B.TECH. COMPUTER SCIENCE & ENGINEERING (BIG DATA & ANALYTICS)

SEMESTER - I

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
ENG0101	G		ENGLISH	3	0	0	3	25	75	100
MATH0101	G		APPLIED MATHEMATICS - I	3	1	0	3.5	50	100	150
CHEM0101	G		INDUSTRIAL CHEMISTRY	3	0	0	3	25	75	100
CHEM0102	G		INDUSTRIAL CHEMISTRY LAB	0	0	2	1	25	25	50
PHYS0101	G		APPLIED PHYSICS – I	3	1	0	3.5	50	100	150
PHYS0102	G		PHYSICS LAB – I	0	0	2	1	25	25	50
CSEI1103	G		SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C)	3	0	0	3	25	75	100
CSEI1104	G		SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C) LAB	0	0	2	1	25	25	50
ECEN0101	G		BASICS OF ELECTRONIC AND ELECTRICAL SCIENCE	4	0	0	4	50	100	150
ECEN0103	G		BASICS OF ELECTRONIC & ELECTRICAL SCIENCE LAB	0	0	2	1	25	25	50
MECH0101	G		ENGINEERING GRAPHICS	1	0	4	3	75	50	125
TOTAL				**20**	**2**	**12**	**27**	**400**	**675**	**1075**

L = Lecture
T = Tutorial
P = Practical
C = Credit Point

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER-I

English

L	T	P
3	0	0

MODULE CODE	ENGL0101
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C Comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to vocabulary, synonyms, anatomize and to enhance English language skills as mentioned below:

1. To achieve knowledge and understanding on fundamentals of English Language and various aspects of it.
2. To get familiar with the rules of Grammar and their correct usage.
3. To enhance the creativity of the students related to verbal ability and reasoning or fluency of language.
4. To acquire knowledge and understanding the basic concepts of English language and its application in Science and & Engineering.
5. To acquire knowledge for the correct usage of technical English.

LEARNING OUTCOMES:

1. Able to achieve knowledge and understanding on fundamentals of English Language.
2. Able to get familiar with the rules of Grammar and their correct usage.
3. Enhance the creativity of the students related to verbal ability and reasoning or fluency of English.
4. Ability to acquire knowledge for the correct usage of technical English.

MODULE CONTENTS:

Unit I: Communicative Grammar Communicative Grammar: Spotting the errors pertaining to parts of speech, nouns, pronouns, adjective, adverbs, preposition, conjunction, genders, infinitives, participles, form of Tenses, use of articles ;Concord - grammatical concord, notional Concord and the principle of proximity between subject and verb and other exceptional usages.
Unit II: Lexis Lexis: Words often confused; One-Word Substitutes; Foreign Words (A selected list may be included for all the above components); Formation of Words (suffixes, prefixes and derivatives)..
Unit III: Introduction to principal components of spoken English Introduction to principal components of spoken English – Phonetics, Word-stress patterns, Intonation, Weak forms in English.
Unit IV: Developing listening and speaking skills through various activities Developing listening and speaking skills through various activities, such As: Role play activities Practicing short dialogues Group discussion Debates Speeches Listening to news bulletins Viewing and reviewing T.V. programs etc.
Unit V: Written Communication Written Communication: Developing reading and writing skills through such tasks/activities as developing outlines, key expressions, situations, slogan writing and theme building exercises. Reading verbal and non-verbal texts like cartoons, Graphs and tabulated data etc.
Unit VI: Technical Writing Business Letters, Format of Business letters and Business letter writing-Fully- blocked layout may be used-mail writing; Reports, Types of Reports and Format of Formal Reports; Press Report Writing.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Basic Business Communication: Raymond V Lesikar Mc A Graw Hill publications. 2. Communication Skills: D G Saxena, Kuntal Tamang Top Quark,New Delhi. 3. A textbook of English Phonetics for Indian Students: TBalasubramanian Macmillan India Limited, New Delhi.
REFERENCE BOOKS	1. Living English Structures:W S Allen Pearson Publications, New Delhi. 2. High School English Grammar and Composition: P C Wren and H Martin S.Chand Publications, New Delhi. 3. Essentials of Communication: B R Sharma and Sanjeev Gandhi Bharat publications, Yamuna Nagar

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,3,4	1,2,3,4	1,2,3	1,2,3	2,4	3,4	1,4	3,4	2,5	1,2,3,5	1,5

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	05
2.	Sessional Test	2	15
3.	Group Discussion	4	05
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4
Class Test	x	x		
Quiz	x	x	x	x
Assignment			x	x

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER-I

Applied Mathematics-I

L	T	P
3	1	0

MODULE CODE	MATH0101
CREDIT POINTS	3.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C Comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

1. To achieve knowledge and understanding on fundamentals of matrices, their various properties and capabilities to model and solve wide range of problems in science and engineering.
2. To get familiar with concepts of differential calculus and develop ability to solve simple problems.
3. To understand multiple integrals and their applications in engineering problems.
4. To learn basic concepts of probability and its application in realistic decision making.
5. To acquire knowledge of statistical hypothesis testing and assess their effectiveness in problem solving.

LEARNING OUTCOMES:

1. Able to understand the evolution of matrices and their applications.
2. Exposure to differential calculus and their capabilities to solve problems.
3. Enhance the knowledge of multiple integrals.
4. Able to understand concepts of probability and its application.
5. Ability to acquire knowledge of statistical hypothesis testing and assess their effectiveness.

MODULE CONTENTS:

UNIT-I: Matrices & their Applications Rank of a matrix, elementary transformations, elementary matrices, inverse using elementary transformations, normal form of a matrix, linear dependence and in dependence of vectors, consistency of linear system of equations, linear and orthogonal transformations, Eigen values and Eigen vectors, properties of Eigen values, Cayley - Hamilton theorem and its applications. Determinants and their evaluations.
UNIT-II: Applications of Differentiation Taylor's and McLaurin's series, Asymptotes and Curvature. Partial Differentiation & its Applications : Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives.
UNIT-III: Applications of Differentiation contd. Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign..
UNIT-IV: Multiple Integration Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.
UNIT-V: Multiple Integration contd. Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.
UNIT-VI: Probability Distributions & Hypothesis Testing Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions. Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only) and Chi-square test of goodness of fit. Chi-square test of independent events, F- Test.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Higher Engineering Mathematics: B.S. Grewal, Khanna Publishers, New Delhi. 2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc., New York. 3. *Advanced Engineering Mathematics*, Peter V. O'Neil, Thomson Learning, Inc., Singapore.
REFERENCEBOOKS	1. Advanced Engineering Mathematics, R.K. Jain and S.R.K. Iyengar, Alpha science International Ltd. Pang Bourne, England. 2. Advanced Engineering Mathematics, Michael D Greenberg, Prentice-Hall, Englewood Cliffs, NJ.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,3 ,4,5	1,2 ,3, 4,5	1,3 ,5	1,2,5	1,2,4	2,3	1,4,5	1,3	1,2 ,5	1,2 ,3	2,4

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz			x		x
Assignment	x	x		x	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER-I

Industrial Chemistry

L	T	P
3	0	0

MODULE CODE	CHEM0101
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C Comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to fuel, lubricants and to enhance skills of industrial chemistry as mentioned below:

1. To achieve knowledge and understanding the phase rule for different systems and further for various engineering applications.
2. To get familiar with the importance of water, impurities in water & their effects like hardness, alkalinity & biological effects.
3. To understand & solve the problems like scale and sludge formation, boiler corrosion due to impurities present in water used for industrial purpose.
4. To learn basic concepts about the process of corrosion of different metals & its types with mechanism and cause.
5. To know various factors that can effect corrosion and to be able to produce different methods for prevention of corrosion of different metals used in machines.
6. To have knowledge of different lubricants and to use different lubricants for different machines.
7. To gain knowledge of different fuels and their efficiency.
8. To acquire knowledge about the preparation & properties of different polymers and to be able to recognize the use of different polymers & their composites for engineering applications.

LEARNING OUTCOMES:

1. Students will be able to develop an insight about the way the chemistry is connected to other occupations and appreciation of the role of chemistry in day to day life in society and the skills of solving related industrial problems.
2. Students will be able to demonstrate their knowledge of removal of hardness of water and different water treatments methods in energy and environment related industries.
3. Graduates will be able to apply their knowledge of preventions of corrosions in different machinery systems.
4. Students will be able to demonstrate the application of different lubricants for various machinery problems and energy usage as well as the influence of human and industrial activities on the environment.
5. Students will show their interest in manufacturing different polymers and polymer composites by using different polymerization techniques and their application in industries.
6. Graduates will be able to develop their challenging careers in the field of chemicals, petroleum, petrochemical, polymer, pharmaceutical, food, biotechnology, microelectronics, energy and nano-materials processing.
7. Graduates will be able to perform laboratory experiments and proper use of standard chemistry glassware and equipment compare and collect quantitative data obtained from experimentation and using various analytical techniques.
8. Graduates will be able to communicate effectively through assignments, presentations and discussions in technical as well as in non technical domain.

MODULE CONTENTS:

UNIT-I: Phase Rule Terminology, Gibb's phase rule equation, One component system (H_2O system and CO_2– system), Two components system: simple eutectic system (Pb–Ag), system with congruent melting point (Zn–Mg), system with incongruent melting point (Na–K), Applications of these systems and phase rule, Cooling curves.
UNIT-II: V Water & its treatment Impurities in water & their effects, hardness of water and its determination (EDTA method), alkalinity of water and its determination, treatment of water for domestic use: coagulation, sedimentation, filtration and disinfection, water softening methods: Lime-Soda process, Zeolite process, Ion–exchange process, Related numerical problems.
UNIT-III: Corrosion and its prevention Introduction, Chemical and Electrochemical corrosion, Types of corrosion: oxidation corrosion, galvanic corrosion, differential aeration corrosion, pitting corrosion, waterline corrosion, stress corrosion (caustic embrittlement), Factors affecting corrosion, preventive measures (Cathodic& anodic protection, electroplating, tinning, galvanization).
UNIT-IV: Lubricants and Fuels Need for lubricants, Classification, general properties & applications of lubricants, Properties of lubricating oils (Flash & Fire point, Viscosity and Viscosity index, Saponification value, Iodine value, Acid value, Aniline point), Definition and classification of fuel, Calorific value of fuels, Dulong' formula, Determination of calorific value of fuels (Bomb's calorimeter & Boy's Gas calorimeter), Related numerical problems.
UNIT-V: Polymers and Composites Classification of polymers, types & mechanism of polymerization (Addition and condensation), preparation properties and technical application of thermoplastics (PE, PVC, Teflon), thermosets (UF, PF) and elastomers (synthetic rubbers: SBR, Nitrile rubber), Inorganic polymers (silicones), Polymeric composites (composition, advantages and application areas), Introduction to conducting polymers and conducting polymer composites.
UNIT-VI: Instrumental Methods of Analysis Principle, instrumentation & general applications of thermal methods of analysis (TGA, DTA, DSC), Basic concepts of spectroscopy, Principal, instrumentation and general applications of spectroscopic techniques (UV-Vis spectroscopy, IR-spectroscopy & Flame photometery), Conductometric titrations, pH metry.

RECOMMENDED BOOKS:

TEXT BOOKS	1. *Engineering Chemistry*, P.C. Jain Monica Jain (Dhanpat Rai & Co) 2. *Fundamentals of Engineering Chemistry*, Shashi Chawla (Dhanpat Rai & Co) 3. *Chemistry for Engineers*, B.K. Ambasta (Luxmi Publication) 4. *Chemistry in Engineering & Tech*, Vol. I & II, Kuriacose (TMH)
REFERENCES	1. *Instrumental methods of Chemical analysis*, MERITT & WILLARD (EAST – WEST press) 2. *Physical Chemistry*, P.W Atkin (ELBS, OXFORD Press) 3. *Physical Chemistry*, W.J.Moore (Orient Longman)

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,3,4,5,6,7	1,2,5,6,7	1,3,5,7	1,2,7	2,4,6	1,2,3,7	1,4,6.7	1,3,4,5,	2,5,6,8	1,2,4,7,8	2,3,4

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:
This subject will be evaluated for a total of 75 marks for theory and 25 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	05
2.	Sessional Test	2	15
3.	Group Discussion	4	05
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6	7	8
Class Test		x	x	x		x	x	
Quiz	x	x	x	x		x		
Assignment	x		x					x

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER-I

Industrial Chemistry Lab

L	T	P
0	0	2

MODULE CODE	CHEM0102
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to chemistry as mentioned below:

1. To achieve the practical knowledge of the importance of water and it's, impurities in water & their effects like hardness, alkalinity & biological effects.
2. To be able to understand & solve the problems like scale and sludge formation, boiler corrosion due to impurities present in water used for industrial purpose.
3. To get familiar with experimental methods for treatment of domestic water, water for industrial purpose.
4. To have knowledge of different properties of lubricants and further to use different lubricants for different machines.
5. To obtain data by cooling method for constructing a phase diagram which indicates the solid and liquid phase that is present at each temperature and composition.
6. To be effective in applying the basic concept of different polymerization synthesis techniques for preparation of different polymers and their applications.

LEARNING OUTCOMES:

1. Able to develop an insight about the way the chemistry is connected to other occupations and appreciation of the role of chemistry in day to day life in society and the skills of solving related industrial problems.
2. Able to perform laboratory experiments and proper use of chemicals in removal of hardness of water and different water treatments methods in energy and environment related industries.
3. Able to check the water samples for various purposes in industries, like chemical industry, Construction Company, pharmaceutical company and demonstrate the role of pure water in day to day life.
4. Able to demonstrate the application of different lubricants for various machinery problems.
5. Enhance the knowledge of different polymers by using some polymerization techniques in industries.
6. Ability to develop their challenging careers in the chemical, petroleum, petrochemical, polymer, pharmaceutical, food and other related industries compare quantitative data collected in the lab and interpret the data obtained from experimentation and using various analytical techniques.

MODULE CONTENTS:

1.	Determination of Ca^{+2} and Mg^{+2} hardness of water using EDTA solution
2.	Determination of alkalinity of water sample.
3.	Determination of dissolved oxygen (DO) in the given water sample.
4.	To determine TDS of Water samples of different sources.
5.	To find the eutectic point for a two component system by using method of cooling curve.
6.	To Prepare Urea formaldehyde and Phenol–formaldehyde resin.
7.	Determination of viscosity of lubricant by Red Wood Viscosity (No. 1 & N0. 2).
8.	To find out saponification no. of lubricating oil.
9.	Determination of concentration of KMnO4 solution spectrophotomererically.
10.	Determination of strength of HCl solution by titrating against NaOH solution conductometerically.
11.	To determine amount of sodium & potassium in given water sample by flame photometer.
12.	Determination of dissociation constant of a weak acid by pH-meter.
13.	Estimation of total iron in an iron alloy
Any other experiment carried out in the laboratory.	

RECOMMENDED BOOKS:

TEXT BOOKS	1. *Essential of Experimental Engineering Chemistry*, Shashi Chawla (DhanpatRai& Co.) 2. *Expeiments in Applied Chemistry*, SunitaRatan (S.K. Kataria& Sons)
REFRENCE BOOKS	1. *Vogel's Text Book of Quantitative Chemical Analysis*, A. I. Vogel, G. H. Jeffery Published by Longman Scientific & Technical, 5th Edition, 1989. 2. *Theory & Practice Applied Chemistry* – O.P.Virmani, A.K. Narula (New Age). 3. *A Text book on Experiments and Calculation– Engineering Chemistry*, S.S.Dara, (S.Chand & Company Ltd).

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,3,4,6	1,2,4	1,3,6	1,2,4	2,4,6	1,4	1,2,4,6	1,2,5	1,3	1,2,3,6	1,2,3

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks.

Practical

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER-I

Applied Physics I

L	T	P
3	1	0

MODULE CODE	PHYS0101
CREDIT POINTS	3.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C Comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to modern physics, interference, difference, polarization and to enhance skills of different type of laser and its applications as mentioned below:

1. To make students aware about Modern Physics, their various properties and capabilities tomodel and solve wide range of problems in science and engineering.
2. To acquire knowledge polarization and their applications in engineering problems.
3. To get familiar with concepts of interference and diffraction and develop ability to solve simple problems.
4. To learn basic concepts of different types of laser and its application in scientific problems.
5. To acquire knowledge of superconductivity implementation and assess their effectiveness in science and Technology.

LEARNING OUTCOMES:

1. Able to apply knowledge in developing advanced materials and devices.
2. Able to apply fundamental laws of superconductivity in engineering.
3. Able to identify and solve applied physics problems.
4. Able to apply knowledge to understand the concepts of fiber optics.
5. Ability to create new problems and solve with the help of applications used.

MODULE CONTENTS:

Unit I: Interference Coherent sources, conditions for sustained interference. Division of Wave-Front, Fresnel's Biprism, Division of Amplitude- Wedge-shaped film, Newton's Rings, Michelson Interferometer, applications, Resolution of closely spaced spectral lines, determination of wavelengths.
Unit II: Diffraction Difference between interference and diffraction, Fraunhofer and Fresnel diffraction, Zone Plate, Fraunhofer diffraction through a single slit, Plane transmission diffraction grating, absent spectra, dispersive power, resolving power and Rayleigh criterion of resolution.
Unit III: Polarization Polarized and unpolarised light, Uni-axial crystals double refraction, Nicol prism, quarter and half wave plates, Detection and Production of different types of polarized light, Polarimetry, Optical and specific rotation, Biquartz and Laurent's haled shade polar meter
Unit IV: Laser & Fibre Optics Absorption of radiation, spontaneous and stimulated emission, Laser action, Einstein Coefficient, characteristics of laser beam-concept of coherence, spatial and temporal coherence. He-Ne and semiconductor lasers (simple ideas), applications of Laser. Propagation of light in optical fibres, numerical aperture, V-number, single and multimode fibres, attenuation dispersion, applications.
Unit V: Nuclear Physics Introduction, Radioactivity, Alpha decay, Gama decay, Q value, Threshold energy, Nuclear reactions, Nuclear fission: Liquid drop model, Nuclear fusion, Particle accelerators: Linear accelerator, Cyclotron.
Unit VI: Theory of Relativity Introduction, Frame of reference, Galilean transformation, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Mass energy relation.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Perspectives of Modern Physics, Arthur Beiser (TMH) 2. Modern Physics for Engineers,S.P. Taneja (R. Chand). 3. Modern Engineering Physics, A.S. Vasudeva (S. Chand). 4. Engineering Physics, SatyaPrakash (PragatiPrakashan). 5. Optics, Ajoy Ghatak (TMH).
REFERENCEBOOKS	1. Fundamentals of Physics, Resnick& Halliday (Asian Book). 2. Introduction to Electrodynamics, D.J. Griffith (Prentice Hall).

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,3,4	1,3,5	1,2,4,5	1,2,3,4,5	1,3,4	1,4	1,2,5	1,3,5	1,4,5	1,2,5	1,3,5

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz			x		x
Assignment	x	x		x	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER-I

Applied Physics Lab I

L	T	P
0	0	2

MODULE CODE	PHYS0102
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

1. To achieve knowledge and understanding on Modern Physics, their various properties and capabilities to model and solve wide range of problems in science and engineering.
2. To get familiar with concepts of interference and diffraction and develop ability to solve simple problems.
3. To understand polarization and their applications in engineering problems.
4. To learn basic concepts of different types of laser and its application in scientific problems.
5. To acquire knowledge of superconductivity implementation and assess their effectiveness in science and Technology.

LEARNING OUTCOMES:

1. Able to apply knowledge for finding wavelength of sodium, colours of white light using advanced technology.
2. Able to apply fundamental laws of superconductivity in engineering and technology.
3. Able to identify new problems and solve through different techniques.
4. Able to apply knowledge to understand the concepts of fiber optics.
5. Able to develop new experiment using advances technology.

MODULE CONTENTS:

1. To find he wavelength of sodium light by Newton's rings experiment.
2. To find the wavelength of sodium light by Fresnel's biprism experiment.
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and cauchey's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by Michelson Interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polar meter.
9. To compare the capacitances of two capacitors by De'sauty bridge and hence to find the dielectric constant of a medium.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photo-conducting cell and hence to verity the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and calendar and Griffin bridge.

RECOMMENDED BOOKS

TEXT BOOKS	1. Advanced Practical Physics - B.L. Workshop and H.T. Flint (KPH)
REFERENCES	1. Practical Physics - S.L. Gupta & V. Kumar (Pragati Prakashan). 2. Advanced Practical Physics Vol. I & II- Chauhan & Singh (Pragati Prakashan).

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,5	1,2, 4	1,2,3 5	1,2,4	2,5	1,3,5	3,5	1,3,5	3	2	3,5

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks.

Practical

Assessment #	Type of Assessment	Per Semester	Maximum Marks
1	Internal Assessment	2	25
2	External Assessment	1	25

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

Module Title : Software Foundation and Programming with C
Programme : BTech (CSE) in Cloud Application in association with IBM
Term : 1st year 1st Semester
Credits :

***Time required in terms of Student Learning*: -**

Learning	Hours
Contact Classes	40
Guided study	20
Total	60

Aim & Objectives:

Teaching and Learning Approach:

The course will focus on using a teacher-student interactive and decision-oriented learning exercises.

For the active learning mode in the course to be effective, participating in class discussions is extremely important along with self paced learning to clear the concepts of software.

In addition to the lectures, discussions and demonstrations, students would be required to work on sample applications and exercises

Guided Study:
Guided study will include Online learning from IBM Career Education @ Campus Portal, text readings, articles on contemporary issues in organization, assignments, case analysis and power point presentations.

Assessment:

Assessment of the student will be based on mid-term and end term examination and continuous assessment subject to class participation, assignments and presentations.

Indicative Contents:

Topic	Coverage
Unit 1	Brief History of Computing Art and Science of Programming Introduction to C Programming - Background of C - Getting Started with C - Constructs, Loops & Arrays - Functions - Pointers - User Defined Types - Binary I/O With Structures - Appendix. Reference Tables
Unit 2	Open Standards, Open Source, and IBM - What is an Open Standard - Open Standards Model - Industries needing standards - The Impact of Standards - Open Source Software - Open Source - Open Source Technology - The OPEN Proposition
Unit 3	Introduction to Linux - What is Linux - Background of Linux - Why is Linux so popular - What can you do with Linux - Linux Distributions - Linux Technology Center - Future of Linux
Unit 4	PHP - What is PHP - PHP – Key Driver of LAMP Stack - Getting Started with PHP - Unified ODBC - PHP Data Objects - PHP Deployment Platform - What is Zend Core - Features and Benefits - Zend and IBM - What is Ruby - What is Rails

Text Material & resources: IBM Course Material

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER - I

Basics of Electronic and Electrical Science

L	T	P
4	0	0

MODULE CODE	ECEN0101
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C Comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

The aim of teaching this subject is to impart knowledge primarily related to application of electricity so that learner will be able to make basic electrical circuits in real life. Some of the objectives of the course are:

1. To acquire basic knowledge of Electric Networks.
2. To inculcate the knowledge of AC and DC fundamentals.
3. To get familiar with the concept of three phase circuit and its various connections.
4. To gain knowledge of static and rotating Electrical machines.
5. To acquire knowledge about semiconductor physics for electronic devices like diode, transistor, amplifier etc.
6. To get familiar with different type of electronic displays.
7. To acquire the knowledge of basic digital circuitry.

LEARNING OUTCOMES:

1. Able to appreciate the significance of electronics in different applications.
2. Able to understand basic aspects of electrical technology used in any kind of industry.
3. Able to understand various electrical applications in day to day life.
4. Able to compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.
5. Able to know the difference between single phase and three phase electrical supply.
6. Acquiring problem solving skills.
7. Get familiar with working of various components of a circuit.

MODULE CONTENTS:

Unit I: D.C. Network Laws Ohm's Law, Kirchhoff's Laws, Nodal and Loop methods of analysis Star to Delta & Delta to Star transformation.
Unit II: Single Phase & Three Phase A.C. Circuits Sinusoidal signal, instantaneous and peak values, RMS and average values, crest and peak factor, Concept of phase, representation-polar & rectangular. Three phase A.C. circuit, star and delta connection, phase and line voltage and currents.
Unit III: Transformers & Machines Construction, EMF equation, ideal transformer, Phasor diagram on no load and full load, equivalent circuit, losses, regulation and efficiency, open and short circuit test. Introduction of AC and DC machines.
Unit IV: Semiconductor Physics Semiconductor Physics : Basic concepts, Intrinsic and extrinsic semiconductors, diffusion and drift currents, reverse bias and forward-bias conditions, p-n junction in the breakdown region, Ideal diode, terminal characteristics of junction diode.
Unit V: Digital Circuits &Electronics Instruments Digital Electronics: Binary, Octal and Hexadecimal number system and conversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT) NAND, NOR as universal gates. Electronics Instruments: Role, importance and applications of general purpose test instruments vizMultimeter, Digital & Analog Cathode Ray Oscilloscope (CRO), and Function/Signal Generator.
Unit VI: Electronic Displays Seven segment display, Fourteen segment display, Dot matrix display, LED Display: Introduction, Construction, Advantage of LEDs in electronics display. LCD Display : Introduction, Types of LCD display- Dynamic scattering and field effect type; Types of liquid crystal cells :- Transmitting type and reflective type; Advantage and disadvantage of LCD display.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Electrical Technology (Vol-I), by B.L. Thareja& A. K. Thareja, S. Chand publications. 2. Electrical Technology (Vol-II), by B.L. Thareja& A. K. Thareja, S. Chand publications. 3. Basic Electrical Engineering, II edition, by V. N. Mittal & Arvind Mittal, TMH Publications. 4. Electronic Devices & Circuits – Boylstad & Nashelsky.

REFERENCEBOOKS	1. Electrical Engineering Fundamentals : Deltoro, PHI 2. Network Analysis ;Valkenburg, PHI. 3. Electrical and Electronic Technology (8th Edition): Hughes, Pearson. 4. A textbook of Electrical Technology, J. B. Gupta, Katson publication. 5. Electrical Technology by Mukesh Saini. 6. J.S Katre "Basic Electronics" Tech Max Publications

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	05
2.	Sessional Test	2	15
3.	Group Discussion	4	05
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Class Test					x	x	
Quiz	x	x		x			x
Assignment		x	x			x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2	3,7	4	4	7	5		6			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER – I

Basics of Electrical & Electronics Science Lab

L	T	P
0	0	2

MODULE CODE	ECEN0103
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

1. To get familiar with various measuring instruments.
2. To get familiar with major parts of electrical machines.
3. To aware students about precautionary measures of using Electrical supply.
4. To analyze different components of any electrical network.
5. To get familiar with ideal and practical characteristics of IC 741.
6. To provide experimental validation of the elementary analogue circuitry using analogue and digital testers.

LEARNING OUTCOMES:

1. Able to understand the basic engineering technique.
2. Creates implementation skills.
3. Identify the basic tools and test equipment used to construct, troubleshoot, and maintain standard electronic circuits and systems.
4. Able to measure various electrical parameters.
5. Get familiar with the operation of CRO and function generator.
6. Get familiar with working environment of three phase electrical supply.
7. Able to design various basic circuits of digital electronics using simple gates and capable to work on IC 741.

LIST OF EXPERIMENTS:

1.	To verify ohm's law.
2.	To verify KCL and KVL.
3.	To study the construction of Transformer.
4.	To measure power and power factor by 3 voltmeter method.
5.	To measure power and power factor by 3 Ammeter method.
6.	To Plot the forward and reverse V-I characteristics of P-N junction diode.
7.	To get familiar with the working knowledge of the following instruments : a) CRO b) Multimeter (Analog and Digital) c) Function generator d) Power supply
8.	To measure phase difference between two waveforms using CRO.
9.	To verify the truth tables of basic logic gates (OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR).
10.	To get familiar with the working and use of seven-segment display.
Experiments based on advanced topics:	
11.	To perform O.C. and S.C. tests of a transformer.
12.	To plot and study the input and output characteristics of BJT in common-emitter configuration.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	1,2	2,4	3,7		6	5	3,7		3	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (IBM Big Data & Analytics)

SEMESTER - I

Engineering Graphics

L	T	P
1	0	4

MODULE CODE	MECH0101
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	75
SUMMATIVE ASSESMENT MARKS	50
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

A knowledge of basics of mechanical engineering is must for all the disciplines. The topics included in this course will enable the students to:

1. Understand the application of industry standard and techniques applied in engineering graphics.
2. To impart the knowledge of different types of drawings and standard codes, scales, dimensioning and standard abbreviations with understanding of different types of tolerance on dimensions.
3. Apply auxiliary or sectional view to most practically represent engineered parts
4. Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two dimensional views.
5. To enable the students with free hand 3 D pictorial sketching.

LEARNING OUTCOMES:

1. The students will acquire basic skills required for communication geometric entities and simple machine parts.
2. The students will be able to draw multi-views drawings.
3. The students will learn the use of computer in drafting and modeling.
4. The students will be able to improve their modeling skills and to apply them in designing a new machine part.
5. The students will learn to visualize the assembled and disassembled machine parts.
6. The students will be able to use the principal of isometric projection in single view.
7. The students will be able analyze tolerances and specify tolerances for design of machine parts.

COURSE CONTENT:

Unit I:Basic Commands Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display Commands: Zoom, Pan, Redraw, and Regenerate; Simple dimensioning and text, Simple exercises.
*Unit II: Projections of Points, Straight Lines and Planes****** Introduction, Various types of projections, First and Third angle systems of orthographic projections, types and use of lines and lettering, Dimensioning, Projection of Points in different quadrants, projections of lines and planes for parallel, perpendicular & inclined to horizontal and vertical reference planes.
Unit III: Projections Solids and Development of Surfaces Cylinder, Cone, Pyramid, & Sphere with axes parallel, perpendicular & inclined to both reference planes. Development of surfaces of various solids.
Unit IV :Sections of Solids Section planes, Sectional views, True shape of Sections for Prism, Cylinder, Pyramid, and Cone & Sphere. Orthographic Projections Simple objects and Simple Machine Components like Bolts and Screw.
Unit V: Isometric projections Isometric scales, isometric views of Simple objects. Introduction to computer-aided drafting (CAD): Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems.
Unit VI : Solid modelling Basics of 2-D and 3-D solid modeling, orthographic, iso-metric projection drawing and sectional views of simple machine elements.

(*Practice with manual drawing tools in addition to graphic tools. First Angle Projection is to be followed.)

RECOMMENDED BOOKS:

TEXT BOOK	1. Engineering Drawing Plane and Solid Geometry: N.D. Bhatt and V.M.Panchal, Forty-Fourth Edition 2002, Charotar Publishing House. 2. Engineering Drawing: Laxmi Narayan and Vaishwanar. Charotar Publishing House 3. Engineering Graphics and Drafting: P.S. Gill, Millennium Edition, S.K. Kataria and Sons 4. Engineering Graphics using AUTOCAD 2007: T. Jeyapoovan, First Edition 2002, Vikas Publishing House.
REFERENCE	1. A Text Book of Engineering Drawing : S.B. Mathur, Second Revised and Enlarged Edition 2000, Vikas Publishing House. 2. AutoCAD 2008 instructor: James A Leach, TMH New Delhi. 3. Engineering Graphics with an introduction to Auto CAD: D. Jolhe, TMH New Delhi

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 125 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	75
2	External Assessment	1	50

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6	7
Class Test		x	x		x		x
Quiz			x		x	x	
Assignment	x	x		x			x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	3	3	2	4	3	6,7	2	5	3	4

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;

- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

SEMESTER - II

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
MATH0116	G		APPLIED MATHEMATICS-II	4	1	0	4.5	50	100	150
PHYS0103	G		APPLIED PHYSICS-II	3	1	0	3.5	50	100	150
PHYS0104	G		APPLIED PHYSICS-II LAB	0	0	2	1	25	25	50
ENGC0101	G		ENVIRONMENTAL SCIENCE AND GREEN CHEMISTRY	4	0	0	4	50	100	150
ENGC0102	G		ENVIRONMENTAL SCIENCE AND GREEN CHEMISTRY LAB	0	0	2	1	25	25	50
MECH2104	G		ENGINEERING MECHANICS	4	0	0	4	50	100	150
MECH2105	G		ENGINEERING MECHANICS LAB	0	0	2	1	25	25	50
MATH0117	G		NUMERICAL METHODS	3	0	0	3	25	75	100
CSEI1105	E	PC	SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C++)	3	0	0	3	25	75	100
CSEI1106	E	PC	SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C++) LAB	0	0	2	1	25	25	50
CIVL0101	G		BASICS OF CIVIL ENGINEERING	2	0	0	2	25	50	75
CIVL0102	G		BASICS OF CIVIL ENGINEERING LAB	0	0	2	1	25	25	50
TOTAL				**23**	**2**	**10**	**29**	**400**	**725**	**1125**

L = Lecture

T = Tutorial

P = Practical

C = Credit Point

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Applied Mathematics-II

L	T	P
4	1	0

MODULE CODE	MATH0116
CREDIT POINTS	4.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

1. To achieve knowledge and understanding of differential equations, their various properties and capabilities to model and solve wide range of problems in science and engineering.
2. To get familiar with concepts of Laplace transforms and develop ability to solve simple and complex problems.
3. To understand Fourier series and their applications in engineering problems.
4. To learn basic concepts of Fourier Transforms and its application in scientific problems.
5. To acquire knowledge of complex functions and assess their effectiveness in science and Technology.

LEARNING OUTCOMES:

1. Able to understand differential equations and their capability to solve problems.
2. Exposure to Laplace transforms and their compatibilities.
3. Enhance the knowledge regarding Fourier series and their applications
4. Able to understand Fourier Transforms and its application.
5. Ability to acquire knowledge of complex functions and assess their effectiveness in science and Technology.

MODULE CONTENT:

UNIT-I: Ordinary Differential Equations & its Applications

Exact differential equations. Equations reducible to exact differential equations. Applications of Differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, heat flow and orthogonal trajectories.

UNIT-II: Linear Differential Equations.

Linear differential equations of second and higher order. Complete solution, complementary function and particular integral, method of variation of parameters to find particular Integral, Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficient. Applications of linear differential equations to simple pendulum, oscillatory electric circuits.

UNIT-III: Partial Differential Equations and Its Applications

Formation of partial differential equations, Lagrange's linear partial differential equation, First orders non-linear partial differential equation, Char pit's method. Method of separation of variables and its applications to wave equation and one dimensional heat equation, two dimensional heat flow, steady state solutions only.

UNIT-IV: Laplace Transforms and its Applications

Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivatives, transforms of integrals, multiplication by t^n, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

Unit –V: Fourier Series and Fourier Transforms

Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem.

UNIT-VI: Functions of Complex Variable

Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity, Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

RECOMMENDED BOOKS

TEXT BOOKS	1. Higher Engineering Mathematics: B.S. Grewal, Khanna Publishers, New Delhi. 2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc., New York. 3. Advanced Engineering Mathematics, Peter V. O'Neil, Thomson Learning, Inc., Singapore.
REFERENCES	1. Advanced Engineering Mathematics, R.K. Jain and S. R .K. Iyengar, Alpha science International Ltd. Pang Bourne, England. 2. Advanced Engg. Mathematics, Michael D. Greenberg, Prentice-Hall, Englewood Cliffs, NJ.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2,5	2, 5	3,4	1,2,3,4	2,3	3,4	2,3,5	1,3	4,5	1,2	1,3

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz			x		x
Assignment	x	x		x	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Applied Physics II

L	T	P
3	1	0

MODULE CODE	PHYS0103
CREDIT POINTS	3.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to solid state physics, crystal geometries, quantum physics, nano-science, energy bands and electromagnetic theory to enhance skills in the field of electricity and magnetism and its applications as mentioned below:

1. To achieve knowledge and understanding on soli-state physics, various properties of crystals to model and solve wide range problems in science and engineering.
2. To get familiar with concepts of micro and nano scales of materials and develop ability to solve simple problems.
3. To understand the concepts of electricity and magnetism, distribution of solids according to band theory, free electrons, and applications of maxwell's equation in engineering problems.
4. To learn basic concepts of different types of magnetic properties of solids in scientific problems.
5. To acquire knowledge of crystal structure and assess their effectiveness in science and Technology.

LEARNING OUTCOMES:

1. Able to apply knowledge in developing advanced materials and devices.
2. Able to apply fundamental laws of electricity and magnetism in engineering.
3. Able to identify and solve crystal structure and semiconductor physics problems.
4. Able to solve applications based on Maxwell's equation
5. Able to apply knowledge to understand the concepts of quantum physics.
6. Able to identify and solve concepts related to nano particles.
7. Ability to create new problems and solve with the help of applications used.

COURSE CONTENT:

UNIT I: Crystal Structure Space lattice, unit cell and translation vector, Miller indices, simple crystal structure. Laue's treatment to Bragg's law, powder method, point defects in solids- Schottky and Frenkel defects, Bonding in solidsionic and covalent bonds.
UNIT II: Quantum Physics Difficulties with classical physics, introduction to quantum mechanics simple concepts, Black body radiations Discovery of Planck's constant, phase velocity and group velocity. Schrodinger wave equations-time dependent and time independent, Expectation value, Ehrnfest Theorem, particle in a one-dimensional box. Quantum Statistics, Bose-Einstein and Fermi-Dirac Statisticsz, Elementary ideas of quark, gluons and hadrons.
UNIT III: Nano-Science Features of nano-systems, concept of quantum size effect, quantum dots and their applications. Free Electron Theory: Elements of classical free electron theory and its limitations. Drude's theory of conduction, quantum theory of free electrons, Fermi level, density of states, Fermi-Dirac distribution function, Thermionic emission, Richardson's equation.
UNIT IV: Band Theory of Solids Origin of energy bonds, Kronig-Penny model (qualitative) E-K diagrams, Brillouin Zones, Concept of effective mass and holes. Classification of solids into metals, semiconductors and insulators. Fermi energy and its variation with temperature. Hall Effect and its applications.
UNIT V: Green Energy Introduction to Green energy, types of green energy, energy conversion mechanisms for solar energy, wind energy, ocean energy and geothermal energy.
UNIT VI: Electro Magnetic Theory Gradient, Divergence, Curl, Gauss' law, Ampere's Law, Continuity equation, Maxwell,s equation (differential and integral forms), Significance of Maxwell's equations, Poynting Theorem, Electromagnetic wave propagation inn dielectrics and conductors.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Concepts of Modern Physics, Arthur Beiser (TMGH) 2. Solid State Physics, S.O. Pillai (New Age Int. Ltd. Pub.) 3. Modern Physics for Engineers, S.P. Taneja (R. Chand) 4. Modern Engineering Physics, A.S. Vasudeva (S. Chand)
REFERENCEBOOKS	1. Introduction to Solid State Physics,Kittel (John Wiley) 2. Quantum Mechanics, A. Ghatak 3. A Textbook of Engineering Physics,Avadhanulu and Kshisagar (S. Chand)

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,3	1,7	1	1,7	1,2,6	1,4	1,2	1,5	2,3	1,2	1,3

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6	7
Class Test	x		x		x		x
Quiz			x		x	x	
Assignment	x	x		x			x

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Applied Physics Lab II

L	T	P
0	0	2

MODULE CODE	PHYS0104
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES

1. To achieve the practical knowledge of low and high resistance and resistance of galvanometer by different methods.
2. To be able to find characteristic of a solar cell, V-I of a p-n diode and to find the fill factor and e/m for electrons by helical method.
3. To get familiar with ionization potential of Argon/Mercury using a thyratron tube and find the radius of coil by Stewart and Gee's apparatus.
4. To have knowledge of hysteresis loss by tracing a B-H curve.
5. To obtain the Planck's constant, co-efficient of self-inductance by using a Rayleigh bridge, Hall Co-efficient of semi-conductor.
6. To obtain band gap of intrinsic semi-conductor using four probe method.

LEARNING OUTCOMES:

1. Able to apply knowledge for finding the characteristics of solar cells and their applications.
2. Able to apply fundamental laws of superconductivity in engineering and technology.
3. Able to identify new problems and solve through different techniques.
4. Able to apply knowledge to understand the concepts of p-n junction diode.
5. Able to develop new experiment using advances technology.

COURSE CONTENT

1.	To find the low resistance by carey- Foster's bridge.
2.	To find the resistance of a galvanometer by Thomson's constant deflection method using a post office box.
3.	To find the value of high resistance by Substitution method.
4.	To find the value of high resistance by Leakage method.
5.	To study the characteristics of a solar cell and to find the fill factor.
6.	To find the value of e/m for electrons by Helical method.
7.	To find the ionisation potential of Argon/Mercury using a thyratron tube.
8.	To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's appratus.
9.	To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10.	To find the value of Planck's constant by using a photo electric cell.
11.	To find the value of co-efficient of self-inductance by using a Rayleigh beidge.
12.	To find the value of Hall Co-efficient of semi-conductor.
13.	To study the V-I characteristics of a p-n diode.
14.	To find the band gap of intrinsic semi-conductor using four probe method.
15.	To calculate the hysteresis loss by tracing a B-H curve.
Note: At least 12 experiments out of the list must be done in the semester.	

RECOMMENDED BOOKS

TEXT BOOKS	1. Advanced Practical Physics, B.L. Workshop and H.T. Flint (KPH)
REFRENCE BOOKS	1. Practical Physics, S.L. Gupta & V. Kumar (PragatiPrakshan). 2. Advanced Practical Physics Vol. I & II – Chauhan & Singh (PragatiPrakshan).

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,5	2,4	2,3,5	1,2,4	1,5	3,4	2,3, 5	1,2,4	4,5	1	3,5

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks.

Practical

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Environmental Science and Green Chemistry

L	T	P
4	0	0

MODULE CODE	ENGC0101
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

1. To achieve basic knowledge about the environment and its allied problems.
2. To understand the use and misuse/overexploitation of different natural resources and biodiversity.
3. To create knowledge about the causes and prevention measures for different types of environmental pollutions.
4. To the design, manufacture and use of chemical products so as to reduce or eliminate chemical hazards intentionally.
5. To create better, safer, chemicals while choosing the safest, most efficient ways to synthesize them
6. To eliminate hazards right at the design stage.
7. To demonstrate how chemical production could be achieved without posing hazard to human health and environment while at the same time being efficient and profitable.

LEARNING OUTCOMES:

1. Develop an insight about the multidisciplinary nature of environmental studies.
2. Able to use alternate energy sources to meet growing needs.
3. Able to understand the need of sustainable development and to control different types of environmental pollutions.
4. Ability to integrate this information into design of molecules to avoid or reduce toxic properties.
5. Exposure to a life cycle approach to reduce the potential risks throughout the production process.
6. Able to understand that a product will pose minimal amount of threat to human health and the environment during production and moreover, its disposal and reuse and at the end of its useful life.
7. Enhance the graduates for continual improvement, discovery and innovation that tends to processes and produce the materials that are much safer to natural ecosystem.

MODULE CONTENT:

UNIT-I: Environment and Environmental Pollution

Environment & its components, Multidisciplinary nature of environmental studies, Environment and human health, Need for public awareness & role of information technology. Definition, causes, effects and control measures of: a) Air pollution b) Water pollution c) Soil pollution d) Noise pollution f) Radiation pollution, Disaster management: floods, earthquake, cyclone and landslides.

UNIT-II: Natural Resources

Renewable and non-renewable resources: a) Forest resources: types, uses and over-exploitation, deforestation, dams & their effects b) Water resources: types, uses and over-utilization of surface & ground water, dam's benefits and problems. c) Mineral resources: types, uses and exploitation, environmental effects of extracting and using mineral resources. d) Energy resources: growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources.

UNIT-III: Social issues and Environment

From unsustainable to sustainable development, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Public awareness.

UNIT-IV: Green Chemistry and its Principles

Green Chemistry & need for Green Chemistry, Goal and Limitations of Green Technology, Principles of Green Technologies with their explanations and examples.

UNIT-V: Designing Green Synthesis

Prevention of Waste/byproducts; maximum incorporation of the materials used in the process into the final products (Atom Economy); waste minimization technique & 3R technique (3R=Reduce, Reuse, Recycle); prevention/minimization of hazardous/toxic products; designing safer chemicals, green solvents,

UNIT-VI: Green Synthesis/Reactions

Green oxidation and photochemical reactions, microwave and ultrasound assisted reactions.

RECOMMENDED BOOKS

TEXT BOOKS	1. V. K. Ahluwalia, Green Chemistry: Environmentally Benign Reactions, Ane Books India, New Delhi, 2006. 2. Rashmi Sanghi and M M Srivastava, Green chemistry: Environment Friendly Alternatives, Narosa Publishing House 3. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner. 4. Bharucha, Frach, The Biodiversity of India, MA pin Publishing Pvt. Ltd.Ahmedabad-380013, India. 5. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p. 4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB). 6. S. Chawla, *A Textbook of Environmental Studies,* McGraw Hill Education Private Limited, 2012.
REFERENCES	4. A. Kaushik and C.P. Kaushik, Perspectives in Environment Studies, 4th Edition, New Age International Publishers,2013. 5. G. T. Miller, *Environmental Science*, Thomas Learning, 2012. 6. W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003. 7. Paul Anastas, John C.Warner, John Warner Joint; Green Chemistry: Theory & Practice New Ed Edition; Oxford University press, USA, 2000. 8. Das, A. K. Environmental Chemistry with Green Chemistry, Books and allied (P) Ltd. 9. R. Rajagopalan, *Environmental Studies*: From Crisis to Cure, 2nd Edition, Oxford University Press, 2011. 10. A.K. De, *Environmental Chemistry*, New Age Int. Publ. 2012. 11. Environmental Engineering by Gerard Kiely, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2	2,5	3,4	2,5	3,5	2,4	3,5	2,3	3,4	1,2	1,3

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6	7
Class Test	x		x		x		x
Quiz			x		x	x	
Assignment	x	x		x			x

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Environmental Science and Green Chemistry Lab	**L**	**T**	**P**
	0	0	2

MODULE CODE	ENGC0102
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES

1. To be able to understand the importance of fresh water and impurities that may be present in drinking water & their effects.
2. Graduates should have ability to use experimental methods to understand different characteristics of water, soil and air.
3. To be effective in applying the green technologies for reduction of environmental pollution.
4. To be able to apply the practical knowledge for preservation of the environment

LEARNING OUTCOMES:

1. Students will develop an insight about the way the environment studies is connected to other fields and appreciation of the role of environmental sciences in day to day life in society.
2. Students will be able to perform laboratory experiments and eco-friendly use of chemicals in determination of water, soil & air qualities.
3. Graduates will be able to adopt green technology for sustainable development.
4. Graduates will be able to develop their challenging careers in the chemical, petroleum, petrochemical, water testing, pharmaceutical, food and other related industries compare quantitative data collected in the lab and interpret the data obtained from experimentation and using various analytical techniques.

COURSE CONTENT

1.	To determine the salinity of water samples (underground water, rain water, sea water etc)
2.	To determine the pH of drinking water sample and rain water.
3.	Determination of conductivity of soil/sludge samples.
4.	Determination of turbidity in the drinking water sample by tubidimeter.
5.	Determination of moisture content of soil sample.
6.	Determination of dissolved oxygen (DO) in the water sample.
7.	Determination of Biological oxygen demand (BOD) in the water sample.
8.	Determination of Chemical oxygen demand (COD) in the water sample.
9.	Determination of Residual Chlorine in the water sample.
10.	Determination of carbon dioxide in the water sample
11.	Determination of ammonia in the water sample.
12.	Determination of nitrate ions or sulphate ions in water using spectrophotometer.
13.	To determine the percent composition of zinc acetate by precipitation of zinc carbonate (green precipitation reaction)
14.	Base catalyzed aldol condensation by Green Methodology.
15.	Acetylation of primary amines using eco-friendly method.
16.	To determine the concentration of particulate matter in the ambient air using High Volume Sampler.
Note: For better understanding of various aspects of environment visits to local areas, depending upon easy access and importance may be planned to any nearby river, forest, grassland, hills and students should write a report based on their observations.	

RECOMMENDED BOOKS

TEXT BOOKS	A. I. Vogel, G. H. Jeffery, *Vogel's Text Book of Quantitative Chemical Analysis*, Published by Longman Scientific & Technical, 5th Edition, 1989.
REFRENCE BOOKS	1. dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory experiments). 2. S. Chawla, *Essentials of Experimental Engineering Chemistry*, Dhanpat Rai & Co., 3rd Edition, 2008 3. W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003 4. S. Rattan, *Experiments in Applied Chemistry*, Published by S.K.Kataria& Sons, 2nd Edition, 2003.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2,4	3	2,4	1	3,4	2,3,	1,2	4	1	1, 3

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks.

Practical

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Engineering Mechanics

L	T	P
4	0	0

MODULE CODE	MECH2104
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will comprise of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B and Section C comprise of short answer type and Long answer type questions and will have internal choices.

OBJECTIVES:

1. To get familiar with the basic concept of engineering mechanics force, moment and Couple.
2. To acquire knowledge about static equilibrium concepts commonly used in analysis and design of engineered structures.
3. To learn basic concepts of trusses and frames.
4. To understand the meaning of centers of gravity (mass)/centroids and moments of Inertia using.

LEARNING OUTCOMES:

1. Able to understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
2. Ability to develop basic dynamics concepts – force, momentum, work and energy.
3. Enhance the knowledge to apply Newton’s laws of motion.
4. To acquire knowledge and understanding of applying other basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.
5. Extend all of concepts of linear kinetics to systems in general plane motion (applying Euler's Equation and considering energy of a system in general plane motion, and the work of couples and moments of forces).

COURSE CONTENT:

Unit I: Introduction Force system, dimensions and units in mechanics, laws of mechanics, vector algebra, addition and subtraction of forces, cross and dot products of vectors, moment of a force about a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.
Unit II: Truss and Frames Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems.
Unit III : Moment of Inertia Centroid, Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Area moment of inertia, mass moment of inertia, parallel axis and perpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects.
Unit IV: Kinematics Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.
Unit V: Friction Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, Belt drive- derivation ofequation.T1/T2 =emq and its application.
Unit VI : Variational Mechanics Hamilton principle, Lagrange equations, principle of virtual work, methods of Minimum potential energy, stability.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Engineering mechanics by R.K BANSAL 2. Engineering mechanics by Dr. D.S KUMAR
REFERENCE BOOKS	1. Engineering Mechanics – Irving H. Shames, PHI Publication 2. Engineering Mechanics – U.C.Jindal, Galgotia Publication 3. Engineering Mechanics – A.K.Tayal, Umesh Publication

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz			x		x
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	5		2	4		1	2		5	4

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review;
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

Engineering Mechanics Lab

L	T	P
0	0	2

MODULE CODE	MECH2105
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

OBJECTIVES:

1. To determine the components of a force in rectangular or nonrectangular coordinates.
2. To determine the resultant of a system of forces.
3. To draw complete and correct free-body diagrams and write the appropriate equilibrium equations from the free-body diagram.
4. To acquire knowledge about support reactions on a structure.

LEARNING OUTCOMES:

1. Ability to understand measurement error, and propagation of error in processed data.
2. Exposure to basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
3. Ability to understand basic dynamics concepts – force, momentum, work and energy.
4. Ability to apply Newton's laws of motion.
5. Understand and be able to apply other basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.
6. Ability to extend all of concepts of linear kinetics to systems in general plane motion (applying Euler's Equation and considering energy of a system in general plane motion, and the work of couples and moments of forces).

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

LIST OF EXPERIMENTS

1.	Verification of reciprocal theorem of deflection using a simply supported beam.
2.	Verification of moment area theorem for slopes and deflections of the beam.
3.	Elastic displacements (vertical & horizontal) of curved members.
4.	Experimental and analytical study of 3 hinged arch and influence line for horizontal thrust.
5.	Experimental and analytical study of behaviour of struts with various end conditions.
6.	To determine elastic properties of a beam.
7.	Experimental and analytical study of a 3 bar pin jointed Truss.
9.	Experimental and analytical study of deflections for unsymmetrical bending of a cantilever beam.

RECOMMENDED BOOKS:

TEXT BOOK	1. Engineering Mechanics – Irving H. Shames, PHI Publication 2. Engineering Mechanics – U.C.Jindal, Galgotia Publication
REFERENCE	Engineering Mechanics – A.K.Tayal, Umesh Publication

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS)

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	4	6	5	1	1,2		6		3,5		1,4

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Numerical Methods

L	T	P
3	0	0

MODULE CODE	MATH0117
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to develop understanding of different methods related to error, area numerically, using different techniques to enhance skills of numerical methods as mentioned below:

1. To achieve knowledge and understanding of different types of error, interpolation, extrapolation and capabilities to solve by different methods with wide range of problems in science and engineering.
2. To get familiar with concepts of nonlinear equations and develop ability to solve simpleComplex problems.
3. To understand direct and indirect methods solve simultaneous linear equations and theirapplications in engineering problems.
4. To learn basic concepts of area solve by integration and its application in realistic decision making.
5. To acquire knowledge of ordinary and partial differential equations solve by different methods and assess their effectiveness in problem solving.

LEARNING OUTCOMES:

1. Able to understand the evolution of techniques and basic terminology.
2. Exposure to various methods and techniques and their compatibilities.
3. Enhance the knowledge regarding different types of error, linear, non-linear and ordinary and partial differential equations.
4. Able to understand the basic techniques and start to implement in real life.
5. Ability to find the largest Eigen values and corresponding Eigen vector.

MODULE CONTENT:

Unit I: Errors in Numerical Calculation Introduction, Numbers and their accuracy, Absolute, relative and Percentage errors and their analysis, General error formula. Interpolation and Curve Fitting:Newton's forward and backward; Gauss forward and backward; central difference interpolation formulae; Lagrange's and Newton divided difference interpolation formula, Interpolating with a cubic spline, Bezier curves and B-spline curves, Curve fitting by Least squares approximations.
Unit II: Nonlinear equations Bisection method, Regula False method, Secant method, Iteration Method, Newton's Raphson method, Giraffe's methods, Muller's method.
Unit III: Simultaneous linear equations Gauss Elimination method, Gauss-Jordan method, LU- decomposition Method, Jacobi's method, Gauss- Seidal method, Relaxation method.
Unit IV: Numerical differentiation and Integration Derivatives from differences tables, higher order derivatives, Newton-cotes integration formula, Trapezoidal rule, Simpson's rules, Boole's rule and Weddle's rule, Romberg's Integration.
Unit V: Numerical solution of ordinary differential equations Taylor series methods, Euler and modified Euler method, Runge-Kutta methods, Milne's method, Adams-Moulton method.
Unit VI: Numerical solution of partial differential equations Finite difference approximation of partial derivatives, solution of Laplace equation (standard 5-point formula only), one dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method). Eigen Value Problems:Power method, Jacobi, Given's and Householder's methods for symmetric matrices.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Applied Numerical analysis: Curtis F Gerald and Patrick, G Wheatley-Pearson Education. 2. Numerical Methods*:* Fairs & Burden, Brooks Cole, 2001. 3. Numerical Methods in Engineering and Science, B S Grewal, Khanna Publishers.
REFERENCE BOOKS	1. Numerical Methods for Scientific and Engineering computations, M.K. Jain, S.R.K. Iyenger and R.K. Jain-Wiley Eastern Ltd. 2. Numerical Methods for engineers, Steven C. Chapra, Raymond P. Can ale, McGraw Hill.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	I	j	k
Course Learning Outcomes	1,2	1,3	1,5	1,3,5	2,3	2,3,4	1,2, 4	1,4	1,3	2,5	1,4

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz			x		x
Assignment	x	x		x	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Software Foundation and Programming with C++

L	T	P
3	0	0

MODULE CODE	CSEN1105
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

1. To get a clear understanding of object-oriented concepts.
2. To understand object oriented programming through C++.
3. Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
4. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching.
5. To understand the concept of XML, XML transformation.
6. To get a clear understanding of IDE, Java development tools and Eclipse.

LEARNING OUTCOMES:

1. Gain the basic knowledge on Object Oriented concepts.
2. Ability to develop applications using Object Oriented Programming Concepts.
3. Ability to implement features of object oriented programming to solve real world problems.
4. Apply C++ features to design and implement program using Object Oriented Programming Concepts.
5. Discover errors and debugs in a program and describe techniques to resolve them.

.

MODULE CONTENT:

Unit I: Art and Science of Programming, Introduction to OOPS, Introduction to C++.
Unit II: Essentials of Programming (classes, Objects), Features of C++, Inheritance, Polymorphism & Encapsulation, Operator Overloading, I/O in C++, Template Functions, Template Classes, Exception Handling.
Unit III: XML Basics, Document type definitions (DTDs), XML namespaces, XML schema, XPath, XSL transformation.
Unit IV: Introduction to - Integrated Development Environment – Eclipse, Java Development Tools, Debugging Applications, The Eclipse Architecture, Eclipse Web Tools Platform Project 1.0, Software in Real World.

RECOMMENDED BOOKS:

TEXT BOOKS	*IBM Course Material*Software Foundation and Programming with C++

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	10
3.	Group Discussion	4	05
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x	x	
Quiz	x	x	x		x
Assignment	X				

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	3	1	2,3	2,5	1,5	2,3			5	4	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Basics of Civil Engineering

L	T	P
2	0	0

MODULE CODE	CIVL0101
CREDIT POINTS	2
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	50
END SEMESTER EXAM DURATION	1.30 Hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answers type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to basic knowledge of different sections of civil engineering as mentioned below:

1. To achieve knowledge and understanding about engineering aspects related to buildings.
2. To get familiar with different building materials and their properties.
3. To understand importance of surveying and the transportation systems.
4. To learn basic concepts related to water supply and sewage disposal.
5. To understand the fundamental concepts of geotechnical engineering and properties of soil.

LEARNING OUTCOMES:

1. Able to know about basic civil engineering terms and their applications.
2. Able to learn about the basic building material used in construction.
3. Able to understand about importance of surveying in civil engineering.
4. Able to know about soil behaviour and soil properties in different conditions.
5. Able to learn about water supply system and different layout of water distribution systems.

MODULE CONTENT:

UNIT -I : Building Materials Introduction of Civil Engineering materials: Bricks– composition, classifications, properties and uses. Stone – classification of rocks, quarrying, dressing properties and uses. Timber – properties, uses. Cement – grades, types, properties, uses. Steel – mild steel, medium steel, hard steel, their properties, uses. Concrete – grade designation, properties and uses.
UNIT-II: Building Components Building – selection of site, classification, components. Foundations –functions, classification bearing capacity. Flooring – requirements, selection, types. Roof – types and requirements.
UNIT-III: Surveying Introduction, Principles of surveying, use and adjustment of various instruments employed in chain survey, compass surveying and plane table surveying. Definition and working principles of a levelling instruments, Use and adjustment of dumpy and tilting levels, Establishment of Bench Marks by levelling.
UNIT-IV: Transportation Highway –classification, cross section and components of roads. Railway – cross section and components of permanent way and their functions. Waterway – docks and harbour, classifications, components. Bridge – introduction and components of bridge.
UNIT-V:Water Supply And Sewage Disposal Water supply – objective, quantity of water, sources, standards of drinking water, distribution system. Sewage – classification, technical terms, septic tank, components and functions.
UNIT-VI: Geotechnical Engineering Soil mechanics– Introduction, formation, composition, classification and properties of soil.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Basics of Civil Engineering, Raju .K.V.B, Ravichandran .P.T, Ayyappa Publications. 2. Engineering Material's, Rangwala .S.C Charotar Publishing House.
REFERENCE BOOKS	1. Basics of Civil Engineering, Shrikrishna, Kiran M .Tajne, Shrikrishna A Dhale.S.Chand Publication 2. Basic Civil Engineering, Satheesh Gopi. Publisher: Pearson India.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	10
3.	Group Discussion	4	5
4.	End Semester Exam	1	50

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x	x	x
Quiz	x	x		x	
Assignment	x		x		x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	3,4,5,6	1,2,3,4,5,6	1,2,4,5	1,3	1,5	5	1,2	1,3,5	3,5	2	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - II

Basics of Civil Engineering Lab

L	T	P
0	0	2

MODULE CODE	CIVL0102
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects of Civil Engineering field to the students of all branches of Engineering.

1. To study the practical experiments in chaining, compass.
2. To study the basics properties of cement.
3. To study the practical application of theodolite.
4. To study the properties of soil.
5. To give experience in handling surveying equipments.

LEARNING OUTCOMES:

1. Able to determine linear measurement like horizontal distance.
2. Ability to determine properties of cement experimentally.
3. Ability to determine different properties of soil experimentally.
4. Ability to determine C B R value of soil.
5. Ability to handle different surveying instruments.

LIST OF EXPERIMENTS

1.	Linear measurement using tape, chain.
2.	Chain survey – Determination of area by perpendicular offset.
3.	Theodolite- Measurement of horizontal and vertical angles by Vernier Theodolite.
4.	To determine the normal consistency of cement paste.
5.	To determine soundness of given cement by Le-Chatelier method
6.	To determine initial and final setting time of cement
7.	To determine the fineness of cement.
8.	To determine water content of soil mass.
9.	To determine Atterberg Limit of soil.
10.	C B R Value test.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	D	e	f	g	h	I	j	k
Course Learning Outcomes		1,2, 3	1,2,3, 4		1,2,3 ,4						

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

SEMESTER - III

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEI2101	E	PC	DATA STRUCTURES AND PROGRAM DESIGN	3	0	0	3	25	75	100
CSEI2102	E	PC	DATA STRUCTURES AND PROGRAM DESIGN LAB	0	0	3	1.5	25	50	75
CSEN2103	E	PC	DISCRETE STRUCTURE	3	1	0	3.5	50	100	150
CSEN2104	E	PC	COMPUTER ARCHITECTURE & ORGANIZATION	3	1	0	3.5	50	100	150
CSEC2101	E	PC	OBJECT ORIENTED PROGRAMMING USING JAVA	3	0	0	3	25	75	100
CSEC2102	E	PC	OBJECT ORIENTED PROGRAMMING USING JAVA LAB	0	0	2	1	25	25	50
	E	PE	ELECTIVE-I	4	0	0	4	50	100	150
MGMT0002	M		PROFESSIONAL ECONOMICS AND FINANCIAL ANALYSIS	3	0	0	3	25	75	100
VALU0119	P	AE	APTITUDE – I	2	0	0	2	25	50	75
VALU0123	P	SE	PROFESSIONAL COMMUNICATION – I	2	0	0	2	25	50	75
ENGL0109	P	AE	ACADEMIC WRITING	0	0	2	1	25	25	50
	P	AE	YOGA/NCC/NSS	0	0	2	1	50	0	50
	TOTAL			**23**	**2**	**9**	**28.5**	**400**	**725**	**1125**

L = Lecture
T = Tutorial
P = Practical
C = Credit Point

ELECTIVE I

MODULE CODE	MODULE
CSEN2205	E- COMMERCE
CSEN2206	DIGITAL ELECTRONICS
CSEN2207	INTERNET AND WEB TECHNOLOGY

YOGA / MEDITATION / NSS

MODULE CODE	MODULE
VALU0118	YOGA
VALU0121	NCC
VALU0122	NSS

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - III

Data Structures & Program Design

L	T	P
3	0	0

MODULE CODE	
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to teach students how to design, write, and analyse the performance of various data structures. It will also enable students to learn advanced data structure such as Tree, Graph, hash tables.

1. To teach the behavior of basic data structure (list, stack, queue, hash table, trees, and graph).
2. To understand and analyse elementary algorithms: sorting, searching.
3. To make students familiar with basic techniques of algorithm analysis including time and space complexity.
4. To teach the implementation of linked data structures such as linked lists and binary trees.
5. To make students familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.
6. To make students familiar with some graph algorithms such as shortest path and minimum spanning tree.

LEARNING OUTCOMES:

Following this course, students will be able to:

1. Students will be able to characterize the space and time complexity of algorithms.
2. Students will understand different data structures including stack, queue, linked list, tree, heap, graph, and hash table.
3. Students will be able to implement insert, retrieve, and delete operations and traversals of binary search trees.
4. Ability to understand traversals and algorithms on graphs.
5. Student will be able to implement hash tables along with insert and retrieve operations.

MODULE CONTENT:

UNIT-I: Overview of 'C', Data structures and Algorithms Introduction, Flow of Control, and Input output functions, Arrays and Structures, Function. Data structures and Algorithms: an overview**:** concept of data structure, choice of right data structures, types of data structures, basic terminology Algorithms, how to design and develop an algorithm: stepwise refinement, use of accumulators and counters; algorithm analysis, complexity of algorithms Big-oh notation.
UNIT-II: Arrays: Searching and Sorting Introduction, One Dimensional Arrays, operations defined: traversal, selection, searching, insertion, deletion, and sorting. Multidimensional arrays, address calculation of a location in arrays. Searching: linear search, binary search; Sorting: selection sort, bubble sort, insertion sort, merge sort, quick sort, shell sort, quick Sort, Heap sort.
UNIT-III: Stacks and Queues Stacks, array representation of stack. Applications of stacks: Infix, postfix, prefix representation, Conversions. Queues, Circular queues, array representation of Queues, Deques, priority queues, Applications of Queues.
UNIT-IV: Pointers and Linked list Pointer variables, Pointer and arrays, array of pointers, Dynamic allocation. Linked Lists: Concept of a linked list, Circular linked list, doubly linked list, operations on linked lists. Concepts of header linked lists. Applications of linked lists, linked stacks, linked Queues.
UNIT-V: Trees Introduction to trees, Basic Terminology of trees, binary trees, Properties of binary trees, traversal of trees: pre-order, post-order, In-order traversal, types of binary trees, Binary Search Tree, threaded binary trees, B Trees,m-Way Tree, B+Tree,AVL trees, Application of trees.
UNIT-VI: Graphs and Hashing Definition of Undirected and Directed Graphs, Basic terminology of Graphs, the Array based implementation of graphs, Adjacency matrix, path-matrix implementation, The Linked List representation of graphs, Graph Traversal–Breadth-first-Traversal, Depth-first-Traversal Hashing: Search efficiency in lists and skip lists, hashing as a search structure, hash table, collision avoidance, linear open addressing and chains

RECOMMENDED BOOKS:

TEXT BOOK	Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub. Data Structures using C by A. K. Sharma, Pearson
REFERENCE	1. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition. 2. Data Structures and Program Design in C By Robert Kruse, PHI, 3. Theory & Problems of Data Structures by Jr. SymourLipschetz, Schaum's outline by TMH 4. Introduction to Computers Science -An algorithms approach, Jean Paul Tremblay, Richard B. Bunt, 2002, T.M.H. 5. Data Structure and the Standard Template library – Willam J. Collins, 2003, T.M.H

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	5
2.	Sessional Test	2	15
3.	Group Discussion	4	5
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE OBJECTIVES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x		x		x	
Quiz			x		x	x
Assignment	x	x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	3	5	2	5	3					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - III

Data Structures & Program Design Lab

L	T	P
0	0	3

MODULE CODE	
CREDIT POINTS	1.5
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	50
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

1. To teach the behavior of basic data structure (list, stack, queue, hash table, trees, and graph).
2. To understand and analyse elementary algorithms: sorting, searching.
3. To make students familiar with basic techniques of algorithm analysis including time and space complexity.
4. To teach the implementation of linked data structures such as linked lists and binary trees.
5. To make students familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.
6. To make students familiar with some graph algorithms such as shortest path and minimum spanning tree.

LEARNING OUTCOMES:

1. To implement the space and time complexity of algorithms.
2. To implement different data structures including stack, queue, linked list, tree, heap, graph, and hash table.
3. To implement insert, retrieve, and delete operations and traversals of binary search trees.
4. To implement traversal algorithms on graphs.
5. To implement hash tables along with insert and retrieve operations.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

LIST OF EXPERIMENTS

1.	Write a program to search an array in a 2-d array using linear search.
2.	Write a program to search an element in an array using binary search.
3.	Write a program to perform following operations on matrices (A) Addition (B)Subtraction (C)Multiplication (D)Transpose
4.	Using iteration and recursion concepts write the program for quick sort.
5.	Write a program for swapping of two numbers using 'call by value' and 'call by reference' methods.
6.	Write a program to perform various operations on link list 1. Add a node 2. Delete a node 3. Display
7.	Write a program to perform various operations on stack such as insertion, deletion, traverse using array.
8.	Write a program to sort numbers using the bubble sort algorithm.
9.	Write a program to perform various operation on circular queue such as insert, delete, traverse using array.
10.	Write a program to sort numbers using selection sort algorithm.
11.	Write a program to simulate the various graph traversing algorithms.
12.	Write a program which simulates the various tree traversal algorithms.
Experiments based on advanced topics:	
13.	Write a program to perform various operation on queue such as insert, delete, traverse using array.
14.	Write a program to sort numbers using insertion sort algorithm.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 75 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	50

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	3	2	4	1	1,2						

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - III

Discrete Structure

L	T	P
3	1	0

MODULE CODE	CSEN2103
CREDIT POINTS	3.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to provide basic knowledge of integration of Algebra with computers. It discusses technical issues relating to set theory, propositional calculus, algebraic structures, graphs and trees.

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contra positives using truth tables and the properties of logic.
2. Express a logic sentence in terms of predicates, quantifiers, and logical connectives.
3. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
4. Determine if a graph has an Euler or a Hamilton path or circuit.

LEARNING OUTCOMES:

On successful completion of this module, students should be able to:

1. Understand and analyze partial order relations and their applications
2. Work on counting techniques.
3. Work on graph algorithms and tree usages
4. Understand the need of algebra in computer science.

MODULE CONTENT:

Unit-I: Set Theory Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions , Partial ordering relations and lattices Function and its types, Composition of function and relations, Cardinality and inverse Relations.
Unit-II: Propositional Calculus Introduction to propositional Calculus: Basic operations: AND(^), OR(v), NOT(~), Truth value of a compound statement, propositions, tautologies, contradictions.
Unit-III: Techniques of Counting and Recursion and recurrence Relation Permutation with and without repetition, Combination. Polynomials and their evaluation, Sequences, Introduction to AP, GP and AG series, partial fractions, linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.
Unit-IV: Algebric Structures Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Integral domain and fields, Cosets, Lagrange's theorem.
Unit-V: Section Graphs Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eurelian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula.
Unit-VI: Trees Trees, Spanning trees, Binary trees and its traversals.

RECOMMENDED BOOKS:

TEXT BOOK	Elements of Discrete Mathematics by C.L Liu, 1985, McGraw Hill
REFERENCE	1. Discrete Mathematics by Johnson Bough R., 5th Edition, PEA, 2001. 2. Concrete Mathematics: A Foundation for Computer Science by Ronald Graham, Donald Knuth and Oren Patashik, 1989, Addison-Wesley. 3. Mathematical Structures for Computer Science by Judith L. Gersting, 1993, Computer Science Press. 4. Applied Discrete Structures for Computer Science by Doerr and Levasseur.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4
Class Test		x		
Quiz	x			
Assignment			x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,3		2,4								

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and

- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - III

Computer Architecture & Organization

L	T	P
3	1	0

MODULE CODE	CSEN2104
CREDIT POINTS	3.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

1. To have a thorough understanding of the basic structure and operation of a digital computer.
2. To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed- point and floating-point addition, subtraction, multiplication & division.
3. To study the different ways of communicating with I/O devices and standard I/O interfaces.
4. To study the hierarchical memory system including cache memories and virtual memory.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Understand pipelining, instruction set architectures, memory addressing.
2. Understand the performance metrics of microprocessors, memory, networks, and disks.
3. Understand the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.
4. Explain how the various parts of a modern computer function and cooperate
5. Exploit the advantages of a computer memory having virtual memory and cache.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

MODULE CONTENT

Unit I: Digital Logic Boolean algebra and logic gates, combinational logic blocks (adders, multiplexers, encoders, de-coder), sequential logic blocks (latches, flip-flops, registers, counters).stored program control concept, flynn's classification of computers (SISD, MISD, MIMD); multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; performance metrics; MIPS, MFLOPS.
Unit II: Instruction Set Architecture Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; operations in the instruction set; arithmetic and logical, data transfer, control flow; instruction set formats (fixed, variable, hybrid**).** Language of the machine: 8086; simulation using MSAM.
Unit III: Basic non pipelined CPU Architecture CPU architecture types (accumulator, register, stack, memory/ register), detailed data path of a typical register based CPU, fetch-decode-execute cycle (typically 3 to 5 stage); micro coded CPU: Pentium processor. Microinstruction sequencing, implementation of control unit, enhancing performance with pipelining.
Unit IV: Memory Hierarchy The need for a memory hierarchy (locality of reference principle, memory hierarchy in practice: cache, main memory and secondary memory, memory parameters: access/ cycle time, cost per bit); main memory (semiconductor RAM & ROM organization, memory expansion, static & dynamic memory types); cache memory (associative & direct mapped cache organizations. virtual memory, high speed memories.
Unit V: Parallelism Introduction to parallelism and computer organization, goals of parallelism (exploitation of concurrency, throughput enhancement); Amdahl's law; instruction level parallelism (pipelining, super scaling –basic features); processor level parallelism (multiprocessor systems overview).
Unit VI: Computer Organization(8086) Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, basics of logic design, accumulator logic, control memory, address sequencing, micro-instruction formats, micro-program sequencer, stack organization. Instruction formats, types of interrupts; memory hierarchy.

RECOMMENDED BOOKS

TEXT BOOKS	1. Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann. 2. Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.
REFERENCE BOOKS	1. Operating Systems Internals and Design Principles by William Stallings, 4th edition, 2001, Prentice-Hall Upper Saddle River, New Jersey. 2. Computer Organization, 5th Edi, by Carl Hamacher, ZvonkoVranesic, 2002, SafwatZaky. 3. Structured Computer Organisation by A.S. Tanenbaum, 4th edition, Prentice-Hall of India, 1999, Eastern Economic Edition. 4. Computer Organisation& amp; Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition. 5. Computer System Architecture by M. Mano, 2001, Prentice-Hall. 6. Computer Architecture- Nicholas Carter, 2002, T.M.H.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES

This subject will be evaluated for a total of 150 marks.

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1	Class Test	4	10
2	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x			x	x
Quiz	x	x	x		
Assignment	x	x		x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	3		1		3	4				5

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - III

IBM CE – Introduction to Object -Oriented Programming using Java

L	T	P
3	0	0

MODULE CODE	CSEC2101
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

1. To get a clear understanding of object-oriented concepts.
2. To understand object oriented programming through JAVA.
3. Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
4. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching.
5. To understand the concept of XML, XML transformation.
6. To get a clear understanding of IDE, Java development tools and Eclipse.

LEARNING OUTCOMES:

1. Gain the basic knowledge on Object Oriented concepts.
2. Ability to develop applications using Object Oriented Programming Concepts.
3. Ability to implement features of object oriented programming to solve real world problems.
4. Apply JAVA features to design and implement program using Object Oriented Programming Concepts.
5. Discover errors and debugs in a program and describe techniques to resolve them.

.

MODULE CONTENT:

– State the advantages of an object-oriented approach to software development – Describe essential object-oriented concepts and terminology – Describe the fundamentals of object-oriented programming – Create Java classes that implement an object-oriented design – Apply Java language constructs that enable and enforce OO related concepts such as data encapsulation, strict typing and type conversion, inheritance, and polymorphism – Use Java syntax to develop applications in Java – Use inheritance and interfaces in Java applications – Refactor Java code – Describe and use some of the important API classes and interfaces available in Java, including: o Primitive wrapper classes o Classes in the Collections Framework o Utility classes o I/O classes o Threads o Exceptions – Use the Java development tools in Eclipse V3.5 – Debug Java programs – Describe Java EE component model and its use in building server side applications – Develop, debug, and test server-side applications – Develop and test servlets – Develop and test JSP pages – Learn how to use JSPs and servlets in accordance with the Model/View/Controller(MVC) programming model – Develop, test, and use JSP custom tags

RECOMMENDED BOOKS:

TEXT BOOKS	*IBM Course Material* Software Foundation and Programming with JAVA

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	10
3.	Group Discussion	4	05
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x	x	
Quiz	x	x	x		x
Assignment	X				

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	G	h	i	j	k
Course Learning Outcomes	3	1	2,3	2,5	1,5	2,3			5	4	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER – III (ELECTIVE I)

E-Commerce

L	T	P
4	0	0

MODULE CODE	CSEN2205
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS:
In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

The aim of this subject is to teach students how to provide better understanding of the concepts of Electronic Commerce .It will also enable students to learn about security in e-commerce, intelligent agents.

1. To teach students about E-Commerce Framework and EDI.
2. To teach students about Security in E-Commerce.
3. To make students understand about Intelligent Agents.

LEARNING OUTCOMES

Following this course, student will be able to learn:
1. About E-Commerce Framework and EDI.
2. About Security in E-Commerce.
3. About Electronic Payment Systems.
4. About Intelligent Agents.

MODULE CONTENT

UNIT-I: Introduction History of E- Commerce, overview of E-commerce framework, E-Business models, network infrastructure, role of Internet, E- commerce and World Wide Web.
UNIT-II: Consumer Oriented E-Commerce Consumer oriented E-commerce applications, mercantile process models, electronic payment systems, Digital Token based EPS: Smart cards, credit cards, risks designing EPS.
UNIT-III: Organizational Commerce & EDI Electronic Data Interchange, EDI applications in business, EDI and E-commerce, EDI standardization and implementation, Internet based EDI.
UNIT-IV: Security Internet security standards, secure electronic payment protocols, cryptography and authentication, security issues, encryption techniques.
UNIT-V: E-commerce Payment Mechanisms E-commerce payment mechanisms, SET protocol, electronic check, electronic cash, E-commerce ethics, regulations and social responsibility.
UNIT-VI: Intelligent Agents Definition and capabilities, limitation of agents, security, web based marketing, search engines and directory registration, online advertisements, portables and info mechanics, website design issues.

RECOMMENDED BOOKS

TEXT BOOK	1. Frontiers of Electronic Commerce by Ravi Kalakota and Andrew B. Whinston, Pearson Education Asia, 1999. 2. Electronic commerce: Security, Risk Management and Control by Marilyn Greenstein and Todd M Feinman, Tata McGraw-Hill , 2000.
REFERENCE	1. E Marketing by Judy Strauss and Raymond Frost, PHI, 2002. 2. Managing e Commerce Business by Brenda Kienan, PHI, 2001. 3. Developing e Commerce Sites – an integrated approach by Vivek Sharma and Rajiv Sharma, Pearson Education Asia, 2000.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Assessments	1	2	3	4
Class Test	x	x		
Quiz	x		x	
Assignment	x		x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes		1		3	4	2					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - III

Digital Electronics

L	T	P
4	0	0

MODULE CODE	CSEN2206
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total, EIGHT questions will be set. Question ONE will be compulsory and cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to develop understanding on basics of digital circuits, combinational and sequential circuits so that learner will be able to make basic digital circuits in real life. Some of the objectives of the course are:

1. To acquire basic knowledge of the basic concepts of basic digital circuits and its advantages.
2. To inculcate the knowledge of Digital Electronics fundamentals.
3. To enable to solve digital circuits adders, subtractors, multiplexer and demultiplexer.
4. To get familiar with the concept of designing like flip-flops & Counters.
5. To understand the concept of semiconductor memories like RAM, ROM, PLA, PAL, FPGA etc.
6. To gain knowledge of A/D &D/A converters.

LEARNING OUTCOMES:

1. Able to understand basic aspects of digital circuits used in any kind of industry.
2. Able to understand various digital electronics applications in day to day life.
3. Get familiar with working of various gates and IC of a circuit.
4. Ability to analyze the behavior of digital circuits in different forms.
5. Able to measure various digital circuit parameters.
6. Able to design different semiconductor memories.
7. Able to convert one analog circuit to digital circuit and vice versa.

MODULE CONTENTS:

Unit I: Number System and Binary Code Introduction, Binary, Octal and Hexadecimal Number System (Conversion, Addition & Subtractions). Signed and unsigned numbers, Binary Subtractions using 1's and 2's compliment, ASCII code, Excess 3 code, Grey code, BCD code and BCD additions.
Unit II: Minimization of logic function OR, AND,NOT,NOR,NAND,EX-OR, EX-NOR, Basic theorem of Boolean Algebra, Sum of Products and Product of Sums, canonical form, Minimization using K-map and Q-M method.
Unit III: Combinational Circuits Introduction, Combinational circuit design, Encoders, decoders, Adders, Subtractors and Code converters. Parity checker, seven segment display, Magnitude comparators. Multiplexers, De-multiplexer, Implementation of Combinational circuit using MUX.
Unit IV: Sequential Circuits Introduction, flip flops, Clocked flip flops, SR, JK, D, T and edge triggered flip-flops. Excitation tables of Flip flops. Shift Registers, Type of Shift Registers, Counter, Counter types, counter design with state equation and state diagrams.
Unit V: D/A and A/D Converters Introduction, Weighted register D/A converter, binary ladder D/A converter, steady state accuracy test, D/A accuracy and resolution, parallel A/D converter, Counter type A/D converter Successive approximation A/D converter. Single and dual slope A/D converter, A/D accuracy and resolution.
Unit VI: Semiconductor Memories Introduction, Memory organisation, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories. Content addressable memories. PLA and PAL.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Digital Design by Morris Mano Prentice Hall of India Pvt. Ltd 2. Digital Principles and Applications, by Donald P. Leach and Albert Paul Malvino , Tata McGraw Hill Publishing Company Limited, New Delhi, 2003. 3. Modern Digital Electronics, by R. P. Jain, Tata McGraw–Hill publishing Company limited, New Delhi, 2003.
REFERENCE BOOKS	1. Digital Fundamentals, by Thomas L. Floyd, Pearson Education, Inc, New Delhi, 2003.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Class Test				x	x	x	x
Quiz	x	x	x				
Assignment		x	x			x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2	5	3	7	5,6	4	7			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER – III

Internet & Web Technology

L	T	P
4	0	0

MODULE CODE	CSEN2207
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS:

In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to teach students how to provide better understanding of the concepts of internet & web technology. It will also enable students to learn about router technologies, search engines, web crawlers & website development.

1. To teach students about internet & router technologies.
2. To teach students about web server technologies.
3. To make students understand about functioning of search engines & web crawlers.
4. To make students learn about website development.

LEARNING OUTCOMES

Following this course, student will be able to learn:

1. About Internet & router technologies.
2. About Web Server technologies.
3. About browsing systems.
4. About functioning of Search Engines & Web Crawlers.
5. About website development.

MODULE CONTENT

UNIT-I: Introduction Internet protocol model, Internet addresses, IP routing concepts, table driven and next hop routing, other routing related protocols, Internet access through PPP, SLIP,WWW, web servers, browsers.
UNIT-II: Router Technology Hubs, bridges, routers, routing protocols, routing security, switch based routing, routing in unicast environment, multicasting, mobile routing.
UNIT-III: Web Server Technology HTML, HTTP, accessing a web server, publishing on web server, Secure HTTP, secure sockets layer, WWW proxies.
UNIT-IV: Browsing Systems Searching and web casting Technique, popular web servers, basic features bookmarks, cookies, progress indicators, customization of browsers, browsing tricks, next generation web browsing.
UNIT-V: Search Engines & Web Crawlers Search engines, architecture of search engines, search tools, web crawlers, types of crawlers, scalable web crawler, incremental crawler, parallel crawler, focused crawler, agent based crawler.
UNIT-VI: Website Development HTML, XHTML, DHTML, XML, structuring data, namespaces, XML schema documents, simple API for XML, XSL, ASP.Net, security and management issues for creating a website.

RECOMMENDED BOOKS

TEXT BOOK	1. Fundamentals of the Internet and the World Wide Web by Raymond Greenlaw and Ellen Hepp – 2001, TMH. 2. Internet & World Wide Programming by Deitel, Deitel& Nieto, 2000, Pearson Education. 3. Beginning XHTML by Frank Boumpery, Cassandra Greer, Dave Raggett, JenetRaggett, SubastianSchnitenbaumer& Ted Wugofski, 2000, WROX press(Indian Shroff Publ. SPD) Ist Edition.
REFERENCE	1. Complete Reference Guide to Java script by Aron Weiss, QUIE, 1997. 2. Intranet & Internet Engg. byMinoli. 3. Internet & Web Technology by Rajkamal.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Assessments	1	2	3	4	5
Class Test	x	x			x
Quiz	x		x		
Assignment	x		x	x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes		1	2	1,3	4	5					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER – III

Aptitude Part - I

L	T	P
2	0	0

MODULE CODE	VALU0119
CREDIT POINTS	2
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	50
END SEMESTER EXAM DURATION	2 hrs
LAST REVISION DATE	

INSTRUCTIONS: All questions are compulsory. Each question may have multiple options and will cover all units.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to analytical and business skills in Aptitude and to enhance skills as mentioned below:

1. To prepare students to develop basic understanding in Aptitude.
2. To acquire knowledge on various analytical tools.
3. To understand syntax and semantics of Aptitude in business.

LEARNING OUTCOMES:

1. Able to understand the basic fundamentals & concepts of Aptitude.
2. Exposure to various analytical tools used in business.
3. Ability to use different mathematical techniques.
4. Able to understand the importance of Aptitude.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

MODULE CONTENTS

UNIT 1:- FUNDAMENTALS & USES OF ARITHMETIC-

Percentage, Ratio & Proportion: Percentage Meaning and Computations of Percentages, Definition of Ratio, Continued Ratio, Inverse Ratio, Definition of Proportion, Continued Proportion, Direct Proportion.

Profit And Loss : Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount, Problems involving cost price, selling price, trade discount and cash discount.

Interest: Simple Interest, Compound Interest, Equated Monthly Instalments (EMI), Word Problems.

Sequence and Series: AP, GP (simple word problems only).

Average: Definition, meaning and simple problems on average.

UNIT 2: DATA ANALYSIS-

To understand different types of data format.

To acquire skills for analyzing different data format.

To understand scope and limitations of data uses in business.

Bar graph: Reading and interpretation of bar graph in vertical forms, reading scales, creating bar graph from given data, solving problems using information presented in bar graph.

Table: Creating table from given data, Reading and interpreting table, solving problems using information presented in table.

Line graph: Reading and interpreting line graph, solving problems using information presented in line graph.

Shares and Dividends: Concept of shares, stock exchange, Face value, Market value, Dividend, Equity shares, Preferential shares, Bonus share with examples.

Matrices and Determinants : Definition of Matrix ,Types of Matrix, Algebra of Matrix (Addition and Multiplication), Determinant, Adjoint of Matrix, Inverse of Matrix via Adjoint matrix, Solving simultaneous equations(Order3).

UNIT 3: ESSENTIALS OF LANGUAGE AND COMMUNICATION-

Speaking Skills: Formal and Informal Conversation, Conversation in the work place, Interviews, Public Speech, Lectures.

Listening Skills: Comprehending, Retaining, Responding, Tactics, Barriers to Listening, Overcoming listening barriers, Misconception about listening.

Reading Skills: Acquiring Reading, Reading Development, Methods of Teaching, Reading difficulties.

Writing skills: Note-making, CV's, Report writing, Copy Writing, Agenda, Minutes, Circular, Essay writing on any current issues, Paragraph, Essay Writing, Writing Research Papers, Dissertation.
UNIT4: Assignment 1, Assignment2, Project

RECOMMENDED BOOKS:

TEXT BOOKS	1. R S Agarwal quantitative aptitude book 2. Abhijit Guha quantitative aptitude book 3. Minippally, Methukutty. M. 2001. Business Communication Strategies. 11th Reprint. Tata McGraw – Hill. New Delhi.
REFERENCE BOOKS	1. Aptitude books by Arihant publication 2. Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates. Prentice Hall Press. New York.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes										1,2	3,4

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	1	10
2.	Sessional Test	2	15
3.	End Semester Written Exam	1	50
4.	End Semester Oral Exam	1	25

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4
Class Test	x	x	x	
Quiz	x	x	x	
Assignment			x	x

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER – III

Professional Communication – I

L	T	P
2	0	0

MODULE CODE	VALU0123
CREDIT POINTS	2
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	50
END SEMESTER EXAM DURATION	2 hrs
LAST REVISION DATE	

INSTRUCTIONS: All questions are compulsory. Each question may have multiple options and will cover all units.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to oral and written linguistic skills of expressing and exchanging information / interacting & communicative competencies to enhance skills as mentioned below:

1. To prepare students to develop basic understanding on professional & corporate communication.
2. To acquire study skills and communication skills in formal and informal situations.
3. To understand fundamental syntax and semantics of communication.
4. To achieve an understanding &confidence in formal and informal contexts of communication.

LEARNING OUTCOMES:

1. Able to understand the Importance of professional & corporate communication.
2. Exposure to various principles, concepts, types, advantages and disadvantages of professional communication.
3. Improve the language proficiency with an emphasis on Speaking, Listening, Reading and Writing skills.
4. Communicate confidently in formal and informal contexts.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

MODULE CONTENTS

UNIT I:- INTRODUCTION TO COMMUNICATION –

- Definition
- Types of Communication
- Language as a tool of communication
- Levels of communication – Interpersonal, Organizational, Mass communications
- The flow & Channels of Communication - Downward, Upward, Lateral or Horizontal (Peer group)
- Barriers to Communication

UNIT II: PRESENTATION STRATEGIES & LISTENING SKILLS –

- Defining Purpose
- Organizing Contents;
- Preparing Outline
- Audio-visual Aids
- Nuances of Delivery
- Body Language
- Dimensions of Speech - Syllable, Accent, Pitch, Rhythm, Intonation
- Paralinguistic features of voice
- Listening Skills - Active Listening, Passive Listening
- Methods for improving Listening Skills

UNIT III: BUSINESS COMMUNICATION–

- Letter Writing – formal & Informal
- Letters of inquiry & complaint
- Job application and Resumes
- Reports- Types, Significance, Structure, Style & Writing of Reports
- Technical Proposal – Parts, Types, Writing of Proposal
- Negotiation & Business Presentation skills

UNIT IV: VALUE BASED TEXT READING-

Value based critical reading of following Short Stories for making the Students acquaint with the styles of great Writers of World-

- O.H. Henry : The Gift of the Magi
- R.N. Tagore : The Renunciation
- Katherine Mansfield : The Fly
- A.P. Chekhor : The Lament
- M.R. Anand : The Barber's Trade Union
- Ruskin Bond : The Eyes Are Not Here
- D.H. Lawrence : The Rocking Horse Winner

RECOMMENDED BOOKS:

TEXT BOOKS	1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd,2011, New Delhi. 2. Improve Your Writing ed. V.N.Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
REFERENCE BOOKS	1. Manual of Practical Communication by L.U.B.Pandey: A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi.

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes										1,2	3,4

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	1	10
2.	Sessional Test	2	15
3.	End Semester Written Exam	1	50
4.	End Semester Oral Exam	1	25

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4
Class Test	x	x	x	
Quiz	x	x	x	
Assignment			x	x

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

SEMESTER - IV

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEI2103	E	PC	DATABASE MANAGEMENT SYSTEM	3	0	0	3	25	75	100
CSEI2104	E	PC	DBMS LAB	0	0	2	1	25	25	50
CSEN2115	E	PC	PRINCIPLES OF OPERATING SYSTEM	3	0	0	3	25	75	100
CSEN2116	E	PC	OPERATING SYSTEM LAB	0	0	2	1	25	25	50
CSEN2117	E	PC	DESIGN AND ANALYSIS OF ALGORITHMS	3	1	0	3.5	50	100	150
CSEN2118	E	PC	ALGORITHM DESIGN LAB	0	0	2	1	25	25	50
CSEN3101	E	PC	COMPUTER NETWORKS	3	1	0	3.5	50	100	150
CSEN3102	E	PC	COMPUTER NETWORKS LAB	0	0	2	1	25	25	50
CSEB2103	E	PC	FOUNDATION IN BUSINESS ANALYTICS USING IBM COGNOS INSIGHT	4	0	0	4	50	100	150
	E	PE	ELECTIVE-II	4	0	0	4	50	100	150
	TOTAL			**20**	**2**	**8**	**25**	**350**	**650**	**1000**

L = Lecture
T = Tutorial
P = Practical
C = Credit Point

ELECTIVE II

MODULE CODE	MODULE
CSEN2220	NATURAL LANGUAGE PROCESSING
CSEN2222	SOFT COMPUTING
CSEN2223	FUZZY LOGIC

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER –IV

Database Management Systems

L	T	P
3	0	0

MODULE CODE	CSEI2103
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

The aim of this subject is to provide keen knowledge of database and data protection by keeping data backup, recovery.

1. Understand the role of a database management system in an Organization, Understand basic database concepts, including the structure and operation of the relational data model.
2. Construct simple and moderately advanced database queries using Structured Query Language (SQL).
3. Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.
4. Describe and discuss selected advanced database topics, such as distributed database systems and the data warehouse.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Analyse the basic concepts and architecture associated with DBMS.
2. Apply normalization steps in database design and removal of data anomalies.
3. Describe the characteristics of database transactions and how they affect database integrity and consistency.
4. Create, maintain and manipulate a relational database using SQL Learning the techniques of recovery and security in databases.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

MODULE CONTENT:

Unit- I: Introduction to DBMS Overview of DBMS, views of data, data Models, Introduction to Database Languages. Advantages of DBMS over file processing systems, Responsibility of DBA. E-R Diagram and Keys: Introduction to Client/Server architecture, three levels architecture of Database Systems, E-R Diagram (Entity Relationship), mapping Constraints, Keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, Reduction of E-R diagram into tables.
Unit- II: Relational Model and Calculus Relational data Model and Language: Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, and tuple and domain calculus.
Unit- III: Introduction on SQL Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, and Procedures in SQL/PL SQL.
Unit- IV: Data Base Design & Normalization Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.
Unit- V: Transaction Processing Concept& Concurrency Control Techniques Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling. Concurrency Control Techniques: Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.
Unit-VI: Distributed Database& File Organization Introduction to Distributed Data processing, parallel Databases, data mining & data warehousing. File Organization: Sequential Files, index sequential files, direct files, Hashing, B-trees Index files.

RECOMMENDED BOOKS:

TEXT BOOK	1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGraw-Hill, International Edition. 2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub
REFERENCE	1. Fundamentals of Database Systems by R. Elmasri and S.B. Navathe, 3rd edition, 2000, Addision-Wesley, Low Priced Edition.

METHODS OF TEACHING AND STUDENT LEARNING:

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	5
2.	Sessional Test	2	15
3.	Group Discussion	4	5
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Assessments	1	2	3	4
Class Test	x	x		
Quiz	x		x	
Assignment			x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	K
Course Learning Outcomes			2,3	1	2	4					

EVALUATION:

At the end of semester, course faculty will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Database Management System Lab

L	T	P
0	0	2

MODULE CODE	CSEI2104
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

1. Understand the role of a database management system in an Organization.
2. Understand basic database concepts, including the structure and operation of the relational data model.
3. Construct simple and moderately advanced database queries using Structured Query Language (SQL).
4. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
5. Understand the concept of a database transaction and related database facilities.

LEARNING OUTCOMES:

1. Analyze the basic concepts and architecture associated with DBMS.
2. Apply normalization steps in database design and removal of data anomalies.
3. Describe the characteristics of database transactions and how they affect database integrity and consistency.
4. Create, maintain and manipulate a relational database using SQL.
5. Learn the techniques of recovery and security in databases.

LIST OF EXPERIMENTS

1	To study about DBMS, RDBMS and ORDBMS.
2.	To study about SQL (Structured Query language).
3.	Write SQL commands to create database.
4.	Write SQL commands to add data constraints.
5.	Write SQL query to implement SELECT command with different clauses.
6.	Write SQL commands to implement SINGLE ROW functions (character, numeric).
7.	Write SQL commands to implement GROUP functions (avg, count, max, min, Sum).
8.	Write SQL commands to implement various type of SET OPERATORS (Union, Intersect, Minus).
9.	Write SQL commands to implement various type of Integrity Constraints.
10.	Write commands to implement various SQL operators.
11.	Write SQL commands to implement Various type of JOINS.
12.	Write SQL commands to create view and index.
Experiments based on advanced topics:	
13.	Write sub queries in SQL.
14.	Introduction to PL/SQL.

Note: At least 12 Experiments out of the list must be done in the semester.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes		3	4	4,5	1	2	2				

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Principles of Operating System

L	T	P
3	0	0

MODULE CODE	CSEN2115
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to teach students about different aspects of operating system.

1. To make students familiar with the basic concepts of Operating System & its types.
2. To learn different concepts of process and CPU Scheduling Algorithms.
3. To make students gain in-depth understanding of memory allocation schemes and to understand the concept of Virtual Memory using Demand Paging.
4. To learn File System this includes file and directory access methods.
5. To make students familiar with the Process Synchronization & Deadlocks.
6. To understand I/O System, UNIX and Windows NT architecture.

LEARNING OUTCOMES:

Following this course, students will be able to:

1. Understand design issues associated with operating systems and comparison of different operating systems.
2. Understand concepts of memory management including virtual memory.
3. Handle issues related to file system, disk scheduling , management and associated Algorithms.
4. Understand protection and security mechanisms & operating system types including Unix and Windows NT.
5. Gain knowledge about various process management concepts including scheduling, synchronization and deadlocks.

MODULE CONTENT:

Unit-I: Introduction Introduction to Operating System Concepts (including multitasking, multiprogramming, multi user, multithreading etc.), Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS; Various Operating system services, architecture, System programs and calls.
Unit–II: Process Management Process concept, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms: First Come First Serve (FCFS), Shortest Job-First (SJF), Priority Scheduling, Round Robin (RR), Multilevel Queue Scheduling.
Unit–III: Memory Management Logical & Physical Address Space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging; Virtual Memory Management: Demand Paging & Page-Replacement algorithms; Demand Segmentation.
Unit–IV: File System Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms; Introduction to distributed file system.
Unit–V: Process Synchronization Classical Synchronization problems: Readers/Writers Problem, Producer and Consumer problem, Critical Section Problem, Semaphores.
Unit-VI: Deadlocks Critical Section Problems, semaphores; methods for handling deadlocks, deadlock prevention, avoidance & detection, deadlock recovery.

RECOMMENDED BOOKS:

TEXT BOOK	1. Operating System Concepts by Silberchatz et al, 5th edition, 1998, Addison-Wesley
REFERENCE	1. Operating System By Peterson , 1985, AW. 2. Operating System ByMilankovic, 1990, TMH. 3. Operating System Incorporating With Unix & Windows By Colin Ritche, 1974, TMH. 4. Operating Systems By Deitel, 1990, AWL. 5. Operating Systems – Advanced Concepts By Mukesh Singhal, N.G. Shivaratri, 2003, T.M.H.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	5
2.	Sessional Test	2	15
3.	Group Discussion	4	5
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x	x			x
Quiz	x		x		x
Assignment			x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes		2	1	3	4	5		3		1	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;

- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Operating System Lab

L	T	P
0	0	2

MODULE CODE	CSEN2116
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES

1. To learn the fundamentals of Operating Systems Lab.
2. To learn commands of WINDOWS & Linux.
3. To learn various commands in UNIX.
4. To learn vi editor and its different modes.
5. To implement programs in shell.

LEARNING OUTCOMES

Following this course students will be able to:

1. Explain the objectives and functions of operating systems Lab.
2. Understand various commands of Operating System.
3. Understand difference between various types of OS commands.
4. Understand vi editor.
5. Make program using shell programming.

LIST OF EXPERIMENTS

1.	Study of Windows 2000 operating system.
2.	Administration of Windows 2000 operating system (including DNS, LDAP, Directory services).
3.	Study of LINUX operating system.
4.	Introduction to various commands in Unix.
5.	Study of directory related commands in Unix.
6.	Study of commands to perform operations on file in Unix.
7.	Study of process related and other commands in Unix.
8.	Study about vi editor and its different modes.
9.	Write a program in vi editor to find greatest of three number.
10.	Write a program in vi editor to find whether the given number is even or odd.
11.	Write a program in vi editor to find factorial of a given number.
12.	Write a program in vi editor to find number is prime or not.
Experiments based on advanced topics:	
13.	Write a program in vi editor to find string is palindrome or not.
14.	Write a program in vi editor to generate Fibonacci series.

Note: At least 12 Experiments out of the list must be done in the semester.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	1	3,4	5	1	2	1	5		2	

EVALUATION

At the end of semester, course faculty will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Design and Analysis of Algorithms

L	T	P
3	1	0

MODULE CODE	CSEN2117
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVE:

The aim of this subject is to understand and analyse efficient algorithms for various applications. Obtaining efficient algorithms is very important in modern computer engineering as the world wants applications to be time and space efficient.

1. Learn principles of algorithm and design.
2. Understand the algorithm analysis and estimate their worst-case and average-case behavior.
3. Get familiar with fundamental data structures and with the manner in which these data structures can best be implemented.
4. Learn how to apply their theoretical knowledge in practice (via the practical component of the course).

LEARNING OUTCOMES

After learning the course the students should be able to:

1. Analyze the asymptotic performance of algorithms.
2. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
3. Find optimal solution by applying various methods.

MODULE CONTENT:

UNIT-I: Introduction to Algorithms Definition, algorithm vs program, complexity of algorithms, asymptotic notation. Divide and Conquer: General method, binary search, merge sort, quick sort, selection sort, Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.
UNIT-II: Greedy Method General method, knapsack problem, job sequencing with deadlines, minimum spanning trees, single source paths and analysis of these problems.
UNIT-III: Dynamic Programming General method, matrix chain multiplication, longest common subsequence, O/I knapsack, the traveling salesperson problem.
UNIT-IV: Back Tracking General method, 8 queen's problem, graph coloring, Hamiltonian cycles, analysis of these problems.
UNIT-V: Branch and Bound Method, O/I knapsack and traveling salesperson problem, efficiency considerations. Techniques for algebraic problems, some lower bounds on parallel computations.
UNIT-VI: Graph Searching and traversal Overview, traversal methods (DFS, BFS), Trees: Binary search tree-traversal, insertion, deletion, B-tree, B^+tressNP Hard and NP Complete Problems: Basic concepts, Cook's theorem, NP hard graph and NP scheduling problems some simplified NP hard problems.

RECOMMENDED BOOKS:

TEXT BOOK	1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, PHI. 2. Fundamental of Computer algorithms, Ellis Horowitz and Sartaj Sahni,1978, Galgotia Publ.
REFERENCE	1. The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley. 2. Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986. Johan Wiley & Sons. 3. Writing Efficient Programs, Bentley, J.L., PHI.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3
Class Test		x	x
Quiz	x	x	
Assignment	x		x

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1			3	2	1		3			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Algorithm Design Lab

L	T	P
0	0	2

MODULE CODE	CSEN2118
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES

1. To make student familiar with the paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
2. Learn how to devise correct and efficient algorithms for solving a given problem.
3. Understand the Greedy Method and how various problems can be solved using Greedy Strategy.
4. To implement divide and conquer strategy.
5. To make student familiar with Dynamic Programming, Back Tracking, Branch and Bound and how various problems can be solved using these techniques.

LEARNING OUTCOMES

Following this course, students will be able:

1. To learn good principles of algorithm design.
2. To develop data structures and describe the ways in which these data structures can best be implemented.
3. To describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
4. To describe the greedy paradigm and explain when an algorithmic design situation calls for it.
5. To implement algorithms using dynamic-programming paradigm.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

LIST OF EXPERIMENTS

1.	Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2.	Implement Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3.	Obtain the Topological ordering of vertices in a given digraph.
4.	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
5.	Print all the nodes reachable from a given starting node in a digraph using BFS method.
6.	Check whether a given graph is connected or not using DFS method.
7.	Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
8.	Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.
9.	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
10.	Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
Experiments based on advanced topics:	
11.	To implement N Queens problem using Backtracking.
12.	Compute the transitive closure of a given directed graph using Warshall's algorithm.

Note: At least 10 Experiments out of the list must be done in the semester.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Mapping of Course Objectives with Students Learning Outcomes	1	5	2	1	2	3	4				5

EVALUATION

At the end of semester, course faculty will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Computer Networks

L	T	P
3	1	0

MODULE CODE	CSEN3101
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network.

MODULE CONTENT:

UNIT-I: Introduction to Computer Networks Computer Networks and its applications, ARPANET, Network Topologies, Types of Networks, Layering architecture of networks, OSI and TCP/IP model -functions, services and protocols of each layer.
UNIT-II: The Physical Layer Transmission media: Guided and Unguided media, Switching, Multiplexing (FDM, WDM, and TDM).
UNIT-III: The Data Link Layer Data link layer design issues, Error detection and Correction Techniques, Elementary data link control protocols, sliding window protocols.
UNIT-IV: The Medium Access Sub layer The channel allocation problem, multiple access protocols, IEEE 802 standards for LANs, Network devices-repeaters, hubs, bridge, switches, routers and gateways.
UNIT-V: The Network Layer Network layer design issues, routing algorithms, congestion control algorithms, Quality of Service, Introduction to IPv4 Addressing, Sub networks and Subneting, IPv4 protocol Packet Format, IPv4 vs IPv6.
UNIT-VI: Transport layer & Application Layer Transport layer services, Elements of transport protocols, Overview of TCP and UDP, Domain Name System, Email – SMTP, POP, IMAP; FTP, HTTP.

RECOMMENDED BOOKS:

TEXT BOOK	1. Data Communications & Networking by B. A Forouzan, 4th Ed, Tata McGraw Hill, 2007. 2. Computer Networks (3rd edition) by Tanenbaum Andrew S, International edition, 1996.

REFERENCE	1. Data Communications, Computer Networks and Open Systems (4th edition) by Halsall Fred, 2000, Addison Wesley, Low Price Edition. 2. Data and Computer Communications by W. Stallings, Pearson Education, 8th Ed, 2007.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz	x			x	
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2	4	3	5			4	2		

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Computer Networks Lab

L	T	P
0	0	2

MODULE CODE	CSEN3102
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES

1. To introduce the key concepts and principles of computer networks.
2. To implement the deployment of communications services in practical networks.
3. To study about CISCO Packet Tracer Stimulation Tool.
4. To study the advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

LEARNING OUTCOMES

Following this course, students will be able:

1. To get the concepts of Data Communication and Networking.
2. To get the knowledge of different trouble shooting commands.
3. To learn about the resource sharing.
4. To create a VLAN and star topology.
5. To configure a network using routing protocols.

LIST OF EXPERIMENTS

1.	Study of computer network and interconnected devices.
2.	To study about trouble shooting commands.
3.	To study about IPconfig and net stat commands.
4.	To study about IPV4 and IPV6.
5.	To study about File and desktop Sharing.
6.	Connect the computers in LAN.
7.	To study about CISCO Packet Tracer Stimulation Tool.
8.	Configure a network topology using packet tracer software.
9.	To create a LAN via switches and transfer packets between them.
10.	Activity to create a VLAN and star topology.
11.	Configure a network using distance vector routing protocol.
12.	Configure a network using link state routing protocol.
Experiments based on advanced topics:	
13.	Study of different types of network cables and practically implement crosswire and straight cable.
14.	Write a Program in C++ to check the whether a 32-bit IP address is in binary notation or not and determine its class.

Note: At least 12 Experiments out of the list must be done in the semester.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2	2	2,5	2	2,5	3	4,5	3,5		3	3

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER –IV

Natural Language Processing

L	T	P
4	0	0

MODULE CODE	CSEN2220
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to provide a sound understanding of Natural Language Processing and challenges involved in that area.

1. To provide the student with knowledge of various levels of analysis involved in NLP.
2. To understand language modeling.
3. To gain knowledge in automated natural language generation and machine translation.

LEARNING OUTCOMES

After successful completion of this course, students should be able to:

1. Outline Natural Language Processing tasks in syntax, semantics, and pragmatics.
2. Explain Morphology and Part of Speech Tagging.
3. Show how syntax parsing techniques can be used.
4. Explain the use of semantic analysis methods.
5. Relate a few applications of NLP.

MODULE CONTENT:

UNIT- I : Overview and Language Modeling Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages-NLP Applications-Information Retrieval. Language Modeling: Introduction-Various Grammar-based Language Models-Statistical Language Model
UNIT- II :Word Level Analysis and Syntactic Analysis Word Level Analysis: Introduction- Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Introduction-Context-free Grammar-Constituency Parsing-Probabilistic Parsing
UNIT- III :Semantic Analysis and Discourse Processing Semantic Analysis: Introduction- Meaning Representation-Lexical Semantics Ambiguity-Word Sense Disambiguation. Discourse Processing: Introduction- cohesion-Reference Resolution Discourse Coherence and Structure
UNIT-IV: Natural Language Generation and Machine Translation Natural Language Generation: Introduction-Architecture of NLG Systems Generation Tasks and Representations-Application of NLG. Machine Translation: Introduction-Problems in Machine Translation Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages
UNIT –V: Information Retrieval Introduction-Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval - Evaluation LEXICAL RESOURCES: Introduction-WordNet-FrameNet-Stemmers-POS Tagger Research Corpora
UNIT- VI: Case Study Generation - Strategies for generation - Planning English referring expressions -KING, a Natural language generation systems. Typical systems - ELIZA - Baseball - GLJS - PARRY - LADDER - SOPGIE & POET current trends in NLP.

RECOMMENDED BOOKS:

TEXT BOOK	1. Natural Language Processing and Information Retrieval by Tanveer Siddiqui, U.S. Tiwary, Oxford University Press, 2008.
REFERENCE	1. Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition by Daniel Jurafsky and James H Martin, Prentice Hall, 2nd Edition, 2008. 2. Natural Language Understanding by James Allen, Bejamin/cummings, 2nd edition, 1995.

METHODS OF TEACHING AND STUDENT LEARNING:

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Assessments	1	2	3	4	5
Class Test	x	x		x	x
Quiz	x		x		
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2,5	3	2,3	1	5	1	3	1		5

EVALUATION:

At the end of semester, course faculty will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Soft Computing

L	T	P
4	0	0

MODULE CODE	CSEN2222
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

The aim of this subject is to teach student's concept Artificial Neural Networks, how it is related to biological neural networks and how it is implemented and to understand Fuzzy logic's concepts.

1. To familiarize with soft computing concepts.
2. To introduce the ideas of neural networks, fuzzy logic and use of heuristics based on human experience.
3. To introduce the concepts of Genetic algorithm and its applications to soft computing using some applications.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Apply various Soft Computing frame works.
2. Design various neural networks.
3. Understand the use of Fuzzy Logic.
4. Apply genetic programming.
5. Understand hybrid soft computing.

MODULE CONTENT:

Unit I : Artificial Neural Network Introduction , Fundamental concept, Evolution of Neural Networks, Basic Models of Artificial Neural Networks, Important Terminologies of ANNs, McCulloch, Pitts Neuron, Linear Separability, Hebb Network. Supervised Learning Network: Perceptron Networks, Adaline, Multiple Adaptive Linear Neurons, Back Propagation Network.
UNIT II: Associative Memory Associative Memory Networks: Training Algorithms for Pattern Association, Auto-associative Memory Network, Hetero-associative Memory Network, Bidirectional Associative Memory, Hopfield Networks, Iterative Auto-associative Memory Networks.
UNIT III: Unsupervised Learning Networks: Fixed weight Competitive Nets, Kohonen, Self-organizing Feature Maps, Learning Vector Quantization, Adaptive Resonance Theory Networks.
UNIT IV: Fuzzy Set Theory Introduction to Classical Sets and Fuzzy sets, Classical Relations and Fuzzy Relations, Tolerance and Equivalence Relations, Membership Functions: Fuzzification, Methods of Membership Value Assignments, Defuzzification, Lambda, Cuts for Fuzzy sets and Fuzzy Relations.
UNIT V: Fuzzy Arithmetic and Fuzzy Measures Fuzzy Arithmetic and Fuzzy Measures: Fuzzy Rule Base and Approximate Reasoning: Truth values and Tables in Fuzzy logic, Fuzzy Propositions, Fuzzy Reasoning, Fuzzy Inference Systems (FIS), Fuzzy Logic Control Systems.
UNIT VI: Hybrid Fuzzy Soft Computing based Hybrid Fuzzy Controllers, Soft Computing based Rocket Engine Control.

RECOMMENDED BOOKS:

TEXT BOOK	1. Principles of Soft Computing, by S.N. Sivanandan and S.N. Deepa, Wiley India, 2007. ISBN: 10: 81,265,1075,7.
REFERENCE	1. Neural Networks, Fuzzy Logic and Genetic Algorithms by S. Rajasekaran and G.A.V.Pai, PHI, 2003. 2. Fuzzy Logic with Engineering Applications by Timothy J.Ross, , McGraw Hill, 1997. 3. Neuro, Fuzzy and Soft Computing by J.S.R. Jang, C.T. Sun and E.Mizutani, PHI, 2004, Pearson Education.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz		x	x		
Assignment	x		x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes		2	1	3	4	5		3		1	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CSE (Big Data & Analytics)

SEMESTER - IV

Fuzzy Logic

L	T	P
4	0	0

MODULE CODE	CSEN2223
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

1. To cater the knowledge of Fuzzy Logic Control and use these for controlling real time systems.
2. To provide adequate knowledge of application of fuzzy logic control to real time systems.
3. To provide comprehensive knowledge of fuzzy logic control
4. To learn about the adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5. To learn about the concept of fuzziness involved in various systems.
6. To provide adequate knowledge about fuzzy set theory.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Understanding principles of fuzzy logic fundamentals.
2. Design the required and related systems.
3. Implement various fuzzy operations.
4. Attempt to generate new ideas and innovations in fuzzy logic and fuzzy system.

MODULE CONTENT:

UNIT-I: Fuzzy Sets and Uncertainty Uncertainty and information, fuzzy sets and membership functions, chance verses fuzziness, properties of fuzzy sets, fuzzy set operations.
UNIT-II: Fuzzy Relations Cardinality, operations, properties, fuzzy cartesian product and composition, fuzzy tolerance and equivalence relations, forms of composition operation.
UNIT-III: Fuzzification and Defuzzification Fuzzification and Defuzzification: Various forms of membership functions, fuzzification, defuzzification to crisp sets and scalars.
UNIT-IV: Fuzzy Logic and Fuzzy Systems Introduction to fuzzy systems, classic and fuzzy logic, approximate reasoning, Natural language, linguistic hedges, fuzzy rule based systems, graphical technique of inference.
UNIT-V: Development of membership functions Membership functions, membership value assignments, intuition, inference, rank ordering, neural networks, genetic algorithms, inductive reasoning..
UNIT-VI: Fuzzy Arithmetic and Extension Principle Fuzzy arithmetic and extension principle, functions of fuzzy sets, extension principle, fuzzy mapping, interval analysis, vertex method and DSW algorithm.

RECOMMENDED BOOKS:

TEXT BOOK	1. Fuzzy Logic with Engineering Applications by Ross, T. J., Wiley India Pvt. Ltd., 3rd Ed.
REFERENCE	2. Fuzzy Set theory and its application by Zimmerman, H. J., Springer India Pvt. Ltd., 4th Ed. 3. Fuzzy Set and Fuzzy Logic: Theory and Applications by Klir, G. and Yuan, B., Prentice Hall of India Pvt. Ltd. 4. Fuzzy Sets, Uncertainty and Information by Klir, G. and Folger, T., Prentice Hall of India Pvt. Ltd.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4
Class Test	x	x		
Quiz	x		x	
Assignment	x		x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	E	f	g	h	i	j	k
Course Learning Outcomes	1,2	2,3	4	2	4	2,3	2				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

SEMESTER – V

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEI3101	E	PC	ESSENTIALS OF SOFTWARE ENGINEERING (OOAD & SW LIFECYCLE)	3	0	0	3	25	75	100
CSEI3102	E	PC	SOFTWARE ENGINEERING (OOAD & SW LIFECYCLE) LAB	0	0	3	1.5	25	50	75
CSEB3101	E	PC	FOUNDATION COURSE IN ENTERPRISE APPLICATION DEVELOPMENT	3	0	0	3	25	75	100
CSEB3102	E	PC	IBM RATIONAL TOOLS LAB	0	0	2	1	25	25	50
CSEN3105	E	PC	THEORY OF AUTOMATA & COMPUTATION	3	1	0	3.5	50	100	150
CSEN3106	E	PD	INDUSTRIAL TRAINING I (TRAINING TO BE UNDERGONE AFTER IV SEMESTER)	0	0	2	1	50	0	50
CSEN3107	E	PD	SPECIALIZED MINOR PROJECT (GROUP)	0	0	4	2	50	50	100
	E	PE	ELECTIVE-III	4	0	0	4	50	100	150
	E	PE	ELECTIVE-IV	4	0	0	4	50	100	150
VALU0136	P	AE	APTITUDE-II	2	0	0	2	25	50	75
VALU0140	P	SE	PROFESSIONAL COMMUNICATION-II	2	0	0	2	25	50	75
TOTAL				**21**	**1**	**11**	**27**	**400**	**675**	**1075**

L = Lecture
T = Tutorial
P = Practical
C = Credit Point

ELECTIVE – III

MODULE CODE	MODULE
CSEN2210	SYSTEM PROGRAMMING & SYSTEM ADMINISTRATION
CSEN3208	MOBILE APPLICATION DEVELOPMENT
CSEN3209	BIG DATA ANALYSIS

ELECTIVE – IV

MODULE CODE	MODULE
CSEN3210	COGNITIVE NETWROKS
CSEN3211	CRYPTOGRAPHY
CSEN3213	IMAGE PROCESSING

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

Theory of Automata & Computation

L	T	P
3	1	0

MODULE CODE	CSEN3105
CREDIT POINTS	3.5
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

The aim of this subject is to clear the concepts of formal languages and to provide keen knowledge of computation using Turing Machine.

1. Identify different formal language classes and their relationships.
2. Design grammars and recognizers for different formal languages.
3. Determine the decidability and intractability of computational problems.
4. Present the theory of automata as the first step towards learning advanced topics such as compiler design.
5. Develop the understanding of computation using Turing Machine.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Design and analyse automata, regular expressions and context-free grammars accepting or generating a certain languages
2. Define Turing machines performing simple tasks
3. Apply mathematical and formal techniques for solving problems in computer science.
4. Define formal languages and explain how they can be generated by different automata.
5. Create an automaton to solve a particular computational problem.

MODULE CONTENT:

Unit-I: Finite Automata Finite State Machines, Properties and limitations of FSM, Basic Definitions of Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA, finite automata with epsilon transitions.
Unit-II: Introduction to Machines & Formal languages Concept of basic Machine, Moore and mealy Machines, Equivalence of Moore and Mealy machines. Formal Grammar's Introduction, Language recognition by the given Grammar, Creation of Grammar for particular language, Recursive & Recursive Enumerable Language, Chomsky hierarchies of grammars, unrestricted grammars, Context sensitive languages, Relation between Languages.
Unit-III: Regular Expressions & Regular Sets Regular Expressions, Equivalence of finite automata and Regular Expressions, Regular expression conversion and vice versa. State and prove Arden's Method. The Pumping Lemma for Regular Sets, Applications of the pumping lemma, Closure properties of regular sets, Myhill-Nerode Theorem and minimization of finite Automata, Minimization Algorithm.
Unit-IV: Grammars Definition, Context free and Context sensitive grammar, Ambiguity of regular grammar, Reduced forms, Removal of useless Symbols, Normal forms for grammar Chomsky Normal Form (CNF), Griebach Normal Form (GNF).
Unit-V: Pushdown Automata Introduction to Pushdown Machines, Designing of PDA, Application of Pushdown Machines, equivalence of CFL and PDA, inter conversion.
Unit-VI: Turing Machines Turing machine, Programming techniques for Turing machine, Design of T.M, Multi-tape T.M., Universal Turing Machine, Halting problem of T.M., PCP Problem, Decidability & undecidability of Problems.

RECOMMENDED BOOKS:

TEXT BOOK	Automata theory, language & computations by Hopcroaft & O.D.Ullman, RMothwani, 2001, AW.
REFERENCE	1. Automata, Languages and computation by K.L.P.Mishra & N.Chandrasekaran, 2000, PHI. 2. Introduction to formal Languages & Automata by Peter Linz, 2001, Narosa Publ. 3. Principles and Practice by Ramond Greenlaw and H. James Hoover, 1998, for "Fundamentals of the Theory of Computation" 4. Introduction to languages and the Theory of Computation by John C. Martin 2003, T.M.H.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test		x	x	x	x
Quiz	x	x			
Assignment	x		x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2		4,5	3	4	2	2	4		

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

System Programming and System Administration

L	T	P
4	0	0

MODULE CODE	CSEN2210
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to understand and learn system software like compiler, linker, assembler etc. Students can learn UNIX administration and shell programming.

1. To be familiar with system programming tools like linker, loaders, assembler, compiler and macro processor etc.
2. To be familiar with the major components and describe the architecture of the UNIX operating system.
3. To be familiar with Basic UNIX Shell programming concepts (variables, expressions etc).
4. To be familiar with files and directories operations.
5. To be familiar with use of the vi text editor to create and modify files.
6. To be familiar with I/O redirection, pipes, quoting, and filename expansion mechanisms.

LEARNING OUTCOMES:

1. Able to describe how compiler and linker can put together in a program.
2. Describe how computer and operating system executes and switches programs.
3. Able to write programs that handle several processes and/or threads that communicate with signals.
4. Describe how computer and operating system handles the memory.
5. Able to create shell programs.

MODULE CONTENT:

Unit-I: Evolution of Components Systems Programming Assemblers, loaders, linkers, macros, compilers; software tools, text editors, interpreters and program generators, debug monitors, programming environment. Compiler, Assembler and Loader: Compiler: brief overview of compilation process, Assembler: problem statement, single phase and two phase assembler, symbol table; Loader schemes, compile and go loader, general loader, absolute loader, subroutine linkage, reallocating loader, direct linkage loader, binders, linking loader, overlays.
Unit-II: Macros & Theoretical Concept of Unix Operating System Macro language and macro-processor, macro instructions, features of macro facility, macro instruction arguments, conditional macro expansion, macro calls within macros, macro instruction defining macros. Basic features of operating system; File structure, CPU scheduling; Memory management: swapping, demand paging; File system: block and fragments, i-nodes, directory structure.
Unit -III: Getting Started with Unix User names and groups, logging in; Format of Unix commands; Changing your password; Characters with special meaning; Unix documentation; Files and directories; Current directory, looking at the directory contents, absolute and relative pathnames, some Unix directories and files; Looking at the file contents; File permissions; basic operation on files; changing permission modes; Standard files: standard output, standard input, standard error; filters and pipelines; Processes; finding out about processes; Stopping background process.
Unit-IV: Text Manipulation Inspecting files; File statistics; Searching for patterns; Comparing files; Operating on files; Printing files; Rearranging files; Sorting files; Splitting files; Translating characters; AWK utility.
Unit-V: Shell Programming UNIX editor vi, programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; Shell programming constructs; interactive shell scripts; Advanced features.
Unit-VI: System Administration Definition of system administration; Booting the system; Maintaining user accounts; File systems and special files; Backups and restoration; Role and functions of a system manager.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Systems Programming by Donovan, TMH. 2. The Unix programming environment by Brain Kernighen & Rob Pike, 1984, PHI & Rob Pike.
REFERENCE BOOKS	1. Advanced Unix programmer's Guide by Stephen Prato, BPB 2. Unix- Concept and applications by Sumitabha Das, 2002, T.M.H.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x		x		x	
Quiz			x		x	x
Assignment	x	x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	A	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2		4	5	3					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

Mobile Application Development

L	T	P
4	0	0

MODULE CODE	CSEN3208
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to teach students how mobile communication works and how to build mobile apps for android operating system.

1. To develop application models of mobile application frameworks.
2. To understand User-interface design for mobile applications.
3. To understand how to manage application data.
4. To understand addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability and security.
5. To use current mobile platforms and their architectures.

LEARNING OUTCOMES:

Following this course student will be able to:

1. Explain functioning of different mobile technology.
2. Demonstrate android activities life cycle.
3. Execute operations on GUI objects.
4. Perform event driven programming.
5. Develop mobile systems with dynamically varying sensor setup using goal oriented cooperative sensing.

MODULE CONTENT:

UNIT-I: Introduction To Mobile Computing Concept of Mobile Communication, Mobile devices vs. desktop devices, ARM and INTEL architectures, Power Management, Screen resolution, Touch interfaces, Application deployment (App Store, Google Play, Windows Store) Native vs. web applications.
UNIT-II: Frameworks and Tools Development Environments: Development Environments (XCode, Eclipse, VS2012, Phone GAP, etc.) Development Tools (HTML5, CSS, JavaScript, JQuery) Mobile-specific enhancements (Browser-detection, Touch interfaces, Geo location, Screen orientation) Mobile browser "interpretations" (Chrome/Safari/Gecko/IE).
UNIT-III: Mobile OS Architectures Mobile OS Architectures (Android, iOS, Windows), Mobile OS (Darwin, Linux, Windows) Runtime Environments (Objective-C, Dalvik, winRT), Mobile Agents and Peer-to-Peer Architecture. Hardware Architecture: Introduction to the processors used for Mobile and Handheld devices and SoC architecture like OMAP and Snap Dragon and its case study with reference to protocols, Input and output interfaces, GPU, DSP etc.
UNIT-IV: Introduction to Android Overview of Android, Environment setup for Android apps Development, Framework Android SDK, Eclipse, Emulators, Android AVD, Android Emulation Creation and set up First Android Application.
UNIT-V: Developing an Application Building a simple "Hello World" App (Android, iOS, Windows) App-structure, built-in Controls, file access, basic graphics, Building useful apps, Database, Network, File access Packaging and Deployment.
UNIT-VI: Advanced UI Programming System-level Apps, Native programming (Android), Low-level programming (iOS), Low-level APIs (Windows).

RECOMMENDED BOOKS:

TEXT BOOK	1. Programming Mobile Devices: An Introduction for Practitioners by Tommi Mikkonen , John Wiley & Sons Ltd, 2007.
REFERENCE	6. Building Android Apps IN EASY STEPS, McGrawHill Education. 7. Mobile Python Rapid Prototyping of Applications on the Mobile Platform by J Scheible and Ville Tuulos John, Wiley India Pvt. Ltd, 2008. 8. Ubiquitous Computing: Smart Devices, Environments and Interactions by S. Poslad , Wiley, 2009. 9. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML by Reza Behravanfar, Cambridge University Press, October, 2004. 10. Fundamentals of Mobile and Pervasive Computing by Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, McGraw-Hill Professional, 2005.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x	x			x
Quiz			x	x	
Assignment	x				

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes		1	2	2,3	3	4,5					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

Big Data Analysis

L	T	P
4	0	0

MODULE CODE	CSEN3209
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The course provides practical foundation level training that enables immediate and effective participation in Big Data Projects. The course provides grounding in basic and advanced methods to Big Data technology and tools including MapReduce and Hadoop.

1. To develop in –Depth Knowledge and understanding of the Big Data analytic domain.
2. To understand the computational approaches to Modelling, Feature Extraction.
3. To understand the various search algorithms applicable to Big Data.
4. To analyze and interpret Streaming data.
5. To learn how to handle large datasets in main memory.
6. Use advanced analytical tools, decision making tools and operation research techniques to analyze complex problems.

LEARNING OUTCOMES:

Upon completion of this course student will be able to:

1. Design algorithm by employing Map Reduce technique for solving Big Data problems.
2. Design algorithms for handling petabytes of datasets.
3. Design algorithm and propose solutions for Big Data by optimizing main memory consumption.
4. Design and build MongoDB based Big Data applications and learn MongoDB query language.
5. Learn difference between conventional SQL query language and NoSQL basic concepts.

MODULE CONTENT:

UNIT-I: Introduction to Big data Introduction to Big Data and its importance, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Four Vs, Drivers for Big Data, Big data Analytics, Algorithm Using Map reduce, Matrix –Vector Multiplication by Map-Reduce.
UNIT-II: Introduction to Hadoop and Hadoop Architecture What is Hadoop? Core Hadoop Components, Hadoop Eco system –Moving Data In and Out of Hadoop, Hadoop Limitations, Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read, Name Node, Secondary Name Node, and Data Node, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers.
UNIT-III: NoSQL What is it? Where it is Used Types of NoSQL databases, Why NoSQL? Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL.
UNIT-IV: HDFS, HIVE AND HIVEQL, HBASE Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper, how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.
UNIT-V: SPARK Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib.
UNIT-VI: Data Base for the Modern Web Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document- Oriented, principles of schema design, Constructing queries on Databases, collections and Documents, MongoDB Query Language.

RECOMMENDED BOOKS:

TEXT BOOK	1. Understanding Big data by Chris Eaton, Dirk deroos et al. McGraw Hill, 2012.
REFERENCE	1. Professional Hadoop Solutions by Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, ", Wiley, 2015. 2. HADOOP: The definitive Guide by Tom White, O Reilly 2012. 3. Big Data Analytics with R and Haoop by Vignesh Prajapati, Packet Publishing 2013. 4. Big Data and Business analytics by Jy Liebowitz , CRC press, 2013. 5. MongoDB in Action by Kyle Banker,Piter Bakkum , Shaun Verch, Dream tech Press. 6. BIG Data and Analytics by Sima Acharya, Subhashini Chhellappan, Willey.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x	x	x		x
Quiz				x	
Assignment	x	x	x		x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	1,2	3	4	5						

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

Cognitive Networks

L	T	P
4	0	0

MODULE CODE	CSEN3210
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to teach students how to design, a network with a cognitive process that can perceive current network conditions, plan, decide, act on those conditions, learn from the consequences of its actions, all while following end-to-end goals

1. To teach the behavior of basic network to achieve some common user-defined objectives.
2. To understand tangled problems emerging from throughput-demanding services.
3. To make students familiar with basic issues incorporating intelligence to network functions.
4. To make students familiar with communication and learning using modern technology.

LEARNING OUTCOMES:

Following this course, students will be able to:

1. Learn various design principles of software defined radio.
2. Understand challenges of receiver design.
3. Select hardware for SDR.
4. Understand the basic architecture of cognitive radio.
5. Study various techniques like spectrum sensing and spectrum analysis.

MODULE CONTENT:

UNIT-I: Biologically Inspired Networking Introduction, Principles of Biologically inspired networks, Swarm Intelligence, Evolutionary and Adaptive systems, The Role of Autonomic Networking in Cognitive Networks: Fundamentals of autonomic computing, The FOCALE Architecture, Application to Wired and wireless Cognitive Networks
UNIT-II: Adaptive Networks Dynamic factors, Network functions, Representative Adaption Techniques, Self-Managing Networks: Vision and challenges of Self-Management, Designing Self-Management networks, Self-Management Intelligence
UNIT-III: Machine Learning for Cognitive Networks Problem formulation in Machine Learning, Open issues and Research Challenges, Cross-Layer Design and Optimization in Wireless Networks Cross-Layer Design: design, taxonomy and implementation; Open Challenges.
UNIT-IV: Cognitive Radio Architecture Function, Components and Design Rules, The cognition cycle, Building the CRA on SDR Architecture, Cognitive Ad hoc Networks: Cognitive Ad Hoc Networks, wisdom of crowds, Scenarios for cognitive Ad Hoc Networks.
UNIT-V: : Distributed Learning and Reasoning in Cognitive Networks Methods and Design Decisions: Framework for Learning and reasoning, Distributed Learning, Sensory and Actuator Functions, The Semantic Side of Cognitive Radio: Formal semantics and semantic web technologies, Community Architecture for Cognitive radio and imperative semantics, Architecture for Cognitive radio Applications,
UNIT-VI: Security Issues and intrusion detection Cognitive Radio Networks, Communication Security, and Attacks on Cognitive Networks, Intrusion Detection, Threat Model, Integrated dynamic security approach, Erasure Tolerant Coding for Cognitive Radios: Spectrum pooling concepts, Overview of Erasure Channels, traditional Erasure codes, Digital fountain Codes, Multiple Description Codes.

RECOMMENDED BOOKS:

TEXT BOOK	1. Cognitive Networks: Towards Self-Aware Networks by Qusay Mahmoud, John Wiley & Sons. 2. Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems by Huseyin Arslan, Springer.
REFERENCE	1. Cognitive Wireless Networks by Frank H. P. Fitzek, Springer. 2. Software Radio: A Modern Approach to Radio Engineering by Jeffrey H. Reed Pearson Education.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test		x			
Quiz	x		x		X
Assignment	x			x	X

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	4	5	3	4	5					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

Cryptography

L	T	P
4	0	0

MODULE CODE	CSEN3211
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES:

The aim of this subject is to teach students how to preserve information properties through different techniques.

1. Recognize the need for security through cryptography
2. Identify the primitives of various cryptographic techniques and the related application areas.
3. Explore the various types of cryptography and the associated application areas
4. To understand practical concepts related to Cryptography.
5. To understand practical concepts related to Steganography.

LEARNING OUTCOMES:

Following this course, students will be able to:

1. Understand basic issues of security in communication and computing.
2. Learn basic approaches in solving security problems.
3. Identify different Cryptography techniques.
4. Compare and contrast Symmetric and Asymmetric encryption system and their vulnerability to attacks.
5. Understand different Steganographic Techniques.

MODULE CONTENT:

Unit I: Security Need of security: Security attacks: vulnerabilities, threats, types of attacks and controls; Security services; Security mechanisms; Model of network security.
Unit II: Cryptography: Concepts and Techniques Cryptography: plain text and cipher text, substitution techniques, transposition techniques; Substitution techniques: caesar cipher, modified version of caesar cipher, mono-alphabetic cipher, homophonic substitution cipher, polygram substitution cipher, polyalphabetic substitution cipher, hill cipher; Transposition techniques: rail fence technique, simple columnar transposition technique, vernam cipher, block cipher; Encryption and decryptionders(ISPs), Internet address, standard address, domain name, DNS, IP.v6, Modems and time continuum, communications software; internet tools.
Unit III: Symmetric Key Cryptography Symmetric key cryptography: algorithm types and modes, an overview of symmetric key cryptography, data encryption standard, variations of data encryption standard (DES), international data encryption algorithm(IDEA),RC4,RC5, advanced encryption standard (AES).
Unit IV: Asymmetric Key Cryptography Asymmetric key cryptography: history of asymmetric key cryptography, an overview of asymmetric key cryptography, rivest-shamir-adelman (RSA) algorithm; symmetric versus asymmetric key cryptography.
Unit IV: Cryptographic Hash Functions Applications of cryptographic hash functions, Secure hash algorithm, Message authentication codes- Message authentication requirements and functions, HMAC, Digital signature, Digital signature Schemes, Digital signature standards.
Unit VI: Steganography Techniques Steganography, least significant bit method and message hidden in 6^{th} and 7^{th} bit method. Spatial Domain and Transform Domain Techniques, Latest Steganography algorithms.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Cryptography and network security by Atul Kahate by Tata McGraw Hill, New Delhi. 2. Cryptography and networks security principles and practice by William stalling Prentice Hall, India
REFERENCE	1. Information and communication security by Hans Springer. 2. Network security by Simonds, McGraw Hill, 1998. 3. Internet Security by Derek Atkins Techmedia, 1998.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz			x		x
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	5	2	4	3		1	5	3			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMESTER - V

Image Processing

L	T	P
4	0	0

MODULE CODE	CSEN3213
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: In total EIGHT questions will be set. Question ONE will be compulsory and will cover all units. Remaining seven questions are to be set taking at least one question from each unit. The students are to attempt five questions in total, first being compulsory.

OBJECTIVES

The aim of this subject is to provide understanding of Digital Image Processing and Image degradation or restoration process.

1. Understand concept of image processing and Image enhancement.
2. To do image enhancement in spatial domain and frequency domain.
3. Understanding of image compression and segmentations.
4. Develop the understanding of Image restoration.

LEARNING OUTCOMES

Following this course, students will be able to:

1. Learn fundamentals of digital image processing.
2. Understand Spatial and frequency domains.
3. Learn Image compression models and techniques.
4. Demonstrate color image processing.

MODULE CONTENT:

Unit I: Fundamentals of digital image processing Digital image processing concepts: origin of digital image processing, examples, fundamental steps in digital image processing, components of digital image processing system; Digital image fundamentals: image sensing and acquisition, image sampling and quantization, basic relationship between pixels.
Unit II: Image Enhancement in the Spatial Domain Background; Basic gray level transformation; Histogram processing; Enhancement using arithmetic/logic operations; Basics of spatial filtering, Smoothing spatial filters and sharpening spatial filters.
Unit III: Image Enhancement in the Frequency Domain Background; Fourier transform and the frequency domain; Smoothing frequency-domain filters; Shaping frequency domain filters; Homomorphic filtering.
Unit IV: Image Restoration Image degradation/restoration process; Noise models; Types of filtering; Inverse filtering; Minimum mean square filtering; Geometric mean filter; Geometric transformations.
Unit V: Color Image Processing Color fundamentals, color models; Color image processing: pseudocolor image processing, full-color image processing; Color transformations; Smoothing and sharpening; Noise in color images; Color image compression.
Unit VI: Image Compression & Segmentation Image Compression: fundamentals, image compression models, error free compression, lossy compression; Image segmentation: detection of discontinuities, edge linking and boundary detection, thresholding, region oriented segmentation.

RECOMMENDED BOOKS:

TEXT BOOK	Digital Image Processing by Rafael C. Gonzalez & Richard E.Woods, Pearson Education.
REFERENCE	1. Digital Image Processing by A.K.Jain, PHI. 2. Digital Image Processing by Abhishek Yadav, Poonam Yadav, University Science Press. 3. Digital Image Processing by Dr. Shashi Kumar Singh, University Science Press.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4
Class Test	x	x		x
Quiz	x		x	
Assignment		x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	1,4	3	1	2		3		1		

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.