

**SCHEME & SYLLABUS**  
***B.Tech Computer Science Engineering***



**Department of Computer Science Engineering**

**UIET**

**Sant Baba Bhag Singh University**

**2016**

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# Course Scheme, B.Tech Computer Science Engineering

## **SEMESTER I / II**

**Scheme for B. Tech. 1<sup>st</sup> Year (Common to all disciplines) (Physics Group)**

### **I. Theory Subjects**

S. No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*PHY105	Engineering Physics	3:0:0	3:0:0	3	3
2	MAT103/ MAT104	Engineering Mathematics-I/ Engineering Mathematics-II	4:2:0	4:1:0	6	5
3	*EE101	Basic Electrical Engineering	2:0:0	2:0:0	2	2
4	*CSE101	Fundamentals of Computer Technology	3:0:0	3:0:0	3	3
5	*EVS101	Environmental Science	3:0:0	3:0:0	3	3

### **II. Practical Subjects**

S. No	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*PHY107	Engineering Physics Laboratory	0:0:2	0:0:1	2	1
2	*EE103	Basic Electrical Engineering Laboratory	0:0:2	0:0:1	2	1
3	*CSE103	Fundamentals of Computer Technology Laboratory	0:0:4	0:0:2	4	2
4	*ME107	Engineering Workshop	0:0:6	0:0:3	6	3
5	*PT101/PT103 /PT105	Physical Training-I (NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2<sup>nd</sup> Semester the scheme for Physics and Chemistry group will interchange
- In the 2<sup>nd</sup> Semester Engineering Mathematics-1 will be replaced by Engineering Mathematics-2
- Training after the 2<sup>nd</sup> Semester will be focused on Engineering Computer Graphics Laboratory work
- \*Indicates that the subject will be offered in both the Semesters

Total Contact Hours = 33

Total Credits Hours = 23

## SEMESTER I / II

**Scheme for B. Tech. 1<sup>st</sup> Year (Common to all disciplines) (Chemistry Group)**

### I. Theory Subjects

S. No	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*CHM105	Engineering Chemistry	3:0:0	3:0:0	3	3
2	MAT103/ MAT104	Engineering Mathematics-I/ Engineering Mathematics-II	4:2:0	4:1:0	6	5
3	*ME101	Basics of Mechanical Engineering	3:1:0	3:0.5:0	4	3.5
4	*ECE101	Basic Electronics & Communication Engineering	2:0:0	2:0:0	2	2
5	*ENG121	Communication Skills-I	2:0:0	2:0:0	2	2
6	*ME103	Engineering Drawing	1:0:0	1:0:0	1	1

### II. Practical Subjects

S. No	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*CHM107	Engineering Chemistry Laboratory	0:0:2	0:0:1	2	1
2	*ECE103	Basic Electronics & Communication Engineering Laboratory	0:0:2	0:0:1	2	1
3	*ENG123	Communication Skills-I (Practical)	0:0:2	0:0:1	2	1
4	*ME103	Engineering Drawing Laboratory	0:0:6	0:0:3	6	3
5	*PT102/PT104/ PT106	Physical Training-II(NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2<sup>nd</sup> Semester the scheme for Physics and Chemistry group will interchange
- In the 2<sup>nd</sup> Semester Engineering Mathematics-1 will be replaced by Engineering Mathematics-2
- Training after the 2<sup>nd</sup> Semester will be focused on Engineering Computer Graphics Laboratory work
- \*Indicates that the subject will be offered in both the Semester.

Total Contact Hours = 32  
Total Credits Hours = 22.5

## SEMESTER III

### I. Theory Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE201	Introduction to Data Structures	4:1:0	4:0.5:0	5	4.5
2	CSE203	Computer Organization & Design	3:1:0	3:0.5:0	4	3.5
3	CSE205	Basics of System Programming	3:1:0	3:0.5:0	4	3.5
4	MAT205	Engineering Mathematics-III	4:1:0	4:0.5:0	5	4.5
5	ECE205	Digital Electronics	3:1:0	3:0.5:0	4	3.5

### II. Practical Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE207	Introduction to Data Structures Lab	0:0:2	0:0:1	2	1
2	CSE209	Basics of System Programming Lab	0:0:2	0:0:1	2	1
3	ECE209	Digital Electronics Lab	0:0:2	0:0:1	2	1
4	CSE211	Institutional Training (undertaken after 2nd semester)	Three Weeks			3
5	PT201/PT203 / PT205	Physical Training-III(NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours = 30  
Total Credits Hours = 25.5

## SEMESTER IV

### I. Theory Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	MAT212	Discrete Structures	4:0:0	4:0:0	4	4
2	CSE202	Object Oriented Programming Systems	3:1:0	3:0.5:0	4	3.5
3	CSE204	Concepts of Operating Systems	3:1:0	3:0.5:0	4	3.5
4	CSE206	Data Communication & Networks	3:1:0	3:0.5:0	4	3.5
5	CSE208	Database Design & Management-I	3:1:0	3:0.5:0	4	3.5
6	ECE201	Microprocessor	3:1:0	3:0.5:0	4	3.5
7		*Educational Tour				

\*At least one Educational Tour must be carried out in the semester for practical exposure of the students. The tour must augment existing or previous lesson plans and synchronize with classroom learning.

### II. Practical Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE210	Object Oriented Programming Systems Lab	0:0:2	0:0:1	2	1
2	CSE212	Concepts of Operating Systems Lab	0:0:2	0:0:1	2	1
3	CSE214	Data Communication & Networks Lab	0:0:2	0:0:1	2	1
4	CSE216	Database Design & Management-I Lab	0:0:2	0:0:1	2	1
5	PT202/PT204/ PT206	Physical Training-IV (NSO/NCC/NSS)	0:0:2	NC	2	NC

#### ❖ 4 Weeks Industrial Training

Total Contact Hours = 34  
Total Credits Hours = 25.5

## SEMESTER V

### I. Theory Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE301	Principles of Software Engineering & Design	3:1:0	3:0.5:0	4	3.5
2	CSE303	Database Design & Management-II	3:1:0	3:0.5:0	4	3.5
3	CSE305	Computer Graphics & Visualization	3:1:0	3:0.5:0	4	3.5
4		Professional Elective-I	4:1:0	4:0.5:0	5	4.5
5	ENG307	Professional Communication Skills	3:0:0	3:0:0	3	3
6	SSC303	Human Values and Professional Ethics	3:0:0	NC	3	NC

### II. Practical Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE307	Principles of Software Engineering & Design Lab	0:0:2	0:0:1	2	1
2	CSE309	Computer Graphics & Visualization Lab	0:0:3	0:0:1.5	3	1.5
3	CSE311	Database Design & Management-II Lab	0:0:3	0:0:1.5	3	1.5
4	CSE313	**Seminar-I	0:0:2	0:0:1	2	1
5	CSE315	*Industrial Training (undertaken after 4 <sup>th</sup> semester)	Four Weeks			3

#### Professional Elective –I

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE317	Compiler Construction	4:1:0	4:0.5:0	5	4.5
2	CSE319	Expert System	4:1:0	4:0.5:0	5	4.5
3	CSE321	Cloud Computing	4:1:0	4:0.5:0	5	4.5

\*The students will undertake Training in Industry of course relevance for 4 weeks after the completion of 4<sup>th</sup> semester. The evaluation of the student will be done in 5<sup>th</sup> semester on the basis of report writing and presentation for the training done in Industry.

\*\*The seminar-I will be studied and presented by the student on the topic of any latest technology in their relevant field. The complete knowledge of the latest technology is expected from the student. A Report and presentation will be submitted at the end of the semester.

Total Contact Hours = 33

Total Credits Hours = 26

## SEMESTER VI

### I. Theory Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	MAT304	Numerical and Statistical Methods	4:0:0	4:0:0	4	4
2	CSE302	Design & Analysis of Algorithms	4:0:0	4:0:0	4	4
3	CSE304	Internet web Programming	4:0:0	4:0:0	4	4
4	CSE306	Mobile Application Development	3:0:0	3:0:0	3	3
5		Professional Elective-II	4:1:0	4:0.5:0	5	4.5
6		Open Elective-I	4:0:0	4:0:0	4	4

### II. Practical Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE308	Internet web Programming Lab	0:0:3	0:0:1.5	3	1.5
2	CSE310	Design & Analysis of Algorithms Lab	0:0:3	0:0:1.5	3	1.5
3	CSE312	*Seminar-II	0:0:2	0:0:1	2	1

### Professional Elective –II

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE314	Simulation & Modeling	4:1:0	4:0.5:0	5	4.5
2	CSE316	Computer Vision	4:1:0	4:0.5:0	5	4.5
3	CSE318	Software Metrics & Project Management	4:1:0	4:0.5:0	5	4.5

\*In Seminar-II the literature survey, problem formulation, assessment for feasibility of the project, objectives and methodology for the project to be undertaken in 7th semester shall be presented in 6th semester. The same problem is to be extended in the Project work in 7th semester.

Total Contact Hours = 32

Total Credits Hours = 27.5

## SEMESTER VII

### I. Theory Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE401	Finite Languages and Automata Theory	4:0:0	4:0:0	4	4
2	CSE403	Computational Intelligence	3:0:0	3:0:0	3	3
3		Professional Elective-III	4:1:0	4:0.5:0	5	4.5
4		Professional Elective-IV	4:1:0	4:0.5:0	5	4.5
5		Open Elective-II	4:0:0	4:0:0	4	4
6	ENG401	Technical Writing and Presentation Skills	3:0:0	NC	3	NC
7		Educational Tour				

### II. Practical Subjects

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE405	Computational Intelligence Lab	0:0:4	0:0:2	4	2
2	CSE407	Project Work	0:0:6	0:0:3	6	3

#### Professional Elective-III

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE409	Cryptography & Security	4:1:0	4:0.5:0	5	4.5
2	CSE411	Multimedia & Animation	4:1:0	4:0.5:0	5	4.5
3	ECE401	Information Theory and Coding	4:1:0	4:0.5:0	5	4.5

#### Professional Elective-IV

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	ECE415	Wireless Sensor Network	4:1:0	4:0.5:0	5	4.5
2	CSE413	Design & Management of Big Data	4:1:0	4:0.5:0	5	4.5
3	CSE415	Wireless Communications	4:1:0	4:0.5:0	5	4.5

\*The problem of the project, formulated during 6th Semester is to be extended and executed in project work by the same group of students. The design/construction/fabrication/computer modeling/experimentation etc. is to be carried out. The results and analysis followed by discussion regarding suitability /non suitability of the project or any positive gain in the project made with conclusions and recommendations for future extension of the project must be covered

Total Credits Hours = 25  
Total Contact Hours = 34

## SEMESTER VIII

S No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	CSE402	6 Months Industrial Training	Six Months			22

Total Credit Hours: 22

\*The 6 month industrial training must be undertaken in reputed industry for whole semester. The student must submit a mid term report after three months. The student will submit Training Report along with training certification from industry. A presentation at the end of semester will be given by the student in front of Faculty of concerned department.



## List of Open Electives

### Open Elective-I

S. No	Course Code	Course Title	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	AGE372	Advanced Engineering systems	4:0:0	4:0:0	4	4
2	AGE374	Engineering Economy and Project Planning	4:0:0	4:0:0	4	4
3	CE372	Rural Technology & Community Development	4:0:0	4:0:0	4	4
4	CE374	Disaster Management	4:0:0	4:0:0	4	4
5	CSE372	Operating System & Database Management System	4:0:0	4:0:0	4	4
6	CSE374	Elements of System Analysis & Design	4:0:0	4:0:0	4	4
7	ECE372	Mobile Communication	4:0:0	4:0:0	4	4
8	ECE374	Broadband Communication	4:0:0	4:0:0	4	4
9	EE372	Electrical Measurement	4:0:0	4:0:0	4	4
10	EE374	Energy Auditing & Management	4:0:0	4:0:0	4	4
11	ME372	Total Quality Management	4:0:0	4:0:0	4	4
12	ME374	Maintenance and Reliability Engineering	4:0:0	4:0:0	4	4
13	MGT372	Basics of Human Resource Management	4:0:0	4:0:0	4	4
14	MGT374	Management Practices	4:0:0	4:0:0	4	4

### **Open Elective-II**

<b>S.No</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Contact Hours (L:T:P)</b>	<b>Credits (L:T:P)</b>	<b>Total Contact Hours</b>	<b>Total Credit Hours</b>
1	AGE471	Reliability Engineering	4:0:0	4:0:0	4	4
2	AGE473	Remote Sensing and Geographical Information System	4:0:0	4:0:0	4	4
3	CE471	Infrastructure and Real Estate Management	4:0:0	4:0:0	4	4
4	CE473	Architecture & Town Planning	4:0:0	4:0:0	4	4
5	CSE471	Web Development	4:0:0	4:0:0	4	4
6	CSE473	Distributed System	4:0:0	4:0:0	4	4
7	ECE471	Computer Networks	4:0:0	4:0:0	4	4
8	ECE473	Speech & Image Processing	4:0:0	4:0:0	4	4
9	EE471	Fundamentals of Electrical Machines	4:0:0	4:0:0	4	4
10	EE473	Elements of Power System	4:0:0	4:0:0	4	4
11	ME471	Renewable Energy Resources	4:0:0	4:0:0	4	4
12	ME473	Ergonomics	4:0:0	4:0:0	4	4
13	MGT471	Managing Innovation and Entrepreneurship	4:0:0	4:0:0	4	4
14	MGT473	Project Management	4:0:0	4:0:0	4	4

## **COURSE SCHEME SUMMARY**

Sem	L	T	P	Contact hrs/week	Credits	HS	BS	ES	PC	PE	OE	Project/Training/Seminar	MC
<b>1</b>	15	2	16	33	23	3	9	11	-	-	-	-	-
<b>2</b>	15	3	14	32	22.5	3	9	10.5	-	-	-	-	-
<b>3</b>	17	5	8	30	25.5	-	4.5	4.5	13.5	-	-	3 Training	-
<b>4</b>	19	5	10	34	25.5	-	4	3.5	18	-	-	-	-
<b>5</b>	19	4	10	33	26	3	-	-	14.5	4.5	-	1 Seminar + 3 Training = 4	3 unit
<b>6</b>	23	1	8	32	27.5	-	4	-	14	4.5	4	1 Seminar	-
<b>7</b>	22	2	10	34	25	-	-	-	9	9	4	3 Project	3 unit
<b>8</b>	6 Months Industrial Training				22	-	-	-	-	-	-	22	-
<b>Total</b>	<b>130</b>	<b>22</b>	<b>76</b>	<b>228</b>	<b>197</b>	<b>09</b>	<b>30.5</b>	<b>29.5</b>	<b>69</b>	<b>18</b>	<b>8</b>	<b>33</b>	<b>6 units</b>

# *First Semester*

Course Code	<b>PHY105</b>
Course Title	Applied Physics
Type of course	BS
L T P	3 0 0
Credits	3
Course prerequisite	
Course Objective (CO)	To provide high quality, comprehensive educational and training opportunities those are compatible to changing needs of the students. Engineering Physics is a field that provides broad training in physics and basic training in engineering and design. Our engineering physics program aims to educate students to become professionals with in-depth knowledge and skills in engineering to understand physical systems; to research, design, and solve problems; and to provide the foundation for graduate study and lifelong learning.

## SYLLABUS

### UNIT-I

**Electromagnetics:**Physical significance of Gradient, Divergence & Curl, Integral and Differential approach to Gauss Law, Ampere's law and Faraday's law, Stoke's theorem, Gauss divergence theorem, Equation of continuity, Maxwell's Equations, Equation of EM waves in free space, velocity of EM waves, Dielectric polarization, displacement Current, Types of polarization.

**Physics of Materials:**Basic ideas of Dia, Para, Ferro & Ferri, Ferrites,Domain theory,Magnetic Anisotropy, Magnetostriction, B-H curve, Hard and Soft magnetic materials, Superconductivity, Superconductors as ideal diamagnetic materials, Signatures of Superconducting state, Meissner Effect,Type I & Type II superconductors, London Equations, Introduction to BCS theory.

### UNIT-II

**Special Theory of Relativity:**Concept of Ether, Michelson Morley experiment, Einstien's postulates, Lorentz transformation equations, lengh, time and simultaneity in relativity, Addition of velocity, Variation of mass with velocity,Mass Energy equivalence,Energy momentum relations.

### UNIT-III

**Lasers:**Introduction,Spontaneous & Stimulated emissions, Einstein's Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System,Lasing action,properties of laser,Three & four level laser systems; Ruby, He-Ne, CO<sub>2</sub> and semiconductor Lasers, Characteristics of different types of lasers, Applications of lasers,Holography.

**Fibre Optics:**Introduction, Acceptance Angle, Numerical Aperture, Normalized Frequency, Modes of propagation, Losses in Optical Fibre,Fibre connectors, Splices and couplers, Applications of Optical Fibres.

### UNIT-IV

**Physics of crystallography:**Unit cell, Basis, Space lattice, Crystal Systems, Miller Indices of Planes & Directions in cubic system, Continuous & Characteristic X-Rays, X-Ray Diffraction & Bragg's law in Crystals,

**Nanophysics:**Nanoscale, Surface to volume ratio, Nanoparticles(1D 2D 3D), Nanomaterials and their properties, Synthesis Methods- Ball milling and sol- gel techniques, Carbon nanotubes(Synthesis and properties), Applications of nanomaterials.

### **RECOMMENDED BOOKS**

S. No	Name	Author(S)	Publisher
1	Physics for Scientists & Engineers (Vol. I &II),	Serway & Jewett, 6thEdition	Cengage Learning.
2	Engineering Physics,	Malik; HK, Singh; AK,	Tata McGraw Hill
3	Materials Science & Engg.,	Raghvan V.	Prentice Hall of India
4	Concepts of Modern Physics	Beiser; A., Mahajan; S., Choudhary; SR	Tata McGraw Hill
5	Solid State Physics	Dan Wei,	Cengage Learning
6	Introduction to Solids	Azaroff LV	Tata Mc Graw Hill
7	Introduction to Electrodynamics	Griffiths; DJ,	Prentice Hall
8	Lasers & Optical engineering	Dass; P,	Narosa Publishers
9	Optical Fibre system, Technology, Design & Applications	Kao; CK	McGraw Hill.



<b>Course Code</b>	<b>MAT103</b>
Course Title	Engineering Mathematics-I
Type of course	BS
L T P	4 2 0
Credits	5
Course prerequisite	+2 with non- medical
Course Objective (CO)	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students : (1) To understand the theory knowledge as well as practical knowledge of different formulas.(2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.

## SYLLABUS

### UNIT-I

**Matrices:** Rank of Matrices, Inverse of Matrices, Gauss Jordan Method, reduction to normal form, Consistency and solution of linear algebraic system of equations, Gauss Elimination Method, Eigen values and Eigen vectors, Diagonalization of Matrix, Cayley Hamilton Theorem, Orthogonal

### UNIT-II

**Partial Derivatives:** Function of two or more variables; Partial differentiation; Homogeneous functions and Euler's theorem ; Composite functions ; Total Derivative ; Derivative of an implicit function, Change of variable, jacobian,

**Applications of Partial Differentiation:** Tangent and normal to a surface; Taylor's and Maclaurin's series for a function of two variables; Maxima and Minima of function of several variables; Lagrange's method of undetermined multipliers.

### UNIT-III

**Multiple Integrals:.** Double and triple integral and their evaluation, change of order of integration, change of variable, Application of double and triple integration to find areas and volumes.

## UNIT-IV

**Vector Calculus:** Scalar and vector fields, differentiation of vectors, velocity and acceleration. Vector differential operators: Del, Gradient, Divergence and Curl, Formulae involving Del applied to point functions and their products. Directional Derivatives and Work Done By Force, Line, surface and volume integrals.

**Application of Vector Calculus:** Solenoidal and irrotational vectors. Gauss Divergence Theorem. Green's Theorem in plane, Stoke's Theorem (without proof) and their applications.

### RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers
2	Fourier Series and Boundary Values Problems	Churchill	McGraw Hill.
3	Complex Variables & Applications	Churchill	McGraw Hill.
4	Engineering Mathematics	Bali & Iyengar	Laxmi Publication.
5	Advanced Engineering Mathematics	Wylie and Barren	McGrawhill, 6th edition.
6	Advanced Engineering Mathematics	Kreyszig, John Wiley	

<b>Course Code</b>	<b>MAT104</b>
Course Title	Engineering Mathematics -II
Type of course	BS
L T P	4 2 0
Credits	5
Course prerequisite	
Course Objective (CO)	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students : (1) To understand the theory knowledge as well as practical knowledge of different formulas.(2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.

## SYLLABUS

### UNIT-I

**Probability Distributions and Sampling Distributions:** Random variables, Probability Distribution: Binomial, Poisson and Normal distributions. Fundamentals of Sampling, Large samples, Small samples; Sampling distribution of the means, t-Distribution, F-Distribution, Chi-square Distribution.

### UNIT-II

**Ordinary Differential Equations of first order and Linear Ordinary Differential Equations of second & higher order:** Exact Differential equations, Equations reducible to exact form by integrating factors; Equations of the first order and higher degree. Clairaut's equation. Leibniz's linear and Bernoulli's equation Solution of linear Ordinary Differential Equations of second and higher order; methods of finding complementary functions and particular integrals. Method of variation of parameters, Cauchy's homogenous and Legendre's linear equation.

### UNIT-III

**Complex Numbers and elementary functions of complex variable:** De-Moivre's theorem and its applications. Real and Imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, functions of complex variables. Summation of trigonometric series. (C+iS method)

### UNIT-IV

**Measures of Central tendency and Dispersion:** Measures of central tendency: Arithmetic Mean, Geometric Mean, Harmonic Mean, Quartiles, Deciles, Percentiles. Median, Mode, Skewness, Kurtosis. Measures of dispersion: Range, Interquartile range, Variance and Standard Deviation.

### RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Grewal, B.S.	Khanna Publishers, Delhi.
2	Advanced Engineering Mathematics	Jain, R.K and Iyengar, S.R.K.	Narosa Publishing Company
3	Statistical Methods	S P Gupta	Sultan Chand & sons Publisher



<b>Course Code</b>	<b>EE101</b>
<b>Course Title</b>	<b>Basics Of Electrical Engineering</b>
<b>Type Of Course</b>	ES
<b>L T P</b>	2 0 0
<b>Credits</b>	2
<b>Course Prerequisites</b>	Physics & Mathematics
<b>Course objectives</b>	To familiarize with AC, DC circuits & their fundamentals, Magnetic circuits & Transformer, Electrical Machines and Measuring Instruments

## SYLLABUS

### UNIT-I

#### DC Circuits

Circuits : Identifying the Elements and the Connected Terminology, Ohm's Law- Statement , Illustration and limitation, Kirchhoff's Laws –Statement and Illustration ,Method of solving a Circuits by Kirchhoff's Laws, Computation of Resistance at Constant temperature, Temperature Dependence of resistance, Computation of Resistance at different temperatures, Units – Work, Power and Energy (Electrical, Thermal and Mechanical).

### UNIT-II

#### AC Fundamentals

Generation of Alternating Emf, Concept of 3-phase EMF Generation, Root Mean Square or Effective Value, Average value of AC, Phasor Representation of Alternating quantities, Representation of Alternating Quantities in Rectangular and Polar forms, Introduction of Resistors, Inductors and Capacitors, R-L Series Circuits, R-C Series Circuits, R-L-C Series Circuits, Admittance and its components, Resonance in Series and Parallel, Analysis of simple 3 phase system, star-delta connections and conversion.

### UNIT-III

#### Magnetic Circuits

Comparison between Magnetic and Electric circuits, Electromagnetic Induction, Magnetic Effects of Electric Current, Current carrying conductor in Magnetic field, Law of Electromagnetic Induction, Self Inductance, Mutual Inductance ,Coupling Coefficient between two magnetically coupled Circuits.

### UNIT-IV

**Electrical Machines** Transformer: principle, construction, working, efficiency& applications. D.C. Generator: principle, construction, working & applications. D.C. Motor: principle, construction, working & applications. Three Phase Induction Motor: principle, construction, working & applications.

### Measuring Instruments

Classification of Instruments, Basic Principles of indicating instruments, Moving Iron Instruments – Attraction and Repulsion Type, Moving Coil Instruments – Permanent Magnet - Dynamometer Type, Multimeters.

Recommended Books			
Sr.No.	Name	Author	Publisher
1	Basic Electrical, Electronics and Computer Engg.	R muthusubramanian,S Salivahanan,K A Muraleedharan	Tata McgrawHill
2	A Textbook of Electrical Tech	B.L Theraja.& A.K Theraja	S Chand
3	Fundamentals of Electrical Engg	Vincent Deltoro	Prentice Hall.
4	A Course in electrical and electronic Measurements & Instrumentation	A.K Sawhney	Dhanpat Rai & co.
5	Basic Electrical Engineering	H.M Rai and S.Marwaha	Satya Prakashan, Delhi



<b>Course Code</b>	<b>CSE101</b>
<b>Course Title</b>	Fundamentals of Computer Technology
<b>Type of Course</b>	ES
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basics of computer and any high level language
<b>Course Objectives (CO)</b>	To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.

## SYLLABUS

### UNIT-I

**Introduction to Computers:** Define a Computer System, Block diagram of a Computer System and its working, associated peripherals, memories, RAM, ROM, secondary storage devices, Computer Software and Hardware.

**Working Knowledge of Computer System and Office automation:** Introduction to the operating system, its functions and types, working knowledge of GUI based operating system, introduction to word processors and its features, creating, editing, printing and saving documents, spell check, mail merge, creating power point presentations, creating spreadsheets and simple graphs

**Problem Solving & Program Planning:** Need for problem solving and planning a program; program design tools – algorithms, flow charts, and pseudo code; illustrative examples.

### UNIT-II

**Overview of C++ Language:** Introduction to C++ language, structure of a C++ program, concepts of compiling and linking, IDE and its features; Basic terminology - Character set, tokens, identifiers, keywords, fundamental data types, literal and symbolic constants, declaring variables, initializing variables, type modifiers.

**Operators and expressions:** Operators in C++, precedence and associativity of operators, expressions and their evaluation, type conversions.

**Beginning with C++ program:** Input/output using extraction (>>) and insertion (<<) operators, writing simple C++ programs, comments in C++, stages of program execution.

### UNIT-III

**Control Structures and Functions:** Decision making statements: if, nested if, if – else. Else if ladder, switch, Loops and iteration: while loop, for loop, do – while loop, nesting of loops, break statement, continue statement, goto statement, Advantages of using functions, structure of a function, declaring and defining functions, return statement, formal and actual arguments, const argument, default arguments,

**Arrays and Strings:** Declaration of arrays, initialization of array, accessing elements of array, I/O of arrays, passing arrays as arguments to a function, multidimensional arrays. String as array

of characters, initializing string variables, I / O of strings, string manipulation functions (strlen, strcat, strcpy, strcmp), passing strings to a function. Use of arrays and strings through illustrative programming examples.

**Classes and Objects:** Concept of classes, Declaration of classes, Defining access specifier, Public, Private, Protected derivations, defining member functions in a class, use of scope resolution operator outside the class definition. Defining objects. Friend function.

#### UNIT-IV

**CAD/CAM:** Introduction to the basics of CAD and CAM, Study 2-D sketching entities like lines, rectangle, parallelogram polygon, circle etc., under SKETCH ENTITY MENU.

Evolution of Internet and its applications and services.

#### RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1.	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2.	Object-Oriented Programming with C++	Lafore R	Waite Group
3.	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley
4.	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House

<b>Course Code</b>	<b>EVS101</b>
Course Title	Environmental Science
Type of course	HS
L T P	30 0
Credits	3
Course prerequisite	Nil
Course Objective (CO)	To make students aware about environment and need of maintaining it with best possible knowledge.

## SYLLABUS

### UNIT-I

**Introduction to Environment and Ecosystem:** Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness, Concept of Ecosystem, Structure, interrelationship, producers, Consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

### UNIT-II

**Environmental Pollution & Natural Resources:** Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management: Floods, earthquake, cyclone and landslides, Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

### UNIT-III

**Social Issues and the Environment :** From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation

### UNIT-IV

**Human Population and the Environment & Field Work:** Population growth, variation among nations. Population explosion –Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies  
Visit to a local area to document environmental assets river/forest/grassland/hill/mountain; Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

### RECOMMENDED BOOKS:

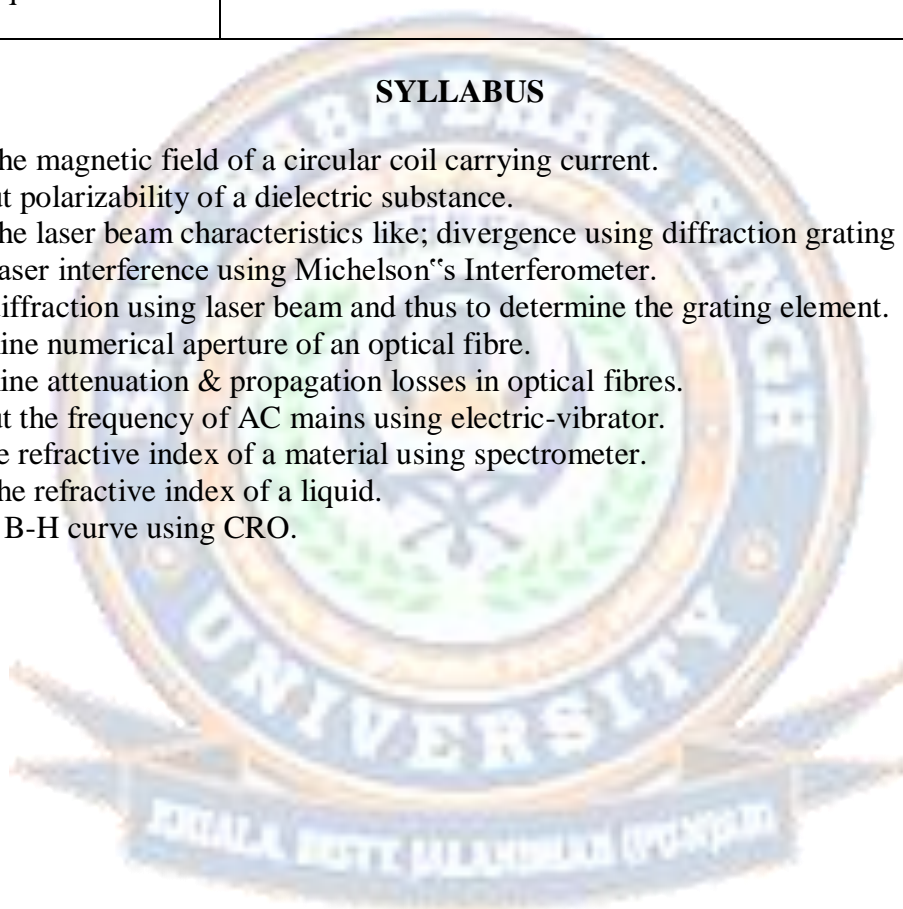
S. No	Name	Author(S)	Publisher
1	A Textbook for Environmental Studies	Erach Bharucha	Orient BlackSwan
2	Environmental Biology,	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner.
3	Environmental Science,	Miller T.G. Jr.	Wadsworth



Course Code	<b>PHY107</b>
Course Title	Engg. Physics laboratory
Type of course	BS
L T P	0 0 2
Credits	1
Course prerequisite	

### SYLLABUS

1. To study the magnetic field of a circular coil carrying current.
2. To find out polarizability of a dielectric substance.
3. To study the laser beam characteristics like; divergence using diffraction grating aperture.
4. To study laser interference using Michelson's Interferometer.
5. Study of diffraction using laser beam and thus to determine the grating element.
6. To determine numerical aperture of an optical fibre.
7. To determine attenuation & propagation losses in optical fibres.
8. To find out the frequency of AC mains using electric-vibrator.
9. To find the refractive index of a material using spectrometer.
10. To find the refractive index of a liquid.
11. To study B-H curve using CRO.



<b>Course Code</b>	<b>EE103</b>
<b>Course Title</b>	<b>Basics Of Electrical Engineering Lab</b>
<b>Type Of Course</b>	ES
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Pre-requisites</b>	Basics Of Electrical Engineering
<b>Course objectives</b>	To familiarize with various AC, DC circuits, Transformer , Electrical Machine and Measuring Instruments

### SYLLABUS

- 1) To find voltage, current relationship and power factor of a given R-L circuit.
- 2) To perform open- circuit and short circuit test on a transformer and determine the following:
  - (a) The transformation ratio (b) the transformer efficiency.
- 3) To find out the line voltage, phase voltage relationship, line current and phase current relationship in case of star and delta connected 3- phase balanced load.
- 4) To connect 3 identical single phase transformers for three phase power transformations through following connections (a) star-delta (b) star-star(c) delta-star (d) delta-delta and to find phase and line voltage ratio.
- 5) To connect, start and reverse the direction of rotation of a 3- phase induction motor.
- 6) To perform the Block Rotor test of 3-phase induction motor test.
- 7) To study various measuring instruments(Moving Iron Instruments – Attraction Type, Moving Iron Instruments – Repulsion Type, Moving Coil Instruments – Permanent Magnet Type, Moving Coil Instruments – Dynamometer Type).
- 8) To study the speed control of characteristic of D.C. Motor.
- 9) To verify the rating of compact fluorescent lamp (CFL).
- 10) To verify Ohm's Law and its limitations.
- 11) To verify Kirchhoff's Laws.
- 12) To measure the resistance and inductance of a coil by ammeter-voltmeter method.
- 13) To measure power and power factor in a single- phase AC circuit.
- 14) To verify series and parallel resonance in AC circuits.

<b>Recommended Books</b>		
<b>Name</b>	<b>Author</b>	<b>Publisher</b>
Basic Electrical, Electronics and Computer Engg.	R muthusubramanian,S Salivahanan,K A Muraleedharan	Tata McgrawHill
A Textbook of Electrical Tech	B.L Theraja.& A.K Theraja	S Chand

<b>Course Code</b>	<b>CSE103</b>
<b>Course Title</b>	Fundamental of Computer Technology Lab
<b>Type of Course</b>	ES
<b>L T P</b>	0 0 4
<b>Credits</b>	2
<b>Course Prerequisites</b>	Basics of computer and knowledge of any high level language
<b>Course Objectives (CO)</b>	To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.

### **SYLLABUS**

#### **Familiarization with the Computer System:**

- 1) To explain the part of the computer system such as system unit, input devices, output devices connected to the computer.
- 2) To explore the outside view of the system unit that includes the panels on front and ports at the rear
- 3) To explore the inside view of the system unit that includes the motherboard, processor, expansion slots, various add-on cards, storage devices, power supply, fans.
- 4) To understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.
- 5) To introduce the graphical user interface (desktop) of Windows operatingSystem to explain the various elements of the desktop such as taskbar, icons (My Computer, Recycle Bin, etc.), short cuts, notification area.
- 6) To configure the desktop that includes selecting the wallpaper, selecting the screen saver with or without password protection, selecting the screen resolution and color quality.

#### **Explore Office automation**

- 1) Creating, Formatting documents with Word, explore the various toolbar options, Mail Merge, Spell Check, Word –Art.
- 2) Creating PowerPoint presentations with Power Point, Explore various views of PPT, Charts, Graphs, animation, multimedia.
- 3) Creating Sheets in Excel using formulas, chart and graphs.

#### **Programming using C++**

- 1) Implement programs using various operators in C++

- 2) Implement various Branch statements: if, if-else, nested if, switch
- 3) Implement various loop statements: for, while, do-while
- 4) Implement other control statements: go-to, exit function, continue
- 5) Implement various programs using arrays and string
- 6) Implement various programs classes and objects

### **Computer Aided Tools and Internet**

- 1) Exercise with CAD/CAM
- 2) Internet surfing and E-mail

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1.	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2.	Object-Oriented Programming with C++	Lafore R	Waite Group
3.	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley.
4.	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House

<b>Course Code</b>	ME107
<b>Course Title</b>	Engineering Workshop
<b>Programme</b>	ES
<b>L T P</b>	0 0 6
<b>Credits</b>	3
<b>Course Prerequisites</b>	+2 Physics and Mathematics
<b>Course Objectives (CO)</b>	To become aware of different manufacturing process in industry.

### SYLLABUS

1. Carpentry and Pattern making: Various types of timber and practice boards, defects in timber, seasoning of wood, tools, wood operations and joints, exercises involving use of important carpentry tools to practice various operations and making joint.
2. Foundry Shop: Introduction to moulding material, mould, melting furnaces, foundry tools and equipment's used in foundry shops; firing of a cupola furnace, exercises involving preparation of small sand moulding and casting.
3. Forging practice: introduction to forging tools; equipment's and operations forge ability of metals; exercises on simple smithy; forging exercises.
4. Machine shop: Machines ; introduction to lathe and shaper machine and its operation performed on it.
5. Welding shop: introduction to different welding methods; welding equipment's; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc

welding.

6. Electrical and electronics shop: introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.
7. Sheet metal shop: shop development of surfaces of various objects; sheet metal forming and joining operation, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.
8. Fitting shop: introduction of fitting practice and tool used in fitting shop; exercise involving marking cutting fitting practice (right angles) male female mating parts practice.

## REFERNCES

S. No	Name	Author(S)	Publisher
1.	Workshop Technology	HS Bawa	McGraw-Hill Publishing Company Limited
2.	Workshop Technology I,II,III	S K Hajra, Choudhary and A K Choudhary	Media Promoters and Pu blishers Pvt. Ltd., Bombay
3.	Manual on Workshop Practice	K Venkata Reddy	MacMillan India Ltd. New Delhi
4.	Basic Workshop Practice Manual	T Jeyapoovan	VikasPublishing House (P) Ltd., New Delhi



# *Second Semester*

Course Code	CHM105
Course Title	Applied Chemistry
Type of course	BS
L T P	3 0 0
Credits	3
Course prerequisite	
Course Objective (CO)	The objectives of the engineering chemistry are to relate the students with basic concepts of chemistry. Some new topics have been introduced to the syllabus for the development of the right attitudes by the engineering students to cope with new technology

## SYLLABUS

### UNIT-I

**Water and its Treatment:** Boiler feed water: Specification, Scales and sludge formation; Priming & foaming; Different methods of the water purifications and softening; Desalination of water; Water for domestic use; Specifications; Disinfection of water.

**Corrosion and its Prevention:** Introduction; Different types of corrosion ;Wet and Dry corrosion; Different types of surface films; Mechanisms of wet corrosion; Galvanic corrosion Galvanic Series; Concentration cell corrosion and differential aeration corrosion; Soil and microbial corrosions; waterline, stress corrosions; Prevention measure against corrosion.

### UNIT-II

**Spectroscopy and its Applications:** An introduction 1). UV/Visible Spectroscopy: Selection rules; Line widths and intensities Chromophores & auxochromes; Factors affecting  $\lambda_{\text{Max}}$  & intensity of spectral lines; Principle and instrumentation; Electronic Transitions lines; Franck Condon principle; Applications of UV/Visible spectroscopy.

2). I.R. spectroscopy: Fundamental modes of vibrations and types; Factors affecting vibration frequency (calculation of force constant); Applications of I.R. spectroscopy.

3). NMR Spectroscopy: Principle & instrumentation; Chemical shift; Spin-Spin Splitting; High resolution NMR spectrum (PMR only); applications of N.M.R. spectroscopy.

**Photochemistry:** Introduction; Photophysical & photochemical processes; Light sources in photochemistry; Beer Lambert Law; Laws of Photochemistry; Quantum yield (primary and overall); Primary and secondary photochemical reactions; Jablonski diagram; Semiconductor photochemistry, Photovoltaic cells Introduction to optical sensors, Introduction to supra-molecular photochemistry.

### UNIT-III

**Green Chemistry and its Applications:** Introductory overview Definition and concepts of Green chemistry; Twelve principles of Green Chemistry with emphasis on the use of alternative feedstock (biofuels); Use of innocuous reagents in natural processes; Design of the safer chemicals; Designing alternative reaction methodology. Microwave and ultrasonic radiation in Green synthesis minimizing energy consumption.

**Polymers and Reinforced Composites:** Introduction; Functionality; Types of polymerization; Specific features of polymers; Tactility of polymers; Average molecular weights and size; number average method; polymers; Introduction: polymer reinforced composite; Effect of molecular weight on the properties of polymers; Biodegradable polymers.

### UNIT-IV

**Nanochemistry:** Introduction; Materials self-assembly; Molecular vs. materials self assembly; Self-assembling materials; Two dimensional assemblies; Mesoscale self assembly; Coercing colloids; Nanocrystals; Super molecular structures Nanoscale materials; Future perspectives.

**Petrochemicals:** Introduction; First, second & third generation petrochemicals; Primary Raw Materials for Petrochemicals Natural gas: Natural gas treatment processes; Natural gas liquids; Properties of natural gas; Crude oil: Composition of crude oil-Hydrocarbon compounds; Non-hydrocarbon compounds; Metallic Compounds, Crude oil classification Physical separation processes; Conversion processes; Production of ethylene and propylene; Renewable and non renewable source of energy.

#### Recommended books:-

S. No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J.Raja Ram	Tata Mcgraw-Hill Co.New Delhi.
2.	Chemical applications of infrared spectroscopy	CNR.Rao.	Acad.Pres, New York.
3.	Ultra violet and visible spectroscopy chemical applications	CNR,Rao	plenum press

<b>Course Code</b>	ME101
<b>Course Title</b>	Basics of Mechanical Engineering
<b>Programme</b>	ES
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	11th and 12th class knowledge of Physics
<b>Course Objectives (CO)</b>	To impart the knowledge of basic thermodynamics, material science, Moment of inertia of different sections, power cycles, thermodynamic laws and steady flow energy equation to students.

## SYLLABUS

### UNIT-I

**Basic Concepts of Thermodynamics:** Definition of thermodynamic: Need to study thermodynamics; Application areas of thermodynamic; Difference between Microscopic (or, Statistical) thermodynamics and Macroscopic (or, Classical) thermodynamics; Brief concept of continuum; Thermodynamic System : definition, types (Open, Closed and Isolated) and their examples; Thermodynamic System Boundary : definition, types and their examples; Surroundings; Control(fixed) mass and Control Volume concept and their example ; Thermodynamic State; Thermodynamic Property: definition, types citing their examples; condition for any quantity to be a property; State postulate; Thermodynamic equilibrium (which includes Thermal, Mechanical and Chemical equilibrium etc.); Thermodynamic path; Thermodynamic process: definition, concept of reversible process, quasi-static (or, quasi-equilibrium) process, irreversible process, conditions for reversibility and how these are met with, non-flow processes and flow processes, method of representation of reversible and irreversible process on property diagrams; Cyclic process; Thermodynamic Cycle: definition and its concept; Energy and its forms (microscopic and macroscopic); Physical insight to internal energy; Energy transfer across system boundary i.e. transient energies (heat and work); Difference between heat and work; Sign conventions for heat and work interactions; heat and work as path functions; Equality of Temperature and Zeroth law of Thermodynamics.

### UNIT-II

**First Law of Thermodynamics and its applications :** Definition, essence and corollaries or consequences of first law of Thermodynamics; Expressions for First law of Thermodynamics for a control mass undergoing a Cycle and for process (i.e., a change in state of a control mass) ; Concept of Enthalpy and total energy and differentiation between the two – a thermodynamic property; Compressible and incompressible substances, Specific heats, Difference between Internal Energy and Enthalpy of compressible and incompressible substances; Representation of first law of thermodynamics as rate equation; Analysis of non-flow/ flow process for a

control mass undergoing constant volume, constant pressure, constant temperature, adiabatic and polytropic processes; Free Expansion Process and its examples, its representation on Property diagram; Review of concepts of control volume; Expressions of first law of thermodynamics for a control volume (i.e. open system) ; Steady State Steady Flow process and its examples; First law analysis of Steady State Flow process e.g. isochoric, isobaric, isothermal, isentropic and polytropic process; Throttling process and its applications; Flow energy or inertial energy of flowing fluids or, Energy transport by mass; Application of Steady State Flow Energy Equation to various engineering devices.

### UNIT-III

**Second Law of Thermodynamics:** Limitations of first law of thermodynamics; and how 2nd law is fully able to explain away and thus overcome those shortcomings of 1st law; Thermal Reservoirs, source and sink (Low temperature and high temperatures); Heat Engine, Heat Pump and Refrigerator: definitions, working, efficiency/performance and their real life examples. Justification as to why the actual efficiency of Heat Pump and Refrigerator shall also be  $\leq 100\%$  though on the face of it seems to be more than 100%; Various statements of Second Law of Thermodynamics and their equivalence; Philosophy of Carnot cycle and its consequences viz. how each of the individual four processes constituting the cycle contribute in optimizing the output and efficiency of the cycle; Carnot Engine, Carnot Refrigerator and Carnot Heat Pump: definitions, working, efficiency/performance and Limitations of the cycle; Carnot theorem for heat engines, refrigerators and heat pumps; derivation of Carnot efficiency/COP (which seems to be more than 100%); Thermodynamic Temperature Scale; Clausius theorem and Inequality; Philosophy and concept of entropy; Entropy changes during various processes; Temperature - Entropy Chart and representation of various processes on it; Principle of Increase of Entropy; Applications of Entropy Principle; Quality of Energy viz. high and low grade energies; Degradation of Energy; Third Law of Thermodynamics.

**Gas Power Cycles :** Introduction; Concept and philosophy of Air Standard Cycle along with associated assumptions and advantages; Air Standard Efficiency; Nomenclature of reciprocating piston-cylinder arrangement with basic definitions such as swept volume, clearance volume, compression ratio, mean effective pressure etc; Otto Cycle (or constant volume heat addition cycle), Diesel cycle (or constant pressure heat addition cycle) and Dual cycle (Mixed or Composite or Limited Pressure cycle) with their representation on P-V and T-S charts, their Air-standard (thermal) Efficiencies; Brayton Cycle, Comparison of Otto, Diesel and Dual cycle under some defined similar parametric conditions; Introduction to heat engines; Merits of I.C. Engines and their important applications, Classification and constructional features of I.C. Engines; working of two stroke and four stroke Petrol and Diesel engines and their comparison.

### UNITIV

**Engineering Materials:** Materials and Civilization, Materials and Engineering, Classification of Engineering Materials, Mechanical Properties of Materials: elasticity, plasticity, strength, ductility, brittleness, malleability, toughness, resilience, hardness, machinability, formability, weldability. Properties, Composition, and Industrial Applications of materials: metals (ferrous- cast iron, toolsteels, stainless steels and non ferrous- Aluminum, brass, bronze ), polymers

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(natural and synthetic , thermoplastic and thermosetting), ceramics (glass, optical fibre glass, cements), composites ( fibre reinforced, metal matrix), smart materials (piezoelectric, shape memory, thermochromic, photochromic, magnetorheological), Conductors, Semiconductors and insulators, Organic and Inorganic materials. Selection of materials for engineering applications.

**Centroid, Centre of Gravity and Moment of Inertia:** Difference between centre of gravity and centroid. Determination of position of centroid of plane geometric figures of I, U, H, L, T, C, Circular and Triangular Sections. Centroid of Composite Areas. Determination of position of Centre of Gravity (CG) of regular solids viz. Right Circular Cone, Solid Hemisphere, thin Hollow Hemisphere. Area moment of inertia & mass moment of inertia, Polar moment of inertia, Parallel axes Theorem (or transfer formula), Perpendicular axes Theorem, Radius of gyration, determination of area Moment of Inertia of I, U, H, L, T, C, Circular and Triangular Sections along various axes. Mass moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their axis of symmetry and other axes.

<b>Recommended Books</b>			
S.No.	Name	Author(s)	Publisher
1.	Elements of mechanical engineering	Kumar D.S	Kataria publications, New delhi
2.	Engineering Thermodynamics	Nag P.K	Tata McGraw Hill
3.	Thermodynamics and Heat Engines	Yadav R	Central Publishing House, Allahabad
4.	Engineering Thermodynamics	Rogers G. and Mayhew Y	Pearson Education
5.	Thermodynamics – An Engineering Approach	Cengel Y.A. and Boles M.A	Tata McGraw Hill.

<b>Course Code</b>	<b>ECE101</b>
<b>Course Title</b>	<b>Basic Electronics &amp; Communication Engineering</b>
<b>Type of Course</b>	ES
<b>L T P</b>	2 0 0
<b>Credits</b>	2
<b>Course Prerequisite</b>	Knowledge of Physics
<b>Course Objectives (CO)</b>	To introduce basic postulates of Electronics, Boolean algebra and basic gates, and Boolean expressions, To outline the formal procedures for the analysis and design of electronics and digital circuits. Introduction to basic fundamentals of communication engineering.

## SYLLABUS

### UNIT-I

Semiconductor Diodes& Applications: Introduction, Semiconductor materials, Extrinsic materials: n type and p type, Semiconductor diodes, Biasing of diodes, Breakdown mechanisms, Ideal diode, Transition and diffusion capacitance, Reverse recovery time, Diode testing, Zener diode, Light emitting diodes (LEDs). Load line analysis, Half wave rectifications, full wave rectification, Clippers, Clampers, Zener diode as a voltage regulator, Voltage multiplier.

### UNIT-II

Digital Electronics Fundamentals: Digital and Analog Quantities, Binary digits, Logic levels, Basic logic operations, Overview of basic logic functions, Number system: Decimal numbers, Binary numbers & its arithmetic operations, octal & Hexadecimal numbers, number system conversions, Logic gates: The inverter, The AND gate, The OR gate, The NAND gate, The NOR gate, The Exclusive OR and Exclusive NOR gates.

### UNIT-III

Basic Signals & Systems: Introduction, Signals and classification of signals, Basic continuous time signals, Basic discrete time signals, System and classification of systems, Transducers.

### UNIT-IV

Communication Systems: Introduction, Elements of a communication system, Classification of communication systems, Modulation and coding, Need of modulation, Multiplexing, Analog and Digital communication, Advantages of digital communication over analog communication, Microwave communication, Satellite communication, Optical communication, Cellular Mobile communication: 1G, 2G, 3G, GSM. (Basic introduction to all communication systems).

<b>RECOMMENDED BOOKS</b>			
<b>S. No</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Electronics Devices & Circuits	Robert Boylested and Louise Nashelsky	Prentice Hall of India

2	Fundamental of Analog Circuits	Thomos L. Floyd and David buchla	Prentice Hall
3	Electronic Devices and Circuits	J.B Gupta	S K Kataria& Sons
4	Wireless Communications	T. L. Singal	Tata McGraw-Hill



Course Code	ENG121
Course Title	Communication Skills-I
Type of Course	HS
L T P	2 0 0
Credits	2
Coursepre-requisite	NA
Course Objectives	<p>The objective of this course is to :</p> <ol style="list-style-type: none"> <li>1.assist the students to acquire proficiency, both in spoken and written language</li> <li>2. to develop comprehension, improve writing skills, and enhance skills in spoken English.</li> </ol>

### **UNIT-I**

#### **Basics of Communication Skills:**

Communication, Process of Communication, Types of Communication-Verbal and Non verbal communication, Channels of Communication- Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

### **UNIT-II**

#### **Listening Skills:**

Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers of Effective Listening, Note Taking

#### **Reading Skills:**

Purpose of reading, Process of reading, reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

### **UNIT-III**

#### **Writing Skills:**

Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precise writing, Memo writing, minutes of meeting.

### **UNIT-IV**

#### **Speaking Skills:**

Speech process, Skills of effective speaking, Role of audience, Feedback Skill, Oral Presentation.

**Text and Reference Books:**

Sr No	Author(s)	Title	Publisher
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panthon	Prentice Hall of India
4	Essentials of Business Communication	Pal and Rorualling	S. Chand and Sons. New Delhi



<b>Course Code</b>	ME103
<b>Course Title</b>	EngineeringDrawing
<b>Type of Course</b>	ES
<b>L T P</b>	1 0 6
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic Mathematics
<b>Course Objectives (CO)</b>	Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

## SYLLABUS

### UNIT-I

**Introduction:** Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning. Basic Definition of geometrical objects: Points, lines, planes and solids.

**Scales:** Representative Fraction, Types of Scale, Plain and Diagonal Scale, Scale of chords

**Projection:** Introduction, Principle of Projection, Method of projection, Planes of projection, Four quadrant, First and Third angle projection, Reference line, symbols for methods of projection, Orthographic projection

### UNIT-II

**Projection of Point:** Introduction, Projection of Point situated in first, second, third & fourth quadrant.

**Projection of lines:** Introduction , Line parallel to One or both the planes, Line contained by

one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to other . Line inclined to both the planes, True length.

**Projection of Planes:** Introduction, Types of planes, Difference between plane and lamina, Projection of planes, Projection of planes perpendicular to both the reference planes, Perpendicular to one plane and parallel to other plane, Perpendicular to one plane and inclined to the other plane, Inclined to both planes.

### UNIT-III

**Projection of solids:** Introduction, Type of solid, Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

**Section of Solids:** Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

**Development of Surfaces:** Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

### UNIT-IV

**Isometric Projection:** Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

**Orthographic Projection:** Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

**Intersection of Surfaces/Solids:** Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

### Recommended Books

S.No.	Name	Author(s)	Publisher
1.	Engineering Graphics	Narayana K L and Kanaiah P	Tata McGraw Hill Publishing Company Limited, New Delhi

2.	Engineering Graphics and Drafting	P S Gill	Katria and Sons, Delhi.
3.	Elementary Engineering Drawing-Plane and solid Geometry	ND Bhat	Chartotar Publishing House, Anand
4.	A Text Book of Engg Drawing	R. K. Dhawan	S. Chand and Co. Ltd
5.	Engineering Graphics	K.L. Narayana and P.Kannaiah	Scitech Publications (India)



Course Code	CHM107
Course Title	Applied Chemistry Laboratory
Type of course	BS
L T P	0 0 2
Credits	1

## SYLLABUS

### 1 Analysis of Effluents

- Determination of hardness of water by EDTA method.
- Determination of C.O.D and B.O.D in water.
- Determination of Residual Chlorine.

### 2. Analysis of Fuels and Lubricants

- Determination of Moisture, Volatile and ash content by proximate analysis.
- Determination of acid value of oil
- Determination of the viscosity.

### 3. Instrumental Analysis

- Determination of surface –tension of given liquid
- Determination of the concentration of a solution conductometrically.
- Determination of the strength of a solution pH meterically.

### 4.Chromatography

- Determination of R<sub>f</sub> value of amino acid by TLC and identification of the amino acid present.
- Separation of metallic ions by paper chromatography.
- Separation of Ions by using complexing agents

### 5. Synthesis & Green Chemistry experiments

- Preparation of a polymer phenol/urea formaldehyde resin or •Preparation of aspirin. •Base catalyzed aldol condensation by Green Methodology •Acetylation of primary amines using ecofriendly method.

### Recommended books:-

S. No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J.Raja Ram,	Tata Mcgraw-Hill Co.New Delhi.
2.	Chemical applications of infrared	CNR.Rao.	Acad.Pres, New York.

	spectroscopy		
3.	Ultra violet and visible spectroscopy chemical applications	CNR,Rao	plenum press
4.	Inorganic quantitative analysis	A.I. Vogel	
5.	Engineering practical	Shashi chawla	Dhanpat Rai and co.



<b>Course Code</b>	ECE103
<b>Course Title</b>	Basic Electronics & Communication Engineering Lab
<b>Type of Course</b>	ES
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Basic knowledge of Electronics components

## SYLLABUS

### List of Experiments

1. Identification of Basic components of Electronics.
2. Introduction to Multimeter.
3. Introduction to working of CRO & Function Generator.
4. Component Testing: Resistance, Capacitor and Inductance.
5. Component Testing: Diode, BJTs.
6. LED testing.
7. Calculate and verify the Resistance and capacitance in series and parallel combination.
8. Verification of Basic Logic gates (AND, OR, NOT).
9. Verification of Universal Logic gates (NAND, NOR).
10. Basics practice on soldering and general purpose PCB component installation.

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<b>Course Code</b>	ENG123
<b>Course Title</b>	Communication Skills-1 (Practical)

Type of Course	HS
L T P	0 0 2
Credits	1
Coursepre-requisite	NA
Course Objectives	The objective of this course is to provide the students sufficient practice for speaking and writing English efficiently.

## SYLLABUS

### UNIT-I

#### **Speaking and Discussion Skills:**

Oral Presentation, Planning and organizing content for presentation, Use of audio /Visual Aids, Making Slides for presentation , Group Discussion ,Debate, Extempore speaking, Interview Skills, Mock interview, Mock Dialogues (Pair Speaking), Cue Card Speaking, Meeting/ Conferences.

### UNIT-II

#### **Listening Skills:**

Listening to any recorded material and asking oral/written questions for listening comprehension.

#### **Reading Skills:**

Active Reading of passages for Reading comprehensions, paraphrase, Summary writing.

### UNIT-III

#### **Writing Skills:**

Guidelines of effective writing, Paragraph Writing, Email Writing.

### UNIT-IV

#### **Grammar and Vocabulary:**

Parts of Speech, Tenses, GRE words (List of 50 Words).

*Third  
Semester*

<b>Course Code</b>	<b>CSE201</b>
<b>Course Title</b>	<b>Introduction to Data Structures</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Basic knowledge of C language and C++ language
<b>Course Objectives (CO)</b>	This course work provides the thorough understanding of the Linear and Non- Linear Data Structures in solving problems and to give the idea of the efficiency of various algorithms.

## SYLLABUS

### UNIT-I

**Introduction:** Concept of data type, Brief description of various data structures, data structures versus data types, operations on data structures, algorithm complexity, Asymptotic Notations.

**Arrays:** Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage.

**Linked List:** Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, and Variations of Linked Lists applications of linked lists.

### UNIT-II

**Stacks:** Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions.

**Queues:** Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, dequeue, priority queue, applications of queues.

### UNIT-III

**Trees:** Basic terminology, sequential and linked representations of trees, traversing a binary tree, BST, inserting a node, deleting a node, brief introduction to threaded binary trees, AVL trees and m-way tree, B-trees.

**Heaps:** Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heap sort algorithm.

**Graphs:** Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs.

### UNIT-IV

**Hashing & Hash Tables:** Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing. **Searching & Sorting:** Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting algorithms.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
<b>1</b>	Data Structures	Seymour Lipschutz	Tata Mcgraw Hill
<b>2</b>	Data Structures, Algorithms and Applications in C++	Sartaj Sahni	Tata McGraw Hill
<b>3</b>	Data Structures using C and C++	Tenenbaum, Augenstein, &Langsam	Prentice Hall of India
<b>4</b>	Data Structures & Algorithms Using C++	R. S. Salaria	Khanna Book Publishing Co. (P) Ltd.



<b>Course Code</b>	<b>CSE203</b>
<b>Course Title</b>	<b>Computer Organization &amp; Design</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Basic knowledge of computer and its components.
<b>Course Objectives (CO)</b>	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.

## SYLLABUS

### UNIT-I

**Introduction:** Introduction to computer system and its sub-modules, Number System and Representation of information.

**Register Transfer and Micro operations:** Register transfer language & operations, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Design of a complete basic computer and it's working.

### UNIT-II

**Basic Computer Organisation and Design:** Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.

**Design of Control Unit:** Control memory, Hardwired control CPU design, Micro-programmed control CPU design and their comparative study.

### UNIT-III

**Central Processing Unit:** General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

**Input-Output Organisation:** Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication.

**Memory Organisation:** Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

### UNIT-IV

**Pipelining:** Introduction to pipelining and pipeline hazards, design issues of pipeline architecture.

**Introduction to Parallel Processing:** Inter-process or communication & synchronization. Cache in multiprocessor systems and related problems, Cache coherence protocols.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
<b>1</b>	Advanced Computer Architecture	Kai Hawang	Tata McGraw Hill

2	Computer Organization and Design	P.PalChoudhary	PHI
3	Computer System Architecture	M.Moris Mano	Pearson
4	Computer Organization and Architecture	William Stallings	Pearson



<b>Course Code</b>	<b>CSE205</b>
<b>Course Title</b>	<b>Basics of System Programming</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Basic Knowledge of System software
<b>Course Objectives (CO)</b>	This subject gives an overview of various software systems and their working principles

## SYLLABUS

### UNIT-I

**Introduction:** Introduction to various translation and interpretation and system software's e.g. editors, assemblers, compilers, macroprocessors, linkers, loaders and debuggers.

**Editors:** Basic use of editors, Line editor, Full screen editor, VI-Editor.

### UNIT-II

**Assemblers:** Algorithm and passes of Assembler, various data structures are used while processing.

**Macroprocessors:** Description of macros, recursive and nested macros.

### UNIT-III

**Compilers:** Introduction to various phases of compilation, Lexical analysis, Parsing, Code generation, code optimization techniques, LEXX and YACC.

### UNIT-IV

**Linkers and Loaders:** Concepts of linking and loading .Various linking and loading schemes.

**Debuggers:** Introduction to debugging, Various debugging techniques.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	System programming	Donovan J.J	Mc-Graw Hill
2	Introduction to System Software	Dhamdhare	Tata McGraw Hill
3	Principles of Compiler Design	Aho A.V ,J.D Ullman	Addison Wesley
4	Compiler Construction	Kenneth C.Louden	Cengage learning

<b>Course Code</b>	<b>MAT205</b>
<b>Course Title</b>	<b>Engineering Mathematics-III</b>
<b>Type of Course</b>	BS
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Applied mathematics I and II
<b>Course Objectives (CO)</b>	This course is an introduction to a broad range of mathematical techniques for solving problems that arise in Science and Engineering. The goal is to provide a basic understanding of the derivation, analysis and use of these techniques along with a detailed understanding of Transforms in engineering applications.

## SYLLABUS

### UNIT-I

**Fourier Series:** Periodic functions, Euler's formula. Even and odd functions, Point of Discontinuous Function, Change of interval half range expansions, Fourier series of different wave forms.

**Fourier Transforms:** Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Examples, Fourier Transform of Derivatives. Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Examples.

### UNIT-II

**Laplace Transforms:** Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform of unit step function, impulse function, periodic functions, applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

### UNIT-III

**Partial Differential Equations:** Formation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients Applications: Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation, solution by the method of separation of variables. Laplacian in polar coordinates.

### UNIT-IV

**Functions of Complex Variable:** Limits, continuity, derivative of complex functions, analytic function, Cauchy-Riemann equation, conjugate functions, harmonic functions; Conformal Mapping: Mapping of a complex function, conformal mapping, standard transforms, mapping of standard elementary transformations, complex potential, applications to fluid flow problems; Complex Integration : Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral

formula and derivatives of analytic function. Taylor's and Laurent's expansions, singular points, poles, residue, complex integration using the method of residues, evaluation of real integrals by contour integration

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Higher Engineering Mathematics (Third Edition) Vol-II	Dr. K.R. Kachot.	Mahajan Pub. House, Ahmedabad.
2	Advanced Engineering Mathematics (Fifth Edition)	Erwin Kreyszig.	John Wiley
3	Higher Engineering Mathematics	Dr. B.S. Grewal.	Khanna, New Delhi.
4	Elementary Differential Equations	W.E.Boyce and R.Diprima	John Wiley
5	Fourier Series& Boundary Value Problems	R.V. Churchill & J.W. Brown	McGraw-Hill.



<b>Course Code</b>	<b>ECE205</b>
<b>Course Title</b>	<b>Digital Electronics</b>
<b>Type of Course</b>	ES
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Basic knowledge of computer and its components.
<b>Course Objectives (CO)</b>	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.

## SYLLABUS

### UNIT-I

**Introduction:** Number system (Binary, Octal, Decimal and Hexadecimal), Signed and unsigned numbers, Binary operations: Addition, Subtraction, Multiplication and Division. Subtractions using 1's and 2's compliment. Weighted & Non-weighted codes, ASCII Code, BCD Code and Gray code.

**Switching Algebra:** Theorems of Boolean algebra. Minimization of logic functions. Logic gates. Sum of products and product of sums. Canonical form. Minimization using K-Map and Q-M Method.

### UNIT-II

**Design of Combinational Circuits:** Introduction, Adders, Subtractors, Multiplexers, Demultiplexers, Decoders, Encoders, Parity generators and checkers, Magnitude comparators, Code converters. Implementation of combinational circuit using MUX.

**Sequential Circuits:** Basic Concepts, Flip Flops: S-R, J-K, D, Master Slave J-K (Truth Tables, Circuits, and Excitation Tables), and Conversion of Flip Flops. Triggered and Clocked Flip Flops. Registers and its types. Shift Register (types, circuit diagram, timing waveforms). Counter (types, counter design with state equation, state diagrams and timing waveforms).

### UNIT-III

**D/A and A/D Converters:** Introduction. DAC (Principle, Types and Specifications). ADC (Principle, Types and Specifications).

### UNIT-IV

**Memory Elements:** Introduction, ROM, PROM, SRAM, DRAM and Flash Memories.

**Logic Families:** TTL, ECL, I<sup>2</sup>L, NMOS, CMOS, And Comparison of Logic Families.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Digital Design	Mano, Morris	Prentice Hall of India
2	Digital Principle and Applications	Malvino	Tata McGraw Hill
3	Modern Digital Electronics	R. P. Jain	TMH

<b>Course Code</b>	<b>CSE207</b>
<b>Course Title</b>	<b>Introduction to Data Structures Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ Programming Language
<b>Course Objectives (CO)</b>	Allows the students to understand the implementation of data structures.

## **SYLLABUS**

### **1: Sequential Arrays**

- 1.1: Insert a new element at end as well as at a given position
- 1.2: Delete an element from a given whose value is given or whose position is given
- 1.3: To find the location of a given element
- 1.4: To display the elements of the linear array

### **2: Linear Linked Lists**

- 2.1: Insert a new element
- 2.2: Delete an existing element
- 2.3: Search an element
- 2.4: Display all the elements

### **3: Stacks and Queues**

- 3.1: Program to demonstrate the use of stack.
- 3.2: Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
- 3.3: Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
- 3.4: Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).

### **4: Sorting and Searching**

- 4.1: Program to sort an array of integers in ascending order using bubble sort.
- 4.2: Program to sort an array of integers in ascending order using selection sort.

4.3: Program to sort an array of integers in ascending order using insertion sort.

4.4: Program to demonstrate the use of linear search to search a given element in an array.

4.5: Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Practical Data Structures Using C :: Beginner's Easy	Harry H. Chaudhary	Createspace LLC USA
2	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
3	Data Structures through C++	Yashavant P. Kanetkar	BPB Publications



<b>Course Code</b>	<b>CSE209</b>
<b>Course Title</b>	<b>Basics of System Programming Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ ,C Programming Language
<b>Course Objectives (CO)</b>	Allows the students to know about background functioning of System Programs

### SYLLABUS

1. Installation and Configuration of Operating systems
2. Program to create, copy, read, concatenate, append file
3. Program to perform addition, subtraction, multiplication, division operation on two numbers using C++ assembler
4. Program to perform addition, subtraction, multiplication, division operation on two numbers using debug assembler
5. Implementation of Text Editor
6. Implementation of Single pass assembler
7. Various debugging techniques
8. LEXX and YACC Tools

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
2	Object Oriented Programming with C++	Robert Lafore	SAMS
3	System programming	Donovan J.J	Mc-Graw Hill

<b>Course Code</b>	<b>ECE209</b>
<b>Course Title</b>	<b>Digital Electronics Lab</b>
<b>Type of Course</b>	ES
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Basic knowledge of Electric circuits, Logic design
<b>Course Objectives (CO)</b>	This course work is to help the students to give the practical implementation of the various digital electronics circuits.

### SYLLABUS

1. To study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR).
2. To design and verify the operation of Half Adder and Full Adder.
3. To design and verify the operation of Half Subtractor and Full Subtractor.
4. Design a 4-bit binary to gray and gray to binary code convertor.
5. Design a 4-bit magnitude comparator using logic gates.
6. Truth table verification of Multiplexer (MUX).
7. Truth table verification of De-Multiplexer (DE-MUX).
8. Implementation and Verification of Encoder and Decoder using Logic Gates.
9. Truth table verification of flip-flops: RS, JK, D & T FLIP FLOPS.
10. Shift registers: study of SISO, SIPO, PISO, PIPO shift registers.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Lab Manual for Digital Electronics: A Practical Approach	Vance Venable , Michael Wiesner	Prentice Hall
2	Digital Electronics	Green	Pearson Education India
3	Lab Experiments--Digital Electronics, a Practical Approach	Vance Venable , Michael Wiesner	Prentice Hall

The logo of Sahyadri Bhagwati University is a circular emblem. It features a central figure, possibly a deity or a symbolic figure, surrounded by a wreath. The text "SAHYADRI BHAGWATI UNIVERSITY" is inscribed around the top and sides of the emblem. Below the emblem, there is a banner with text in Marathi.

# ***Fourth Semester***

<b>Course Code</b>	<b>MAT212</b>
<b>Course Title</b>	<b>Discrete Structures</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic Mathematics
<b>Course Objectives (CO)</b>	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students: (1) To understand the theory knowledge as well as practical knowledge of different formulas. (2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.

## SYLLABUS

### UNIT-I

**Graph theory:** Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles, Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications.

### UNIT-II

**Sets and functions:** Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, and partial order relations.

**Monoids and groups:** Groups Semigroups and monoids Cyclic semigroups and submonoids, Subgroups and Cosets, Congruence relations on semigroups, Morphisms. Normal subgroups, Structure of cyclic groups.

### UNIT-III

**Boolean algebra:** Boolean algebra, direct product, morphisms Boolean, sub-algebra Boolean Rings Application of Boolean algebra (Logic Implications, Logic Gates, Karnaughmap).

### UNIT-IV

**Probability:** Sample spaces, events and probability functions, Examples using counting methods, sampling with and without replacement, Algebra of events, Conditional probability, partitions of sample space theorem of total probability. Bayes theorem, independence, Random variables, Probability mass functions. Discrete distributions, Bernoulli binomial, Poison, geometric

Expectation mean and variance independence for discrete random variables.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Discrete Mathematics	Schaum series by Lipschutz	McGraw Hill
2	Applied Discrete Structures for Computer Science	Alan Doerr and Kenneth Levarseur.	Science Research Associates
3	Discrete Mathematics	N Ch SN Iyengar, VM Chandrasekaran.	Vikas Publishing
4	Discrete Mathematics and Graph Theory	by Sartha	Cengage Learning
5	Discrete Mathematics and its Applications.	Kenneth H Rosen	McGraw Hill



<b>Course Code</b>	<b>CSE202</b>
<b>Course Title</b>	<b>Object Oriented Programming Systems</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Basic knowledge of Programming Language
<b>Course Objectives (CO)</b>	To understand the basic concepts of object oriented programming languages and to learn the techniques of software development in C++.

## SYLLABUS

### UNIT-I

**Object-Oriented Programming Concepts:** Introduction, procedural programming paradigm and object-oriented programming paradigm, comparison, concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationships among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, Messaging.

**Standard Input/Output:** Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

### UNIT-II

**Classes and Objects:** Specifying a class, creating class objects, accessing class members, access specifiers, and static members, use of *const* keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

**Constructors and Destructors:** Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists.

### UNIT-III

**Inheritance:** Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

**Virtual Functions & Polymorphism:** Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

### UNIT-IV

**Exception Handling:** Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

**Templates and Generic Programming:** Template concepts, Function templates, class templates, illustrative examples.

**Files:** File streams, hierarchy of file stream classes, error handling during file operations,

reading/writing of files, accessing records randomly, updating files.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Object Oriented Programming in C++	Robert Lafore	SAMS
2	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House
4	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley
5	The Complete Reference to C++ Language	Herbert Schildt	McGraw Hill-Osborne.
6	C++ Primer	Lippman F. B	Addison Wesley
7	Object Oriented using C++	Farrell	Cengage Learning



<b>Course Code</b>	<b>CSE204</b>
<b>Course Title</b>	<b>Concepts of Operating Systems</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Overview of Computer Architecture
<b>Course Objectives (CO)</b>	This course provides the knowledge about the role of an operating system, issues in the management of resources like processor, memory and input-output, design of an operating system.

## SYLLABUS

### UNIT-I

**Introduction:** Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

### UNIT-II

**Operating System Organization:** Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

**Process Management:** Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

### UNIT-III

**Memory Management:** Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

**File and I/O Management:** Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

### UNIT-IV

**OS and Security:** Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

**Case Study :** UNIX and LINUX operating systems

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Operating Systems Concepts	A Silberschatz, P.B. Galvin, G. Gagne	John Wiley Publications
2	Operating Systems: A Modern	G. Nutt	Pearson Education

	Perspective		
3	Modern Operating Systems	A.S. Tanenbaum	Pearson Education
4	Operating Systems, Internals & Design Principles	W. Stallings	Prentice Hall of India



<b>Course Code</b>	<b>CSE206</b>
<b>Course Title</b>	<b>Data Communication &amp; Networks</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Basic knowledge of Computer, Digital Circuits and Network Arrangement.
<b>Course Objectives (CO)</b>	To be familiar with various computer network architectures and to identify the infrastructure components, design infrastructure including devices, topologies and protocols.

## SYLLABUS

### UNIT-I

**Introduction to Computer Networks:** Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

### UNIT-II

**Physical Layer:** Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.

**Data Link Layer:** Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

**Medium Access Sub-Layer:** Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

### UNIT-III

**Network Layer:** Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

**Transport Layer:** Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

#### **UNIT-IV**

**Application Layer:** World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security.

#### **Session & Presentation Layer**

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garrcia and IndraWidjaja	TMH
2	Computer Networks.	A.S. Tanenbaum	PHI
3	Introduction to Data Communication and Networks	Forouzan, Coombs and Fagan	TMH
4	Data and Communication	William Stallings	PHI



<b>Course Code</b>	<b>CSE208</b>
<b>Course Title</b>	<b>Database Design &amp; Management –I</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
<b>Course Objectives (CO)</b>	This subject assesses new developments in database technology. It Interpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems

## SYLLABUS

### UNIT-I

**Introduction to Databases and Transactions:** database system, purpose of database system, File based system, view of data, database architecture,

**Data Models:** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

**Database Design ER-Diagram:** Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

### UNIT-II

**Relational database Model:** Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

**Relational Algebra and Calculus:** Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

### UNIT-III

**Constraints, Views and SQL:** Database Languages, Constraints and its types, Integrity constraints, Views: Introduction to views, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations.

### UNIT-IV

**Transaction management and Concurrency control:** Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management

**Database Security and Authorization:** Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges, Introduction to Statistical Database Security.

## RECOMMENDED BOOKS

<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Fundamentals of Database Systems, Third Edition	Elmasri/Navathe	Addison Wesley
2	Database Concepts	Korth and Silberschatz Abraham,	McGraw Hall
3	An introduction to Database Systems	C.J.Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication



<b>Course Code</b>	<b>ECE201</b>
<b>Course Title</b>	<b>Microprocessor</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Digital Electronics
<b>Course Objectives (CO)</b>	To introduce the students with the basics of microprocessor and its needs, develop the capability to write assembly language programs and understand how the hardware and software components of microprocessor work together to develop microprocessor based system.

## SYLLABUS

### UNIT-I

**8085 Microprocessor:** Introduction to Microprocessor, Difference between Microprocessor and CPU, Evolution & history of microprocessors, application areas of microprocessors, 8085 architecture, pin diagram, demultiplexing of address and data bus, addressing modes, 8085 instruction set, programming of 8085, stack and subroutines, interrupts of 8085.

### UNIT-II

**8086 Microprocessor:** 8086 internal architecture, 8086 pin configuration and timing, memory segmentation, minimum and maximum mode configuration, interrupts, instruction set of 8086, programming of 8086

### UNIT-III

**Microprocessor system peripheral and interface :** Introduction to interfacing, memory mapped I/O and I/O mapped I/O, block diagram and modes of operation of interfacing devices like 8255,8254,8259,USART .

### UNIT-IV

**Microprocessor applications:** Interfacing of single and multiple digitseven-segment LED output display. Interfacing of DAC & ADC. Applications like Temperature measurement and control, water level indicator, measurement and display of motor speed and traffic light control system.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	Penram International
2	Advanced Microprocessors & Interfacing	Badri Ram	Tata MC Graw Hill

3	Microprocessor Principles and Applications	Charles M. Gilmore	Tata MC Graw Hill
4	Microprocessors and Interfacing programming and Hardware	Douglas V. Hall	Tata MC Graw Hill



<b>Course Code</b>	<b>CSE210</b>
<b>Course Title</b>	<b>Object Oriented Programming Systems Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Fundamentals of C language and Knowledge of computer
<b>Course Objectives (CO)</b>	This course work is to help the students to give the practical implementation of the C++ programs

### **List of Practical**

#### **1: Classes and Objects**

- 1.1: Write a program that uses a class where the member functions are defined inside a class
- 1.2: Write a program that uses a class where the member functions are defined outside a class.
- 1.3: Write a program to demonstrate the use of static data members.
- 1.4: Write a program to demonstrate the use of const data members.

#### **2: Constructors and Destructors**

- 2.1: Write a program to demonstrate the use of zero argument and parameterized constructors.
- 2.2: Write a program to demonstrate the use of dynamic constructor.
- 2.3: Write a program to demonstrate the use of explicit constructor.

#### **3: Operator Overloading**

- 3.1: Write a program to demonstrate the overloading of increment and decrement operators.
- 3.2: Write a program to demonstrate the overloading of binary arithmetic operators.
- 3.3: Write a program to demonstrate the overloading of memory management operators.

#### **4: Typecasting**

- 4.1: Write a program to demonstrate the typecasting of basic type to class type.
- 4.2: Write a program to demonstrate the typecasting of class type to basic type.
- 4.3: Write a program to demonstrate the typecasting of class type to class type.

#### **5: Inheritance**

- 5.1: Write a program to demonstrate the multilevel inheritance.
- 5.2: Write a program to demonstrate the multiple inheritances.
- 5.3: Write a program to demonstrate the virtual derivation of a class.

#### **6: Polymorphism**

- 6.1: Write a program to demonstrate the runtime polymorphism.

#### **7: Exception Handling**

- 7.1: Write a program to demonstrate the exception handling.

#### **8: File Handling**

- 8.1: Write a program to demonstrate the reading and writing of mixed type of data.
- 8.2: Write a program to demonstrate the reading and writing of objects.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Object Oriented Programming in C++	Lafore R.	Waite Group
2	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House



<b>Course Code</b>	<b>CSE212</b>
<b>Course Title</b>	<b>Concepts of Operating System Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Operating System, DOS Commands
<b>Course Objectives (CO)</b>	To provide the understanding of the operating system operation and inter-process communication.

### SYLLABUS

#### List of Practicals

1. Simulation of the CPU scheduling algorithms:
  - a) Round Robin
  - b) SJF
  - c) FCFS
  - d) Priority
2. Simulation of continuous memory management allocation techniques :
  - a) First Fit
  - b) Best Fit
  - c) Worst Fit
3. Simulation of page Replacement Algorithms:
  - a) FIFO
  - b) LRU
  - c) OPT
4. Simulation of file allocation Strategies:
  - a) Sequential
  - b) Indexed
  - c) Linked
5. Simulation of file organization techniques:
  - a) Single Level Directory
  - b) Two Level
- 7: Unix Commands
8. Reading from a file, Writing into a file , File Creation

#### RECOMMENDED BOOKS

<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Practical Linux Programming: Device Drivers, Embedded Systems	Ashfaq A. Khan	Firewall Media
2	A Practical Guide to Linux Commands, Editors, and Shell Programming	Mark G. Sobell	Pearson Education
3	A Practical Guide to UNIX System V Release 4	M. G. Sobell	Benjamin/Cummings

			Publishing Company
4	100 Shell Programs in Unix	Sarika Jain	Pinnacle Technology



<b>Course Code</b>	<b>CSE214</b>
<b>Course Title</b>	<b>Data Communication &amp; Networks Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Basic Knowledge of infrastructure components, design infrastructure including devices, topologies and protocols.
<b>Course Objectives (CO)</b>	To make students proficient in understanding Network components, Topologies and implementing Network protocols.

## SYLLABUS

### List of Practicals

#### 1: Specification, Familiarization of Networking Components & devices.

1.1: Specification of laptop & computers.

1.2: Familiarization of Networking Components & devices: LAN adapter, Hub, Switches, Routers.

#### 2: Familiarization with transmission media & tools, Preparing cables.

2.1: Coaxial cable, UTP Cable, Coaxial cable, UTP Cable.

2.2: Preparing straight cable & cross cable.

#### 3: Study of topology, Study of TCP/IP Protocol.

3.1: Study of LAN topology & their creation using N/W devices, cables & computers.

3.2: Configuration of TCP/IP protocol in windows & LINUX.

#### 4: Addressing, File & Printer sharing.

4.1: Implementation of file & printer sharing.

4.2: Designing & implementing class A, B,C network.

#### 5: Subnet planning, FTP Server, TCP/UDP

5.1: Subnet planning & implementation.

5.2: Installation of FTP server & client.

5.3: Study of TCP/UDP performance.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	A+ Guide to PC Hardware Maintenance and Repair, Volume 1	Michael W. Graves	Cengage Learning
2	Practical TCP/IP and Ethernet Networking	Deon Reynders, Edwin Wright	Newnes
3	Data Communication and Networking: A Practical Approach	Massoud Moussavi	Cengage Learning
4	A Practical Guide to Advanced Networking	Jeffrey S. Beasley, Piyasat Nilkaew	Pearson

<b>Course Code</b>	<b>CSE216</b>
<b>Course Title</b>	<b>Database Design and Management-I Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objectives (CO)</b>	This practical course work allows the students to efficiently design a working software model.

### **SYLLABUS**

#### **List of Practicals**

#### **1: Introduction To DBMS And Its Applications**

1.1: Introduction to DBMS and its applications.

#### **2: Study Of SQL Statements**

2.1: Data types, creating tables, retrieval of rows using select statement, conditional retrieval of rows, alter and drop statements.

2.2: working with null values, matching a pattern from a table, ordering the result of a query, aggregate functions, grouping the result of a query, update and delete statements.

#### **3: Operators**

3.1: arithmetic operators- add, subtract, multiply, divide

3.2: rename field

3.3: logical operations-and, or, not

#### **4: Other Operations**

4.1: aggregate function- average, minimum, maximum, sum, count, count(\*)

4.2: numeric functions- absolute, power, sqrt, round

4.3: string functions: lower, upper, initcap, length, ltrim, rtrim, substring, lpad, rpad

#### **5: T-SQL: Transact Structured Query Language**

5.1: Implement grants and revoke commands, commit and rollback commands.

5.2: program to write a pl/sql block which inserts a record in the table and applies rollback and commit in it.

#### **6: Joins And Sequences**

6.1: program to illustrate use of join.

6.2: program to illustrate use of sequence.

#### **7: View And Indexes**

7.1: create a view.

7.2: create an index.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	DBMS – Complete Practical Approach	Sharad Maheshwari, Ruchin Jain	Firewall Media

2	Database Systems: A Practical Approach To Design, Implementation And Management	Connolly	Pearson Education India
3	Fundamentals of Database Systems	Ramez Elmasri	Pearson Education India



# ***Fifth Semester***



<b>Course Code</b>	<b>CSE301</b>
<b>Course Title</b>	<b>Principles of Software Engineering and Design</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Overview of Structure and Software Analysis and Design
<b>Course Objectives (CO)</b>	This Course Work provides the thorough understanding of the software engineering concepts and it also gives the ideas of handling the projects in the organizations and in institutes

## SYLLABUS

### UNIT-I

**Introduction:** Software Engineering definition, history, evolution of software, software components, applications, software myths, software crisis.

**Software Development Life-cycle:** Requirements analysis, software design, coding, testing, maintenance

**Software Process Models:** Waterfall model, prototyping, interactive enhancement, spiral model. Role of Management in software development. Role of metrics and measurement.

### UNIT-II

**Software Requirement Specification:** Problem analysis, requirement specification, validation, metrics, monitoring and control, SRS

**System Design:** Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control, UML.

### UNIT-III

**Coding:** Top-down and bottom-up, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics, monitoring and control.

**Testing:** Levels of testing functional testing, structural testing, test plane, test cases specification, and reliability assessment.

### UNIT-IV

**Software Project Management:** Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, SIX SIGMA, Project Monitoring, Risk management, reverse engineering

### CASE Tools

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Engineering: A Practitioners Approach	Roger Pressman	McGraw Hill
2	Software Engineering	Sommerville	Adison Wesley
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and WitoldPedrycz	Wiley



<b>Course Code</b>	<b>CSE303</b>
<b>Course Title</b>	<b>Database Design and Management-II</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
<b>Course Objectives (CO)</b>	This subject assesses new developments in database technology. It Interpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems

### **SYLLABUS**

#### **UNIT-I**

**SQL and PL/SQL:** Introduction, loops and control statements, Triggers, cursor, stored procedure.

**Distributed Database:** Distributed Transactions and its Protocols, Concept of deadlock

Relational Model: Open Database Connectivity (ODBC), Java Database Connectivity (JDBC), Triggers, Security and Authorization. Query By Example (QBE), User Interfaces and Tools, Forms and Graphical User Interfaces. Report Generators. Overview of Relational Query Optimization.

#### **UNIT-II**

**Implementation Techniques:** Overview of physical storage media ,Magnetic disks ,RAID ,Tertiary storage, File organization ,Organization of records in files, Indexing and hashing ,Ordered indices, B+ tree index files, B tree index files, Static hashing, Dynamic hashing, Query processing overview, Catalog information for cost estimation, Selection operation, Sorting ,Join operation, Database tuning

#### **UNIT-III**

**Internet Databases** - World Wide Web, Client Side Scripting and Applets, Web Servers and Sessions, Services, Server Side Scripting. XML – Structure of XML Data, XML Document Schema, XQuery, Storage of XML Data, XML Applications.

#### **UNIT-IV**

**Advanced Topics:** OLAP, data mining, data warehouse, Timestamp database, multimedia database, geographical database, spatial database

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Fundamentals of Database Systems,	Elmasri/Navathe	Addison Wesley

	Third Edition		
2	Database Concepts	Korth and Silberschatz Abraham,	McGraw Hall
3	An introduction to Database Systems	C.J.Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication



<b>Course Code</b>	<b>CSE305</b>
<b>Course Title</b>	<b>Computer Graphics and Visualization</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 1 0
<b>Credits</b>	3.5
<b>Course Prerequisites</b>	Computer graphics (basics), linear algebra, programming
<b>Course Objectives (CO)</b>	The main objective of this course is to give the student a comprehensive understanding of computer graphics and visualisation and their applications. In particular participants will have the ability to understand the process of generating virtual images from virtual scenes, typically identified as a pipeline of generate, compute and store/display.

### SYLLABUS

#### UNIT-I

**Introduction** - History of computer graphics, applications, graphics pipeline, physical and synthetic images, synthetic camera, modeling, animation, rendering, relation to computer vision and image processing, review of basic mathematical objects (points, vectors, matrix methods)

**Introduction to OpenGL** - OpenGL architecture, primitives and attributes, simple modeling and rendering of two- and three-dimensional geometric objects, indexed and RGB color models, frame buffer, double buffering, GLUT, interaction, events and callbacks, picking.

#### UNIT-II

**Geometric transformations**- Homogeneous coordinates, affine transformations (translation, rotation, scaling, shear), concatenation, matrix stacks and use of modelview matrix in OpenGL for these operations.

**Viewing** - Classical three dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations; **Visibility**- z-Buffer, BSP trees, Open-GL culling, hidden-surface algorithms.

#### UNIT-III

**Shading** - Light sources, illumination model, Gouraud and Phong shading for polygons. **Rasterization**- Line segment and polygon clipping, 3D clipping, scan conversion, polygonal fill, Bresenham's algorithm.

#### UNIT-IV

**Discrete Techniques**- Texture mapping, compositing, textures in OpenGL; Ray Tracing- Recursive ray tracer, ray-sphere intersection.

**Representation and Visualization**- Bezier curves and surfaces, B-splines, visualization, interpolation, marching squares algorithm.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher

1	Interactive Computer Graphics. A Top-Down Approach Using OpenGL	Edward Angel	Pearson Education
2	Computer Graphics with OpenGL	Donald Hearn and Pauline Baker	Prentice Hall
3	Computer Graphics using OpenGL	F. S. Hill Jr. and S. M. Kelley	Prentice Hall
4	Computer Graphics (first edition)	Peter Shirley and Steve Marschner	A. K. Peters



<b>Course Code</b>	<b>ENG307</b>
<b>Course Title</b>	<b>Professional Communication Skills</b>
<b>Type of Course</b>	HS
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge of English grammar and sentence making.
<b>Course Objectives (CO)</b>	The course is career oriented which aims to develop and improve the English language and proficiency of students in order to gain confidence in public and professional life and strengthen the abilities and skills pertinent to success.

### SYLLABUS

#### UNIT-I

**Language Skills:** Parts of Speech, Vocabulary, Phrase, Clause, Sentence and its types, Punctuation.

#### UNIT-II

**Business Correspondence:** Meaning of Business correspondence – Importance of Business Correspondence, Essential qualities of a business letters, types of business letters – cover letter, thank you letters, message through email and Fax. Acceptance letters, rejection letters, and withdrawal letters.

#### UNIT- III

**Principles of communication:** LSRW in communication. What is meant by LSRW Skills – Why it is important – How it is useful – How to develop the skills? Non verbal communication: Body language-Kinesics, Proxemics, Para linguistic, Chronemics Signs and symbols, Territory/Zone Oral: Speaking words, articulation and pronunciation.

#### UNIT- IV

**Enhancing self esteem and Personality development:** Self theory and the Johari window: Characteristics of fully functioning individuals, manifestations of low and high self esteem, techniques for enhancing self esteem, nurturance techniques.

**Comprehension Skills:** Collection of Short Stories: Khushwant Singh's *The Mark of Vishnu*

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Communication Skills	Loveleen Kaur	Satya Prakashan
2	A course in Communication Skills and English Grammatr	Tanu Gupta, Titiksha Mittal	Ajay Publications Yamuna Nagar

3	Business Communication	Varinder Kumar, Bodh Raj	Kalyani Publishers
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<b>Code</b>	<b>SSE303</b>
<b>Course Title</b>	<b>Human Values and Professional Ethics</b>
<b>Type of Course</b>	MC
<b>L T P</b>	3 0 0
<b>Credits</b>	NC
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	<ol style="list-style-type: none"> <li>1. To help the students to discriminate between valuable and superficial in the life.</li> <li>2. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief.</li> <li>3. This Course will encourage the students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life.</li> </ol> <p>This course is an effort to fulfill our responsibility to provide our students significant input about understanding</p>

## SYLLABUS

### UNIT-I

#### **Course Introduction- Need, Basic Guidelines, Content and Process for Value Education :**

Understanding the need, basic guidelines, content and process for Value Education, Understanding Happiness and Prosperity correctly.

**Understanding Harmony in the Human Being :** Understanding the harmony with self and the Body: Sanyam and Swasthya.

### UNIT-II

**Harmony in Human Relationship:** Understanding harmony in the Family- the basic unit of human interaction, visualizing a universal harmonious order in society

**Understanding Harmony in the Nature and Existence:** Understanding the harmony in the Nature, Holistic perception of harmony at all levels of existence

### UNIT-III

**Understanding of Harmony on Professional Ethics:** Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.

#### UNIT-IV

**Strategy for transition from the present state to Universal Human Order:** At the level of individual, at the level of society.

**Case studies:** Typical Holistic Technologies, Management models and production systems

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	A Foundation Course in Value Education	R R Gaur, R Sangal, G P Bagaria	Excel Books Publishers
2	Energy & Equity	Ivan Illich	The Trinity Press, Worcester, and HarperCollins, USA
3	Human Values and Professional Ethics	Rishabh Anand	Satya Prakashan, New Delhi
4	Jeevan Vidya ek Parichay.	A Nagraj	Divya Path Sansthan, Amarkantak



<b>Course Code</b>	<b>CSE307</b>
<b>Course Title</b>	<b>Principles of Software Engineering &amp; Design Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objectives (CO)</b>	This practical course work allows the students to efficiently design a working software model.

### **SYLLABUS**

#### **1: Use Case Models**

- 1.1: To develop a problem statement.
- 1.2: Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
- 1.3: Identify Use Cases and develop the Use Case model.

#### **2: UML Diagrams**

- 2.1: Identify the business activities and develop an UML Activity diagram.
- 2.2: Identify the conceptual classes and develop a domain model with UML Class diagram.
- 2.3: Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
- 2.4: Draw the State Chart diagram.
- 2.5: Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.

#### **3: Implementations of Layers**

- 3.1: Implement the Technical services layer.
- 3.2: Implement the Domain objects layer.
- 3.3: Implement the User Interface layer.
- 3.4: Draw Component and Deployment diagrams.

#### **4: Mini- Projects Using UML**

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design	Jim Arlow, Ila Neustadt	Pearson Education
2	Practical Object-Oriented Design With Uml	Priestley	Tata McGraw-Hill Education
3	Object-Oriented Software Engineering: Practical Software Development Using UML and Java	Lethbridge	Tata McGraw-Hill Education

<b>Course Code</b>	<b>CSE309</b>
<b>Course Title</b>	<b>Computer Graphics and Visualisation Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 3
<b>Credits</b>	1.5
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objectives (CO)</b>	This practical course work allows the students to efficiently design a working software model.

### SYLLABUS

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – all slopes Circle (Midpoint)
2. 2D Geometric transformations –
  - Translation
  - Rotation Scaling
  - Reflection Shear
  - Window-Viewport
3. Composite 2D Transformations
4. Line Clipping
5. 3D Transformations – Translation, Rotation, Scaling.
6. 3D Projections – Parallel, Perspective.
7. Creating 3D Scenes.
8. Image Editing and Manipulation – Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
9. 2D Animation – To create Interactive animation using any authoring tool.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Interactive Computer Graphics. A Top-Down Approach Using OpenGL	Edward Angel	Pearson Education
2	Computer Graphics with OpenGL	Donald Hearn and Pauline Baker	Prentice Hall
3	Computer Graphics using OpenGL	F. S. Hill Jr. and S. M. Kelley	Prentice Hall
4	Computer Graphics (first edition)	Peter Shirley and Steve Marschner	A. K. Peters

<b>Course Code</b>	<b>CSE311</b>
<b>Course Title</b>	<b>Database Design and Management-II Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 3
<b>Credits</b>	1.5
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objectives (CO)</b>	This practical course work allows the students to efficiently design a working software model.

## SYLLABUS

### 1: Introduction To PL/SQL

1.1: introduction to PL/SQL, basic code structure, difference b/w SQL and PL/SQL

1.2: study PL/SQL control structure

- Conditional control-if and case statements
- Iterative control-loop and exit statements
- Sequential control-goto and null statements

1.3: programs

- Program to find greatest of two numbers
- Program to find greatest of three numbers
- Program to perform addition, subtraction, multiplication, division according to user's choice
- Program to print first n natural numbers.
- Program to print first n natural numbers using for loop.
- Program to print table of a number entered by user
- Program to show the use of goto statement.

### 2: Cursor Management

2.1: study cursor, types of cursor, attributes of cursor

2.2: program to display message to check whether the record is deleted or not. ( use %notfound)

2.3: program to display message to get the number of records deleted by delete statement.( use %rowcount)

2.4: program to calculate the total salary of the employee having empno=100 using %type variable attribute.

2.5: program to calculate the total salary of the employee having empno=100 using %rowtype variable attribute

2.6: program to display the empno,ename,ejob of employees using %type variable attribute.

### 3: Sub-Programs: Procedures And Functions

3.1: introduction to sub-programs, syntax and types-local and stored subprograms.

3.2: program to create local procedure that accepts a number and returns addition, subtraction, multiplication, division i.e. Returning multiple values.

3.3: program to create stored procedure that accepts a number and returns addition, subtraction, multiplication, division i.e. Returning multiple values.

3.4: program to create a local function which returns the addition of two numbers.

3.5: program to create a stored function which returns the addition of two numbers.

#### **4: Packages In PL/SQL**

4.1: introduction to package, package specification, package body

4.2: create a package specification for insert operation.

4.3: create a package specification for retrieve operation

4.4: create a package specification for update operation

4.5: create a package specification for delete operation

#### **5: Triggers**

5.1: introduction to triggers in PL/SQL and its types.

5.2: create a trigger for employee table which makes entry in employee name in upper case

5.3: create a trigger for employee table which shows old and new values of employee name after any updation on employee name.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	DBMS – Complete Practical Approach	Sharad Maheshwari, Ruchin Jain	Firewall Media
2	Database Systems: A Practical Approach To Design, Implementation And Management	Connolly	Pearson Education India
3	Fundamentals of Database Systems	Ramez Elmasri	Pearson Education India

<b>Course Code</b>	<b>CSE317</b>
<b>Course Title</b>	<b>Compiler Construction</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Basic understanding of Programming Languages, Data structures and machine architecture
<b>Course Objectives (CO)</b>	This course provides the student with the techniques used in design and construction of a working compiler. The course emphasizes connections between compilers and formal languages, data structures, and computer architecture.

## SYLLABUS

### UNIT-I

**Introduction to Compilers:** The role of language translation in the programming process; Comparison of interpreters and compilers, language translation phases, machine-dependent and machine-independent aspects of translation, language translation as a software engineering activity

**Lexical Analysis:** Application of regular expressions in lexical scanners, hand coded scanner vs. automatically generated scanners, formal definition of tokens, and implementation of finite state automata.

### UNIT-II

**Syntax Analysis:** Revision of formal definition of grammars, Ambiguity, BNF and EBNF; bottom-up vs. top-down parsing, tabular vs. recursive-descent parsers.

**Syntax-Directed Translation:** Syntax-directed definitions, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down and Bottom-up evaluation of inherited attributes, Analysis of syntax-directed definitions

**Type Checking:** Data type as set of values with set of operations, Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions, An algorithm for unification

### UNIT-III

**Run-Time Environments:** Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques, Storage allocation in Fortran

**Parsers Implementation:** automatic generation of tabular parsers, symbol table management, the use of tools in support of the translation process.

#### UNIT-IV

**Intermediate code Representation:** Intermediate and object code, intermediate representations, implementation of code generators.

**Code generation, code optimization:** code generation by treewalking; context sensitive translation, register use. Machine-independent optimization; data-flow analysis; loop optimizations; machine-dependent optimization, Error Detection and Recovery, Error Repair, Compiler Implementation.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Compilers Principles, Techniques, & Tools	A.V.Aho, R.Sethi&J.D.Ullman	Pearson Education
2	Engineering a Compiler	Keith Cooper and Linda Torczon,	Morgan-Kaufman Publishers
3	Crafting a compiler	C. Fischer and R. LeBlanc	Benjamin Cummings
4	Modern Compiler Implementation in Java	Andrew W. Appel	Cambridge University Press
5	Compiler Construction Principles and Practice	Kenneth C. Louden	Kenneth C. Louden



<b>Course Code</b>	<b>CSE319</b>
<b>Course Title</b>	<b>Expert System</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Nil
<b>Course Objectives (CO)</b>	<p>The capturing of expertise allows exposition of other possibilities:</p> <ul style="list-style-type: none"> <li>▪ Understanding of general principles of expertise</li> <li>▪ Categorization of domain specific principles of expertise</li> <li>▪ Possible improvement of performance by refinement of these principles</li> </ul>

## SYLLABUS

### UNIT-I

**Overview**; introduction to rule-based expert systems, Background, general introduction, Forward and backward chaining, conflict resolution

Uses: structured selection, configuration, diagnosis, and business rules.

### UNIT-II

#### **Rule-based expert systems**

Uncertainty, fuzzy logic and belief nets, Expert System Shells

#### **Other expert system paradigms**

PIES example system (Pan and Tenenbaum), OOPs, frames, Case-based reasoning and help desks, Recommender systems (CDNow Case Study), Scheduling (Steelmaking example: Dorn and Slany)

### UNIT-III

#### **Machine learning and data-base mining**

Data Mining, Decision Trees, Neural Networks, Text Mining, Web mining

### UNIT-IV

#### **Current trends, projects**

Current trends in AI, Presentation and discussion of projects

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	An Overview Of Expert System	Patterson	Pearson
2	A Guide to Expert Systems	Donald Arthur Waterman	Addison-Wesley
3	Expert systems	Paul Harmon	Wiley

<b>Course Code</b>	<b>CSE321</b>
<b>Course Title</b>	<b>Cloud Computing</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Distributed System, Operating Systems and Networking
<b>Course Objectives (CO)</b>	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.

## SYLLABUS

### UNIT-I

Introduction: Shift from distributed computing to cloud computing; principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service oriented computing and cloud environment. Cloud Computing Technology: Client systems, Networks, server systems and security from services perspectives; Accessing the cloud with platforms and applications; cloud storage.

### UNIT-II

Working with Cloud: Infrastructure as a Service–conceptual model and working Platform as a Service – conceptual model and functionalities. Software as a Service: conceptual model and working. Trends in Service provisioning with clouds.

### UNIT-III

Using Cloud Services: Cloud collaborative applications and services–case studies with calendars, schedulers and event management; cloud applications in project management. Case studies: Microsoft Azure, Google App Engine and Open source clouds- Open-Nebula and Eucalyptus.

### UNIT-IV

Microsoft office 365 solution: IBM Cloud (Need Credit Card Details), Virtualization Technology, Creating VMs, Hypervisor. Storage Technology, types of Storage Devices, RAID Tech Practical Session for RAID (Hands on) File system, DAS, NAS & SAN Tech.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Cloud Computing – A Practical Approach	Anthony T.Velte, Toby J.Velte and Robert E	TMH
2	Cloud Computing – Web based Applications	Michael Miller	Pearson Publishing



# *Sixth Semester*

<b>Course Code</b>	<b>MAT304</b>
<b>Course Title</b>	<b>Numerical And Statistical Methods</b>
<b>Type of Course</b>	BS
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Applied Mathematics
<b>Course Objectives (CO)</b>	

## SYLLABUS

### UNIT-I

**Computer Arithmetic and Errors:** Representation of integers and real numbers in computers. Fixed point arithmetic, Floating point arithmetic, normalized floating point numbers, Round off and truncation errors, Relative and absolute errors

**Solution of Non-linear equations:** Bisection method for solution of a single non-linear equation and its rate of convergence. Ragula falsi method for solution of a single non-linear equation and its rate of convergence. Newton-Raphson method for solution of a single non-linear equation. Rate of convergence.

### UNIT-II

**Finite differences and Interpolation: Finite difference:-** First and Higher order differences, Forward differences and backward differences, Properties of operators, Shifting operator E, Relations between the operators. **Interpolation:-** Newton Forward and Backward Interpolation formulae, Divided differences, Newton's Divided difference formula, Lagrange's Interpolation formula, Inverse interpolation.

### UNIT-III

**Numerical differentiation and integration:** Newton's forward and backward differences formulae to compute first and higher order derivatives, The Trapezoidal rule, Simpson's one third rule and three eighth rule.

**Numerical solution of ordinary differential equations:** Solution by Taylor's series, Euler's method, modified Euler method, Runge-Kutta methods upto fourth order (No proof), Milne's Method, Adam's Bashforth method.

### UNIT-IV

**Solution of system of linear equation:** Gauss elimination method with concept of partial and complete pivoting. Gauss Jordan method for solving linear equations. Jacobi's method and Gauss Siedel method for solving system of linear equations.

**Numerical solution of partial differential equations:** Classification of Partial differential

equations of the second order, Laplace's equation and its solution by Liebmann's process. Solution of Poisson's equation, Solutions of Parabolic and Hyperbolic equations.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Numerical Methods,	Dr. B.S. Grewal	Khanna Publishers
2	Introductory Methos of Numerical Analysis	S.S. Shastri	PHI
3	Numerical Methods	M.K. Jain, SRK Iyengar, R. K.Jain	New Age Intl. Publishers
4	Numerical Solution of Differential Equations	M.K.Jain,	



<b>Course Code</b>	<b>CSE302</b>
<b>Course Title</b>	<b>Design&amp; Analysis of Algorithms</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Data Structures, C, C++ Programming language
<b>Course Objectives (CO)</b>	This course provides the ability to understanding the computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

## SYLLABUS

### UNIT-I

**Introduction:** Introduction to algorithm. Review of elementary data structures, Time and space complexity of an algorithm. Performance Analysis. Different orders of growth. Asymptotic notations. Polynomial and Exponential running time of an algorithm. Recurrence relations, Concept of hashing. MAXMIN algorithms.

**Algorithm Design Techniques:** Divide-and-conquer, Sorting, Median Finding, Greedy approach, Randomization, and Dynamic Programming, Branch and Bound, Backtracking. Knapsack problems and algorithms illustrating the use of these techniques.

### UNIT-II

**Sorting and Searching:** Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting. Median and order statistics.

**Graph:** Graph traversal algorithms: breadth-first search (BFS) and depth-first search (DFS). Applications of BFS and DFS. Topological sort. Shortest path algorithms in graph: Dijkstra and Bellman-Ford. Minimum spanning trees, Travelling salesman problem, Kruskal's algorithm, Prim's algorithm, single source shortest paths, Relaxation, Floyd-Warshall algorithm, Johnsons algorithm.

### UNIT-III

**NP-Completeness:** Definition of class NP. NP-hard and NP-complete problems. SAT, 3SAT is NP-complete. Proving a problem to be NP-complete using polynomial-time reductions. Examples of NP-complete problems. Approximation algorithms for various NP-complete problems.

### UNIT-IV

**Pattern Matching Algorithms:** Knuth-Morris-Pratt algorithm. Algorithms in Computational

Geometry: Convex hulls. Fast Fourier Transform (FFT) and its applications. Integer and polynomial arithmetic. Matrix multiplication: Strassen's algorithm.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Design and Analysis of Algorithms	Sartaj Sahni	Silicon PR.
2	Let Us C	Yashwant Kanitkar	BPB Publications
3	Object Oriented Programming Using C++	E.Balagurusamy	Tata McGraw Hill Education



<b>Course Code</b>	<b>CSE304</b>
<b>Course Title</b>	<b>Internet Web Programming</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of Program Development and Programming Language Constructs
<b>Course Objectives (CO)</b>	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state of the art programming languages for the creation of interactive web sites. Students will create web pages that utilize the most current advances in web development.

## SYLLABUS

### UNIT-I

**Internet and WWW:** Introduction to internet and its applications, Email, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address World Wide Web (WWW) : World Wide Web and its evolution, uniform resource locator (URL), browsers - internet explorer, netscape navigator, opera, firefox, chrome, mozilla. Search engine, web saver - apache, IIS, proxy server, HTTP protocol.

**HTML and Graphics:** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags.

**Image maps:** Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagemaps together, alternative text for Imagemaps,

**Tables:** Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool

### UNIT-II

**Frames :** Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME> tag, Targeting named frames, Creating floating frames, Using Hidden frames,

**Forms :** Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons,

Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data

**Style Sheets:** What are style sheets? Why are style sheets valuable? Different approaches to style sheets, Using Multiple approaches, Linking to style information in separate file, Setting up style information, Using the <LINK> tag, embedded style information, Using <STYLE> tag, Inline style information.

### UNIT-III

**Java Script:** Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional operator), (Comma operator), delete, new, this, void.

**Statements:** Break, comment, continue, delete, do ... while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with,

Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, RegExp

**Document and its associated objects:** document, Link, Area, Anchor, Image, Applet, Layer  
Events and Event Handlers: General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload

### UNIT-IV

**XML:** Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL

**PHP:** Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors / problems.

**Advanced PHP and MySQL:** PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech press
2	HTML :Beginner's guide	Wendy Willard	Mc Graw Hill
4	HTML,XHTML, and CSS Bible, 5ed.	Steven M. Schafer	Wiley India
5	Beginning HTML,XHTML, CSS	John Duckett	Wiley India

	and JavaScript		
6	Beginning CSS: Cascading Style Sheets for web design	Ian Pouncey, Richard York	Wiley India
7	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech press



<b>Course Code</b>	<b>CSE306</b>
<b>Course Title</b>	<b>Mobile Application Development</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Students are expected to have basic knowledge of JAVA, HTML, Javascript and CSS
<b>Course Objectives (CO)</b>	Students will learn the basics of the programming language, designing mobile interfaces, using libraries to build applications, user input and other aspects.

## **SYLLABUS**

### **UNIT-I**

#### **Introduction To Mobile Devices**

Mobile devices vs. desktop devices, ARM and intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store, Development environments ,Xcode, Eclipse, VS2012, PhoneGAP, Native vs. web applications

#### **Mobile Applications**

Introduction to mobile computing, mobile applications , Embedded systems, Market and business drivers for mobile applications , Publishing and delivery of mobile applications , Requirements gathering and validation for mobile applications

### **UNIT-II**

#### **Mobile OS Architectures**

Comparing and Contrasting architectures of all three – Android, iOS and Windows , Underlying OS (Darwin vs. Linux vs. Win 8) , Kernel structure and native level programming , Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management , Security

#### **Basic Design**

Introduction , Basics of embedded systems design , Embedded OS Design constraints for mobile applications, both hardware and software related , Architecting mobile applications , user interfaces for mobile applications , touch events and gestures , Achieving quality constraints , performance, usability, security, availability and modifiability.

### **UNIT-III**

#### **Advanced Design**

Designing applications with multimedia and web access capabilities, Integration with GPS and social media networking applications, Accessing applications hosted in a cloud computing environment, Design patterns for mobile applications.

#### **Technology I - Android**

Introduction , Establishing the development environment , Android architecture , Activities and

views , Interacting with UI , Persisting data using SQLite , Packaging and deployment , Interaction with server side applications , Using Google Maps, GPS and Wifi, Integration with social media applications.

## UNIT-IV

### Technology II - iOS

Introduction to Objective C ,iOS features , UI implementation , Touch frameworks , Data persistence using Core Data and SQLite , Location aware applications using Core Location and Map Kit , Integrating calendar and address book with social media application , Using Wifi iPhone marketplace.

### Mobile Device Security

Mobile malware, Device protections, iOS “Jailbreaking”, Android “rooting” and Windows’ “defenestration”.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Professional Mobile Application Development	Jeff McWherter and Scott Gowell	Wrox
2	Android in Practice	Charlie Collins, Michael Galpin and Matthias Kappler	DreamTech
3	Beginning iOS 6 Development: Exploring the iOS SDK	. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson	Apress

<b>Course Code</b>	<b>CSE308</b>
<b>Course Title</b>	<b>Internet Web Programming Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ Programming Language Concepts
<b>Course Objectives (CO)</b>	To make students skillful in developing desktop and web applications.

## SYLLABUS

### 1: HTML

- 1.1: Web page creation using HTML
- 1.2: To embed an image map in a web page
- 1.3: To fix the hot spots.
- 1.4: Show all the related information when the hot spots are clicked.

### 2: CSS

- 2.1: Web page creation with all types of Cascading style sheets

### 3: DHTML

- 3.1: Client side scripts for validating web form controls using DHTML

### 4: JAVA

- 4.1: Java programs to create applets
- 4.2: Create a color palette with matrix of buttons
- 4.3: Set background and foreground of the control text area by selecting a color from color palette.
- 4.4: In order to select foreground or background use check box control as radio buttons.
- 4.5: To set background images.

### 5: SERVLETS IN JAVA

- 5.1: Programs in java using servlets

### 6: JSP

- 6.1: Programs in java to create three-tier applications using JSP and Databases
- 6.2: for conducting online examination
- 6.3: for displaying students mark list.

### 7: XML

- 7.1: Programs using XML-schema-XSLT/XSL

### 8: AJAX

- 8.1: Programs using AJAX

### 9: DATABASE

- 9.1: Implementation of web services and databases.

## RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Ajax Rich Internet Applications, and Web Development for Programmers	Deitel Harvey M.	Pearson Education India
2	Web Programming: Building Internet Applications	Chris Bates	John Wiley & Sons
3	Web Programming and Internet Technologies: An E-commerce Approach	Porter Scobey, Pawan Lingras	Jones & Bartlett Publishers
4	A Complete Guide to Internet And Web Programming	Deven N. Shah	Dreamtech Press



<b>Course Code</b>	<b>CSE310</b>
<b>Course Title</b>	<b>Design and Analysis of Algorithms Lab</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ Programming Language Concepts
<b>Course Objectives (CO)</b>	Makes the students proficient in implementing algorithms using the algorithm design techniques.

### **SYLLABUS**

#### **1. Array**

- 1.1: WAP. Two code and analyze to compute greatest common divisor of two numbers.
- 1.2: WAP two code and analyze to find the mid element in an array.
- 1.3: WAP. To code to analyze to find maximum and minimum element (without MAXMIN algorithm) in array.
- 1.4: WAP. To code and analyze to find the largest element in an array.
- 1.5: WAP. To code to analyze to enter elements in an array.

#### **2. Searching**

- 2.1: WAP. To find maximum and minimum element choosing MAXMIN algorithm.
- 2.2: WAP to code and analyze to find an element using binary search and find its time complexity.

#### **3. Sorting**

- 3.1: WAP. To code and analyze to short an array of integer using HEAP Sort.
- 3.2: WAP. To code and analyze to short an array of integer using Merge Sort.

#### **4: Pattern Matching**

- 4.1: WAP. To code and array analyze to find all occurrence of pattern in a given string.

#### **5: Shortest Path Algorithm**

- 5.1: WAP. To code and analyze to find minimum path using Kruskal's Algorithm.

#### **6: Dynamic Programming**

- 6.1: WAP. To code and analyze to find the distance between two characters strings using Dynamic programming.

#### **7: Divide and Conquer**

- 7.1: WAP to code and analyze to find an element using linear search by applying divide and conquer technique and find its time complexity.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	The Algorithm Design Manual	Steven S Skiena	Springer Science & Business Media
2	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh, Mrs. Pinki Parampreet Kaur	Technical Publications
4	Data Structures through C++	Yashavant P. Kanetkar	BPB Publications

<b>Course Code</b>	<b>CSE314</b>
<b>Course Title</b>	<b>Simulation &amp; Modelling</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Programming skills in one or more of the programming languages
<b>Course Objectives (CO)</b>	Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs.

### **SYLLABUS**

#### **UNIT-I**

Introduction- When simulation is appropriate and when not, advantages and disadvantages of simulation, application areas in communication, computer and software design, systems and systems environment, components of a system, discrete and continuous systems, model of a system, types of models, discrete-event simulation, steps in a simulation study. Simulation Examples- Simulation of queueing systems, on-demand and inventory systems, simulation for reliability analysis etc

General Principles- Concepts in discrete event simulation: event scheduling/time advance algorithms, world views. List Processing: properties and operations, data structures and dynamic allocation, techniques;

Simulation Software- Integrated environments. Examples and review of some existing software popular and useful in the industry, e.g., Arena, AutoMod, Extend, Flexsim, Micro Saint, ProModel, Quest, SIMUL8, WITNESS etc. Simulation using languages and environments like C++/Java/GPSS/SSF etc. Experimentation and Statistical-Analysis Tools: common features and relevant current products.

#### **UNIT-II**

Statistical Models in Simulation- Terms and concepts. Statistical Models. Review of discrete and continuous distributions. Review of Poisson (stationary and non-stationary) processes. Empirical Distributions; Elementary Queueing Theory- Basic Structure of Queueing Models. Input Source (Calling Population). Queue, Queue Discipline, Service Mechanisms. Notations and relationships between L, W, Lq, and Wq. Little's Formula. Role of Exponential Distribution and Properties. Birth and Death Processes. M/M/s queues. Finite queue variation in M/M/s/K models with different s values. Finite Calling Population cases. Queueing Models involving Non-Exponential Distributions: M/G/1, M/D/s, M/Ek/s (involving Erlang distribution), Models without a Poisson Input, Models involving hyperexponential distributions, Priority Discipline Queueing Models: Preemptive and Non- Preemptive with results, properties and server number variations, Queueing Networks:Equivalence Property. Infinite Queues in Series and Product

Form Solutions. Jackson Networks,

Application of Queueing Models- Review of Characteristics (calling population system capacity, arrival processes, behavior and disciplines, service times and mechanisms etc) and notations, Application of Long-Run Measures of Performance: Time average in system, average time spent per customer, Little's Formula and server utilization, costs. Steady State behaviour of Infinite (M/G/1, M/M/c/infinity, M/M/c/N/infinity) and finite (M/M/c/K/K) Calling Population Models, Use of Network of Queues.

### **UNIT-III**

Random Number Generation- Properties. Generation of Pseudo-Random Numbers, Techniques for Generation of Pseudo-Random Numbers: Linear Congruential, Combined Linear Congruential, Random Number Streams. Tests for Random Numbers: Frequency Tests and Tests for Autocorrelation. Random Variate Generation- Inverse Transform Techniques for Exponential, Uniform, Weibull, Triangular and for Empirical Continuous Distributions. Acceptance-Rejection Techniques for Poisson (Stationary and NonStationary) Distribution and Gamma Distribution. Special Properties like the Direct Transformation for the Normal and Lognormal Distributions, Convolution Method and others.

Input Modeling- Data collection, Identifying the Distribution with Data: Histograms, Selection of the Appropriate Family of Distributions, Quantile-Quantile Plots. 100 Parameter Estimation: Sample Mean and Sample Variance and various biased and unbiased Estimators. Goodness of Fit Tests applied to Simulation inputs: Chi-Square and Chi-Square with Equal Probabilities, Kolmogorov-Smirnov Tests, pValues and Best Fits. Verification and Validation of Simulation Models- Verification and Validation of Simulation Models. Calibration and Validation: Face Validity, Validation of Assumptions, Input-Output Transformation Validation.

### **UNIT-IV**

Output Analysis of a Single Model- Output analysis and types of simulation. Stochastic Nature of the Output Data. Measures of Performance and Estimation: Point Estimation and Confidence-Interval Estimation. Output Analysis for Terminating Simulations and Estimation of Probabilities. Output Analysis of Steady State Simulations: Initialization Bias, Error Estimation, Replications, Sample Size and Batch Means for Interval Estimation.

Comparison and Evaluation of Alternative System Designs- Comparison of Two System Designs. Sampling with Equal and Unequal Variances. Common Random Numbers. Confidence Intervals with Specified Precision. Comparison of Several System Designs: Bonferroni Approaches to Multiple Comparisons and to Screening and to Selection of the Best. MetamodelingL Sample Linear Regression, Testing for Significance, Multiple Linear Regression. Random Number Assignment for Regression. Optimization via Simulation: Robust

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Heuristics.

Simulation of Computer Systems- Simulation Tools: Process Orientation and Event Orientation. Model Input: Modulated Poisson Process and Virtual-Memory Referencing. High-Level Simulation. CPU and Memory Simulations. Simulation of Computer Networks- Traffic Modeling, Media Access Control: TokenPassing Protocols and Ethernet, Data Link Layer, TCP, Model Construction.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Discrete-Event System and Simulation	Jerry Banks, John S. Carson II, Barry L. Nelson and David M. Nicol	Prentice Hall of India, New Delhi
2	Simulation modeling and analysis	Averill M. Law	Tata McGraw Hill India
3	Applied Modeling and Simulation	David Cloud, Larry Rainey	Tata McGraw Hill, india
4	Modeling and simulation: theory and practice	Walter J. Karplus, George A. Bekey, Boris Yakob Kogan	Springer,

<b>Course Code</b>	<b>CSE316</b>
<b>Course Title</b>	<b>Computer Vision</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Computer Graphics
<b>Course Objectives (CO)</b>	To familiarize the student with specific, well known computer vision methods, algorithms and results. To understand the roles of image transformations and their invariances in pattern recognition and classification.

## **SYLLABUS**

### **UNIT-I**

Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

### **UNIT-II**

Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.

Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

### **UNIT-III**

Motion Analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.

Perceptual organisation and cognition: Vision as model-building and graphics in the brain, Learning to see.

Lessons from neurological trauma and visual deficits, Visual agnosias and illusions, and what they may imply about how vision works.

#### UNIT-IV

Model estimation: Machine learning and statistical methods in vision. Applications of machine learning in computer vision. Discriminative and generative methods. Content based image retrieval.

Miscellaneous Applications: CBIR, CBVR, Activity Recognition, computational photography, Biometrics, stitching and document processing; Modern trends - super-resolution; GPU, Augmented Reality; cognitive models, fusion and SR&CS.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Computer Vision: Algorithms and Applications	Richard Szeliski	Springer
2	Computer Vision: A Modern Approach	D. A. Forsyth, J. Ponce	Prentice Hall
3	Introductory Techniques for 3D Computer Vision	Trucco and Verri	Prentice Hall
4	Computer vision	Shapiro, L. & Stockman, G	Prentice Hall
5	Three dimensional Computer Vision: A geometric approach	Olivier Faugeras	Olivier Faugeras

<b>Course Code</b>	<b>CSE318</b>
<b>Course Title</b>	<b>Software Metrics &amp; Project Management</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Software Engineering
<b>Course Objectives (CO)</b>	Student learn to select and apply software metrics and project management techniques for process modeling, planning, estimation, process metrics and risk management; perform software verification and validation using inspections, design and execution of system test cases.

## **SYLLABUS**

### **UNIT-I**

#### **Software Project Management**

Project Definition, Contract Management, Activities covered By Software Project Management, Overview of Project Planning, Stepwise Project Planning.

#### **Project Evaluation**

Strategic Assessment, Technical Assessment, Cost Benefit Analysis –Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation.

#### **Activity Planning**

Objectives, Project Schedule, Sequencing and Scheduling Activities –Network Planning Models, Forward Pass, Backward Pass, Activity Float, Shortening Project Duration, Activity on Arrow Networks, Risk Management, Nature Of Risk, Types Of Risk, Managing Risk, Hazard Identification, Hazard Analysis, Risk Planning And Control

### **UNIT-II**

#### **Monitoring And Control**

Creating Framework, Collecting Data, Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting Project Back To Target, Change Control, Managing Contracts, Introduction, Types Of Contract, Stages In Contract Placement, Typical Terms Of A Contract, Contract Management, Acceptance.

#### **Managing People And Organizing Teams**

Introduction, Understanding Behavior, Organizational Behaviour: A Background, Selecting The Right Person For The Job, Instruction In The Best Methods, Motivation, The Oldham, Hackman Job Characteristics Model, Working In Groups, Becoming A Team, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety, Case Studies.

### UNIT-III

#### Software Metrics

Measurement in software engineering, objectives & scope of software metrics, quality models & measures, measurement & models

#### Empirical Investigation

Principles Of Investigation, Procedures For Experiments, Types Of Experimental Designs, Nested Vs Crossed Designs.

#### Software-Metrics Data Collection & Analysis

Defining Data, Faults, Collecting, Storing & Extracting Data, Analyzing results of experiments, Examples of simple analysis techniques, Measuring internal & external product attributes.

### UNIT-IV

#### Software Reliability & Process Predictions

Reliability Theory, Software Reliability Problem, Measuring Productivity, Teams, Tools, And Methods, Making Process Predictions, Cost Estimation: Problems And Approaches, Models Of Effort And Cost, Dealing With Problems Of Current Estimation Methods.

#### Planning A Measurement Program

Metrics Plans, Developing Goals, Questions, And Metrics, Mapping Measures To Activities, Assessment Tools, Measurers, Analysts, And Audience

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Software Project Management	Bob Hughes, Mike Cotterell	Third Edition, Tata McGraw Hill, 2004
2	Software Project Management in Practice	Jalote	Pearson Education
3	Software Metrics And Project Management	Madhuvanti Joshi Teje	Vision Publications

# *Seventh Semester*



<b>Course Code</b>	<b>CSE401</b>
<b>Course Title</b>	<b>Finite Languages and Automata Theory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Basic knowledge of Discrete mathematics and System programming
<b>Course Objectives (CO)</b>	This course provides the basic knowledge of concepts in automata theory and theory of computation. Allows the students to design grammars and recognizers for different formal languages.

## SYLLABUS

### UNIT-I

**Basic Theory of Automata:** Sets, Relation, Functions, Alphabet, String, Languages Finite Automata: Formal Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with  $\epsilon$ -moves, Equivalence of NFA and DFA, Minimization of finite automata, Two-way finite automata, Moore and Mealy machines, Applications of finite automata b) Regular Expression: Definition, Algebraic Laws, Conversion of R.E to F.A, F.A to R.E , Applications, Regular grammar for F.A.

### UNIT-II

**Regular Sets and Context Free Grammars:** Properties of regular sets, Context-Free Grammars – Derivation trees, Chomsky Normal Forms and Greibach Normal Forms, Ambiguous and unambiguous grammars.

**Pushdown Automata and Parsing Algorithms:** Pushdown Automata and Context-Free Languages; Top-down parsing and Bottom-up parsing, Properties of CFL, Applications of Pumping Lemma, Closure properties of CFL and decision algorithms, Chomsky hierarchy.

### UNIT-III

**Turing Machines:** Turing machines (TM) – computable languages and functions –Turing Machine constructions – Storage in finite control.

**Variations of TMs:** Variations of TMs – Recursive and Recursive enumerable languages, Recursive Function, Partial and Total Recursive Function, Primitive Recursive Function.

### UNIT-IV

**Introduction to Computational Complexity:** Time and Space complexity of TMs –Complexity classes – Introduction to NP-Hardness and NP-Completeness, PCP Problem, Concept of decidability & undecidability. Unit 7: Cellular Automata:- DNA computing, Membrane computing.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
<b>1</b>	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft and Jeffrey D. Ullman	Narosa Publishers

2	Theory of Computer Sc. (Automata, Languages & Computation)	K.L..P. Mishra & N. Chandershekar	PHI
3	Introduction to the Theory of Computations	Michael Sipser	Brooks/Cole, Thomson Learning,
4	Introduction to Languages and the Theory of Computation	John C. Martin	Tata McGraw-Hill



<b>Course Code</b>	<b>CSE403</b>
<b>Course Title</b>	<b>Computational Intelligence</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	NIL
<b>Course Objectives (CO)</b>	In this course we will study the techniques of computational intelligence, especially evolutionary computation and neural networks.

## SYLLABUS

### UNIT-I

Introduction to Computational Intelligence, Fundamental concepts, Introduction to Evolutionary Computing , Evolutionary computation terms, Canonical genetic algorithm, Evolutionary computation variations, Evolutionary programming and Evolution strategies, Implementation of Evolutionary Computing.

### UNIT-II

Swarm Intelligence, Particle Swarm Optimization, Classification, Learning, and Adaptation, Supervised, Unsupervised, Reinforcement Learning, Data partitioning and Cross Validation, Error metrics: Mean squared error, receiver operating characteristic curves, Neural Networks and Evolutionary Computation: Explanation and Sensitivity Analysis, Neural Networks Implementation.

### UNIT-III

Fuzzy sets, Fuzzy Logic, Fuzzy set operators, Fuzzy rule-based systems, Fuzzification, defuzzification, Fuzzy control, Evolving fuzzy rule systems, Neuro-fuzzy systems, Fuzzy-GA systems.

### UNIT-IV

Probabilistic reasoning: Bayesian reasoning and Dempster-Shafer theory, Bayesian belief networks, Fuzzy belief networks Evolving belief networks, Artificial Immune Systems.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Computational Intelligence: An Introduction	A. P. Engelbrecht	John Wiley & Sons.
2	Introduction to Evolutionary Algorithms	X. Yu and M. Gen	Springer Verlag.
3	Computational Intelligence: Concepts to Implementations	Russell Eberhart and Yuhui Shi	Morgan Kaufmann Publishers
4	Soft Computing and Intelligent	Fakhreddine Karray	ADDISON WESLEY PU

	Systems Design	and Clarence de Silva	BLISHING,ISBN 03211 16178
5	-Computational Intelligence: an Introduction	AndriesEngelbrecht	Wiley & Sons, Second Edition, (ISBN: 978-0-470-03561-0)
6	Computational Intelligence: Principles, Techniques, and Applications	Amit Konar	Springer, ISBN: 978-3-540-27335-6



<b>Course Code</b>	<b>ENG401</b>
<b>Course Title</b>	<b>Technical Writing and Presentation Skills</b>
<b>Type of Course</b>	MC
<b>L T P</b>	3 0 0
<b>Credits</b>	NC
<b>Course Prerequisites</b>	General English
<b>Course Objectives (CO)</b>	Aims to teach oral and written skills in English with illustrations and examples drawn from project reports, paper presentations and published papers in scientific journals. The grammar exercises are not taught in a rule-based manner but through observation and use in specific contexts. Newspaper and popular scientific reports are also included as course material. Presentation skills will be taught through practice sessions. During the course, all participants make presentations and also critique the presentations by others. Emphasis is placed on teaching how to present the same findings orally and in writing.

### SYLLABUS

#### UNIT- I

**Reinforcement of Language Skills:** Correcting common errors- Verbosity – How to avoid unnecessary jargon – Words and Usage – List of “aura” words, Synonyms and Antonyms – Phrasing, Tense, Voice, Prepositions, Punctuation. Type of technical reports – creating specs, lab manuals, worksheets.

#### Unit II

##### Organization of Ideas

1. Preparing a Basic plan – Structuring the ideas, collecting the relevant materials
2. Creating Outlines – Headings of Sections, Topic Sentences.
3. Reviewing Sentences and Rewriting Paragraphs
4. Revising Drafts

#### Unit III

**Format:** Margins, Headings, Indentation, Pagination, Type face and fonts, Abbreviations, Symbols, Layouts, Proof reading Symbols

**Contents of a Report:** Cover and title page, Table of Contents, List of Tables and Figures, Preface, Foreword, Acknowledgement, Abstract, Introduction, Body (in Sections and Subsections), Results, Conclusions and Recommendations, Appendices, References

#### Unit IV

##### Presentation of the Report

Difference between Oral Presentations and Written Reports; How to give a good presentation, Proper use of technological aids; Discussion skill.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Technical Communication Principles and Practice	Meenakshi Raman, Sangeeta Sharma	Oxford University Press
2	Basic Technical Communication.	Gupta, Ruby and Anugrah Rohini Lall	Cambridge University Press
3	Basic Technical Communication	Kirkman, John	Pitman Publishing Ltd.,

<b>Course Code</b>	<b>CSE405</b>
<b>Course Title</b>	Computational Intelligence Lab
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 4
<b>Credits</b>	2
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	In this course we will study the techniques and algorithms of computational intelligence and expert system.

### SYLLABUS

1. Prolog features and format.
2. WAP using variables in Prolog.
3. WAP for Usage of rules in Prolog.
4. WAP for using Input, Output and fail predicates in Prolog.
5. Write programs for studying Usage of arithmetic operators in Prolog.
6. WAP to study usage of cut, not, fail predicates in Prolog.
7. WAP to study usage of Recursion in Prolog.
8. Write program which finds and display factorial of a given number.
9. Write program which display Fibonacci series.
10. Write a program which finds and displays maximum number and minimum number from three given numbers.
11. Write a program to implement 8 puzzle problem.
12. Write a program to implement Tower of Hanoi problem.
13. Write a program to implement A\* Algorithm.
14. To Study JESS expert system.
15. To Study RVD expert system

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Computational Intelligence: An Introduction	A. P. Engelbrecht	John Wiley & Sons
2	Introduction to Evolutionary Algorithms	X. Yu and M. Gen	Springer Verlag

3	Computational Intelligence: Concepts to Implementations	Russell Eberhart and Yuhui Shi	Morgan Kaufmann Publishers
4	Computational Intelligence: an Introduction	Andries Engelbrecht	Wiley & Sons, Second Edition

<b>Course Code</b>	<b>CSE409</b>
<b>Course Title</b>	<b>Cryptography &amp; Security</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Basic Knowledge of complexity theory, algorithms, game theory, machine learning
<b>Course Objectives (CO)</b>	This course work provides the thorough understanding of the network security and various cryptography techniques to obtain the security on network and a computer.

## SYLLABUS

### UNIT-I

**Introduction:** Attacks, Services and Mechanisms, Security attacks, security services, model for internetwork security. **Conventional Encryption:** Conventional Encryption Model, steganography, **Classical Encryption Techniques:** Substitution Techniques, Transposition Techniques.

### UNIT-II

**Modern Encryption Techniques:** Simplified Data Encryption Standard, Block Cipher Principles.

**The Data Encryption Standard, Strength of DES. Encryption Algorithms:** Triple DES, International Data Encryption Algorithm, Blowfish.

### UNIT-III

**Confidentiality using Conventional Encryption:** Placement of Encryption Function, Traffic Confidentiality, Key distribution, Random Number Generation.

**Public- Key Cryptography:** Principles of Public- Key Cryptosystems, RSA algorithm, Key

Management, Diffie-Hellman Key.

#### UNIT-IV

**Message Authentication and Hash Functions:** Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of hash Functions and MACs, Digital Signatures, Authentication Protocols, SHA-1, RC-4, RC-5.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Cryptography and Network Security: Principles and Practice	William Stallings	Pearson Education
2	Computer Networks	A.S. Tanenbaum	Pearson Education
3	Network Security	C. Kaufman, R. Perlman, M. Speciner	Pearson Education



<b>Course Code</b>	<b>CSE411</b>
<b>Course Title</b>	<b>Multimedia &amp; Animation</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Basic knowledge of Computer Graphics & Image Processing.
<b>Course Objectives (CO)</b>	The main objective of the subject is to impart the knowledge about Animation execution, workflow & post-production

## SYLLABUS

### UNIT-I

**Fundamentals of Animation:** Animation Drawings/Cels, Rough Drawings , Clean ups, Color reference drawings, Layout, Model Sheet, Key Drawing, Master Background, Concept Piece, Character drawing, Story Board.

**Modeling Concepts:** Introduction to Maya, Types of 3D Modeling, Advantages & Disadvantages, Difference between Polygon Modeling and NURBS modeling

**Texturing - Assigning Materials To Models:** UV texturing: Texturing of Characters and Props, Shading: Different Maya Shaders.

### UNIT-II

**Lighting& Shadows:** Sources of light: Natural and artificial Lights, Types of lights in Maya, Types of Shadows in Maya.

**Rigging& Skinning of a Model:** Joints, Inverse Kinematics, Forward Kinematics. Types of Skinning.

**Animation Types:** Types of Animation. Stop motion vs. motion graphics.

### UNIT-III

**Rendering Process:** Process, Types of Renderer.

**Data Management:** How to manage 3D Assets

**Compositing:** Basics of compositing, Chroma keying, Background colors, Even Lighting, Processing the video, Various Tools used.

#### UNIT-IV

**Music & Dubbing:** Process of adding music to the clip, Tools used for placing, editing the sound tracks.

**Editing Clips:** Process, Tools used for editing process.

**Output& Formats:** Types of Output formats, lossless and lossy compression techniques.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	3D Animation for the Raw Beginner Using Maya	Roger King, Chapman and Hall	2015
2	Editing Digital Video - The Complete Creative and Technical Guide	Robert Goodman	McGraw-Hill
3	Maya Documentation	<a href="https://knowledge.autodesk.com">https://knowledge.autodesk.com</a>	Autodesk

<b>Course Code</b>	<b>ECE401</b>
<b>Course Title</b>	<b>Information Theory and Coding</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Digital Communication
<b>Course Objectives (CO)</b>	To get the knowledge of Coding Techniques & Error Detection and Correction Techniques in Communication Engineering.

## SYLLABUS

### UNIT-I

**INTRODUCTION:** Introduction to information theory & error control coding, Probability, random variables, Probability distribution and density functions, Information measure, Information Capacity Theorem and its implications, Entropy, Differential Entropy, Conditional Entropy, Relative Entropy, Information rate, Mutual Information, Channel Capacity. Introduction to SDH, WDM, DWDM, OTN and ASON Technologies. **SOURCE CODING** Shannon's Source Coding Theorem, Data Compaction, Prefix Coding, Kraft McMillan Inequality, Huffman Coding, Shannon-Fano Coding, Arithmetic Coding, Lempel-Ziv Algorithm, Rate Distortion Theory, and Mutual Information.

### UNIT-II

**CHANNEL CAPACITY & CODING** Channel Models, Channel Coding Theorem, Markov Sources, Discrete Channel with discrete Noise, BSC, BEC, Capacity of a Gaussian Channel, channel capacity for MIMO system, Bandwidth-S/N Trade-off.

### UNIT-III

**LINEAR BLOCK CODES** Introduction to Linear Block codes, Error detecting and correcting capabilities of a block code, Syndrome and Error detection, Minimum distance of block code, Hamming Weight and Hamming Distance, Linear Block Codes, Encoding and decoding of Linear Block-codes, Parity Check Matrix, Bounds for block codes, Hamming Codes, Syndrome Decoding. Introduction to Convolutional Codes, Encoding of convolution codes **CYCLIC CODES** Introduction to cyclic code, Generator and parity check matrices of cyclic codes, Method for generating Cyclic Codes, Matrix description of Cyclic codes.

#### UNIT-IV

TRANSMISSION: SDH systems: Emergence, Standards, Frame Structure, WDM Systems, DWDM Technologies, OTN Interface, ASON Technology, Transmission Products

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Information Theory, Coding & Cryptography	Ranjan Bose	TMH, Second Edition
2	Communication Systems	S. Haykin	Wiley-Publication
3	Elements of Information Theory	Thomas M. Cover, J. A. Thomas	Wiley-Interscience Publication
4	Error Correction Coding Mathematical Methods and Algorithms	Todd K. Moon	Wiley-India Edition.
5	Cryptography and Network Security	William Stallings	Mc Graw Hill.



<b>Course Code</b>	<b>ECE415</b>
<b>Course Title</b>	<b>Wireless Sensor Network</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Objectives (CO)</b>	The primary objectives of this course is to obtain a broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks and to Understand the medium access control protocols and address physical layer issues

## **SYLLABUS**

### **UNIT-I**

**Characteristics Of WSN:** Characteristic requirements for WSN - Challenges for WSNs – WSN vs Adhoc Networks - Sensor node architecture – Commercially available sensor nodes –Imote, IRIS, Mica Mote, EYES nodes, BTnodes, TelosB, Sunspot -Physical layer and transceiver design considerations in WSNs, Energy usage profile, Choice of modulation scheme, Dynamic modulation scaling, Antenna considerations.

### **UNIT-II**

**Medium Access Control Protocols:** Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts - Contention-based protocols - Schedule-based protocols - SMAC - BMAC - Traffic-adaptive medium access protocol (TRAMA) - The IEEE 802.15.4 MAC protocol.

### **UNIT-III**

**Routing And Data Gathering Protocols** Routing Challenges and Design Issues in Wireless Sensor Networks, Flooding and gossiping – Data centric Routing – SPIN – Directed Diffusion – Energy aware routing - Gradient-based routing - Rumor Routing – COUGAR – ACQUIRE – Hierarchical Routing - LEACH, PEGASIS – Location Based Routing – GF, GAF, GEAR, GPSR – Real Time routing Protocols – TEEN, APTEEN, SPEED, RAP - Data aggregation - data aggregation operations - Aggregate Queries in Sensor Networks - Aggregation Techniques – TAG, Tiny DB.

### **UNIT-IV**

**Applications Of WSN:** WSN Applications - Home Control - Building Automation - Industrial

Automation - Medical Applications - Reconfigurable Sensor Networks - Highway Monitoring - Military Applications - Civil and Environmental Engineering Applications - Wildfire Instrumentation - Habitat Monitoring - Nanoscopic Sensor Applications – Case Study: IEEE 802.15.4 LR-WPANs Standard - Target detection and tracking - Contour/edge detection - Field sampling.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Wireless Sensor Networks Technology, Protocols, and Applications	Kazem Sohraby, Daniel Minoli and Taieb Znati	John Wiley & Sons.
2	Protocols and Architectures for Wireless Sensor Networks	Holger Karl and Andreas Willig	John Wiley & Sons, Ltd;



<b>Course Code</b>	<b>CSE413</b>
<b>Course Title</b>	<b>Design &amp; Management of Big Data</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	Design and Management of Data
<b>Course Objectives (CO)</b>	Study the requirements of non-traditional large-scale data applications

## SYLLABUS

### UNIT-I

**DBMS Overview** Introduction to big data, Handling and Processing Big Data, Methodological Challenges and Problems, Benefits and challenges of big data, Examples.

### UNIT-II

**Analysis of data at Rest- Hadoop analytics:** Limitations of existing distributing systems, Hadoop Approach, Hadoop Architecture, Distributed file system: HDFS and GPFS, Internals of Hadoop MR engine, Need for High level language- JAQL and PIG.

### UNIT-III

**Introduction to Text Analytics:** Using Regular expressions, Using AQL, Sentiment analysis

**No SQL:** JSON store, MongoDB, RDF, HBASE

### UNIT-IV

**Analytics:** Clustering, Classification, Segmentation, Linear regression, ML Search: Indexing and Indexing Techniques, Create inverted index using JAQL, Lab using Data Explorer Bundling Hadoop job: Application, Use BI tooling to create application, Publish applications. Analysis of data in motion – Real time analytics

Introduction to streams computing, Challenges/limitations of conventional Systems, Solving a real time analytics problem using conventional system, Challenges to be solved - scalability, thread pooling, etc., Understanding the challenges in handling streaming data from the real world and how to address those using stream computing, Benefits of stream computing in Big Data

world, Realtime Analytics Platform(RTAP).

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Chris Eaton, Paul Zikopoulos	McGraw-Hill
2	Big Data Analytics: Turning Big Data into Big Money	Frank J. Ohlhorst	John Wiley & Sons
3	Ethics of Big Data	Kord Davis	O'Reilly Media
4	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends	Michael Minelli, Michele Chambers, Ambiga Dhiraj	Wiley



<b>Course Code</b>	<b>CSE415</b>
<b>Course Title</b>	<b>Wireless Communications</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 1 0
<b>Credits</b>	4.5
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	To gain an understanding of the principles behind the design of wireless communication systems and technologies.

### **SYLLABUS**

#### **UNIT-I**

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.

GSM system : Architecture and features ; GSM Services ; Authentication ; Incoming & outgoing call flow ; Handover in GSM.

#### **UNIT-II**

Digital Communication through fading multipath channels: Fading types and their characteristics. Concept of diversity branches and signal paths- Combining methods- Selective diversity combining- pre-detection and post-detection combining- Switched combining- maximal ratio combining- Equal gain combining. Different type of channels: Control & Traffic channels.

BTS hardware: Introduction of BTS 3900 series ; Baseband unit (BBU); Radio Frequency unit (RFU ); Description of Cards; Login to BTS 3900

#### **UNIT-III**

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, CDMA (code division multiple access), Space Division Multiple Access. WCDMA (wideband CDMA) features and architecture, handoff and its types.

#### **UNIT-IV**

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G & UMTS & CDMA 2000 standards, specifications and architecture of UMTS ,

Forward CDMA Channel, Reverse CDMA Channel. BSC Hardware: Introduction to 6900 series ;MPR & EPR; Description of Cards ; Login to BSC 6900. Future trends: Blue Tooth technology, 4G mobile techniques, Wi-Fi Technology,LTE advance system, zigbee.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Wireless Communications	T.S.Rappaport,	Principles Edition, and Practice, 2 <sup>nd</sup> Pearson Education Asia, 2010.
2	Mobile Cellular Telecommunications	William C Y Lee	2nd Edition, MGH.
3	Mobile and Personal Communication systems and services	Raj Pandya	Prentice Hall of India.
4	Wireless and Digital Communications	Dr. Kamilo Feher	TMH





# *Open Electives*



<b>Course Code</b>	<b>AGE372</b>
<b>Course Title</b>	<b>Advanced Engineering Systems</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	The students will be able to understand the concept of mechanical, electrical systems and also be able to analyse the equations.

### **SYLLABUS**

#### **UNIT-I**

Equation of motion for simple physical systems. Mechanical, Electrical, and Electromechanical systems.

#### **UNIT- II**

Equations of motion for simple heat, conduction and fluid systems. Analogies. Equations of motion for mechanical system in two and three dimensions.

#### **UNIT- III**

Dynamic response of first order and second order systems. Forced Oscillations of elementary systems. Dynamic stability of compound systems.

#### **UNIT- IV**

Total response of compound systems. Fundamentals of control system analysis.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Dynamics of Physical systems	Cannon, Robert H	McGraw Hill Kngakusha

<b>Course Code</b>	<b>AGE374</b>
<b>Course Title</b>	<b>Engineering Economy and Project Planning</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	

## **SYLLABUS**

### **UNIT-I**

#### **Introduction**

Economics, definition; Engineering economics; Industrial economics; Utility; Law substitution; Value and pricing goods and wealth ; Wants; Demands and Supply; The law of demand and supply; Elasticity of demand; Factors effecting and elasticity of demand.

Money; Value of money; Velocity of circulation; Inflation; Hyper inflation; Deflation; Trade cycle; Banks, types of banks; Commercial banks; Central Banks; Industrial Banks; Agricultural Banks; Exchange banks; IMF; World Bank.

### **UNIT-II**

#### **Terminology and Cash Flow Diagram**

Time value of money; Engineering economy factors and their use; Economic analysis, present worth; Equivalent uniform annual worth; Capitalized cost; Internal rate of return;

Economic analysis of operating plans; Profit versus Loss cost comparison; Break even analysis; Compound interest calculations; The uniform annual cost method; Equal service period requirement.

#### **Replacement Studies**

Determination of replacement; Salvage value; Book value; replacement theories; Cost benefit and pay back analysis; Capital budgeting.

### **UNIT-III**

#### **Depreciation**

Purpose of depreciation; Type; Economic life; Depreciation methods; Straight line method:

Declining balance method; Sum of years digits methods; Sinking fund formula; Service output method; Selection of depreciation method; Depletion; Valuation; Determination of property life from limitations in the use of mortality data.

### **Forecasting**

Forecasting in operations; Forecasting and operations; Sub systems; Characteristics of demand overtime; Dependent versus independent demand; Forecast error; Intuitive or formal approaches; Useful forecasting models; Quantitative models; Time series quantitative models; Exponential smoothing; Double exponential smoothing; Regression analysis; Selection of the forecasting model; Behavioral dimensions of forecasting.

### **UNIT-IV**

#### **Network Analysis**

PERT and CPM; The terminology of networks; Shortest path problem; Minimum spanning tree problem; Maximum flow problem; Minimum cost flow problem; Network simplex method; Project planning and control with PERT CPM.

#### **Inventory Control**

Demand and control systems; Characteristics inventory concepts costs; Inventory modelling; Deterministic inventory models; Stochastic inventory models; Applications in behavioral pit falls in inventory control.

#### **RECOMMENDED BOOKS**

<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Engineering Economy	Dagavino, E.P.	Seventh Edition
2	Productions and Operations Management	Chaby, S.N.	Tata McGraw Hill, 1980
3	Engineering Economics	Riggs, J.L.	McGraw Hill
4	Managerial and Engineering Economy	Taylor, G.A.	East West Press
5	Financial Management and Policy	Vanhorne, J.C.	Prentice Hall of India

<b>Course Code</b>	<b>CE372</b>
<b>Course Title</b>	<b>Rural Technology &amp; Community Development</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	The objective of this course is to make students aware of the various elements of rural technology and community development.

### **SYLLABUS**

#### **UNIT-I**

##### **Data analysis and measures of central tendency**

Meaning nature scope and limitations of statistics, collection of statistical data, classification, tabulation and diagrammatic representation of data, measures of central tendency : statistical averages means, media and mode.

#### **UNIT-II**

##### **Data Information and Knowledge**

Concept of information, need of information(professional education, research), qualities of information, value of information, difference between data and information, properties of the needed information, information and management, planning organizing, Coordinating and controlling

#### **UNIT-III**

##### **Concept of Marketing**

Difference between marketing selling and retailing, marketing mix, market segmentation, marketing planning, strategy and approaches; modern concept of marketing

##### **Community Development**

Concept, definition, meaning, need, history, principles objectives and scope. Community building: coming age, regenerating community, community model

#### **UNIT-IV**

##### **Consensus Organizing model**

What's behind building healthy communities, participatory democracy. The role of various NGOs in community development. The role of business and government in community development initiatives, how to form a non profit corporation fund raising and grant writing.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Encouraging community development	Biddle William wishart	Mcgraw hill
2	Sustainable rural technology	M.S Viridi	Daya publishing house
3	Rural technology	Punia RD Roy	Satyaparkashan
4	Rural education and technology	S.B Verma, S.K Jiloka	Deep and deep publication

<b>Course Code</b>	<b>CE374</b>
<b>Course Title</b>	<b>Disaster Management</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	The objective of this course is to make students aware of the various elements of rural technology and community development.

### **SYLLABUS**

#### **UNIT-I**

##### **Introduction to Disaster Management:**

Define and describe disaster, hazard, emergency, vulnerability, risk and disaster management; Identify and describe the types of natural and non-natural disasters. Important phases of Disaster Management Cycle.

##### **Disaster Mitigation and Preparedness:**

*Natural Hazards:* causes, distribution pattern, consequences and mitigation measures for earth quake, tsunami, cyclone, flood, landslide drought etc. *Man-made hazards:* causes, consequences mitigation measures for various industrial hazards/disasters, Preparedness for natural disasters in urban areas.

#### **UNIT-II**

##### **Hazard and Risk Assessment:**

Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems.

##### **Emergency Management Systems (EMS):**

Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation.

#### **UNIT-III**

##### **Capacity Building:**

Gender sensitive disaster management approach and inculcate new skills and sharpen existing skills of government officials, voluntary activists, development of professional and elected representative for effective disaster management, role of media in effective disaster management, overview of disaster management in India, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines.

##### **Application of Geoinformatics and Advanced Techniques:**

Use of Remote Sensing Systems (RSS) and GIS in disaster Management, role of knowledge based expert systems in hazard scenario, using risks-time charts to plan for the future, early warning systems.

#### **UNIT-IV**

##### **Integration of public policy:**

Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.

**Case Studies:**

Lessons and experiences from various important disasters with specific reference to Civil Engineering.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Natural Hazards in the Urban Habitat	Iyengar, C.B.R.I.	Tata McGraw Hill.Publication
2	Disaster Management	R.B. Singh	Rawat Publications
3	Disaster Management –Future Challenges & Opportunities	Jagbir Singh,	I.K. International Publishing House.



<b>Course Code</b>	<b>CSE372</b>
<b>Course Title</b>	<b>Operating System &amp; Database Management System</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Elementary knowledge about the Hardware/Software Interface
<b>Course Objectives (CO)</b>	This course should provide the students with good understanding of database systems concepts and Operating System including its architecture and all its components.

### SYLLABUS

#### UNIT-I

**Introduction to Operating system:** Role of Operating system as resource manager, function of kernel and shell, operating system structures, views of an operating system.

**Process Management:** CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery.

#### UNIT-II

**Memory Management:** Overlays, Memory management policies, Fragmentation and its types, Partitioned memory management, Concept of Thrashing, Paging, Segmentation, Need of Virtual memories, Page replacement Algorithms

**File Management:** File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security:

#### UNIT-III

**Introduction to Database Systems:** File Systems Versus DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence. Purpose of Database System, Views of data, Data Models, Database Languages, Database System Architecture, Database users and Administrator, Entity–Relationship model (E-R model), E-R Diagrams.

**Relational Model:** The relational Model, Types, Keys, Relational Algebra, Domain Relational Calculus, Tuple Relational Calculus, Fundamental operations, Additional Operations, SQL fundamentals, Security.

#### UNIT-IV

**Database Design:** Functional Dependencies, Non-loss Decomposition, Functional Dependencies, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form- Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form

**Transactions:** Transaction Concepts, Transaction Recovery, ACID Properties, System

Recovery, Media Recovery, Two Phase Commit - Save Points, SQL Facilities for recovery, Concurrency, Need for Concurrency, Locking Protocols, Two Phase Locking, Intent Locking, Deadlock, Serializability, Recovery Isolation Levels, SQL Facilities for Concurrency.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Operating System Concepts	A. Silberschatz and Peter B. Galvin	Addison Wesley Publishing Company
2	Systems Programming & Operating Systems	Dhamdhere	Tata McGraw Hill
3	Database System Concepts	Abraham Silberschatz, Henry F. Korth, S. Sudharshan	Tata McGraw Hill
4	An Introduction to Database Systems	C.J.Date, A.Kannan, S.Swamynathan	Pearson Education
5	Database Systems Concepts, Design and Applications	S.K.Singh	Pearson Education



<b>Course Code</b>	<b>CSE374</b>
<b>Course Title</b>	<b>Elements of System Analysis &amp; Design</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	None
<b>Course Objectives (CO)</b>	The course has been designed to provide a solid foundation of systems principles and an understanding of how business functions, while heightening students to the issues analysts face daily.

## **SYLLABUS**

### **UNIT-I**

Introduction: System definition and concepts: Characteristics and types of system, Manual and automated systems Real-life Business sub-systems: Production, Marketing, Personal, Material, Finance Systems models types of models: Systems environment and boundaries, Real-time and distributed systems, Basic principles of successful systems, Systems analyst :Role and need of systems analyst ,Qualifications and responsibilities ,Systems Analyst as agent of change.

### **UNIT-II**

System Development cycle: Introduction to systems development life cycle (SDLC): Various phases of development: Analysis, Design, Development, and Implementation, Maintenance Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization. System Planning: Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits. Feasibility study and its importance Types of feasibility reports System Selection plan and proposal Prototyping , Cost-Benefit and analysis: Tools and techniques

### **UNIT-III**

Systems Design and modelling: Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD and ERD diagrams. Data Modeling and systems analysis , Designing the internals: Program and Process design, Designing Distributed Systems .Input and Output :Classification of forms: Input/output forms design, User-interface design, Graphical interfaces, Modular and structured design :Module specifications ,Module coupling and cohesion , Top-down and bottom-up design .System Implementation and Maintenance :Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems qualify Control and assurance, Maintenance activities and issues.

### **UNIT-IV**

System Audit and Security :Computer system as an expensive resource: Data and Strong media Procedures and norms for utilization of computer equipment, Audit of computer system usage, Audit trails, Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	System analysis and design	Elias M.Awad.	Galgotia Publications Pvt. Ltd
2	System analysis and design	Perry Edwards	Mitchell McGraw-Hill
3	Analysis and design of information systems	James A.Senn	McGraw-Hill



<b>Course Code</b>	<b>ECE372</b>
<b>Course Title</b>	<b>Mobile Communication</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Digital Communication
<b>Course Objectives (CO)</b>	To build an understanding of the fundamental concepts and basic taxonomy of computer mobile communication area, to study architecture of GSM and CDMA technology, to explain the need and significance of different types of networks, topologies and protocols, to study and understand how mobile and rest of the world do actually communicates with each other.

## SYLLABUS

### UNIT-I

Introduction to Cellular systems: Basic Cellular systems, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, concept of frequency reuse, cochannel interference reduction factor, desired C/I from a normal case in an omnidirectional antenna system, handoff mechanism, cell splitting, consideration of the components of cellular systems, different cellular systems and B3G systems.

### UNIT-II

Cochannel and Code channel interference reductions: Cochannel interference, exploring cochannel interference areas in a system, real time cochannel interference measurement at mobile radio transceivers, design of an omni-directional antenna system in worst case. Design of directional antenna system, lowering antenna height, reduction of cochannel interference by means of a notch in the tilted antenna pattern, umbrella pattern effect, use of parasitic elements, power control.

### UNIT-III

Handoff and Dropped Calls: Value of implementing handoffs, initiation of a hard handoff, delaying a handoff, forced handoffs, queuing of handoffs, power difference handoffs, MAHO and soft handoff, cell site handoff only, intersystem handoff, introduction to dropped call rate. GSM core network, GSM, BSS, NSS, OSS core and architecture overview, MSC (Mobile Switching Center), HLR (Home Location register), VLR (Visitor Location Register)

### UNIT-IV

Connectivity and interfaces, GSM subscriber services, Huawei GSM core network product, product introduction, Structure, logical structure etc. General call flows in Core network, Overview of GPRS/UMTS network, SGSN, GGSN, GPRS/UMTS network components.

General call flows in Core network, Overview of GPRS/UMTS network, SGSN, GGSN, GPRS/UMTS network components. 3G Systems: WCDMA-UMTS (UTRA-FDD) physical layer, WCDMA-ARIB physical layer, WCDMA-TDD physical layer, UMTS network architecture, Evolution of UMTS-3GPP release 4 and beyond (release 5, 6, 7)

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Principle of Mobile Communication	Gordan L. Stuber	Springer
2	Wireless communications	Theodore S. Rappaport	TMH
3	Wireless communication networking	Vijay Garg	Elesvier



<b>Course Code</b>	<b>ECE374</b>
<b>Course Title</b>	<b>Broadband Communication</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Objectives (CO)</b>	Study the principles and features of various possible alternatives for realizing high speed communication systems. Analyze and identify the suitability of a specific broadband system from the available alternatives depending on the geographical location, subscriber density.

### **SYLLABUS**

#### **UNIT-I**

Mobile and Satellite Communication - Mobile Communication Principles, Architecture of GSM, Introduction to 2G to 4G Systems such as GSM, HSCSD, GPRS, EDGE etc, Principles of CDMA. Satellite technology evolution, LEO, MEO, GEO satellites and their special services, orbital equations, link budget for C- band satellite, impact of satellite in Indian scenario.

#### **UNIT-II**

Fixed Wireless System and Wireless System-Microwave Links, Private Unlicensed links( Spread Spectrum), MMDS(Multi channel Multi- point distribution service), LMDS (Local multipoint Distribution Service), Introduction to Wi- Fi and Wi- MAX , Principles and Parameters for Wireless Lan(IEEE 802.11 Standards), Operating Principles for Wi- MAX( IEEE 802.16 standard) , Comparison of Wi- Fi and Wi-MAX.

#### **UNIT-III**

Optical Fiber Communication.-Principles of optical fiber communication, significant features and advantages of optical fiber communications, Recent trend- FTTH( Fiber – to –the – Home) System.

#### **UNIT-IV**

Quality of Service (Qos) in Broadband. Qos issues in broadband communication.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Mobile Communication Design Fundamentals	William C.Y. Lee	Wiley
2	Satellite Communications	Timothy Pratt	John Wiley & Sons
3	Wireless Communications	T.L Singhal	Tata McGraw-Hill Education
4	Optical Fibre Communications	Senior.John.M	Prentice Hall

<b>Course Code</b>	<b>EE372</b>
<b>Course Title</b>	<b>Electrical Measurement</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic electrical
<b>Course Objectives (CO)</b>	To understand various electrical quantities, their measurements and to familiarize with the construction, working principle and applications of various electrical instruments.

## SYLLABUS

### UNIT-I

**UNITS, DIMENSIONS AND STANDARDS:** Introduction to MKS (**Meter-Kilogram-Second**) and Rationalized MKSA (**Meter-Kilogram-Second-Ampere**) System, SI Units (International System of Units), Standards of electromotive force (EMF), Resistance, Capacitance and Inductance, Systematic errors

**GENERAL THEORY OF ANALOG MEASURING INSTRUMENTS:** Operating torque, damping and controlling torque, Torque-weight ratio, Pointers and Scales. Principles of operation of various types of electro mechanical indicating / registering instruments viz. Permanent Magnet Moving Coil (PMMC), dynamometer, induction, thermal, etc. for direct current and alternating current measurement of voltage, current, power, frequency, phase and power factor etc., energy meter: their sources of error and compensation, shunts and multipliers, multi-meter.

### UNIT-II

**POTENTIOMETERS:** Basic direct current (DC) potentiometer circuit, Modern form of DC potentiometer, measurement of voltage, current, Resistance and calibration of voltmeter and ammeter using DC potentiometer, volt ratio box, Self-balancing potentiometer, Alternating current (AC) potentiometers and their applications.

### UNIT-III

**MAGNETIC MEASUREMENTS:** Flux meter, B-H Curve, Hysteresis loop, Permeameters, AC Testing of Magnetic materials, Separation of iron losses, iron loss measurement by Wattmeter and Bridge methods.

### UNIT-IV

**INSTRUMENT TRANSFORMERS:** Theory and construction of current and potential transformers, ratio and phase angle errors and their minimization, Characteristics of current transformers (CT) and potential transformers (PT) and their Testing.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	A Course in Electrical and Electronics Measurement and Instrumentation.	Sawhney A. K	Dhanpat Rai and Sons.
2	Electrical Measurements and Measuring instruments	Golding Edward William and Widdis Frederick Charles	Wheeler's India .
3	Modern Electronic Instrumentation. and Measurement Techniques	Helfrick A.D. and Cooper W.D.	Prentice Hall



<b>Course Code</b>	<b>EE374</b>
<b>Course Title</b>	<b>Energy Auditing &amp; Management</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic electrical
<b>Course Objectives (CO)</b>	To understand how energy is used within the plant and to find opportunities for improvement, energy saving, energy audits concepts to evaluate the effectiveness of an energy efficiency project or program.

## SYLLABUS

### UNIT-I

**Energy Scenario:** Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment: Air pollution, Climate change, Energy security, Energy conservation and its importance, Energy strategy for the future, Energy conservation Act- 2001 and its features.

### UNIT-II

**Energy Management and Audit:** Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

### UNIT-III

**Financial Management:** Investment-need, Appraisal and criteria, Financial analysis techniques- Simple payback period, Return on investment, Net present value, Internal rate of return, Cash flows, Risk and sensitivity analysis, Financing options, Energy performance contracts and role of energy savings companies (ESCOs).

### UNIT-IV

**Electrical system:** Electricity tariff, Load management and maximum demand control, Power factor improvement, Distribution and transformer losses. Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, energy efficient motors. Light source, Choice of lighting, Luminance requirements, and Energy conservation avenues

**Compressed air system:** Types of air compressors, Compressor efficiency, efficient compressor operation, Compressed air system components, Capacity assessment, Leakage test Factors affecting the performance and efficiency.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher

1	Solar Energy and Energy Conservation.	Sawhney and Maheshwari	Prentice Hall (India)
2	Energy Technology	Rao S. and B. B. Parulkar	Khanna Publishers
3	Solar Energy	Sukhatme S. P	Tata McGraw Hill



<b>Course Code</b>	<b>ME372</b>
<b>Course Title</b>	<b>Total Quality Management</b>
<b>type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Objectives (CO)</b>	This subject provides students with the knowledge to understand the philosophy and core values of Total Quality Management (TQM), determining the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; apply and evaluate best practices for the attainment of total quality.

## SYLLABUS

### UNIT-I

**Quality and Total Quality Management:** Excellence in manufacturing/service, factors of excellence, relevance of TQM.

**Concept and definition of quality:** Total quality control (TQC) and Total Quality Management (TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.

**Just-in-time (JIT):** Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation.

### UNIT-II

**Customer:** Satisfaction, data collection and complaint, redressal mechanism.

**Planning Process:** Policy development and implementation; plan formulation and implementation.

**Process Management:** Factors affecting process management, Quality function development (QFD), and quality assurance system.

### UNIT-III

**Total Employees Involvement (TEI):** Empowering employees: team building; quality circles; reward and Recognition; education and training, Suggestion schemes.

**Problems solving:** Defining problem, Problem identification and solving process, QC tools. Benchmarking: Definition, concept, process and types of benchmarking.

### UNIT-IV

**Quality Systems:** Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.

**Advanced techniques of TQM:** Design of experiments: failure mode effect analysis: Taguchi methods.

<b>Recommended Books</b>			
<b>S.No.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
<b>1</b>	Total Quality Management	Sunder Raju	Tata McGraw Hill.
<b>2</b>	TQM for engineers	M.Zairi	Aditya Books.
<b>3</b>	Total Quality Management Handbook	J.L. Hradeskym	McGraw Hill.
<b>4</b>	Total Quality Key terms and concepts	William L.Duncan	Amacom
<b>5</b>	Total Quality Management and Operational Excellence Text with Cases	John S. Oakland	Routledge



<b>Course Code</b>	<b>ME374</b>
<b>Course Title</b>	<b>Maintenance and Reliability Engineering</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Objectives (CO)</b>	The course covers principles of reliability, failure rate and its relation to reliability, probability distribution of the time to failure, exponential distributions, reliability of systems, series and parallel systems, stand by redundancy, systems mean time to failure, mean residual life, reliability in design. It also includes failure mode effect analysis, failure tree analysis, and reliability testing and analysis, and warranty problems.

### **SYLLABUS**

#### **UNIT-I**

**Introduction:** Objective and characteristics of maintenance function, Organization of the maintenance system, Operating practices in maintenance, Maintenance record keeping.

**Cost Aspect of Maintenance:** Costs of machine breakdown, estimation of life cycle costs, Application of work measurement in maintenance, Manpower planning and training, Incentive payments for maintenance.

#### **UNIT-II**

**Planning of Maintenance Activities:** Evaluation of alternative maintenance policies breakdown, preventive and predictive maintenance, fault diagnosis and condition monitoring techniques, simulation of alternative practices, Development of preventive maintenance schedule, House keeping practices, total productive maintenance.

**Maintenance Engineering:** Maintenance requirements of mechanical, electrical, process and service equipment, Safety aspect in maintenance, Aspect of lubrication; chemical control of corrosion, Computerized maintenance information systems.

#### **UNIT-III**

**Reliability:** Concept and definition, configuration of failure data, various terms used in failure data analysis in mathematical forms, component and system failures, uses of reliability concepts in design and maintenance of different system.

**Reliability and Availability of Engineering systems:** Quantitative estimation of reliability of parts, Reliability of parallel and series elements, Accuracy and confidence of reliability estimation, Statistical estimation of reliability indices, Machine failure pattern, Breakdown time distribution.

#### UNIT-IV

**Reliability improvement:** Reliability in design, reliability in engineering, systems, systems with spares, reliability simulation, redundant and stand by systems, confidence levels, component improvement element, unit and standby redundancy optimization and reliability-cost trade off.

**Fault Tree Analysis:** Introduction and importance, fault tree construction, reliability calculations from fault tree, tie set and cut set methods, event tree and numerical problems.

Recommended Books			
S.No.	Name	Author(s)	Publisher
1	Maintenance Engineering Handbook	Lindley R. Higgins	McGraw Hill.
2	Principles of Planned Maintenance	R.H. Clifton	Edward Arnold.
3	Maintenance Planning control,	A Kelly	McGraw Hill.
4	Reliability Engineering	L.S Srinath	East West Press.
5	Reliability Engineering	S.K. Sinha	John Wiley.

<b>Course Code</b>	<b>MGT372</b>
<b>Course Title</b>	<b>Basics of Human Resource Management</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	To familiarize students with the concepts of Human resources in the organization and their roles in the Business Concerns.

## SYLLABUS

### UNIT-I

**Introduction to Human Resource Management:** Definition and Concept, Features, Objectives, Functions, Scope and Development of Human Resource Management, Importance of Human Resource Management, Human Resource Practices. **HRM and Personnel Management:** Introduction, Concept of Personnel Management, Personnel Management in India, Functions of the Labour Welfare Officer, Difference Between Personnel Management and HRM

### UNIT-II

**Human Resource Planning:** Concept of Human Resource Planning (HRP), Factors in HRP, Process of HRP. **Job Analysis and Design:** Job Analysis, Job Description, Writing a Job Description, Job Specification, Job Design. **Recruitment:** Introduction, Concept of Recruitment, Factors Affecting Recruitment, Types of Recruitment

### UNIT-III

**Selection:** Introduction, Concept of Selection, Process of Selection, Selection Tests, Barriers in Selection. **Induction:** Introduction, Meaning and Definition of Induction, Need for Induction, Problems Faced during Induction, Induction Programme Planning. **Training:** Concept and Significance of Training, Training Needs, Training Methods, Types of Training. **Performance Appraisal:** Introduction, Concept of Performance Appraisal, Purpose of performance appraisal, Process, Methods of Performance Appraisal, Major Issues in Performance Appraisal

### UNIT-IV

**Wages and Salary:** Introduction, Nature and Significance of Wage and Salary Administration, Theories of Wages, Methods of Wage Fixation. **Incentives:** Introduction, Concept of Incentives, Effective Incentive System, Types of Incentive Scheme. **Employee Relations:** Introduction, Concept of Employee Relations, Managing Discipline, Managing Grievance, Employee Counseling. **Employee Empowerment:** Introduction, Concept of Employee Empowerment,

Process of Empowerment, Empowerment in Indian Scenario, Empowerment in Global Scenario.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Human Resource Management	Aswathappa, K	Tata McGraw-Hill.
2	Human Resource Management	Bratton, J. and Gold, J.	Theory and Practice,
3	Human Resource Management	Flippo, E.	McGraw Hill.
4	Managing Human Resources	Gomez-Mejia, L.	Pearson Education



<b>Course Code</b>	<b>MGT374</b>
<b>Course Title</b>	<b>Management Practices</b>
<b>Type of Course</b>	PE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	This course introduces the fundamental management concepts and techniques.

## **SYLLABUS**

### **UNIT-I**

Management- concept, nature, process, importance & Functions. An overview of functional areas of management, managerial roles. Management as Art, Science & Profession Evolution of Management Theory (contributions) – Work of Fredrick .W. Taylor, Fayol's contribution, Discovery of Elton Mayo.

### **UNIT-II**

Management Functions – Planning, Organizing, Staffing, Directing and controlling. Planning: meaning-importance-elements- process – limitations Decision Making- concept, importance and steps in decision making, techniques of decision making. Motivation – concept; theories – Maslow, Herzberg, Mc Gregor.

### **UNIT-III**

Organizing - Concept, nature and significance; organizing structures: Line structure, Functional structure, Line and Staff structure, Project structure, Matrix structure, Authority and responsibility relationships, centralization and decentralization, departmentation. Staffing - importance, functions of staffing .Recruitment- sources & methods of recruitment, selection-meaning and process. Directing – meaning and steps of direction.

### **UNIT-IV**

Leadership- concept, styles and traits .Control: concept, process, Effective control system. Recent Trends in Management: Social Responsibility of Management – environment friendly management, Total Quality management, Stress Management, International Management

### **RECOMMENDED BOOKS**

<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Essentials of Management	Koontz H & W	McGraw Hill, New York
2	Management and organization	Rudani	Tata McGraw Hill
3	Basic Managerial Skills for All	McGrath, E.H.	Prentice Hall of India
4	Essentials of Management	Massie Joseph	Prentice Hall of India
5	Management-Text & Cases	VSP Rao	Excel Books, Delhi



<b>Course Code</b>	<b>AGE471</b>
<b>Course Title</b>	<b>Reliability Engineering</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	

### **SYLLABUS**

#### **UNIT- I**

##### **Introduction:**

Definitions and CO111T'pb, Reliability. Probability, Impossible and certain events. Failure-Data and its analysis, Hazard rate and Failure density, Reliability in terms of hazard rate, Failure density in other situations.

#### **UNIT-II**

##### **Hazard Models:**

Types of distribution and standard deviation and variance, Expectations Conditional probabilities.

#### **UNIT- III**

##### **System Reliability:**

Series, parallel and mixed configurations, Methods of solving complex systems.

#### **UNIT-IV**

##### **Reliability Improvement:**

Types of redundancies, Reliability allocation for a series system, Optimization Reliability - cost Trade-off.

#### **RECOMMENDED BOOKS**

<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Reliability Engineering	Srinath, L.S.	Affiliated East-West Press Limited, New Delhi
2	Reliability Evaluation of Engineering systems, Concepts and Techniques	Roy Billington and Ronald N.Allan	Pitman Advanced Publishing Co
3	Reliability Engineering	Govil, A.K	Tata McGraw Hill, New Delhi
4	Reliability Engineering	Balagurusamy, E.	Tata McGraw Hill, New Delhi



<b>Course Code</b>	<b>AGE473</b>
<b>Course Title</b>	<b>Remote Sensing And Geographical Information System</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	To introduce the principles and basic concepts of Remote Sensing and GIS  To introduce the remote sensing systems, data products and analysis. To introduce the spatial data models, analysis and presentation techniques. To study the applications of Remote Sensing and GIS in agriculture, soil and water resources

### **SYLLABUS**

#### **UNIT– I**

##### **Introduction**

Basic principles of remote sensing; Conventional aerial photography; Non-conventional photography; Non-photographic sensors; Rocket and earth orbital imagery; Energy sources and radiation principles; Energy interaction in the atmosphere and with earth surface; Nature of electromagnetic radiation; Active and passive remote sensing systems; Earth resource satellite.

##### **Photographic Systems for Remote Sensing**

Fundamental consideration; Aerial photographic film, cameras and filters.

#### **UNIT– II**

##### **Imaging and Nonimaging Sensors**

Sensor fundamentals; Nonimaging sensors; Optical mechanical scanners; Radiometric calibration.

##### **Remote Sensing Data Systems Processing and Management**

Information system; Image data storage and retrieval; Image data input and output; Image processing principles; Image processing implementation; Pattern recognition.

### **UNIT--III**

#### **Ground Investigations in Support of Remote Sensing**

Test sites; Common measurements; Geologic investigations; Agriculture and Forestry investigations; Atmospheric investigation.

#### **Image Interpretation**

Activities of image interpretation; Elements of image interpretation; Techniques of Image interpretation; Visual requirements for image interpretation; Image interpretation equipment.

### **UNIT-- IV**

#### **Digital Image Processing and Geographic Information System**

Image rectification and restoration; Image enhancement; Contrast manipulation; Multi image manipulation; Image classification; Post classification smoothing; Classification accuracy assessment; Basic concepts of GIS; Data imagery and GIS application for land and water resources.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Introduction to Environmental Remote Sensing	Barret, E.C. and Curits, L.F.	John Wiley and Sons Inc. New York
2	Space Remote Sensing System Introduction	Chern, H.S.	Academic Press Inc. New York
3	Remote Sensing and Image Interpretation	Lillesand, T.M. and Kiefer, R.W.	John Wiley and Sons Inc. New York
4	Remote Sensing: Methods and Applications	Hard, R.M.	John Wiley and Sons Inc. New York
5	Mannual of Remote Sensing	Reeves, R.G., Ansom, A. and David Landen	

<b>Course Code</b>	<b>CE471</b>
<b>Course Title</b>	<b>Infrastructure And Real Estate Management</b>
<b>Type of Course</b>	<b>OE</b>
<b>L T P</b>	<b>4 0 0</b>
<b>Credits</b>	<b>4</b>
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	The objective of this course is to make students aware of the various elements of infra structure and real estate management.

## SYLLABUS

### UNIT-I

#### **Introduction:**

Impact of Infrastructure development on economic development, standard of living and environment. Reasons for rise of public sector and government in infrastructural activities. Changed socio-economic scenario and current problems and related issues.

#### **Infrastructure Management:**

Importance, scope and role in different sectors of construction.

- **Highway Sector:**  
Repayment of Funds, Toll Collection Strategy, Shadow tolling, and direct tolls, Maintenance strategy, Review of toll rates & structuring to suit the traffic demand,
- **Irrigation Projects:**  
Large / Small Dams - Instrumentation, monitoring of water levels, catchments area, rainfall data management, prediction, land irrigation planning & policies, processes Barrages, Canals.
- **Power Projects:**  
Power scenario in India, Estimated requirement, Generation of Power distribution strategies, national grid, load calculation & factors, Hydropower - day to day operations, management structures, maintenance, Thermal Power, Nuclear Power.
- **Airports:**  
Requisites of domestic & International airports & cargo & military airports, facilities available, Terminal management, ATC.
- **Railways:** Mass Rapid Transport System MRTS, LRT, Multi-modal Transport System.

### UNIT-II

#### **Real estate management**

Introduction, functions of real estate project management.

#### **Project management –I**

Project management processes and organizational pattern, work breakdown structure, time scheduling techniques, CPM/PERT network analysis, resource management and scheduling

techniques, material management, time cost analysis, project organization, project peculiarities, good practices and managerial responsibilities, project cost control.

### **Project management II**

The application of management processes such as scope management, cost management, risk management, communication management and time management during the different construction phases. Some of the major techniques to be discussed are value engineering, quality function deployment, cost benefit analysis, risk identification and its quantification.

### **UNIT-III**

#### **Operation management**

Introduction , nature & scope of operation/production management, relationship with other functional areas, recent trends in operation management, manufacturing & theory of constraints, types of production system, just in time(JIT) and lean system

#### **Product design and process selection**

Stages in product design processes, value analysis, facility location and layout: types characteristics, merits and demerits, work measurement, job design

### **UNIT-IV**

#### **Forecasting and capacity planning**

Method of forecasting, overview of operation planning, aggregate production planning, production strategies, capacity requirement planning, MRP, scheduling supply chain management, purchase management, inventory management.

#### **Quality management**

Definition, dimension, cost of quality, continuous improvement(kaizen), ISO (9000&14000 series), quality awards, statistical quality control, variable and attribute, process control, control chart(X,R,P,np and C Charts) acceptance sampling operating characteristic curve(AQL, LTPD, a & b risk) total quality management(TQM)

### **RECOMMENDED BOOKS**

<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Project planning analysis, selection, financing, implementation and review	Chandra, prassanna	Tata McGraw Hill.Pub
2	Infrastructure development & financing towards a public private partnership	Raghuram.G& Jain R	Macmillan India ltd
3	Production and operation management, concepts methods & strategy	Charry S.N(2005)	John willy &sons asiapvt ltd

<b>Course Code</b>	<b>CE473</b>
<b>Course Title</b>	<b>Architecture &amp; Town Planning</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	To enable the students to relate the architectural projects in context of planning in rural, urban and regional context.

### SYLLABUS

**Elements of Design:**

Line direction. Shape, size, texture, value and colour, balance, scale and proportion.

**Principles of Design:**

Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions.

**The Industrial Revolution:**

The age of revivals, the emergence of engineer, new materials and techniques and the evolution of balloon frame and steel frame.

**Origin of Modern Architecture:**

Definition and concept of modern architecture, various pioneers of modern architecture.

**Town Planning:**

Definition and meaning, age of planning, scope and motives of planning, brief history of town planning – its origin and growth, historically development of town planning in ancient valley civilizations. Indus Nile Tigris and Euphrates, Greek Roman, Medieval and Renaissance town planning

**New Concepts:**

Garden city movement, Linear city and concentric city concepts, Neighbourhood and Radburn, La-cite industrial, Radiant city to present day planning.

**Planning Principles:**

Types of town and their functions, types of town planning – Grid Iron, Radial, Spider webs, Irregular and Mixed, their advantages and disadvantages.

**Planning Practice and Techniques:**

Zoning – its definition, procedure and districts, height and bulk zoning, F. A. R., Master Plan – Meaning, preparation and realization, the scope of city planning – city rehabilitation and slum clearance.

<b>RECOMMENDED BOOKS</b>
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<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Urban Planning Problems	Cherry, Gordon	Board Hill, London
2	Urban and Regional Planning in India	Sundaram, K V	Vikas Publishing house(P) Ltd., New Delhi
3	The Urban Pattern	Gallion A B, Eisner S,	Van Nostrandreinhold, New York



<b>Course Code</b>	<b>CSE471</b>
<b>Course Title</b>	<b>Web Development</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of Computer and its functions, Internet and Browser
<b>Course Objectives (CO)</b>	Allows the students to understand the various design and website development technologies, enhances the design skills of students.

## SYLLABUS

### UNIT-I

**INTERNET AND WORLD WIDE WEB:** Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLS, http, WEB applications, Tools for WEB site creation.

**HTML:** Introduction to HTML: HTML tags, Frames and forms, Lists, adding graphics to HTML page, creating tables, linking documents, frames, DHTML: Object model and Collections, Event model, Filters and Transitions, Data binding with tabular data control and Style sheets.

### UNIT-II

**Java Script:** Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies.

**JAVA:** Introduction to java objects and classes, control statements, arrays, inheritance, polymorphism, Exception handling.

Server side scripting Languages-JSP: Introduction to JSP, JSP Architecture, Scripting components, Standard actions, JSP with JDBC

Case study of a simple online application.

### UNIT-III

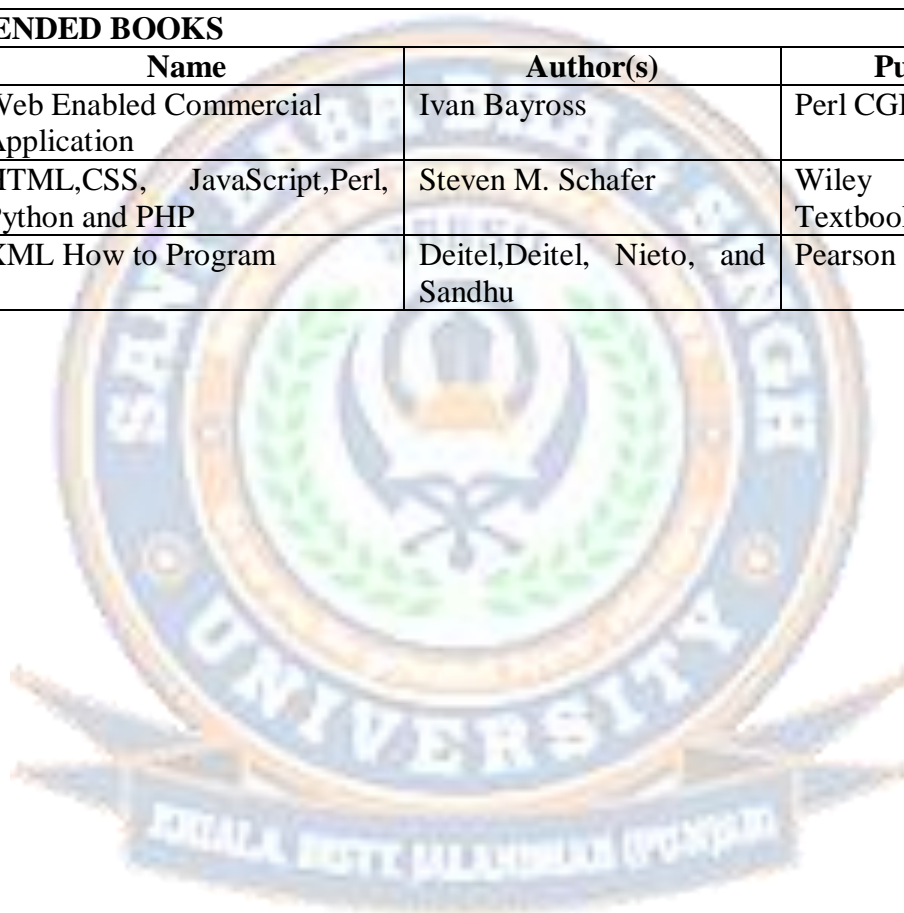
**XML:** Why XML, XML syntax rules, XML elements, XML attributes, XML DTD displaying XML with CSS, Extensible Style sheet Language(XSL).

### UNIT-IV

**AJAX:** Introduction, HTTP request, XMLHttpRequest, AJAX Server Script, AJAX Database.

**PHP:** Introduction, syntax, statements, operators, sessions, E-mail, PHP and MySQL, PHP and AJAX.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1.	Web Enabled Commercial Application	Ivan Bayross	Perl CGI
2.	HTML,CSS, JavaScript,Perl, Python and PHP	Steven M. Schafer	Wiley India Textbooks
3.	XML How to Program	Deitel,Deitel, Nieto, and Sandhu	Pearson Education



<b>Course Code</b>	<b>CSE473</b>
<b>Course Title</b>	<b>Distributed System</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of object oriented programming, data structures, threads, operating system concepts.
<b>Course Objectives (CO)</b>	This Course work provides the complete understanding of distributed system and its various applications in the field of computer Science.

## SYLLABUS

### UNIT-I

**Characterization of Distributed Systems:** Introduction, Examples of distributed Systems, Issues in Distributed Operating Systems, Resource sharing and the Web Challenges.

**System Models:** Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, and termination detection.

### UNIT-II

**Distributed Mutual Exclusion:** Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

**Distributed Deadlock Detection:** system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

### UNIT-III

**Agreement Protocols:** Introduction, System models, classification of Agreement Problem-Interactive consistency Problem, Applications of Agreement algorithms.

**Distributed Objects and Remote Invocation:** Communication between distributed objects,

Remote procedure call, Events and notifications, Java RMI case study.

**Transactions and Concurrency Control:** Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

#### UNIT-IV

**Distributed Transactions:** Introduction, Flat and nested distributed transactions, Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Distributed shared memory – Design and Implementation issues, consistency models, CORBA Case Study: CORBA RMI, CORBA services.

**File System:** File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Advanced Concepts in Operating Systems	MukeshSinghal&Niranjan G Shivaratri	Tata McGraw Hill
2	Distributed System: Concepts and Design	Coulouris, Dollimore, Kindberg	Pearson Education
3	Distributed Operating Systems	Tanenbaum S	Pearson Education
4	Distributed System: Concepts and Design	P K Sinha	PHI

<b>Course Code</b>	<b>ECE471</b>
<b>Course Title</b>	<b>Computer Networks</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Communication Engineering
<b>Course Objectives (CO)</b>	To build an understanding of the fundamental concepts and basic taxonomy of computer networking area, to explain the need and significance of different types of networks, topologies and protocols, to study and understand how computer and rest of the world do actually communicates with each other.

## SYLLABUS

### UNIT-I

Data Communications : Describe the purpose and functions of various network devices, Components, protocols and standards, Network and Protocol Architecture, Reference Model ISO-OSI, TCP/IP-Overview, Encapsulation and De-capsulation Process, Describe the purpose and basic operation of the protocols in the OSI and TCP models, topology, transmission mode, digital signals, digital to digital encoding, digital data transmission, DTE-DCE interface, interface standards, modems, cable modem, transmission media guided and unguided, transmission impairment, Performance, wavelength and Shannon capacity.

### UNIT-II

Basic Switching Concepts: Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching. Overview and difference between Circuit switching and packet switching. Data Link Layer: Design issues, Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ. Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point-to – Point Access: PPP Point –to- Point Protocol, PPP Stack. Ethernet, Ethernet cabling, Types of Ethernet, Ethernet frames, Ethernet devices (Repeater, Hub, Switch), CSMA/CD, Ethernet

Addressing (MAC Address), ARP.

### UNIT-III

Medium Access Sub layer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANs and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges. Network Layer: Design issues, Routing algorithms, Congestion control algorithms, Host to Host Delivery: Internetworking, addressing and routing, IP addressing (class full & Classless), Subnet, Network Layer Protocols: IPV4, IPV6. Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service.

### UNIT-IV

Calculate addressing scheme including VLSM IP addressing design to a network. Describe the basic routing concepts, perform and verify routing configuration tasks for a static or default mode, configure and verify RIP, OSPF, Configure and verify STP, Describe the principle of VLAN, configure and verify the VLANs and trucking on Huawei switches, describe the architecture of the optical access network, Describe GPON concepts, Analyze main GPON protocols, Datacom product introduction.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Computer Networks	A. S. Tanenbaum	4th Edition, PHI
2	Data Communications and Networking	B. A. Forouzan	TMH, 1 <sup>st</sup> ed.
3	Data & Computer Communication	William Stallings	PHI, 6ed.
4	An Engineering approach to Computer Networking	S. Keshav	Addison Wesley

<b>Course Code</b>	<b>ECE473</b>
<b>Course Title</b>	<b>Speech Signal &amp; Image Processing</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Objectives (CO)</b>	<p>To provide the student with an appreciation to understand the concepts of Speech Signals and their processing</p> <p>To analyze the different types of images and how can we apply different methods on images in order to enhance the different types of images.</p>

## SYLLABUS

### UNIT-I

Introduction to Image Processing Historical background, visual perception, image formation, Elements of Storage, sampling & Quantization, Relationships between pixels-neighbors of pixel, connectivity labeling of connected components, Relations, equivalence and Transitive closure, Distance measures, Arithmetic/ Logic operation, Imaging Geometry Basic and perspective transformation stereo imaging, application of image Processing.

### UNIT-II

Image Enhancement Spatial and frequency domain methods point processing, intensity transformation, Histogram processing image substation and Averaging spatial filtering, LP, HP and homo-morphic felling, generation of spatial marks, Color image processing.

### UNIT-III

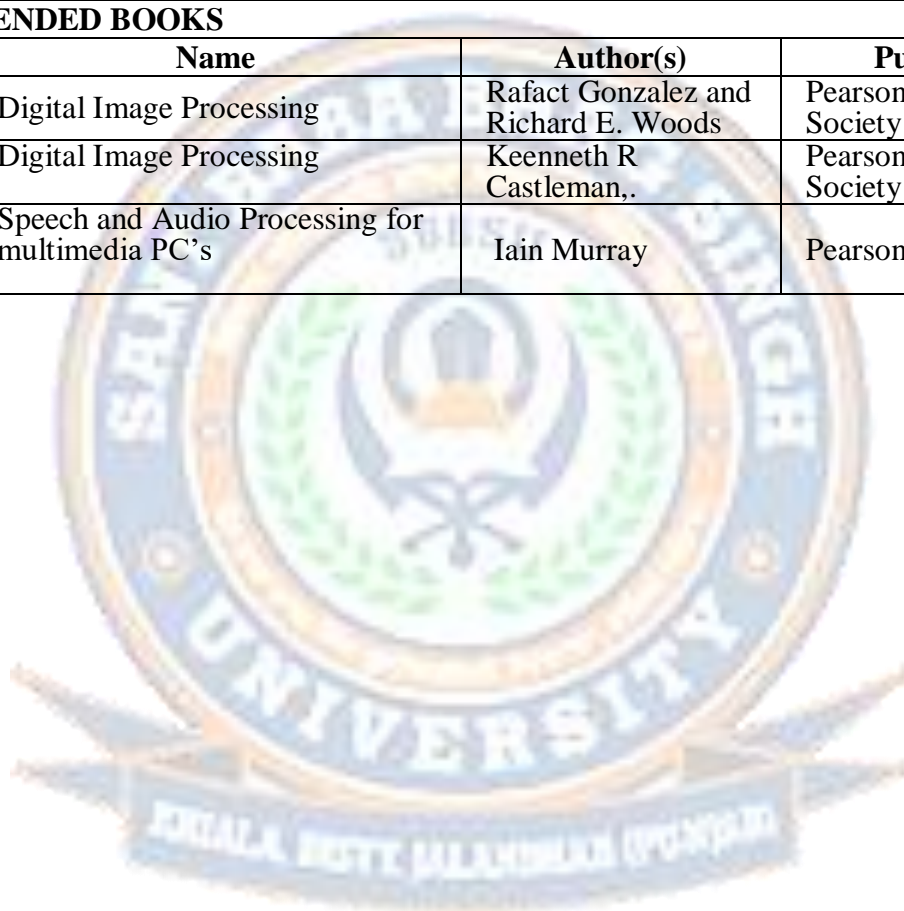
The Fundamentals of Digital Speech Processing. A Review of Discrete-Time Signal & Systems, Fourier transfer, DFT, FFT Fundamental of Digital Filters, FIR system, IIR Systems. 2. Time – Domain Methods for Speech Processing. Time-Dependent Processing of speech, short-time energy and Average Magnitude, Short time Average Zero-Crossing Rate. 3. Digital Representation of speech Waveform Sampling speech signals, statistical model, Instantaneous

quantization, Instantaneous companding, quantization for optimum SNR, Adaptive quantization, Feed-forward Feedback adaptations.

#### UNIT-IV

Speech Processing Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm. Human speech production, the vocal tract, the Larynx, the source filter. Speech signal processing-the phasor mode. Software, Elements of speech Synthesis speech Recognition-speech in the computer-human interface

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Digital Image Processing	Rafact Gonzalez and Richard E. Woods	Pearson Education Society
2	Digital Image Processing	Keenneth R Castleman,.	Pearson Education Society
3	Speech and Audio Processing for multimedia PC's	Iain Murray	Pearson Education.





<b>Course Code</b>	<b>EE471</b>
<b>Course Title</b>	<b>Fundamentals of Electrical Machines</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic electrical.
<b>Course Objectives (CO)</b>	To become familiar with single phase and three phase transformer, DC and AC machines, parallel operation of machines & to calculate the efficiency of machines.

### SYLLABUS

#### UNIT-I

**Introduction:** Basic Principle, Types and constructional features of electrical machines, torque, and torque angle, basic electromagnetic laws, Induced EMF.

#### UNIT-II

**Transformers:** Basic principle, turns ratio, types and parts of a transformer, ideal transformer, transformer on no-load and on-load, phasor diagram, transformer reactance and equivalent circuit, losses, efficiency, all day efficiency, regulation, basic concept of three-phase transformer and auto transformer (excluding analysis).

#### UNIT-III

**Direct Current (DC) Machines:** Principle, Constructional features, Types of direct current (DC) machines, Electromotive force (EMF) and torque equations, circuit model, armature reaction, commutation, Types of armature winding (no detailed diagram), characteristics of dc motors, characteristics of dc generators, starting (three point and four point starters), speed control methods, efficiency and applications.

#### UNIT-IV

##### A.C MOTORS

**Three-phase Induction Machines:** Concept of rotating magnetic field in three phase, Construction and principle of operation. slip frequency, rotor currents, rotor Magnetomotive force (MMF) and torque production, equivalent circuit; torque slip characteristics, power output, starting;

**Single-phase Induction Motors:** Principle of single phase induction motors, double field revolving theory, types of single phase induction motors.

**Synchronous Machines:** Construction and types, Electromotive force (EMF) equation, synchronous reactance.

**Principle of Special Motors:** Alternating current (AC) series motor, universal motor, reluctance motor, hysteresis motor, stepper motor, Brushless Motors, Switched reluctance motor and their

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Electrical Machines, VOL II	Thareja B.L	S.Chand
2	Bimbhra P.S.	Electrical Machinery,	Khanna Publishers

3	Electrical Machines	Nagrath I.J. and Kothari D.P	Tata McGraw Hill
<b>Course Code</b>		<b>EE473</b>	
<b>Course Title</b>		<b>Elements of Power System</b>	
<b>Type of Course</b>		OE	
<b>L T P</b>		4 0 0	
<b>Credits</b>		4	
<b>Course Prerequisites</b>		Basic electrical.	
<b>Course Objectives (CO)</b>		To familiarize with concept of power system transmission and distribution.	

### SYLLABUS

#### UNIT-I

**Power System Components:** Single line Diagram of Power system, Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator Supply System Different kinds of supply system and their comparison, choice of transmission voltage

**Transmission Lines:** Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect.

#### UNIT-II

**Over Head Transmission Lines:-** Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading  
**Overhead line Insulators:** Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

#### UNIT-III

**Mechanical Design of transmission line:** Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers Insulated cables: Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

#### UNIT-IV

**Neutral grounding:** Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices

**EHV AC and HVDC Transmission:** Introduction to EHV AC and HVDC transmission and their comparison, use of bundle conductors, kinds of DC links, and incorporation of HVDC into AC system

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Electrical Power Systems.	Wadhwa C. L.	New age international Ltd.
2	Power System Analysis and	Gupta B. R.	S. Chand & Co

	Design.		
3	Electric Power	Uppal S. L.	Khanna Publishers



<b>Course Code</b>	<b>ME471</b>
<b>Course Title</b>	<b>Renewable Energy Resources</b>
<b>type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro.

### SYLLABUS

#### UNIT-I

**Principles of solar radiation:** Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

#### UNIT-II:

**Solar energy collection:** Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**Solar energy storage and applications:** Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

#### UNIT-III:

**Wind energy:** Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**Bio-mass:** Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

#### UNIT-IV:

**Geothermal energy:** Resources, types of wells, methods of harnessing the energy, potential in India.

**Ocean energy:** OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

**Direct energy conversion:** Need for DEC, Carnot cycle, limitations, principles of DEC

<b>Recommended Books</b>			
<b>S.No.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>

1	Non-Conventional Energy Sources	G.D. Rai	Khanna Publishers
2	Renewable Energy Resources	Twidell&Wier	CRC Press( Taylor & Francis)
3	Renewable energy resources	Tiwari and Ghosal	Narosa.
4	Renewable Energy Technologies	K Mittal	Wheeler



<b>Course Code</b>	<b>ME473</b>
<b>Course Title</b>	<b>Ergonomics</b>
<b>type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	Human Factors and Systems Design gives students an overview of the underlying philosophy, aims and approaches of human centered systems design. Students are introduced to the human sensory and physiological systems and cognitive processes. They are exposed to basic principles of designing and evaluating workplaces and interfaces. Issues on accidents, human error and designing for safety are also covered in this course.

### **SYLLABUS**

#### **UNIT-I**

**Introducing Ergonomics and Discipline approach; Ergonomics/ Human factors:** Design today- Human aid to lifestyle, Journey, Fitting task to man their contractual structure, Domain, Philosophy and Objective, Mutual task comfort: two way dialogue, communication model, Ergonomics/ human Factors fundamentals, Physiology (work physiology) and stress

#### **UNIT-II**

**Human physical dimension concern:** Human body- structure and function, anthropometrics, Anthropometry: body growth and somatotypes, Static and dynamic anthropometry, Stand Posture- erect, Anthropometry landmark: Sitting postures, Anthropometry: squatting and cross-legged postures, Anthropometric measuring techniques, Statistical treatment of data and percentile calculations

**Posture and movement:** Human body- structure and function, Posture and job relation, Posture and body supportive devices, Chair characteristics, Vertical work surface, Horizontal work surface, Movement, Work Counter

#### **UNIT-III**

**Behaviour and perception:** Communication and cognitive issues, Psycho-social behaviour aspects, behaviour and stereotype, Information processing and perception, Cognitive aspects and mental workload, Human error and risk perception

**Visual Issues:** Visual performance, Visual displays

**Environments Factors:** Environmental factors influencing human performance

#### **UNIT-IV**

**Ergonomic design process:** Ergonomics design methodology, Ergonomics criteria/check while designing, Design process involving ergonomics check, Some checklists for task easiness.

**Performance support and design intervention:** Occupational safety and stress at workplace

in view to reduce the potential fatigue, errors, discomforts and unsafe acts, Workstation design, Furniture support, Vertical arm reach and design application possibility, Humanising design: Design and human compatibility, comfort and adaptability aspects, Concluding session: Design Ergonomics in India: scope for exploration.

<b>Recommended Books</b>			
<b>S.No.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
<b>1</b>	Introduction to Ergonomics	Bridger, RS	Taylor & Francis
<b>2</b>	Ergonomics for beginners, a quick reference guide	Dul, J. and Weerdmeester, B.	Taylor & Francis
<b>3</b>	Human Factors in Product Design	Green, W.S. and Jordan, P.W	Taylor & Francis
<b>4</b>	Handbook of Human Factors and ergonomics	G. Salvendy	John Wiley & Sons
<b>5</b>	Ergonomics Interventions for Health and Productivity	Singh, S	Himanshu Publications



<b>Course Code</b>	<b>MGT471</b>
<b>Course Title</b>	<b>Managing Innovation and Entrepreneurship</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	Foundations of Entrepreneurship Concept ,innovation management-definition and process of innovation management methods of management innovation Women entrepreneurs& Entrepreneurship Development

### **SYLLABUS**

#### **UNIT-I**

Foundations of Entrepreneurship Concept , Need, Definition& role of Entrepreneurship, Definition, characteristics& scope of Entrepreneur, Innovation, Invention, Creativity, Opportunities . Concepts of Entrepreneur, Manager, Intrapreneur / Corporate Entrepreneur comparative study, Roles& Responsibilities. Role of entrepreneur in Indian economy,

#### **UNIT-II**

Women entrepreneurs& Entrepreneurship Development Meaning, role, problems& reasons for less women entrepreneurs. Various institutes & Govt schemes to help & uplift women entrepreneurs. Case studies for successful women entrepreneurs. Concept, need & role of Entrepreneurship Development

#### **UNIT-III**

Small& Medium Enterprises: Small & Medium Industry: Meaning and importance Definition of SME –role & importance in India Economy, Steps for Starting Small Industry: Decisions to become entrepreneur -Steps to be taken-Search for a business idea, source of ideas, idea processing, selection idea, input requirements

#### **UNIT-IV**

Innovation management- definition and process of innovation management methods of management innovation. Entrepreneurship as a career, Sustaining Competitiveness Maintaining competitive advantage

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Renu arora, S.K sood	Fundamentals of Entrepreneurship	Kalyani Publishers
2	Richard Branson	Entrepreneurship and Business	Pearson

<b>Course Code</b>	<b>MGT473</b>
<b>Course Title</b>	<b>Project Management</b>
<b>Type of Course</b>	OE
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	
<b>Course Objectives (CO)</b>	Projects are non-recurring activities requiring a different set of skill for planning as compared to regular and operative activities. The course is aimed at developing the understanding of project activities and relevant skills.

## SYLLABUS

### UNIT-I

Project: Meaning, Objectives of a Project, Project Identification Analysis: Socio-economic Consideration in Project Formulation; Social Infrastructure Projects for Sustainable Development; Investment Opportunities; Project Screening and Presentation of Projects of Decision Making; Expansion of Capacity; Diversification, , Project Life cycle. Project planning-process.

### UNIT-II

Market and Technical Analysis: Market and Demand Analysis –Market Survey, Demand Forecasting, Uncertainties in Demand Forecasting; Technical Analysis. Project Costing and Finance: Cost of project; Cost of production; Break even Analysis; Means of Financing Project; Role of Financial Institution in Project Finance.

### UNIT-III

Project Appraisal: Time Value of Money; Project Appraisal Techniques – Playback Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return, Benefit Cost Ratio; Social Cost Benefit Analysis; Effective Rate of Protection, Local Cost Benefit Analysis. Risk Analysis: Measures of Risk; Sensitivity Analysis; Stimulation Analysis; Decision Tree Analysis.

### UNIT-IV

Project Scheduling/Network Techniques in Project Management: CPM and PERT Analysis and LOB. Project Audit; Project Audit Life Cycle, responsibilities of Evaluator/ Auditor. Project Selection.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Project Management: Strategic financial Planning Evaluation and Control	Bhavesh, M. Patel	Vikas Publisher

2	Project management	Chandra, P.	Tata McGraw hill
3	Modern project finance-A case book	Robert Bick, Robert K, David B, Crane	John Wiley and Sons

