fourteen segmental display Nixie tube.	
	Transducers	10
	Strain gauge, LVDT, thermocouple, piezoelectric,crystal and photoelectric transducers and their applications	
	Data Acquisition Systems	06
	Data acquisition systems And Applications	
	Telemetry	06
	Introduction, method of data transmission, types of telemetry systems and applications.	

Recommended Books:

1. Electrical and Electronic Measurements and Instrumentation, by K. SAWHNEY.
2. Electronic Instrumentation and Measurement Techniques, by D Cooper.
3. Electronic Instrumentation, by H.S. Kalsi, Tata McGraw Hill
4. Applied Electronics Instrumentation and measurement, David Buchla, Wayne Melachlan:
5. Electronics Measurement and Instrumentation, Oliver by B.H and Cag J.M. McGrawHill.
6. Element of Electronic Instrumentation &Measurment, by Carr, Pearson Education.
7. Electronic Measurments& Instrumentation, by Kishore, Pearson Education.
8. Process Control Systems and Instrumentation, Bartelt, Cengage Learning

Title of the course : Introduction to Food Processing
Subject Code : FT-411
Weekly load : 3   **LTP** 3-0-0
Credit : 3 (Lecture 3; Practical 0)

Unit	Course outline	Lectures
UNIT-I	**Introduction** Introduction to food processing: scope and importance; basic concepts about properties of foods: liquid, solid and gases; unit operations; water activity.	4
	Basics of unit operation Processing at ambient temperatures: theory and equipment for raw material processing, size reduction, mixing and forming, separation and concentration of food components, irradiation.	6
	Cereal and legumes Cereals and Legumes: Structure, pre-treatments, processing, storage, use in various preparation. Cereal products, breakfast cereals, fast food.	4
	Milk and Milk Products Milk and Milk products: Composition, Classification, Selection, Quality, Processing, Storage and uses in different preparations, Nutritional aspects, shelf life and spoilage.	6
UNIT- II	**Animal and animal products** Meat, Fish and Poultry: Types, Selection, Purchase, Storage, Uses, preparations, Spoilage of fish, poultry and meat. Eggs: Production, grade, quality selection, storage and spoilage, cost nutritional aspects and use in different preparations.	7
	Fruits &Vegetables Vegetables and Fruits: Variety, selection, purchase, storage, availability, causes and nutritional aspects of raw and processed products and their use in different preparations.	7
	Food microbiology and spoilage. Introduction to important microorganisms in foods. Cultivation of microorganisms, nutritional requirements of microorganisms, types of media used, methods of isolation. Sterilization and disinfection. Contamination and microorganisms in the spoilage of different kinds of foods.	8

Recommended books:

Author	Title	Publisher
G. W. Gould	New Methods of Food Preservation	CRC
R.P.Singh	Introduction to Food Engineering	CRC
Barbosa-Canovas	Novel Food Processing Technologies	CRC

Title of the course : **Measurement Science**
Subject Code : **IE-411**
Weekly load : 3   LTP-3 0 0
Credit : 3   (Lecture 3; Practical 0)

Unit	Course outline	Lecture(s)
Unit-1	**Introduction to measurements** Measurements, Significance, classification of the methods of measurement, instruments and measurement systems, types of instruments, elements of a generalized measurement system, input / output configuration of measurement systems, methods of correction for the various inputs.	08
	StaicCharcateristics of the instruments Measurement system performance, static characteristics in detail, calibration, error in measurement, loading effects, input/ output impedance, loading effects due to series and shunt connected instruments.	08
	Errors in measurement and their statistical analysis Limiting errors, combination of quantities with errors, types of errors, statistical treatment of data, Gaussian curve of errors, Probable error and tables, specifying measurement data, rejection of data, uncertainty analysis.	08
Unit-2	**Dynamic characteristics of the instruments** Dynamic response and analysis, time and frequency domain analysis, mathematical models of the measurement system, types of systems, dynamic response of the first order and second order instruments to standard inputs, correlation between the time and frequency response.	08
	Units, Dimensions and standards Units, Dimensions, systems of electrical units, dimensions in electromagnetic and electrostatic systems, Determination of absolute units, standards of measurement and their classification.	08
	Signals and noise in measurement systems Introduction, deterministic and random signals, statistical representation of the random signals, effects of noise and interference on the measurement system, noise sources and coupling mechanism , method of reducing effects, reliability , choice and economics of the measurement system.	08

Recommended Books-

1. A K Ghosh: Introduction to Instrumentation and Control, Prentice Hall of India, New Delhi 2004.

2. A K Sawhney: A course on electrical and electronic measurements and instrumentation, Dhanpat

3. JOHN P. BENTLEY: Principles of Measurement System, Pearson Education

4. David A Bell: Electronic Instrumentation and measurement, Prentice Hall of India

Title of the course : **Engineering Drawing**
Subject Code : **ME-411**
Weekly load : 04   LTP   0-0-4
Credit : 02 (Lecture 0; Practical 2)

Unit	Particulars	Lecture(s)
Unit-I	**Introduction** Introduction, Objectives, applications. Fundamentals of engineering drawing, Use and handling of different drawing instruments, title block, sheet sizes, first and third angle projections, orthographic projections.	04
	Lettering and Dimensioning Free hand sketching of different types of lines in engineering drawing as per IS specifications, Free hand lettering (alphabet and numerals) - lower case and upper case, vertical and inclined at 75^0 in the ratio of 7:4, Notation of dimensioning, size and location dimensions, aligned and undirectional systems of dimensioning, general rules for dimensioning, unit of dimensioning.	04
	Scales Uses of scales, sizes of scale, representative fraction, construction of plain and diagonal scales	06
	Projection of points, line Introduction on theory of projections and orthographic projections, projection of a point in different quadrants, projection of straight lines in different positions (all possible cases)	12
Unit-II	**Projection of Planes** Definition of plane, types of planes, traces of plane, projection of planes in different positions	06
	Projection of Solids Types of solids, projections of solids in simple and typical positions, introduction on sectioning of solids	08
	Development of surfaces Introduction, Development of a right prism, cylinder, pentagonal prism, and a right pyramid, truncated pentagonal pyramid.	08

Recommended Books

Title	Author(s)	Publisher
Engineering Drawing	P S Gill	Kataria and Sons, New Delhi
Engineering Drawing	R.K.Dhawan	S. Chand & Co, New Delhi
Engineering Drawing	N.D,Bhatt	Charotar Publishing House

Title of the course : Workshop Technology & Practice-I　　　　　　**LTP 2-0-4**
Sub code　　　　 : WS-411
Weekly load　　　　 : 6
Credit　　　　　　 : 4(Lecture 2; Practical 2)

Unit	Course Description	Lecture(s)
Unit –I	**Sheet Metal** Introduction to sheet metal work; GI sheets, aluminium, tin plate, copper, brass etc, Hand tools used in sheet metal shop like steel rule, vernier calipers, micrometer, sheet metal gauge etc., scriber, divider, punches, chisels, hammers, snips, pliers, stakes, rivets etc., Operations -shearing, bending, drawing, squeezing etc.	06
	Pattern making Introduction to pattern making, moulding and foundry practice. Pattern materials like wood, cast iron, brass, aluminium, waxes etc., different types of patterns, pattern allowances.	06
	Foundry Introduction to casting process, core-boxes, core prints, hand tools-shovel, riddle, rammer, trowel, slick, lifter, sprue pin, bellow, mallet,vent rod, pouring weights etc., moulding sands-green sand, dry sand, loam sand, facing sand etc., grain shape and size, properties of moulding sand, sand preparation and testing etc., Gating Systems- requirements and functions, Functions of risers, Riser and directional solidification, casting- permanent mould casting, centrifugal casting etc.	08
Unit-II	**Carpentry** Introduction to wood working, Types of wood, seasoning methods, Marking and Measuring Tools-rule, try square, marking gauge, mortise gauge etc., Cutting Tools-rip saw, tenon saw, firmer chisel, mortise chisel, iron jack plane, wooden jack plane etc., Drilling Tools-braces, drill bits etc., Striking Tools-hammers, mallet etc., Holding Tools-bench vice, G-cramp etc., Miscellaneous Tools- rasps, files, screw driver, pincer etc.; Operations-marking, sawing, planning, chiseling, boring, grooving etc., Joints- Corner joints, Tenon and Mortise joint, Briddle cross-joint.	06
	Fitting Introduction to fitting, Tools used in fitting -bench vice, hammers, chisels, files-flat file, square file, half round file, round file, knife edge file, scrapers, hacksaws, try squares, drill machine, drill bits, taps, dies etc, Operations-chipping, filing, scrapping, sawing, marking, drilling, tapping, dieing etc.;	06

Recommended Books

1. HajraChoudhury, HazraChoudhary and Nirjhar Roy, 2007, Elements of Workshop Technology, vol. I, Media promoters and Publishers Pvt. Ltd.
2. W A J Chapman, Workshop Technology, 1998, Part -1, 1st South Asian Edition, Viva Book Pvt Ltd.
3. P.N. Rao, 2009, Manufacturing Technology, Vol.1, 3rd Ed., Tata McGraw Hill Publishing Company.
4. Kaushish J.P., Manufacturing Processes, 2008, Prentice Hall India

LIST OF PRACTICALS (WS-411)

(10-14 jobs from the following list)

CARPENTRY SHOP

Making of various joints like:
   a) Cross lap joint
   b) T-lap joint
   c) Corner lap joint
   d) Mortise and tenon joint
   e) Dovetail joint

FITTING SHOP
   a) Study and use of instruments in fitting shop, like, vernier calipers, micrometer, height gauge and bevel protractor
   b) Exercise on simple operation viz. cutting, chipping, sawing, filing, drilling,

FOUNDRY SHOP
   a) Familiarization with different patterns and hand tools.
   b) Preparations of green sand mould using single piece pattern three-four exercises.
   c) Preparations of green sand mould using split pattern on bench moulding.
   d) .Preparations of green sand mould using solid pattern by bedded method.

PATTERN SHOP
   a) 1 Familiarization with different tools and patterns in pattern shop.
   b) Exercise on making of solid piece pattern
   c) Exercise on making of split piece pattern
   d) Exercise on making of cored pattern.

SHEET METAL SHOP
   a) Study the layout and different equipment used in sheet metal shop.
   b) Familiarization with different tools and processes in sheet metal shop.
   c) Exercise on sheet cutting, development, folding, bending, piercing, punching, parting, notching and slitting.
   d) Profile and circle cutting exercise.

Title of the course : Workshop Technology & Practice
Sub code   : WS-412
Weekly load   : 6   **LTP 2-0-4**
Credit   : 4(Lecture 2; Practical 2)

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	Machining Turning, Chamfering, Tapering, Facing, Knurling , Lathe	04

Recommended Books:

1. HajraChoudhury, HazraChoudhary and Nirjhar Roy, 2007, Elements of Workshop Technology, vol. I, Media promoters and Publishers Pvt. Ltd.
2. W A J Chapman, Workshop Technology, 1998, Part -1, 1st South Asian Edition, Viva Book Pvt Ltd.
3. P.N. Rao, 2009, Manufacturing Technology, Vol.1, 3rd Ed., Tata McGraw Hill Publishing Company.
4. Kaushish J.P., Manufacturing Processes, 2008, Prentice Hall India
   Practical: 10-14 jobs from the following list.

LIST OF PRACTICALS (WS-412)

CARPENTRY SHOP

Making of various joints like:

a) Cross lap joint
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c) Corner lap joint
d) Mortise and tenon joint
e) Dovetail joint

FITTING SHOP

a) Study and use of instruments in fitting shop, like, vernier calipers, micrometer, height gauge and bevel protractor
b) Exercise on simple operation viz. cutting, chipping, sawing, filing, drilling,

FOUNDRY SHOP

a) Familiarization with different patterns and hand tools.
b) Preparations of green sand mould using single piece pattern three-four exercises.
c) Preparations of green sand mould using split pattern on bench moulding.
d) Preparations of green sand mould using solid pattern by bedded method.

PATTERN SHOP

a) Familiarization with different tools and patterns in pattern shop.
b) Exercise on making of solid piece pattern
c) Exercise on making of split piece pattern
d) Exercise on making of cored pattern.

SHEET METAL SHOP

a) Study the layout and different equipment used in sheet metal shop.
b) Familiarization with different tools and processes in sheet metal shop.
c) Exercise on sheet cutting, development, folding, bending, piercing, punching, parting, notching and slitting.
d) Profile and circle cutting exercise.

MACHINE SHOP

a) To familiarize with safety aspects.
b) To familiarize with equipment and tools.
c) Practice of turning operation on lathe
d) Practice of facing operation on lathe
e) Practice of taper turning on lathe