Suggestive Study Path for Information Technology Department

	First Semester	Second Semester	Third Semester	Fourth Semester	Fifth Semester	Sixth Semester	Seventh Semester	Eighth Semester
Humanity and Social Sciences including Environmental Studies (14)	-------	Communication skill(05) (Total= 05)	Environment Studies 4+0+0 (Total=4)	PECL 3+0+0 (Total= 3)		BI 2+0+0 (Total =2)		
Basic Sciences (23)	EM I 3+1+0=4 Chem 3+0+1=4 (Total=8)	EM II 3+1+0=4 Phy 3+0+1=4 Biology 3+0+0 (Total= 11)	EM-III (4) (Total=4)	----------				
Engineering Sciences(25)	Workshop I 0+0+1=1 Graphics 3+0+1=4 Basics of ECTX 4+0+1=5 AM 3+0+1=4 (Total=14)	Workshop2 0+0+1=1 Basics of XXXX 4+0+1=5 (Total= 6)		OOP 3+0+1 (TOTAL=4)	OPEN SOURCE LAB - 0+0+1 (Total=1)			
Professional Core (82)	-------	-------	DE& MP 3+0+1 DS 3+0+1 CG 3+0+1 S/W LABI 0+0+2 (Total= 14)	DMS 3+1+0 DBMS 3+0+1 DCN 3+0+0 S/W LAB II- 0+0+1 (Total= 12)	CA 3+0+1 CN 2+1+1 SET 3+0+1 OS 3+0+1 (Total= 16)	TOC 3+1+0 ADBMS 3+0+1 MOC 3+0+1 (Total=12)	DM 3+0+1 IP 3+0+1 Cloud Computing 3+0+1 PROJECT I-02 (Total=14)	CNS 3+0+1 IOT 3+0+1 PROJECT II -06 (Total=14)
Professional Electives (20)	--------	-------	-------	-------	ERP /CO 4+1+0 (Total=5)	LOS/Distributed System 4+0+1 (Total=5)	CC/SC 4+0+1 (Total=05)	IR/GIS 4+0+1 (Total=05)
Open Elective (12)	-------	-------	-------	Basics of DS /Basics of CS 3+0+0 (Total 3)		PPL/OMD 3+0+0 (Total =3)	ML 3+0+0 (Total =03)	Big Data & Analytics 3+0+0 (Total 3)
Mandatory Courses (No Credits)	Any one		NCC/NSS/ / Yoga	NCC/NSS/ Group	Seminar/ Group Discussion	In-plant training (Two week) / Product Survey	Talent hour/ drama / Music / Instrument /	
Total Credits	22	22	22	22	22	22	22	22

GOVT. COLLEGE OF ENGINEERING AURANGABAD

CURRICULUM

First Year B. Tech.

(Civil/Electrical/Mechanical Engineering/ Electronics and Telecommunication/ Computer Science and Engineering/ Information Technology)

(With Effect From 2018-19)

Structure for First Year B.Tech. (Civil/Mechanical Engineering/Electrical) from Academic Year 2018 - 19

Choice Based Credit System

Semester- I

Sr. No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class Test I	Class test II	TA	ESE	TW	Total
1	MA1001	**Engineering Mathematics-I**	3	2	-	4	15	15	10	60	-	100
2	BS1001	**Engineering Physics**	3	-	-	3	15	15	10	60	-	100
3	HS1001	**Communication Skills**	3	2	-	4	15	15	10	60	-	100
4**	ET1099	**Engineering Exploration**	-	-	6	3	25	25	25	25	-	100
5*	#	**BCE/BME/BEE**	4	-	-	4	15	15	10	60	-	100
6	BS1002	**Lab- Engineering Physics**	-	-	2	1		-	-	-	50	50
7	HS1002	**Lab- Communication Skills**	-	-	2	1		-	-	-	50	50
8	#	**Lab- BCE/BME/BEE**	-	-	2	1		-	-	-	50	50
9	ME1005	**Lab- Workshop-I**	-	-	2	1		-	-	-	50	50
		Total	**13**	**4**	**14**	**22**	**85**	**85**	65	265	**200**	**700**

***BCE Course will be compulsory for FE Civil, BME Course will be compulsory for FE Mechanical, BEE Course will be compulsory for FE Electrical**

** For the course ET1009 Engineering Exploration Class Test – I will be Evaluation – I, Class Test – II will be Evaluation – II TA will be Evaluation – III and ESE will be Final Evaluation

Semester- II

Sr.No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class Test I	Class test II	TA	ESE	TW	Total
1	MA1002	**Engineering Mathematics-II**	3	2	-	4	15	15	10	60	-	100
2	BS1003	**Engineering Chemistry**	3	-	-	3	15	15	10	60	-	100
3	ME1003	**Engineering Graphics**	3	-	-	3	15	15	10	60	-	100
4	AM1001	**Engineering Mechanics**	3	-	-	3	15	15	10	60	-	100
5*	#	**BCE/BME/BEE /BECE/BCOMP&IT/BEEE**	4	-	-	4	15	15	10	60	-	100
6	BS1004	**Lab- Engineering Chemistry**	-	-	2	1		-	-	-	50	50
7	ME1004	**Lab- Engineering Graphics**	-		2	1		-	-	-	50	50
8	AM1002	**Lab- Engineering Mechanics**	-		2	1		-	-	-	50	50
9	#	**Lab- BCE/BME/BEE/ BCOMP&IT /BECE/BEEE**	-		2	1		-	-	-	50	50
10	ME1006	**Lab- Workshop-II**	-		2	1		-	-	-	50	50
		Total	**16**	**2**	**10**	**22**	**75**	**75**	**50**	**300**	**250**	**750**
		Grand Total	**29**	**6**	**24**	**44**	**160**	**160**	**115**	**565**	**450**	**1450**

L = Lecturer, **T** = Tutorial, **P** = Practical, **TA** = Teacher Assessment, **ESE** = End Semester Examination

**** Students of FE Civil shall select any one course except BCE, Students of FE Mechanical shall select any one course except BME, Students of FE EEP shall select any one course except BEE & BEEE.**

 # CE1001 BCE: Basics of Civil Engineering
ME1001 BME: Basics of Mechanical Engineering
EE1003 BEEE: Basics of Electrical & Electronics Engineering
CS1001 BCOMP&IT: Basics of Computer & IT
EE1001 BEE: Basics of Electrical Engineering
ET1001 BECE: Basics of Electronics Engineering

CE1002 : LAB. Basics of Civil Engineering
ME1002 : LAB. Basics of Mechanical Engineering
EE1004: LAB. Basics of Electrical & Electronics Engineering
CS1002: LAB. Basics of Computer & IT
EE1002 LAB. Basics of Electrical Engineering
ET1002 LAB. Basics of Electronics Engineering

Structure for First Year B.Tech. (Electronics and Telecommunication/Computer Science and Engineering/ Information Technology) from Academic Year 2018 – 19

Choice Based Credit System

Semester- I

Sr.No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class test I	Class Test II	TA	ESE	TW	Total
1	MA1001	Engineering Mathematics-I	3	2	-	4	15	15	10	60	-	100
2	BS1003	Engineering Chemistry	3	-	-	3	15	15	10	60	-	100
3	ME1003	Engineering Graphics	3	-	-	3	15	15	10	60	-	100
4	AM1001	Engineering Mechanics	3	-	-	3	15	15	10	60	-	100
5	#	BCOMP&IT/BECE	4	-	-	4	15	15	10	60	-	100
6	BS1004	Lab- Engineering Chemistry	-	-	2	1	-		-	-	50	50
7	ME1004	Lab- Engineering Graphics	-		2	1	-		-	-	50	50
8	AM1002	Lab- Engineering Mechanics	-		2	1	-		-	-	50	50
9	#	Lab- BCOMP&IT/BECE	-		2	1	-		-	-	50	50
10	ME1005	Lab- Workshop-I	-	-	2	1	-		-	-	50	50
		Total	**16**	**2**	**10**	**22**	**75**	**75**	**50**	**300**	**250**	**750**

***BECE Course will be compulsory for FE ETC, BCOMP&IT will be compulsory for FE CSE & FE IT**

Semester- II

Sr.No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class Test I	Class test II	TA	ESE	TW	Total
1	MA1002	Engineering Mathematics-II	3	2	-	4	15	15	10	60	-	100
2	BS1001	Engineering Physics	3	-	-	3	15	15	10	60	-	100
3	HS1001	Communication Skills	3	2	-	4	15	15	10	60	-	100
4**	ET1099	Engineering Exploration	-	-	6	3	25	25	25	25	-	100
5	#	BCE/BME/BEE /BECE/BCOMP&IT/BEEE ***	4	-	-	4	15	15	10	60	-	100
6	BS1002	Lab- Engineering Physics	-	-	2	1		-	-	-	50	50
7	HS1002	Lab- Communication Skills	-	-	2	1		-	-	-	50	50
8	#	Lab- BCE/BME/BEE /BECE/BCOMP&IT/BEEE	-	-	2	1		-	-	-	50	50
9	ME1006	Lab- Workshop-II	-		2	1		-	-	-	50	50
		Total	**13**	**4**	**14**	**22**	**85**	**85**	65	**265**	**200**	**700**
		Grand Total	**29**	**6**	**24**	**44**	**160**	**160**	**115**	**565**	**450**	**1450**

L = Lecturer, **T** = Tutorial, **P** = Practical, **TA** = Teacher Assessment, **ESE** = End Semester Examination

** For the course ET1009 Engineering Exploration Class Test – I will be Evaluation – I, Class Test – II will be Evaluation – II TA will be Evaluation – III and ESE will be Final Evaluation

***** Students of FE ETC shall select any one course except BEEE & BECE, Students of FE CSE & FE IT shall select any one course except BCOMP&IT**

 # CE1001 BCE: Basics of Civil Engineering
ME1001 BME: Basics of Mechanical Engineering
EE1003 BEEE: Basics of Electrical & Electronics Engineering
CS1001 BCOMP&IT: Basics of Computer & IT
EE1001 BEE: Basics of Electrical Engineering
ET1001 BECE: Basics of Electronics Engineering

CE1002 : LAB. Basics of Civil Engineering
ME1002 : LAB. Basics of Mechanical Engineering
EE1004: LAB. Basics of Electrical & Electronics Engineering
CS1002: LAB. Basics of Computer & IT
EE1002 LAB. Basics of Electrical Engineering
ET1002 LAB. Basics of Electronics Engineering

MA1001 : Engineering Mathematics-I	
Teaching Scheme: **Lectures: 03 Hrs/Week** **Tutorials: 02 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Engineering Mathematics-I (MA 1001) is a compulsory course for the first year engineering students of all disciplines of the institute.

Course Objectives:

Main objective is to give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies.

Course Outcomes:

After completing the course, students will able to:

CO1	Understand and apply the concepts of complex numbers to support their subsequent engineering studies
CO2	Understand and apply theory of matrices to support their subsequent engineering studies
CO3	Understand and apply the concept of univariate calculus to support their subsequent engineering studies
CO4	Understand apply the concept of multivariate calculus to support their subsequent engineering studies.

Detailed Syllabus:

Unit 1	**Complex Numbers** **(6L+4T)** De Moivre's theorem, Applications of De' Moivre's theorem to find roots of polynomial equations ,Expansion of $\sin n\theta, \cos n\theta, \sin^n \theta, \cos^n \theta$, Circular functions & Hyperbolic functions , Logarithm of complex numbers, Separation of complex numbers into real and imaginary parts
Unit 2	**Matrices** **(6L+6T)** Rank of a matrix, Normal form of matrix, Echelon form of matrix, Algebraic system of m linear equations in n unknowns, Linear dependence and independence of vectors, Eigen values and Eigen vectors , Cayley-Hamilton theorem and its applications
Unit 3	**Successive Derivatives** **(8L+4T)** n^{th} order ordinary derivatives of elementary functions, Leibnitz's rule of derivatives of product of two functions, Expansion of function in power series, Taylor series, Maclaurin's series, Convergence of series, Range of convergence of power series, Test for convergence- Ratio test, Comparison test
Unit 4	**Partial Derivatives** **(5L+2T)** First and second order Partial derivatives, Partial derivatives of implicit and composite function, Total Derivative of a function, Euler's theorem on homogeneous functions Change of independent variables
Unit 5	**Applications of differential calculus** **(5L+4T)** Jacobian, Partial derivatives using Jacobian , Functional dependence, Maxima and minima of functions of two variables , Errors and Approximations

Text and Reference Books:

1. A Text Book of Engineering Mathematics (Vol.1 &2)- P.N.Wartikar & J.N.Wartikar, Pune Vidhyarthi Griha Prakashan, Pune.
2. Advanced Engineering Mathematics- Erwin Kreyszig Willey Eastern Ltd. Mumbai.
3. Engineering Mathematics-A Tutorial Approach by Ravish R Singh, Mukul Bhatt.
4. Higher Engineering Mathematics- B. S. Grewal, Khanna publication, New Delhi.
5. Advanced Engineering Mathematics-H. K. Dass, S. Chand and Sons.
6. Advanced Engineering Mathematics- Michael Greenberg,2/e, Pearson

BS1001 : Engineering Physics	
Teaching Scheme **Lectures: 03 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Engineering Physics (BS1001) is a one semester compulsory course for the first year engineering students of all disciplines of the institute. The course is aimed at introducing the fundamentals of engineering physics to under graduate students.

Course Objectives:
To provide deeper insight in understanding of engineering courses.
To awaken them to understand latest developments in engineering and technology.
To provide the basic concept to resolve many engineering and technological problems.
To enable them to work in inter-disciplinary areas, having potential of new technologies.
To motivate the students through practical examples that demonstrates the role of physics in progress of engineering disciplines so as to inculcate the interdisciplinary academic environment.

Course Outcomes:
After completing the curse, students will able to:

CO1	Apply core concepts in engineering physics to solve engineering problems and communicate effectively their understanding of physical concepts.
CO2	Describe the physical principles of electron ballistics and apply the same to situations of physical and engineering world.
CO3	Understand optical phenomenon such as interference and diffraction in terms of wave model.
CO4	Understand optical phenomenon such as polarization and birefringence in terms of wave model.
CO5	Summarize the importance of free charged particles in determining properties of semiconductor; understand the concept of Fermi energy.
CO6	Apply core concepts in materials (magnetic and dielectric) to select proper material for engineering application.
CO7	Gain the fundamental knowledge of architectural acoustics and its application in designing acoustically good buildings and describe production and non-destructive applications of ultrasound.
CO8	Identify and solve engineering physics problems.

Detailed Syllabus:

Unit 1	**Electron Ballistics** Motion of Electron in uniform electric and magnetic field (parallel and perpendicular field), Millikan's oil drop method for electronic charge, e/m by Thomson's method, Electron Refraction, Electro-static and Magneto-static focusing, Electron microscope, block diagram and working of TEM
Unit 2	**Optics-I** Interference- Introduction, Concept of Thin Film, Interference due to thin films of uniform thickness (with derivation) and non uniform thickness (qualitative), Newton's rings, Anti-reflection coating. Diffraction- Diffraction of waves, Fraunhofer diffraction at single slit(geometrical method),Condition for maxima and minima ,Double slit Diffraction (qualitative results only).Plane diffraction grating(qualitative),Conditions for maxima and minima, Rayleigh's criterion of resolution, R.P of grating.
Unit 3	**Optics-II** Polarization - Introduction, Production of plane polarized light by double refraction, Polarizer and Analyzer, Law of Malus, Superposition of e-ray and o-ray for production of circularly and elliptically polarized light, Quarter and Half wave plates, Polaroides. LASER-Stimulated Absorption, Spontaneous and Stimulated emission of radiation, Population inversion, Pumping, Optical resonator, Construction and Working of He-Ne laser, Applications of laser.
Unit 4	**Semiconductors** Band theory of Solids, Classification of solids on the basis of energy band theory, Fermi-Dirac statistics, Concept of Fermi level and its variation with temperature and impurity, Density of states (qualitative), Position of Fermi level in intrinsic semiconductor (with derivation) and in extrinsic semiconductor (qualitative), Conductivity of semiconductor, Working of p-n junction from energy band diagram, Hall effect in semiconductor (with derivation).
Unit 5	**Engineering materials** Dielectric properties of material- Dielectric constant, Induced and Permanent dipoles, Polar and Non-Polar dielectrics, Polarization of dielectric materials, Types of polarization, Ferro and Piezo-electricity(qualitative),Frequency dependence of dielectric constant, Applications of dielectric materials. Magnetic properties of materials-Review of basic formulae, Magnetic susceptibility, Classification of dia, para and ferromagnetic materials, Ferromagnetic domains, Hysteresis in ferromagnetic materials, Soft and Hard magnetic materials, Applications.
Unit 6	**Sound** Acoustics- Reflection of sound, Echo, Reverberation, Reverberation time, Absorption of sound, Absorption coefficient, Sabine's formula (with derivation), Eyring's equation, Condition for good acoustic of the building, Ultrasound-Production of ultrasound by piezo-electric and magneto-striction oscillator, Engineering applications of ultrasound-non destructive testing.

Text Books

1. Engineering Physics,Malik and Singh,Mc Graw Hill Publication
2. Engineering Physics,Avadhanulu,Kshirsagar,S.Chand Publications
3. Engineering Physics, Gaur ,Gupta ,Dhanpat Rai and Sons Publications
4. Engineering Physics,K.Rajgopal,Prentice Hall of India Pvt.Ltd.
5. Applied Physics, P.K.Mittal,I.K.International New Delhi

Reference Books

1. Optics,Ajoy Ghatak,Tata-McGraw Hill Publications(Third Edition)
2. Fundamentals of Optics,Jenkin and White,Mc Graw Hill Publication(4th Edition)
3. Laser and non-linear optics,B.B.Land,Oscar Publications
4. Fundamentals of physics Halliday, Resnic and Walker, 9th Ed. , John Wiley

BS1002 : Lab Engineering Physics	
Teaching Scheme **Practical: 02 Hrs/Week**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes:
As an outcome of completing the Laboratory course, students will able to:

CO1	Gain hands-on experiences concerned to basic laws of physics with experimental process.
CO2	Acquire and interpret experimental data to examine the physical laws.
CO3	Conduct experiments to understand the relationships between variables in physical problems.
CO4	Learn to draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.
CO5	Work in teams and understand the effective team dynamics.

List of Experiments

Sr. No.	Details
1	e/m by Thomson's method.
2	Determination of radius of curvature of plano-convex lens by Newton's ring.
3	Determination of the wavelength of light of a given source using diffraction grating.
4	Resolving power of telescope.
5	Study of C.R.O (amplitude and frequency measurement).
6	Specific rotation of sugar solution by Laurent's half shade polarimeter.
7	Determination of band gap of a semiconductor.
8	To study temperature dependence of resistivity of a semiconductor using four probe method.
9	To determine the Hall coefficient of a semiconductor material and then evaluate carrier type and its density of charge carrier.
10	Study of solar cell characteristics.
11	Determination of wavelength of Laser using grating.
12	Determination of velocity of sound through water using ultrasonic interferometer.
13	To plot the hysteresis loop of a given magnetic material (iron).
14	To study characteristics of photovoltaic cell.
15	To find curie temperature of a ferroelectric material by measuring capacitance as a function of temperature.
16	Study of divergence of Laser beam.
17	To measure thickness of fine wire and grating element with the help of Laser source.
18	Calculation of lattice constant from the given X-ray pattern.
19	Determination of the power distribution within Laser beam and spot size of the beam.
20	Semiconductor diode characteristics (Ge, SI, Zener, LED).
21	Determination of Plank's constant by Photocell.
22	Measurement of thermo e.m.f between different types of thermocouples as a function of temperature difference between the junctions, measurement of unknown temperatures.

BS1003 : Engineering Chemistry	
Teaching Scheme **Lectures: 03 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Engineering Chemistry (BS1003) is a one semester compulsory course for the first year engineering students of all disciplines of the institute.

The course is aimed at introducing the fundamentals of engineering chemistry to under graduate students. The goal of the course is to remember, understand and apply basic principles of engineering chemistry and their application in different branches of engineering to solve engineering problems and to support their concurrent and subsequent engineering studies.

Course Objectives:

To identify, formulate and solve problems.

To function on multidisciplinary terms.

To understand the impact of engineering chemistry on engineering solutions in global, economic, environmental and societal context.

Course Outcomes:

After completing the curse, students will able to:

CO1	To understand the basic principles of chemistry for handling of materials. To attain knowledge of properties and applications of such materials.
CO2	To apply knowledge of structure, reactivity, mechanism and stereochemistry for making advancement in research and technology.
CO3	To develop an ability of analysis of materials by using analytical methods.
CO4	An ability to conduct experiments, analyzes data, and interprets results, with responsible and ethical scientific conduct.
CO5	Effective interpretation of analytical data to transform complex technical information in a clear and concise manner.

Detailed Syllabus:

Unit 1	**Lubricants** Introduction, Mechanisms of lubrication - Fluid film, Boundary film & Extreme pressure. Types of lubricants – Solid lubricants – Molybdenum disulphide, Graphite. Liquid lubricants – Vegetable, Animal, Mineral & Synthetic oils. Semi solid lubricants – Greases, Lubricating Emulsions – Oil in water, Water in oil. Properties of lubricants & its significance – Physical properties – Viscosity & Viscosity Index. Determination of viscosity by Redwood viscometer, Flash & Fire point by Pensky-Marten's apparatus, Cloud & Pour point. Chemical properties – Acid value, Saponification value, Steam emulsification number.
Unit 2	**Fuels** Definition, Classification of fuels, Calorific value – Gross calorific value, Net calorific value, Different units of Calorific value & their inter-relation, Numerical. Types of fuels – Solid fuel – Coal – Proximate & Ultimate analysis of coal, Determination of calorific value by Bomb calorimeter, Numerical. Liquid fuel – Petroleum – origin, refining & Fractional distillation, Catalytic cracking – Fixed bed and Moving bed type. Gaseous fuel - preparation, properties and applications of – Coal gas, Water gas. Advantages and Disadvantages of solid, liquid and gaseous fuels.

Unit 3	**Water Treatment** Introduction, Definition of hard and soft water, Sources of water and classification of impurities, Hardness and its types, Units of hardness, Determination of hardness of water by EDTA method, Numerical. Boiler troubles - Scale & Sludge formation in boiler, Internal treatment methods, Priming & Foaming, Caustic Embrittlement. Water softening process – Zeolite process.
Unit 4	**Polymers** Introduction, Classification of polymers, Mechanism of addition polymerization by free radical method. Preparation, properties & applications of – Polyethylene, Polystyrene, PVC, Nylon 66, Teflon, Polyester. Vulcanization of rubber by accelerated sulpher method, Synthetic Rubber – preparation, properties & applications of – Styrene butadiene rubber (SBR), Nitrile rubber, Butyl rubber.
Unit 5	**Stereochemistry and Analytical methods** Optical isomerism – optical activity, Chirality, D-L and R-S configuration system, determination of configuration using sequence rules, Optical isomerism in compounds containing one & two asymmetric carbon atom - Lactic acid & Tartaric acid. Conformational analysis – Conformations of cyclohexane – chair & boat Conformation. Conformation of mono & di-substituted cyclohexane. Separation methods - Chromatography – Introduction, types of chromatography, Principle, techniques & applications - Paper chromatography (Ascending and Descending type), Thin layer chromatography. Absorption methods – Colorimetry - Principle, techniques & applications. Electro-analytical methods – Conductometry, P^{H} metry - Principle, techniques & applications.

Text Books

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.
2. S S Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.
3. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.
4. "Engineering Chemistry", B Sivasankar, Tata Mc Graw Hill (P) Ltd.
5. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.
6. "Engineering Chemistry", S K Singh, New Age International.
7. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.

Reference Books

1. "Stereochemistry", P S Kalsi, Wiley Eastern Ltd.
2. V R Gowariker, "Polymer Science", New Age International.
3. "Industrial methods of Chemical Analysis" Volume I & II, Scott.
4. "Instrumental methods of Chemical Analysis" B K Sharma
5. "Instrumental methods of Chemical Analysis" Chatwal & Anand
6. "Instrumental methods of Chemical Analysis" G W Ewing, 3rd Ed. Tata Mc Graw Hill (P) Ltd.
7. "Fundamentals of organic chemistry", Graham - Soloman T W, John Wiley & Sons Inc.
8. "Physical Chemistry", Alberty & Silbey, John Wiley & Sons Inc.
9. "Organic Chemistry", Morrison & Boyd, Prentice Hall of India, 6th Edition.
10. "Laboratory manual on Engineering chemistry", S K Basin, Sudha Rani, Dhanpat Rai Publishing Co.
11. S S Dara, "A Textbook on Experiment and calculation in Engineering Chemistry" S. Chand Publication
12. "Experiment in General Chemistry" East West Press, New Delhi

BS1004 : Lab Engineering Chemistry	
Teaching Scheme **Practical: 02 Hrs/Week**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will able to:

CO1	To perform accurate quantitative measurements with an understanding of the theory, principle and procedure.
CO2	To understand the objectives of experiments, carry out the experiments, and appropriately record and analyze the results.
CO3	To demonstrate excellent laboratory skills and techniques including the proper use of relevant instruments and related technologies.
CO4	To Work effectively and safely in a laboratory environment in teams as well as independently.
CO5	To have Knowledge and understanding of the issues of safety regulations, ethics and societal issues in the use of chemicals in their laboratory work.

List of Experiments

Sr. No.	Details
1	Determination of Hardness of Water by EDTA method.
2	To determine the chloride content of water sample by Mohr's method.
3	Conductometric titration – mixture of Acid & Base.
4	Determination of Cell Constant.
5	Determination of Acid Value of lubricant.
6	Determination of Saponification Value of lubricant.
7	Determination of Viscosity of lubricating oils by Redwood Viscometer.
8	Determination of Flash & Fire point of lubricant oil.
9	To Determination PH value of solutions by indicator, paper and by PH meter.
10	Preparation of Phenol Formaldehyde Resin (Bakelite).
11	Determine the yield percentage of Polystyrene by bulk polymerization.
12	Determination of Iron by colorimetric method.
13	Separation of chemicals by thin layer chromatography.
14	To determine % purity of an iron form an ore.
15	Determination of Cloud & Pour point.
16	To verify Lambert Beer's Law colorimetrically.
17	Determination of specific rotation and concentration of dextrose solution using colorimeter.
18	To determine Rf value and identify phenyl alanine & Glycine mixture by ascending paper chromatography.
19	To separate Methylene blue and Methyl orange by thin layer chromatography.
20	To determine conductometrically, the strength of given HCl solution by titrating with standard NaOH solution.
21	To estimate HCl in a given solution using 0.05 N NaOH solution PH metrically.
22	To determine moisture, volatile matter and ash contents in a given coal sample by proximate analysis.
23	Determination of calorific value of a solid fuel, using Bomb calorimeter.
24	To determine the empirical formula of ferric-5 sulpho salicylate complex by Jobs method.
25	Determination of Chemical Oxygen Demand (C.O.D.) of waste water.

HS1001 : Communication Skills	
Teaching Scheme **Lectures: 03 Hrs/Week** **Tutorials: 02 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Communication Skills (HS1001) is a one semester compulsory course for the first year engineering students of all disciplines of the institute. The course is aimed at introducing the basic of the communication skills. Communication skill is for the development of formal communication and improvement in the communication of day to day life.

Course Objectives:
To develop interpersonal communication skills.
To able them to communicate in professional as well as day to day life.

Course Outcomes:
After completing the course, students will able to:

CO1	Understand communicative process and ways to communicate effectively, overcome the barriers in speaking and writing English and know and correlate concepts of communication and get the ability to communicate in different situations.
CO2	Develop their personality through corporate etiquettes and take active participation in classroom discussion and other academic activities as well.
CO3	Use proper words and structure in speaking English language and develop vocabulary and use of correct English.
CO4	Express them through oral as well as written communication, acquire techniques for effective writing and develop written communication for professional and business purpose.
CO5	Use of E-Communication in their day to day as well as professional life and familiar with the E-Communication and the etiquettes used in Email writing.

Detailed Syllabus:

Unit 1	**Communication Skills & Soft Skills** Basic Concept, Factors, Process and Types of Communication, Principles of Effective Communication, Barriers of Communication. And how to overcome these barriers. Basic of Soft skills, phonetics symbols, articulation of speech sound.
Unit 2	**Nonverbal Communication and Corporate Etiquettes** Body Language and its different aspects, Voice Dynamics & Voice Modulation, Professional Appearance, Clothing Etiquettes and Corporate Dressing.
Unit 3	**Remedial Grammar And Vocabulary Building** Parts of Speech, Types of Tense, Use of Articles, Synonyms and Antonyms, Find out the Grammatical Errors in the given sentences.
Unit 4	**Writing Skills And Business Correspondence** Letter Writing, Office documents like Circulars, Notices, Minutes, Agenda And Memos Report Writings. Resume Writing.
Unit 5	**E-Communication** Email Communication And Email Etiquettes

Reference Books

1. " Business Communication" By Urmila Rai & S. M. Rai
2. "Communication Skills" By Leena Sen
3. "Technical communication" By William Sanborn (Pearson publications.)
4. "Presentation Skills for Managers", McGraw Hills brief case books.
5. Professional Communication Skill, Pravil S.R. Bhatia, S.Bhatia
6. Technical Report Writing Today: Daniel G. Riordan, Steven E. Pauley
7. Technical Writing: B. N. Basu 22 of 25
8. English Grammar Composition & Effective Business Communication, M.A Pink, S. E. Thomas.
9. Written Communication in English, by Sarah Freeman

HS1002 : Lab Communication Skills	
Teaching Scheme **Practical: 02 Hrs/Week**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand the role of communication.
CO2	Acquire the skills of communication to achieve excellence in academic and professional career.
CO3	Develop leadership and management skills.
CO4	Use the correct English in both written and oral communication as well.
CO5	Utilize the techniques of E- Communication.
CO6	Enhance the listening and understanding capacity.
CO7	Understand the use of non-verbal communication.

List of Experiments

Sr. No.	Details
1	**Communication Skills**
	1. Different Communication Situation.
	(Formal, Informal, Upward, Downward . etc)
	2. Telephonic Communication.
	(Enquiry, Leaving Message.etc)
2	**Functional English**
	3.JAM Sessions
	4. Group Discussion.
	5. Debate.
	6.Presentation
	7.Interview
3	**Remedial Grammar And Vocabulary Building**
	8.Practical Based on the following Points
	a. Parts of Speech,
	b. Types of Tense,
	c. Use of Articles,
	d. Synonyms and Antonyms,
	e. Find out the Grammatical Errors in the given sentences
4	**Writing Skills And Business Correspondence**
	9. Practical Based on the following Points
	a. Letter Writing,
	b. Office documents like, Notices, Minutes, Agenda
	c. Report Writings.
	d. Resume Writing
5	**E-Communication**
	10.Email Writing,
6	**Listening Skills**
	11.Listen to the Audio and Answer the Questions
7	**Data Interpretation and Analysis**
	12.Analyse the Data and answer The questions

ME 1001: Basics of Mechanical Engineering	
Teaching Scheme Lectures: 4 Hrs/Week Credits: 4	**Examination Scheme** Class Test I: 15 Marks Class Test II: 15 Marks Teachers Assessment : 10 Marks End Semester Exam : 60 Marks

Course Description: After completing this course, students will have fundamental understanding of the Laws of thermodynamics, pressure and temperature measurement, thermal machines, sources of energy, power transmitting elements, various manufacturing processes and engineering materials.

Course Objectives:

- Impart knowledge of General Principles of Mechanical Engineering.
- Have a understanding of laws of thermodynamics and Thermodynamic Processes
- Understanding working Principles of Thermal Machines and Power Transmitting Devices
- Understanding Basic Materials and Manufacturing Processes

Course outcomes

After completing the course, students will able to:

CO1	Acquire basic knowledge of Thermodynamics, able to solve numerical problems on fundamental of thermodynamics, laws of thermodynamics, energy interaction
CO2	Understand working of two stroke and Four stroke IC engine, Compressor and Turbines, Refrigeration, Non conventional energy sources.
CO3	Understand the Working Principles of power transmitting elements.
CO4	Understand various manufacturing and machining processes and its applications.

Unit 1	**Fundamentals of Thermodynamics**, Pressure and Pressure Measurement, Temperature, Zeroth law of Thermodynamics, Measurement of Temperature, Thermometric scale, Forms of Energy, Work Transfer, P-dV work, other forms of Work Transfer, Heat Transfer, Concept of Specific Heat, Sensible Heat, Latent Heat.
Unit 2	**First law of Thermodynamics**: Law of Conservation of Energy, Joule's experiment, First law for Cyclic and Non-Cyclic processes, Concept of Internal Energy, Enthalpy, Ideal Gases – Concept of Constant Pressure, Constant Volume, Constant Temperature, Adiabatic, Polytropic, Throttling Processes and their representation on p-V and T-s diagrams, Engineering applications of various processes
Unit 3	**Introduction to Thermal Machines & Sources of Energy**: Working principles and application of - Internal Combustion Engines – (2-stroke and 4- stroke engines), Turbines, Compressor, Refrigerator (Description with block diagrams), Renewable and Non-Renewable energy, Principles and Working of – Steam Power Plant, Nuclear Power Plant, (Description with block diagrams).

Unit 4	**Power Transmitting Elements**: Working principles and application of – Shaft, Axle and Spindles. Couplings- types of couplings, Friction Clutches, Bearings, Brakes- types of Brakes, Drives – Belt, Chain drives construction, Gears- Classification of Gears.
Unit 5	**Manufacturing Processes and Engineering Materials**: Working principles and applications of – Casting, Forging, Welding, Brazing and Soldering. Machining Processes- Turning, Shaping, Milling, Drilling and Grinding, Introduction to Engineering Materials- Ferrous and Non Ferrous

Text Books and Reference Books

1. Ballaney P.L., "Thermal Engineering", Khanna Publishers
2. Rajput R.K., "Engineering Thermodynamics", Laxmi Publications.
3. Hajra Choudhary, Bose, "Work Shop Technology", Media Promoters & publishers Pvt. Ltd. (Vol.-I & II).
4. Bhandari V.B., "Machine Design", Tata-McGraw Hill Publications.
5. Domkundwar V.M., "Engineering Thermodynamics" Dhanpat Rai & Co.
6. Rao P.N., "Manufacturing Technology" McGraw Hill Pvt. Ltd.
7. Chapman series "Workshop Technology" Edward Arnold,1972.
8. Nag P.K., "Engineering Thermodynamics", Tata-McGraw Hill Publications.
9. Ven Violin "Classical Thermodynamics" Tata-McGraw Hill Publications

ME 1002: Lab Basics of Mechanical Engineering	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Course Objectives

1. Understand the concept of manufacturing processes and basic mechanical engineering.
2. To impart knowledge of: Internal Combustion engines, Refrigeration

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand the operation of IC Engine and Refrigerator
CO2	Understand the working of Brakes, Clutch, Couplings. Bearings and Gears.
CO3	Understand manufacturing operation of Various Machines Viz. Lathe, Milling.
CO4	Understand the operations of CNC Machines.
CO5	Understand operation of welding process.

The students shall perform the following experiments

Sr. No.	Details
1.	Study and Demonstration of operation of I.C. Engines
2.	Study and Demonstration of operation of Refrigerator.
3.	Study and Demonstration of working of Brakes, Clutch and Couplings.
4.	Study and Demonstration of working of Bearings and Gears
5.	Study and Demonstration of working of Lathe Machines, Milling Machines.
6.	Study and Demonstration of operation of CNC Machines
7.	Study and Demonstration of operation of Welding Processes.
8.	Industrial Visit

ME 1003: Engineering Graphics	
Teaching Scheme **Lectures: 3 Hrs/Week** **Credits: 3**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course Description: Engineering Graphics course is aimed at providing basic understanding of the fundamentals; mainly visualization, graphics theory, standards, conventions and tools.

Course Objectives:

1. Understand the basic principles of engineering graphics and improve the visualization skills.
2. To gain knowledge on projection of points, straight lines, planes, solids.
3. To know the principles of orthographic and isometric projections.
4. To understand the real life objects through Drawings.

Course Outcome

After completing the course, students will able to:

CO1	Identify basic concepts in drawing and its application
CO2	Plan and prepare neat orthographic drawings of points, straight lines, planes and solids
CO3	Develop the ability to visualize and draw orthographic and isometric projection of solids
CO4	Acquire skill to draw real life engineering objects by using the engineering drawing

Detailed Syllabus:

Unit 1	**Projections of Straight Lines:** Projections of Points in Four Quadrants, Projections of Points in Reference Plane, Line Parallel to both the Plane, Line Parallel to One Plane and Perpendicular to the other, Line Inclined to One Plane and Parallel to The Other, Line Inclined to Both the Reference Planes, Traces of Line, Use of Traces of Line in obtaining Projections (All four quadrants should be considered).
Unit 2	**Projections of Planes:** Plane with Surface Parallel to One Plane and Perpendicular to other, Plane Inclined to One Plane and Perpendicular to other, Projections of Planes Inclined to both the Planes.
Unit 3	**Projections of Solids:** Introduction to Solids: Prisms, Pyramid, Cylinder, Cone, Cube, Tetrahedron, Sphere, Projections of above Solids with Axis inclined to one plane, Projections of above solids with Axis inclined to both the Planes, Projection of composite solids (different arrangement of Spheres with above Solids).
Unit 4	**Orthographic Projections:** Orthographic projections of different Machine Parts, Sectional Orthographic Projections.
Unit 5	**Isometric Views:** Introduction to Pictorial views, Isometric Projections and Isometric views (Isometric and Non Isometric planes).

Text Books and Reference Books

1. Bhatt N. D. and Panchal V. M., "Engineering Drawing", Charotar Publishing House, Ananad
2. N. B. Shaha and B. C. Rana, "Engineering Drawing", Pearson Education
3. Dhabhade M. L., "Engineering Graphics", Vol.-I and Vol.-II, Vision Publications, Pune
4. W. J. Luzadder, "Fundamentals of Engineering Drawing", Prentice Hall of India, New Delhi
5. French and Vierck, "Graphic Science", Mc-Graw Hill International
6. Amar Pathak, "Engineering Drawing", WIELY India Publication

ME 1004: Lab Engineering Graphics	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Course Description: Engineering Graphics course is aimed at providing basic understanding of the fundamentals of Engineering Graphics; mainly visualization, graphics theory, standards and conventions of drawing, the tools of drawing and the use of Drawings in engineering applications. Drawing is the language of Engineers.

Course Objectives:

5. To learn the use of different types of drawing instruments, symbols, conventions and representation of letters/numbers/title block in engineering drawing
6. To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient
7. To gain knowledge on projection of points, straight lines, planes, solids
8. To know the principles of orthographic and isometric projections
9. Develop ability to demonstrates ideas and design concepts using drafting software

Course Outcome

As an outcome of completing the Laboratory course, students will able to:

CO1	Develop competence in correct expression of the visualized objects
CO2	Dimension and annotate two-dimensional engineering drawings
CO3	Plan and prepare neat orthographic drawings of points, straight lines, planes and solids
CO4	Develop the ability to visualize and draw orthographic and isometric projection of solids using CAD software

List of Experiments

Laboratory work shall consist of drawing sheets as given below

Sr. No.	Details
1	Drawing three problems based on projections of lines on half imperial size drawing sheet
2	Drawing three problems based on projections of planes on half imperial size drawing sheet
3	Drawing three problems based on projections of solids on half imperial size drawing sheet
4	Drawing two problems based on orthographic projections using software package
5	Drawing two problems based on isometric projections using software package

ME 1005: LAB – WORKSHOP -I	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Laboratory Course Outcomes
Students will able to:

CO1	Understand use of tools of Fitting, Carpentry & Sheet Metal working operations
CO2	Acquire engineering skills in Fitting, Carpentry & Sheet Metal working operations.

List of Experiments

Sr. No.	Details
1	**Fitting:** Preparing one job involving simple Fitting operations like Sawing, Marking, Fitting different shapes. By using different types of Files, Drilling, Tapping or use of Die for external Threading.
2	**Carpentry**: Preparing one job by using different Carpentry Tools and Operations.
3	**Sheet Metal Working:** Preparing one job of Sheet Metal using different Tools and Operations.

Text and Reference Books:

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008

CE 1001 : Basics of Civil Engineering	
Teaching Scheme **Lectures: 4 Hrs/Week** **Tutorials: None**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course Description: After completing this course, students will have a broad and fundamental understanding of different aspects of Civil Engineering. Topics range from building planning, civil engineering materials, construction equipments, geographical measurement, building and road construction. Students will learn different aspects of earth quake engineering. In addition, students will learn terminology; methods used in water shed management and roof top rain water harvesting. Students will also be introduced with different types of dams, necessity of irrigation and micro irrigation.

Course Objectives:

1. To introduce function of various components of the building and structures.
2. To identify suitable material for the construction of particular component of a structure.
3. Define the various terms used in earthquake engineering and the concept of earthquake resistant structures.
4. Carry out linear and angular measurement, elevation details and calculate the missing data.
5. Select specific water harvesting storage structure suitable for the watershed and river basin.

Course Outcomes:

After completing the course, students will able to:

CO1	Plan and draw line plan of residential building and sketch different components of structure
CO2	Get knowledge regarding occurrence of earthquake and earthquake resistant structures
CO3	Know component parts of buildings, roads and water resources structures
CO4	Determine the reduced levels of different stations
CO5	Know importance of water and different measures to be adopted for water harvesting

Detailed Syllabus:

Unit 1	**Building Planning, Civil Engineering Materials and Construction Equipments:** Functions of building, Site selection, Principles of planning, plinth area, carpet area, Floor space Index, Cost of building, Building Bye-laws, typical plan of residential building, setting out plan of a building. Properties and uses of civil engineering materials a) Bricks b)Stones c) Aggregates d) Sand e) Cement f) Concrete g) Steel and h) concrete blocks Construction Equipments: Excavation equipment- power shovel, drag line, scrapers, bull dozer, Concrete mixer, and Rollers: smooth wheeled, pneumatic tyred and sheep foot rollers.
Unit 2	**Geographical Measurement:** Principles of survey, measurement of distance by chain and tape, base line and offsets. Equipments for laying offsets, Prismatic compass, measurement of bearing and calculation of included angles, study and use of dumpy level, levelling staff, bench mark, determination of reduced levels.

Unit 3	**Building and Road Construction** Loads coming on structure, Types of construction a) Load bearing structure b) Framed structure Function of foundation, Column footing, combined footing and machine foundation. Superstructure and its components, typical cross section through load bearing wall, Brick and stone masonry used for construction. Technical terms related with doors, windows and stairs. Classification of roads, Rigid and flexible pavements, typical road sections in cutting and embankment, function of Camber, Super-elevation
Unit 4	**Earthquake Engineering** Earth quake- definition, Causes of earthquake, Changes in earth crust during earthquake, Technical terms related with earthquake such as focus, epicentre, magnitude and intensity of Earthquake, seismograph. Factors affecting damage, nature of earthquake forces, General construction aspects, Earthquake resistant Low Cost buildings, Precautions to be taken before and during an earthquake
Unit 5	**Water Resources Engineering** Definition of watershed, Necessity of watershed management works. Different structures involved in watershed management. Roof top rainwater harvesting and ground water recharge. Classifications of dams, Typical cross section of gravity dam and zoned earthen embankment. Necessity of irrigation and benefits of irrigation, Micro irrigation-sprinkler and drip irrigation

Text and Reference Books

1. Anderson "Introduction to Surveying" McGraw Hill International Student Edition.
2. Arora S.P. and Bindra S.P. "Building Construction", DhanpatRai and Sons, Delhi.
3. Duggal A.K. "Surveying and Levelling", Vol-I, Prentice Hall of India
4. Garg S.K. "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, Delhi.
5. Richter C.F. "Elementary Seismology", S. Chand and Company, New Delhi.
6. Shah, Kale and Patki "Building Design and Drawing", TATA McGraw Hill.

CE1002 : Laboratory Basics of Civil Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work : 50 marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Measure the dimensions of building and different components
CO2	Identify and decide the location of stairs, doors, windows
CO3	Measure included angle by using compass and distance by using chain and tape
CO4	Draw the plan and sectional elevation of roads, door, windows, stair and water resources structures

List of Experiments

The term work shall consist of at least 10 exercises of following nature. Individual course teacher shall have freedom of including additional exercises.

Sr. No.	Details
1	Lettering and numbering in different sizes
2	Measured drawing of laboratory/hall (with furniture arrangement)
3	Line plan of residential building/bungalow
4	Plan and sectional elevation of paneled door/window
5	Plan and sectional elevation of dog-legged stair case
6	Typical cross section of load bearing wall
7	Study and use of chain and compass
8	Introduction of surveying equipments
9	Typical road section of pavement
10	A report based on site visit to construction site
11	Cross-section of gravity dam/earthen dam
12	Case study of successful water conservation/ water harvesting practices

ET1001: Basics of Electronics Engineering	
Teaching Scheme **Lectures: 4 Hrs/Week** **Tutorials:**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course description: **(Sample)** After completing this course, students will have a broad and fundamental understanding basic electronics. Students will be able to discuss the basic principles of various electronics devices and communication techniques and explain basic applications of electronics devices and communication.

Course Objectives:

To impart knowledge of basic electronics devices and its applications
To create awareness of electronics communication concept
To educate basic concepts of transducers, consumer electronics and instruments

Course Outcomes
After completing the course, students will able to:

CO1	Discuss the basic principles of various electronics devices and communication techniques.
CO2	Explain basic application of electronics devices and communication
CO3	Acquire knowledge of consumer electronics gadgets

Detailed Syllabus:

Unit 1	Diode -PN junction diode, characteristics and parameter, diode as rectifier Bipolar junction transistors: NPN & PNP transistors, structure, typical doping, working of NPN transistor, concepts of common base, common emitter & common collector configurations, current gain of each, input & output characteristics of common emitter configuration, comparison of three configurations with reference to voltage & current gain, input & output resistances and applications
Unit 2	Introduction of Electronics devices- Zener diode: Operation and Applications, pto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR), DIAC,TRIAC – Operation, Construction, Characteristics, Ratings, Applications
Unit 3	Consumer Electronics: Products-blue ray player,CCTV systems, HDTV, basic principles of Plasma TV and displays LCD&LED displays, Dolby System, speaker systems, etc
Unit 4	Measurements: principle and block diagram of analog and digital multimeter, working principle of CRT, block diagram of CRO, measurements using CRO, principle of digital storage oscilloscope, principle and block diagram of function generator Transducers : Introduction , classification , LVDT, Photo electric and piezoelectric transducer, temperature sensors

Unit 5	Radio communication: principle of AM & FM, wave forms, bandwidths, block diagrams of AM & FM transmitters, principle of AM &FM demodulation, comparison of AM & FM,principle &block diagram of super heterodyne receiver. Radar and navigation, Mobile communication Satellite communication: microwave frequency bands, concept of geo-stationary satellite, frequency bands used, satellite transponder, block diagram of earth station transmitter & receiver, advantages of satellite communication, principle of Global Positioning System(GPS).

Text and Reference Books

1. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9e, 2011
2. R. G. Gupta, "Audio-Video Engineering", TMG, 2e.
3. R. S. Sedha, "A textbook of Applied Electronics", S. Chand Publication. 2e.
4. Helfric A.D & Cooper W.D, Modern Electronic Instrumentation &Measurement Techniques, Pearson Education
5. David A Bell, Electronic Devices And Circuits, Oxford University Press
6. Wayne Tomasy, Advanced Electronic Communication System, Phi Publishers
7. C. S. Rangan, G. R. Sarma, V. S. V. Mani, Instrumentation: devices and systems, Tata McGraw-Hill
8. Robert L. Boylested, Louis Nashelsky, Electronic Devices And Circuit Theory, Pearson Education
9. George Kennedy, Bernard Davis, Electronic Communication Systems, Mc Graw Hill
10. Louis E. Frenzel, Principles Of Electronic Communication Systems, Mc Graw Hill

LAB ET 1002: Lab Basic Of Electronics Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work : 50** **Practical Examination & Viva Voce: : --**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Observe the characteristics of semiconductor devices, components
CO2	Perform experiment to identify transducers. characteristics
CO3	Imitate the various communication techniques
CO4	Observe the various test point signals of consumer electronics gadget

List of Experiments

Sr. No.	Details
1	Plot the characteristics of PN diode, LED,Photo diode
2	Plot the characteristics of transistor NPN/PNP.
3	Plot the characteristics of diac/triac
4	Plot the characteristics of sensors : thermister , LVDT
5	Plot the characteristics of sensors: Piezoelectric/ Piezo-resistive
6	Observe the various test point signals of consumer electronics gadget(Any One)
7	Study of basic Audio-Video systems
8	Implement different modulation technique
9	To demonstrate radar/satellite communication

CS1001 : Basics of Computer & IT	
Teaching Scheme **Lectures: 4 Hrs/Week** **Tutorials:**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course description: Basics of Computer & IT is designed to familiarize students with basic architecture of Computer System along with its important integral hardware & software components. It introduces internet based applications through web technology. The course emphasizes on applications of computer in problem solving through programming Language.

Course Objectives:

1.Aware students with different components of computer system.
2. Demonstrate working of computer system.
3. Introduce with current trends in Computer Technology for general purpose applications.
4. Illustrate basic C programming concepts for problem solving.

Course Outcomes

After completing the course, students will able to:

CO1	Distinguish different key components of a computer system and demonstrate their working. (hardware, software, firmware etc)
CO2	Describe current trends in computer technology and Identify applications
CO3	Use Web technology for general purpose application
CO4	Write & execute C Programs using basic C constructs.
CO5	Solve real time problems using C programming Language

Detailed Syllabus:

Unit 1	**Introduction to Computer** : Brief Overview of Computer History. A basic Computer architecture. Hardware & Software Components. Introduction to Web Architecture: two tier , three tier, Multitier. Introduction to Open Source Software. **Introduction to number system:** Data representation, character representation codes, Binary, hex, octal codes and their inter conversions.
Unit 2	**System software**: Types of software, High level language, Low level language, Translators (Compiler, Interpreter, Assembler), Linker. Operating System and its type. **Web Technologies :** Introduction to World Wide Web, Search engines, e-mail, news, gopher, Audio & Video Conferencing, Internet Protocols: FTP, telnet, TCP/IP, SMTP, HTTP, Languages used for WEB Technology: HTML
Unit 3	**Introduction to C Language fundamentals**, The C character set, variables and constants, data types, keywords, expressions, statements, operators- arithmetic operators , unary operators, relational & logical operators, conditional operators, type conversions , type casting.
Unit 4	**Conditional execution** - if, nested if, it else, switch, goto statement, Loop execution - For loop, While loop, Do while loop, break, and continue statements. **Functions** - Defining a function, passing arguments to functions, returning values from function, command line arguments, Recursion, Local & Global variables concept.

Unit 5	**Arrays-** definition, passing array to the function, Multidimensional array, String operation- String copy, String length, String concatenation, String compare. Introduction to structure and union. Array of structure, Passing structure as an object to function. Structure as an return type of function. **Pointer**s- pointer as a variable, pointer to array, pointer as argument to function. String operations using pointers.

Text and Reference Books

1. E. Balagurusamy; *Programming in C, Third Edition. Tata McGraw Hill.*
2. H.S.Kalsi, Electronic Instrumentation, TMH
3. K. R.Venugopal, Rajkumar B., T.Ravishankar; *Mastering C, Tata McGraw Hill.*Rangan and Sarma,
4. PC Hardware a begginers guide by Ron Ginlster
5. Dennis Ritchie; C *Programming Language, Pearson Education Asia.*
6. Thomas Powell,"HTML & CSS: The Complete Reference", Fifth Edition by.
7. Jon Duckett ,"Beginning HTML, XHTML, CSS, and JavaScript". – Wrox Publication.on

CS1002:Lab. Basics of Computer & IT	
Teaching Scheme **Practical: 2Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Familiarize with C programming development environment, compiling, debugging, linking and executing a program using the development environment
CO2	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO3	Use and apply the in-built functions and customized functions for solving the problems.
CO4	Document and present the algorithms, flowcharts and programs in form of user-manuals
CO5	Providing students with the necessary knowledge and skills in using the various technologies and tools for developing web sites.

List of Experiments

Sr. No.	Details
	Level: Basic (all)
1	Introduction to HTML tags
2	Creating Web site using free web hosting
3	Simple program using scanf() and printf()
4	Program using Control Statements
5	Program using Loops
6	Program to generate Fibonacci series and/or factorial of a number using recursive function
	Level: Moderate (any three)
7	Creating Web site using free web hosting
8	Using arrays for sorting numbers
9	Program which shows use of call by value and call by reference
10	Program to accept and display student information using structure.
	Level: Complex (any two)
11	Program to pass structure/array as a parameter to a function
12	Program to prepare monthly telephone bill
13	Menu driven program for matrix addition and subtraction
14	Program for matrix multiplication
15	Program for pointers

EE1001: Basics of Electrical Engineering	
Teaching Scheme **Lectures: 04 Hrs./Week**	**Examination Scheme** **Test I : 15Marks** **Test II : 15Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course description: This is the basic course in Electrical Engineering which introduces the basic concepts, transformer, and electrical motors to students.

Course Objectives:

The objectives of the course are to

1. Explain basic laws & theorems of electrical networks
2. Explain fundamentals of magnetic circuits and alternating current circuits
3. Apply knowledge of magnetic circuits to electrical machines
4. Illustrate electrical wiring fundamentals and safety measures

Course Outcomes

After completing the course, students will be able to:

CO1	Demonstrate knowledge of circuit analysis using various basic laws and theorems of electrical circuit
CO2	Demonstrate knowledge of magnetic circuit
CO3	Demonstrate and understand definition and relationship of various AC circuits
CO4	Demonstrate and understand the operations of Transformers, DC motors, Induction motors and their applications
CO5	Demonstrate and understand the electrical wiring installations

Detailed Syllabus:

Unit 1	a) DC Circuits: Kirchoff's laws, Source conversion, series and parallel circuit, currentand voltage division rule, Delta star and star delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem, (Numericals limited to two sources) b) Charging and discharging of capacitor, Time constant for RC circuit
Unit 2	a) Electromagnetic Induction: Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, dot convention, inductance in series and parallel b) Magnetic Circuits: Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss C) Rise and decay of current in inductive circuit, Time constant for RL circuit
Unit 3	a) Single phase AC Circuits: Concept of single phase supply, Terms related with A.C.quantities, pure resistive, inductive and capacitive circuits, Complex and phasorrepresentation of AC quantities, series and parallel circuits, resonance in series and parallel circuits, Q-factor of coil b) Three phase AC Circuits: Concept of Three phase supply, star and delta connections, line and phase values, solution of balanced three phase circuits, phasor diagram
Unit 4	Principle of operation, constructional details, types and applications of single phase Transformer Single phase and three Induction motors, DC motors (Descriptive treatment only)

Unit 5	Electric Wiring installations: Types of insulated wires & wiring systems, concept of fuses, MCBs, ELCBs, etc. in wiring installations, concept of earthing, energy bill calculations, study of different lamps

Text and Reference Books

1. Leonard Bobrow ''Fundamentals of Electrical Engineering" ,Oxford University press
2. Vincent Del Toro, "Principles of Electrical Engineering ", Prentice Hall.
3. D.P. Kothari, I.J Nagrath ,"Basic Electrical Engineering "Tata McGraw Hill
4. M.S.Naidu, S.Kamakshaiah ,"Introduction to Electrical Engineering" Tata McGraw Hill
5. J.P.Tiwari,"Basic Electrical Engineering "New Age Publication
6. Joseph Administer,"Schaum's outline of Electric circuits", Tata McGraw Hill

EE1002: Lab - Basics of Electrical Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** : **50Marks** Practical/Oral : ---

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand and apply electrical safety measures
CO2	Apply various basic laws and theorems of electrical circuit
CO3	Demonstrate and understand definition and relationship of various AC circuits
CO4	Explain the fundamental principle of transformer and electrical machine.
CO5	Calculate energy bill consummation for domestic applications.

List of Experiments

Sr. No.	Details
1	Study and representation of electrical components/equipment's
2	Verification of any two circuit theorems i. Thevenin's theorem, ii. Superposition theorem, iii. Norton's theorem iv. Maximum power transfer theorem
3	Any one experiments out of the following i. To measure current, voltage and power in R-L-C series circuit exited by single phase AC supply ii. Study of R-L-C series resonance circuit
4	1. Any Four experiments out of the following i. To plot hysteresis loop of magnetic material ii. To Determine transformation ratio (K) of a single phase transformer iii. Starting and reversing of D.C. motor iv. Connection, starting and reversal of a three phase induction motor v. Connection & measurement of power consumption of a fluorescent lamp. vi. Energy bill calculation for different lamps vii. Measurements of light output in lumens of different lamps. viii. Study of wiring systems

EE1003 BEEE: Basics of Electrical and Electronics Engineering	
Teaching Scheme **Lectures: 04 Hrs/Week**	**Examination Scheme** **Test I : 15Marks** **Test II : 15 Marks** **Teachers Assessment : 10Marks** **End Semester Exam : 60 Marks**

Prerequisites: Basic knowledge of Physics, mathematics

Course description: The objectives of this course are to learn Basic laws & theorems of electrical networks, Fundamentals of magnetic circuits and electrical circuits and Application of concepts to solve numerical on electrical & magnetic circuits

This course provides comprehensive idea about working principle, operation and characteristics of electronic devices, transducers, Digital Electronics and Audio-Video Systems.

Course Outcomes:

After completing the course, students will able to:

CO1	Define and explain electrical circuit using various basic laws and theorems
CO2	Define and explain fundamentals of electrical and magnetic circuits
CO3	Apply the concepts of electrical and magnetic circuits to solve numerical.
CO4	Understand the fundamentals of electronic components, devices, transducers and Audio-Video Systems.
CO5	Explain basic concepts of digital electronics.

Detailed Syllabus:

Unit 1	**DC Circuits:** Kirchhoff's laws, Source conversion, Series and parallel circuit, Current and voltage division rule, Delta-star and star-delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem, (Numerical limited to two sources)
Unit 2	**Electromagnetic Induction:** Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, dot convention, inductance in series and parallel **Magnetic Circuits:** Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss
Unit 3	**Single phase AC Circuits:** Concept of single phase supply, Terms related with alternating quantities, Electrical circuits with pure resistance, inductance and capacitance, Complex and Phasor representation of AC quantities, Series and parallel circuits, Resonance in series and parallel circuits, Q-factor of coil

	Three phase AC Circuits: Concept of Three phase supply, Star and delta connections, Line and phase values, solution of balanced three phase circuits, Phasor diagram
Unit 4	**Electronic Components** (3 hours) Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses). **Semiconductor Devices** (5 hours) Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, Zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell, optocouplers).
Unit 5	**Digital Electronics** (5 hours) Number systems – binary codes - logic gates - Boolean algebra, laws & theorems, simplification of Boolean expression, implementation of Boolean expressions using logic gates, standard forms of Boolean expression, Introduction to Flip-Flop, Registers, Counters.

Text and Reference Books

1. Thyagarajan. T, SendurChelvi. K. P, Rangaswamy. T.R, "Engineering Basics: Electrical, Electronics and Computer Engineering", New Age International, 3e, 2007.
2. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9e, 2011
3. R. G. Gupta, "Audio-Video Engineering", TMG, 2e.
4. R. S. Sedha, "A textbook of Applied Electronics", S. Chand Publication. 2e.
5. Helfric A.D & Cooper W.D, Modern Electronic Instrumentation &Measurement Techniques, Pearson Education
6. Leonard Bobrow ***"Fundamentals of Electrical Engineering"*** ,Oxford University press
7. Vincent Del Toro ,"***Principles of Electrical Engineering*** ", Prentice Hall
8. D.P. Kothari, I.J Nagrath ,"***Basic Electrical Engineering*** "Tata McGraw Hill
9. M.S.Naidu, S.Kamakshaiah ,"***Introduction to Electrical Engineering"*** Tata McGraw Hill

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO 13	PO 14
CO1	1					2								
CO2	1		3											
CO3	1	3	3			2								
CO4	1		3			2				3				
CO5	1		2			2				3				

1 – High2 – Medium3 - Low

Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test I	Test II	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	5	5	4	15
K2	Understand	5	5	2	15
K3	Apply	5	5	2	15
K4	Analyze			2	15
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table

Assessment Tool	K1	K2	K4	K3	K2
	C01	C02	C03	CO4	CO5
Class Test (30 Marks)	10	10		10	
Teachers Assessment (20 Marks)	4	2	2	2	
ESE Assessment (60 Marks)	15	12	5	25	3

Special Instructions if any: NIL

Designed by
1.Supriya R. Kulkarni
2.Dhote V.P.

EE1004 : Lab - Basics of Electrical and Electronics Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** : **50Marks** Practical/Oral : ---

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand and apply electrical safety measures
CO2	Apply various basic laws and theorems of electrical circuit
CO3	Demonstrate and understand definition and relationship of various AC circuits
CO4	Understand the fundamentals of electronic components, devices, transducers and Audio-Video Systems.
CO5	Explain basic concepts of digital electronics.

List of Experiments

Sr. No.	Details
1	Study and representation of electrical components/equipment's
2	Verification of any two circuit theorems i. Thevenin's theorem, ii. Superposition theorem, iii. Norton's theorem iv. Maximum power transfer theorem
3	Any one experiments out of the following i. Measurement of current, voltage and power in R-L-C series exited by single phase AC supply ii. Study of R-L-C series resonance
4	Study of basic electronic component
5	Study of basic semiconductor devices and transducers.
6	Study of basic Audio-Video systems.
7	Study of Basic logic gates

Assessment Table Course coordinator has full flexibility in deciding assessment table

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO 13	PO 14
CO1	3		1			2								
CO2	1	2	3			3								
CO3	1		3											
CO4	1		3			3								
CO5	1					2								

1 – High 2 – Medium 3 - Low

Mapping of Course outcome with Program Outcomes (ElectricalEngineering Department)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1			2						
CO2	1	2	3			3						
CO3	1		3									
CO4	1		3			3						
CO5	1					2						

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (50 Marks)	10	10	10	10	10
Practical Examination & Viva Voce					

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	20	
S2	Manipulation	20	
S3	Precision	10	
S4	Articulation		
55	Naturalization		
Total		50	

Preparation (S1)	10	
Conduct of Experiment (S2)	10	
Observation and Analysis of Results (S3)	20	
Record (S2)	10	
Mini-Project / Presentation/ Viva-Voce (S3)		
Total	50	

AM1001: Engineering Mechanics			
Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test 1 Test 2	15 Marks 15 Marks
Tutorials	-	Teacher Assessment	10 Marks
Total Credits	3	End-Semester Examination	60 Marks

Course Objectives

1. To introduce the concepts of rigid body mechanics for bodies at rest and in motion.
2. To make the students appreciate the applications of basic laws of physics to a variety of problems.
3. To inculcate the analytical skills to solve numerical problems.

Course Outcomes

1. Students will be able to state the relevant laws and apply them to numerical problems.
2. Students will be able to identify the force system acting on bodies and perform analysis.
3. Students will be able to locate the centroid and compute moment of inertia.
4. Students will be able to establish relations between kinematic parameters for different types of motion.
5. Students will be able to formulate relevant equations for static and dynamic systems.

UNIT-1	Fundamental Concepts and Principles, Types of Force systems, Composition and Resolution of Forces, Moment of force, Couple, Resultant of Planar and Spatial force systems, Analytical and Graphical methods
UNIT-2	Free body diagrams, Equations of Equilibrium, Types of Supports and support reactions, Equilibrium of Co-planer force systems, Applications to beams and frames, Theory and Laws of Friction, Cone of friction, wedge friction, rolling friction, Belt friction and their applications.
UNIT-3	Centroid of Plane figures and lines, Moment of Inertia of plane sections, Transformation theorems, Radius of gyration, Mass Moment of Inertia.
UNIT-4	Kinematics of particles : Rectilinear Motion, Equations of Motion, Motion curves and their applications, Curvilinear motion in Cartesian and Polar Co-ordinates, Motion of projectile, Relative motion, Fixed axis rotation.
UNIT-5	Kinetics of particles , D'Alembert's Principle: Newton's laws of Motion, Equations of motion of particle and rigid body ,motion of connected bodies, Fixed axis rotation. Principle of work and Energy, Principle of Impulse and Momentum and their applications to particles, Direct central impact

Text books:

1. Beer and Johnston, Mechanics for Engineers (Statics and Dynamics), McGraw Hill Co.Ltd.
2. A.K.Tayal, Engineering Mechanics , Umesh publications.
3. V.S. Mokashi, Engineering Mechanics Vol. I and II, Tata McGraw Hill Publishing Co. ltd., New Delhi

Reference Books:

1. F.L. Singer, Engineering Mechanics, Harper and Row Publishers, USA
2. Timoshenko and Young, Engineering Mechanics, McGraw Hill Co.Ltd.
3. R.C. Hibbeler, Engineering Mechanics (Statics and Dynamics), McMillan publications
4. Engineering Mechanics by McLean and Nelson, Schaum's Outline Series, McGraw Hill Co.Ltd. New Delhi

AM 1002: Lab- Engineering Mechanics			
Teaching Scheme Practical's Total Credits	2 Hrs/Week 1	**Evaluation Scheme** Term Work	50 Marks

Course Objectives

Experimental verification of principles of Engineering Mechanics and analytical solutions.

Course Outcomes

Students will be able to

1. Apply graphical method to solve problems in statics.
2. Verify the principles of Engineering Mechanics experimentally.

The term work shall consist of

1. Graphical solutions for the following problems
    a. Resultant of Coplanar Non Concurrent force system:
        i. At least one problem with resultant as a force
        ii. At least one problem with resultant as a couple
    b. Equilibrium of Coplanar Non Concurrent force system: At least one Problem
    c. Friction: At least one Problem
2. Following experiments shall be conducted.
    a. Polygon law of forces
    b. Law of moments
    c. Jib crane
    d. Beam Reaction
    e. Friction
    f. Screw Jack
    g. Fly wheel
3. Tutorial Problem
    a. At least three problem each on unit of the theory course AM 1001.
    b. The tutorial problem need to be solved by the student during the practical hours only.

MA1002 : Engineering Mathematics-II	
Teaching Scheme **Lectures: 03 Hrs/Week** **Tutorials: 02 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: MA1001 : Engineering Mathematics-I

Course description: Engineering Mathematics-II is a compulsory course for the first year engineering students of all disciplines of the institute

Course Objectives: Main objective is to give adequate exposure of basics of engineering mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies.

Course Outcomes

After completing the course, students will able to:

CO1	Understand and apply the theory of first order first degree differential equation to simple electrical circuits, rectilinear motion, geometrical curves and orthogonal trajectories.
CO2	Understand and apply special functions like Beta, Gamma and error function and rule of differentiation under integral sign to evaluate some definite integrals.
CO3	Trace and rectify the plane geometric curves manually.
CO4	Evaluate multiple integrals and apply them to find area bounded by plane curves and volume bounded by closed surfaces.
CO5	Understand and apply knowledge of Fourier series to expand the periodic function in a infinite series of sine and cosine terms.

Detailed Syllabus:

Unit 1	**Ordinary Differential equations of first order first degree and its applications (8L+4T)** Classification of differential equations as ordinary and partial, Derivation of Differential equations, General solution of ordinary differential equation, Exact differential equation, Reducible to exact differential equation (Method of Integrating factor), Linear differential equation of first order first degree, Reducible to linear differential equation of first order first degree, Length of Tangent, normal, sub tangent and sub normal of a plane curve, Determination of curves, Orthogonal trajectories, Electrical circuits, Mechanical systems
Unit 2	**Integral Calculus (5L+4T)** Reduction formulae, Beta function, Gamma function, Error function, Leibnitz's rule of Differentiation under Integral sign (DUIS)
Unit 3	**Curve Tracing and its applications (4L+4T)** Tracing of Cartesian, polar and parametric curves, Rectification of plane curves
Unit 4	**Multiple Integrals and its applications (8L+4T)** Double Integration (Cartesian form, polar forms), Change of order of Integration double integration , Triple Integration (Cartesian and polar form), Area bounded by plane curves, Volume of solid bounded by closed surface

Unit 5	**Fourier series**	**(5L+4T)**
	Definitions, expansion of periodic functions (continuous and discontinuous) in to Fourier series, Half Range Sine series, Half Range Cosine Series, Practical harmonic analysis	

Text and Reference Books:

1. A Text Book of Engineering Mathematics (Vol.1 &2)- P.N.Wartikar & J.N.Wartikar, Pune Vidhyarthi Griha Prakashan, Pune.
2. Advanced Engineering Mathematics- Erwin Kreyszig Willey Eastern Ltd. Mumbai.
3. Engineering Mathematics-A Tutorial Approach by Ravish R Singh, Mukul Bhatt.
4. Higher Engineering Mathematics- B. S. Grewal, Khanna publication, New Delhi.
5. Advanced Engineering Mathematics-H. K. Dass, S. Chand and Sons.
6. Advanced Engineering Mathematics- Michael Greenberg,2/e, Pearson

ME 1006: LAB – WORKSHOP -II	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Pre-requisite: Basic Mechanical Engineering

Laboratory Course Outcomes

Students will able to:

CO1	Understanding use of various tools of Plumbing, Welding & Black smithy operations.
CO2	Acquire engineering skills in Plumbing, Welding & Black smithy operations.

List of Experiments

Sr. No.	Details
1	**Plumbing**: Demonstration of different Plumbing tools and operations. Preparation of a job individually or amongst a group of students (not more than four) involving Plumbing operations on Pipe using different Plumbing Tools.
2	**Welding:** Preparing one job involving Butt Joint, Lap Joint, Tee Joint, Joint at Angle. The edge preparation in Welding Joints is undertaken where required.
3	**Black Smithy:** Study of the Smithy Tools and the process. Preparing one job involving various Black Smithy operation and changes in cross section, Bending and forming.

Text Books and Reference Books

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas
5. Pub.2008

Annexure A

ET 1099: Engineering Exploration	
Teaching Scheme **06 Hrs/Week** **Total Credits:3** Contact Hours 60	**Examination Scheme** **Evaluation I : 25 Marks** **Evaluation II : 25 Marks** **Evaluation III : 25 Marks** **Final Evaluation : 25 Marks**

Prerequisites: NIL

Course Outcomes

As an outcome of completing the course, students will able to:

CO1	Explain the role of an Engineer as a problem solver
CO2	Identify multi-disciplinary approach required in solving an engineering problem
CO3	Build simple systems using engineering design process
CO4	Analyse engineering solutions from ethical perspectives
CO5	Analyse engineering solutions from sustainability perspectives
CO6	Use basics of engineering project management skills in doing projects
CO7	Demonstrate data acquisition and analysis skills using a tool.

Detailed Syllabus:

Content	Hrs
Module 1: Introduction to Engineering and Engineering Study Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes.	3 hrs
Module 2: Engineering Design Engineering Design Process, Multidisciplinary facet of design, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution ,Pugh Chart, Motor and battery sizing concepts, introduction to PCB design	18 hrs
Module 3: Mechanisms Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism,4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism. Simple Robotic Arm building.	6 hrs
Module 4. Engineering Ethics Identifying Engineering as a Profession, Significance of Professional Ethics, Code of Conduct for Engineers, Identifying Ethical Dilemmas in different tasks of engineering, Applying Moral Theories and codes of conduct for resolution of Ethical Dilemmas	3 hrs
Module 5: Platform based development Introduction to various platform based development (Arduino) programming and its essentials, Introduction to sensors, transducers and actuators and its interfacing with Arduino.	15 hrs

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Module 6. Data Acquisition and Analysis Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of Microsoft Excel tool for descriptive statistics, Data Acquisition(Temperature and humidity) using Sensors interfaced with Arduino, Exporting acquired data to Microsoft Excel and analysis using visual representation,	6 hrs
Module 7. Project Management Introduction to Agile practices, Significance of team work, Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation	3 hrs
Module8. Sustainability in Engineering Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon foot print	6 hrs
Total Contact Hours	**60 Hrs**
Course Project Reviews Evaluation of group projects	12 hrs

Evaluation Scheme			
Name of the module	Hours		
		Marks	Evaluation
1.Introduction to Engineering & Engineering study	3	0	Evaluation - I
2. Engineering Design	18	15	
3. Mechanisms	6	5	
4. Engineering Ethics	3	5	
5. Platform based development	15	25	Evaluation - II
6. Data Acquisition & Analysis	6	15	Evaluation - III
7. Project Mgmt.	3	5	
8. Sustainability in Engineering	6	5	
9. Course Project Reviews	12	20	Final Evaluation
10.Honor code	-	5	
TOTAL	72	100	

16/08/18

Approved in XIX th Academic Council, dated 27/07/18

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD
"*In Pursuit of Global Competitiveness*"
(An Autonomous Institute of Government of Maharashtra)
Department: Information Technology

(Class SEIT : With Effect From 2017-2018)

Program Educational Objective(s) After graduation and few years of graduation, the (Information Technology) graduates would	
PEO I	Interpret, design and analyze data for effective problem solving
PEO II	Pursue advanced studies to adapt to current trends
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude

Program Outcome(s)

The program enables students to achieve by the time of graduation:

1. An ability to apply principles and methodologies of mathematics, science, and engineering fundamentals
2. An ability to identify, study research literature, formulate the computing requirements appropriate to its solution
3. An ability to design solutions for engineering problems and design systems or processes that meet specified needs with appropriate considerations

4. An ability to conduct investigations of complex problems including design of experiments, analysis and interpretation of data to provide valid conclusions
5. An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools with an understanding of the limitations
6. An understanding of professional engineering practice with concern to societal, health, safety and legal responsibilities
7. Recognize the impact of IT solutions in an environmental and societal context and demonstrate knowledge of and need for sustainable development
8. Understand and commit to professional ethics and responsibilities and norms of engineering practice
9. An ability to function effectively as an individual and as a member or leader in a team to accomplish a common goal
10. Communicate effectively to comprehend and write effective reports, design documentation and make effective presentations
11. An ability to engage in independent and life-long learning to enhance their careers for continuing professional development
12. An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

Mapping of PEOs and POs

	Programme Educational Objective(s)	**Program Outcome(s)**
PEO I	Interpret, design and analyze data for effective problem solving	1,2,3
PEO II	Pursue advanced studies to adapt to current trends	3,4,5,6,7,9
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development	4,5,6,7,8,9,10,11,12
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude	6,8,10,11,12

Second Year Engineering (IT) Choice Based Credit System

Semester- III

			Contact Period (Hrs.)				Continuous Evaluation in terms of Marks						
Sr No	**Subject Code**	**Subject**	**TH**	**T**	**PR**	**Credits**	**Class Test I**	**Class Test II**	**TA**	**ESE**	**TW**	**Practical/ Viva-Voce**	**Total (100)**
1	HS2001	Environment Studies	4	0	-	4	15	15	10	60	-		100
2	MA2001	Engineering Mathematics-III	4	0	-	4	15	15	10	60	-		100
3	IT2031	Digital Electronics and Microprocessor	3	0	-	3	15	15	10	60	-		100
4	IT2032	Data Structures	3	0	-	3	15	15	10	60	-		100
5	IT2033	Computer Graphics	3	0	-	3	15	15	10	60	-		100
6	IT2034	Lab: Digital Electronics and Microprocessor	-	-	2	1	-	-	-		50	25	75
7	IT2035	Lab: Data Structures	-	-	2	1	-	-	-		25	25	50
8	IT2036	Lab: Computer Graphics	-	-	2	1	-	-	-		25	25	50
9	IT2037	Lab: Software Development Lab-I	-	-	4	2	-	-	-		50	25	75
Total			**17**	**0**	**10**	**22**	**75**	**75**	**50**	**300**	**150**	**100**	**750**

Second Year Engineering (IT) Choice Based Credit System

Semester- IV

			Contact Period (Hrs.)				Continuous Evaluation in terms of Marks						
Sr No	**Subject Code**	**Subject**	**TH**	**T**	**PR**	**Credits**	**Class Test I**	**Class Test II**	**TA**	**ESE**	**TW**	**Practical/Viva-voce**	**Total (100)**
1	HS2003	Professional Ethics and Cyber Laws	3	0	0	3	15	15	10	60	-		100
2	IT2021	Object Oriented Programming	3	0	0	3	15	15	10	60	-		100
3	IT2038	Discrete Mathematics & Structure	3	1	0	4	15	15	10	60	-		100
4	IT2039	Database Management System	3	0	0	3	15	15	10	60	-		100
5	IT2040	Data Communication Networking	3	0	0	3	15	15	10	60	-		100
6	OEIT2001	Basics of Data Structure	3	-	-	3	15	15	10	60	-		100
7	OEIT2002	Basics of Cyber Security											
8	IT2022	Lab: Object Oriented Programming	-	-	2	1	-	-	-		25	25	50
9	IT2041	Lab: Database Management System	-	-	2	1	-	-	-		25	25	50
10	IT2042	Lab: Software Development Lab-II	-	-	2	1	-	-	-		25	25	50
Total			**18**	**1**	**6**	**22**	**90**	**90**	**60**	**360**	**75**	**75**	**750**

- Students should undergo Internship/Industrial Training at the end of fourth and sixth semester of total four to six weeks duration. This is Mandatory Audit Course

IT2031: Digital Electronics & Microprocessor

Teaching Scheme	Examination Scheme	
Lectures: 03Hrs/Week	**Test-1**	**: 15 Marks**
Credits :03	**Test-2**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Description: This course introduces binary arithmetic, fundamentals of digital circuits, and their applications. Also fundamental concepts of 8086 microprocessor, architecture, instruction set and assembly Language Programming of 8086.

Course Objectives:

1. To train the students on fundamentals of digital electronics
2. To train the students for minimization of digital circuit
3. To study combinational and sequential Logic Design (Multiplexer, Demultiplexer, Counters, Registers)
4. To learn architecture, instruction set, interrupt structure of 8086 microprocessor
5. To learn assembly language programming of 8086

Course Outcomes

After completing the course, students will able to:

CO1	Perform binary arithmetic, explain logic gates, universal gates, K-map.
CO2	Differentiate between Combinational and Sequential Logic Design.
CO3	Discuss Registers, Counters
CO4	Present the fundamental concepts of 8086 microprocessor, their architecture, instruction set, and interrupt structure.
CO5	Use assembly language programming of 8086.

Detailed Syllabus:

Unit 1 **Binary arithmetic, Logic Gates, Boolean algebra:**
Binary arithmetic, 2's complement arithmetic, Gray code, Excess three codes, error detecting and correcting codes. Basic gates, Universal gates and their truth tables, De-Morgan's theorem.
Combinational circuit design
K-Map minimization , don't care condition, Binary half and full adders and subtractors, BCD to Seven Segment decoder, binary to gray and gray to binary conversion. Quine-McClusky minimization technique. Multiplexers, cascading of multiplexers, Demultiplexers, cascading of Demultiplexers, Binary and BCD Adders.

Unit 2 **Flip-Flops, Sequential Logic Design**
Flip-flops - One bit memory cell, Clocked SRFF, JKFF, D- Type, T-type FF, Application of Flip-flops. Introduction to registers, shift registers, universal registers, application of shift registers as ring counters, twisted ring counter.

Unit 3 **Counters :** Ripple or Asynchronous Counters, Modulus of Counters, Introduction to

general purpose 54/74 series, Asynchronous IC's, Cascading of ripple counter IC's, Synchronous counters, up/down counters.

Unit 4 **Introduction to Microprocessor:** Introduction to 16 bit microprocessor, Architecture and Pin diagram of 8086, Programmers model of 8086 (Registers), Segmentation, logical to physical address translation, even and odd memory banks, Read write cycle timing diagrams.

Unit 5 **Addressing modes & Instruction Set:** Addressing modes, Instruction set of 8086 in detail, Instruction Formats, Stacks, Assembler, Linker, Debugger (Turbo debugger), Directives, Procedures (Near & Far), Macros, Loop constructs, 8086 Programming examples.

8086 Interrupts: 8086 Interrupt Structure, Interrupt Vector Table (IVT), ISR.

Text and Reference Books

1. R. P Jain, "Modern Digital Electronics", Tata Mcgraw Hill.
2. R. P. Jain & Thomas L. Floyd,"Digital Fundamentals", Pearson
3. D. P. Leach, A. P. Malvino, G. Saha ; Digital Principles & applications Inc.
4. Douglas Hall, "Microprocessors & Interfacing", McGraw Hill, Revised 2nd Edition, 2006 ISBN 0-07-100462-9
5. Ray,K.Bhurchandi, "Advanced Microprocessors and peripherals: Arch, Programming &Interfacing",Tata McGraw Hill,2004 ISBN 0-07-463841-6

Reference Books:

1. D. P. Leach, A. P. Malvino, G. Saha ; Digital Principles & applications Inc.
2. John Uffenbeck," The 8086/88 Family: Design, Programming & Interfacing", PHI
3. Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
4. Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC"

Reference websites:

https://www.tutorialspoint.com/computer_logical_organization/overview.htm
https://www.tutorialspoint.com/videos/digital_electronics/index.htm
https://www.tutorialspoint.com/microprocessor

IT2032:Data Structure

Teaching Scheme	**Examination Scheme**	
Lectures: 03 Hrs/Week	**Test I**	**:15 Marks**
Credits:03	**Test II**	**:15 Marks**
	Teachers Assessment	**:10 Marks**
	End Semester Exam	**:60 Marks**

Prerequisites: CS1001 BCOMPIT

Course Description:
This course covers some of the general-purpose data structures and algorithms, and software development. It is aimed at helping you understand the reasons for choosing structures or algorithms. Topics covered include managing complexity, abstraction, analysis, vectors, lists, queues, trees, heaps, hash tables maps, and graphs.

Course Objectives:
1. To train the students on fundamentals that one must learn of data structures
2. To train the students for a strong foundation for programming using data structures

Course Outcomes
After completing the course, students will able to:

CO1 Interpret and compute asymptotic notations of algorithms to analyze the consumption of resources (time/space).
CO2 Describe and explain data structure: arrays, records, strings, linked list, stacks and queues.
CO3 Compare the searching algorithms and sorting algorithms.
CO4 Identify and model graph algorithms like DFS, BFS, shortest path, spanning tree.

Detailed Syllabus:

Unit 1 **Sorting & searching**
Different sorting tech, classification on the basis of big-O notation, tech such as straight selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques, Sequential searching, index Sequential searching binary searching.

Unit 2 **Introduction to data structure, The Stacks& Queues**
The Arrays as an ADT: Using One-Dimensional Arrays, Using Two-Dimensional Arrays, Using Multidimensional Arrays, Definition and Examples, Primitive Operation, The stack as an ADT, The queue and its sequential representation, The queue as an ADT, Basic Definition and examples: Infix, Postfix, and Prefix, Program to evaluate a Postfix expression, Limitations of the program, Circular Queue, priority queue

Unit 3 **Linear Data Structure & their representation :**
Definition, concept, operation on linked lists, Circular linked lists
Doubly linked lists, Operations like insertion, deletion, insertion in order, searching, updating , Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list

Unit 4 Definition, Basic terminology, operation on binary trees, linked storage representation

for binary
search trees, Basic operation on binary search tree such as creating a binary search tree, searching, modifying an element, inserting & deleting the element, destroy a binary search tree, tree traversals ,in-order, pre-order, post-order , tree application for expression evaluation & for solving sparse Matrices, Huffman code algorithm, height balanced trees2-3 tree, B trees, B+ trees, AVL trees

Unit 5 **Graph:**
Definitions, basic terminology, matrix representation & implementation of graphs, graph travels, DFS, BFS, Shortest path, spanning tree

Text Books

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data Structures using C and C++ " , Pearson Pub.
2. G.S. Baluja, "Principles of Data Structures using C and C++",

Reference Books

1. Yashavant P Kanetkar, "Data Structures through C", BPB Pub. (Book with CD)
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures",
3. Robert L Kruse, "Data Structures and Program Design", PHI

IT2033: Computer Graphics

Teaching Scheme	Examination Scheme	
Lectures: 03 Hrs/Week	Test I	: 15 Marks:
Credits:03	Test II	: 15 Marks
	Teachers Assessment	: 10 Marks
	End Semester Exam	: 60 Marks

Prerequisites: CS1001 BCOMPIT

Course Description: This course gives description about computer graphics applications. Subject overviews about different line drawing algorithms. It introduces 2D and 3D transformations for graphics programming.

Course Objectives:

1. To introduce basic concepts of Computer graphics.
2. To study line drawing algorithms.
3. To understand line clipping and polygon clipping.
4. To study animation techniques.

Course Outcomes

After completing the course, students will be able to:

CO1 Remember the basic concepts of graphics with line drawing algorithms.
CO2 Identify transformation methods.
CO3 Apply clipping and segmenation techniques.
CO4 Examine use of color models, shading and animation.
CO5 Analyze the curve generation and use of graphics tools.

Detailed Syllabus:

Unit 1 Basics of Computer Graphics

Introduction of computer graphics, Raster scan & Random scan displays**,** Display Files, Plotting Primitives: Scan conversions, lines, line segments, vectors, pixels and frame buffers, vector generation.

Line drawing Algorithms: DDA, Bresenham.

Circle drawing Algorithms: DDA, Bresenham.

Character Generation: Stroke Principle, Starburst Principle, Bit map method, Introduction to aliasing and anti-aliasing**.**

Polygon and its types, inside test, polygon filling methods: Seed fill, Scan Line, Flood fill and Boundary fill.

Unit 2 Graphical Transformations

2-D transformations:homogeneous coordinates and matrix representation of 2-D transformations,other 2-D transformations: reflection and shear

3D transformations: Translation, scaling, rotation, rotation about X, Y, Z and arbitrary axis reflection about XY, YZ, XZ and arbitrary plane.

Projections: Types Parallel - Oblique: Cavalier, Cabinet and orthographic :Isometric, Dimetric, Trimetric and Perspective - Vanishing Points as 1 point, 2 point and 3 point.

Unit 3 **Windowing ,Clipping and Segments**

Introduction, Segment table, Segment creation, closing, deleting and renaming, Visibility Concept of window and viewport, viewing transformations,
Line Clipping: Cohen Sutherland Method.
Polygon Clipping : Sutherland Hodgman method for clipping convex and concave polygons

Unit 4 **Shading and Animation**

Color Models – RGB, YIQ, CMY, HSV,
Shading: Halftoning, Gouraud and Phong Shading
Computer Animation: Animation sequences, functions & Languages, Key-frame Systems, Motion Specifications, Introduction to OpenGL ES.

Unit 5 **Curves and Fractals**

Introduction, Curve generation, Interpolation, interpolating algorithms, interpolating polygons, BSplines and corners, Bezier curves, Fractals, fractal lines and surfaces .
Interactive Graphics & usage of the tools of computer graphics – 3D Studio and Maya or Blender.

Text Books:

1. S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 – 100472 – 6.
2. D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371 – 4**.**
3. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9
4. D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4

Reference Books:

1. D. Rogers, J. Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2002, ISBN 0 – 07 – 048677 – 8**.**
2. Zhigang Xiang, Roy Plastock, "Computer Graphics", Schaum's Series outlines
3. F.S. Hill JR, "Computer Graphics Using Open GL", Pearson Education
4. Foley, "Computer Graphics: Principles & Practice in C", 2e, ISBN 9788131705056, Pearson Edu.
5. Mario Zechner, Robert Green, "Beginning Android 4 Games Development", Apress, ISBN: 978- 81-322-0575-3

IT2034 : Lab: Digital Electronics & Microprocessor

Teaching Scheme	Examination Scheme	
Practical: 2Hrs/Week	**Term Work**	**: 50 Marks**
Credits :01	**Practical Examination & Viva**	**: 25 Marks**

Course Outcomes Expected: After successful completion of the course, students will be able to:

CO1 Implement functions with logic gates.
CO2 Demonstrate the concepts half and full adder and subtractors , analyze the code conversion circuit of gray to binary and binary to gray,
CO3 Illustrate the concepts of various multiplexer, de-multiplexer.
CO4 Demonstrate arithmetic operators by using MASM
CO5 Implement logical and string operations

Suggestive List of Practicals:

Sr. No.	Details
	Level: Basic (all)
1	To study the logic gates & verify the truth table. .
2	To study & verify the truth table for half adder, full adder, half subtractor, full subtractor.
3	To implement BCD adder.
4	Arithmetic operations –Addition and Subtraction, Multiplication and Division , BCD – arithmetic operation
5	Logic operations –converting packed BCD to unpacked BCD, BCD to ASCII conversion
	Level: Moderate (any three)
6	To study & verify the code conversion circuits Binary to Gray Code, Gray to binary.
7	To study multiplexer/demultiplexer circuit and verify their truth table.
8	To study registers and verify their summary table.
9	String operations-Move/exchange Block, Reverse string, , Length of the string, String comparison.
10	To find smallest/largest number within an array.
	Level: Complex (any two)
11	To implement up/down counter, mod counter
12	To implement bidirectional shift registers.
13	To sort array in ascending /descending order.
14	To implement string concatenation, string palindrome

IT2035: Lab :Data Structure

Teaching Scheme	**Examination Scheme**
Practical: 02Hrs/Week	**Term Work : 25 Marks**
Credits:01	**Practical Examination & Viva Voce: : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1 To implements the algorithms including various operations on queues, stacks, linked list, trees, graphs, sorting, searching on real time application.

CO2 Design and implement abstract data types with static or dynamic representation.

CO3 Analyze, evaluate and Design appropriate data types and algorithms for solving particular problems

List of Experiments

Sr. No.	Details
	Level : Easy
1	Program for Bubble Sort and Bucket Sort.
2	Program for Merge Sort and Heap Sort.
3	Program for Insertion Sort and Quick sort.
4	Program for Binary Search to search an element in the given sequence
	Level : Moderate
5	Program to implement two stacks in the one array.
6	Program for implementing Stack and Queue.
7	Program for implementing Singly Linked List and Doubly Linked List.
8	Program for implementing Circular Queue using Linked List.
9	Program for Creation of Binary Tree and operations on it.
	Level : Complex
10	Program for Creation of Binary Threaded Tree.
11	Program for Depth First search and Breadth First search.

IT2036 : Lab- Computer Graphics

Teaching Scheme	Examination Scheme	
Practical: 02 Hrs/Week	**Term Work**	**: 25 Marks**
Credits:01	**Practical Examination & Viva Voce:**	**: 25 Marks**

Prerequisites: CS1002 Lab: BCOMPIT

Course Objectives:

1. To learn basic concepts of Computer Graphics.
2. To study the various algorithms for generating graphical figures.
3. To summarize mathematics behind the graphical transformations
4. To understand various methods regarding projections, animation, shading.

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Identify functions of graphics editor with graphics packages.
CO2	Apply and implement line drawing and circle drawing algorithms to draw specific shape given in the problem.
CO3	Identify geometrical transformations for given input shape.
CO4	Formulate various polygon filling methods for given input polygon.
CO5	Analyze Fractals clipping algorithms, animation on the given object and apply any graphics tool.

List of Experiments

Sr. No.	Details
	Level : Easy
1.	Implement a program to draw and color all the basic shapes in graphics editor.
2.	Implement a program for DDA Line drawing Algorithm with any pattern.
3.	Execute a program for Bresenham's Line drawing Algorithm with any pattern.
4.	Simulate a program for Bresenham's circle drawing Algorithm with 4X4 chessboard rotated 45˚ with the horizontal axis.
	Level : Moderate
5.	Develope a program for one pattern (or use above chessboard) by polygon filling.
6.	Execute a program for seedfill algorithm by polygon filling.
7.	Implement a program for 2 D transformation by using specific pattern.
8.	Implement a program for other transformations like Reflection and Shear.
	Level : Complex
9.	Implement Cohen Sutherland Hodgman algorithm to clip any given polygon.
10.	Generate fractal patterns by using Koch curves.
11.	Execute animation assignments like National Flag hoisting.
12.	Usage of the computer graphics tools. (Maya/Blender).

IT2037: Software Lab-1

Teaching Scheme	Examination Scheme	
Practical: 4 Hrs/Week	**Term Work**	**: 50 Marks**
Credits :02	**Practical Examination & Viva**	**: 25 Marks**

Total Hours required for this course: 48 Hours.

CO1	Understand the basic features of object-oriented programming.
CO2	Design, implement, and test the implementation of friend function and constructors.
CO3	Implement the concepts of overloading and overriding methods and contrast them.
CO4	Make use of object oriented concept like virtual function, inheritance, polymorphism.
CO5	Formulate a software application and propose an object oriented design.

Suggestive List of Practical

Sr. No.	Details
	Level: Basic (all)
1	Implement program using Structure
2	Program which shows use class and Objects.
3	Program for Static Data Members and Member functions.
4	Program for friend function and inline function.
5	Write a program to demonstrate different types of constructors
6	Write a program for overloading various binary operators.
7	Write a program to implement to implement the Use of “this” Pointer.
	Level: Moderate (any four)
8	Program using streams
9	Write a program for Multilevel and multiple inheritances..
10	Write a program for Hierarchical and hybrid inheritance.
11	Write a program for polymorphism (virtual function).
12	Program using manipulators.
13	Program for User Defined Manipulators
	Level: Complex (any one from 10,11,12)
10	Implementation of any Data structure using object oriented language.
11	Program using files (open function method)
12	Program using files(constructor method)
13	**Mini Project in C++**

HS2003 : Professional Ethics and Cyber Laws

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	**Test I**	**: 15 Marks**
Credits: 3	**Test II**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

- To make students familiar with the fundamental concepts of computer ethics
- To know the linkage between computer, professional, philosophical ethics and decision making
- To develop the concepts in computer forensics
- To introduce the linkage between technology, law and ethics

Course Outcomes:

After completion of this course students will be able to:

CO1	To makes students familiar with the fundamental concepts of computer ethics.
CO2	To know the linkage between computer, professional philosophical ethics and decisions making.
CO3	Identify the cyber threats
CO4	Illustrate tools and methods used in Cyber crime
CO5	Make use of information and data to serve as digital evidence

Unit 1 An Overview of Ethics.Ethics for IT Professionals and IT Users.Foundations of Information Ethics.
Ethical Issues Involving Computer Security: Hacking,Hacktivism, and Counterhacking.Identify some of the basic content in the field of Computers, Information Systems, Ethics, Society and Human Values.

Unit 2 Ethical Decision Making: Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics. Crime incident Handling Basics: Hacking, cyber activism, Tracking hackers, clues to cyber crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations
Information Technology Act 2000
Scope, jurisdiction, offense and contraventions, powers of police, adjudication

Unit 3 Introduction: Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes Cyberoffenses How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector

Unit 4 Constitutional & Human Rights Issues in Cyberspace, Freedom of Speech and Expression in Cyberspace,Right to Access Cyberspace Access to Internet, Right to Privacy, Right to Data Protection,Cyber Crimes & Legal Framework,Cyber Crimes

against Individuals, Institution and State, Hacking , Digital Forgery, Cyber Stalking/Harassment,Cyber Pornography,Identity Theft & Fraud,Cyber terrorism, Different offences under IT Act 2000.

Unit 5 Cyber Law -Need for Cyber Law,International Perspectives,Cyber Jurisprudence at International and Indian Level,Dispute Resolution in Cyberspace,Cyber Torts:Cyber Defamation,Different Types of Civil Wrongs under the IT Act 2000, Intellectual Property Issues in Cyber Space:Interface with Copyright Law,Interface with Patent Law,Trademarks & Domain Names Related issues. Concept of Jurisdiction Indian Context of Jurisdiction and IT Act.2000,International Law and Jurisdictional Issues in Cyberspace.

TEXT AND REFERENCE BOOKS

Text Books:

1.Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, New Delhi

2. Deborah G Johnson, " *Computer Ethics*", Pearson Education Pub., ISBN : 81-7758-593-2.

3. Earnest A. Kallman, J.P Grillo, "*Ethical Decision making and IT: An Introduction with Cases",* McGraw Hill Pub.

4. .Cyber Law & Cyber Crimes By Advocate Prashant Mali; Snow White Publications, Mumbai

Reference Books:

1.Michael E. Whitman, Herbert J. Mattord, "*Principles of Information Security",* 2nd Edition,, CengageLearning Pub.

2.Nina Godbole, "Information Systems Security", Wiley India, New Delhi

3.Kennetch J. Knapp, "Cyber Security & Global Information Assurance", Information Science Publishing.

4.Randy Weaver, Dawn Weaver, "*Network Infrastructure Security*", Cengage Learning Publication.

5 Guide to Cyber Laws by Rodney D. Ryder; Wadhwa and Company, Nagpur

Websites:

Http://www.garykessler.net.library/forensicsurl.html

IT2021: Object Oriented programming

Teaching Scheme	Examination Scheme	
Lectures: 03 Hrs/Week	**Test I**	**: 15 Marks**
Credits: 03	**Test II**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: CS1001: BCOMP & IT, IT2037 SDL- I

Course Description: Object Oriented Programming is designed to create sophisticated programs to solve real-time problems using object oriented approach. The course emphasizes to improve the logical thinking of the students.

Course Educational Objectives:

- To enable the students to understand the core principles of the Object Oriented Language.
- To understand the concept of Multi-threading.
- To understand the concept of Exception Handling.
- Introduce the students to database connectivity.
- Introduce the students to Java EE.

Course Outcomes:

After completion of this course students will be able to:

CO1	Illustrate Object oriented principals using Object Oriented programming language's.
CO2	Develop programs using Inheritance, Interfaces. Multithreading.
CO3	Develop programs using Exception handling.
CO4	Develop application using database.
CO5	Illustrate the basics of Java Enterprise Edition

Syllabus

Unit 1 Abstract Data types: Evolution of OOP,Features of OOP, Syntax and Semantics of OO Programming language in C++, Java, C#

Unit 2 Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads

Unit 3 Exception handling: Exceptions, exception Propagation, Exception handler in C++ ,Java and C#, Packages ,Namespace

Unit 4 Database connectivity:
JDBC and Database Programming: Introduction to JDBC, JDBC Drivers, creating DSN, The java.sql package, PreparedStatement class, CallableStatement object, Scrollable Resultset, Updatable Resultset
Database Connectivity using c#:Connecting to Database and Connection Pooling

Unit 5 Introduction to Java Enterprise Edition:
Need for J2EE, Advantages of J2EE, Types of Enterprise Architecture, Architecture of J2EE, J2EE Components, J2EE Containers, J2EE Technologies

TEXT AND REFERENCE BOOKS

Text Books:

1.Bjarne Stroustrup," The C++ Programming Language",4th Edition, Addison-Wesley ISBN ISBN:978-0321563842.
2.Herbert Schildt, "*The Complete Reference Java2",* 7th Edition, TMH Publications.
3.E Balguruswamy, *"Programming with Java - A Primer"*
4. Herbert Schildt, "C# 4.0 *The Complete Reference", 1st* Edition, TMH Publications, ISBN**:**9780070703681.

Reference Books:

1.E Balguruswamy, *"Object Oriented Programming with C++"*4th Edition, TMH Publications
1.Cay S. Horstmann, Gary Cornell*, "Core Java Volume II"* - Pearson Education.
2.Steven Holzner, "*Java 2 Black Book*", Dreamtech Pub.
3.Ian Griffiths, Matthew Adams, Jesse Liberty"Programming C# 4.0"- O'Reilly Media

Reference websites:

1.www.java.sun.com/docs/books/tutorial
2.https://www.tutorialspoint.com/csharp
3.https://www.tutorialspoint.com/cplusplus
4. http://docs.oracle.com/javaee/6/tutorial/doc/

IT2038: Discrete Mathematics and Structure

Teaching Scheme	Examination Scheme	
Lectures: 03 Hrs/Week	**Test-I**	**: 15 Marks**
Tutorial:01 Hrs/Week	**Test-II**	**: 15 Marks**
Credits:04	**Teachers Assessment**	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Description: Discrete Mathematics deals with objects that are discrete. It is the fundamental mathematics for digital computer and all fields of computer science. Topics covered in the course include proof techniques, logic and sets, functions, relations, graph tree and algebraic techniques, probability and recurrences.

Course Objective:

1. To make students familiar with correct mathematical terminologies and notations
2. To understand sets, functions, relations, graphs and trees used in computer algorithms
3. To familiarize logical reasoning to solve a variety of problems.
4. To impart formal proof techniques

Course Outcomes: After successful completion of the course, students will be able to:

CO1 Describe basics of sets, relations, functions and recursion
CO2 Use logical reasoning to solve the problems
CO3 Explain and apply permutations and combinations
CO4 Practice problems based on graphs and trees
CO 5 Apply the concepts to various applications to find effective solution

Detailed Syllabus:

Unit 1 Sets, Combinations of sets, Finite and Infinite sets, Uncountably infinite sets, Mathematical Induction, Principle of inclusion and exclusion, Multisets, Propositions, Logical Connectives, Conditionals and Biconditionals, Logical equivalences, Euclidean Algorithm

Unit 2 Relations, Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations and partitions, Partial ordering relations and lattices, Chains and Anti chains, Functions, Recursive functions, Pigeon hole principle., Recurrence relation, Linear Recurrence Relations With constant Coefficients, Homogeneous Solutions, Total solutions, solutions by the method of generating functions

Unit 3 Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations. Discrete Probability, Conditional Probability, Bayes' Theorem, Information and Mutual Information

Unit 4 Graphs & Trees Basic terminology, multi graphs and weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, Factors of a graph, planar graph graphcoloring. Trees, rooted trees, path length in rooted trees, binary search trees, spanning trees and cut sets

Unit 5 Algebraic Systems: Algebraic Systems, Groups, Semi Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Rings, Integral domain and Fields.

Text Books:

1. C. L. Liu, D. P.Mohapatra, "Elements of Discrete Mathematics", 3rd Edition, Tata McGraw Hill, 2008, ISBN 978-0-07-066913-0
2. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2001, ISBN 81-7808-279-9
3. G.Shanker Rao, "Discrete Mathematics and Structure", 1st Edition, New Age International publisher, 2003, ISBN 81-224-1424-9

Reference Books:

1. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
2. J. Tremblay, R. Manohar, "Discrete Mathematical Structures with application to Computer Science", McGraw-Hill, 2002, ISBN 0-07-065142-6
3. Kenneth H. Rosen: Discrete Mathematics and Its Applications, 5th Edition, Tata McGraw-Hill, 2003, ISBN 0-07-053047-5

IT2039 Data Base Management System

Teaching Scheme	Examination Scheme	
Lectures: 03 Hrs/Week	**Test I**	**: 15 Marks**
Credits:03	**Test II**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: MA2001: Engineering Mathematics-III

Course Description: Database Management System. In short, a DBMS is a database program. Technically speaking, it is a software system that uses a standard method of cataloging, retrieving, and running queries on data. The DBMS manages incoming data, organizes it, and provides ways for the data to be modified or extracted by users or other programs.Some DBMS examples include MySQL, PL/SQL, Microsoft Access, SQL Server, FileMaker, Oracle, RDBMS, dBASE and FoxPro. Since there are so many database management systems available, it is important for there to be a way for them to communicate with each other

Course Educational Objectives:

1. To recognize the different issues involved in the design and implementation of a database system.
2. Realize and successfully apply logical database design principles, including E-R diagrams and database normalization.
3. To identify and use data manipulation language to query, update, and manage a database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

Course Outcomes

After completing the course, students will able to:

CO1	Analyze the basic concepts and architecture associated with DBMS
CO2	Convert entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data
CO3	Apply normalization steps in database design and removal of data anomalies
CO4	Develop team spirit and professional attitude towards the development of database applications
CO5	Learn and implement the principles and concepts of information integrity, security and confidentiality

Detailed Syllabus:

UNIT-1 **Introduction:** What is Database? Necessity of database? DBMS, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach, Database System Architecture, Data Models, Schemes and Instances, Data Independence, Database Languages and Interfaces, Database System Environment, Classification of Database Management Systems. Database users and administration

UNIT-2 ER Models, Relational Models:

Different types of integrity constraints-Primary Key, Unique , Foreign key, Check, Not Null, Super key, Candidate Key, **E-R model**- Entity, Entity set, Strong and Weak entity ,Entity-Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Attributes- Simple, Derived, Composite, Multi valued, Identifier, Relationship, Associative entity, Cardinality constraints, Degree of relationship. E-R diagram naming conventions and design issues. Examples, Extended E_R Features.

Relational Models: the Relational Data Model, the Relational Algebra: Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra operations. ER-to-Relational Mapping

UNIT-3 Structured Query Language:

Background, Structure of SQL Queries, Data Definition language-Create, alter, Describe, Drop, Truncate clause, create table using Integrity constraints Select clause, Set Operations, Functions-single row functions-general, conversion, date, character, Multiple row functions -Aggregate Functions, Group by clause, Having clause, Nested Sub queries, Complex Queries, Views, Modification of the Data-DML-Insert, Update, Delete, Different types of joins, Introduction to PL/SQL-Cursor, triggers, Procedures.

UNIT-4 Database Designing:

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Decomposition Using Functional Dependencies, Decomposition using Multi-valued Dependencies, More Normal Forms up to BCNF.

UNIT-5 Query Processing and Transaction Processing:

Overview of Query Processing, Measures of Query Cost, Transaction Concept, Transaction State, Implementation of Atomicity and Durability.

Introduction to NoSQL: CAP Theorem and BASE Properties, Types of NoSQL Database. Concurrent Executions, Serializability, Recoverability, Implementation of Isolation. Transaction support in SQL Concurrency control techniques, concurrency control based on timestamp based protocol, validation based protocol, deadlock handling, Database Recovery Techniques based on Immediate Update, Failure classification, Shadow Paging, Log based recovery, failure with loss of Nonvolatile Storage, Authorization and transaction control SQL clauses

Text Books

1. Abraham Silberschatz and Henry Korth, Sudarshan : Database System Concepts, 5th Edition, ISBN : 0-07-120413X, Tata McGraw-Hill.
2. Elmasri and Navathe : Fundamentals of Data base Systems (5th Ed.), Addison-Wesley, 1999.
3. Christof Strauch, “NoSQL Databases”

Reference Books

1. Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.
2. Hector Garcia- Molina, Jeffrey D. Ullman and Jennifer Widom-“Database System Implementation” Pearson Education-2003

IT2040 : Data Communication and Networking

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	**Test-I**	**: 15 Marks**
Credits :03	**Test-II**	**:15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Description: After completing this course, students will understand fundamentals of Data communication and Networking. First and second unit introduces Network models and it also explores the telecommunication aspects of the physical layer in the Internet model. Third unit is devoted to switching and error detection and correction. The forth and fifth unit explores the data link layer and Medium Access Control sub-layer of the to data link control

Course Educational Objectives:

1. To explore Data communication, Networking , Protocols and Standards and Networking Models
2. To discuss issues related to physical layer and transmission medium.
3. To discuss services provided by data link layer.
4. To make the students understand error detection and correction.

Course Outcomes:

After completion of this course students will be able to:

CO1	Understand Data communication components and network structures.
CO2	Compare ISO-OSI model and TCP/IP model with their functionalities.
CO3	Identify and solve issues related to physical layer.
CO4	Make use of error correction/ detection techniques.
CO5	Classify Multiple Access Protocols and be familiar with IEEE standards.

Unit 1 **Introduction:**Data Communication, Networks, Internet, Protocols and Standards, Network Models: OSI, TCP/IP analog and digital data, analog signal, digital signal, transmission impairments, data rate limits, performance.

Unit 2 **Bandwidth Utilization and Transmission Media:**
Signal Conversion: digital-to-digital, analog-to-digital, analog-to-analog, digital-to-analog conversion, multiplexing, spread spectrum, guided media and unguided media

Unit 3 **Switching and Error Detection - Correction**
Switching: circuit switched networks, datagram networks, virtual circuit networks, Types of errors, detection vs correction, block coding, linear block codes, cyclic codes, checksum, hamming code

Unit 4 **Data Link Control Medium Access**
Framing, flow control and error control protocols, protocols: stop-and-wait, go-back-n, selective-repeat, piggybacking, HDLC and PPP.

Unit 5 **Medium Access, Ethernet and LAN**
Random access: ALOHA, CSMA, CSMA/CD, CSMA/CA, controlled access, channelization, IEEE standards, different Ethernets, connecting devices, backbone networks, VLAN.

TEXT BOOKS:

- B. A. Forouzan, "Data Communications and Networking",5th Edition, Tata McGraw-Hill, 2013, ISBN-10: 1-25-906475-1
- Alberto Leon Garcia and Indra Widjaja, "Communication Networks, Fundamental Concepts and Key Architectures", 2nd Edition, Tata McGraw-Hill. 2004, ISBN-10: 007246352X

REFERENCE BOOKS:

- William Stallings, "Data and computer Communication",7th Edition, Pearson Education, ISBN-81-297-0206-1
- A S Tanenbaum, "Computer Networks", 4th Edition, Pearson Education, ISBN 9788177581652
- S. Keshav , "Engineering Approach to Computer Networks", Pearson Education, 1997, ISBN-13: 9780201634426
- J.F. Kurose and K. W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet" , 2nd Edition, Pearson, 2003, ISBN-13: 97802019769911

WEB REFERENCES:

- **http://nptel.ac.in/courses/106108098/**
- **http://nptel.ac.in/courses/106105082/**
- **www.mhhe.com/engcs/compsci/forouzan/**
- **https://accessengineeringlibrary.com/**

OEIT2001: Basics of Data Structure

Teaching Scheme	Examination Scheme	
Lectures: 03 Hrs/Week	**Test I**	**: 15Marks**
Tutorial:00 Hrs/Week	**Test II**	**: 15Marks**
Credits:03	**Teachers Assessment**	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Description:
This course covers some of the general-purpose data structures and algorithms, and software development. It is aimed at helping you understand the reasons for choosing structures or algorithms. Topics covered include managing complexity, abstraction, analysis, vectors, lists, queues, trees, heaps, hash tables maps, and graphs.

Course objectives:

- To acquaint student with: Algorithm analysis and its complexity.
- Data structure design methodologies and its implementation.
- Motivate students to use critical thinking skill to implement algorithms and data structures.

Course Outcomes

After completing the course, students will able to:

CO1 Interpret and compute asymptotic notations of algorithms to analyze the consumption of resources (time/space).
CO2 Describe and explain data structure: arrays, records, Pointer, stacks and queues.
CO3 Compare the searching algorithms and sorting algorithms.
CO4 Identify and model binary tree and file structure .

Unit 1 **Introduction to Data Structure :**Algorithms, performance analysis- time complexity and space complexity. Basic terminology, Elementary Data Organization, Definition of Data structure and Abstract data type, Classification of Data structures

Unit 2 **Arrays :**Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C++, Character string operation, Array as Parameters. **Pointer:** Pointers Definition and declaration, Initialization; Indirection operator, address of operator; pointer arithmetic; dynamic memory allocation; arrays and pointers; function and pointers

Unit 3 **Stacks and Queue:**Array Representation and Implementation of stack, Operations on Stacks: Push, Pop, Traverse. Linked Representation of Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack, Applications in recursion**,**Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues. **Introduction of Link list**

Unit 4 **Searching, Hashing and Sorting** :Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation, Selection sort, Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting

Unit 5 **Binary Search Trees and File Structures**:Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.**,** Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons

Text Books

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data Structures using C and C++ " , Pearson Pub.
2. G.S. Baluja, "Principles of Data Structures using C and C++",

Reference Books

1. Yashavant P Kanetkar, "Data Structures through C", BPB Pub. (Book with CD)
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures",
3. Robert L Kruse, "Data Structures and Program Design", PHI

OEIT2002: Basics of Cyber Security

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	**Test I**	**: 15 Marks**
Credits: 03	**Test II**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Educational Objectives:

- To make students familiar with the fundamental concepts of cyber security.
- To Identify the cyber threats
- To develop the concepts in computer forensics
- To make use of information and data to serve as digital evidence

Course Outcomes:

After completion of this course students will be able to:

CO1 To makes students familiar with the fundamental concepts of cyber security
CO2 To understand the different types of attacks
CO3 Identify the cyber threats
CO4 Illustrate tools and methods used in Cyber crime
CO5 Make use of information and data to serve as digital evidence

Unit 1 Introduction to cyber security. Definition, Computer Security, Necessity of Security, What to Secure? Benefits of Computer Security Awareness, Losses due to Security Attacks, Different Elements in Computer Security, Cyber security strategies, Policies To Mitigate Cyber Risk. Introduction to Cybercrime, Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cyber crime, Cyber crime and the Indian ITA2000, A global Perspective on cybercrimes.

Unit 2 How criminal plan the attacks, Social Engg, Cyber stalking, Cyber cafe and Cybercrimes, Botnets, Attack vector, Cloud computing, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Devices Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptop

Unit 3 Tools and methods used in cybercrime: Software Vulnerabilities: Phishing, password cracking, key loggers and spywares, Viruses, Worms, and other Malware, steganography, DoS and DDoS attacks, SQL injection, Buffer overflow, Attacks on wireless network, Identity theft.

Unit 4 Cybercrimes and Cyber security: The Legal Perspectives, Introduction Cybercrime and the Legal , Landscape around the World, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the, Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students: Indian Scenario.

Unit 5 Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail , Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Antiforensics

TEXT AND REFERENCE BOOKS

Text Books:

1.Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, New Delhi
2. . James Graham, Richard Howard, Ryan Olsan, "Cyber Security Essentials" CRC Press.

Reference Books:

1.Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, "Cyber Security Policy Guidebook" Wiley Publications
2.Albert J. Marcella, Jr. Doug Menendez"CYBER FORENSICS: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes", Auerbach Publications
3.Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012

Website:

1. http://nptel.ac.in/courses/106106129
2. https://www.tutorialspoint.com/information_security_cyber_law/cyber_security_strategies.htm

IT2022: Lab Object Oriented Programming

Teaching Scheme	Examination Scheme
Practical: 2Hrs/Week	**Term Work : 25 Marks**
Credits :01	**Practical Examination & Viva: 25 Marks**

Prerequisite : CS1002 Lab : BECOMPIT, IT2037 Lab SDL-I

Course Outcomes :

CO1	Familiarize with Object Oriented programming Syntax , Semantics, compiling, debugging, linking and executing a program using the development environment
CO2	Use and apply Multithreading using OO programming languages
CO3	Use and apply Exception Handling using OO programming languages
CO4	Develop database applications to access and query a database
CO5	Illustrate the basics of Java Enterprise Edition

Suggestive List of Practical

Sr. No.	Details
	Level: Basic (all)
1	Install JDK,set the variables and write program to print message on the output screen
2	Install C#,set the variables and write program to print message on the output screen
3	Program to implement the concept of OOP's using C++
4	Program to implement the concept of OOP's using C#
5	Program to implement the concept of OOP's using Java
6	Program to implement the concept of database connectivity using Java
7	Program to implement the concept of database connectivity using C#
	Level: Moderate (any four)
8	Program to implement the concept of Virtual function in C++.
9	Program to implement the concept of Multithreading using java.
10	Program to implement the concept of Exception Handling using java.
11	Program to implement the concept of Multithreading using c#.
12	Program to implement the concept of Exception Handling using c#.
13	Program to implement the 2-tier architecture using J2EE.
	Level: Complex (any one)
14	Mini Project in C++
15	Mini Project in Java
16	Mini Project in C#

Expected to solve all problems of simple level any four from Moderate and any one from complex level

IT2041 Lab-Database Management System

Teaching Scheme	Examination Scheme	
Practical: 02 Hrs/Week	**Term Work**	**: 25 Marks**
Credits: 01	**Practical Examination & Viva Voce:**	**: 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Formulate and test SQL queries using SELECT FROM, WHERE, ORDER BY blocks
CO2	Recognize the need for logical operation, set operators, UNION, DISTINCT, LIKE, and use them appropriately.
CO3	Formulate and test queries using aggregate functions in SQL
CO4	Formulate and test of cursor and procedure in PL/SQL.

List of Experiments

Sr. No.	Details
	Level: Basic (all)
1	To Study different types of Oracle Data types
2	To Study different types of DDL commands.
3	To study different types of DML commands.
4	To study different integrity constraints
	Level: Moderate (any three)
5	To study different types SQL functions
6	To study subqueries.
7	To study views.
8	To study different types of joins
	Level: Complex (any two)
9	Study of Open Source Databases : MySQL
10	Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, and set operator
11	To study cursor and procedure in PL/SQL
12	To study trigger in PL/SQL
13	Mini Project

IT2042: Software Development Lab-II

Teaching Scheme	Examination Scheme
Practical: 2Hrs/Week	**Term Work : 25 Marks**
Credits :01	**Practical Examination & Viva Voce : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Demonstrate secure web applications using ASP.Net
CO2	Ability to handle XML file and Database.
CO3	Create a simple website to demonstrate the use of rich controls for creating online registration form
CO4	Ability to create Advance programs using ASP.net which is required in IT industry
CO5	Ability to develop Web services

List of Practical

Sr. No.	Details
	Level: Easy
1	To Study the ASP.Net Introduction. Create a webform that allow users to upload files to the web server.
2	Create online registration form using rich controls
3	Design logon Web form and validate it
	Level: Moderate
4	Develop a web page to insert, delete & modify information stored in the database.
5	Create a feedback form having various choices and count obtained percentage of each choice
6	Develop a web application to read an XML document containing subject, mark scored, and year of passing into a Dataset.
	Level: Complex
7	Develop a webpage that displays data in graphical form, using the "Chart Helper".
8	To create advertisements using adRotator
9	Create a program using web service
10	Create a web form for Online test.
11	Mini Project

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD

"*In Pursuit of Global Competitiveness*"

(An Autonomous Institute of Government of Maharashtra)

Department of Information Technology

Class TE IT With Effect From 2018-2019

Program Educational Objective(s) After graduation and few years of graduation, the (Information Technology) graduates would	
PEO I	Interpret, design and analyze data for effective problem solving
PEO II	Pursue advanced studies to adapt to current trends
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude

Program Outcome(s)

The program enables students to achieve by the time of graduation:

1. An ability to apply principles and methodologies of mathematics, science, and engineering fundamentals
2. An ability to identify, study research literature, formulate the computing requirements appropriate to its solution
3. An ability to design solutions for engineering problems and design systems or processes that meet specified needs with appropriate considerations
4. An ability to conduct investigations of complex problems including design of experiments, analysis and interpretation of data to provide valid conclusions
5. An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools with an understanding of the limitations
6. An understanding of professional engineering practice with concern to societal, health, safety and legal responsibilities
7. Recognize the impact of IT solutions in an environmental and societal context and demonstrate knowledge of and need for sustainable development
8. Understand and commit to professional ethics and responsibilities and norms of engineering practice
9. An ability to function effectively as an individual and as a member or leader in a team to accomplish a common goal
10. Communicate effectively to comprehend and write effective reports, design documentation and make effective presentations
11. An ability to engage in independent and life-long learning to enhance their careers for continuing professional development
12. An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

Mapping of PEOs and POs

	Programme Educational Objectives	**Program Outcome(s)**
PEO I	Interpret, design and analyze data for effective problem solving	1,2,3
PEO II	Pursue advanced studies to adapt to current trends	3,4,5,6,7,9
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development	4,5,6,7,8,9,10,11,12
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude	6,8,10,11,12

Third Year Engineering (IT) Choice Based Credit System

Semester- V

			Contact Period (Hrs.)				Continuous Evaluation in terms of Marks						
Sr No	**Subject Code**	**Subject**	**TH**	**T**	**PR**	**Credits**	**Class Test I**	**Class Test II**	**TA**	**ESE**	**TW**	**Practical/Viva-voce**	**Total (100)**
1	IT3043	Computer Algorithm	3	-	-	3	15	15	10	60	-		100
2	IT3044	Computer Networks	2	1	-	3	15	15	10	60	-		100
3	IT3045	Software Engineering and Testing	3	-	-	3	15	15	10	60	-		100
4	IT3046	Operating System	3	-	-	3	15	15	10	60	-		100
5	IT3072 IT3073	**Professional Elective-I** Enterprise Resource Planning Computer Organization	4	1	-	5	15	15	10	60			100
		LAB											
6	IT3047	Lab: Computer Algorithm	-	-	2	1	-	-	-		25	25	50
7	IT3048	Lab: Computer Networks	-	-	2	1	-	-	-		25	25	50
8	IT3049	Lab: Software Engineering and Testing	-	-	2	1	-	-	-		25	25	50
9	IT3050	Lab: Operating System	-	-	2	1	-	-	-		25	25	50
10	IT3023	Lab: Open Source-I	-	-	2	1	-	-	-		50	-	50
Total			**15**	**2**	**10**	**22**	**75**	**75**	**50**	**300**	**150**	**100**	**750**

Third Year Engineering (IT) Choice Based Credit System

Semester- VI

			Contact Period (Hrs.)				Continuous Evaluation in terms of Marks						
Sr No	**Subject Code**	**Subject**	**TH**	**T**	**PR**	**Credits**	**Class Test I**	**Class Test II**	**TA**	**ESE**	**TW**	**Practical/Viva-voce**	**Total (100)**
1	HS3008	Business Intelligence	2	-	-	2	15	15	10	60	-		100
2	IT3051	Theory of Computation	3	1	-	4	15	15	10	60	-		100
3	IT3052	Advanced Database Management System	3	-	-	3	15	15	10	60	-		100
4	IT3053	Mobile Computing	3	-	-	3	15	15	10	60	-		100
5	IT3074 IT3076	**PROFESSIONAL ELECTIVE –II** Linux Operating System Distributed Systems	4	-	-	4	15	15	10	60	- -		100
6	OEIT3001 OEIT3002	**OPEN ELECTIVE** Principles of Programming Language Object Oriented Modeling and Design	3	-	-	3	15	15	10	60	-		100
7	IT3054	Lab: Advanced Database Management System	-	-	2	1	-	-	-		25	25	50
8	IT3055	Lab: Mobile Computing	-	-	2	1	-	-	-		25	25	50
9	IT3075 IT3078	**Lab PROFESSIONAL ELECTIVE –II** Lab: Linux Operating System Lab: Distributed Systems	-	-	2	1	-	-	-		25	25	50
Total			**18**	**01**	**06**	**22**	**90**	**90**	**60**	**360**	**75**	**75**	**750**

- Students should undergo Internship/Industrial Training at the end of fourth and sixth semester of total four to six weeks duration. This is Mandatory Audit Course

IT3043 : Computer Algorithm

Teaching Scheme	**Examination Scheme**
Lectures: 03 Hrs/Week	**Test I : 15 Marks:**
Credits:03	**Test II : 15 Marks**
	Teachers Assessment : 10 Marks
	End Semester Exam : 60 Marks

Pre-requisite: IT 2032 Data Structures

Course Objectives:

To enable the students to design good efficient solutions to real world problems and understand the complexity of their solution in terms of memory space and computer time

Course Outcomes:

After completing the course, students will be able to:

CO1 Appreciate the need for analysis of algorithms.

CO2 How to analyze the best-case, average-case and the worst-case running times of algorithms using asymptotic analysis.

CO3 Know the standard design techniques of algorithms and know the conditions in which each particular technique is to be applied based on complexities.

CO4 Design efficient algorithms for problems encountered in common engineering design situations.

CO5 Know the limitations on the time complexity of algorithms i.e. the theory of NP Complete problems.

Detailed Syllabus:

Unit 1 **Introduction**

Algorithm concept, Need for Analysis, Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case, best case analysis, amortized analysis, Space complexities, Mathematical foundations, summation of arithmetic and geometric series, $\sum n$,$\sum n^2$, recurrence relations and methods.

Unit 2 **Divide and conquer**

Divide and conquer basic strategy and its complexity, Sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, binary search, quick sort, merge sort, Fast Fourier Transform.

Unit 3 **Greedy method** - Basic strategy and its complexity, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path, Knapsack Problem.

Dynamic Programming - Basic strategy and its complexity, Principle of optimality, multistage graphs, all pairs shortest path, single source shortest paths, Huffman codes, travelling salesman problem, 0/1 knapsack problem , Matrix-chain multiplication, Longest common subsequences.

Unit 4 **Traversal and Search Techniques:** graph traversal, breadth first search and depth first search, connected components, DAG, Backtracking basic strategy, The Method Of

Branch And Bound, 8-Queen's problem, graph coloring, Hamiltonian cycles, Travelling Sales Person Problem Using Branch And Bound

Unit 5 **NP problems:** P and NP concept, decision Vs optimization problems, NP-hard and NP-complete problems, satisfiability, Clique, Node cover, non deterministic algorithms.

Text Books:

1. 1 Introduction to Algorithms : Cormen T.H. et.al : Prentice Hall of India
2. Computer Algorithms : Horowitz, Sahani, Rajsekharan , Galgotia Publications Pvt.Ltd
3. Fundamentals of Algorithms : Brassard, Bratley , Prentice Hall

IT3044 Computer Networks

Teaching Scheme	Examination Scheme	
Lectures: 2 Hrs/Week	**Test 1**	**: 15 Marks**
Tutorial : 1 Hr/Week	**Test 1**	**:15 Marks**
Total Credits :03	**Teachers Assessment**	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: IT2040 Data Communication and Networking

Course description: Students learn about the distinct concepts and protocols in network architecture.

Course Objectives:

1. To discuss issues related to application-layer concepts, including network services required by applications
2. To discuss working of Network layer and Transport Layer
3. To make the students understand Multimedia networking
4. To understand why need to Network Mangament

Course Outcomes

After completing the course, students will able to:

CO1	Explain application-layer concept and working of different protocols of application layer
CO2	Describe the principle of working of transport layer and implementation of these principles in existing protocols
CO3	Express working of network layer and routing protocols
CO4	Explore Archiecture and Mechanisms for multimedia networking in a best-effort network
CO5	The network Mangament by motivation the need for providing appropriate tools for networking administrator

Detailed Syllabus:

Unit 1 Application Layer

Principles of Network Applications , The Web and HTTP , File Transfer , Electronic Mail in the Internet , DNS, Peer-to-Peer Sharing,Socket Programming With TCP.

Unit 2 Transport Layer

Introduction and Transport-Layer Services, Multiplexing and Demultiplexing , Connectionless Transport-UDP, Principles of Reliable Data Transfer , Connection-Oriented Transport , Principles of Congestion Control , TCP Congestion Control

Unit 3 The Network Layer

Introduction Forwaring and Routing, Router , The Internet Protocol (IP) , Routing Algorithms, Routing in the Internet , Broadcast and Multicast Routing.

Unit 4 Multimedia Networking

Multimedia Networking Applications , Streaming Stored Video , Protocols for Real-Time Interactive Applications,Scheduling and Policing Mechanisms,RSVP.

Unit 5 Network Management

What Is Network Management ?, The Infrastructure for Network Management, The Internet-Standard Management Framework,ASN.1.

Text and Reference Books

1. "Computer Networking- a top-down approach featuring the Internet", by James F. Kurose and Keith W. Ross, Person Education, ISBN-10- 0132856204, 6th Edition.
2. "Data Communications and Networking", by Forouzan B. A, Tata McGraw-Hill Publications, 2006, ISBN-0-07-063414-9, 4th edition.
3. "Computer Networks", by Tanenbaum A. S., Pearson Education , 2008, ISBN- 978-81-7758-165-2, 4th Edition
4. "Computer Networks and Internet", by Comer D., Pearson Education, ISBN-81-297- 0330-0, 2nd Edition.
5. "Computer Networks- A Systems Approach", by Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann, ISBN-978-81-312-1045-1, 4th Edition.

IT3045: Software Engineering and Testing

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	**Test 1**	**: 15 Marks**
Total Credits :3	**Test 1**	**:15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Description

The course aims to prepare students for careers in software engineering, software project management, and software development and integration, implementation of testing levels for real time projects.

Course Educational Objectives:

1. To understand fundamental concepts of software engineering principles.
2. To design and implement the software solutions and methodologies, good test cases
3. To understand the role and contents of testing activities in different life cycle phases.
4. To train the students on basic principles of Software Engineering used in Industry.

Course Outcomes:

CO1 Apply principles of software engineering with internal fundamentals.
CO2 Identify software design solutions for appropriate processes.
CO3 Select modern IT testing tools as per software levels.
CO4 Apply appropriate testing tools as per engineering and management principles.
CO5 Create planning management and bug reporting to function effectively to achieve common goal.

Detailed Syllabus:

UNIT-1 **Introduction:** Software engineering basics, SDLC Models, Requirement Engineering, Agile methodology,Software Project Planning with Size estimation, Cost estimation Models, The constructive Cost mode COCOMO II.

UNIT-2 **Software Design**
Design, Modularity, Strategy of design, Function oriented design, IEEE Recommended practice for Software Design Description , Object Oriented Design, Unified Modeling Language diagrams, Software metrics, data structures metrics, Information flow metrics, Metrics analysis, Software quality, software reliability Models, ISO 9000.

UNIT-3 **Basic of software testing:** Quality Concepts, Needs and Objective of testing, Software Development & Software Testing Life Cycle, Testing Standards:-IEEE, CMM, ANSI. Verification and Validation Model, Techniques of Verification, levels of testing,

UNIT-4 **Testing methods and Testing tools:** Black Box methods:-Equivalence partitioning, Boundary-value analysis, Error guessing. White Box methods:-Statement coverage, Decision coverage, Condition coverage.
Testing Tools:-Win Runner, Load Runner.

UNIT-5 **Test Planning & Documentation:** Testing Strategy, Defect Management and Test Reporting, Software maintenance process and models, estimation of maintenance costs, reverse engineering, software re-engineering, Configuration management, documentation.

Text books:

1. Pressman R.S., " *Software Engineering*", McGraw-Hill Publication
2. K.K.Aggarwal , Yogesh Singh , "*Software Engineeri*ng" , New Age International Publishers
3. Ron Patton, "*Software testing*", Pearson Publications

Reference Books:

1. Ian Sommerville , "*Software Engineering*" , Pearson Education
2. Boris Bezier, "*Software testing techniques*", Dreamtech Publications
3. Meilir Page-Jones, " *Fundamentals of Object Oriented Design in UML*" Pearson Education
4. Rex Black , "*Software testing*", Wrox Publications
5. Dr.K.V.K.K. Prasad, "*Software testing tools*", Dreamtech Publications

IT3046 : Operating System

Teaching Scheme	**Examination Scheme**	
Lectures: 3 Hrs/Week	**Test 1**	**: 15 Marks**
Total Credits :3	**Test 1**	**:15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: IT2032 Data Structures

Course description: This course provides students with major functions and principles of operating systems using latest OS. Main topics include the structure of operating systems, process management, memory management, I/O management, file management.

Course Objectives:

1. Understand structure of modern operating systems.
2. Describe the needs for OS.
3. Summarize techniques for concurrency, synchronization, storage.

CO1	Understand the concept of OS internal functions for research literature.
CO2	Examine details of process concepts and algorithms to design solutions
CO3	Apply the concept of deadlock and synchronization for professional development.
CO4	Analyze software projects for performance centric applications.
CO5	Justify I/O management and security for modern engineering techniques.

Course Outcomes

After completing the course, students will able to:

Detailed Syllabus:

Unit 1	**Introduction** : Operating system and functions, operational view of a computing system, issues in communication with devices, kernel and shell of an operating system Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocessor Systems, Multithreaded Systems, Operating System Structure-Layered structure, System Components, Operating System services, System calls, Concept of Virtual machine
Unit 2	**Process Management**: Process Concepts, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Concepts, Scheduling Algorithms, Multiprocessor Scheduling Inter Process Communication models and Schemes, Process generation.
Unit 3	**Process Synchronization**: Concurrent Processes, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Semaphores, Classical Problem in Concurrency- Dining Philosopher Problem, Monitors, Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.
Unit 4	**Memory Management**: Basics of memory management, memory relocation, linking and loading of memory, processes and primary memory management, Multiprogramming with fixed and variable partitions, Paging, hardware support for paging, segmentation, segmentation with paging, fragmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page

replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit 5 **File System, Protection & security:** File concept, File system structure, file allocation methods,Disk space management,Swap-space management, I/O Management and disk scheduling. Goals of protection, Access matrix, Implementation of access matrix, The security problem, Authentication, Programming threats, System threats, Threat monitoring, Encryption.

Text and Reference Books

1. Abraham Silberschatz and Peter Barer Galvin, "*Operating System concepts",* 8th Ed. Addison
   Wesley, 1998
2. Andrew S. Tanenbaum, *"Modern Operating Systems",* Prentice Hall, 1991
3. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition

IT3072: Enterprise Resource Planning

Teaching Scheme	Examination Scheme	
Lectures:04Hrs/Week	**Test-1**	**: 15 Marks**
Tutorial:01 Hrs/Week	**Test-2**	**:15 Marks**
Credits:05	**Teachers Assessment**	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Objectives:

Understand necessity of ERP in organization.Learn modelling and implementation details of ERP. Learn customization issues in ERP implementations.

Course Outcomes:

CO1 Understanding the necessity, challenges associated with managing ERP systems.

CO2 Learn the concept of supply chain management, relationship management.

CO3 Students will have an understanding of many approaches that may be drawn upon in the implementation of an ERP system

CO4 Introduce methods, formalisms and tools necessary for transferring architectural decisions to system designs and to successfully implemented systems.

CO5 Study the role of ERP in E-commerce and E-Business Intelligence system.

Detailed Syllabus:

Unit I **Introduction:** Definition / concept of an enterprise, Evolution of ERP, reasons for explosive growth of ERP in the market, tangible and intangible benefits of ERP systems, Limitations of ERP, Concept of business integration and how it is achieved by ERP systems, discussion on whether companies can develop their own ERP packages or should go for ERP implementation

Unit II **ERP and related technologies:** Management Information Systems, Decision Support Systems, Executive Information Systems, Introduction to Data Warehousing, Introduction to Data Mining, Concept of Online Analytical Processing, concept of Supply chain management, concept of Supply Relationship Management, concept of Customer Relationship Management, concept of Product Lifecycle Management.

Unit III **ERP implementation:** ERP implementation process, gap analysis, importance of end user training, concept of business consultants, definition of vendors, concept of domain experts, definition of end users, Concept of customization, ERP Implementation guidelines, reasons why an ERP fails, Post Implementation (Maintenance Mode).

Unit IV **ERP Market:** ERP Market: Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards World Solutions Company, System Software Associates, Inc. (SSA); QAD; A Comparative Assessment and Selection of ERP Packages and Modules.

Unit V **Electronic commerce & Future Directions:** Electronic commerce, role of ERP in electronic commerce, ERP Case studies, Future of ERP. Impact of Business Intelligence and Cloud Computing on ERP systems.

Text Books:

1. Enterprise Resource Planning: Mary Sumner, Pearson Fifth Edition, 2009
2. Enterprise Resource Planning: Alexis Leon Tata McGraw-Hill

Reference Books:

1. Concepts in Enterprise Resource Planning: Bret Wagner, Ellen Monk, Ceneage Learning India, 2012
2. Enterprise Resource Planning Systems: Daniel E. O'Leary, Cambridge University Press

IT3073 : Computer Organization

Teaching Scheme	Examination Scheme	
Lectures:04Hrs/Week	**Test-1**	**: 15 Marks**
Tutorial:01 Hrs/Week	**Test-2**	**:15 Marks**
Credits:05	**Teachers Assessment**	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisite: IT2031 DEMP or Equivalent

Course Objectives: Expose the ideas and techniques that define the art of computer architecture, organization, and design. Provide the students with architectural framework and foundation needed to understand future trends in the design.

Course Outcomes: Students will be able to:

CO1 Know about various trends in computer design and architecture of advanced processors

CO2 Identify where, when and how enhancements of computer performance can be accomplished with external devices.

CO3 Perform computer arithmetic operations and will also be introduced to more recent applications of computer organization in advanced digital systems.

CO4 Focus on Addressing modes, instruction format and perform operation on instruction set.

CO5 Realize about issues related to instruction level execution, pipeline, and control unit operations, memory organization & optimization techniques.

Detailed Syllabus:

UNIT 1 Introduction ,Organization and Architecture , Computer Evolution and Performance , Computer Components and Function, Bus Interconnection , Cache Memory - Principles, Elements of Cache Design , Pentium 4 Cache Organization , Internal Memory Technology , Semiconductor Main Memory, Advanced DRAM Organization , Cache size vs Block size, mapping functions, replacement algorithms, write policy

UNIT 2 Input/Output, External Devices, I/O Modules, Programmed I/O,Interrupt-Driven, I/O,Direct Memory Access , I/O Channels and Processors, The External Interface: FireWire and Infiniband

UNIT 3 Computer Arithmetic, The Arithmetic and Logic Unit (ALU), Integer Representation- Sign Magnitude Representation, Twos Complement Representation , Converting between Different Bit Lengths, Fixed-Point Representation, Integer Arithmetic, Booths Algorithm, Floating-Point Representation, Floating-Point Arithmetic - Addition and Subtraction, Multiplication and Division , Precision Considerations , IEEE Standard for Binary Floating-Point Arithmetic

UNIT 4 Instruction Sets: Characteristics and Functions, Machine Instruction Characteristics, Types of Operands, Intel x86 and ARM Data Types, Types of Operations, Intel x86 and ARM Operation Types, x86 and ARM Addressing Modes, Instruction Formats, x86 and ARM Instruction Formats

UNIT 5 Processor Structure and Function : Register Organization, The Instruction Cycle, Instruction Pipelining, pipeline hazards , RISC , CISC, Instruction-Level Parallelism and Superscalar Processors, Control Unit Operation - Micro-operations, Hardwired Implementation , Microinstruction Sequencing, Microinstruction Execution, basic concepts in parallel processing & classification of parallel architectures.

Text and Reference Books

1. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson Education, 8th Edition

Reference Books:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Elsevier.
2. Carl Hamachar, Zvonco Vranesic and Safwat Zaky, Computer Organization, McGraw Hill.
3. John P. Hayes, Computer Architecture and Organization, McGraw Hill.
4. Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, Pearson Education.

Reference websites:

1. http://nptel.ac.in/courses/106103068/
2. https://www.tutorialspoint.com/computer_organization/index.asp
3. http://www.cse.iitm.ac.in/~vplab/courses/comp_org.htm

IT3047: Lab Computer Algorithm

Teaching Scheme	**Examination Scheme**
Practical: 2 Hrs/Week	**Term Work marks : 25 Marks**
Credit : 01	**Practical Examination & Viva Voce: : 25 Marks**

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1 Design and implement appropriate data structures for computation
CO2 Demonstrate algorithms using divide and conquer approach
CO3 Solve problems using greedy method.
CO4 Apply dynamic programming techniques.
CO5 Illustrate backtracking techniques in problem solving

Suggestive List of Experiments

Sr. No.	Details
	Low Level
1	Implement recursive and iterative algorithms for specific problems.
2	Implementation of sorting methods using recursion.
3	Write a program for finding maximum and minimum using divide and conquer approach
4	Implement merge sort using divide and conquer approach.
	Medium Level (Any Five)
5	Implement the Greedy Knapsack problem.
6	Write a program for finding minimal spanning Trees using Prim's/ Kruscal's Greedy approach.
7	Write a program for finding shortest path using multistage graph problem.
8	Implement the all pairs shortest path problem using dynamic programming approach.
9	Implement the different techniques for tree traversals
10	Implement the graph traversal techniques
	Difficult Level (Any One)
11	Illustrate 8-Queens problem using general backtracking method and recursive backtracking method.
12	Implement a program for travelling salesperson problem algorithm using (a) Dynamic programming approach, and (b) Backtracking

IT3048 Lab Computer Networks

Teaching Scheme	**Examination Scheme**
Practical: 2Hrs/Week	**Term Work : 25 Marks**
Credits :01	**Practical / Viva Voce : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Demonstrate routing algorithm
CO2	Exercise socket programming
CO3	Demonstrate sliding window protocols
CO4	Design networks using NS too and Virtual Labs
CO5	Illustrate Packet sniffing and analyze packets using Wireshark

Suggested list of Practicals

1 Write a program for distance vector algorithm to find suitable path for transmission

2 Using TCP/IP sockets, write a client-server program file transfer

3 Write a program for congestion control using Leaky bucket algorithm

4 Write a program for implementation of simple DNS

5 Write a program for to simulate a sliding window protocol: Go Back N

6 Write a program for to simulate a sliding window protocol: Selective Repeat

7 Basics of Network Simulation

8 Simulating a Local Area Network

a. Study of Ethernet Frame Structure
b. Simulating a LAN using Network Simulator 2

9 Write a Program of Wireshark

a. Platform required
b. 10Installation
c. Packet sniffing and analysis using Wireshark

10 Study of Tcpdump

IT3049 Lab: Software Engineering and Testing

Teaching Scheme	Examination Scheme
Practical: 2Hrs/Week	**Term Work : 25 Marks**
Credits :01	**Practical / Viva Voce: 25 Marks**

Course Outcomes:

1. Hands on software engineering principles, tools and techniques to develop, maintain and evaluate software systems
2. Ability to design and develop efficient, reliable, robust and cost-effective software solutions
3. Ability to work as an effective member or leader of software engineering teams and meet ethical standards with legal responsibilities

Computer Usage / Lab Tool

QTP/ALM tools/latest open source tools

Suggestive List of Experiments:

1 Study Project planning through the study of problem.
2 Case study of Software requirement analysis.
3 Software design by writing test cases.
4 Software development and debugging using tools
5 Software verification and validation procedure real time example
6 Study of latest Testing tools QTP/ALM
7 Introduction to QTP/ALM tools
8 Real time application testing by QTP/ALM tools
9 Design test cases by boundary value analysis
10 Design test cases by equivalence portioning
11 Design test cases by regression testing.

IT3050: Lab Operating System

Teaching Scheme	**Examination Scheme**
Practical: 2 Hrs/Week	**Term Work : 25 Marks**
Credits: 01	**Practical Examination & Viva Voce: : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1 Apply the Knowledge of basic commands for computing requirements.
CO2 Evaluate design of process component to implement with multithreading.
CO3 Analyze the need of interprocess communication to select and continue with IT tool
CO4 Understand the basic difference between primary memory and virtual memory

List of Experiments

Sr. No.	Details
1	Installation Process of modern operating systems and implement various commands
2	Case study of various process states.
3	Write a program using system calls.
4	Write a Program to simulate process scheduling like FCFS, Shortest Job First and Round Robin(any two)
5	Write a program for interprocess communication using Shared memory
6	Write a program for interposes communication using pipes
7	Write a Program for deadlock avoidance(Bankers algorithm)
8	Write a Program to simulate page replacement algorithms like FIFO and LRU.
9	Write a Program to simulate memory allocation using First fit, Best fit, and Worst fit.(any two)
10	Write a program for disk scheduling

IT3023 Lab Open Source-1
Python Programming

Teaching Scheme	**Examination Scheme**
Practical: 2Hrs/Week	**Term Work : 50 Marks**
Credits :01	

Pre-Requisite Courses: **CS1002 Lab: BCOMPIT, IT2021 OOP**

Course Outcomes

CO1 Understand Python especially the C and object oriented concepts with problems and design systems or processes.
CO2 Identify the built in objects of Python and requirements appropriate to its solution
CO3 Classify the interpretation of loop control statements.
CO4 Justify to advanced applications such as programming for modern and IT tools.
CO5 Create data from a text file using Python, select and apply appropriate techniques

Unit 1 Introduction to Python and Basics of Python, all primitive and Non-Primitive variable
Unit 2 Operators and Expressions: All type operator and expression,Decision Statements,Loop Control Statements and Function

Unit 3 Class and Inheritance : Introduction, Class definition, Method Overriding and Overloading, Multiple Inheritance, Abstraction And Encapsulation, Polymorphism. Strings,function strings
Unit 4 List and Multidimensional List and List Processing
Unit 5 Sets, Tuples and Dictionary,Graphical User Interface in Python,Python- Database Access MYSQL db,

Text and Reference Books

1. Mark Lutz, Programming Python O'REILLY.
2. John M. Zelle Python Programming: Introduction to Computer Science

Suggested list of Practicals

Programming List Control Statements

A. Write a program to display reverse of the entered number.
B. Program to print Fibonacci series upto nth number.
C. Write a program to display multiplication tables from 1 to 5.
D. Read the String "Hello World" from the user. Make use of ***continue*** keyword and remove space.

Programming List on Functions

1. Program to find the factorial of a number.
2. Write a any simple program to demonstrate the use of keyword and positional argument.
3. Write a program to pass a number and return square and cube of number simultaneously.

4. Write a function calc_Distance(x1, y1, x2, y2) to calculate the distance between two points represented by Point1(x1, y1) and Point2 (x2, y2). The formula for calculating distance is given below.

a. $\text{Distance} = \sqrt{(x2-x1)^2 + (y2-y1)^2}$

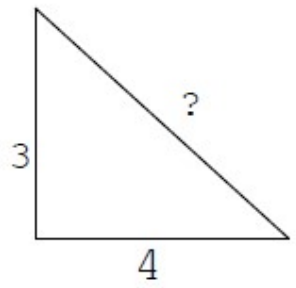
Programs on List, Tuple and Dictionaries

1. Consider the list with 5 different Celsius values. Convert all those Celsius values to Fahrenheit.
2. Write a Program to traverse the tuples from a list.
3. Consider the following example of tuple, T = (1, 3, 2, 4, 6, 5) Write a program to store numbers present at odd index into the new tuple.
4. Write a function histogram that takes string as parameter and generates a frequency of characters contained in it.

Input:S = "AAPPLE"
The Program should create a dictionary
D= {'A': 2, 'E': 1, 'P': 2, 'L': 1}

Program on Module(Math_Module)

1.Write a program to calculate the hypotenuse of Right angle triangle given below.



3. Programs on String: Write a program to print all the letters from word1 that also appear in word2.
4. Example: Word1 = USA North America
    i. word2= USA South America
5. Program on Class and Object Oriented Programming.
6. Write a program to calculate the volume of Box.
    a. Note: Make use of Constructor, Member variable, and Member Functions.
7. Simple program to demonstrate the concept of Multilevel inheritance.
8. Mapping of Course outcome with Program Outcomes
9. Mapping of Course outcome with Program Outcomes

HS 3008: Business Intelligence

Teaching Scheme		**Evaluation Scheme**	
Lectures	02Hrs/Week	Class Test I	15 Marks
Total Credits	02	Class Test II	15 Marks
		Teacher Assessment	10 Marks
		End-Semester Examination	60 Marks

Course Educational Objectives: To expose the students to the basics of business intelligence system with an understanding of modeling aspects behind Business Intelligence.

Course Outcomes Expected:

After completing the course, students will be able to:

CO1 Realize the need for business intelligence
CO2 Know the business intelligence life cycle and its techniques
CO3 Interpret different data analysis tools and techniques
CO4 Explore modeling and analysis of data
CO5 Identify business intelligence applications

UNIT-1 **BUSINESS INTELLIGENCE:** Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT-2 **Decision Making, Systems, Modeling:** Introduction and Definitions, Models, Phases of the Decision-Making Process, Decision Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Implementation Phase

UNIT-3 **Decision Support System:** How Decisions Are Supported, Decision Support System Configurations, Decision Support System Characteristics and Capabilities, Decision Support System Classifications, Components of Decision Support Systems

UNIT-4 **Modeling and Analysis:** Management Support Systems Modeling, Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, and Risk Management Support Systems, Mathematical Programming Optimization, Spreadsheet Model, Linear Programming, Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking, Decision Analysis with Decision Tables and Decision Trees

UNIT-5 **BUSINESS INTELLIGENCE APPLICATIONS:** Digital Marketing models: Google analytics, Search Engine marketing, Email marketing, Social media marketing, Sales force management, Business case studies, Logistic and Production models – Supply chain optimization, Optimization models for logistics planning, Revenue management system, Business Case studies.

Text Books:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013.
2. Business Intelligence: Data Mining and Optimization for Decision Making Carlo Vercellis Politecnico di Milano, Italy. A John Wiley and Sons, Ltd., Publication.
3. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable, Ian Dodson, Wiley publications

References Books:

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003.
2. Carlo Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager‟s Guide”, Second Edition, 2012.

IT 3051: Theory of Computation

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	**Test 1**	**: 15 Marks**
Tutorial: 1 Hr/ Week	**Test 2**	**: 15 Marks**
Total Credits: 4	**Teachers Assessment**	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites:

Course description: This course includes introduction to theory of computation. Topics like automata theory, formal languages and grammars, Turing machines are covered in this course.

Course Objectives:

- To provide introduction to formal languages and grammars
- To recognize deterministic and nondeterministic automata for regular languages
- To get acquainted with the use of context free languages and Push down automata
- To know Turing machines and computing with Turing machine

Course Outcomes

After completing the course, students will able to:

CO1 Design finite automata and its equivalent regular expressions
CO2 Convert DFA's to NFAs and regular expression
CO3 Formulate pushdown automata and its equivalent context free grammars
CO4 Use pumping lemmas to prove the type of language
CO5 Illustrate Turing machines

Unit 1 **Mathematical Preliminaries and Finite Automata:** Sets, Relations and Functions, Principle of Induction, Introduction to Finite Automata, Structural Representations, Automata and Complexity, Central Concepts to Automata Theory, Deterministic finite Automata (DFA), Nondeterministic finite Automata (NFA), Equivalence of DFA and NFA, FA with epsilon transition, Applications of FA, Moore and Mealy machines

Unit 2 **Regular Expressions and Languages:** Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Proving languages not to be regular, Closure Properties of Regular Expressions, Decision Properties of Regular Expressions, Equivalence and minimization of Automata

Unit 3 **Context Free Grammar:** Definition, Derivations using grammar, Language of a grammar, Parse Trees, Application of CFG, Ambiguity in Grammars and Languages, Normal Forms for Context Free Grammars, Pumping Lemma for CFL, Closure and Decision Properties of Context Free Languages

Unit 4 **Pushdown Automata:** Definition of Push Down Automata, Languages of Pushdown Automata, Equivalence of PDA's and CFG's, Deterministic PDA

Unit 5 **Turing Machine:** Introduction to Turing Machine, The Turing machine, Programming Techniques of Turing Machines, Extension to Basic Turing Machine, Turing Machines and Computers, Undecidable Problems about Turing Machines

Text and Reference Books

Text Books:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "*Introduction to Automata Theory, Languages, and Computation*" 3rd ed., Pearson Education, ISBN: 81-317-1429-2

Reference Books:

1. K.L.P. Mishra, N. Chandrasekaran, "*Theory of Computer Science: Automata, Languages and Computation*" 3rd Edition, PHI, ISBN: 978-81-203-2968-3

2. John C Martin, "*Introduction to Languages and the Theory of Computation",* 3rd ed., Tata McGraw Hill, ISBN: 0-07-066048-4

IT3052: Advanced Database Management Systems

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	Test 1	: 15 Marks
Total Credits: 3	Test 2	: 15 Marks
	Teachers Assessment	: 10 Marks
	End Semester Exam	: 60 Marks

Prerequisites: IT2039 Database Management System

Course Description: The course deals with various aspects of database design, data storage and retrieval. It also focuses on issues pertaining to concurrency in transaction management and database security. Current developments in database systems such as Distributed, Parallel, Object-Oriented and No-Sql databases along with their application are discussed. It is intended to cover several case studies relating to database design and implementation for different real-life application scenarios

Course Educational Objectives:

1 Identify, describe, and categorize database objects
2 To learn and understand Object Oriented Databases.
3 To learn and understand various Database Architectures and Applications
4 Interpret and explain the impact of emerging database standards
45 Explore non-relational database systems and structures

Course Outcomes Expected:

CO1 Describe different database architecture and analyses the use of appropriate architecture in real time environment.
CO2 Use modern database techniques such as NOSQL. □
CO3 Define the role of data warehousing and enterprise intelligence in industry and government
CO4 Design, construct and maintain a database and various database objects using procedural language

Detailed Syllabus Contents

UNIT1 **Object and Object Relational Databases :**Concepts for Object Databases: Object Identity ,Object structure ,Type Constructors ,Encapsulation of Operations ,Methods ,Persistence, Type and Class Hierarchies Inheritance , Complex Objects ,Object Database Standards, Languages and Design: ODMG Model, ODL , OQL Object Relational and Extended – Relational Systems : Object Relational features in SQL/Oracle – Case Studies XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

UNIT2 **Parallel Databases :**Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism

UNIT3 **Distributed Data Base** : Distributed database concepts, distributed DBMS architecture, distributed database design, top-down and bottom design, fragmentation, fragment allocation, distributed query processing, transaction management in distributed database, distributed concurrency control, reliability issues in distributed DBMS.

UNIT4 **NO SQL**-Introduction to NoSQL Database, Types and examples of NoSQL Database- Key value store, document store, graph, Performance, Structured verses unstructured data, Distributed Database Model, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, NoSQL Data Models, Case Study-unstructured data from social media.

UNIT5 **Introduction to Data Warehousing** – Concepts, Benefits and Problems, Data Warehouse Architecture – Operational Data, load manager, meta data, DW Data flows – inflow, upflow, meta flow, DW tools and technologies – Extraction, cleansing and transformation tools, DW DBMS, admin and management tools, data marts – reasons and issues, Data Warehousing using Oracle. Data Warehousing Design – Designing, Dimensionality modeling, Design methodology, DW deign using Oracle.On-line Analytical Processing – OLAP BenchMarks, applications, benefits, tools, categories, extensions to SQL

Text Books

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2. Pramod J. Sadalage and Martin Fowler, ―NoSQL Distilled‖, Addison Wesley, ISBN10: 0321826620, ISBN-13: 978-0321826626
3. Paulraj Ponniah, "Data Warehousing Fundamentals, Wiley Publications"

References Books:

1. C J Date, ―An Introduction to Database Systems‖, Addison-Wesley,
2. S.K.Singh, ―Database Systems : Concepts, Design and Application‖, Pearson, Education, ISBN 978-81-317-6092-5
3. Kristina Chodorow, Michael Dirolf, ―MangoDB: The Definitive Guide‖ ,O'Reilly Publications, ISBN: 978-1-449-34468-9
4. Adam Fowler, ―NoSQL For Dummies‖, John Wiley & Sons, ISBN-1118905628
5. . Connally T, Begg C., "Database Systems", Pearson Education, ISBN 81-7808-861-4

IT3053: Mobile Computing

Teaching Scheme	**Examination Scheme**	
Lectures: 3 Hrs/Week	**Test 1**	**: 15 Marks**
Total Credits: 3	**Test 2**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: Computer Networking

Course Objectives:

It introduces basic terminology, fundamental concepts and principles behind design of distributed applications which can run on mobile devices and support user mobility by leveraging wireless communications. Location of mobile devices, judicious use of bandwidth, relocation of computation, are some of the key issues which will constitute the topics for further exploration. The course would be a mix of approximately 50% study of cellular network with wireless communication and 50% study of android operating system and its application development.

Course Outcomes:

After completing the course, students will able to:

CO1 Understand the structure and Design issues of mobile communication systems

CO2 Design and Study mobile IP, the extension of the Internet protocol (IP) into the mobile domain also to Ad-hoc networks with their requirements for specific routing protocols

CO3 Implement several approaches of adapting the current transmission control protocol (TCP), which is well known from the Internet, to the special requirements of mobile communication systems

CO4 Understand basic concept, components behind Android OS also Learn android programming to create applications for smartphones

CO5 Create smartphone applications with different services, storage, connectivity and publishing mobile applications

Detailed Syllabus:

UNIT 1 Introduction: Challenges in mobile computing, Modern wireless communication system, Cellular Concept & architecture, co-channel interference, frequency reuse, Channel assignment strategy, Handoff strategy, Interference and system capacity improvement. Evolution of mobile system: CDMA, FDMA, TDMA, SDMA, GSM. Wireless transmission, Multiplexing, Modulation, Medium access control

UNIT 2 **Mobile Network Layer:** Mobile IP :Goals, assumptions and requirements, IP packet delivery, Agent discovery, Registration, Tunnelling and encapsulation, Optimization, Reverse tunnelling ,IPv6 IP micro-mobility support , Dynamic host configuration protocol ,Mobile ad-hoc networks, Routing, Destination sequence distance vector, Dynamic source routing, Alternative metrics, Overview ad-hoc routing protocols

UNIT 3 **Mobile transport layer:** Traditional TCP ,Congestion control , Slow start , Mobile communications, Fast retransmit/fast recovery , Implications of mobility ,Classical TCP improvements ,Indirect TCP ,Snooping TCP ,Mobile TCP , Fast retransmit/fast recovery ,Transmission/time-out freezing, Selective retransmission , Transaction-oriented TCP , TCP over 2.5/3G wireless networks, Performance enhancing proxies .

UNIT 4 Introduction , Android OS, History and Version, android-architecture, services, Features of Android, OS kernel, libraries and devices, Dalvik VM, Installing required software's, OS Components, Activity life cycle, intent,, Directory Structure, Android Core Building Blocks, Security Philosophy, Android platform security architecture, OS protected APIs, UI Widgets :Working with Button, Toast , Toggle, switch, image button, checkbox, spinner.

UNIT 5 User Experience-themes and styles, material design, adaptive layouts, accessibility, localization, debugging the UI ,Storing Data, SQLite database ,Sharing Data, content resolvers and providers, Adding Google Map, Device Connectivity: Working with Camera, Wi-Fi, Bluetooth, paired devices, Animation, Services: Service lifecycle, foreground service, Android - Connecting MYSQL , Publishing Your App.

Text and Reference Books:

1. T. Rappaport, "Wireless Communication: Principles and Practice", Pearson Education
2. J. Schiller, "Mobile Communications", 2nd edition, Pearson Education, 2003.
3. Asoke K Talukder and Roopa R. Yavagal; Mobile Computing – Technology, Applications and Service Creation; TMH Pub., New Delhi, 2006
4. Android Programming (Big Nerd Ranch Guide), by Phillips, Stewart, Hardy and Marsicano.
5. Android Programming – Pushing the limits by Hellman
6. Wei-Meng Lee, "Beginning Android Application development", Wiley Publishing, Inc.
7. Reto Meier, "Professional Android 4 Application Development", Wiley Publishing, Inc.

Web References:

1. **http://freevideolectures.com/Course/2329/Wireless-Communication**
2. **http://nptel.ac.in/courses/106106147/**
3. **https://www.tutorialspoint.com/android/**

IT3074: Linux Operating System

Teaching Scheme	Examination Scheme	
Lectures: 4 Hrs/Week	**Test 1**	**: 15 Marks**
Total Credits: 4	**Test 2**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisite: Data structures, Operating system

Course description: This course provides basic functions and principles of Linux operating System. Main topics include the overview of Linux operating systems, process management, memory management, storage management, essential Linux utilities and commands, shell scripting with system programming.

Course Objectives:

1. To study internals of Linux Operating System.
2. Understand required data structures for process management.
3. Describe system calls, memory management and interrupt handlers

Course Outcomes

After completing the course, students will able to:

CO1 Design solutions for engineering problems using Linux kernel specification
CO2 Identify process scheduling for computing requirements
CO3 Execute kernel data structure for engineering practice
CO4 Analyze software development tools as per appropriate techniques
CO5 Determine storage techniques to manage projects

Detailed Syllabus:

Unit 1 **Introduction:**
Introduction to the Linux Kernel, Kernel Designs and Versions, Obtaining and Installing the Kernel Source, The Kernel Source Tree, Building and Configuring the Kernel, Installing the New Kernel, GNU C, Inline Functions, Synchronization and Concurrency, Importance of Portability

Unit 2 **Process Management**: The Process Structure, Allocating and Storing the Process Descriptor, Process States, The Linux Implementation of Threads, Creating Threads, Kernel Threads, Process Scheduling, Multitasking, Linux's Process Scheduler, The Scheduling Policy in Action, The Linux Scheduling Algorithm, Fair Scheduling, The Linux Scheduling Implementation, Preemption and Context Switching, User and kernel Preemption, Real-Time Scheduling Policies.

Unit 3 **System Calls and Kernel Data Structures:** Communicating with the Kernel, APIs, POSIX, and the C Library, System calls, Linked Lists, Manipulating Linked Lists, Queues Maps, Binary Trees, Data Structure to Use, Algorithmic Complexity, Time Complexity

Unit 4 **Interrupts and Interrupt Handlers:** Interrupts, Interrupt Handlers,Registering and Writing an Interrupt Handler, A Real-Life Interrupt Handler, Implementing Interrupt Handlers,/proc/interrupts, Interrupt Control, An Introduction to Kernel Synchronization, Causes of Concurrency, Deadlocks, Contention and Scalability, Atomic Operations, Spin Locks, Reader-Writer Spin Locks, Semaphores, Reader-Writer Semaphores, Mutexes.

Unit 5 **Memory Management**: Pages,Zones,kmalloc(),vmalloc(),Slab Layer, Statically Allocating on the Stack, High Memory Mappings, Per-CPU Allocations, The New percpu Interface, Reasons for Using Per-CPU Data, Picking an Allocation Method, The Virtual File system, Common File system Interface, File system Abstraction Layer, Unix File systems, VFS Objects and Their Data Structures, The Superblock Object and Operations, The Inode Object and Operations, Data structures of files and process.

Text and Reference Books

1. Linux Operating System" by "Robert Love
2. Linux: The Complete Reference", Petersen R. L., Tata McGraw Hill, ISBN: 0- 07-05849-7, 2003
3. LINUX with Operating System Concepts" by Richard Fox ISBN: 978-1-4822-3589-0

IT3076 : Distributed System

Teaching Scheme	**Examination Scheme**	
Lectures: 4 Hrs/Week	**Class Test 1**	**:15 Marks**
Credits:0	**Class Test 1I**	**:15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisite: Operating Systems, Computer Networking,Web Technology, JavaProgramming

Course Objectives:

- To get comprehensive knowledge of fundamentals and architecture of distributed systems.
- Understand the principles and desired properties of distributed systems.
- To examine state-of-the-art distributed systems, such as Google File System.
- To make students aware about security issues and protection mechanism for distributed environment and able to design and implement sample distributed systems.

Course Outcomes:

CO1 Demonstrate knowledge of the core architectural aspects of distributed systems and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
CO2 Identify the challenges in developing distributed applications.
CO3 Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems);
CO4 Develop and apply knowledge of distributed systems techniques and methodologies.
CO5 To design and implement distributed applications by considering security measures.

Detailed Syllabus:

Unit 1 Introduction
Introduction, Examples of distributed systems, Different Trends in distributed systems, Focus on Resource Sharing, Challenges. System Models: Physical models, Architectural Models, Fundamental Models. **Case Study: The World Wide Web**

Unit 2 Communication
Inter-process Communication, API for the Internet Protocols, External Data Representation and Marshalling, Multicast Communication, Network Virtualization: Overlay Networks, **Case Study: Java RMI** Indirect Communication: Group Communication, Publish-subscribe Systems, Message Queues, Shared Memory approaches

Unit 3 Distributed Objects and Components Introduction, Distributed Objects, Case Study: CORBA. From Objects to Components **Case Studies: Enterprise JavaBeans and Fractal Web Services**: Introduction, Web Services, SERVICE Descriptions and IDL for Web Services, A directory service for use with web services, XML security, Coordination of web services, Applications of Web Services.

Unit 4 Distributed Storage & Algorithm Distributed File Systems: Introduction, File Service Architecture, Sun Network File System, and HDFS.**Name Services:** Introduction, Name Services and the Domain Name System, Directory Service Time and Global States: Introduction, Clocks, Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States.

Unit 5 Security In Distributed Systems Introduction to Security: overview of Security Techniques, Design Issues, Cryptographic Algorithm, Digital Signature, **Case Study: Kerberos. Designing of Distributed Systems: Google case study**

Text and Reference Books

1. George Coulouris, Jean Dollimore, Tim Kindberg, & Gordon Blair, "Distributed Systems – Concept and Design", 5thEdition, Publisher: Pearson.
2. P. K. Sinha,"Distributed Operating Systems Concepts and Design", Publisher: PHI.
3. Reference Books:

4. Sunita Mahajan, Seema Shah, “Distributed Computing”, 2ndEdition, Publisher: Oxford University Press.
5. Advanced concepts in Operating Systems, Mukesh Singhal & N.G.Shivaratri, TMH.
6. Randay Chow, Theodore Johnson, “Distributed Operating System and Algorithm Analysis”, Publisher: Pearson (LPE).

OEIT3001: Principles Of Programming Languages

Teaching Scheme	**Examination Scheme**	
Lectures: 03 Hrs/Week	**Test I**	**: 15 Marks:**
Credits:03	**Test II**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: CS1001 Basics of Computers & IT

Course description: After completing this course, students will have a broad and fundamental understanding of different programming languages. Students will be able to discuss the basic principles and implementapplications using C,Java and C#.

Course Objectives:

- To understand the basic building blocks of programming languages.
- To learn and understand various programming paradigms

Course Outcomes

After completing the course, students will be able to:

CO1 Understand the basic principles of various programming languages.
CO2 Implement programs using Java
CO3 Design programs using C#
CO4 Acquire knowledge of Logical Programming
CO5 Attain knowledge of Functional Programming

Detailed Syllabus:

Unit 1 Introduction

Role of programming languages, need to study programming languages, characteristics of a good programming languages. Introduction to various programming paradigms: Procedural, objectoriented, logic and functional programming, Parallel Programming, Concurrent Programming

Procedural Programming: Design Principles, Control flow: statement-oriented and block-oriented structure programming, Execution steps, desirable and undesirable characteristics of procedural programming. Procedural Programming with C: Program structure, control structures:conditional and iterative, arrays, procedures and functions, pointers, parameter passing, User defined data types

Unit 2 Design Principles:

Objects, classes, Messages and methods, Implementation of Object-oriented Programming, Object oriented programming with Java: Program structure, Object and class declarations, constructors, inheritance, polymorphism, access specification, interfaces, packages,exception handling, Java I/O, Java applications and applets, introduction to Java threads and multithreading

Unit 3 Object Oriented Programming: C#

Brief introduction to Microsoft .NET - The Microsoft .NET platform, .NET framework, advantages, introduction to C#, type system, classes, method, Properties, Arrays, Interfaces, Delegates and event handlers, Multithreading Patterns, Exception Handling.

Unit 4 Logic Programming

Logic programming language model, logical statements, resolution, unification, search structures:backward and forward, Applications of logic programming

Unit 5 Functional Programming

Introduction to functional programming, Lambda calculus: Ambiguity, free and bound identifiers, reductions, typed lambda calculus, application of functional programming

Text Books:

1. Roosta S., "Foundations of Programming Languages", Thomson Brookes/Cole, ISBN 981 -243-141-1
2. Sethi R., "Programming Languages concepts & constructs", 2nd Edition, Pearson Education, ISBN 81 - 7808 - 104 – 0

References Books:

1. Scbesta R., "Concepts Of Programming Languages", 4th Edition, Pearson Education, ISBN-81-7808-161-X
2. Balagurusamy E., "Programing with C#", Tata McGraw-Hill, 2002, ISBN 0-07 -047339-0
3. Herbert Schildt "The Complete Reference Java2", 5th Edition, Tata McGraw-Hill 0 - 07-049543-2
4. Programming Language Pragmatics. Michael Scott, Morgan Kaufmann, 2000.
5. Essentials of Programming Languages. Friedman, Wand and Haynes, Prentice-Hall International (PHI), 1998.
6. Principles of Programming Languages. Tennant. PHI, 1981.

Web References:

1. http://nptel.ac.in/courses/106102067/
2. https://www.tutorialspoint.com/computer_programming/
3. http://freevideolectures.com/Course/2249/Principles-of-Programming-Languages
4. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv061-Page1.htm

OEIT3002: OBJECT ORIENTED MODELING and DESIGN

Teaching Scheme	Examination Scheme	
Lectures: 03 Hrs/Week	**Test I**	**: 15 Marks:**
Credits:03	**Test II**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Course Description: After completing this course, students will gain a good understanding of the foundation concepts of object oriented modeling techniques and tools used in object oriented modeling. Students will also gain about Rational Unified Process, Overview of all diagrams in UML, State Machine diagrams,Support for modeling Architecture in UML, Concepts of distributed operating system,etc.

Course Objectives:

1. To understand object oriented modeling techniques.
2. To develop the ability to use tools used in object oriented modeling.
3. To develop the ability to design object oriented architecture for complex applications.
4. To understand various concepts of distributed operating system
5. To Develop the ability to use tools used in object oriented modeling

Course Outcomes:

After completing the course, students will able to:

CO1	Understand the theoretical concepts of OOM.
CO2	Develop the ability to design object oriented architecture for complex applications.
CO3	Develop the ability to use tools used in object oriented modeling.
CO4	Master the art of using UML in object oriented modeling.

Detailed Syllabus:

Unit 1 Review of OO concepts. Object diagrams, Class diagrams, Classes and Relationships, Interfaces and ports, Templates, Active Objects, Advanced relationships generalization, inheritance, association, aggregation, dependencies.

Unit 2 Introduction to UML. UML History, UML New Features. Rational Unified Process emphasizing Inception, Elaboration, Construction, Transition Phases. 4+1 View architecture, Architectural approaches: Use case Centric, Architecture driven, Iterative approach. UML Meta Model. Extensibility mechanisms like stereotypes, tagged values, constraints and profiles. OCL. Overview of all diagrams in UML.

Unit 3 Composite structure diagrams including composite structures, collaborations. Interaction diagrams. Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions, Sequence diagrams, Communication diagrams.

Unit 4 State Machine diagrams, States, encapsulation of states, transitions, submachine, state generalization. Timing diagrams, Activity diagrams, Activities, sub activities, signals, exceptions, partitions, and regions.

Unit 5 Support for modeling Architecture in UML. Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications. All diagrams are to be assumed for UML 2.0 for each diagram the need, purpose, Concepts, Notation, Forward Engineering, Reverse Engineering & Application must be considered.Concepts of distributed operating system: COM and CORBA , Introduction to Object Oriented Database.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson "Unified Modeling Language User Guide", The (2nd Edition) (Addison-Wesley Object Technology Series).
2. Rambaugh: Object Oriented Modelling and Design, PHI

Reference Books:

1. Joseph Schmuller "SAMS Teach yourself UML in 24 Hours", 3rd edition.
2. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", 3rd Edition (Paperback) ,Addision Wesley.
3. Dan Pilone, Neil Pitman "UML 2.0 in a Nutshell", (In a Nutshell (O'Reilly)) Paperback)
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado "UML 2 Toolkit (Paperback)
5. Jim Arlow, Ila Neustadt "UML 2 and the Unified Process : Practical Object-Oriented Analysis and Design" (2nd Edition) (Addison-Wesley Object Technology Series)
6. Michael Jesse, James A. Schardt "UML 2.0 for dummies "

IT3054: Lab Advanced Database Management Systems

Teaching Scheme
Practical: 2Hrs/Week
Credits :01

Examination Scheme
Term Work : 25 Marks
Practical Examination :25 Marks & Viva Voce

Prerequist-IT2041 Database Management Systems

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

Mapping of Course outcome with Program Outcomes

CO1	Evaluate models/databases with respect to their accuracy.
CO2	Discover and measure interesting patterns from different kinds of database
CO3	Demonstrate capacity to perform a self directed piece of practical work that requires the application of data warehousing techniques
CO4	Develop hypotheses based on the analysis of the results obtained and test them
CO5	Design and implement a complete problem solution using current database technology. (Oracle 11g)

List of Experiments

Sr. No.	Details
1	**Group A: Introduction to Databases (Study assignment)** Study and design a database with suitable example using following database systems: Relational: SQL / PostgreSQL / MySQL Key-value: Riak / Redis Columnar: Hbase Document: MongoDB / CouchDB Graph: Neo4J Compare the different database systems based on points like efficiency, scalability, characteristics and performance.
	Group B: SQL and PL/SQL
1	Design any database with at least 3 entities and relationships between them. Apply DCL and DDL commands. Draw suitable ER/EER diagram for the system.
2	Design and implement a database and apply at least 10 different DML queries for the following task. For a given input string display only those records which match the given pattern or a phrase in the search string. Make use of wild characters and LIKE operator for the same. Make use of Boolean and arithmetic operators wherever necessary
3	Implement nested sub queries. Perform a test for set membership (in, not in), set comparison (<some, >=some, <all etc.) and set cardinality (unique, not unique
4	Write and execute suitable database triggers .Consider row level and statement level triggers.
	Group C: Large Scale Databases
5	Study of Open Source NOSQL Database: MongoDB (Installation, Basic CRUD operations, Execution)
6	Design and Develop MongoDB Queries using CRUD operations. (Use CRUD operations, SAVE method, logical operators)
7	Implement aggregation and indexing with suitable example using MongoDB.
8	Design and Implement any 5 query using MongoDB
9	Create simple objects and array objects using JSON
10	Encode and Decode JSON Objects using Java/Perl/PHP/Python/Ruby

Group D:Mini Project :

1 Write a program to implement MogoDB database connectivity with PHP/ python/Java Implement Database navigation operations (add, delete, edit etc.) using ODBC/JDBC

2 Implement MYSQL/Oracle database connectivity with PHP/ python/Java Implement Database navigation operations (add, delete, edit,) using ODBC/JDBC.

IT 3055 Lab: Mobile Computing

Teaching Scheme	**Examination Scheme**
Practical: 2Hrs/Week	**Term Work : 25 Marks**
Credits :01	**Practical Examination & Viva Voce : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Design GUI application in Android
CO2	Construct an applications with database connectivity
CO3	Create an application which interacts with real time data
CO4	Design gaming applications
CO5	Create application using modern tools

List of Practical

Sr. No.	
	Low Level
1	To study Android Studio and android installation with Eclipse. Create "Hello World" application
2	Create login application where you will have to validate EmailID (UserName). Till the username and password is not validated , login button should remain disabled. On successful login , open browser with any URL.
3	Design simple GUI application with activity and intents e.g. calculator.
4	Create an application to handle address book.
5	Create an application to handle images and videos according to size.
	Medium Level (Any Four)
6	Create an app that read messages from the mobile and display it on the screen
7	Design a client server application to communicate with database server.
8	Create an android app for database creation using SQLite Database
9	Develop an android application to show nearby police station/ Hotels
10	Design an application to locate the user and to show map information
	High Level (Any One)
11	Design a pages with Ajax support
12	Develop a mini project in Android
13	Design a gaming app

Designed by
Prof. A. N. Ghule
Prof. P.A.Mohrut
Prof. K.V.Sonkambale

IT3075 Lab: Linux Operating System

Teaching Scheme	**Examination Scheme**	
Practical: 2 Hrs/Week	**Term Work**	**: 25 Marks**
Credits:01	**Practical Examination & Viva Voce**	**: 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Develop essential operating system skills including how to use, setup, configure, troubleshoot and maintain a current operating system.
CO2	Identify program structures confidently in Unix/Linux environment.
CO3	Use shell scripts to automate various tasks.
CO4	Understand the basics of Linux administration.

List of Experiments

Sr. No.	**Details**
1	Installation of Linux OS using different utilities.
2	Shell programs using loops.
3	Shell program using patterns, and expansions.
4	Shell program using substitution and I/O system calls.
5	AWK programming for student database.
6	AWK programming using different loops.
7	Use the vi editor to create and modify file content.
8	Use simple shell features such as pipes and I/O redirection.
9	Implement semaphores, mutex.
10	Implement reader's writer's problem.

Designed by

1. Prof. S.M.Chavan
2. Prof. U.S.Bodkhe
3. Prof.P.A.Moharut
4. Prof.K.Sonkamble

IT3075 Lab: Distributed Systems

Teaching Scheme	Examination Scheme
Practical: 2 Hrs/Week	**Term Work : 25 Marks**
Credits:01	**Practical Examination & Viva Voce : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Apply Distributed System And Operating System Structures
CO2	Perform Interprocess communication
CO3	Implement Distributed Mutual Exclusion and Distributed Deadlock Detection algorithm
CO4	Use Protection and Security in Distributed file systems.

List of Experiments

Sr. No.	Details
1	Write the Programs for Remote Procedure call.
2	Write the Programs for Remote Method Invocation.
3	Write the Programs for Thread Programming in JAVA.
4	Write a Program to Increment a Counter in Shared Memory
5	Implement Network File System (NFS)
6	Study of Web Service Programming
7	Study of Grid Services using various Tools
8	Design a Distributed application using socket
9	Design a Distributed Application using Mobile agent that travels in the network and performs a given task on the targeted node
10	Find out the list of users who owns a file having maximum size in the current working directory using MapReduce Progaram.

Designed by

Prof. K.S.Gandale

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD
"*In Pursuit of Global Competitiveness*"
(An Autonomous Institute of Government of Maharashtra)
Department of Information Technology

Bachelor of Technology in Information Technology
Class BEIT : With Effect From 2021-2022

Program Educational Objective(s) After graduation and few years of graduation, the (Information Technology) graduates would	
PEO I	Interpret, design and analyze data for effective problem solving
PEO II	Pursue advanced studies to adapt to current trends
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude

Program Outcome(s)

The program enables students to achieve by the time of graduation:

1. An ability to apply principles and methodologies of mathematics, science, and engineering fundamentals
2. An ability to identify, study research literature, formulate the computing requirements appropriate to its solution
3. An ability to design solutions for engineering problems and design systems or processes that meet specified needs with appropriate considerations
4. An ability to conduct investigations of complex problems including design of experiments, analysis and interpretation of data to provide valid conclusions
5. An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools with an understanding of the limitations
6. An understanding of professional engineering practice with concern to societal, health, safety and legal responsibilities
7. Recognize the impact of IT solutions in an environmental and societal context and demonstrate knowledge of and need for sustainable development
8. Understand and commit to professional ethics and responsibilities and norms of engineering practice
9. An ability to function effectively as an individual and as a member or leader in a team to accomplish a common goal
10. Communicate effectively to comprehend and write effective reports, design documentation and make effective presentations
11. An ability to engage in independent and life-long learning to enhance their careers for continuing professional development
12. An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

Mapping of PEOs and POs

Programme Educational Objective(s)	Program Outcome(s)	
PEO I	Interpret, design and analyze data for effective problem solving	1,2,3
PEO II	Pursue advanced studies to adapt to current trends	3,4,5,6,7,9
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development	4,5,6,7,8,9,10,11,12
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude	6,8,10,11,12

Final Year Engineering (IT) Choice Based Credit System
Semester- VII

			Contact Period (Hrs.)				Continuous Evaluation in terms of Marks						
Sr No	**Subject Code**	**Subject**	**TH**	**T**	**PR**	**Credits**	**Class Test I**	**Class Test II**	**TA**	**ESE**	**TW**	**Practical/Viva-voce**	**Total (100)**
1	IT4056	Data Mining	3	-	-	3	15	15	10	60	-		100
2	IT4057	Image Processing	3	-	-	3	15	15	10	60	-		100
3	IT4058	Cloud Computing	3	-	-	3	15	15	10	60	-		100
4	IT 4078 IT4080	**Professional Elective – III** Compiler Construction Soft Computing	4	-	-	4	15	15	10	60	-		100
5	OEIT4001	**Open Elective** Machine Learning	3	-	-	3	15	15	10	60	-		100
6	IT4059	Lab: Data Mining	-	-	2	1	-	-	-		25	25	50
7	IT4060	Lab: Image Processing	-	-	2	1	-	-	-		25	25	50
8	IT4061	Lab: Cloud Computing	-	-	2	1					25	25	50
9	IT4079 IT4081	**Lab: Professional Elective – III** Lab: Compiler Construction Lab: Soft Computing	-	-	2	1	-	-	-		25	-	25
10	IT4062	Project Part I	-	-	4	2	-	-	-		50	25	75
Total			**16**	**0**	**12**	**22**	**75**	**75**	**50**	**300**	**150**	**100**	**750**

Final Year Engineering (IT) Choice Based Credit System
Semester- VIII

			Contact Period (Hrs.)				Continuous Evaluation in terms of Marks						
Sr No	**Subject Code**	**Subject**	**TH**	**T**	**PR**	**Credits**	**Class Test I**	**Class Test II**	**TA**	**ESE**	**TW**	**Practical/ Viva-voce**	**Total (100)**
1	IT4064	Cryptography and Network Security	3	-	-	3	15	15	10	60	-		100
2	IT4065	Internet of Things	3	-	-	3	15	15	10	60	-		100
3	IT4084 IT4085	**Professional Elective – IV** Information Retrieval Geographical Information System	4	-	-	4	15	15	10	60	-		100
4	OEIT4002	**Open Elective** Big Data & Analytics	3	-	-	3	15	15	10	60	-		100
5	IT4066	Lab: Cryptography and Network Security	-	-	2	1	-	-	-		50	25	75
6	IT4067	Lab: Internet of Things	-	-	2	1	-	-	-		50	25	75
7	IT4086 IT4087	**Professional Elective – IV** Lab: Information Retrieval Lab: Geographical Information System	-	-	2	1	-	-	-		25	25	50
8	IT4068	Project Part-II	-	-	12	6	-	-	-		50	100	150
		Total	**13**	**00**	**18**	**22**	**60**	**60**	**40**	**240**	**175**	**175**	**750**

IT 4056 : Data Mining

Teaching Scheme	Examination Scheme	
Lectures: 3Hrs/Week	Class Test-I	:15 Marks
Credits: 3	Class Test-II	:15 Marks
	Teachers Assessment	:10 Marks
	End Semester Exam	:60 Marks

Prerequisites: IT2039 Database Management System, IT3052 Advance Database Management Systems

Course Description: Data Mining studies algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. It is currently regarded as the key element of a more general process called Knowledge Discovery that deals with extracting useful knowledge from raw data. The knowledge discovery process includes data selection, cleaning, coding, using different statistical and machine learning techniques, and visualization of the generated structures. The course will cover all these issues and will illustrate the whole process by examples. Special emphasis will be give to the Machine Learning methods as they provide the real knowledge discovery tools.

Course Educational Objectives:

1. To introduce the basic concepts of Data Mining techniques
2 Examine the types of the data to be mined and apply preprocessing methods on raw data
3 Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms

Course Outcomes:

CO1 Process raw data to make it suitable for various data mining algorithms.
CO2 Discover and measure interesting patterns from different kinds of databases.
CO3 Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data
CO4 Determine whether a real world problem has a data mining solution

Detailed Syllabus

UNIT-1 **Introduction:** Introduction to Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.
Getting to know your data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity.
Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT-2 **Mining Frequent Patterns, Associations and correlations**: Basic Concepts, Frequent Item Set Mining Methods, Interesting patterns, Pattern Evaluation Methods, Pattern Mining in Multilevel and multidimensional space

UNIT-3 **Classification:** Basic Concepts**,** Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy: Introducing Ensemble Methods, Bagging, Boosting and AdaBoost.

Classification: Advanced Methods Bayesian Belief Networks, Classification by Back propagation, Support Vector Machines, LazyLearners (or Learning from Your Neighbors),

UNIT-4 **Cluster Analysis:** Basic Concepts and Methods, Overview of Basic Clustering Methods, Partitioning Methods, Hierarchical Methods: Agglomerative versus Divisive Hierarchical Clustering, Distance Measures in Algorithmic Methods, BIRCH: Multiphase Hierarchical Clustering Using Clustering Feature Trees.

Density-Based Methods: DBSCAN: Density-Based Clustering Based on Connected Regions with High Density, OPTICS: Ordering Points to Identify the Clustering Structure, Grid-Based methods **Evaluation of Clustering:** Assessing Clustering Tendency, Determining the Number of Clusters, Measuring Clustering Quality

UNIT-5 **Knowledge Discovery**, innovative techniques for knowledge discovery, application of those techniques to practical tasks in areas such as fraud detection, scientific data analysis, and web mining **Outlier Detection:** Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Proximity-Based Approaches

Data Mining Trends and Research Frontiers: Mining Complex Data Types: Mining Sequence Data: Time-Series, Symbolic Sequences andBiological Sequences, Mining Other Kinds of Data, Data Mining Applications, Data Mining and Society, Data Mining Trends.

Text Books

1. Han J & Kamber M, "Data Mining: Concepts and Techniques", Third Edition, Elsevier, 2011

Reference Books:

1. Pang-Ning Tan, Michael Steinback, Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2008

2. Kargupta, Joshi,etc., "Data Mining: Next Generation Challenges and Future Directions", Prentice Hall of India Pvt Ltd, 2007

3. Dunham, Margaret H, Data Mining: Introductory and Advanced Topics, Prentice Hall.

IT4057: Image Processing

Teaching Scheme	Examination Scheme	
Lectures: 3Hrs/Week	**Class Test-I**	**:15 Marks**
Credits: 3	**Class Test-II**	**:15 Marks**
	Teachers Assessment	**:10 Marks**
	End Semester Exam	**:60 Marks**

Prerequisites: Computer Algorithm

Course Description: To learn and understand the fundamentals of digital image processing, Image Enhancement Techniques, Image restoration Techniques and methods, image compression and Segmentation used in digital image processing

Course Objectives:

- To learn and understand Digital Image Processing fundamentals.
- To study basic image processing operations.
- To understand image analysis algorithms.

Course Outcomes

After completing the course, students will able to:

CO1	Understand the basics of formation and representation of images.
CO2	Know the effect of different image enhancement techniques.
CO3	Model the Image Restoration process in both time and frequency domains
CO4	Learn Edge detection algorithms and its importance in image processing.
CO5	To provide broader understanding of image morphology and image compression

Detailed Syllabus:

Unit 1 **Introduction to Image processing** Introduction, Resolution, Human visual system, Classification of digital images, Image types(optical and microwave), Elements of an image processing system, Image file formats(tiff, jpeg, ico, ceos, png, raster image format, Image sampling and quantization, Some Basic Relationships Between Pixels

Unit 2 **Image Enhancement** Thresholding, Segmentation, Watershed Segmentation, Edge-based 6 Segmentation, Fuzzy Segmentation Spatial domain techniques – Image Negative, Contrast stretching, gray level slicing, bit plane slicing, histogram and histogram equalization, local enhancement technique, image subtraction and image average, low–pass spatial filters, median filtering, high-pass spatial filter, Frequency domain techniques- Ideal low-pass filter, butterworth low-pass filter, High-pass filter, Homo-morphic filters.

Unit 3 **Image Restoration and Reconstruction** A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations. Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares

Filtering. Geometric Mean Filter, Image Reconstruction from Projections.

Unit 4 **Morphological Image Processing & Segmentation:** Detection of discontinuities, Point, Line and Edge Detection, Thresholding. Region-Based Segmentation Laplacian of Gaussian, Derivative of Gaussian, Canny Edge Detection. Morphological operations, Dilation and Erosion, Opening and Closing, Hit-or-Miss Transformation, Basic morphological algorithms for boundary extraction, Region filling, extraction of connected components, thinning and thickening.

Unit 5 **Image Compression and Object Representation:** Introduction to Image Compression and its need, Coding Redundancy, Classification of Compression Techniques (Lossy and Losless - JPEG, RLE, Huffman, Shannon fano), Scalar & Vector Quantization. Introduction to Object Recognition, Object representation (Signatures, Boundary Skeleton), Simple Boundary Descriptors, Regional descriptors(Texture).

Text and Reference Books

1. Rafel C Gonzalez and Richard E Woods, "Digital Image Processing'', Pearson Education, 3rd Edition, 2009.
2. Anil Jain, "Fundamentals Of Digital Image Processing", Anil Jain PHI, 1989.
3. B. Chanda, D Dutta Majumder, "Digital Image Processing and Analysis'', Prentice-Hall, India, 2002
4. J.G. Proakis, "Introduction to Digital Signal Processing", PHI, 2007.
5. S. Sallivahanan, "Digital Signal Processing", Tata McGraw Hill, 2001.
6. William Pratt, "Digital Image Processing", John Willey & Sons Inc, 2007.

IT4058 : Cloud Computing

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	**Class Test-I**	**:15 Marks**
Credits: 3	**Class Test-II**	**:15 Marks**
	Teachers Assessment	**:10 Marks**
	End Semester Exam	**:60 Marks**

Prerequisite: IT 3046 Operating Systems, IT 3044 Computer Networks

Course Objectives:

To learn cloud computing concepts and various cloud platforms. To design various applications in cloud computing.

Course Outcomes:

CO1	Describe computing environment and infrastructure, cloud architectures types
CO2	Characterize the distinctions between different cloud services
CO3	Explain virtualization and their role in elastic computing
CO4	Explain major security and privacy problems in the cloud and how they are addressed with the security mechanisms

Detailed Syllabus:

Unit 1	**Introduction:** Introduction of Cloud Computing, model architecture and computing environments**,** Cloud deployment models, Cloud characteristics, challenges and Risks. Service oriented architecture (SOA) and Cloud Computing Reference Architecture by IBM
Unit 2	**Cloud Services :** Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Business-Process-as-a-service (BPaaS), Identity-as-aservice (IDaaS), Communication-as-a-service (CaaS), Monitoring-as-a-service (MaaS), Storage as a service: Traditional storage versus storage cloud, Cloud Service providers: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Force.com.
Unit 3	**Virtualization:** Introduction to Virtualization, Types of Virtualization, Full and Para Virtualization, Techniques of Virtualization, Technology examples: Xen, Vmware, Web services: SOAP and REST ,Load Balancing
Unit 4	**Security in Cloud Computing** : Cloud Security Challenges, Infrastructure Security: Network, Host and Application level, Data security and Storage, Security Management in the cloud, Data Privacy, Life cycle of Data, Key Privacy concerns in cloud and Disaster Recovery.
Unit 5	**Cloud Applications** : Using Google web service exploring Google application, serving Google application portfolio :Index Search dark web, Aggregation and intermediation, productivity application and services .Case study-DropBox,Amazon, Google AppEngine

Text and Reference Books

1. Cloud computing Bible by Barrie Sosinsky, Wiley India Pvt Ltd (2011)
2. Enterprise Cloud Computing: Technology, Architecture, Applications by Gautam Shroff, Cambridge University Press.
3. Cloud Computing Implementation, Management, and Security By John W. Rittinghouse,James F. Ransome , CRC Press.
4. Mastering Cloud Computing Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi
5. Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication
6. Borko Furht, "Handbook of Cloud Computing", Springer
7. Venkata Josyula,"Cloud computing – Automated virtualized data center", CISCO Press
8. Greg Schulr,"Cloud and virtual data storage networking",CRC Press
9. Mark Carlson,"Cloud data management and storage", Mc Graw hill
10. Lizhe Wang, " Cloud Computing:Methodology, System and Applications", CRC Press
11. Cloud computing: Data Intensive Computing and Scheduling by Chapman Hall/CRC
12. Christopher M. Moyer, Building Applications in the Cloud: Concepts, Patterns, and Projects
13. IBM smart storage cloud Red paper by Larry Coyne Mark Bagley Gaurav Chhaunker
14. Google Apps by Scott Granneman,Pearson
15. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)
16. Cloud Computing : A Practical Approach, Antohy T Velte, et.al McGraw Hill,
17. Stefano Ferretti et.al.,‖QoS–aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing

IT 4078: Compiler Construction

Teaching Scheme	Examination Scheme	
Lectures: 4 Hrs/Week	**Test 1**	**: 15 Marks**
Credits :04	**Test 1**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Pre-requisite: Theory of Computation

Course Objectives:
Given the knowledge of languages and grammars with tools to process them, a graduate IT student will be able to solve problem of creating a language processing tool and understand ways of its optimization.

Course Outcomes:

CO1 Illustrate the knowledge of different translators and modern compiler

CO2 Apply the knowledge of patterns, tokens & regular expressions for solving a problems for appropriate solutions

CO3 To acquire knowledge about different parsing techniques, techniques to generate intermediate code and different optimization techniques

CO4 Understanding of compiler optimization techniques would enable students to write reasonably efficient programs

CO5 Recognize the need of understandable error reports, accurate and reliable object code, and efficient use of in-memory data structures.

Detailed Syllabus:

Unit 1 Introduction to compilers, compilers and translators, phase structure of a typical compiler, Number of passes, ideas about lexical analysis, syntax analysis, code optimization and code generation, design of lexical analyzer. Lexical Analysis -Role of lexical analyzer, recognition of tokens, Design of Lexical analyzers, tool for study of lex

Unit 2 Syntax specification of programming languages, Design of top-down parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR,LR parsers. Dealing with ambiguity of the grammar. Study of syntax directed definitions and syntax directed translation schemes as notational frame work to specify the translations. Using syntax directed translation schemes for translation of expressions, controls structures, declarations, procedure calls

Unit 3 Storage allocation and run time storage administration, Implementation of Simple Stack allocation Schemes, Storage allocation in Block Structured Languages symbol table management, Error detection and recovery, error recovery in LR parsing, error recovery in LL parsing, Automatic error recovery in YACC.

Unit 4 Introduction to Important code optimization techniques, loop optimization, control flow

analysis, data flow analysis, setting up data flow equations to compute reaching definitions, available expressions, Live variables. DAG representation of Basic Blocks, value numbers and algebraic laws, Global data flow analysis, Dominators, Reducible flow graphs, DFS

Unit 5 Code Generation: Object programs, problems in code generation, Machine model, Simple code generator, Register allocation and assignments, Problem, Code generation from DAGs, peephole optimization

Text/ References:

1.Principles and practice of compiler writing : Aho, Sethi , Ullman , Addison Wesley
2.Compiler Design in C : Alan Holub , PHI
3.Crafting a compiler : Fischer and LeBlanc , Addison Wesley
4.Principles of Compiler Design : Aho A. V., Ullman J.D , Narosa Publishing House.

IT4080 : Soft Computing

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs/Week	**Class Test 1 :15 Marks**
Credits:4	**Class Test 1 :15 Marks**
	Teachers Assessment : 10 Marks
	End Semester Exam : 60 Marks

Course Description: After completing this course, students will have fundamental understanding of soft computing. Topics include types of neural networks, genetic algorithms, and Fuzzy logic. These soft computing tools will help students to carry out the research.

Course Objectives:

- Select models of ANN and Fuzzy Logic
- Apply models in practice for solving problems
- Use Neural networks, GA, Fuzzy techniques

Course Outcomes

After completing the course, students will able to:

CO1	Describe artificial neural networks and different learning algorithms to formulate computing requirements
CO2	Identify soft computing techniques and their role in professional engineering practice
CO3	Apply fuzzy logic and reasoning to handle uncertainty in engineering problems
CO4	Make use of genetic algorithms to solve optimization problems
CO5	Demonstrate Hybrid Techniques and applications of soft computing

Detailed Syllabus:

Unit 1 Introduction to soft computing, structure and working of a biological neural network, artificial neural network, terminology, models of neurons, Basic learning laws, functional units for ANN for Pattern Recognition Task

Unit 2 Basic concepts of Fuzzy Logic, linguistic variables, possibility distributions, fuzzy rules, Fuzzy sets, Operations on fuzzy sets, properties, geometric representation of fuzzy sets, possibility theory

Unit 3 Fuzzy Logic in database and Information systems, fuzzy relational data models, operations in fuzzy relational data Models, fuzzy object oriented databases, Fuzzy information retrieval and web search

Unit 4 Basics of Genetic algorithm, Design issues, Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle - stopping condition – constraints - classification - genetic programming – multilevel optimization – real life problem- advances in GA.

Unit 5 Hybrid Soft Computing Techniques & Applications :
Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion

approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

Text Books

1. B. Yegnanarayana , "*Artificial Neural Networks*", PHI publications
2. Satish Kumar, "*Neural Networks- A classroom Approach*", TMH Publication
3. John Yen, Reza Langari, "*Fuzzy Logic*", Pearson Education
4. S. Rajasekaran, Vijaylakshmi Pari, "Neural networks, Fuzzy Logic and Genetic Algorithms- Synthesis and Applications", PHI publication.

Reference Books

1. Lotfi A. Zadeh, "Soft computing and Fuzzy Logic",World Scientific Publishing Co., Inc. River Edge, NJ, USA.
2. J.S.R.Jang, C.T.Sun and E.Mizutani, .Neuro-Fuzzy and Soft Computing., PHI, 2004, Pearson Education 2004.
3. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.

OEIT4001: Machine Learning	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits: 3**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT2032 Data Structures, IT2038 Discrete mathematics and Structure

Course Description: Machine Learning is the study of how to build computer systems that learn from experience. The course covers the basic concepts and techniques of Machine Learning. It includes ML approaches as Decision Trees and Bayesian Learning ,SVM,Reinforcement learning ,clustering, dimensionality reduction, Kernel methods. These course will help students to carry out the research.

Course Objectives:

- To introduce concepts and techniques of Machine Learning.
- To become familiar with regression methods, classification methods, support vector machine.
- To become familiar with clustering methods and Dimensionality reduction Techniques.

Course Outcomes

After completing the course, students will able to:

CO1 Ability to analyze and appreciate the applications which can use Machine Learning Techniques.
CO2 Ability to understand optimization techniques.
CO3 Ability to understand the difference between supervised and unsupervised learning methods.
CO4 Apply the knowledge of SVM and Reinforcement Learning
CO5 Ability to appreciate Dimensionality reduction techniques.

Detailed Syllabus:

Unit 1 **Introduction to Machine Learning:** What is Machine Learning?, Key Terminology, Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, How to choose the right algorithm, Steps in developing a Machine Learning Application.

Unit 2 **Introduction to optimization:** The gradient method, Momentum term and adaptive step sizes, batch and on-line optimization, Ljung's convergence conditions.
Association rule learning: Algorithms- Apriori algorithm, Eclat algorithm, FP-growth algorithm, k optimal pattern discovery.

Unit 3 **Supervised Learning (Regression and Classification):**
Learning with Regression : Linear Regression, Logistic Regression.
Basic methods: Distance-based methods, Nearest-Neighbors, Decision Trees, Naïve Bayes

Learning with trees : Using Decision Trees, Constructing Decision Trees, Classification and Regression Trees (CART).

Unit 4 **Support Vector Machines(SVM)** Maximum Margin Linear Separators, Quadratic Programming solution to finding maximum margin separators, Kernels for learning non-linear functions.**Beyond Binary Classification:** Multi-class/Structured Outputs, Ranking Reinforcement Learning

Unit 5 **Unsupervised Learning Clustering Algorithms**- Connectivity based clustering (Hierarchical clustering), Centroid based clustering, Distribution-based clustering, Density-based clustering. Evaluation of Clustering Results- Internal evaluation, External evaluation, Applications. **Dimensionality Reduction**: Dimensionality Reduction Techniques, Principal Component Analysis, Independent Component Analysis.

Kernal Methods

Text and Reference Books

1. Peter Harrington "Machine Learning In Action", DreamTech Press
2. EthemAlpaydın, "Introduction to Machine Learning", MIT Press
3. Tom M.Mitchell "Machine Learning" McGraw Hill
4. Stephen Marsland, "Machine Learning An Algorithmic Perspective" CRC Press
5. William W.Hsieh, "Machine Learning Mehods in the Environmental Sciences", Cambridge
6. Han Kamber, "Data Mining Concepts and Techniques", Morgann Kaufmann Publishers
7. Margaret.H.Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education

IT4059: Lab Data Mining

Teaching Scheme	**Examination Scheme**
Practical: 2Hrs/Week	**Term Work :25 Marks**
Credits :01	**Practical Examination & Viva Voce :25 Marks**

Prerequisites: IT 2041 Lab: Database Management System, IT3054 Lab: Advanced Database Management System

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Evaluate models/algorithms with respect to their accuracy.
CO2	Discover and measure interesting patterns from different kinds of database
CO3	Demonstrate capacity to perform a self directed piece of practical work that requires the application of data mining techniques
CO4	Develop hypotheses based on the analysis of the results obtained and test them
CO5	Plan, design and deploy the necessary data mining technologies to support a software system

List of Experiments

Sr. No.	Details
	Group A: Study Experiments
1	Introduction about launching the Weka tool, Weal Explore
2	Introduction to the classification of Mining techniques and Attribute Relation File Format (ARFF)
	Group B: Perform using Weaka
3	To perform Preprocessing, Classification and Visualization techniques on Customer dataset.
4	To perform Preprocessing, Classification and Visualization techniques on Weather dataset
5	To perform Clustering technique on Customer dataset.
6	To perform Association technique on Customer dataset,, Agricultural data set
7	To perform all the techniques on Company dataset
	Group C : Develop using any language
8	Introduction to Data Cleansing,implement Data Cleansing applying uppercase on first name in C++/Java
9	Develop an application to extract association mining rules.
10	Develop an application for classification of data.
11	Develop an application for implementing one of the clustering technique
12	Develop an application for implementing Naïve Bayes classifier
13	Develop an application for Decision tree classifier
	Group D: Mini Project
14	Implement one application using data mining

IT4060: Lab Image Processing

Teaching Scheme	**Examination Scheme**
Practical: 2Hrs/Week	**Term Work :25 Marks**
Credits :01	**Practical Examination & Viva Voce :25 Marks**

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Apply basics of Image Processingto find solutions to problems
CO2	Analyze the output of different filtering methods
CO3	Select edge detection methods to detect edgesof a image
CO4	Apply various morphological operationson image
CO5	Experiment with data compression using Huffman coding

List of Experiments

Sr. No.	**Details**
1.	Perform Point processing in spatial domain a. Negation of an image b. Thresholding of an image c. Contrast Stretching of an image
2.	Perform the experiments for histogram equalization
3.	Perform Zooming by interpolation and replication
4.	Implement Filtering in spatial domain a. Low Pass Filtering b. High Pass Filtering c. Median filtering
5.	Implement Filtering in frequency domain a. Low pass filter b. High pass filter
6.	Implement edge detection using derivative filter mask a. Prewitt b. Sobel c. Laplacian
7.	*Im*plement boundary extraction algorithm
8.	Implement different morphological operations
9.	Implement data compression using Huffman coding

Implementation of the programs is to be done using MATLAB platform.

IT4061: Lab- Cloud Computing

Teaching Scheme	**Examination Scheme**
Practical: 2 Hrs/Week	**Term Work : 25 Marks**
Credits:01	**Practical Examination & Viva Voce: : 25 Marks**

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1 Create Virtual Machine images and to deploy them on a Cloud.
CO2 Characterize performance of cloud equipment.
CO3 Participate in a group atmosphere for the defining, planning, and execution of a cloud
CO4 Installation of Clould
CO5 Develop an understanding of economic issues related to cloud

List of Experiments

Sr. No.	Details
1.	Introduction to cloud computing.
2.	Implementation of SOAP Web services in C#/JAVA Applications.
3.	Implementation of RESTFul Web services in C#/JAVA Applications.
4.	Implementation of Para-Virtualization using VMWare's Workstation/ Oracle's Virtual Box and Guest O.S
5.	Implementation of Full-Virtualization using VMWare's ESXi and Guest O.S.
6.	Creating a Warehouse Application in SalesForce.com.
7.	Installation and Configuration of Single-Node Setup in Hadoop.
8.	Create any Application (Ex: Word Count) Using Hadoop Map/Reduce.
9.	To study Cloud security challenges.
10.	Case Study: PAAS (Face book, Google App Engine)
11.	Case Study : Amazon Web Services

IT 4079 Lab: Compiler Construction

Teaching Scheme
Practical: 2 Hrs/Week
Credits: 01

Examination Scheme
Term Work : 25 Marks

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1 Design lexical rules using a LEX utility to find a solution
CO2 Implement YACC tools to create a parser to interpret data
CO3 Formulate semantic rules into a parser using appropriate techniques
CO4 Use code optimization techniques to improve speed &space requirement of the program
CO5 Identify Intermediate code generation methods

List of Experiments

Sr. No.	
	Low Level (All)
1	Program to generate lexical tokens
2	Study of LEX tool
3	Program to generate a parse tree
4	Design of a Predictive parser
5	Study of YACC
	Mid Level (Any Two)
6	Program to compute FIRST of non terminals
7	Program to compute FOLLOW of non terminals
8	Program to remove left factoring
	High Level (Any One)
9	Write a program for constructing of LL(1) parsing
10	Write a program to implement LALR parsing

IT4081 Lab: Soft Computing

Teaching Scheme
Practical: 2 Hrs/Week
Credits: 01

Examination Scheme
Term Work : 25 Marks

Course Outcomes
As an outcome of completing the Laboratory course, students will able to:

CO1	Apply basics of neural network, fuzzy logic to find solutions to problems
CO2	Construct neural network models to interpret data
CO3	Select genetic algorithms methods to optimize resources
CO4	Experiment with fuzzy sets and Hebb net to meet desired needs
CO5	Experiment with hetero-associative and auto-associative net to meet desired needs

List of Experiments

Sr. No.	Details
	Level: Easy
10.	Write a program to calculate union, intersection, complement and difference of two fuzzy sets
11.	To plot various membership functions.
12.	To implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality ans service.
13.	Program for McCulloch-Pitts neurons that implement logical NOT, AND and OR gates
14.	Generate XOR function using McCulloch-Pitts neural net.
	Level: Moderate
15.	Write a program to implement Roulette wheel and ranking selection method.
16.	Write a program to maximize a function subject to the constraints
17.	Write a program to calculate addition and subtraction of fuzzy sets
	Level: Hard
18.	Hebb Net to classify two dimensional input patterns in bipolar with given targets.
19.	Perceptron net for an AND function with bipolar inputs and targets.
20.	To calculate the weights for given patterns using hetero-associative neural net.
21.	To store vector in an auto-associative net. Find weight matrix & test the net with input
22.	To store the vector ,find the weight matrix with no self connection. Test this using a discrete Hopfield net.

Implementation of the programs is to be done using MATLAB platform.

IT 4062 Project Part –I

Teaching Scheme	**Examination Scheme**
Practical: 4 Hrs/Week	**Term Work : 50 Marks**
Credits: 02	**Practical Examination & Viva Voce: : 25 Marks**

Course Description:
This course is to makes students to acquire thorough knowledge and develop skills to formulate computing requirements for the solution.

Course Objectives:
To accustom with the process of undertaking literature survey/industrial visit and identifying the problem
To practice the process of solving the problem in a team
To select and use engineering fundamentals and modern IT tools
To apply management principles and testing techniques

Course Outcomes:

CO1	Work efficiently and constructively in a project team
CO2	Review literature to identify gaps and define objectives & scope of the work.
CO3	Get experiences of using obtained knowledge, and learn how to use certain tools used in the IT-community
CO4	Synthesize and integrate information for designing modules
CO5	Design innovative idea for solving the problem

Project I should be assessed based on following points

1. Quality of problem selected
2. Clarity of Problem definition and feasibility of problem solution
3. Relevance to the specialization
4. Clarity of objective and scope
5. Breadth and depth of literature survey
6. Project I should be examined through a presentation by the student project group to a panel of examiners appointed by the DBOS

IT4064 Cryptography and Network Security

Teaching Scheme	Examination Scheme	
Lectures: 3Hrs/Week	Class Test-I	:15 Marks
Credits: 3	Class Test-II	:15 Marks
	Teachers Assessment	:10 Marks
	End Semester Exam	:60 Marks

Prerequisites: IT3044 Computer Networks

Course Description: After completing this course, students will have a broad and fundamental understanding of Cryptography and Network Security. First and second unit addresses basic issues in Network Security. It gives conventional encryption algorithms and design principles. Third unit explores Authentication codes, Digital Signatures and e-mail security field. Fourth unit focuses on IP Security and Web Security. Fifth unit looks at system level security issues.

Course Objectives:

- To provide classical and modern encryption algorithms
- To accustom with public key cryptography
- To explore the use of cryptographic algorithms and security protocols to provide security over network
- To deal with security facilities designed to protect a system

Course Outcomes

After completing the course, students will able to:

CO1	Summarize classical and modern symmetric key and public key algorithms
CO2	Demonstrate Encryption and Decryption using public key algorithm
CO3	Explain use of authentication codes and security protocols
CO4	Analyze algorithms for difficulty of attacking
CO5	Examine intruders , access control, password management, malicious software issues

Detailed Syllabus:

Unit 1 **Introduction and Symmetric Key Ciphers**

Introduction to Network security: Security attacks, Security Services and Security Mechanisms. **Symmetric Ciphers**: Symmetric Cipher Model, Classical encryption techniques like Substitution and Transposition. Block cipher Principle: The Data Encryption Standard, Linear and Differential Cryptanalysis, triple DES, Linear and Differential Cryptanalysis

Unit 2 **Number Theory and Public Key Encryption**

Introduction to Number Theory: Fermat's and Euler's Theorem, The Chinese Remainder Theorem, Euclidean Algorithm, Extended Euclidean Algorithm.

Public Key Cryptosystem: Encryption Principles, the RSA Algorithm, Key Management, Diffie- Hellman Key Exchange

Unit 3 **Authentication and Network Security Applications**

Authentication Requirements, Authentication Functions, Digital Signatures, Authentication Protocols, Digital Signature Standards. Kerberos, X.509 Authentication service, E- mail Security: Pretty Good Privacy, S/MIME.

Unit 4 **IP Security and Web Security**

IP Security: Overview, IP security architecture, Authentication header, Web Security: Web security requirements, Secure Socket Layer (SSL): Functionality, Transport layer security TLS, Secure electronic Transactions TES.

Unit 5 **System Security**

Intruders, Intrusion Detection, Password Management, Viruses, Virus countermeasures. Firewalls: Firewall Design Principles, Trusted Systems

Text and Reference Books

1. William Stallings, "Cryptography and Network Security" Pearson Education, Fourth Edition
2. Behrouz A. Forouzan & Debdeep Mukhopadhyay, "Cryptography and Network Security" Mc Graw Hill Publication , 2nd Edition
3. Robberta Bragg, Mark Phodes-Ousley &Keith Strassberge "The Complete Reference Book of Network Security", Tata McGraw-Hill Publication
4. Neal Krawetz, "Introduction to Network Security", Cengage Learning Pub

IT4065 : Internet of Things (IoT)

Teaching Scheme	Examination Scheme
Lectures: 3 Hrs/Week	**Class Test 1 : 15 Marks**
Total Credits :3	**Class Test 2 :15 Marks**
	Teachers Assessment : 10 Marks
	End Semester Exam : 60 Marks

Pre-Requisite Courses: IT 3044 Computer Network, IT 3053 Mobile Computing

Course Objectives:

- To Understand Identify the components of IoT
- To learn the Architecture of IoT
- To Learn and understand the Protocol of IoT
- To Learn and Understand web of things and cloud of things
- To Understand security issues in IoT
- To Understand and get an idea of some of the application areas where Internet of Things can be applied

Course Outcomes:

CO1	Summarize Challenges and opportunities of IoT
CO2	Characterize building block of IoT and role of wired and wireless network
CO3	Understand protocols and IoT Analytics- Data visualization and its importance
CO4	Interpret WoT and cloud of things architectures
CO5	Summarize security issues and security services of IoT

Detailed Syllabus

Unit 1 **Introduction to Internet of Things** Introduction to IoT- Overview of IoT-What is IoT-Why IoT-Vision of IoT- Characteristics of IoT- Four Pillars of IoT- Challenges and requirements of IoT-Opportunities for IoT- Introduction M2M- M2M to IoT- An emerging industrial structure for IoT.

Unit 2 **IoT Architecture** IoT Layered Architecture- Architectural and building block of IoT-Networking and Communication – Wired & Wireless connectivity and technology – IoT and Wireless Sensor Network- NFC,RFID, ZigBee.

Unit 3 **IoT Protocol and Analytics** IoT Protocol stack- TCP/IP Protocol stack vs. IoT Protocol stack- IoT Protocol Standardization- IoTProtocol:MQTT, CoAP, AMQP, DDS, REST, XMPP- Cloud Computing in IoT- IoT with Cloud Architecture- What is IoT Analytics-Data visualization and its importance in IoT –Internet of Things and Big Data.

Unit 4 **Web of Things versus Internet of Things** – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things -The Cloud of Things Architecture

Unit 5 **IoT Security, Privacy and Trust and Applicatipon** Need of IoT Security – Issues in IoT security – Trust for IoT - Security and Privacy for IoT – Physical IoT Security-On Devices Security and Privacy - Security and Privacy in IoT Cloud. Applicatipon of IOT

Text and Reference Books

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.
2. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1stEdition, VPT, 2014.
3. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013

IT4084 : Information Retrieval

Teaching Scheme	Examination Scheme	
Lectures: 4Hrs/Week	**Test-1**	**:15 Marks**
Credits: 4	**Test-2**	**:15 Marks**
	Teachers Assessment	**:10 Marks**
	End Semester Exam	**:60 Marks**

Prerequisites: IT2039 Database Management Systems.

Course Description: After completing this course, students will gain a good understanding of the foundation concepts of information retrieval(IR) techniques and be able to apply these concepts into practice. The subject covers the basics and important aspects associated with IR, need of retrieval, storage and searching techniques, retrieval performance evaluation and ontology, distributed and multimedia IR and web searching etc.

Course Objectives:

1. To understand information retrieval process.
2. To understand concepts of clustering and how it is related to Information retrieval.
3. To deal Storage, Organization & Access to Information Items.
4. To evaluate the performance of IR system.
5. To understand information sharing on semantic web.
6. To understand the various applications of Information Retrieval giving emphasis to multimedia and distributed IR, web Search.

Course Outcomes

After completing the course, students will able to:

CO1 Realize the concept of Information retrieval.

CO2 Deal with storage and retrieval process of text and multimedia data

CO3 Evaluate performance of any information retrieval system.

CO4 Interpret use of Search Engines and Web crawlers.

CO5 Get to knoe various applications of Information Retrieval giving emphasis to multimedia and distributed IR, web Search retrieval

Detailed Syllabus:

Unit 1 **INTRODUCTION:** Basic Concepts of IR, Data Retrieval & Information Retrieval, IR system block diagram. Automatic Text Analysis: Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing,Automatic Classification. Measures of Association, Different Matching Coefficient, Classification Methods, Cluster Hypothesis, Clustering Algorithms, Single Pass Algorithm, Single Link Algorithm

Unit 2 **STORAGE AND SEARCHING TECHNIQUES:**

Storage: Inverted file, Suffix trees & suffix arrays, Signature Files, Clustered files.

IR Models: Basic concepts, Boolean Model, Vector Model

Searching strategies: Boolean Search, Serial search, cluster based retrieval, Query languages, Types ofqueries, Patterns matching, structural queries.

Unit 3 **RETRIEVAL PERFORMANCE EVALUATION AND ONTOLOGY**

Performance evaluation: Precision and recall, alternative measures.

Ontology: Ontology based information sharing, Ontology languages for semantic web, Ontologycreation.

Unit 4 **DISTRIBUTED AND MULTIMEDIA IR**

Distributed IR: Introduction, Collection Partitioning, Source Selection, Query Processing, web issues.

Multimedia IR: Introduction, Data Modeling, Query languages, Generic multimedia indexingapproach, One dimensional time series, two dimensional color images, Automatic feature extraction.

Unit 5 **WEB SEARCHING:**

Challenges, Characterizing the Web, Search Engines, Browsing, Mata-searchers,Web crawlers, Meta-crawler, Web data mining, Finding needle in the Haystack, Searching using Hyperlinks, Page ranking algorithms.

Text Books:

1. Yates & Neto, "Modern Information Retrieval", Pearson Education, ISBN 81-297-0274-6.
2. C.J. Rijsbergen, "Information Retrieval", (www.dcs.gla.ac.uk).
3.Heiner Stuckenschmidt, Frank van Harmelen, "Information Sharing on th Semantic Web", Springer International Edition, ISBN 3-540-20594-2.

Reference Books:

1. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze"Introduction to Information Retrieval", Cambridge University Press, ISBN 978-0-521-86571-5
2. Mark leven, "Introduction to search engines and web navigation", John Wiley and sons Inc., ISBN 9780-170-52684-2.
3. V. S. Subrahamanian, Satish K. Tripathi "Multimedia information System", KulwerAcademic Publisher.
4. ChabaneDjeraba,"Multimedia mining A highway to intelligent multimedia documents",Kulwer Academic Publisher, ISBN 1-4020-7247-3.
5. Ricci, F, Rokach, L. Shapira, B.Kantor, "Recommender Systems Handbook", First Edition,2011
6. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval Implementing and Evaluating Search Engines, The MIT Press, Cambridge, Massachusetts London, England, 2010.

Web Resources:

http://www.cs.utexas.edu/users/mooney/ir-course
http://www.informationretrieval.org

IT 4085 : Geographical Information System

Teaching Scheme	**Examination Scheme**	
Lectures: 4 Hrs/Week	**Class Test 1**	**: 15 Marks**
Credits: 4	**Class Test 2**	**: 15 Marks**
	Teachers Assessment	**: 10 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites:

Course Description: This is to provide in-depth information about Geographical information system a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. It is to cover all dimensions of Geographical Information System concepts like spatial referencing, data analysis, data visualization in maps etc.

Course Objectives:

To recognize organization of GIS
To make students aware of GIS capabilities and tools and methods.
To give the knowledge of real world applications in GIS

Course Outcomes

After completing the course, students will able to:

CO1	To Understand fundamentals of GIS
CO2	To be able to apply knowledge of data management in GIS
CO3	Solving the problems on spatial referencing and positioning
CO4	To Understand applications of GIS models
CO5	To study visualization concepts in GIS

Detailed Syllabus:

Unit 1	A gentle introduction of GIS: The Nature of GIS, The real world and representation of it. Geographic Information and Spatial Data type: Models and representation of real world, geographic phenomena, Computer representation of geographic information, organising and managing spatial data, The temporal dimension.
Unit 2	Data management and processing systems: Hardware and Software trends, GIS, Stages of spatial data handling, Database management system, GIS and Spatial database.
Unit 3	Spatial referencing and positioning: Spatial referencing, Satellite based positioning. Data entry preparation: Spatial data input, data quality, data preparation, point data transformation.
Unit 4	Spatial data analysis: classification of analytical GIS capabilities, retrieval, classification and measurement, overlay functions, Neighbourhood functions, network analysis, GIS and application models, error propagation in spatial data processing
Unit 5	Data visualization: GIS and maps, the visualization process, visualization strategies, the cartographic toolbox, how to map, Map cosmetics, map dimension

Text and Reference Books

1. "Principles of GIS systems" by Otto Huisman and Rolf A. De
2. "GIS, Environmental Modeling and Engineering", Second Edition By Allan Brimicombe
3. "Remote sensing, models and methods for image processing "Third Edition by Robert A. Schowengerdt

Website Links

1. The Open GIS Consortium "Learning Resources Page"
2. ColorBrewer, a useful online guide to using color in maps and graphics

OEIT4002 : Big Data Analytics

Teaching Scheme	Examination Scheme	
Lectures: 3 Hrs/Week	Test 1	: 15 Marks
Total Credits: 3	Test 2	: 15 Marks
	Teachers Assessment	: 10 Marks
	End Semester Exam	: 60 Marks

Course Description:

Data Analytics is the science of analyzing data to convert information to useful knowledge. This knowledge could help us understand our world better, and in many contexts enable us to make better decisions.

Course Objectives:

1. To provide concept of Big data analytics
2. To explore Analytics Platform
3. To understand Descriptive and Inferential Statistics

Course Outcomes

After completing the course, students will able to:

CO1 Illustrate big data and components
CO2 Identify Advanced Analytics Platform and discuss implementation of Big Data Analytics
CO3 Describe HIVE and PIG
CO4 Descriptive Statistics and Inferential Statistics
CO5 Demonstrate deep learning and make proper decision to select Big DA solution

Detailed Syllabus

Unit 1 **Introduction to Big data:**
Introduction, Challenge, Drivers for Big data, Big data analytics Applications
Architecture Components: Massively Parallel Processing (MPP) Platforms**,** Unstructured Data Analytics and Reporting-Search and Count-Context-Sensitive and Domain-Specific Searches-Categories and Ontology-Qualitative Comparisons-Focus on Specific Time Slice or Using Other Dimensions, Big Data and Single View of Customer/Product, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines

Unit 2 **Advanced Analytics Platform: Real**-Time Architecture for Conversations, Orchestration and Synthesis Using Analytics Engines-Entity Resolution-Model Management-Command Center-Analytics Engine, Discovery Using Data at Rest, Integration Strategies Implementation of Big Data Analytics: Revolutionary, Evolutionary, or Hybrid, Big Data Governance-Integrating Big Data with MDM, Journey, Milestones, and Maturity Levels- Analytics Business Maturity Model Components to build big data analytics solution**-**Architecture, Hardware, Functionality, Process Decision criteria for selecting A big data analytics solution

Unit 3 **Introduction to NoSQL**, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Comparing SQL and NoSQL, Introduction of apache, cassandra and its needs, Characteristics of cassandra

Big data with Hive and Pig: Overview of hive and its architecture, Hive data types and File format, Hive query language (HQL), Introduction to Pig, pig latin overview, Data types in Pig and Running Pig

Unit 4 **Descriptive Statistics and Inferential Statistics**

Descriptive Statistics, Probability Distributions,**Inferential Statistics-** Inferential Statistics through hypothesis tests, Permutation & Randomization Test, Regression, ANOVA(Analysis of Variance)

Unit 5 **Neural Networks:** introduction to neural network, Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Deep learning: Introduction, Need for deep learning, Overview of Deep Learning Applications, Stochastic Gradient Descent, Backpropagation, Introduction to Convnet (architectures – AlexNet, VGG, Inception, ResNet – loss surface

Text and Reference Books

1. Arvind Sathi, "Big data Analytics", First edition
2. Hastie, Trevor, et al., The elements of statistical learning, Vol. 2. No. 1. New York: springer, 2009.
3. Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for engineers. John Wiley & Sons, 2010

Web source

1. Deep Learning Tutorial,Release 0.1, LISA lab, University of Montreal
2. Maryam M Najafabadi, et.al., "Deep learning applications and challenges in big data analytics", Journal of Big Data, a Springer Open Journal, (2015) 2:1 DOI 10.1186/s40537-014-0007-7
3. http://deeplearning.net/tutorial/

IT4066 Lab: Cryptography and Network Security

Teaching Scheme
Practical: 2Hrs/Week
Credits:01

Examination Scheme
Term Work : 50 Marks
Practical Examination & Viva Voce: : 25 Marks

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1 Explore the use of Euclid's algorithm
CO2 Identify and formulate computing solution for symmetric key algorithms
CO3 Practice RSA and DH algorithm
CO4 Analyze the results of frequency of letters program
CO5 Summarize different modern tools used for system security

List of Experiments

Sr. No.	Details
1	Write a program for implementation of Euclid's Algorithm.
2	Demonstrate Caesar Cipher with the help of a program A. Sender's Side(Encryption) B. Receiver's Side(Decryption)
3	Formulate computing solution for Transposition Cipher A. Sender's Side(Encryption) B. Receiver's Side(Decryption)
4	Implement Key generation , Encryption and Decryption using RSA Algorithm
5	Write a program for implementation of DH Algorithm also find the solution for man – in- the middle attack
6	Write a program checking frequency of letters in a three different types of files and analyze the result
7	Write a program for implementation of Radix -64
8	Study of system security modern tools –CASE Study : Group Activity

IT4067 Lab: Internet of Things (IoT)

Teaching Scheme	**Examination Scheme**
Practical: 2Hrs/Week	**Term Work : 50 Marks**
Credits :01	**Practical / Viva Voce :25 Marks**

Pre-Requisite Courses:

CO1 Explore Arduino and different types of Arduino
CO2 Implementation and use of different type of sensor
CO3 Implementation and use of different protocols using Arduino
CO4 Configure Raspberry Pi

List of Experiment

1. Study and Install IDE of Arduino and different types of Arduino.
2. Write program using Arduino IDE for Blink LED.
3. Write Program for RGB LED using Arduino.
4. Study different type of sensor and implement ultra-sonic sensor.
5. Study the Temperature sensor and Write Program foe monitor temperature using Arduino.
6. Study different shield of Arduino and implement Wifi shield using Arduino.
7. Study and Implement RFID, NFC using Arduino.
8. Study and implement MQTT protocol using Arduino.
9. Study and Configure Raspberry Pi.
10. WAP for LED blink using Raspberry Pi.
11. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.12.
12. WAP for Web controlled LED using REST protocol and Arduino

IT 4086 Lab: Information Retrieval

Teaching Scheme	Examination Scheme
Practical : 2 Hrs/Week	**Term Work : 25 Marks**
Credits : 01	**Viva Voce : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Explore Conflation Algorithm & Document Representative.
CO2	Practice Clustering using single pass algorithm.
CO3	Analyze Indexing, Inverted Files and searching with the help of inverted file
CO4	Summarize working of Web Crawler.
CO5	Explore recent papers on IR, Digital Libraries and Multimedia IR.

List of Experiments:

Sr. No.	Details
	Level :Basic (all)
1	To implement Conflation Algorithm using File Handling.
2	To implement single pass algorithm for clustering .
3	To implement a program Retrieval of documents using inverted files.
4	To implement a simple Web Crawler in Java.
	Level :Complex (any three)
5	To implement a program for feature extraction in 2D colour images (any features like color, texture etc.)
6	To study recent papers on IR / search engine / Digital Libraries/ content management system for document .
7	Assignments based on Multimedia.
8	Assignments based on Digital Libraries.

IT4087- Lab Geographical Information System

Teaching Scheme	**Examination Scheme**
Practical: 02Hrs/Week	**Term Work : 25 Marks**
Credits:01	**Practical & Viva Voce : 25 Marks**

Course Outcomes Expected: On successful completion of this course, students will be able to:

CO1 Demonstrate the concepts of ArcGIS
CO2 Collect the knowledge of working principles of different ARC.
CO3 To create various graphics and shapes in user defined area
CO4 To perform analysis and Extraction on dataset

Suggestive List of experiments:

1 To study Organization of ArcMap

2 To Convert Dynamic Labels to Annotation

3 To Perform Analysis in the Map Display

4 Query to find precise information and ascertain patterns in the data such as the location of customers or low-income residents.

5 To study Repeating Shapes Tool for ArcGIS and generate an array of repeating shapes over a user-specified area.

6 To study Tools for Graphics and Shapes for ArcGIS

7 To study DEM Surface Tools for ArcGIS

8 To generate a variety of surface characteristics of a landscape, using both projected and unprojected digital elevation model (DEM) rasters

9 To study and install Raster Extractor tool for ArcGIS

10 To extract raster datasets from a raster catalog, with options to combine and clip those rasters to the current display extent.

11 To quickly select all raster catalog datasets that intersect the selected features from any feature class.

IT 4068 Project II

Teaching Scheme	**Examination Scheme**
Practical: 12 Hrs/Week	**Term Work : 50 Marks**
Credits:06	**Practical Examination & Viva Voce: : 100 Marks**

Course Description:
After completing this course, students will be able to develop solution for a practical problem with innovative ideas and thus enable them to have a practical exposure.

Course Objectives:
To accustom with the process of undertaking literature survey/industrial visit and identifying the problem
To practice the process of solving the problem in a team
To select and use engineering fundamentals and modern IT tools
To apply management principles and testing techniques

CO1	Develop team spirit among students in order to make them learn how to work with colleagues
CO2	Planning and follow-up of a complex project task, and taking care of run time and compile time errors that might occur
CO3	Integrate smaller modules into a larger one
CO4	Express ideas coherently & communicate effectively in both verbal and written form
CO5	Develop solution for the selected problem within stipulated time and test if it meets the requirements and prepare a report in proper format