

مؤلانا آآآاآ نیشنل اردو یونیورسٹی

مولانا آزاد نیشنل اردو یونیورسٹی

MAULANA AZAD NATIONAL URDU UNIVERSITY

(A Central University Established by an Act of Parliament in 1998)

(Accredited "A" Grade by NAAC)

Gachibowli, Hyderabad – 500032, Telangana, INDIA

AICTE Model Curriculum with effect from 2020-21 for MANUU Polytechnics



General Course Structure

&

Credit Distribution

DIPLOMA

IN

INFORMATION TECHNOLOGY

MANUU POLYTECHNICS

Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical (P) per week	1 credit

A. Program Credits:

The total number of credits proposed for the three-year Diploma program in Engineering & Technology is 120.

B. Structure of Diploma Engineering Program:

The structure of Diploma Engineering program shall have essentially the following categories of courses with the breakup of credits as given:

Sr. No.	Category	Suggested Breakup of Credits
1.	Humanities & Social Sciences courses	7
2.	Basic Science courses	18
3.	Engineering Science courses	16
4.	Program Core courses (Branch specific)	46
5.	Program Elective courses (Branch specific)	12
6.	Open Elective courses (from other technical and/or emerging subjects)	9
7.	Project work, seminar and internship in industry or elsewhere	12
8.	Audit Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge etc.]	(non-credit)
	Total	120

C. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
HS	Humanities & Social Sciences Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
AU	Audit Courses
SI	Summer Internship
PR	Project
SE	Seminar

D. Course level codingscheme:

As per the CBCS Rules and Regulations of Examination Branch of MANUU.

E. Category-wise Courses

HUMANITIES & SOCIAL SCIENCES COURSES [HS]

Note:

(i) Number of Humanities & Social Sciences Courses: 4

(ii) Credits: 7

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1.		Communication Skills in English	2	0	0	I	2
2.		Sports and Yoga	0	0	2	I	1
3.		Communication Skills in English Lab	0	0	2	I	1
4.		Entrepreneurship and Start-ups	3	0	0	VI	3
Total Credits							7

BASIC SCIENCES COURSE [BS]

Note:

(i) Number of Basic Sciences Courses: 8

(ii) Credits: 18

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1.		Mathematics-I	2	1	0	I	3
2.		Applied Physics-I	2	1	0	I	3
3.		Applied Chemistry	2	1	0	I	3
4.		Applied Physics-I Lab	0	0	2	I	1
5.		Applied Chemistry Lab	0	0	2	I	1
6.		Mathematics-II	3	0	0	II	3
7.		Applied Physics-II	2	1	0	II	3
8.		Applied Physics-II Lab	0	0	2	II	1
Total Credits							18

ENGINEERING SCIENCE COURSES [ES]

Note:

- (i) Number of Engineering Sciences Courses:8
- (ii) Credits:16

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1.		Engineering Graphics	0	0	3	I	1.5
2.		Engineering Workshop Practice	0	0	3	I	1.5
3.		Introduction to IT Systems	2	1	0	II	3
4.		Fundamentals of Electrical & Electronics Engineering	2	1	0	II	3
5.		Engineering Mechanics	2	1	0	II	3
6.		Introduction to IT Systems Lab	0	0	4	II	2
7.		Fundamentals of Electrical & Electronics Engineering Lab	0	0	2	II	1
8.		Engineering Mechanics Lab	0	0	2	II	1
Total Credits							16

PROGRAM CORE COURSES [PC]

Note:

- (i) Number of Program Core Courses: 20 to 30 (including lab courses)
- (ii) Credits: 46**
- (iii) Number of contact hours per week of a subject may vary as per subject contents without affecting the subject credits.

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1							
.							
.							
n							
Total Credits							46

PROGRAM ELECTIVE COURSES [PE]

Note:

- (i) Number of Program Elective Courses: 4 to 6
(minimum ten Branch Specific courses to be specified for the students to choose from)
- (ii) Credits: 12

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1							
.							
.							
n							
Total Credits							12

OPEN ELECTIVE COURSES [OE]

Note:

- (i) Number of Open Elective Courses: 3 to 4 (minimum ten courses to be specified out of the suggestive list of open elective courses given as Appendix III)
- (ii) Credits: 9
- (iii) The Open Elective Courses to be offered preferably in III year (one course may be offered in V Semester and two courses in VI Semester)
- (iv) The students can opt only for those open elective courses that are offered by other than their respective departments

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1							
.							
.							
n							
Total Credits							9

PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY OR ELSEWHERE

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1.		Summer Internship – I (3-4 weeks) after II nd Sem					2
2.		Summer Internship – II (4-6 weeks) after IV th Sem					3
3.		Minor Project	0	0	4	IV	2
4.		Major Project	0	0	2	V	4
5.			0	0	6	VI	
6.		Seminar	1	0	0	VI	1
Total Credits							12

Note:

- Summer Internship – I should be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in social sector/ Govt. Skill Centres/Institutes/Schemes.
- Summer Internship – II should be undertaken in an industry only
- Seminar should be based on real/ live problems of the Industry/Govt./NGO/MSME/Rural Sector or an innovative idea having the potential of a Startup

AUDIT COURSES [AU]

Note: These are mandatory non-credit courses.

Sl. No	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1.		Environmental Science	2	0	0	II	0
2.		Essence of Indian Knowledge and Tradition	2	0	0	IV	0
3.		Indian Constitution	2	0	0	VI	0
Total Credits							0

DESCRIPTION OF BRANCH CODES

Sr. No.	Branch	Code
1.	Civil Engineering	CE
2.	Computer Engineering	CO
3.	Electronics and Communication Engineering	EC
4.	Electrical Engineering	EE
5.	Mechanical Engineering	ME
6.	Production Engineering	PE
7.	Information Technology	IT
8.	Chemical Engineering	CH

INDUCTION PROGRAM

Please refer Appendix IV for guidelines.

The Essence and Details of Induction program can also be understood from the 'Detailed Guide on Student Induction program', as available on AICTE Portal, although that is for UG students of Engineering & Technology
(Link: <https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf>).

Induction program (mandatory)	Two-week duration
Induction program for students to be offered right at the start of the first year.	<ul style="list-style-type: none">• Physical activity• Creative Arts• Universal Human Values• Literary• Proficiency Modules• Lectures by Eminent People• Visits to local Areas• Familiarization to Dept./Branch & Innovations

F. Mandatory Visits/Workshop/Expert Lectures:

- It is mandatory to arrange one industrial visit every semester for the students of each branch.
- It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/industry/entrepreneurial orientation.
- It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry

G. Evaluation Scheme:

a. For Theory Courses:

(The weightage of Internal assessment is 40% and for End Semester Exam is 60%)
The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

b. For Practical Courses:

(The weightage of Internal assessment is 60% and for End Semester Exam is 40%)
The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

c. For Summer Internship / Projects / Seminar etc.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation by the student in front of Internship & project review committees consist of HoD, Principal Nominated Member and Concerned Faculty.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

F_R (Fail due to shortage of attendance and therefore, to repeat the course)

Semester I–Pool: 1
(Common to CIVIL, MECH, ECE Branches)
Curriculum Structure

Sl.No	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs/week	Scheme of Evaluation		Credits
				L	T	P		CIE	SEE	
1	Basic Science	DPCC113BST	Mathematics-I	2	1	0	3	40	60	3
2	Basic Science	DPCC111BST	Applied Physics-I	2	1	0	3	40	60	3
3	Basic Science	DPCC112BST	Applied Chemistry	2	1	0	3	40	60	3
4	Engineering Science	DPCE111PCP	Engineering Graphics	0	0	2	2	60	40	1
5	Basic Science	DPCC112BSP	Applied Chemistry Lab	0	0	2	2	60	40	1
6	Engineering Science	DPIT111PCT	Introduction to IT Systems	2	1	0	3	40	60	3
7	Engineering Science	DPIT111PCP	Introduction to IT Systems Lab	0	0	4	4	60	40	2
8.	Basic Science	DPCC111BSP	Applied Physics-I Lab	0	0	2	2	60	40	1
9	Humanities & Social Science	CCPE055NCP	Sports and Yoga	0	0	2	2	50	--	1
Total Credits										18

Semester I- Pool: 2
(Common to CSE, IT, EEE Branches)
Curriculum Structure

Sl. No	Category of Course	Code No.	Course Title	Hours Per week			Total contact hrs/ week	Scheme of Evaluation		Credits	
				L	T	P		CIE	SEE		
1	Basic Science	DPCC113BST	Mathematics-I	2	1	0	3	40	60	3	
2	Basic Science	DPCC111BST	Applied Physics-I	2	1	0	3	40	60	3	
3	Engineering Science	DPCE101EST	Engineering Mechanics	2	1	0	3	40	60	3	
4	Humanities & Social Science	DPCC111HST	Communication Skills In English	2	0	0	2	20	30	2	
5	Engineering Science	DPEE111PCT	Fundamentals of Electrical & Electronics Engineering	2	1	0	3	40	60	3	
6	Humanities & Social Science	DPCC111HSP	Communication Skills in English Lab	0	0	2	2	60	40	1	
7	Engineering Science	DPCE112PCP	Engineering Workshop Practice	0	0	4	4	60	40	2	
8	Basic Science	DPCC111BSP	Applied Physics-I Lab	0	0	2	2	60	40	1	
9	Engineering Science	DPCE111ESP	Engineering Mechanics Lab	0	0	2	2	60	40	1	
10	Engineering Science	DPEE111PCP	Fundamentals of Electrical & Electronics Engineering Lab	0	0	4	4	60	40	2	
11	Audit	DPCC116NCT	Environmental Science	2	0	0	2	20	30	0	
Total Credits											21

Semester II–Pool: 1
(Common to CIVIL, MECH, ECE Branches)
Curriculum Structure

Sl.No	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs/ week	Scheme of Evaluation		Credits
				L	T	P		CIE	SEE	
1	Basic Science	DPCC213BST	Mathematics-II	2	1	0	3	40	60	3
2	Basic Science	DPCC211BST	Applied Physics-II	2	1	0	3	40	60	3
3	Humanities & Social Science	DPCC111HST	Communication Skills in English	2	0	0	2	20	30	2
4	Engineering Science	DPEE111PCT	Fundamentals of Electrical & Electronics Engineering	2	1	0	3	40	60	3
5	Engineering Science	DPCE101EST	Engineering Mechanics	2	1	0	3	40	60	3
6	Basic Science	DPCC211BSP	Applied Physics-II Lab	0	0	2	2	60	40	1
7	Engineering Science	DPCE112PCP	Engineering Workshop Practice	0	0	4	4	60	40	2
8	Engineering Science	DPEE111PCP	Fundamentals of Electrical & Electronics Engineering Lab	0	0	4	4	60	40	2
9	Engineering Science	DPCE111ESP	Engineering Mechanics Lab	0	0	2	2	60	40	1
10	Humanities & Social Science	DPCC111HSP	Communication Skills In English Lab	0	0	2	2	60	40	1
11	Audit	DPCC116NCT	Environmental Science	2	0	0	2	20	30	0
Total Credits										21

Semester II – Pool: 2
(Common to CSE, IT, EEE Branches)
Curriculum Structure

Sl.No	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs/week	Scheme of Evaluation		Credits
				L	T	P		CIE	SEE	
1	Basic Science	DPCC213BST	Mathematics-II	2	1	0	3	40	60	3
2	Basic Science	DPCC211BST	Applied Physics-II	2	1	0	3	40	60	3
3	Engineering Science	DPIT111PCT	Introduction to IT Systems	2	1	0	3	40	60	3
4	Engineering Science	DPCE111PCP	Engineering Graphics	0	0	2	2	60	40	1
5	Basic Science	DPCC112BST	Applied Chemistry	2	1	0	3	40	60	3
6	Basic Science	DPCC211BSP	Applied Physics-II Lab	0	0	2	2	60	40	1
7	Engineering Science	DPIT111PCP	Introduction to IT Systems Lab	0	0	4	4	60	40	2
8	Basic Science	DPCC112BSP	Applied Chemistry Lab	0	0	2	2	60	40	1
9	Humanities & Social Science	CCPE055NCP	Sports and Yoga	0	0	2	2	50	--	1
Total Credits										18

Semester III
Curriculum Structure
Diploma in Information Technology

Sl No	Category	Code No.	Course Title	Hours per week			Total contact hrs/ week	Scheme of Evaluation		Credits
				L	T	P		CIE	SEE	
1.	Program core course	DPCS311PCT	Computer Programming	2	1	0	3	40	60	3
2.	Program core course	DPCS312PCT	Scripting Languages	2	1	0	3	40	60	3
3.	Program core course	DPIT301PCT	Multimedia Basics	2	0	0	2	40	60	2
4.	Program core course	DPCS313PCT	Introduction to DBMS	2	0	0	2	40	60	2
5.	Program core course	DPIT302PCT	Information and Communication Technologies	2	0	0	2	40	60	2
6.	Summer Internship-I (4 weeks) after II Semester	DPCC301SEP	Summer Internship-1						50	2
7.	Program core course	DPCS311PCP	Computer Programming Lab	0	0	4	4	60	40	2
8.	Program core course	DPCS312PCP	Scripting Languages Lab	0	0	4	4	60	40	2
9.	Program core course	DPIT301PCP	Multimedia Basics Lab	0	0	4	4	60	40	2
10.	Program core course	DPCS313PCP	Introduction to DBMS Lab	0	0	4	4	60	40	2
	Total Credits									22

Semester IV
Curriculum Structure
Diploma in Information Technology

S I. N o	Category	Code No.	Course Title	Hours per week			Total conta ct hrs/ week	Scheme of Evaluati on		Credi ts
				L	T	P		CIE	SEE	
1.	Program core course	DPIT402PC T	Object Oriented Analysis and Design	2	1	0	3	40	60	3
2.	Program core Course	DPIT403PC T	Data Structures through C	2	1	0	3	40	60	3
3.	Program core course	DPIT404PC T	Comput er Hardwa re Networking	2	0	0	2	40	60	2
4.	Program core course	DPIT405PC T	Information Coding Techniques	2	0	0	2	40	60	2
5.	Program core course	DPIT406PC T	Web Technologies	2	0	0	2	40	60	2
6.	Program core course	DPIT403PC P	Data Structures through C Lab	0	0	4	4	60	40	2
7.	Program core course	DPIT404PC P	Computer Hardware Net working Lab	0	0	4	4	60	40	2
8.	Program core course	DPIT406PC P	Web Technologi es Lab	0	0	4	4	60	40	2
	Program core course	DPIT402PC P	Object Oriented Analysis and Design Lab	0	0	4	4	60	40	2
9.	Minor Project	DPCC402SE P	Minor Project	0	0	4	4	60	40	2
10.	Mandatory Course	DPCC401PE T	Essence of Indian Knowledge and Tradition	2	0	0	2	20	30	0
			T o t a l C							22

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Semester V
Curriculum Structure
Diploma in Information Technology

Sl · No	Category	Code No.	Course Title	Hours per week			Total conta ct hrs/ week	Scheme of Evaluatio n		Credits
				L	T	P		CIE	SEE	
1.	Program core course		Introducti on toe- Governance	2	1	0	3	40	60	3
2.	Program core course		Internet of Things	2	1	0	3	40	60	3
3.	Program Elective course		Program Elective-1	2	1	0	3	40	60	3
4.	Program Elective course		Program Elective-2	2	1	0	3	40	60	3
5.	Open Elective		Open Elective-1	3	0	0	3	40	60	3
6.	Summer Internship- II (6 weeks) after IV Semester		Summer Internship-II						100	3
7.	Major Project			0	0	2	2			^
			T o t a l C r e d							1 8

	i t s			
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Program Elective-1:

1. Fundamentals of A.I
2. VB.Net Programming

Program Elective-2:

3. Java Programming
4. Data Warehousing and Data Mining

Open Elective-I:

1. Artificial Intelligence&Machine Learning
2. Soft Computing Techniques

Semester VI
Curriculum Structure
Diploma in Information Technology

Sl No	Category	Code No.	Course Title	Hours per week			Total contact hrs/ week	Scheme of Evaluation		Cred its
				L	T	P		CIE	SEE	
1.	Program Elective course		Program Elective- 3	2	1	0	3	40	60	3
2.	Program Elective course		Program Elective- 4	2	1	0	3	40	60	3
3.	Humanities and Social Science course		Entrepreneurship and Startups	3	0	0	3	40	60	3
4.	Open Elective		Open Elective-2	3	0	0	3	40	60	3
5.	Open Elective		Open Elective-3	3	0	0	3	40	60	3

6.	Mandatory Course		Indian Constitution	2	0	0	2	20	30	0
7.	Major Project			0	0	6	6	120	80	4^
8.	Seminar			1	0	0	1	50	--	1
			Total Credits							20

Program Elective-3:

1. Network Forensics
2. Distributed Systems

Program Elective-4:

3. Information Security
4. FOSS (Free and Open Source Software)

Open Elective-3:

1. Project Management
2. Internet of Things

Open Elective-4:

3. Artificial Intelligence
4. Human Computer Interaction

Mathematics-I**Course Objectives:**

This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of algebra.

Course Content:**UNIT - I: Trigonometry**

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of $\sin x$, $\cos x$, $\tan x$ and e^x .

Differential Calculus

Definition of function; Concept of limits. Four standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow a} \left(\frac{a^x - 1}{x} \right)$ and $\lim_{x \rightarrow a} (1+x)^{1/x}$.

Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x and $\log_a x$. Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

UNIT - III: Algebra

Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number. De-moivre's theorem, its application.

Partial fractions: Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

Permutations and Combinations: Value of nP_r and nC_r .

Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems

References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. A Text book of Engineering Mathematics for I,II semester by Dr. M.V.S.S N. Prasad by Radiant Publishing House.
4. A Text Book of Intermediate Mathematics I, II year by Telugu Akademi, Telangana
5. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)
6. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., Vi-kas Publishing House.
7. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

APPLIED PHYSICS-I**Course Objectives:**

Applied Physics includes the study of a large number of diverse topics all related to materials/things that exist in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which such objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

Learning Outcome:

After undergoing this subject, the student will be able to:

- Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.
- Represent physical quantities as scalar and vectors and solve real life relevant problems.
- Analyse type of motions and apply the formulation to understand banking of roads/railway tracks and conservation of momentum principle to describe rocket propulsion, recoil of gun etc.
- Define scientific work, energy and power and their units. Derive relationships for work, energy and power and solve related problems.
- Describe forms of friction and methods to minimize friction between different surfaces.

Course Content:**Unit 1: Physical world, Units, Dimensions and Vectors**

Physics – scope and nature– physics in relation to technology, Physical quantities, Fundamental physical quantities, Derived physical quantities with units, examples. S.I. Units of various physical quantities with symbols, Rules for writing SI units. Dimensions of physical quantity, dimensional formulae, principle of Homogeneity of Dimensions, applications of Dimensional Analysis. Scalar and Vector quantities – examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Resolution of a Vector, Triangle and Parallelogram law of vectors, Scalar and Vector Product, properties with examples, problems solving

Unit 2: Dynamics

Recapitulation of equations of motion in a straight line, acceleration due to gravity, expressions for Maximum Height, Time of ascent, Time of descent and time of flight. Work, energy, power and their SI units, potential Energy and Kinetic Energy examples and their expression. The law of conservation of Energy, verify in the case of freely falling body. simple harmonic motion with examples, conditions of S.H.M, Explanation of simple Harmonic Motion by Reference circle, Expressions for Displacement, Velocity, Acceleration, Time Period and Frequency in S.H.M, simple pendulum and expression for time period of a simple pendulum, second's pendulum, problems solving

Unit 3: Properties of Matter

Introduction to Elasticity, stress and strain, types of stress and strain, Hooke's law moduli of elasticity, young's modulus, Bulk Modulus, Rigidity Modulus. Surface tension: concept, units, cohesive and adhesive forces, angle of contact, applications of surface tension, effect of temperature and impurity on surface tension. Capillarity and its applications in daily life, Experimental determination of surface tension based on capillary rise method. Viscosity and coefficient of viscosity and effect of temperature on viscosity, problems solving

Unit 4: Heat and Thermodynamics

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), scales of temperature and their relationship, Expansion of solids, coefficient of linear, Areal and cubical expansions and relation amongst them. Expansion of

gases, volume coefficient of a gas and pressure coefficient of a gas, Boyles law, Charles laws, ideal gas Equation, laws of thermodynamics, specific heats and molar specific heats, C_p - $C_v=R$, problems solving.

Text Books and References

1. **Concepts of physics by HC VERMA, Surya publication, Ghaziabad, india**
2. **Physics- Resnik and Halliday- Wiley Toppan Publishers- England**
3. **Physics- intermediate-I &II year- Telugu Academy, Telangana**
4. **P.k palaniswamy: Atext book of Engineering Physics**
5. **C.Kittel(Wiley Eastern) : introduction to solid state physics.**

Applied Physics-I Lab**Course Objectives**

Study of Applied Physics aims to give an understanding of physical world by observations and predictions. Concrete use of physical principles and analysis in various fields of engineering and technology is very prominent. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

Learning Outcome:

After undergoing this lab work, the student will be able to:

- Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, Spherometer etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.
- Differentiate various shapes and determine dimensions of plane, curved and regular surfaces/bodies.
- Apply and Verify laws of forces and determine resultant force acting on a body.
- Appreciate role of friction and measure co-efficient of friction between different surfaces.
- Describe and verify Hook's law and determine force constant of spring body.
- Identify various forms of energy, energy transformations and verify law of conservation of energy.
- Understand viscosity of liquids and determine viscosity of a given liquid.
- Understand use of thermometers to measure temperature under different conditions and different scales of temperature measurements.

List of Practical's

1. Determination of volume of solid cylinder and sphere, using a Vernier caliper
2. Determination of diameter of a wire, thickness of thin glass plate using a screw gauge.
3. Determination of radius of curvature of a convex and a concave mirror/surface using a spherometer.
4. To verify triangle and parallelogram law of forces.(Concurrent forces)
5. Determination of the acceleration due to gravity at a place using simple pendulum.
6. Determination of force constant of a spring using Hooke's Law.
7. Determination of the surface Tension of a given liquid by capillary Rise Method.
8. Determination of the viscosity of a given liquid by Stoke's law
9. Determination of atmospheric pressure at a place using Quill Tube Method
10. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

Applied Chemistry**Course Objectives:**

There are numerous number materials are used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw material essentially requires principles and concepts of Applied Chemistry for technicians. On successful completion of this course content will enable technicians to understand, ascertain and analyse and properties of natural raw materials require for producing economical and eco-friendly finished products.

- Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding.
- Use relevant water treatment method to solve domestic and industrial problems.
- Solve the engineering problems using knowledge of engineering materials and properties.
- Use relevant fuel and lubricants for domestic and industrial applications
- Solve the engineering problems using concept of Electrochemistry and corrosion.

Learning Outcomes:

At the end of the course student will be able to

1. Understand the classification and general properties of engineering materials such as metal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.
2. Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.
3. Qualitatively analyze the engineering materials and understand their properties and applications.
4. Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products.
5. a) Ascertain construction, mechanism efficiency of electrochemical cells, solar cell fuel cells
b) Understand corrosion and develop economical prevention techniques.

Course Content:**Unit 1: Atomic Structure, Chemical Bonding and Solutions**

Bohr's theory (expression of energy and radius to be omitted), Quantum numbers orbital concept. Shapes of s, p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond, co-ordination bond in

NH_4^+ .

Solution – idea of solute, solvent and solution, methods to express the concentration of solution – molarity (M = mole per liter), ppm.

Unit 2: Water, Chemistry of Fuels and Lubricants

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness. Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc). Water softening techniques – soda lime process, zeolite process and ion exchange process. Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.

Chemistry of Fuels and Lubricants:

Definition of fuel and combustion of fuel, classification of fuels, calorific values

(HCV and LCV), calculation of HCV and LCV using Dulong's formula.
Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.

Lubrication – function and characteristic properties of good lubricant, classification with examples. physical properties (viscosity and viscosity index, oiliness, flash and fire point, cloud and pour point only) and chemical properties (coke number, total acid number saponification value) of lubricants.

Unit 3: Engineering Materials

Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, metallurgy – brief account of general principles of metallurgy. Extraction of iron from haematite ore using blast furnace. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.

Portland cement and hardening, Glasses Refractory and Composite materials. Polymers – monomer, homo and co polymers, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon – 6, nylon – 66, Bakelite only), rubber and vulcanization of rubber.

Unit 4: ElectroChemistry

Electronic concept of oxidation, reduction and redox reactions.

Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems. Industrial Application of Electrolysis –

- Electrometallurgy
- Electroplating
- Electrolytic refining.

Application of redox reactions in electrochemical cells –

- Primary cells – drycell,
- Secondary cell-commercially used lead storage battery,

fuel and Solar cells. Introduction to Corrosion of metals –

- definition, types of corrosion (chemical and electrochemical), H₂ liberation and O₂ absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.

Internal corrosion preventive measures –

- Purification, alloying and heat treatment and

External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.

Text Books:

- 1) Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
- 2) Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.

Applied Chemistry Lab**Course Objectives:**

There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus.

This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

Learning Outcomes:

At the end of the course student will be able to

- To express quantitative measurements accurately.
- To practice and adapt good measuring techniques.
- To use various apparatus for precise measurements.
- To understand and differentiate different methods of quantitative analysis.
- To know and understand principles of quantitative analysis using instruments.

LIST OF PRACTICALS:

Perform any 12 (twelve) Laboratory Practicals.

Volumetric and Gravimetric analysis:

- 1 Preparation of standard solution of oxalic acid or potassium permanganate.
- 2 To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
- 3 Standardization of KMnO_4 solution using standard oxalic acid and Determine the percentage of Iron present in given Hematite ore by KMnO_4 solution.
- 4 Iodometric estimation of copper in the copper pyrite ore.
- 5 Volumetric estimation of total acid number (TAN) of given oil.
- 6 Volumetric estimation of
 - a) Total hardness of given water sample using standard EDTA solution.
 - b) Alkalinity of given water sample using 0.01M sulphuric acid
- 7 Proximate analysis of coal
 - a) Gravimetric estimation moisture in given coal sample
 - b) Gravimetric estimation ash in given coal sample

Instrumental analysis

8. Determine the conductivity of given water sample.
9. Determination of the Iron content in given cement sample using colorimeter.
10. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
11. Determination of viscosity of lubricating oil using Redwood viscometer.
12. Determination of flash and fire point of lubricating oil using Abel's flash point apparatus.
13. To verify the first law of electrolysis of copper sulfate using copper electrode.
14. Construction and measurement of emf of electrochemical cell (Daniel cell).
15. To study the effect of dissimilar metal combination.

Text Book:

Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017- 18.

Communication Skills in English**Course Objectives:**

Communication skills play an important role in career development. This course aims at introducing basic concepts of communication skills with an emphasis on developing personality of the students. Thus, the main objectives of this course

To develop confidence in speaking English with correct pronunciation.

To develop communication skills of the students i.e. listening, speaking, reading and writing skills. To introduce the need for personality development- Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc.

Course outcomes:

At the end of this course, the participants will:

- Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.
- Be informed of the latest trends in basic verbal activities such as presentations, facing interviews and other forms of oral communication.
- Also develop skills of group presentation and communication in team. Develop non-verbal communication such as proper use of body language and gestures.

Course Content:**Unit-1 Communication: Theory and Practice**

- Basics of communication: Introduction, meaning and definition, process of communication etc.
- Types of communication: formal and informal, verbal, non-verbal and written Barriers to effective communication.
- 7 Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).
- Art of Effective communication,
 - Choosing words
 - Voice
 - Modulation
 - Clarity
 - Time
 - Simplification of words
- Technical Communication.

Unit-2 Soft Skills for Professional Excellence

- Introduction: Soft Skills and Hard Skills.
- Importance of soft skills.
- Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligence and empathy etc.
- Applying soft skills across cultures.
- Case Studies.

Unit-3: Reading Comprehension

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts:

Section-1

Malgudi Days: R.K. Narayan

The Room on

Roof: Ruskin

Bond “The Gift
of the Magi” by

O. Henry

“Uncle Podger Hangs a Picture” Jerome K. Jerome

Section-2

Night of the Scorpion by Nissim Ezekiel,

Stopping by Woods on a Snowy

Evening by Robert Frost, Where the

Mind is Without Fear by Rabindranath

Tagore, Ode to Tomatoes by Pablo

Neruda,

Unit-4: Professional

Writing The art of

précis writing,

Letters:

business and

personnel,

Drafting e-mail, notices, minutes of a meeting etc.

Filling-up different forms such as banks and on-line forms for placement etc.

Vocabulary and Grammar

Vocabulary of commonly used words

Glossary of administrative terms

(English and Hindi) One-word

substitution, Idioms and phrases

etc.

Parts of speech, active and passive voice, tenses etc., Punctuation

References:

1. M.AshrafRizvi.*EffectiveTechnicalCommunication*.Mc-GrawHill:Delhi,2002.

Communication Skills in English – Lab**Course****Objectives:**

Communication skills play an important role in career development. This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students. Thus, the objectives of this course are:

1. To develop listening skills for enhancing communication.
2. To develop speaking skills with a focus on correct pronunciation and fluency.
3. To introduce the need for Personality development- Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

Learning Outcome:

- At the end of this course the students will be able to communicate effectively with an increase in their confidence to read, write and speak English fluently.
- They will also demonstrate a significant increase in word power.
- The variety of exercises and activities that will be conducted in the Language Lab will develop their skills needed to participate in a conversation like listening carefully and respectfully to others' viewpoints; articulating their own ideas and questions clearly and overall students will be able to prepare, organize, and deliver an engaging oral presentation.
- They will also develop non-verbal communication such as proper use of body language and gestures.

Course Content:**Unit 1 Listening Skills**

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

Unit II Introduction to Phonetics

Sounds: consonant, vowel, diphthongs, etc. transcription of words (IPA), weak forms, syllable division, word stress, intonation, voice etc.

Unit III Speaking Skills

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

Unit IV Building Vocabulary

Etymological study of words and construction of words, phrasal verbs, foreign phrases, idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

Recommended Readings:

1. Daniel Jones. *The Pronunciation of English*. Cambridge: Cambridge University

Engineering Graphics**Course Objectives:**

- To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.
- To develop drafting and sketching skills, to know the applications of drawing equipments, and get familiarize with Indian Standards related to engineering drawings.
- To develop skills to visualize actual object or a part of it, on the basis of drawings.
- To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.
- To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD.

Course Outcomes:

Following outcomes will be achieved:

- Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing
- Draw views of given object and components
- Sketch orthographic projections into isometric projections and vice-versa.
- Apply computer aided drafting tools to create 2D engineering drawings

Course Content**Unit – I Basic elements of Drawing**

Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications.

Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale.

Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning.

Geometrical and Tangency constructions. (Redraw the figure)

Unit – II Orthographic projections

Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications (No question to be asked in examination).

Introduction to orthographic projection, First angle and Third angle method, their symbols.

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only)

Isometric Projections

Introduction to isometric projections. Isometric scale and Natural scale. Isometric view and isometric projection.

Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.

Unit – III Free Hand Sketches of engineering elements

Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching)

Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)

Unit – IV Computer aided drafting interface
Computer Aided Drafting: concept.

Hardware and various CAD software available.

System requirements and Understanding the interface.

Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.

File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit.

Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.

Computer aided drafting

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, PolyLine.

Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.

Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers.

Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions.

Continuous, Diameter, Radius, Angular Dimensions.

Text Books: Single line Text, Multiline text.

Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

Text: Single line Text, Multiline text.

Environmental Science

Course Objectives:

Technicians working in industries or elsewhere essentially require the knowledge of environmental science so as to enable them to work and produce most efficient, economical and eco-friendly finished products.

- Solve various engineering problems applying ecosystem to produce eco – friendly products.
- Use relevant air and noise control method to solve domestic and industrial problems.
- Use relevant water and soil control method to solve domestic and industrial problems.
- To recognize relevant energy sources required for domestic and industrial applications.
- Solve local solid and e-waste problems.

Course outcomes:

At the end of the course student will be able to

1. Understand the ecosystem and terminology and solve various engineering problems applying ecosystem knowledge to produce eco – friendly products.
2. Understand the suitable air, extent of noise pollution, and control measures and acts.
3. Understand the water and soil pollution, and control measures and acts.
4. Understand different renewable energy resources and efficient process of harvesting.
5. Understand solid Waste Management, ISO 14000 & Environmental Management.

Course Content:

Unit-1 Ecosystem

- Structure of ecosystem, Biotic & Abiotic components
- Food chain and food web
- Global warming -Causes, effects, process, Green House Effect, Ozone depletion

Unit– 2 Air and Noise Pollution

- Definition of pollution and pollutant, Natural and manmade sources of air pollution
- Air Pollutants: Types, Particulate Pollutants: Effects and control of air pollution
- Noise pollution: sources of pollution, Effects and control of Noise pollution

Unit- 3 Water and Soil Pollution

- Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition
- Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste.

Unit– 4 Renewable sources of Energy

- Solar Energy: Basics of Solar energy. Solar pond. Solar water heater, solar dryer.
- Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas.
- Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.
- New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy
- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste.

References:

TextBooks:

1. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, New Delhi
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
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Introduction to IT Systems**Course Objectives:**

This course is intended to make new students comfortable with computing environment - Learning basic computer skills, Learning basic application software tools, Understanding Computer Hard- ware, Cyber security awareness

Course outcomes:

At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/ attacks.

Course Content:**UNIT 1:**

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital

India portals (state and national portals) and college portals.

General understanding of various computer hardware components – CPU, Memory, Display, Key- board, Mouse, HDD and other Peripheral Devices.

UNIT 2:

OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.

UNIT 3: HTML4, CSS, making basic personal webpage.

UNIT 4: Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.

Information security best practices.

Class lectures will only introduce the topic or demonstrate the tool, actual learning will take place in the Lab by practicing regularly.

Suggested Lab Work:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. This course is all about some theory and a lot of practice.

References:

R.S. Salaria, Computer Fundamentals, Khanna Publishing House

Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House

Online Resources, Linux man pages, Wikipedia

Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

Introduction to IT Systems Lab**Course Objectives:**

This Lab course is intended to practice whatever is taught in theory class of Introduction of IT Systems" and become proficient in using computing environment basic computer skills, basic application software tools, Computer Hardware, cyber security features, etc.

Course outcomes:

At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/attacks.

Course Content:

S.No.	Topics for Practice
1	Browser features, browsing, using various search engines, writing search queries
2	Visit various e-governance/Digital India portals, understand their features, services offered
3	Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognise various ports/interfaces and related cables, etc.
4	Install Linux and Windows operating system on identified lab machines, explore various options, do it multiple times
5	Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6	Practice HTML commands, try them with various values, make your own Webpage
7	Explore features of Open Office tools, create documents using these features, do it multiple times
8	Explore security features of Operating Systems and Tools, try using them and see what happens.

This is a skill course. More you practice, better it will be.

References:

1. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
2. IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, CISC Press, Pearson Education.

Applied Physics –II**Course Objectives**

Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

Learning Outcome:

After undergoing this subject, the student will be able to;

- a) Describe waves and wave motion, periodic and simple harmonic motions and solve simple problems. Establish wave parameters: frequency, amplitude, wavelength, and velocity and able to explain diffraction, interference, polarization of waves.
- b) Explain ultrasonic waves and engineering, medical and industrial applications of Ultrasonics. Apply acoustics principles to various types of buildings for best sound effect.
- c) State basic optical laws, establish the location of the images formed by mirrors and thin converging lens, design and assemble microscope using lenses combination.
- d) Describe refractive index of a liquid or a solid and will be able to explain conditions for total internal reflection.
- e) Define capacitance and its unit, explain the function of capacitors in simple circuits, and solve simple problems.
- f) Differentiate between insulators, conductors and semiconductors, and define the terms: potential difference, electromotive force.

Course Content**UNIT - 1: Wave motion and Optics**

Wave motion, transverse and longitudinal waves with examples, progressive and its characteristics, Sound waves and their properties, principle of superposition of waves and beat formation. Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications. Light waves and their properties, reflection and refraction, refractive index (Snell's law), Critical angle, Total internal reflection and conditions for total internal reflection, applications of total internal reflection in optical fiber, Image formation by thin lenses, lens formula, power of lens, magnification, problems solving

UNIT -2: Electrostatics and Current Electricity

Charges, Coulombs inverse square law, Electric field, Electric lines of force and their properties, Electric potential and potential difference. Capacitance and its units Capacitor and its principle, Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors.

Electric Current and its units, Ohm's law, Resistance and its units, Conductance, Specific resistance, conductivity, Series and parallel combination of resistances. Kirchhoff's laws, Wheatstone bridge and its applications, Meter Bridge Experiment for determination of specific resistance with neat circuit diagram, problems solving.

UNIT - 3: Electromagnetism

Introduction to magnetism, coulomb inverse square law in magnetism, Magnetic field and its units, magnetic lines of force, Magnetic induction, magnetic moment and units,

Force on moving charge in magnetic field. Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter, problems solving.

UNIT - 4: Modern Physics

Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction diode and V-I characteristics Photo- Electric effect, Einstein's photoelectric equation, laws of photoelectric effect, working of photo cell

Nanoscience and Nanotechnology Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology and applications, problems solving.

Text Books and References

1. Concepts of physics by HC VERMA, Surya publication, Ghaziabad, india
2. Physics- Resnik and Halliday- Wiley Toppan Publishers- England
3. Physics- intermediate-I &II year- Telugu Academy, Telangana
4. P.k palaniswamy: A text book of Engineering Physics
5. C.Kittel(Wiley Eastern) : introduction to solid state physics.

Applied Physics Labs –II**Course Objectives:**

Concrete use of physical principles and analysis in various fields of engineering and technology is very prominent. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

Learning Outcome:

After undergoing this subject, the student will be able to;

- a) Apply concept of vibrations and determine the time period of vibrating objects.
- b) Use of equipment for determining velocity of ultrasonics in different liquids.
- c) Verify optical laws; reflection, refraction from plane interfaces and surfaces.
- d) Apply knowledge of optics to determine focal length and magnifying power of optical lenses.
- e) Understand uses of electrical components and meters and verify Ohm's law for flow of current.
- f) Quantify resistances and verify laws of series and parallel combination of resistances.
- g) Measure resistance of a galvanometer and how it is converted into an ammeter and volt- meter.
- h) Handle optical fibers and determine numerical aperture of given optical fiber.

List of Practicals/Activities:

1. Determine the Velocity of sound in air using resonance column Apparatus at room temperature and at 0o C.
2. Determine focal length and magnifying power of a convex lens.
3. Determine focal length and magnifying power of a concave lens
4. To verify Ohm's law by plotting graph between current and potential difference
5. Determine the resistance and specific resistance of the wire using Meter Bridge
6. To verify laws of resistances in series and parallel combination using meter bridge.
7. Draw the lines of force of combined magnetic field due to bar magnet in earth's magnetic field by locating the null points when North pole of the bar magnet pointing towards Geographical North of the Earth.
8. Draw the lines of force of combined magnetic field due to bar magnet in earth's magnetic field by locating the null points when North pole of the bar magnet pointing towards Geographical North of the Earth
9. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee voltage.
10. To measure numerical aperture (NA) of an optical fiber.

Engineering Mechanics**Course Objectives:**

Following are the objectives of this course:

- 1) To obtain resultant of various forces
- 2) To calculate support reactions through conditions of equilibrium for various structures
- 3) To understand role of friction in equilibrium problems

Course outcomes:

After completing this course, student will be able to:

1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.

Course Contents:**Unit – I Basics of mechanics and force system**

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics.

Space, time, mass, particle, flexible body and rigid body.

Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units.

Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a

force, Principle of transmissibility of force, Force system and its classification.

Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem.

Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Unit– II Equilibrium

Equilibrium and Equilibrant, Free body diagram, Analytical method of analysing equilibrium.

Lami's Theorem – statement and explanation, Application for various engineering problems.

Types of beams, supports (hinge, roller and fixed) and loads (vertical, inclined point load & uniformly distributed load) acting on the beam.

Beam reaction for cantilever, simply supported beam with or without overhang – subjected to Point load, uniformly distributed load and combination of loads.

Unit– III Friction

Introduction - Theory of Friction - Angle of friction - Laws of Friction - Static

and Dynamic Frictions- Wedge Friction, Screw-jack and Differential Screw-jack
Equilibrium of bodies on level surface subjected to force parallel and inclined to plane.

Unit– IV Centroid

Introduction to Centroid, Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle). Centroid of T, L, I, Channel section, Z section, Unsymmetrical I section and Built-up sections.

Text Book:

1. Khurmi, R.S., Applied Mechanics, S. Chand &Co. New Delhi.

Engineering Mechanics Lab**Course Objectives:**

Following are the objectives of this course:

- 1) To obtain resultant of various forces
- 2) To calculate support reactions through conditions of equilibrium for various structures
- 3) To understand role of friction in equilibrium problems
- 4) To know fundamental laws of machines and their applications to various engineering problems

Course outcomes:

After completing this course, student will be able to

1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.
5. Select the relevant simple lifting machine(s) for given purposes.

List of Practical to be performed:

1. To study various equipments related to Engineering Mechanics.
2. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
3. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
4. Determine resultant of concurrent force system graphically.
5. Determine resultant of parallel force system graphically.
6. Verify Lami's theorem.
7. Study forces in various members of Jib crane.
8. Determine support reactions for simply supported beam.
9. Obtain support reactions of beam using graphical method.
10. Determine coefficient of friction for motion on horizontal and inclined plane.
11. Determine centroid of geometrical plane figures.

Text Book:

1. Khurmi, R.S., Applied Mechanics, S.Chand & Co. New Delhi.

Fundamentals of Electrical and Electronics Engineering

Course Objectives:

To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

Outcomes:

1. Understand the basics of analog and digital electronics
2. Analyze electric and magnetic circuits
3. Understand the working of transformers and machines.

Course Contents:

UNIT I Overview of Electronic Components & Signals:

Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values.

UNIT II Overview of Analog and Digital Circuits:

Operational Amplifiers-Ideal Op-Amp, Practical op amp, Application of Op-Amp as amplifier, adder, differentiator and integrator.

Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach.

Unit III Electric and Magnetic Circuits:

EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, Electromagnetic induction, Faraday's law of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

Unit IV A.C. Circuits, Transformers and Machines

Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; General construction and principle of transformer; Emf equation and transformation ratio of transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

Text Book:

1. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House

Fundamentals of Electrical and Electronics Engineering Lab

Course Objectives:

To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

Course Outcomes:

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

1. Understand basic principle and operation of electric circuits and machines.
2. Solve basic problems related to electrical circuits and machines. Explain the operation of different electrical technologies.
3. Demonstrate an understanding of the control systems.
4. Understand the basic circuit elements.
5. Understand different types of signal waveforms.
6. Understand logic gates and apply them in various electronic circuits.
7. Understand the basic concepts of op-amps, and their applications.
8. Use relevant electric/electronic protective devices safely.

S.No.	List of Experiments	Approx. Hrs.
1.	Determine the value of given resistor using digital multimeter to confirm with colour code.	02
2	Connect resistors in series and parallel combination on bread board and measure its value using digital multimeter.	02
3	Use LCR-Q tester to measure the value of given capacitor and inductor.	02
4	Connect capacitors in series and parallel combination on bread board and measure its value using multimeter.	02
5	Measure voltage, current and power in 1-phase circuit with resistive load.	02

6	Measure voltage, current and power in R-L series circuit.	02
7	Test the performance of PN-junction diode.	02
8	Test the performance of Zener diode.	02
9	Determine the current gain of CE transistor configuration.	03
10	Determine the transformation ratio (K) of 1-phase transformer.	03

Text Book:

Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House, 2018

Mathematics-II

Course Objectives: This course is designed to give a comprehensive coverage at an introductory level to the subject of matrices, Integral Calculus coordinate geometry, Basic elements of vector algebra and First Order Differential Equations.

Course Content:**UNIT - I: Determinants and Matrices**

Elementary properties of determinants up to 3rd order, consistency of equations, Cramer's rule. Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT - II: Integral Calculus

Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by

partial fractions (for linear factors only). Use of formulas $\int_0^{\pi/2} \sin^n x dx$, $\int_0^{\pi/2} \cos^n x dx$ and

$$\int_0^{\pi/2} \sin^m x \cos^n x dx$$

for solving problems Where m and n are positive integers.

Applications of integration for (i). Simple problem on evaluation of area bounded by a curve and axes. (ii). Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT - III: Co-Ordinate Geometry

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given:

- i. Centre and radius,
- ii. Three points lying on it and
- iii. Coordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof.

Problems on conics when their foci, directories or vertices are given.

UNIT - IV: Vector Algebra

Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT-V: Differential Equations

Solution of first order and first degree differential equation by variable separation method (simple problems). MATLAB – Simple Introduction.

References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. A Text book of Engineering Mathematics for I,II, III semester by Dr. M.V.S.S N. Prasad by Radiant Publishing House.
4. A Text Book of Intermediate Mathematics I, II year by Telugu Akademi, Telangana
5. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
6. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
7. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

Engineering Workshop Practice

Course Objectives:

- To understand basic engineering processes for manufacturing and assembly.
- To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's
- To understand and interpret job drawings, produce jobs, and inspect the job for or specified Dimensions
- To understand the various types of wiring systems and acquire skills in house wiring
- To understand, operate, control different machines and equipment's adopting safety practice

Course outcomes

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

CO1	Acquires skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines
CO2	Understand job drawing and complete jobs as per specifications in allotted time
CO3	Inspect the job for the desired dimensions and shape
CO4	Operate, control different machines and equipment's adopting safety practices

Course Content:

S.No.	Details Of Practical Content
I	<p>Carpentry: i) Demonstration of different wood working processes, like planing, marking, chiseling, turning of wood etc ii) One simple job involving any one joint like mortise and tendon dovetail, bridle, half lap etc.</p> <p>Fitting: i) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc. ii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc</p>
II	<p>Welding: i) Demonstration of different welding tool. ii) Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding. iii) One simple job involving butt and lap joint</p> <p>Sheet Metal Working: i) Demonstration of different sheet metal operations like sheet cutting, bending, edging, lancing, soldering, and riveting. ii) One simple job involving sheet metal operations and soldering and riveting</p>
III	<p>Electrical House Wiring: Practice on simple lamp circuits (i) one lamp controlled by one switch by surface conduit wiring, (ii) Lamp circuits- connection of lamp and socket by separate switches,</p>
IV	<p>Demonstration: i) Demonstration of measurement of Current, Voltage, Power and Energy. ii) Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories. iii) Tools for Cutting and drilling</p>

References:

1. S.K. Hajara Chaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015

Semester III
Curriculum Structure
Diploma in Information Technology

Sl No	Category	Code No.	Course Title	Hours per week			Total contact hrs/week	Scheme of Evaluation		Credits
				L	T	P		CIE	SEE	
1.	Program core course	DPCS311PCT	Computer Programming	2	1	0	3	40	60	3
2.	Program core course	DPCS312PCT	Scripting Languages	2	1	0	3	40	60	3
3.	Program core course	DPIT301PCT	Multimedia Basics	2	0	0	2	40	60	2
4.	Program core course	DPCS313PCT	Introduction to DBMS	2	0	0	2	40	60	2
5.	Program core course	DPIT302PCT	Information and Communication Technologies	2	0	0	2	40	60	2
6.	Summer Internship-I (4 weeks) after II Semester	DPCC301SEP	Summer Internship-1						50	2
7.	Program core course	DPCS311PCP	Computer Programming Lab	0	0	4	4	60	40	2
8.	Program core course	DPCS312PCP	Scripting Languages Lab	0	0	4	4	60	40	2
9.	Program core course	DPIT301PCP	Multimedia Basics Lab	0	0	4	4	60	40	2
10.	Program core course	DPCS313PCP	Introduction to DBMS Lab	0	0	4	4	60	40	2
Total Credits										22

Semester IV
Curriculum Structure
Diploma in Information Technology

S I. N o	Category	Code No.	Course Title	Hours per week			Total conta ct hrs/ week	Scheme of Evaluati on		Credi ts
				L	T	P		CIE	SEE	
1.	Program core course		Object Oriented Analysis and Design	2	1	0	3	40	60	3
2.	Program core Course		Data Structures through C	2	1	0	3	40	60	3
3.	Program core course		Compu ter Hardw are Networking	2	0	0	2	40	60	2
4.	Program core course		Information Coding Techniques	2	0	0	2	40	60	2
5.	Program core course		Web Technologies	2	0	0	2	40	60	2
6.	Program core course		Data Structures through C Lab	0	0	4	4	60	40	2
7.	Program core course		Computer Hardware Net working Lab	0	0	4	4	60	40	2
8.	Program core course		Web Technolog ies Lab	0	0	4	4	60	40	2
	Program core course		Object Oriented Analysis and Design Lab	0	0	4	4	60	40	2
9.	Minor Project		Minor Project	0	0	4	4	60	40	2
10.	Mandatory Course		Essence of Indian Knowledge and Tradition	2	0	0	2	20	30	0
			T o t a l C r e d i t							22

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COMPUTER PROGRAMMING

Course Learning Objectives: To enable student, develop structured solutions to problems and implementing them using computers. This involves two parts: i) Formulating a solution for a given problem as a well-defined sequence of actions, and ii) Expressing solution in a machine readable form or a programming language. For the second part, we will learn the common units of programming languages. The first part can only be learned through the repeated practice of solving problems.

Course outcomes: Student should be able to computationally formulate basic problems and write code snippets to execute them. The focus of the course as mentioned above should be on example based learning. The application part should be clear. For instance, when to use an array, when to use loop and when to use conditional statements.

Course Content: The language of choice will be C. The focus will be on problem solving and problem where these ideas can be applied. The main focus of the class will to take examples of problems where these ideas can be employed.

UNIT 1: Introduction to Problem Solving (computational way of thinking); Introduction to C, Variables and Representation, Arithmetic, Relational, Logical and Bitwise Operators; Input, Output Formatting.

UNIT 2: Conditional Statements, Repeat Statements, Loops and Nested Loops

UNIT 3: Arrays and Memory Organization, Strings, Multidimensional Arrays, Functions and Parameter Passing, Recursion and Recursive solutions

UNIT4: Pointers, Structures and Unions.

Reference Books:

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House

3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.
7. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill

SCRIPTING LANGUAGES

Course Learning Objectives: To learn how to work with a scripting language.

Course outcomes: At the end of the course student will be able to build program with a scripting language and will be able to learn any other scripting language on their own.

Course Content:

Unit 1:

Fundamentals of Python: Introduction to Python, Running Python Programs, Writing Python Code

Working with Data: Data Types and Variables, Using Numeric Variables, Using String Variables

Unit 2:

Input and Output: Printing with Parameters, Getting Input from a User, String Formatting

Making Decisions: Logical Expressions, The “if” Statement, Logical Operators,
More Complex Expressions

Lists and Loops: Lists and Tuples, List Functions, “For” Loops, “While” Loops

Unit 3:

Numeric and Date Functions: Dates and Times, Advanced Data and Time Management, Random Numbers, The Math Library.

Functions: Writing and Calling Functions, Function Inputs and Outputs, Local and Global Scope

Unit 4:

Python Classes: Thinking about Objects, Class Variables and Methods, Managing Class Files

Class Instances: Creating Objects with Instance Data, Instance Methods, Managing Objects

Reference Books:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University

SCRIPTING LANGUAGES LAB

Course Objective:

This course focuses on developing the python programming to do a variety of programming tasks where the students are encouraged to develop application using python. At the end of the course the student will be developing adequate skills in programming and will be known to understand the implementation of various applications using python.

Course Outcomes:

At the end of the course, the students are able to:

- ✓ Write, Test and Debug Python Programs
- ✓ Implement Conditionals and Loops for Python Programs
- ✓ Use functions
- ✓ Represent Compound data using Lists, Tuples and Dictionaries
- ✓ Develop programs using objects and classes

Course Contents:

1. Fundamentals of Python

- 1.1 Installation of Python
- 1.2 Running Python Programs
- 1.3 Writing Python Code

2. Working with Data

- 2.1 Data Types and Variables
- 2.2 Using Numeric Variables
- 2.3 Using String Variables

3. Input and Output

- 3.1 Printing with Parameters
- 3.2 Getting Input from a User
- 3.3 String Formatting

4. Making Decisions

- 4.1 Logical Expressions
- 4.2 The “if” Statement
- 4.3 Logical Operators
- 4.4 More Complex Expressions

5. Lists and Loops

5.1 Lists and Tuples

5.2 List Functions

5.3 “For” Loops

5.4 “While” Loops

6. Numeric and Date Functions

6.1 Dates and Times

6.2 Advanced Data and Time Management

6.3 Random Numbers

6.4 The Math Library

7. Working with Strings

7.1 Character Data

7.2 String Functions

7.3 Input Validation with “try / except”

8. Functions

8.1 Writing and Calling Functions

8.2 Function Inputs and Outputs

8.3 Local and Global Scope

9. Python Classes

9.1 Thinking about Objects

9.2 Class Variables and Methods

9.3 Managing Class Files

10. Class Instances

10.1 Creating Objects with Instance Data

10.2 Instance Methods

10.3 Managing Objects

Reference Books:

1. Allen B. Downey , “ Think Python: How to Think Like a Computer Scientist”, Second Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.
2. Shroff “Learning Python: Powerful Object-Oriented Programming; Fifth edition, 2013.
3. David M.Baezly “Python Essential Reference”. Addison-Wesley Professional; Fourth edition, 2009.
4. David M. Baezly “Python Cookbook” O’Reilly Media; Third edition (June 1, 2013) by. 5.
5. <http://www.edx.org>

COMPUTER PROGRAMMING LAB

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

Course outcomes: Student should be able to write code snippets, and then compile, debug and execute them

Course Content:

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

Reference Books:

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

MULTIMEDIA BASICS

COURSE CONTENTS

1.0 INTRODUCTION TO MULTIMEDIA

What is Multimedia – Components of Multimedia – History of Multimedia – Hypermedia and Multimedia – Overview of Multimedia software tools. Multimedia editing and authoring tool Graphics and image data types, 1 bit images, 8 bit images, image data types, 24 bit color images, 8 bit color images, Popular file formats, GIF, JPEG, PNG, TIFF, EXIF, Graphic animation files, PS and PDF, WMF, BMP, Fundamental concepts in Video, Type of video signals, Component video, Composite video, S video, Analog video, NTSC, PAL, SECAM, Digital Audio, Chroma, CCIR, High definition TV, Basics of Digital Audio, What is Sound

2.0 WORKING WITH PHOTOSHOP

Basics, Tool box, Working with selection tools, Rectangular and elliptical Marquees, Lasso, The polygonal Lasso Tool, The magnetic Lasso, Magic wand, Selection menu, Feather, Modifying selections, Selecting large areas, Cutting and pasting, Transforming, Resizing, Rotating, Color modes and color models, Adjusting colors, Paint brushes and art tools, Digital painting, Moving paint, Layers, Masks, Paths, Different Filters, Photo repair and enhancement

3.0 WORKING WITH FLASH

Understanding the flash, Learning the flash, Learning Flash panels, Drawing objects, Creating animations, Using guides and masks, Creating symbols, Adding sounds to movies, Publishing flash movies.

4.0 Web site Development

Understand HTML, Creating a web page, Formatting and linking web pages, Adding color, graphs and animation to web pages.

REFERENCE BOOKS

1. Fundamentals of Multimedia, Ze – Nian li and Mark S Drew, Pearson Education, 2004
2. Multimedia Basics, Morse, Thomson Course Technology.
3. Macromedia Flash MX, a beginner's guide, Brain Underdahi, Dreamtech press, 2002.
4. Photoshop CS, Sams Teach yourself, Carla Rose, pearson Education, Six edition, 2004.

MULTIMEDIA BASICS LAB

Course Objective:

- To understand the Multimedia concepts
- To understand the Multimedia programming
- To understand Graphical User Interface (GUI) programming

Course Outcome:

- The skills to apply programming in Designing, Animations etc
- Ability to implement GUI applications .

Course Content

I

1. Practice how to scan a picture and save it in the requested format.
2. Edit the picture in the Photoshop.
3. How to work with different layers in Photoshop.
4. How to work with basic pen techniques in Photoshop.
5. How to work with vector shapes and crippling paths.

II

6. Practice the basic features of the Flash.
7. How to apply transformations to text and graphics
8. How to add pictures and sound to the Flash movie
9. Write a program to animate on different layers.
10. Create a web page and add the text, pictures and flash movies to it.

Text Books and References:

- 1 Fundamentals of Multimedia, Ze – Nian li and Mark S Drew, Pearson Education, 2004
- 2 Multimedia Basics, Morse, Thomson Course Technology.
- 3 Macromedia Flash MX, a beginner's guide, Brain Underdahi, Dreamtech press, 2002.
- 4 Photoshop CS, Sams Teach yourself, Carla Rose, pearson Education, Six edition, 2004.

INTRODUCTION TO DBMS

Course Learning Objectives:

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

Course outcomes:

After completing the course, the students will understand (i) how to design a database, database-based applications (ii) How to use a DBMS (iii) the critical role of database system in designing several information system-based software systems or applications.

Unit I: Introduction to Databases

Introduction: An Example, Characteristics of database approach & History of database applications, Data models, Schemas & Instances. Data independence, People who work with databases. The Database System environment classification of DBMS.

Entities and Relationships: Entities and Their Attributes, Composite versus Simple (Atomic) Attributes, Single-Valued versus Multi-valued attributes stored versus Derived Attributes, NULL Values, and Complex Attributes. Entity types, Entity sets, Key Attributes of an Entity, Value Sets (Domains) of Attributes. Relationship Types, Relationship Sets, Cardinality Ratios for Binary Relationship, structural constraints, Specialization and Generalization Summary of Notation for ER Diagrams. ER diagrams examples

Unit II: relational model concepts and SQL

Brief introduction to SQL, Data types; DDL, DML, SQL, INSERT, DELETE, and UPDATE, DCL.

The relational model; Relational algebra and relational calculus, Types of Keys in DBMS, types of joins in DBMS, Functions in DBMS, -views, sequences, synonyms and indexes.

Unit III: Normalization and Transaction Processing

Introduction to Normalization using Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, 1st, 2nd, 3rd and BCNF.

Introduction to transaction Processing, Transaction and System concepts, Desirable properties of Transactions.

Unit IV: –PL/SQL

Data types, control structures, cursor management, triggers, exceptions, functions, procedures recursion and packages.

Recommended Books:

1. Introduction to Database Management Systems: Kahate, Atul · 2006.
2. Beginning PL/SQL From Novice to Professional By Donald Bales · 2007.

3. Database management systems , Panneerselvam,Rr. · 2018.
4. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke.
5. Oracle PL/SQL Programming, 6th Edition by Steven Feuerstein, Bill Pribyl Released February 2014 Publisher(s): O'Reilly Media, Inc.
6. Fundamentals of Database Systems, Book by Ramez Elmasri.

INTRODUCTION TO DBMS LAB

MYSQL software with command line is recommended for practicing lab experiments.

Course Learning Objectives:

This Lab course is intended to practice whatever is taught in theory class of ‘Introduction to DBMS’. A few sample case studies are listed with some suggested activities. More case studies may be added to this list. You need to develop these case studies, apply all relevant concepts learnt in theory class as the course progress, and identify activities/operations that may be performed on the database. It will be a good idea to also use concepts learnt in the course on Software Engineering/SSAD.

S.No	Topic
1	Case Study-1: Employee database – ‘Create’ employee table, ‘Select’ and display an employee matching a given condition, ‘Delete’ duplicate records, delete rows using triggers, insert and update records, find net salary, etc.
2	Case Study-2: Visitor Management database
3	Case Study-3: Students Academic database
4	Case Study-4: Inventory Management System database
5	Case study-5: Bank Operations database
6	Case Study-6: Bus Operator (Roadways) – Do related activities such as prepare E-R Model, Relational Model, do Normalization, Create Tables, Insert data, Delete Data, Query database, create stored procedures, etc.

This is a skill course. More student practice and try to find solution on their own, better it will be.

Recommended Books:

1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education
2. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India.
Computer Engineering Curriculum Structure 344
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill, New Delhi, India.
4. Introduction to Database Systems, C.J.Date, Pearson Education
5. Introduction to SQL, Rick F.Vander Lans, Pearson Education

INFORMATION CODING TECHNIQUES

Course Objectives:

To introduce the fundamental concepts of information theory: data compaction, data compression, data transmission, error detection and correction.

Course Outcomes:

- To have a complete understanding of error-control coding.
- To understand encoding and decoding of digital data streams.
- To introduce methods for the generation of these codes and their decoding techniques.
- To have a detailed knowledge of compression and decompression techniques.
- To introduce the concepts of multimedia communication.

UNIT I INFORMATION ENTROPY FUNDAMENTALS

Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding – Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem.

UNIT II DATA COMMUNICATION

Define Information and data, data communication, need of data communication. Elements of data communication model- source, transmitter, transmission media, receiver and destination. Modes of transmission - simplex, half- duplex and full- duplex, transmission paths- point-to-point, multi-point, broad casting.

UNIT III ERROR CONTROL CODING

Types of Errors, Error Detection and Error Correction. Linear Block codes, Minimum distance consideration ,cyclic codes, Generator Polynomial, Parity check polynomial.

UNIT IV COMPRESSION TECHNIQUES

Basics of compression techniques , Principles,Text compression, Huffman Coding
Image Compression, Graphics Interchange format, Tagged Image File Format, Introduction to JPEG standards.

TEXTBOOKS:

1. Simon Haykin, "Communication Systems", John Wiley and Sons, 4th Edition, 2001.
2. Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002; Chapters: 3,4,5.

REFERENCES:

1. Mark Nelson, "Data Compression Book", BPB Publication 1992.
2. Watkinson J, "Compression in Video and Audio", Focal Press, London, 1995.

COMPUTER HARDWARE & NETWORKING

Course Objectives:

On completion of the study of the subject the student should be able to comprehend the following:

- To understand the basic concept and working principles of Computers hardware
- To understand the different topologies

Course Outcome:

- Ability to prepare and estimate approximate cost and materials required for a network
- Skill to prepare different wires and test LANs and trouble shoot networking devices and solve the problem.
- Ability to provide correct power backup to the computer hardware devices.

UNIT I:

PC hardware and software Components, Hardware used for I/P, O/P & inside computer case, system board components used for communication among devices, Types of Software, ROM BIOS, OS, application software functions of BIOS- The boot process POST and important beep codes, Know about different connectors.

UNIT II:

System Board Various Types of Buses, Types of system boards **The CPU** & the chipset – CPU form factor, CPU slots and sockets Different types of RAM, **Buses** – ISA, MCA, EISA, USB, Firewire, AGP,PCI, Setting the CPU & Bus speeds, CMOS setup and data protection. Troubleshooting hard drives & data recovery, **Optimizing Hard drive** – disk cleanup, disk fragmentation. disk backup.

UNIT III:

Bootable rescue disk, diagnostic software, virus, detection software, Anti-Static tools, How to isolate computer problems, Surge protection & battery backup Stand by UPS, Inline UPS, Line-interactive UPS, intelligent UPS.

UNIT IV:

Introduction to Networks and Topologies, Classification of Networks –LAN,MAN,WAN, OSI Reference Model, TCP/IP Reference Model, Basic Topologies such as Bus, Ring, Star and Hybrid, Network Addressing, LAN Cables and Connectors, wireless network adapter, Coaxial Cables, Twisted-Pair Cables, Optical Fiber Cables, and Connectors. LAN Devices- repeaters, Hubs, Switches, Network Interface Cards (NICs), Routers, Modem (56KBPS Internal or External, ADSL Modems,Etc.), Introduction to Network Addressing, IP Address Classes, IP Subnetting.

TEXT BOOKS

1. Enhanced Guide to Managing And Maintaining Your PC --Jean Andrews (Thomson)

- | | | | |
|----|-----------------------------------|----|-----------------------|
| 2. | Basics of Networking | -- | NIIT PHI publication |
| 3. | PC Hardware A Beginners Guide | -- | Gilster (TMH) |
| 4. | PC Upgrading | -- | Stephen Bigelow (TMH) |
| 5. | Trouble Shooting Your PC | -- | Stone & poor |
| 6. | Computer Networks | -- | Andrew S. Tanenbaum |
| 7. | Computer Installation & Servicing | -- | D. Balasubramaniam |

COMPUTER HARDWARE & NETWORKING LAB

Course Objectives:

On completion of the study of the subject the student should be able to comprehend the following:

- To understand the basic concept and working principles of Computers hardware
- To understand the different topologies,

Course Outcome:

- Ability to prepare and estimate approximate cost and materials required for a network
- Skill to prepare different wires and test LANs and trouble shoot networking devices and solve the problem.
- Ability to provide correct power backup to the computer hardware devices.

Unit Course Content

I

1. Identify motherboard components, RAM identification, removal, installation.
2. CMOS setup, Print a summary of your system Hardware, Upgrading memory.
3. Hard drive, optical drive installation.
4. Trouble shooting keyboard ,monitor, printer
5. Printer Problems: laser printer>
 - a) Printer never leaves warm-up mode.
 - b) Paper Jam message is displayed.
 - c) Printed messages are distorted
6. Installation of operating system.

II

1. Installation of Network card.
2. Preparing the UTP cable for cross and direct connections using crimping tool.
3. Installation of a switch,Router and connecting systems to a network switch.
4. Installation of a modem (internal, external or USB) and connecting to internet.
5. Using FTP for uploading and downloading files.
6. Installation and configuring the proxy server for internet access.

Text Books and References:

- 1 Enhanced Guide to Managing And Maintaining Your PC --Jean Andrews (Thomson)
- 2 Basics of Networking -- NIIT PHI publication
- 3 PC Hardware A Beginners Guide -- Gilster (TMH)
- 4 Trouble Shooting Your PC -- Stone & poor

DATA STRUCTURES THROUGH C

Course Objectives:

To provide strong foundation for implementing programming language to formulate, analyse and develop solutions related to various data structures problems.

Course Content:

UNIT 1:

Introduction to Data Structures: Basic Terminology, Classification of Data Structures, Operations on Data Structures.

Linked Lists: Singly Linked List, Representation in Memory, Operations on a Single Linked List, Circular Linked Lists, Doubly Linked Lists.

UNIT 2:

Linear Data Structures- Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks-Infix-to-Postfix Transformation, evaluating Postfix Expressions. Queues: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Types of Queues-Dequeue, Circular Queue, Applications of Queues-Round Robin Algorithm, Sparse Matrix and its Representation.

UNIT 3:

Searching And Sorting: Introduction to different sorting techniques – selection, insertion, bubble, quick and merge. Introduction to different searching techniques – sequential and binary.

UNIT 4:

Non-Linear Data Structures - Trees: Basic Terminologies, Definition and Concepts of Binary Trees, Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree-Insertion, Deletion, Traversals, Types of Binary Trees.

GRAPHS: Graph Terminologies, Representation of Graphs- Set, Linked, Matrix, Graph Traversals.

Reference Books:

1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, SamantaDebasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGrawHill Education, India.

Course outcomes:

Have a good understanding of Data Structures and its applications in algorithms.

DATA STRUCTURES THROUGH C LAB

Course Learning Objectives:

This Lab course is intended to practice whatever is taught in theory class of 'Data Structures', 'Algorithms' and is an extension of previous course on 'Computer Programming'.

Students should work on problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below. This Lab course requires a good coordination between theory course in Data Structures and Algorithms.

List of Experiments

1. Simple Programs on Arrays
2. Exercises on creation, insertion, deletions and display of elements in a singly linked list
3. Exercises on creation, insertion, deletions and display of elements in a doubly linked list
4. Write a program to implement a stack
5. Write a program to implement a queue
6. Write a program to create a sparse matrix
7. Write a program to create a binary tree and its traversal operations
8. Exercise on Selection sort
9. Exercise on insertion sort
10. Exercise on bubble sort
11. Implement a program for merge sort on two sorted lists of elements
12. Exercises on linear search
13. Exercise on binary search

Reference Books:

1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, SamantaDebasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGrawHill Education, India.

Course outcomes:

1. Student will be able to write programs for creating and doing different operations on various data structures.
2. Student will be able to use/implement various algorithms learnt in the course on Algorithms.
3. In summary student will have a good command over Data Structures and its applications in Algorithms.

OBJECT ORIENTED ANALYSIS AND DESIGN

COURSE OBJECTIVES:

The course should enable the students will try to learn:

- I. The issues in analysis and design of software systems.
- II. UML (2.0) notation and associated methodologies.
- III. Use of UML Meta model – structural and behavioral diagrams, and their extensions.

COURSE OUTCOMES:

At the end of the course, the students are able to:

CO 1

List the importance and use of basic principles in object oriented modeling for appropriate analysis and design of given scenarios.

CO 2

Make use of building blocks and different views for creating conceptual model architectural view of system in unified software development life cycle.

CO 3

Demonstrate static and dynamic aspects of the system through UML diagrams for specifying structure and interaction of objects during runtime.

UNIT I: OOAD and Introduction to UML

Introduction to OOAD with OO Basics, Unified Process, and Introduction to UML Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Software Development Life Cycle. UML diagrams, Use Cases

UNIT II: Basic Structural Modeling, Class & Object Diagrams

Classes, Relationships, Common Mechanisms, Class & Object Diagrams, Modeling techniques for Class & Object Diagrams

UNIT III: Basic Behavioral Modeling

Use cases; Use case Diagrams, Activity Diagrams, Interactions, Interaction diagrams, time and space, state chart diagrams.

UNIT IV: Architectural Modeling

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Case Study: The Unified Internet Banking Application.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Pearson Education, 2nd Edition, 2004.
2. Craig Larman, “Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development”, Pearson Education, 3rd Edition, 2005.

Reference Books:

1. MeilirPage-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education, 1st Edition, 2006.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, “UML 2 Toolkit”, WILEY-Dreamtech India Pvt. Ltd., Pearson Education, 3rd Edition, 2005.

OBJECT ORIENTED ANALYSIS AND DESIGN LAB

OBJECTIVES:

- To capture the requirements specification for an intended software system
- To draw the UML diagrams for the given specification
- Draw standard UML diagrams using an UML modeling tool for a given case study

OUTCOMES:

Upon completion of this course, the students will be able to:

- ✓ Perform OO analysis and design for a given problem specification.
- ✓ Identify and map basic software requirements in UML mapping.
- ✓ Test the compliance of the software with the SRS.

List of Experiments:

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Class Diagram.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams.
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the use case diagram
9. Implement the modified system and test it for various scenarios

Web References:

1. https://www.tutorialspoint.com/uml/uml_overview.html
2. https://www.utdallas.edu/~chung/OOAD/M03_1_StructuralDiagrams.ppt
3. <https://onedrive.live.com/download?cid=99CBBF765926367>

E-Text Books:

1. <https://www.utdallas.edu/UML2.0/Rumbaugh>
2. <https://www.utdallas.edu/~chung/SP/applying-uml-and-patterns.pdf>

WEB TECHNOLOGIES

Course Objectives:

1. To introduce HTML & CSS
2. To introduce PHP language for server-side scripting
3. To introduce XML and processing of XML Data.
4. To introduce Client-side scripting with Javascript.

Course Outcomes:

1. Understand the basics of Web Design and HTML
2. Develop Web pages using HTML and CSS
3. Understand XML and Web Browsers.
4. Provide Logic on web pages using Java Script.
5. Apply the basic concepts of website development using PHP
6. Develop websites and Database connectivity.

UNIT- I

Principles of Web Design and Introduction to HTML

Anatomy of Web page, Format, Elements, Navigation, Building, Launching and maintaining web site - HTML – Introduction, Format of web page, Tags and attributes, Formatting text.

HTML & CSS: HTML – Adding images - Positioning Lists – Colors - Connecting to hyperlinks, Tables, Forms, Frames - CSS – Introduction - Inline styles - Embedded style sheets - Linking external style sheets - Positioning elements – Backgrounds - Element dimensions-Borders-Colors.

UNIT- II

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

Client-side Scripting: Introduction to JavaScript, JavaScript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

UNIT - III

Introduction to PHP

Fundamentals of PHP – Operators - Conditional Statements - Loops – Strings – String Methods – Arrays- Array Methods. **Advanced PHP:** Functions - Passing arguments - Scope and lifetime of variables - Recursive functions - Object orientation in PHP - Working with forms in PHP - cookies and sessions - Database concepts - Connecting to Database - Retrieving data.

TEXT BOOKS:

- 1) Principles of Web Design -- Sklar, TMH
- 2) HTML complete reference -- Powell, THH
- 3) Internet & World Wide Web -- Dietel & Dietel, Pearson education
- 4) Straight to the point PHP -- Laxmi Publications
- 5) Basics of Web Site Design -- NIIT – PHI
- 6) WWW Design with HTML -- Xavier (TMH)
- 7) Web Technologies, Uttam K Roy, Oxford University Press
- 8) The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech
2. Java Script, D.Flanagan
3. Beginning Web Programming-Jon Duckett WROX.

WEB TECHNOLOGIES LAB

Objectives:

- ✓ To develop an ability to design and implement static and dynamic website
- ✓ Choose best technologies for solving web client/server problems
- ✓ Create conforming web pages
- ✓ Use JavaScript for dynamic effects
- ✓ To prepare PHP scripts
- ✓ Use JavaScript & PHP to validate form input entry
- ✓ Understand, analyze and create XML documents and XML Schema
- ✓ Understand, analyze and build web applications using PHP
- ✓ Use appropriate client-side or Server-side applications

Outcomes:

Upon successful completion of this course, the students will be able to:

- ✓ Design and implement dynamic websites with latest technical know-how's
- ✓ Create web pages using HTML and Cascading Styles sheets
- ✓ Analyze a web page and identify its elements and attributes
- ✓ Create dynamic web pages using JavaScript
- ✓ Build web applications using PHP
- ✓ Create XML documents and XML Schema

List of Experiments:-

1. Create a HTML page that uses the tags like head, title, body etc.
2. Create a HTML page that uses formatting tags, bookmark.
3. Create a HTML page that uses anchor tag and image tag.
4. Create a HTML page that uses marquee tag.
5. Create a HTML page that uses unordered list and ordered list.
6. Create a HTML page that uses style attribute ,target attribute.
7. Create a HTML page that uses frames and different presentation formats, colors.
8. Create a HTML page with a table consisting of a header, body and footer.
9. Create a HTML page that uses attributes of table tag like border , cellpadding , cellspacing , rowspan , colspan,alignment , width , height .
10. Create time table or diploma memo using all table tags and attributes.
11. Create a HTML page with a form containing various controls.
12. Create a style sheet to set the background color, position and dimensions of a HTML element.
13. Create a HTML page that uses CSS on border properties using all attributes .
14. Create a simple XML file that contains student data.
15. Create a XML file using namespace.

JAVA SCRIPT

16. Develop JavaScript code using all operators.
17. Develop JavaScript code using conditional statements
18. Develop JavaScript code using iterative statements.
19. Develop JavaScript code to implement sorting.
20. Develop JavaScript code that uses recursion.
21. Develop JavaScript code that displays date in various formats.
22. Develop JavaScript code using String Methods.
23. Develop JavaScript code using functions and recursive functions.

PHP

24. Develop PHP program using all operators.
25. Develop PHP program using conditional and iterative statements.
26. Develop PHP program using Date methods.
27. Develop PHP program using String Methods.
28. Develop PHP program on functions.

Course Code	:	DPCC401PET
Course Title	:	Essence of Indian Knowledge and Tradition
Number of Credits	:	0 (L: 2, T: 0, P:0)
Prerequisites	:	Nil
Course Category	:	AU

Learning Outcomes:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the important roots of knowledge system.
- To make the students understand the traditional knowledge and analyse it and apply it in their day to day life

Course Outcomes:

At the end of the Course, Student will be able to:

- Identify the concept of Traditional knowledge and its importance.
- Understand the need and importance of protecting traditional knowledge.
- Illustrate the various enactments related to the protection of traditional knowledge.
- Explain the importance of Traditional knowledge in Agriculture and Medicine.

Course Contents:**UNIT I:**

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge (Unani / Siddha/ Ayurveda), Indigenous Knowledge (IK)

UNIT II:

Protection of traditional knowledge: The need for protecting traditional knowledge, Significance of traditional knowledge Protection, value of traditional knowledge in global economy, Role of Government to harness traditional knowledge

UNIT III:

Traditional Knowledge in different Sectors: Traditional knowledge and engineering, Traditional medicine system, traditional knowledge in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of traditional knowledge

Suggested Learning Resources:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor.
3. Madhya Himalayi Sanskriti mein Gyan, Vigyan evam Paravigyan by Prof PC Pandey.

Suggested Online Link: Web Links:

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003/>

MINOR PROJECT

Course Objectives:

1. To enable students learn by doing.
2. To develop capability to analyse and solve real world problems
3. To develop innovative ideas among the students

Course Outcomes: Students should be able to do the following:

1. To provide innovative solutions
2. To work in a team
3. To manage time and resources in the best possible manner

Students are required to choose a topic for minor project related to the courses of this semester. Student has to implement and present the project as per the given schedule. During the implementation of the project, student has to follow the schedule given below. Report of the project work has to be submitted for evaluation.

Schedule:

S.No	Description	Duration
1.	Problem Identification / Selection	4 weeks
2.	Preparation of Abstract	1 week
3.	Design, Implementation & Testing of the Project	5 weeks
4.	Documentation & Project Presentation	2 weeks

Guidelines for the Award of marks:

S.No.	Description	CIE Max. Marks 60	SEE Max. Marks 40
1.	Weekly Assessment	20	--
2.	Design/ Implementation	20	10
3.	Presentation	10	10
4.	Viva Voce	10	10
5.	Report	-	10

Final Minor Project demonstration and PPT presentation is to be evaluated for the entire class together by the entire faculty handling Minor project for that class.

Semester V
Curriculum Structure
Diploma in Information Technology

Sl No	Category	Code No.	Course Title	Hours per week			Total cont act hrs/ week	Scheme of Evaluatio n		Credits
				L	T	P		CIE	SEE	
1.	Program core course		Introducti on toe- Governance	2	1	0	3	40	60	3
2.	Program core course		Internet of Things	2	1	0	3	40	60	3
3.	Program Elective course		Program Elective-1	2	1	0	3	40	60	3
4.	Program Elective course		Program Elective-2	2	1	0	3	40	60	3
5.	Open Elective		Open Elective-1	3	0	0	3	40	60	3
6.	Summer Internship- II (6 weeks) after IV Semester		Summer Internship-II						100	3
7.	Major Project			0	0	2	2			^
			T o t a l C r e d i t s							1 8

Program Elective-1:

1. Fundamentals of A.I
2. VB.Net Programming

Program Elective-2:

3. Java Programming
4. Data Warehousing and Data Mining

Open Elective-I:

5. Artificial Intelligence&Machine Learning
6. Soft Computing Techniques

Semester VI
Curriculum Structure
Diploma in Information Technology

Sl No	Category	Code No.	Course Title	Hours per week			Total contact hrs/ week	Scheme of Evaluation		Cred its
				L	T	P		CIE	SEE	
1.	Program Elective course		Program Elective- 3	2	1	0	3	40	60	3
2.	Program Elective course		Program Elective- 4	2	1	0	3	40	60	3
3.	Humanities and Social Science course		Entrepreneurship and Startups	3	0	0	3	40	60	3
4.	Open Elective		Open Elective-2	3	0	0	3	40	60	3
5.	Open Elective		Open Elective-3	3	0	0	3	40	60	3
6.	Mandatory Course		Indian Constitution	2	0	0	2	20	30	0
7.	Major Project			0	0	6	6	120	80	4 [^]
8.	Seminar			1	0	0	1	50	--	1
			To tal Cr edi ts							20

Program Elective-3:

3. Network Forensics
4. Distributed Systems

Program Elective-4:

7. Information Security
8. FOSS (Free and Open Source Software)

Open Elective-3:

5. Project Management
6. Internet of Things

Open Elective-4:

7. Artificial Intelligence
8. Human Computer Interaction

OPEN ELECTIVE COURSES (OE)

S.No.	Code No.	Course Title	Hours per week			Sem	Credits
			L	T	P		
1	**OE###	Economic Policies in India	3	0	0	V / VI	3
2	**OE###	Artificial Intelligence & Machine Learning	3	0	0	V / VI	3
3	**OE###	Soft Computing Techniques	3	0	0	V / VI	3
4	**OE###	Project Management	3	0	0	V / VI	3
5	**OE###	Renewable Energy Technologies	3	0	0	V / VI	3
6	**OE###	Energy Conservation & Audit	3	0	0	V / VI	3
7	**OE###	Product Design	3	0	0	V / VI	3
8	**OE###	Engineering Economics & Accountancy	3	0	0	V / VI	3
9	**OE###	Operations Research	3	0	0	V / VI	3
10	**OE###	Renewable Energy Technologies	3	0	0	V / VI	3
11	**OE###	Energy Efficiency and Audit	3	0	0	V / VI	3
12	**OE###	Web Designing and Multimedia Technology (*)	3	0	0	V / VI	3
13	**OE###	History of Science and Engineering (*)	3	0	0	V / VI	3
14	**OE###	Internet of Things	3	0	0	V / VI	3
15	**OE###	Professional Orientation (*)	3	0	0	V / VI	3
16	**OE###	Disaster Management	3	0	0	V / VI	3
17	**OE###	Sustainable Development (*)	3	0	0	V / VI	3
18	**OE###	Smart Systems (*)	3	0	0	V / VI	3
19	**OE###	Robotics (*)	3	0	0	V / VI	3
20	**OE###	Introduction to E-Governance (*)	3	0	0	V / VI	3
21	**OE###	Cyber Security Laws, Standards and IPR (*)	3	0	0	V / VI	3
22	**OE###	Organic and Natural Farming Practices(*)	3	0	0	V / VI	3
23	**OE###	Classical Text Reading (*)	3	0	0	V / VI	3
24	**OE###	3-D Printing (*)	3	0	0	V / VI	3
25	**OE###	Virtual Reality (*)	3	0	0	V / VI	3
26	**OE###	Mechatronics	3	0	0	V / VI	3
27	**OE###	Artificial Intelligence	3	0	0	V / VI	3

Note: (*) means that course details will be added soon.

Course Code	:	
Course Title	:	Introduction to e-Governance
Number of Credits	:	3 (L: 2, T: 1, P: 0)
Prerequisites	:	-----
Course Category	:	PC

Course Learning Objectives:

To cover the concepts of e-Governance and to understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.

Course Content:**UNIT 1:**

Exposure to emerging trends in ICT for development; Understanding of design and implementation of e-Government projects, e-governance life cycle.

UNIT 2:

Need for Government Process Re-engineering (GPR); National e-Governance Plan(NeGP) for India; SMART Governments & Thumb Rules

UNIT 3:

Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for Innovation and Change Management in e-Governance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws

UNIT 4:

Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

Reference Books:

1. Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India
2. The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
3. e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India
4. <http://www.csi-sigegov.org/publications.php>
5. <https://negd.gov.in>
6. <https://www.nisg.org/case-studies-on-e-governance-in-india>

Course outcomes:

Through exposure to introductory ideas and practices followed in a selected number of e-Governance initiatives in India, the course will help students to understand and appreciate the essence of e-Governance.

Course Code	:	
Course Title	:	Internet of Things
Number of Credits	:	3 (L: 2, T: 1, P: 0)
Prerequisites	:	-----
Course Category	:	PC

Course Learning Objectives:

Internet of Things (IoT) is presently an important technology with wide ranging interest from Gov- ernment, academia and industry. IoT cuts across different application domain verticals ranging from civilian to defence sectors which includes agriculture, space, health care, manufacturing, construc- tion, water, mining, etc. Today it is possible to build different IoT solutions such as shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems. Therefore, it is very important to learn the funda-mentals of this emerging technology.

Course Content:**UNIT 1:**

Introduction to IoT; Sensing; Actuation

UNIT 2 :

Basics of IoT Networking, Communication Protocols, Sensor networks

UNIT 3:

Introduction to Arduino programming, Integration of Sensors/Actuators to Arduino

UNIT 4:

Implementation of IoT with Raspberry Pi; Data Handling Analytics

UNIT 5:

Case Studies: Agriculture, Healthcare, Activity Monitoring

Reference Books:

1. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22
2. “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, by Pethuru Raj and Anupama C. Raman (CRC Press)
3. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)
4. “Internet of Things: A Hands-on Approach”, by Arshdeep Bahga and Vijay Madisetti (Universities Press)
5. *Internet of Things: Architecture and Design Principles*, Raj Kamal, McGraw Hill
6. Research papers

Course outcomes:

Students will have good understanding of various aspect of IoT, know some tools and have basic implementation skills.

Course Code	:	
Course Title	:	Java Programming
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	C and Basics of DS
Course Category	:	PE

Course Learning Objectives:

Open source platforms play significant role in the corporate world and are gaining popularity because these are freeware and ease of access. Java is a simple, portable, distributive, robust, secure, dynamic, architecture neutral, object oriented programming language. This technology allows the software designed and developed once for an idealized 'virtual machine' and run on various computing platforms. Companies of all sizes are using Java as the main programming platform to develop various applications/projects worldwide.

Course Content:**Unit – I (Introduction to Java)**

Describe Internet role, advantages and, environment setup of Java, Differentiate between POP and OOP, List important OOP fundamentals, Write simple programs using java

Unit – II (Building Blocks of the Language)

Explain Data types: constant and variables, State the steps to implement programs for Arrays and String Handling, List different types of operators, State the steps to implement small programs using Decision & Control Structures

Unit – III (Object Oriented Programming Concepts, Inheritance, Packages)

Define Objects and Classes and methods, Explain Constructors & its types, Object as a parameter, constructor overloading. Describe Inheritance and method overriding, List the types of Inheritance, Describe Creating package, importing package, access rules for packages, class hiding rules in a package.

Unit– IV (Interfaces, Exception Handling & Multi threaded Programming)

Define interface. Explain inheritance on interfaces, implementing interface, multiple inheritance using interface, Describe Abstract & final classes.

Explain errors, & exceptions, List types of errors, Define thread, creating threads, multi threading, thread priority & synchronization.

Text Books

The complete reference Java -- Patrick Naughten, Herbert Schildt TMH company Limited, New Delhi.

References

1. Java Foundations of Programming – NIIT, PHI
2. Programming with Java -- Balagurusamy, TM
3. Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education (OR)
3. Java: How to Program P.J. Deitel and H.M. Deitel, PH

Course outcomes:

So, after learning this course, student can float themselves as Java developer in the software industry as well this course works as foundation course for advance Java programming for the forthcoming semester.

Course Code	:	
Course Title	:	.Net Programming
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	Basics of Programming
Course Category	:	PE

Course Objective:

- To understand the .NET Programming concepts.
- To understand the integrated development environment.
- To understand Graphical User Interface (GUI) programming.
- Design, formulate, and construct applications with VB.NET
- Integrate variables and constants into calculations applying VB.NET
- Implement lists and loops with VB.NET controls and iteration
- Separate operations into appropriate VB.NET procedures and functions
- Assemble multiple forms, modules, and menus into working VB.NET solutions
- Create VB.NET programs using multiple array techniques
- Build integrated VB.NET solutions using files and structures with printing capabilities
- Translate general requirements into data-related solutions using database concepts

Course Outcome:

On completion of course, the students will able to:

- Apply .NET programming concepts in problem solving
- Implement GUI applications.
- Determine logical alternatives with VB.NET decision structures
- Student will able to Develop window Form and Web based Application

Unit	Course Content
I	Introduction to Visual Basic.NET - Features of Visual Basic. What is .NET Framework - Component of .NET – CLR and Library –NET - Understand the IDE, .NETAssemblies- Private & shared assemblies - Benefits of .NET assemblies. .NET Programming fundamentals in VB (Console Application): Variable declaration and types – User defined data types – Scope and life of a variable – Arrays & Constraints, OOPs Concepts, – Control flow statements – Writing programs using control flow statements – Procedures and Functions – Recursion concept in VB.NET - Exception Handling in VB.NET.
II	Developing Windows Applications: Design aspects of VB.NET forms, Elements of User Interface– Properties of Controls – Text box, Label, command button, check box and list box Common properties of the above controls – enable , disable controls, control arrays, Menus and common dialogue control – creating menus at design time and runtime, create short cut keys for pull down menus common dialogue control, Fundamentals of graphics in vbLine and shape controls in creating graphics – paint picture method –Display and printing information fundamentals of printing, printer object – printing with print form method.

III	<p>Developing Web Application: Introduction to Web Forms – Creating buttons, Text boxes, Labels and Literals in Web forms - Creating Place holders, hidden Field Control and Creating Upload - Controls Web forms - Working with Check boxes, Radio buttons, Tables and Panels in Web forms - Know how to use Images, List boxes, Drop-down lists, Hyper links and link buttons in Web Forms.</p>
IV	<p>Data Access with ADO.NET Introduction to ADO.NET data objects, Accessing data with Server explorer - Accessing data with data adapters and data sets - Multiple Table Connection - Data binding with controls like Text Boxes, List Boxes, Data grid etc. - Navigating data source - Data Grid View, Data form wizard - Data validation – Connection Objects, Command Objects, Data Adapters, Dataset Class - Features and advantages with ADO.NET.</p>
Examination and Evaluation Pattern	
	As per the AICTE Rules and Regulations of Examination Branch of MANUU. Each Unit will carry equal Weightage of marks.
Text Books and References:	
1	Visual basic.NET Programming Steven Holzner Dream tech
2	VB.NET PROGRAMMING BY T. GADDIS (Dreamtech)
3	Microsoft Visual Basic. Net step by step By Halvorsen (PHI)
4	OOP with Microsoft Visual Basic.Net By Reynold Hacrte (PHI)

Course Code	:	
Course Title	:	Mobile Computing
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

To teach how to build mobile apps and students are expected to work on a project as part of the course.

Course Content:**UNIT 1:**

A brief history of Mobile, Types of mobile phone generations, The Mobile Ecosystem, Types of Mobile Applications, Mobile Information Architecture Android Versions, Features of Android, Android Architecture, Installing Android SDK Tools, Configuring Android in Eclipse IDE, Android Development Tools (ADT), Creating Android Virtual Devices (AVD)

UNIT 2:

Creating first android application, Anatomy of android application, Deploying Android app on USB connected Android device, Android application components, Activity life cycle, Understanding activities, Exploring Intent objects, Intent Types, Linking activities using intents

UNIT 3:

Fragments life cycle, Interaction between fragments, Understanding the components of a screen (Layouts), Adapting to display orientation, Action Bar, Views(UI Widgets)-Button, Toast, ToggleButton, CheckBox, RadioButton, Spinner, WebView, EditText, DatePicker, TimePicker, ListView, ProgressBar, Analog and Digital clock, Handling UI events, List fragment, Dialog fragment

UNIT 4:

Menus-Option, Context, Popup, Images-ImageView, ImageSwitcher, AlertDialog, Alarm manager, SMS, E-mail, Media Player, Using camera, recording video, Handling Telephony Manager.

Storing the data persistently-Data Storage Options: preferences, Internal Storage, External Storage, Content Provider, The SQLite database, Connecting with SQLite database and operations-Insert, Delete, Update, Fetch, Publishing android applications, Deploying APK files

Suggested Lab Work:

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools/technologies introduced during the course and become comfortable with their use. Teacher should give weekly practice tasks as assignment. Learnings from this course should be used in the project/software built.

Reference Books:

1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley Publishing, Inc.
2. Pradeep Kothari, "Android Application Development Black Book", DreamTech Press
3. James C. Sheusi, "Android Application Development for Java Programmers", Cengage Learning
4. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
5. Sayed Y Hashimi and Satya Komatineni(2009), "Pro Android", Wiley India Pvt Ltd
6. Reto Meier, Professional Android 4 Application Development, Wiley India Pvt Ltd

Course outcomes: Will be able to develop and deploy basic mobile applications.

Course Code	:	
Course Title	:	Multimedia Technologies
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	Multimedia Basics
Course Category	:	PE

Course Learning Objectives:

To introduce students to the domain of Multimedia Technologies, which explain the technologies underlying digital images, videos and audio contents, including various compression techniques and standards, and the issues to deliver multimedia content over the Internet.

Course Content:

UNIT 1: Introduction to Multimedia

Multimedia Foundation and Concepts: Multimedia Hardware, Multimedia Software , Multimedia operating systems , Multimedia communication system

UNIT 2: Basic Compression Techniques

Video and Audio Data Compression Techniques – Lossy and Lossless. Example algorithms/standards: Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265

UNIT 3: Content Development and Distribution

Desktop publishing (Coral Draw, Photoshop, Page maker)

Multimedia Animation & Special effects (2D/3D animation, Flash)

UNIT 4: Introduction to Digital Imaging

Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia

Suggested Lab Work:

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools introduced during the course and become comfortable with their use. Teacher should give weekly tasks as assignment.

Reference Books:

1. An Introduction to Multimedia Authoring, A. Eliens
2. Fundamentals of Multimedia, Prentice Hall/Pearson, Ze-Nian Li & Mark S. Drew.
3. Multimedia and Animation, V.K. Jain, Khanna Publishing House, Edition 2018
4. Fundamentals of Multimedia, Ramesh Bangia, Khanna Book Publishing Co., N. Delhi (2007)

Course outcomes:

Student will understand various aspects of Multimedia and related standards. Student will be able to build multimedia content and applications and also multimedia enable Web applications and mobile applications.

Course Code	:	
Course Title	:	Fundamentals of AI
Number of Credits	:	4 (L: 3, T: 1, P: 0)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

To introduce students to the domain of Artificial Intelligence.

Course Content:**UNIT 1: Introduction**

Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents.

UNIT 2: Search

Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search

Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization.

UNIT 3:

Finding Optimal Paths: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam StackSearch.

Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net.

Game Playing: Minimax Algorithm, AlphaBeta Algorithm, SSS*.

UNIT 4:

Planning and Constraint Satisfaction: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graphplan, Constraint Propagation.

Logic and Inferences: Propositional Logic, First Order Logic, Soundness and Completeness, Forward and Backward chaining.

Reference Books:

1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India)
2. <https://nptel.ac.in/courses/106106126/>
3. Stefan Edelkamp and Stefan Schroedl. Heuristic Search, Morgan Kaufmann.
4. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History and
5. Prospects of Artificial Intelligence, A K Peters/CRC Press
6. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill.
7. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, Prentice
8. Hall
9. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House

Course outcomes:

Student will have general idea about Artificial Intelligence, will be able to explore AI tools effectively.

Course Code	:	
Course Title	:	Advance Computer Networks
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

Introduce Advance Networking Concepts, Theories and Tools

Course Content:**UNIT 1:**

Review of Networking Basics; Advance Topics in IPv4 – Subnetting, Multicasting, Multicast Routing Protocols (IGMP, PIM, DVMRP); Advance Topics in TCP – flow management, congestion avoidance, protocol spoofing; IPv6

UNIT 2:

Telecom Networks, Switching Techniques; Introduction to Frame Relay, ATM, MPLS; VSAT Communication – Star and Mesh architectures, bandwidth reservation; Wireless Networks – WiFi, WiMax, Cellular Phone Technologies – GSM, CDMA, 3G, 4G

UNIT 3:

Network Redundancy, Load Balancers, Caching, Storage Networks; QoS; Network Monitoring – SNMP, RMON;

UNIT 4:

Introduction to Network Security – VLAN, VPN, Firewall, IPS, Proxy Servers

Network Simulation, Network design case studies and exercises, IP Addressing schema, Protocol Analysers (Wireshark, etc)

Reference Books:

1. RFCs and Standards Documents (www.ietf.org and other standard body websites)
2. Communication Networking – An Analytical Approach, Anurag-Manjunath-Joy
3. TCP/IP Illustrated (Vol.1,2), Stevens
4. Data Networks, Bertsekas-Gallager
5. An Engineering Approach to Computer Networking, S. Keshav

Course outcomes:

1. Understanding core concepts/theories/algorithms of computer networks
2. Some hands-on capability on various network devices and tools
3. Capability to design and implement a computer network

Course Code	:	
Course Title	:	Information Security
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

To learn how to evaluate and enhance information security of IT infrastructure and organizations

Course Content:**UNIT 1:**

Introduction to Information Security, Various aspects of information security (PAIN), Security Features of Operating Systems – Authentication, Logs, Audit Features, File System Protection, User Priv-ileges, RAID options, Anti-Virus Software, etc.

UNIT 2:

Understanding security weaknesses in popular networking protocols – IP, TCP, UDP, RIP, OSPF, HTTP, SMTP, etc.; security weaknesses in common networking devices – Hub, switch, router, WiFi; Security solutions to mitigate security risk of networking protocols (IPSec, HTTPS, etc) and devices (VLAN, VPN, Ingress Filtering, etc)

UNIT 3:

Basics of Cryptography, PKI, Security considerations while developing softwares

Network Security Products – Firewall, IDS/IPS, VPN Concentrator, Content Screening Gateways, etc.

UNIT 4:

Introduction to Security Standards – ISO 27001, Indian IT Act, IPR Laws; Security Audit procedures; Developing Security Policies; Disaster Recovery, Business Continuity Planning

Reference Books:

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. RFCs of protocols listed in content (<https://www.ietf.org>)
3. Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
4. Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)
5. <https://www.cert-in.org.in/>
6. <https://www.sans.org/>

Course outcomes:

Understanding of security needs and issues of IT infrastructure. Have basic skills on security audit of networks, operating systems and application software.

Course Code	:	
Course Title	:	Network Forensics
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

To understand various network forensic aspects for analysing network security breach

Course Content:**UNIT 1:**

Review of Networking concepts and Protocols, Introduction to Network Forensics, various aspects of Network Forensics

UNIT 2:

Introduction to Network Forensic Tools and techniques: Wireshark, TCP Dump, Syslog, NMS, Promiscuous Mode, Network Port Mirroring, snooping, scanning tools, etc.

UNIT 3:

Understanding and Examining Data Link Layer, Physical Layer, Ethernet Switch Logs, MAC Table, ARP Table, etc.

Understanding and Examining Network Layer, Router Logs, WiFi Device logs, Firewall logs,

UNIT 4:

Understanding audit features of OS and applications; Enabling and Examining Server logs, User activity logs, Browser history analysis, Proxy server logs, Antivirus logs, Email logs.

Limitations and challenges of network forensics due to encryption, spoofing, mobility, storage limitations, privacy laws, etc.

Suggested Lab Work:

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools/applications introduced during the course. Teacher should give weekly tasks as assignment.

Reference Books:

1. Manuals of OS, application software, network devices
2. RFCs of various networking protocols (<https://www.ietf.org/>)
3. <https://www.sans.org/>
4. <https://www.cert-in.org.in/>
5. Handbook of Digital Forensics and Investigation, Eoghan Casey, Elsevier Academic Press
6. Cyber Forensics, Albert Marcella and Doug Menendez, CRC Press
7. Computer Forensics (5 volume Set) mapping to CHFI (Certified Hacking Forensics Investigator), by EC-Council

Course outcomes:

Student will understand basic concepts of network forensics, learn tools, and will be able to do basic forensic investigations and handle security incidents.

Course Code	:	
Course Title	:	Data Warehousing and Data Mining
Number of Credits	:	4 (L: 3, T: 1, P: 0)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

Introduce students to the domain of Data Warehousing and Data Mining

Course Content:**UNIT 1: Introduction**

Motivation, Importance, Definitions, Kind of Data, Data Mining Functionalities, Kinds of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of A Data Mining Sys- tem with A Database or Data Warehouse System, Major Issues in Data Mining, Types of Data Sets and Attribute Values, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity. PREPROCESSING: Data Quality, Major Tasks in Data Preprocessing, Data Reduction, Data Transfor- mation and Data Discretization, Data Cleaning and Data Integration.

UNIT 2: Data Warehousing and on-line Analytical Processing

Data Warehouse basic concepts, Data Warehouse Modeling - Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented In- duction, Data Cube Computation.

UNIT 3: Patterns, Associations and Correlations

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Fre- quent Itemset Mining Methods, Pattern Evaluation Methods, Applications of frequent pattern and associations.

Frequent Patterns and Association Mining: A Road Map, Mining Various Kinds of Association Rules,

Constraint-Based Frequent Pattern Mining, Extended Applications of Frequent Patterns.

UNIT 4: Classification

Basic Concepts, Decision Tree Induction, Bayesian Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy: Ensemble Methods, Handling Different Kinds of Cases in Classification, Classification by Neural Networks, Support Vector Machines, Pattern-Based Classification, Lazy Learners (or Learning from Your Neighbors).

Reference Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

Course outcomes:

Student will have general idea about Data Warehousing and Data Mining techniques, will be able to explore further and effectively use related tools.

Course Code	:	
Course Title	:	FOSS (Free and Open Source Software)
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	FOSS (Free and Open Source Software)
Course Category	:	PE

Course Learning Objectives:

Exposure to free and open source software philosophy and tools.

Course Content:**UNIT 1: FOSS PHILOSOPHY**

Understanding the FOSS Community and FOSS Philosophy, Benefits of Community based Software Development, Guidelines for working with FOSS community, Requirements for being open, free soft-ware, open source software, FOSS Licensing Models, FOSS examples

UNIT 2: LINUX

Linux Installation and Hardware Configuration, Boot Process, Dual-Booting Linux and other Operating Systems, Kernel Options during Boot, X Windows System Configuration, System Administration (Server Administration, Backup and Restore Procedures, Strategies for keeping a Secure Server)

UNIT 3: Programming Tools and Techniques

Libreoffice Tools; Samba: Cross platform; Introduction about LAMP; Brief Introduction to Programming using languages like Java /Python / Perl; Database Systems Mysql, PostgreSQL or equivalent; Open Source UML Tools; Introduction to Mobile Programming; Version Control Systems like SVN, Git or equivalent; Project Management Tools; Bug Tracking Systems; Package Management Systems

UNIT 4: FOSS CASE STUDIES

Some example case studies of FOSS implementation

Suggested Lab Work:

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various FOSS tools/applications on a Linux system. Teacher should give weekly tasks as assignment. Learnings from this course should be used in the major project.

Reference Books:

1. Linux in a Nutshell, by Ellen Siever
2. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.
3. Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/>.
- Version control system URL: <http://git-scm.com/>.
4. Samba: URL : <http://www.samba.org/>.
5. Libre office: <http://www.libreoffice.org/>.

Course outcomes:

Student will be able to work with FOSS tools, find and evaluate FOSS alternatives for any software requirement.

Course Code	:	
Course Title	:	Software Testing
Number of Credits	:	4 (L: 3, T: 0, P: 2)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

Inculcate essential software testing knowledge and skills, required to reasonably test a system under development in a systematic manner.

Course Content:

As per the course design, concepts learned in this course will/should be used in the major project (Proj.202).

UNIT 1: Basics

Introduction to Software Quality basics: Verification and validation, quality perspectives, Testing terminology, Software Testing Life Cycle (STLC), “V” model of Testing, QA process, cost of testing, types of tests,

UNIT 2: Writing Test Cases

Writing test cases, Functional Testing, non-functional testing, (Performance testing), UI testing. Preparing test data, Writing Unit test, Integration test and User Acceptance Tests, preparing test scenarios from Software requirements

UNIT 3: Test Execution and Management

test execution, Test Oracles, test planning, test strategy including when to stop testing, test-coverage

- Traceability matrix, JIRA, Bugzilla and other bug tracking tools. Test data mining, test reporting.

UNIT 4: Test Automation and quality Assurance

Why automation, when not to automate, writing simple automated test cases, learn and practice any one automated testing framework like Selenium.

Quality and Defect management - Code reviews, Quality tools, Change management, version control

Suggested Lab Work:

Writing and executing test cases of different types for a sample system, may be for the minor project done earlier; using Bugzilla to report cases; writing performance test cases for different types of test (load, stress, benchmarking, etc.); Writing automated test for UI, writing-executing test scripts for a sample system

Reference Books/Resources:

1. Software Engineering – A Practitioner’s Approach, 7th Edition, Roger Pressman.
2. Bugzilla (<https://www.bugzilla.org/>)
3. JIRA (<https://www.atlassian.com/software/jira>)

Course outcomes:

Student will develop skills to understand the system, choose suitable testing methods, strategies, tools and technology, execute and report the test. Student will also be able to understand need and usage of test automation and gain expertise in at

least 1 test automation tool.

Course Code	:	
Course Title	:	DISTRIBUTED SYSTEMS
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	Data Structure and Algorithm, Operating System, Computer Network
Course Category	:	PE

Course Learning Objectives:

A distributed system is a system whose components are located on different networked computers, which communicate and coordinate their actions by passing messages to one another. The objective of this course is to understand fundamentals of distributed systems, architectures and communication where in components interact with one another in order to achieve a common goal. Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure of components.

Course Content:

Unit-I (Fundamentals of Distributed System)

Definition of a Distributed System, Goals of a Distributed System, Types of Distributed Systems, Basics of Operating System and Networking.

Unit-II (Basics of Architectures, Processes, and Communication)

Architectures - Types of System Architectures, Self Management in Distributed Systems; Processes - Basics of Threads, Virtualization, Roles of Client and Server, Code Migration; Communication - Types of Communications, Remote Procedure Calls, Message-Oriented Communication, Stream-Oriented Communication, Multicasting

Unit-III (Security)

Introduction to Security- Security Threats, Policies, and Mechanisms, Design Issues, Basics of Cryptography, Secure Channels- Authentication, Message Integrity and Confidentiality, Secure Group Communication;

Unit-IV (Access Control)

General Issues in Access Control, Firewalls, Secure Mobile Code, Denial of Service; Categories of Distributed System:Architectures

Course outcomes:

From this course, students may learn foundations of distributed systems, idea of peer to peer services and file system, and security issues in distributed system

Reference Books:

1. Tanenbaum, A.S. and Van Steen, M., 2007. Distributed systems: principles and paradigms. Prentice-Hall.
2. Sinha, P.K., 1998. Distributed operating systems: concepts and design. PHI Learning Pvt. Ltd..
3. Liu, M.L., 2003. Distributed computing: principles and applications. Pearson Education Inc..

4. Lynch, N.A., 1996. Distributed algorithms. Elsevier.

5. Coulouris, G.F., Dollimore, J. and Kindberg, T., 2005. Distributed systems: concepts and design.pearson education.

Course Code	:	
Course Title	:	Human Computer Interaction
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	
Course Category	:	PE

Course Learning Objectives:

For end-users, the interface is the system. So design in this domain must be interaction-focused and human-centered. The main objectives of the course are:

- Provide an overview of the concepts relating to the design of human-computer interfaces in ways making computer-based systems comprehensive, friendly and usable.
- Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces.
- Understand the important aspects of implementation of human-computer interfaces.

Course Content:

Unit I -Introduction- Course objective and overview, Historical, Evolution of the field Interactive system design (theory and practice) ,Concept of usability - definition and elaboration, HCI and software engineering, GUI design and aesthetics, Prototyping techniques.

Unit –II Model-based Design and evaluation-Basic idea, introduction to different types of models, GOMS family of models (KLM and CMN-GOMS), Fitts' law and HickHyman's law, Model-based design case studies, Guidelines in HCI-Shneiderman's eight golden rules, Norman's seven principles, Nielsen's ten heuristics with example of its use.

Unit –III Dialog Design-Introduction to formalism in dialog design, design using FSM (finite state machines), State charts and (classical) Petri Nets in dialog design, Cognitive architecture-Introduction to CA, CA types, relevance of CA in IS design, Model Human Processor (MHP)

Unit- IV Object Oriented Programming- OOP- Introduction, Case Study 1 - GUI design for a mobile phone based Matrimonial application, Case Study 2 - Employment Information System for unorganised construction workers on a Mobile Phone.

Course outcomes:

After completion of the course students are expected to be able to: Understand the Computer and Human-Computer Interaction (HCI), Have an insight to Human Capabilities, Interactive Systems Design and Windows Concepts and Interfaces.

Reference Books

- 1.Dix A., Finlay J.,Abowd G. D. and Beale R. Human Computer Interaction, 3 rd edition, Pearson Education, 2005.
2. Preece J., Rogers Y.,Sharp H.,Baniyon D., Holland S. and Carey T. Human Computer Interaction,Addison-Wesley, 1994.

Suggested Books

3. B.Shneiderman; Designing the User Interface,Addison Wesley 2000 (Indian Reprint).

Third Edition Alan Dix, Lancaster University Janet Finlay, Leeds Metropolitan University Gregory
 4. D. Abowd, Georgia Institute of Technology Russell Beale, University of Birmingham.
 5. *Designing the User Interface* by Shneiderman, Plaisant, Cohen, and Jacobs

Course Code	:	**OE###
Course Title	:	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	OE

Course Learning Objectives:

Have a thorough understanding of classical and modern AI applications. Be able to implement a wide range of AI concepts using Prolog. Understand non-classical AI approaches such as genetic algorithms and neural networks. Be able to assess the potential of AI in research and real-world environments.

Course Content:

UNIT-I: Introduction: History and foundations of AI, Problem solving: Uninformed and informed Search; Constraint Satisfaction Problems and Constrained Optimization problems (complete and in- complete techniques).

UNIT-II: Adversarial Search: Two players games, games with uncertainty; Decision support systems and technologies; Knowledge representation, Reasoning, Expert systems Contents (2/2), Planning (basics).

UNIT-III: Machine learning Basics: Decision trees, Ensemble learning, Reinforcement learning, evolutionary computation, Neural networks, Problems, data, and tools; Visualization;

References:

1. Russell, Norvig, Artificial intelligence: A modern approach, 2nd edition. Pearson/Prentice Hall.
2. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House, New Delhi (2018)
3. V.K. Jain, Machine Learning, Khanna Publishing House, New Delhi (2018)
4. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, <http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012>.

Course outcomes:

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

CO1	Identify problems that are amenable to solution by AI methods.
CO2	Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
CO3	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
CO4	able to design and implement various machine learning algorithms in a range of real-world applications.
CO5	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

Course Code	:	**OE###
Course Title	:	SOFT COMPUTING TECHNIQUES
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	OE

Course Learning Objectives:

- To learn Fuzzy logic and its applications.
- To learn artificial neural networks and its applications.
- To solving single-objective optimization problems using GAs.
- To solving multi-objective optimization problems using Evolutionary algorithms (MOEAs).
- Applications of soft computing to solve problems in varieties of application domains.

Course Content:

UNIT-I: Problem Solving Methods and Tools: Problem Space, Problem solving, State space, Algo- rithm's performance and complexity, Search Algorithms, Depth first search method, Breadth first search methods their comparison, A*, AO*, Branch and Bound search techniques, p type, Np complete and Np Hard problems.

UNIT-II: Evolutionary Computing Methods: Principles of Evolutionary Processes and genetics, A history of Evolutionary computation and introduction to evolutionary algorithms, Genetic algo- rithms, Evolutionary strategy, Evolutionary programming, Genetic programming.

Genetic Algorithm and Genetic Programming: Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

UNIT-III: Swarm Optimization: Introduction to Swarm intelligence, Ant colony optimization (ACO), Particle swarm optimization (PSO), Artificial Bee colony algorithm (ABC), Other variants of swarm intelligence algorithms.

Reference Books:

1. Tettamanzi Andrea, Tomassini and Marco, Soft Computing Integrating Evolutionary, Neural and Fuzzy Systems, Springer, 2001.
2. Elaine Rich, Artificial Intelligence, McGraw Hill, 2/e, 1990.
3. Kalyanmoy Deb, Multi-objective Optimization using Evolutionary Algorithms, John Wiley and Sons, 2001.

Course outcomes:

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

CO1	Classify and differentiate problem solving methods and tools.
CO2	Apply A*, AO*, Branch and Bound search techniques for problem solving.
CO3	Formulate an optimization problem to solve using evolutionary computing methods.
CO4	Design and implement GA, PSO and ACO algorithms for optimization problems in Mechanical Engineering.

CO5	Apply soft computing techniques for design, control and optimization of Manufacturing systems.
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Course Code	:	**OE###
Course Title	:	PROJECT MANAGEMENT
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	OE

Course Learning Objectives:

- To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

Course Content:

UNIT-I: Concept of a project: Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time)project priority matrix-work break down structure.

UNIT-II: Capital budgeting process: Planning- Analysis-Selection-Financing-Implementation-Re- view. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

UNIT-III: Financial estimates and projections: Cost of projects-means of financing- estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis. Introduction to various Project management softwares.

Reference Books:

1. Project planning, analysis, selection, implementation and review – Prasannachandra – Tata McGraw Hill
2. Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson - McGraw Hill
3. Project management - David I Cleland - Mcgraw Hill International Edition, 1999
4. Project Management – Gopala krishnan – Mcmillan India Ltd.
5. Project Management-Harry-Maylor-Pearson Publication

Course outcomes:

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

CO1	Understand the importance of projects and its phases.
CO2	Analyze projects from marketing, operational and financial perspectives.
CO3	Evaluate projects based on discount and non-discount methods.
CO4	Develop network diagrams for planning and execution of a given project.

CO5	Apply crashing procedures for time and cost optimization.
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Course Code	:	**OE###
Course Title	:	Internet of Things
Number of Credits	:	3
Prerequisites (Course code)	:	-
Course Category	:	OE

Course Content:

Unit I - Introduction to Internet of Things

- Define the term “Internet of Things”
- State the technological trends which have led to IoT.
- Describe the impact of IoT on society.

Unit II - Design consideration of IoT

- Enumerate and describe the components of an embedded system.
- Describe the interactions of embedded systems with the physical world.
- Name the core hardware components most commonly used in IoT devices.

Unit III Interfacing by IoT devices

- Describe the interaction between software and hardware in an IoT device.
- Explain the use of networking and basic networking hardware.
- Describe the structure of the Internet.

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	Internet of Things	Raj Kamal	McGraw Hill Education; First edition (10 March 2017) ISBN 978-9352605224
2	Internet of Things: A Hands-On Approach	Arsheep Bahge and Vijay Madiseti	Orient Blackswan Private Limited - New Delhi; First edition (2015) ISBN : 978-8173719547

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. <https://www.raspberrypi.org/blog/getting-started-with-iot/>
2. <https://www.arduino.cc/en/IoT/HomePage>
3. <https://www.microchip.com/design-centers/internet-of-things>
4. <https://learn.adafruit.com/category/internet-of-things-iot>
5. <http://esp32.net/>

Course Code	:	**OE###
Course Title	:	Artificial Intelligence
Number of Credits	:	3
Prerequisites (Course code)	:	None
Course Category	:	OE

Course Content:**Unit 1 – Introduction to Artificial Intelligence**

- Artificial Intelligence (AI) definition
- Goals of AI
- History of AI
- Applications of AI

Unit 2 – Agents and Environments

- Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents
- Nature of Environments, Properties of Environments

Unit 3 – Search Algorithms Terminology

- Brute Force Search Strategies – Breadth First Search, Depth First Search.
- Heuristic Search Strategies, Local Search Algorithms.

Unit 4 – Fuzzy Logic Systems and Neural Networks

4.1 Introduction to Fuzzy Logic and Fuzzy systems,

- Membership functions,
- Fuzzification/Defuzzification

Neural Networks

4.2 Basic structure of Neural Networks

- Perceptron
- Back-propagation

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1	Artificial Intelligence By Example: Develop machine intelligence from scratch using real artificial intelligence use cases	Denis Rothman	Packt Publishing ISBN – 978-1788990547

Course Code	:	**OE###
Course Title	:	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	OE

Course Learning Objectives:

Have a thorough understanding of classical and modern AI applications. Be able to implement a wide range of AI concepts using Prolog. Understand non-classical AI approaches such as genetic algorithms and neural networks. Be able to assess the potential of AI in research and real-world environments.

Course Content:

UNIT-I: Introduction: History and foundations of AI, Problem solving: Uninformed and informed Search; Constraint Satisfaction Problems and Constrained Optimization problems (complete and in- complete techniques).

UNIT-II: Adversarial Search: Two players games, games with uncertainty; Decision support systems and technologies; Knowledge representation, Reasoning, Expert systems Contents (2/2), Planning (basics).

UNIT-III: Machine learning Basics: Decision trees, Ensemble learning, Reinforcement learning, evolutionary computation, Neural networks, Problems, data, and tools; Visualization;

References:

1. Russell, Norvig, Artificial intelligence: A modern approach, 2nd edition. Pearson/Prentice Hall.
2. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House, New Delhi (2018)
3. V.K. Jain, Machine Learning, Khanna Publishing House, New Delhi (2018)
4. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, <http://mitpress.mit.edu/catalog/item/default.asp?type=2&tid=12012>.

Course outcomes:

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

CO1	Identify problems that are amenable to solution by AI methods.
CO2	Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
CO3	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
CO4	able to design and implement various machine learning algorithms in a range of real-world applications.

CO5	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
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Course Code	:	**OE###
Course Title	:	SOFT COMPUTING TECHNIQUES
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	OE

Course Learning Objectives:

- To learn Fuzzy logic and its applications.
- To learn artificial neural networks and its applications.
- To solving single-objective optimization problems using GAs.
- To solving multi-objective optimization problems using Evolutionary algorithms (MOEAs).
- Applications of soft computing to solve problems in varieties of application domains.

Course Content:

UNIT-I: Problem Solving Methods and Tools: Problem Space, Problem solving, State space, Algo- rithm's performance and complexity, Search Algorithms, Depth first search method, Breadth first search methods their comparison, A*, AO*, Branch and Bound search techniques, p type, Np complete and Np Hard problems.

UNIT-II: Evolutionary Computing Methods: Principles of Evolutionary Processes and genetics, A history of Evolutionary computation and introduction to evolutionary algorithms, Genetic algo- rithms, Evolutionary strategy, Evolutionary programming, Genetic programming.

Genetic Algorithm and Genetic Programming: Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

UNIT-III: Swarm Optimization: Introduction to Swarm intelligence, Ant colony optimization (ACO), Particle swarm optimization (PSO), Artificial Bee colony algorithm (ABC), Other variants of swarm intelligence algorithms.

Reference Books:

Tettamanzi Andrea, Tomassini and Marco, Soft Computing Integrating Evolutionary, Neural and Fuzzy Systems, Springer, 2001.

Elaine Rich, Artificial Intelligence, McGraw Hill, 2/e, 1990.

Kalyanmoy Deb, Multi-objective Optimization using Evolutionary Algorithms, John Wiley and Sons, 2001.

Course outcomes:

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

CO1	Classify and differentiate problem solving methods and tools.
CO2	Apply A*, AO*, Branch and Bound search techniques for problem solving.
CO3	Formulate an optimization problem to solve using evolutionary computing methods.
CO4	Design and implement GA, PSO and ACO algorithms for optimization problems in Mechanical Engineering.

CO5	Apply soft computing techniques for design, control and optimization of Manufacturing systems.
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Course Code	:	**OE###
Course Title	:	PROJECT MANAGEMENT
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	OE

Course Objectives:

- To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

Course Content:

UNIT-I: Concept of a project: Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time)project priority matrix-work break down structure.

UNIT-II: Capital budgeting process: Planning- Analysis-Selection-Financing-Implementation-Re- view. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

UNIT-III: Financial estimates and projections: Cost of projects-means of financing- estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis. Introduction to various Project management softwares.

Reference Books:

1. Project planning, analysis, selection, implementation and review – Prasannachandra – Tata McGraw Hill
2. Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson - McGraw Hill
3. Project management - David I Cleland - Mcgraw Hill International Edition, 1999
4. Project Management – Gopala krishnan – Mcmillan India Ltd.
5. Project Management-Harry-Maylor-Pearson Publication

Course outcomes:

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

CO1	Understand the importance of projects and its phases.
CO2	Analyze projects from marketing, operational and financial perspectives.
CO3	Evaluate projects based on discount and non-discount methods.
CO4	Develop network diagrams for planning and execution of a given project.
CO5	Apply crashing procedures for time and cost optimization.

Course Code	:	**OE###
Course Title	:	Internet of Things
Number of Credits	:	3
Prerequisites (Course code)	:	-
Course Category	:	OE

Course Content:**Unit I - Introduction to Internet of Things**

- Define the term “Internet of Things”
- State the technological trends which have led to IoT.
- Describe the impact of IoT on society.

Unit II - Design consideration of IoT

- Enumerate and describe the components of an embedded system.
- Describe the interactions of embedded systems with the physical world.
- Name the core hardware components most commonly used in IoT devices.

Unit III Interfacing by IoT devices

- Describe the interaction between software and hardware in an IoT device.
- Explain the use of networking and basic networking hardware.
- Describe the structure of the Internet.

SUGGESTED LEARNING RESOURCES:

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2	internet of Things: A Hands-On Approach	Arsheep Bahge and Vijay Madiseti	Orient Blackswan Private Limited - New Delhi; First edition (2015) ISBN : 978-8173719547

SUGGESTED SOFTWARE/LEARNING WEBSITES:

6. <https://www.raspberrypi.org/blog/getting-started-with-iot/>
7. <https://www.arduino.cc/en/IoT/HomePage>
8. <https://www.microchip.com/design-centers/internet-of-things>
9. <https://learn.adafruit.com/category/internet-of-things-iot>
10. <http://esp32.net/>

Course Code	:	**OE###
Course Title	:	Artificial Intelligence
Number of Credits	:	3
Prerequisites (Course code)	:	None
Course Category	:	OE

Course Content:

Unit 1 – Introduction to Artificial Intelligence

- Artificial Intelligence (AI) definition
- Goals of AI
- History of AI
- Applications of AI

Unit 2 – Agents and Environments

- Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents
- Nature of Environments, Properties of Environments

Unit 3 – Search Algorithms Terminology

- Brute Force Search Strategies – Breadth First Search, Depth First Search.
- Heuristic Search Strategies, Local Search Algorithms.

Unit 4 – Fuzzy Logic Systems

Introduction to Fuzzy Logic and Fuzzy systems,

- Membership functions,
- Fuzzification/Defuzzification

Unit 5 – Neural Networks

Basic structure of Neural Networks

- Perceptron
- Back-propagation

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1	Artificial Intelligence By Example: Develop machine intelligence from scratch using real artificial intelligence use cases	Denis Rothman	Packt Publishing ISBN – 978-1788990547

Entrepreneurship and start-ups

Course Learning Objectives:

- Acquiring Entrepreneurial spirit and resourcefulness.
- Familiarization with various uses of human resources for earning dignified means of living.
- Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individual and the nation
- Acquiring entrepreneurial quality, competency, and motivation.
- Learning the process and skills of creation and management of entrepreneurial venture

Course contents

Unit -I

Introduction to Entrepreneurship and Start – Ups: Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation, Types of Business Structures, Similarities/differences between entrepreneurs and managers.

Unit -II

Business Ideas and their implementation: Discovering ideas and visualizing the business, Activity map, Business Plan.

Unit -III

Idea to Start-up: Market Analysis – Identifying the target market, Competition evaluation and Strategy, Development. Marketing and accounting, Risk analysis, Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy.

Unit -IV

Management, and Financing & Protecting Ideas

Company's Organization Structure, Recruitment and management of talent, Financial organization and management, Financing methods available for start-ups in India, Communication of Ideas to potential investors – Investor Pitch, Patenting and Licenses.

Text And Reference Books:

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company Steve Blank and Bob Dorf K & S Ranch ISBN – 978-0984999392
2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Eric Ries Penguin UK ISBN – 978-0670921607
3. Demand: Creating What People Love Before They Know They Want It Adrian J. Slywotzky with Karl Weber Headline Book Publishing ISBN – 978-0755388974
4. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business Clayton M. Christensen Harvard business ISBN: 978-142219602

Course Outcome:

On completion of the study of the subject the student will be able to

- Understanding the dynamic role of entrepreneurship and small businesses
- Organizing and Managing a Small Business
- Financial Planning and Control
- Forms of Ownership for Small Business

- Strategic Marketing Planning
- New Product or Service Development
- Business Plan Creation

MAJOR PROJECT

Course Objectives:

1. To impart team building and management skills among students.
2. To instill writing and presentation skills for completing the project.
3. Plan, Analyse, Design and implement a project.

Course Outcomes: Students should be able to do the following:

1. Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios.
2. Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time.
3. Prepare and submit the Report and deliver presentation before the departmental Committee.

Students are required to choose a topic for major project related to the courses of this semester. Student has to implement and present the project as per the given schedule. During the implementation of the project, student has to follow the schedule given below. Report of the project work has to be submitted for evaluation.

Schedule:

S.No	Description	Duration
1.	Problem Identification / Selection	5 weeks
2.	Preparation of Abstract	2 week
3.	Design, Implementation & Testing of the Project	12 weeks
4.	Documentation & Project Presentation	5 weeks

Guidelines for the Award of marks:

S.No	Description	CIE Max. Marks 120	SEE Max. Marks 80
1.	Weekly Assessment	30	--
2.	Design/ Implementation	50	20
3.	Presentation	20	20
4.	Viva Voce	20	20
5.	Report	-	20

Final Major Project demonstration and PPT presentation is to be evaluated for the entire class together by the entire faculty handling Major Project for that class.

Course Code	:	AU302
Course Title	:	Indian Constitution
Number of Credits	:	0 (L: 2, T:0; P:0)
Prerequisites (Course code)	:	None
Course Category	:	AU

Course Content

Unit 1 – The Constitution - Introduction

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit 2 – Union Government

- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

Unit 3 – State Government

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 4 – Local Administration

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 5 – Election Commission

- Role and Functioning
- Chief Election Commissioner, State Election Commission

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Constitution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

<https://www.constitution.org/cons/india/const.html>

<http://www.legislative.gov.in/constitution-of-india>

<https://www.sci.gov.in/constitution>

<https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>