Course Code		16B1NHS63	1	Semester E	ven	Semeste Month 1	er 6 th from J	Session 2 January 201	2018 -2019 19 to May 2019
Course Name		PROJECT MANAGEMENT							
Credits			3		Contact H	lours		2-1	-0
Faculty (N	ames)	Coordinato	r(s)	Dr. Santoshi S	engupta (Se	ec-62), Dr	. Deep	ak Verma (S	Sec-128)
		Teacher(s) (Alphabetica	ally)	Dr. Deepak Ve	erma, Dr. Sa	intosh De	v, Dr.	Santoshi Se	ngupta
COURSE	OUTCO	OMES						COGNIT	IVE LEVELS
304-5.1	Apply objecti	the basic conc ves, life cycle,	epts of p model a	project managem	ent such as t, in a given	features, context		Apply Lev	vel (C3)
304-5.2	Analyz various in orde	ze projects and s theoretical fra er to make corr	their as ameworl ect sele	sociated risks by ks, non-numeric ction decisions	understand al and nume	ling the erical mod	lels	Analyze L	evel (C4)
304-5.3 Evaluate the various determine correct tec terminating the projection		te the various ine correct tec ating the project	stages of hniques cts	f project manage for planning, sc	ement and ic heduling, co	lentify an ontrolling	d and	Evaluate Level (C5)	
304-5.4 Evaluate project mar to achieve overall pro		nagement processes, tools and techniques in order ject success			Evaluate Level (C5)				
Module No.	Title o Modu	of the le	the Topics in the Module			No. of Lectures for the module			
1.	Project Manag Introdu	t gement: uction	nt: Characteristics of project; Life Cycle of Project; Project Model; Project Management as discipline; Contemporary aspects of Project Management				4		
2.	Project	ect Selection Theoretical Models; Non-numeric models; Numeric Models; Financial Models; Project Portfolio process, Significance and applicability of Monte Carlo simulation				6			
3.	Project Organization, Manager and PlanningPure Project organization; Functional Organizations; Mixed organizations; Matrix organizations; Role, Attitudes and Skills of Project Manager, Project Coordination, Systems Integration, Work Breakdown Structure, Linear Responsibility Charts.			4					
4.	Risk N	Risk Management Theoretical Aspects of risk, Risk Management process, Numeric Techniques, Hillier model, Sensitivity Analysis, Certainty Equivalent approach and Risk adjusted discount rates, Game theory.				4			
5.	Project and Re Alloca	t Scheduling esource tion	Theore AOA a Crashi Resour	etical aspects-In and AON charts ng of Projects- rce Leveling and	nportance, s, Probabilit - Time and l Loading.	Focus A y Analys d Cost t	rea-PE is, Ga radeof	ERT/CPM, ntt Charts, f, Basics-	6

6.	Budgeting, Control and Project Termination	Estimating Project Budgets, Improving the process of cost estimation, Basics, Importance, Purpose of control, Types of Control, Desirable features of Control, Control Systems, Critical Ratio Method, Control of creative activities, Control of change and scope creep, Why Termination, Types of termination, typical termination activities.	4		
Total number of Lectures					
Eval	uation Criteria				
Components Maximum Marks					
T1	-	20			
T2		20			
End	Semester Examination	35			
TA		25 (Assignment, Project, Oral Questions)			
Tota	l	100			
			·		
Reco Refe	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)				
1.	Meredith, Mantel, Project Management-A Managerial Approach, 10 th Edition, Wiley Publications, First Published 1985				

3	Vohra, N. D., Quantitative Techniques in Management, 3rd Edition, Tata McGraw Hill Publishing
5.	Company, 2007

Course Code	16B1NHS635	Semester: Even		Semester: VI Session: 2018 -2019 Month: Jan 2019 to June 2019		
Course Name	Organizational Behavior					
Credits 3			Contact Hours		3(2-1-0)	

Faculty (Names)	Coordinator(s)	Ms Puneet Pannu (Sec 62) & Dr Anshu Banwari (Sec 128)	
	Teacher(s) (Alphabetically)	Dr Anshu Banwari Ms Puneet Pannu	

COURSE OUTCOMES			
C304-6.1	Identify dynamic human behavior through an insight into relationships between individuals, groups and organizations	Apply (C3)	
C304-6.2	Analyze individual management style as it relates to influencing and managing behavior in the organization.	Analyze (C4)	
C304-6.3	Decide and justify set of strategies for meeting the special challenges in the 21st century competitive workplace	Evaluate (C5)	
C304-6.4	Assess the potential effects of important developments in the external environment on behavior in organizations	Evaluate (C5)	

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1	Introduction to OB: Challenges and Opportunities	Interdisciplinary Field, Concepts, Approaches, Responding to Globalization; Improving Quality & Productivity; Improving Customer Service; Improving People Skill; Empowering People; Stimulating Innovation & Change; Coping with Temporariness; Positive Organizational Behavior, Working in Networked Organizations; Balancing Work-Life Conflict	3
2	Managing Workforce Diversity	Major forms of Workplace Diversity, Valuing Diversity, Role of Disabilities, Discrimination, Diversity Initiatives, Diversity Awareness and Affirmative Action, Diversity Management and strategies to implement it Competitive Advantage of Diversity Management Generational Workforce	4
3.	Job Design and Flexible Job Environment	Job Design & its uses; Flexible Job Environment; Job Enrichment Model	2
4.	Leadership: Authentic Leadership	Inspirational Approach to Leadership: Authentic, Ethical & Servant Leadership Defining Authentic Leadership through Intrapersonal, Interpersonal and Developmental Aspects; Basic Model Of Authentic Leadership; Practical Approach to Authentic Leadership through the research of	6

		Terry and Bill George; Authentic Leadership: Trust and Ethics, Dimensions of Trust, Counseling & Mentoring	
5.	Power & Politics	Concept of Power; Sources of Power Contingencies of Power; Power Tactics; Measuring Power Bases: Power Authority Obedience Organizational Politics: Types Factors contributing to Political Behavior; Consequences & Ethics of Politics	5
6.	Employee Engagement	Creating a Culture of Engagement, Models of engagement, Benefits of Employee Engagement, Gallup Study, Methods of engaging employees – from entry to exit, Managers Role in Driving Engagement	2
7.	Organizational Culture & Workplace Spirituality	Creating Organizational Culture Approaches to Organizational Culture; How employees learn culture; Measuring Organizational Culture; Spirituality & Organizational Culture	3
8.	Organizational Change & Development	Organizational Change: Meaning & Types; Technology & Change; Resistance to Change v/s Inviting Change; Approaches to Organizational Change; Planning & Implementing Change; Organizational Development; OD Interventions & Change	3
		Total number of Lectures	28
		Evaluation Criteria	
Components T1 T2 End Semester Examination TA Total		Maximum Marks 20 20 35 25 (Oral Questions, Assignment, Project) 100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	S. Robbins, T. Judge, S. Sanghi, Organizational Behavior, 13th Ed, Prentice-Hall India, 2001
2.	P.Subba Rao , Organizational Behavior: Text Cases & Games, 2 nd Edition, Himalaya Publishing House, 2015
3.	John R. Schermerhorn, Richard N. Osborne, Mary Uhl-Bien; James G. Hunt, Organizational Behavior, 12 th Edition, Wiley India Pvt. Ltd, 2012
4.	Debra L.Nelson and James C. Quick, Organizational Behavior, Cengage Learning, India Edition, 2009
5.	Steven L. McShane and Mary Ann Von Glinow , <i>Organizational Behavior Essentials</i> , Tata McGraw Hill Publishing Company Ltd, 2007
6.	Jerald Greenberg, Behavior in Organizations, 10th Ed, PHI Learning Pvt Ltd

Subject Code	16B1NHS632		Semester: EVEN	Semester VI	Session 2018-19	
				Month from Jan 20	019 to June 2019	
Subject Name	COGNITIVE PSY	CHO	DLOGY			
Credits	3		Contact Hours	2-1-0		
Faculty	Coordinator(s)	Dr.	. Ruchi Gautam Dr. Badri Bajaj			
(Names)	Teacher(s) (Alphabetically)	Dr. Dr.	Badri Bajaj . Ruchi Gautam			

COURSE	OUTCOMES	COGNITIVE LEVELS
After pursu	ing the above mentioned course, the students will be able to:	
304-4.1	Understand and apply the concepts of cognitive psychology in everyday life	Applying Level (C3)
304-4.2	Analyze the different models of various cognitive processes	Analyzing Level (C4)
304-4.3	Evaluate cognitive psychology issues and recommend possible solutions	Evaluating Level (C5)
304-4.4	Evaluate interventions/solutions for self-development through cognitive processes	Evaluating Level (C5)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to Cognitive Psychology	Historical Background: Emergence of modern cognitive Psychology; Approaches: Information Processing and PDP Model; Research Methods	3
3.	Perceptual Processes	Perceptual learning and development; perception of shape, space and movement.	4
3.	Attention	Selective Attention and Divided Attention: Meaning, Definition and Theories.	4
4.	Memory	Short Term Memory	3
5.	Imagery	Properties of mental images; Representation of images and cognitive maps.	3
6.	Language	Structure of language and its acquisition, speech perception, factors affecting comprehension.	4
7.	Thinking and Problem	Types of thinking; Classification of	4

	Solving	problems; Problems solving approaches, Problems space theory by Newell and Simon, Creativity	
8.	Decision Making	Logical reasoning types and errors in reasoning processes. Concept formation and categorization; Judgment and decision making	3
Total number of Hours			28
	Ev	aluation Criteria	
Components	Maximum Ma	arks	
T1	20		
T2	20		
End Semester E	xamination 35		
ТА	25 (Assignm	ent, Quiz , Oral Questions)	
Total	100		

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)			
1.	Ronald T. Kellogg, Fundamentals of Cognitive Psychology, 2 nd Ed., Sage Publishing, 2012		
2.	Robert Solso, Otto Maclin, M. Kimberly Maclin, Cognitive Psychology, 8 th Ed., Pearson Education, 2013		
3.	Kathleen M. Galotti, Cognitive Psychology, 5th Ed., Sage Publishing, 2014		

Course Code	19B12HS612	Semester : Even		Semester VISession2018 -2019Month from Jan 2019 to June 2019	
Course Name	Social Media and Socie	ty			
Credits	3	Contact H		Iours	2-1-0
Faculty (Names)	Coordinator(s)	Dr. Shirin Alavi			
	Teacher(s) (Alphabetically)	Dr. Shirin Alavi			

COURSE O	DUTCOMES	COGNITIVE LEVELS
C304-1.1	Infer the implications of digital change, and the concept of social media and e-marketing in the context of the changing marketing landscape	Apply Level(C3)
C304-1.2	Elaborate the implications of cyber branding and digitization on online marketing mix decisions	Create Level (C6)
C304-1.3	Develop specific models related to social media and social media analytics	Create Level (C6)
C304-1.4	Evaluate concepts related to Search Engine Marketing, Customer Centric Web Business models and Web Chain Analysis	Evaluate Level(C5)
C304-1.5	Illustrate the new age marketing practices	Understand Level (C2)

Mod ule No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction , Individuals Online and Rules for engagement for social media	What is social media marketing, the importance of social media for influencing target audience, Patterns of internet usage, Internet user demographics, The Behavioural Internet, E-Marketing, The Virtual world, the changing Marketing Landscape, E -Marketing- Strengths and Applications, Online Marketing Domains, Digital Marketing Optimization, The Need for Digital Engagement	4
2.	The Online Marketing Mix	The Online Marketing Mix, Consumer Segmentation, Consumer Traits, Consumers and Online Shopping Issues, E-Product, E-Place, E-Price, E-Promotion, Website Characteristics affecting online purchase decision.	3
3.	The Online Consumer and Social Media	The Digital Ecosystem, Online Consumer Behavior, Cultural Implications of key web characteristics, Models of website visits, Web 2.0 and Marketing, The collaborative web, Network evolution, Network science, Marketing with networks, Metcalfe's law, Netnography, Social Media Model by McKinsey, Social Media Tools-Blogs, Wikis, Online Communities, Facebook, Twitter, You Tube, Flickr, Microblogging.	4

4.	Online Branding and Traffic Building	Cyberbranding, Online brand presence and enhancement, The Digital Brand Ecosystem, Brand Experience, Brand Customer Centricity, Brands and Emotions, The Diamond Water paradox, Internet Traffic Plan, Search Marketing Methods, Internet Cookies and Traffic Building, Traffic Volume and quality, Traffic Building Goals, Search Engine Marketing, Keyword Advertising, Keyword value, Internet Marketing Metrics, Websites and Internet Marketing.	4	
5.	Web Business Models ,Social Media Strategy ,Social Media Marketing Plan	The value of a Customer Contact, Customer Centric Business Management, Web Chain of Events, Customer Value Analysis and the Internet, Business Models, Revenue Benefits, Value Uncertainty, Purchase Importance, Define a social media plan, explain the social Media marketing planning cycle, list the 8C's of strategy development.	4	
6.	Market Influence analytics in a Digital Ecosystem	Engagement Marketing through Content Management, Online Campaign Management, Consumer Segmentation, Targeting, and Positioning using Online Tools, Market Influence Analytics in a Digital Ecosystem, The Digital Ecosystem, Knowledge as a value proposition, CGM and Consumer behavior, The value of the power of influence, Amplifying Social Media Campaigns.	4	
7.	The Contemporary Digital Revolution and its impact on society	Online Communities and Co-creation, The fundamentals of online community management strategies, The World of Facebook, The Future of Social media Marketing—Gamification and Apps, Game based marketing The world of Apps, Apps and the Indian Diaspora	3	
8.	Integrating Mobile into Social Media Marketing	Types of Mobile Marketing, Progression of the mobile as a Marketing channel, some Indian mobile marketing campaigns, Impact of Social Media on government, the economy, development, and education	2	
	Tota	al number of Lectures	28	
Evaluation CriteriaComponentsMaximum MarksT120T220End Semester Examination35TA25 (Assignment and Class Test)Total100				
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)				

1.	Social Media Marketing A Strategic Approach, Melissa Barker, Donald Barker, Second Edition Cengage Learning ,2017.
2.	Digital Marketing ,Seema Gupta,First Edition ,Mc Graw Hill Education (India) Private Limited ,2018
3.	Digital Marketing, Vandana Ahuja, First Edition, Oxford University Press, 2015
4.	Social Media Marketing, Liana "Li" Evans, First Edition , Pearson, 2011.

Course Code	16B1NHS636	Semester : Even		Semeste Month	er VI Session 2018 -2019 from Jan 2019 to June 2019
Course Name	Literature & Adaption				
Credits	3	Contact Hours 2-1-0		2-1-0	

Faculty (Names)	Coordinator(s)	Dr. Monali Bhattacharya (Sector 62) Dr. Ekta Srivastava Sector (128)
	Teacher(s) (Alphabetically)	Dr. Ekta Srivastava, Dr. Monali Bhattacharya.

COURSE	COGNITIVE LEVELS	
C304-3.1	Understand and outline the elements and theories of adaptation and its various	Understand
	changes in the contemporary society.	Level (C2)
C304-3.2	Utilize visual literacy to analyze the language and style adopted in filmed texts and examine them as reflections of Readers' and Audience' values and perceptions in the context of myriad cultures and multidisciplinary settings individually and in groups.	Apply Level (C3)
C304-3.3	Analyze texts and their adaptations beyond the surface level of narrative or character as reflections of value systems of various cultures and times individually and in a team.	Analyse Level (C4)
C304-3.4	.4 Evaluate, interpret and document source texts and adaptations thematically and Evaluate I stylistically to learn the nuances of language, culture and values of the society.	
C304-3.5	Compose and make an effective presentation of a literary/non literary piece in any genre and design an ethical adaptation of any literary/non literary piece in another form individually and in groups.	Create Level (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction Literary Devices	Figures of speech, Character, Plotline, Conflict, Point of View	2
2.	Literature & Adaptation	Understanding Cultural Contexts Forms of Adaption Cinematography & Narratology	4
3.	Framework	Adaptation Theories; Reader Response & Audience Response Theories	4
4.	Play & adaptations	The Pygmalion: George Bernard Shaw Hamlet : William Shakespeare	6
5.	Novel & Adaptations	Pride & Prejudice: Jane Austen The Kite Runner: Khalid Hossenni	12

	The Namesake: Jhumpa Lahiri	
	The Godfather: Mario Puzo	
	Total number of Lectures	28
Evaluation Criteria		
Components	Maximum Marks	
T1	20	
T2	20	
End Semester Examination	35	
ТА	25 (Assignment, Poster Presentation, Oral Questions)	
Total	100	

Reco	ommended Reading material:
1.	Linda Hutcheon, A Theory of Adaptation, Routledge, 2006
2.	Mark William Roche , <i>Why Literature matters in the 21st Century</i> , 1 st edition, Yale University Press 2004
3.	George Bernard Shaw, Pygmalion, Electronic Version, Bartleyby.com, New York, 1999
4.	Stanley Wills & Gary Taylor , <i>The Complete Works. The Oxford Shakespeare</i> (Compact ed.). Oxford: Clarendon Press., 1988.
5.	Jhumpa Lahiri , The Namesake, 1 st Edition, Houghton Mifflin US, 2003
6.	Jane Austen, Pride & Prejudice, Reprint, Thomas Egerton, 2013
7.	Mario Puzo, The Godfather, 1 st Edition, <u>G. P. Putnam's Sons</u> , USA, 1969
8.	Khalid Hossenni, The Kite Runner, 1 st edition, Riverhead Books US, 2003

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Course Co	de	19B12HS613	Semester: Eve	en	Semester VI Session 2018 -2019 Month from: Ion 2010 June 2019		Session 2018 - 2019
				1011.	Jan 2019-June 2019		
Course Na	me	International Trade a	nd Finance				
Credits		03		Contact Hours		2-1-0	
			(
Faculty (N	ames)	Coordinator(s)	Dr. Amba Aga	rwal			
		Teacher(s) (Alphabetically)	Dr. Amba Agarwal				
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COURSE OUTCOMES COGNITIVE LEVELS			COGNITIVE LEVELS				
After pursuing the above mentioned course, the students will be able to:							
C304-8.1 Explain the foundations of international trade and finance in the era of Under globalisation.			Understanding Level (C2)				
C304-8.2	Analyz	ze the major models an	d theories of int	ernational ti	rade.		Analyzing Level (C4)
C304-8.3	04-8.3 Identify the effects of tariffs, quotas and technical progress on Applying Level (C3) economic growth.				Applying Level (C3)		
C304-8.4 Examine the equilibrium in the Balance of Payments (BOP) and measures to correct disequilibrium.			Analyzing Level (C4)				
C304-8.5	Compa trade n	are the fixed and flexib nultiplier & trade polic	and flexible exchange rate, monetary policy, foreign Analyzing trade policy.			Analyzing Level (C4)	
C304-8.6	Analyz	yze the working of regional blocks & international organization.			on.	Analyzing Level (C4)	

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	International trade and globalisation.	2
2.	Theory of International Trade	The pure theory of international trade -Theories of absolute advantage, comparative advantage and opportunity costs, modern theory of international trade; Theorem of factor price equalization; Theory of absolute cost and comparative cost.	4
3.	Economic Growth and International Trade Policy	Terms of trade, Technical progress: Neutral, Labour Saving and Capital Saving, Trade Restrictions: Tariffs, General equilibrium analysis of a tariff in a small and large country, Optimum tariff. Non-Tariff Barriers: Import Quota, Dumping, Voluntary Export Restraints, Export Subsidy.	5
4.	Balance of Payments	Meaning and components of balance of payments; balance of trade, equilibrium and disequilibrium in the balance of payments; Measuring Deficit or Surplus in BOP, Measures to correct it.	4
5.	Fixed and Flexible Exchange Rate	Fixed exchange rates and flexible exchange rates; Internal and External Balance, IS-LM-BP Model, Expenditure- reducing and expenditure-switching policies.	4
6.	Trade and Monetary Policy	Foreign Trade Multiplier, Devaluation, Review of the monetary approach to the theory of balance of payments adjustment. Trade problems and trade policies in India.	3

7.	The Theory of Regional Blocs & International organisation	y of Blocs & Rationale and economic progress of SAARC/SAPTA and ASEAN regions. Regionalism (EU, NAFTA); Functions of GATT/WTO (TRIPS, TRIMS), Custom Unions, IMF and World Bank.			
		Total number of Lectures	28		
Eval	uation Criteria				
Com	ponents	Maximum Marks			
T1	-	20			
T2		20			
End S	Semester Examination	35			
TA		25 (Assignment, Test, Quiz)			
Tota		100			
Recommended Reading material:					
1.	1. Bhagwati, J., International Trade, Selected Readings, Cambridge, University Press, Massachusetts, 1981				

2.	Kindleberger, C.P., International Economics, R.D. Irwin, Homewood, 1973
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3. Salvatore, D., International Economics, Prentice Hall, Upper Saddle River, N.J., New York, 1997

4. Soderston, Bo, International Economics, The Macmillan Press Ltd., London, 1991

Dana, M.S., International Economics: Study, Guide and Work Book, (5th Edition), Routledge Publishers, London, 2000

Course Code	18B12HS611	Semester :EVEN Semester Month fr		r VI Session 2018 -2019 rom Jan 2019 to June 2019	
Course Name	Marketing Managem	ent			
Credits	3	Contact Hours 2-1-0			2-1-0
Faculty (Names)	Coordinator(s)	Dr Swati Sharma			
	Teacher(s) (Alphabetically)	Dr. Swati Sharma			
COURSE OUTCOMES COGNITIVE LEV			COGNITIVE LEVELS		
After pursuing the above mentioned course, the students will be able to:					

-	-	
C304-7.1	To illustrate the fundamentals of marketing, marketing environment and market research	Understanding Level (C2)
C304-7.2	To model the dynamics of marketing mix	Applying Level (C3)
C304-7.3	To demonstrate the implications of current trends in social media marketing and emerging marketing trends.	Understanding Level (C2)
C305-7.4	To appraise the importance of marketing ethics and social responsibility	Evaluating(C5)
C-305- 7.5	To conduct environmental analysis, design business portfolios and develop marketing strategies for businesses to gain competitive advantage.	Creating (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Understanding New Age MarketingDefining Marketing For 21st Century The importance of marketing and marketing's role in business and society. Introduction to Digital Marketing. Online Communication Tools. The Social Media-Conversations, Community and Content. Affiliate Marketing and Mobile Engagement. The Digital Campaigns		5
2	Marketing Environment and Market Research and insights	Internal and external forces impacting marketers. Marketing and Customer Value. Gathering Information and Scanning the environment. Company's Micro and Macro Environment Responding to the Marketing Environment	3
3	Strategic Planning and the marketing Process	Explore the impact of social forces on marketing actions. Describe how technological change affects marketing. Designing the business Portfolio Discuss the Strategic Planning Process and Strategic	5

		Marketing Process.		
4	Consumer and Business Buyer BehaviorConsumer Markets and consumer buyer behaviour. The buying decision process. Business Markets and business buyer behaviour. Discuss the modern ethical standards.			
5	Branding	Brand Image, Identity and Association. Product brands and Branding decisions. Product line and mix decisions. Consumer Brand Knowledge. New Product Development and Product life cycle strategies.	4	
6	Pricing products: Pricing considerations and strategies	Factors to consider when setting prices. New product pricing strategies. Product mix pricing strategies. Price adjustments and changes.	4	
7 The New Age Social Marketing		 Ethics and social responsibility in marketing. Ethical behavior in business. Ethical decision making. Social forces affecting marketing. Impact of culture on marketing. Discuss modern ethical standards. Importance of marketing in CSR and business sustainability. 	2	
		Total number of Lectures	28	
Evaluation Criteria Components T1 T2 End Semester Examination TA Total		Maximum Marks 20 20 35 25 (Assignment and Viva) 100		
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Reference Books, Journals, Reports, Websites etc. in the IEEE format)				

1.	Kotler, Philip and Gary Armstrong, Principles of Marketing, 17 th Edition, New Delhi, Pearson Education, 2017.
2.	Kotler, Philip., and Kevin Lane Keller, Marketing Management, 15 th Edition, New Delhi, Pearson Education, 2014.
3.	Grewal D., &Levy Michael, Marketing, 5 th Edition, Mc graw Hill Education (India) Private Limited 2017.
4.	Winer, Russell S ., Marketing Management, 4 th Edition, Prentice Hall,2014.

Course Code	19B12HS611	Semester : EVEN (specify Odd/Even)		Semester : VI Session 2018 -2019 Month from: January- June	
Course Name	Econometric Analysi	5			
Credits	03	Contact H		Hours	2-1-0
Faculty (Names)	Coordinator(s)	Manas Ranjan Behera			
	Teacher(s) (Alphabetically)	Manas Ranjan Behera			

COURSE OU	TCOMES	COGNITIVE LEVELS
After pursuing t		
C304-2.1	<i>Demonstrate</i> the key concepts from basic statistics to understand the properties of a set of data.	Understanding Level –(C2)
C304-2.2	<i>Apply</i> Ordinary Least Square method to undertake econometric studies.	Apply Level – (C3)
C304-2.3	<i>Examine</i> whether the residuals from an OLS regression are well-behaved.	Analyze Level – (C4)
C304-2.4	<i>Evaluate</i> different model selection criteria for forecasting.	Evaluation Level – (C5)
C304-2.5	<i>Create</i> models for prediction from a given set of data.	Creation Level – (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Statistical Inference	Point and interval estimation; ;The Z distribution ;The Null and Alternate hypotheses ;The chi-square distribution; The F distribution; The t distribution	3
2.	Regression Analysis	Two variable regression model; The concept of the PRF; Classical assumptions of regression; Derivation of the OLS estimators and their variance; Properties of OLS estimators under classical assumptions; Gauss-Markov Theorem; Tests of Hypothesis, confidence intervals for OLS estimators; Measures of goodness of fit: R square and its limitations; Adjusted R square and its limitations	7
3.	Econometric Model Specification	Identification: Structural and reduced form; Omitted Variables and Bias; Misspecification and Ramsay RESET; Specification test; Endogeneity and Bias	5
4.	Failure of Classical Assumptions	Multi-collinearity and its implications; Auto-correlation: Consequences and Durbin-Watson test ;Heteroskedasticity: Consequences and the Goldfeld -Quandt test	2
5.	Forecasting	Forecasting with a)moving averages b) linear trend c) exponential trend CAGR; Forecasting with linear regression; Classical time series decomposition; Measures of forecast performance: Mean square error and root mean	5

square error; Limitations of econometric forecasts					
6.	Time Series Analysis	Univariate Time Series Models: Lag Operator, ARMA, ARIMA models, Autoregressive Distributed Lag Relartionship	3		
7.Linear ProgrammingLi programming		Linear programming; Dual of a linear programming problem; Simplex method Transportation	3		
		Total number of Lectures	28		
Eval	uation Criteria				
Com	ponents	Maximum Marks			
T1		20			
T2		20			
End	Semester Examination	35			
TA		25 (Quiz+ Assignment+Viva -Voce)			
Tota	1	100			
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Reco Refe	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)				
1.	Gujarati, D.N. (2002), Basic Econometric (4 th ed.), New York: McGraw Hill.				
2.	Greene, W.H. (2003), Eco	nometric Analysis, New Jersey: Prentice Hall.			
3.	Madala, G.S. (1992), Intro	duction to Econometrics (2 nd ed.), New York: Macmillan.			

Course Co	Sourse Code 15B11EC611 Semester - EVEN Semester 6 Session 2018 Month from Jan 2019 to Ju			18 -2019 June 2019					
Course Na	e Name Telecommunication Networks								
Credits	s 4 Contact Hours 4					1			
Faculty (Names)Coordinator(s)1. Ankur Bhardwaj2. Anand Agrawal(CCC)				CCC)					
		Teacher(s) (Alphabetica	ally)	 Ankur Bhard Dr. Bhagirath Bhawna Gup Dharmendra Neetu Singh 	lwaj h sahu pta I Jhariya				
COURSE	OUTCO	OMES						COGNIT	IVE LEVELS
CO1	Unders Traffic	stand the basic Engineering a	concept and swite	s of Telecommu ching technologi	nication ne es.	twork mo	del,	Understan	ding (Level II)
CO2	Unders and flo	stand the conce ow control mec	epts of C hanisms	SI model and ar introduced by d	nalyze the v lata link lay	arious err er.	or	Analyzing	g (Level IV)
CO3	Unders concep a netw	stand the TCP/ ot of subnetting ork.	IP proto to alloc	col, routing algo cate and distribut	rithm and a te the logica	apply the al address	es in	Apply (L	evel III)
CO4	Unders ATM,	erstand concept of LAN access protocols, ISDN, B-ISDN and Understanding (1, their implementation and performance issues.			ding (Level II)				
	,			and performance	155465.				
Module No.	Title o Modu	f the le	Topics	s in the Module					No. of Lectures for the module
Module No. 1.	Title o Modul Teleco networ	f the le ommunication k model	Topics Teleco types	s in the Module	twork mode	el, Differe	ent netv	works	No. of Lectures for the module 2
Module No. 1. 2.	Title o Modul Teleco networ Switch techno	f the le ommunication tk model logies	Topics Teleco types Switch networ Switch Multip Princip Messag	mmunication ne med Communica ks, Time Divis- ing, Time D lexed Time Sw oles-Datagram ge switching.	ation Netw ion Switch Division T vitching and and Virt	el, Differe vorks, Ci ing-Time Time Sv d TSI, P ual Cire	rcuit Divisi vitchin acket cuit	works Switching ion Space g, Time Switching Approach,	No. of Lectures for the module 2 12
Module No. 1. 2. 3.	Title o Modul Teleco networ Switch techno Compu Netwo	f the le ommunication tk model hing logies	Topics Teleco types Switch networ Switch Multip Princip Messay Seven primiti	mmunication ne ed Communica ks, Time Divis ing, Time D lexed Time Sw oles-Datagram ge switching. layered OSI moo ves and services	twork mode ation Netw ion Switch Division T vitching and and Virt del, Functio	el, Differe vorks, Ci ing-Time Fime Sv d TSI, P ual Circ	ent netv rcuit Divis: vitchin acket cuit erent la	works Switching ion Space g, Time Switching Approach, ayers,	No. of Lectures for the module 2 12 2
Module No. 1. 2. 3. 4.	Title o Modul Teleco networ Switch techno Compu Netwo Detaile of data	of the le ommunication tk model ing logies uter rks ed working link layer	Topics Teleco types Switch networ Switch Multip Princip Messag Seven primiti Data li Contro Back-P Analys	s in the Module mmunication ne ded Communica ks, Time Divis ing, Time D lexed Time Sw bles-Datagram ge switching. layered OSI mod ves and services nk Control, Flow bl, Sliding Windo N ARQ, Selectiv sis, HDLC.	twork mode ation Netw ion Switch Division T vitching an and Virt del, Function w Control, S ow Flow Co e-Reject Al	el, Differe vorks, Ci ing-Time Fime Sv d TSI, P ual Circ ons of diff Stop and V ontrol, Err RQ, Perfo	ent netv rcuit Divisi vitchin acket cuit erent la vait flo or Cor rmanc	works Switching ion Space g, Time Switching Approach, ayers, ayers, ow itrol, Go- e	No. of Lectures for the module21226
Module No. 1. 2. 3. 4. 5.	Title o Modul Teleco networ Switch techno Compu Netwo Detaile of data	of the le ommunication tk model hing logies uter rks ed working hink layer rk, Transport tysical layers.	Topics Teleco types Switch networ Switch Multip Princip Messa Seven primiti Data li Contro Back-N Analys Basic D Routin routing	s in the Module mmunication ne ed Communica ks, Time Divis ing, Time Divis ing, Time Divis ing, Time Divis lexed Time Sw bles-Datagram ge switching. layered OSI mod ves and services nk Control, Flow bl, Sliding Windo N ARQ, Selectiv sis, HDLC. Principles of Net g Schemes-Dis g, Hierarchical ro	twork mode ation Netw ion Switch Division T /itching and and Virt del, Function del, Function del del del del del del del del del del	el, Differe vorks, Ci ing-Time Sime Sv d TSI, P ual Circ ons of diff Stop and V ontrol, Err RQ, Perfo isport and ctor rout	ent netv rcuit Divisi vitchin acket cuit erent la or Cor rmanc Physi ing, l	works Switching ion Space g, Time Switching Approach, ayers, ayers, ow atrol, Go- e cal layers. Link-State	No. of Lectures for the module212266

7.	Local area networks	LAN Protocols-ALOHA, CSMA, CSMA-CD, Implementation and performance issues, High speed LAN.	6		
8.	ISDN, B-ISDN ATM.	Introduction to ISDN, B-ISDN and ATM.	2		
		Total number of Lectures	40		
Eval	uation Criteria				
Com	ponents	Maximum Marks			
T 1		20			
T2		20			
End	Semester Examination	35			
TA		25 (10 – attendance, 10 - Quiz/Assignment/tutorial, 5 -Class r	performance)		
Tota	1	100			
U					
Reco Refe	ommended Reading mater rence Books, Journals, Rep	ial: Author(s), Title, Edition, Publisher, Year of Publication etc. orts, Websites etc. in the IEEE format)	(Text books,		
1.	W. Stallings, Data & Com	puter Communication, PHI			
2.	B. A Forouzan, DATA COMMUNICATIONS AND NETWORKING, 4 th Edition TMH				
3.	A.S. Tanenbaum, Comput	er Networks, PHI			
4.	John C. Bellamy, Digital	Celephony, 3 rd Edition, Wiley.			

5. Thiagarajan Viswanathan, Telecommunication Switching Systems and Networks, PHI

Detailed Synabus							
Course C	ode	15B11CI518	Semester - ODD Semester VI Session 2018 -2019		Session 2018 - 2019		
			(specify Odd	/Even)	Month	from J	an '19 to Jun '19
Course N	ame	Data Structures & A	lgorithms				
Credits		3-1-0	0 Contact Hours 4			4	
			Ш.				
Faculty		Coordinator(s)	Dr. K. Vimal Kumar				
(Names)	(Names) Teacher(s) Prantik Biswas, Shardha Porwal, Dr. Tribhuwan Tewar Vimal Kumar		Fribhuwan Tewari, Dr. K				
COURSE	COURSE OUTCOMES COGNITIVE LEVELS						
Explain the fundamental Data Structures including linked-lists, trees, Understand			Understand level				

Detailed Syllabus

	binary search trees, AVL trees, heap trees, graphs, and hash-tables.	(Level 2)
CO2	Analyze and compare different sorting algorithms - Merge Sort, Quick sort, Shell sort and Bucket Sort.	Evaluating Level (Level 5)
СО3	Develop basic programs using data structures in various real-time practical problems	Apply Level (Level 3)
CO4	Formulate novel solutions for programming problems or improve existing code using learned algorithms such as, Backtracking, Branch and Bound, Greedy algorithm and Dynamic programming	Apply Level (Level 3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to data structures, lists, Doubly linked list, circular linked list, multi linked list, Applications - sparse matrix representation, Stack and queue (array and linked list representation)	6
2.	Algorithm Complexity	Abstract data type, Growth of function, Space-Time tradeoffs, Complexity analysis of algorithms - Asymptotic analysis	2
3.	Sorting & Searching	Merge Sort, Quick sort, Shell sort, Bucket Sort, Median search, Interpolation search	6
4.	Trees Binary Tree, Binary Search tree, AVL Tree, RB Tree Tree, B+ Tree		7
5.	Heaps	Introduction, Binary heap, Binomial heap, Skew heaps	5
6.	Graph	Introduction to graphs, Representation – adjacency list, adjacency matrix, Traversal – BFS, DFS, Minimum	8

7.		Hashing	Introduction to hashing, Collision resolution – open and closed hashing methods	4	
8.	Algorithm Backtracking Algorithm (n-queens puzzle, rat in a maze), Branch and Bound, Greedy algorithm, Dynamic programming			6	
			Total number of Lectures	44	
Eval	uation	Criteria			
Com	ponent	S	Maximum Marks		
T2			20		
End S TA Tota	Semeste I	er Examination	35 25 (Assignment-10, Quiz-10, Regularity & Attendance-5) 100		
Reco book	ommen s, Refe	ided Reading mate erence Books, Journ	erial: Author(s), Title, Edition, Publisher, Year of Publica als, Reports, Websites etc. in the IEEE format)	tion etc. (Text	
1.	Yedid 2 nd Ed	yah Langsam, Moshe ition, PHI, 2001	2 J., Augenstein and Aaron M. Tenenbaum: Data Structures Us	sing C and C++,	
2.	Kurt N	Mehlhorn: Data Struct	ures and Algorithms 3, Springer, 1984		
3.	Dines	h P Mehta, Sartaj Sah	ani: Handbook of Data Structure and Applications, Chapman &	z Hall, 2004	
4.	Mark	Allen Weiss: Data Str	ructures and Algorithm Analysis in C, 2 nd Edition, Pearson		
5.	Sahni:	Data Structures, Alg	orithms and applications in C++, Universities press, Hyderabac	1, 2005	
6.	Kruse, Tonso, Leung: Data Structures and Program Design in C, 2rd Edition, Pearson Education Asia, 2002				
7.	Weiss, Mark Allen: Data Structures and Algorithm Analysis in C/C++, 2nd Edition, Pearson Education Asia, 2003				
8.	Corme	en et al: Introduction t	to Computer Algorithms, 2nd edition, PHI New Delhi 2003		
9.	Aho, Hopcraft, Ullman: Data Structures and Algorithms, Pearson Education Asia (Adisson Wesley), New Delhi, 2001				
10.	Standish: Data Structures in Java, Pearson Education Asia (Adisson Wesley), New Delhi, 2000				
11.	Knuth Wesle	: The Art of Compu y), New Delhi, 2002	tter programming Vol I, Vol III, 2nd edition, Pearson Educati	on Asia (Adisson	
12.	Heilen Delhi,	nan: Data Structure 2002	s, Algorithms and Object Oriented Programming, Tata Mc-	Graw Hill, New	
13.	Sorens Hill, N	son and Tremblay: A New Delhi, 2003	In Introduction to Data Structures with Algorithms, 2nd Editio	n, Tata Mc-Graw	

Detailed Syllabus

Subject Code	15B11CI578	Semester: Odd	Semester EVEN Session 2018-2019 Month from Jan'19 to Jun'19
NBA Code	C311		
Subject Name	Data Structures & Al	gorithms Lab	
Credits	1	Contact Hours	2

Faculty	Coordinator(s)	Suma Dawn
(Names)	Teacher(s) (Alphabetically)	K Vimal Kumar, Neetu Sardana, Prashant Kaushik, Suma Dawn, Taj Alam, Tribhuwan Tewari

COURSE	OUTCOMES	COGNITIVE LEVELS
C311.1	Demonstrate the use of basic data structure and algorithm design such as Linked lists, Stacks, Queues, and others, for various applications.	Understanding Level (C2)
C311.2	Interpret the complexity of algorithms for given problems.	Understanding Level (C2)
C311.3	Apply Searching, Sorting, and Trees and use their properties for abstractions and defining modules for implementing functionalities.	Apply Level (C3)
C311.4	Examine case-study specific application of Heaps, Graphs, and Hashing methods.	Apply Level (C3)
C311.5	Model algorithmic solutions for small real-life problems using Backtracking, Greedy algorithm and Dynamic programming, Branch and Bound, and others	Apply Level (C3)

Module No.	Title of the Module	List of Experiments	СО
1.	Introduction & Algorithm Complexity	Lab Assignments 1, 2: Conversion from one number system to another; Manipulation with arrays and strings, structures; Manipulation with a single Linked lists of integers; Stacks and Queues Finding Complexity: Big O, Big Omega Lab Assignment 6: Cost Analysis	CO1, CO2, Understanding Level (C2)

2.	Sorting, Searching & Trees	Lab Assignments 2, 3: Doubly Linked List, Circular Linked List, Multi-Linked Lists	CO1 Understanding (C2)	Level	
		Lab Assignments 4, 5: Sorting, Searching, Application based.	CO3		
		Lab Assignments 6: Binary Tree, Binary Search Trees, AVL Tree, Case-study: Priority Queue with Binary Trees	Apply Level (C3)		
3.	Heaps, Graph	Lab Assignments 7: B Trees, Heaps, Lab Assignments 8: Directed and undirected graphs, weighted graphs, etc.	CO4 Apply Level (C3)		
4. Hashing & other Algorithms		Lab Assignments 9: Hashing, Backtracking, Branch and Bound, Greedy Algorithms, Dynamic Programming.	CO5 Apply Level (C3)		
Eval	uation Criteria				
Components Lab Test 1 Lab Test 2 Day-to-Day Evaluations Day-to-Day - Attendance		Maximum Marks 20 20 45 15			
Tota	1	100			
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)					
1	Yedidyah Langsam, Moshe J., Augenstein and Aaron M. Tenenbaum: Data Structures Using C and C++, 2 nd Edition, PHI, 2001				
2	Kurt Mehlhorn: Data S	tructures and Algorithms 3, Springer, 1984			

- 3 Dinesh P Mehta, Sartaj Sahani: Handbook of Data Structure and Applications, Chapman & Hall, 2004
- 4 Mark Allen Weiss: Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson

5 Sahni: Data Structures, Algorithms and applications in C++, Universities press, Hyderabad, 2005

- 6 Kruse, Tonso, Leung: Data Structures and Program Design in C, 2rd Edition, Pearson Education Asia, 2002
- 7 Weiss, Mark Allen: Data Structures and Algorithm Analysis in C/C++, 2nd Edition, Pearson Education Asia, 2003
- 8 Cormen et al: Introduction to Computer Algorithms, 2nd edition , PHI New Delhi 2003
- 9 Aho, Hopcraft, Ullman: Data Structures and Algorithms, Pearson Education Asia (Adisson Wesley), New Delhi, 2001
- 10 Standish: Data Structures in Java, Pearson Education Asia (Adisson Wesley), New Delhi, 2000
- 11 Knuth: The Art of Computer programming Vol I, Vol III, 2nd edition, Pearson Education Asia

	(Adisson Wesley), New Delhi, 2002
12	Heileman: Data Structures, Algorithms and Object Oriented Programming, Tata Mc-Graw Hill, New Delhi, 2002
13	Sorenson and Tremblay: An Introduction to Data Structures with Algorithms, 2nd Edition, Tata Mc-Graw Hill, New Delhi, 2003

Course Code	15B11EC613	Semester: Even		Semester: 6 th Session: 2018 -2019 Month from: Jan-May	
Course Name	Control Systems				
Credits	4		Contact Hours		4
Faculty (Names)	Coordinator(s) Dr. Jitendra		a Mohan, Dr. Shamim Akhter		
	Teacher(s)Dr .Bhartender(Alphabetically)Singh, Dr. M		Chaturvedi gha Agarwa	, Dr. Jiten 1, Dr. Sha	dra Mohan, Dr. Kirmender mim Akhter, Ms. Ruby Beniwal

COURSE	OUTCOMES	COGNITIVE LEVELS
CO1	Classify the open loop and closed loop control systems and construct mathematical model for physical systems.	Applying (Level III)
CO2	Solve complex systems through block diagram reduction method and signal flow graph technique.	Applying (Level III)
CO3	Determine transient response and steady state response of the systems using standard test signals.	Evaluating (Level V)
CO4	Analyze the stability of the system and select suitable controllers and compensators for linear time invariant system.	Analyzing (Level IV)
CO5	Apply time domain and frequency domain techniques to identify the stability of control systems.	Applying (Level III)
CO6	Solve continuous time and discrete time systems using state variable approach.	Applying (Level III)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Control System	Development of control systems, non feedback and feedback systems, negative feedback a means of automatic regulation, basic classification of control systems	3
2.	Modeling and Mathematical Representation of Systems	Block diagram simplification of continuous-time systems, Classification of system models, input – output description of systems, signal flow graph representation	8
3.	Time Domain Analysis and Design	Time domain response, steady state error and error coefficients, design considerations for second order systems, time domain response considerations for higher order systems. PID Controller	7
4.	Stability Analysis for continuous- time systems	Basic stability concept of linear systems, absolute stability criteria for continuous-time systems, relative stability Concepts	5
5.	Root Locus Method and Design in Time Domain	Fundamentals of Root Locus, construction of root loci, root contour diagram	6

6.	Frequency Bodes plot and Nyquist plot, Gain Margin & Phase		7		
•••	Response Analysis	Analysis Margin, stability analysis			
	and Design				
7.	State Variable	State variable representation of continuous-time	6		
	Approach to Time	systems; System Response and State Transition Matrix			
	Domain Analysis	(STM); Applications of STM.			
		Total number of Lectures	42		
Eval	uation Criteria				
Com	ponents N	Aaximum Marks			
T1		20			
T2		20			
End	End Semester Examination 35				
TA	TA 25 (Attendance : 5 Marks, Quiz:10 Marks, Assignment: 10 Marks)				
Tota	Total 100				
Reco	ommended Reading material	: Author(s), Title, Edition, Publisher, Year of Publication etc. (7	Fext books,		
Refe	Reference Books, Journals, Reports, Websites etc. in the IEEE format)				
-	I. J Nagrath and M. Gopal, Control Systems Engineering, Fifth edition, New age International, 5 th				
1.	Ledition, 2009.				
2.	2. Normal S. Nise,, Control Systems Engineering, 7 th Edition, John Wiley,2014				
3.	K.Ogata, Modern Control Er	K.Ogata, Modern Control Engineering, 5 th Edition, Prentice Hall, 2010			

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Course Code 16B1NHS634 Semester: Even Semester VI Month from			Session 2 Jan 2019 to	018 -2019 0 June2019				
Course Name		Theatre and Perfor	mance					
Credits		2	Contact Hours 1-0-2		2			
Faculty		Coordinator(s)	Dr Nilu Choud	lhary				
(Names)		Teacher(s) (Alphabetically)	Dr Nilu Choudhary					
CO Codo					IVE I EVELS			
COCode								
C305-20.1	.1 Demonstrate problem solving ability and effective life skills through Understanding level(0 theatre performances.					iding level(C2)		
C305-20.2	Develop awareness of the role of these arts in human life Understanding level(iding level(C2)				
C305-20.3	20.3 Apply skills of listening, articulation, awareness and collaboration through the creation of performance. Applying level(C3)				level(C3)			
C305-20.4	Design and present an original performance alone or in collaboration Creating level(C6) with other artists.				evel(C6)			

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction of Theatre	History of theatre: role of theatre in human culture with special reference to India	2
2.	Characterization	Tips for developing character, thinking about thoughts, Flash –back, Performance	2
3.	Script Writing	Turning a story into a play, How to write a one Act, setting the scene, character, stage direction, Dialogues	3
4.	School of Drama	Natya-Shastra, Stanislavsky and Brecht	3
5.	Text and its interpretation	Mother Courage ,Galileo , Aadhe Adhure (any one)	3
6.	Back-stage work	Management, planning, execution	1
		Total number of Lectures	14

Module No.	Title of the Module	List of Experiments/Activities	СО
1.	Moving in Space.	Students will be moving around the room, filling up the space, changing pace, changing direction, being aware of other people but not touching them. Find new ways of moving, with a different emphasis each time – smooth, jagged, slow, fast, heavy, light, high up, low down and so on. Every now and again Teacher will shout "Freeze! And Students need to freeze every	C305- 20.1

		muscle in your body. Absolutely NO LAUGH, LOOKING AROUND, OR MOVING. You will be out.	
2.	Mirror Activity	A great way to get students aware of body movement and working together.	C305- 20.1
3.	Characterization	Developing and analyzing characters to reveal the special qualities and personalities of the characters in a story, making character believable.	C305- 20.2
4.	Script Writing	The more passionate you feel about your idea, the more attractive your play will be. Divide the idea into a beginning, middle and end.	C305- 20.3
5.	Role Assignment	No acting or movement at this point – just sit together to speak and hear the script carefully. Discuss and clarify any confusing aspects of the script and any apparent challenges in bringing the script to the stage. Division of script into small "units" and rehearsed separately	C305- 20.3
6.	Turning story into a play	Read thru each episode or unit separately "on its feet". Actors moving around the stage space. Set blocking for each episode. Use ideas generated from Mini-Episodes, and Staging with Images. Make sure the gestures, movements, and stage pictures tell the story clearly.	C305- 20.3
7.	Stage blocking	Practice the blocking and the lines so that everyone knows what happens when and what their performance responsibilities are. Memorize lines. Work on making characters, relationships, and dialogue clear. This is a good place in which to use the Creating the Character lessons. Pay attention to vocal projection and articulation. Generate ideas about any technical elements you want to incorporate using the Transformation of Objects.	C305- 20.3
8.	Script to performance	Finalize and run the entire play from beginning to end without stopping to check any additional rehearsal required to get everything running smoothly or not. Finally Perform!!	C305- 20.4

Evaluation Criteria	
Components	Maximum Marks
Mid Term	30
End Term	40
ТА	30 (Presentation 1, Presentation 2 and Assignment)
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Eric Bentley, ed., The Theory of the Modern Stage: An Introduction to Modern Theatre and Drama, Penguin Books, 1968
2.	Mark Fontier, Theory/ Theatre: An Introduction, New York: Routledge, 2002
3.	Michael Holt, Stage Design and Property, Oxford: Phaidon, 1986
4.	Michael Holt, Costume and Make-up, Oxford: Phaidon, 1988
5.	Natyashastra, tr. by Adya Rangacharya, New Delhi: Munshiram Manoharlal, 1996,

•		1			
Course Code	19B13HS611	Semester: Even Se		Semester: VI Session: 2018 -2019	
				Month	From Jan 2019 to June 2019
Course Name	Morality of Everyday Living and Moral Decision Making				
Credits 2			Contact I	Hours	1-0-2

Faculty (Names) Coordinator(s)		Ms Puneet Pannu, Dr Deepak Verma
	Teacher(s) (Alphabetically)	Ms Puneet Pannu, Dr Ekta Srivastava, Dr Praveen Sharma, Dr Deepak Verma

COURSE O	DUTCOMES	COGNITIV E LEVELS
C305-3.1	Apply and Analyze morality in all facets of personal and professional life	
		Analyze
		(C4)
C305-3.2		Analyze
	Discover ways to address moral dilemmas by deliberating on the pros and cons to	(C4)
	find the best possible outcome	
C305-3.3		Evaluate
	Justify and Formulate morally correct decisions and stand by them	(C5)
C305-3.4		Create
	Adapt and develop a character respected by peers and superior alike	(C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	The Big Questions: Origins of Morality	What is morality? Universal aspects of morality, Evolution of Morality, Development of Morality, Morality Theories, Everyday Dilemmas and Decision Making	4
2.	Compassion/ Empathy	Reason/Emotion; Where does concern for others come from? Empathy—and is more empathy necessarily a good thing? And what can we learn from the study of those who seemingly lack normal moral feelings, such as violent psychopaths?	3
3.	Moral Differences	How does culture influence our moral thought and moral action? What role does religion play? Why are some of us conservative and others liberal, and how do political differences influence our sense of right and wrong?	2
4.	Moral Circles: Family, Friends, and Strangers	Moral feelings: Family, Friends, and allies. Reciprocal Altruism, The Morality of Group Preference, Morality of racial and ethnic bias. : Stereotypes, How Do We Treat Strangers	2
5.	Moral Decision Making	Contemporary Everyday Ethical Issues	3
		Total number of Lectures	14

Module No.	Title of the Module	List of Experiments/Activities	СО
1.	The Big Questions: Origins of Morality	Experiential Sharing: Morality & its significance to them Case Study: No such thing as free drink.	C305-3.1
2.	The Big Questions: Universal Aspects of Morality	Universal Aspects of Morality: Big Questions: Why be good? Universal Aspects of Morality: Big Questions: Is it permissible to lie? Universal Aspects of Morality: Big Questions: Is it good to gossip??	C305-3.1
3.	The Big Questions: Everyday Dilemmas and Decision Making	UPSC Case Study Ethical Dilemma of a Marketing Manager	C305-3.2 C305-3.3
4.	Evolution & Development of Morality	Ethical Analysis: A young Professor's Career	C305-3.1 C305-3.2 C305-3.3
5.	Compassion/ Empathy: Reason v/s Emotion	Discussion: Can we do better than the Golden Rule Discussion: Obligation to Others/ Is jealousy & Resentment always bad?	C305-3.1 C305-3.4
6	Compassion/ Empathy	EI Assessment Discussion on Reading: What's the matter with Empathy?	C305-3.1 C305-3.4
7	Moral Differences	Case Study: Difference in Morality Experiential Exercise: Country/ Org/ Home Moral Culture	C305-3.4
8	Moral Circles: Family, Friends, and Strangers	Experiential Sharing: Moral Circles and their influence on us Stereotyping in Morality	C305-3.4
9	Moral Decision Making	Contemporary Real World Scenario: Analyzing it through CATWOE	C305-3.1 C305-3.2 C305-3.3 C305-3.4

Evaluation Criteria			
Components	Maximum Marks		
Mid Term	30 (Project Presentation)		
End Semester Examination	40 (End Term Written Paper)		
ТА	30 (Case Study Assessment, Assignment, Oral Questions)		
Total	100		

Reco Refe	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)		
1.	Martin, Clancy "Moral Decision Making: How to approach everyday Ethics", The Great Courses, USA, 2014		
2.	Shukla T., Yadav A.& Chauhan G.S." Human Values & Professional Ethics", Cengage Learning India Pvt Ltd, 2018		
3.	Khanka S.S. "Business Ethics & Corporate Governance (Principles & Practices)", S. Chand, 2014		
4.	Mruthyunjaya H.C.," Business Ethics & Value systems", PHI Learning Pvt Ltd, 2013		

Course Code	18B13HS612	Semester : Even		mester : Even Semester VI Session		
			Month from Jan 2019 to June 2019			
Course Name	Course Name Effective tools for Career Management and Development					
Credits 2 Contact H		ours	1-0-2			

Faculty (Names)	Coordinator(s)	Dr Kanupriya Misra Bakhru
	Teacher(s) (Alphabetically)	Dr Kanupriya Misra Bakhru

COURSE	OUTCOMES	COGNITIVE LEVELS
C305-2.1	Assess ones personal priorities, skills, interests, strengths, and values using a variety of contemporary assessment tools and reflection activities.	Evaluate Level (C 5)
C305-2.2	Apply knowledge of all the Career Stages in making informed career decisions.	Apply Level (C 3)
C305-2.3	Develop and maximize ones potential for achieving the desired career option.	Create Level (C6)
C305-2.4	Analyze the processes involved in securing and managing career by employees of different organizations.	Analyze Level (C 4)

Module	Title of the	Topics in the Module	No. of
No.	Module	•	Lectures and Tutorial for the module
1.	Introduction to Career Life cycle	Introduction to Career Life Cycle of an individual-Role and importance of human resource in an organization, Evolution of Strategic Human Resource Management.	3
2.	Self Branding and strategies to do well in Recruitment and Selection	Introduction to complete cycle of Recruitment and Selection, Introduction to various tools used for assessment and testing candidates-aptitude test, personality test, graphology test etc. Introduction to Workforce planning, Importance and practical application of Job Analysis, Job Description and Job Specification.	3
3.	Personnel Development and your career	Introduction to various learning and development, Introduction to various techniques used for learning and development, measure of training effectiveness, Training techniques / delivery, Kirkpatrick Model, Introduction to Succession Planning, Transactional Analysis.	3
4.	Human Resource Evaluation and Compensation	Performance Management: Measurement Approach, Developing Job Descriptions, Key Result Areas, Key Performance Indicators, Assessment Centre, 360 Degree feedback, Balanced Scorecard, Effective Performance Metrics. Compensation Strategy and trends- Compensation package, ESOPs, Performance based pay, Recognition, Retrial benefits, Reward management, Team rewards.	3

5.	Human Resource Control and special topics	Human Resources Audit, The Human Resource Information System (HRIS), Human Resources Accounting, Competency Management, Human Resource Management Practices in India, Internationalization of Human Resource Management Commonly Used Jargons.	2		
Total number of Lectures					

Module No.	Title of the Module	List of Experiments/Activities	СО
1.	Introduction to Career Life cycle	Practical Sessions on Resume and Cover Letter Writing	C305-2.1, C305-2.2
2.	Self Branding and strategies to do well in Recruitment and Selection	Practical Sessions on Job Description, Job Specification and Self-Branding	C305-2.3, CO4
3.	Personnel Development and your career	Practical Sessions on Johari Window-Knowing Thyself, Transaction Analysis-Parent, Child, Adult Ego State for effective interpersonal communication.	C305-2.1, C305-2.3
4.	Human Resource Evaluation and Compensation	Practical Sessions on HR Interview and Mock HR Interview	C305-2.2, C305-2.4
5.	Human Resource Control and special topics	Practical Sessions on Group Discussions and Mock Group Discussions	C305-2.2, C305-2.4

Evaluation Criteria	
Components	Maximum Marks
Mid Term	30 (Project)
End Term	40 (Written)
ТА	30 (Class Mock Activities, Assignment, Quiz)
Total	100

Reco	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books,				
Refe	Reference Books, Journals, Reports, Websites etc. in the IEEE format)				
1.	Pande and Basak, Human Resource Management- Text and Cases, Pearson, 2012				
2.	Dessler and Varkkey, Human Resource Management, Pearson, 2011				
3.	VSP Rao, Human Resource Management, Excel Books, 2007				
4.	Aswathappa, Human Resource Management, McGraw-Hill, 2010				
5.	Gary Dessler, Human Resource Management, Pearson/Prentice Hall, 2005				

Course Code		16B19HS692		Semester: EVEN Semester Month fr		er VI from .	Session 2018-19 Jan 2019 to June 2019		
Course Name		Psychological	Testin	g					
Credits		2			Contact H	Contact Hours 1-0-2			
Faculty (Names)		Coordinator(s)	Dr. Ruchi Gau	tam				
		Teacher(s) (Alphabetical	ly)	Dr. Ruchi Gautam					
CO Code COURSE OUTCOMES			COGNIT	IVE LEVELS					
C305-19.1	05-19.1 Explain the various concepts of psychological testing.			Understan	ding Level (C2)				
C305-19.2	5-19.2 Apply concepts from psychological testing to researches and real life Apply Level scenarios.			v Level (C3)					
C305-19.3	Analyze the different psychological tests. Analyze Level (C4)			ze Level (C4)					
C305-19.4 Evaluate the psycho		uate the psychological	ogical	gical testing procedures.		Evaluate Level (C5)			
				N f					

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Psychological Testing	Psychological Testing: History and Overview	1
2.	Nature of Psychological Tests	Timeline; Types of Tests: Intelligence Tests, Aptitude Tests, Achievement Tests, Creativity Tests, Personality Tests, Interest inventories, and Behavioral procedures; Uses of tests.	2
3.	Types of Scales	Concept and Different types of scales: Nominal, Ordinal, Interval, and Ratio.	2
4.	Item Writing	Test Construction; Principles of Item Writing; Factor Analysis	2
5.	Item Analysis	Concept, Procedure, Factor Analysis, Discrimination Index, Difficulty Value, Criteria for Selection & Rejection Items.	2
6.	Interpretation of Scores	Standardized procedure; Scores or categories; Norms or standards; and Prediction of non-test behavior	1
7.	Reliability	Meaning, Types: Test-Retest Reliability, Parallel-Forms Reliability, and Internal Consistency Reliability.	2
8.	Validity	Concept, Types: Face validity, Content validity, Construct validity, and Criterion validity.	2
Total num	iber of Lectures		14

Mod No.	ule Title of the Module	List of Experiments/Activities	СО		
1.	Item Writing Item Analysis Interpretation of Scores Reliability Validity	Personality Big Five Inventory / Personality Assessment Inventory	C305-19.2 C305-19.3 C305-19.4		
2.	Item Writing Item Analysis Interpretation of Scores Reliability Validity	Cognitive Emotion Regulation Questionnaire/ Indian Adaptation of the Multidimensional Aptitude Battery - MAB - II	C305-19.2 C305-19.3 C305-19.4		
3.	Item Writing Item Analysis Interpretation of Scores Reliability Validity	Cognitive Failures Scale/ Test of Memory and Learning - Second Ed. (TOMAL-2)	C305-19.2 C305-19.3 C305-19.4		
4.	Item Writing Item Analysis Interpretation of Scores Reliability Validity	Five Facet Mindfulness Questionnaire (FFMQ)	C305-19.2 C305-19.3 C305-19.4		
5.	Item Writing Item Analysis Interpretation of Scores Reliability Validity	Resilience Scale/ Social Skills Inventory	C305-19.2 C305-19.3 C305-19.4		
6. Item Writing Item Analysis Interpretation of Scores Reliability Validity		Hamilton Depression Rating Scale (HDRS)/ Children's Academic Intrinsic Motivation Inventory	C305-19.2 C305-19.3 C305-19.4		
7.	7. Item Writing Item Analysis Interpretation of Scores Reliability Validity The Warwick–Edinburgh Mental Well-being So (WEMWBS)/ Emotions & Expressions/ Problem Solv Picture Cards		C305-19.2 C305-19.3 C305-19.4		
Eval	uation Criteria				
Com Mid S End S TA Tota	ComponentsMaximum MarksMid Sem30End Semester Examination40TA30 (Lab Assignment and Research Assignment)Tatal100				
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the JEEE format)					
1.	 Ronald Jay Cohen & Mark E. Swerdlik, Psychological Testing and Assessment 9th Edition, McGraw-Hill Education 2017 				
2.	Anne Anastasi & Susana Urbina, Psychological Testing, 7 th Ed., Pearson Education, 2012.				
3.	Frank S. Freeman, Theory and P	Practice of Psychological Testing, 3 rd Ed., Oxford & IBH Pu	blishing, 2010.		
4.	 Robert J. Gregory, Psychological Testing: History, Principles and Applications, 1st Ed., Pearson Publishing, 2006. 				

Course Code	18B13EC314	Semester Even	Semester VI Session 2018-2019 January
Course Name	Machine Learning for Signal Processing		
Credits	Audit course	Contact Hours	3

Faculty	Coordinator(s)	Dr. Abhinav Gupta			
(Names)	Teacher(s) (Alphabetically)	Dr. Abhinav Gupta			
COURSE	OUTCOMES	COGNITIVE LEVELS			
CO1	Illustrate various machine learning approaches Understanding (C2)				
CO2	Experiment with the different techniques for feature extraction and feature selectionApplying (C3)				
СО3	Apply and analyze various classifier models for typical machineAnalyzing (C4)learning applications				
CO4	Make use of deep learning techniques in real life problems Applying (C3)				

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction and Basic Concepts	Linear algebra, Probability distributions, Representing signals, Types of Features and Proximity measures	8
2.	Linear Models for Regression and Feature Selection	Regression: Linear Basis Function Models, The Bias-Variance DecompositionTypes of Feature Selection : Mutual Information (MI) for Feature Selection, Goodman– Kruskal Measure, Laplacian Score, SVD, Ranking for Feature Selection, Feature Selection for Time Series Data	12
3.	Linear Models for Classification	Discriminant Functions, Probabilistic Generative Models, Probabilistic Discriminative Models, The Laplace Approximation	6
4.	Decision Tree Learning	Decision Tree Representation, Hypothesis space search, Inductive bias, Issues in decision tree learning	7
5.	Support Vector Machines	Linear maximum margin classifier for linearly separable data, Linear soft margin classifier, Kernel induced feature spaces, Nonlinear classifiers, Regression by SVM, SVM variants	6
6.	Introduction to Deep	Convolutional neural networks and	4

Network	KS	applications	
		Total number of Lectures	43
Evaluation Criteria			<u>.</u>
Components	Maximum Ma	arks	
T1	NA		
T2	30		
End Semester Examinatio	on 40		
ТА	30		
Total	100		

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)									
1.	Pattern Recognition and Machine Learning, C.M. Bishop, 2nd Edition, Springer, 2011.								
2.	Deep Learning, I. Goodfellow, Y, Bengio, A. Courville, MIT Press, 2016.								
3.	The Elements of Statistical Learning, T. Hastie, R. Tibshirani, J. Friedman., 2nd Edition, 2008								
4.	Machine Learning, T. Mitchell, McGraw Hill, 1997.								
Course Code		16 B19EC691		Semester EvenSemest(specify Odd/Even)Month		Semeste Month	emester 6th Session 2018 -2019 Ionth from Jan to June		
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Course Name Renewable E			nergy	1					
Credits			2		Contact Hours			2	
Faculty (N	ames)	Coordinato	r(s)	Vinay A. Tikk	iwal				
		Teacher(s) (Alphabetica	ally)	Mandeep Naru	la, Vinay A	. Tikkiwa	ıl		
COURSE	OUTCO	OMES						COGNIT	IVE LEVELS
CO1	Explain energy	n the need of r on environme	enewab nt, chall	le sources of en- enges in the elec	ergy, impac etric grid, Si	t of renev mart Grid	vable	Understan	ding (Level II)
CO2	Analyz PV sys	te basics of So stems	olar radi	ation and Solar	photovolta	ics, Balan	ce of	Analysis (Level IV)
CO3	Analyz Genera	e wind ener ators	gy reso	ource and desi	gning of	Wind E	nergy	Analysis (Level IV)
CO4	Illustra energy	te different bio	omass ei	nergy resources,	and extract	ion of bic	omass	Understan	ding (Level II)
Module No.	lule Title of the Module			Topics in the Module					No. of Lectures for the module
1.	Introduction			Overview of energy use and related issues, major energy options, issues of supply and demand, energy conversions, global climate change issues, effects on ecology and biodiversity, status of renewable energy in India.				4	
2.	Solar EnergyFundamentals of Solar radiation, Solar Resource Assessment, Solar Photovoltaics, Balance of PV Systems, and Solar Thermal.				10				
3.	3. Wind Energy Wind resource, Basics of aerodynamics, Maximum power extraction from wind resource fundamental power equations, Basic design concepts of Wind Energy Generators				8				
4.	4. Biomass Energy Biomass resource, extracting biomass energy, landfill gas, waste to energy, energy balances and economics.					6			
5.	Electr	ic Grid	Basic develo	operations, ppments and chal	berformance lenges in th	e related le electric	l issu grid.	ies, new	2

	Total number of Lectures	30							
Eval	Evaluation Criteria								
Com	nponents Maximum Marks								
Mid-	-Term 30								
End	Semester Examination 40								
TA	30								
Tota	d <u>100</u>								
Reco Refe	commended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (brence Books, Journals, Reports, Websites etc. in the IEEE format)	Text books,							
1.	Solanki, C.S., Solar Photovoltaics: Fundamental, technologies and applications, 3rd ed., Delhi: Prentice Hall of India, 2015								
2.	Momoh, J., Smart Grid: Fundamentals of Design and Analysis, Wiley-IEEE Press, 2012.								
3.	Ahmed S., Wind Energy: Theory and Practice, 3rd ed., Delhi: Prentice Hall of India, 2016								
4.	Earnest J., Wind Power Technology, 2nd ed., Delhi: Prentice Hall of India, 2015								
5.	Kothari, D.P., Singal, K.C. and Ranjan, R., <i>Renewable Energy Sources and Emerging Tech</i> ed., Delhi: Prentice Hall of India, 2016.	chnologies, 2nd							

Subject Code	18B16CS311	Semester: Even (specify Odd/Even)	Semester VI Session 2018-2019 Month from January'19 to June'19
Subject Name	Internet Of Things (W		
Credits	0-0-4	Contact Hours	4

Faculty	Coordinator(s)	Dr K. Rajalakshmi
(Names)	Teacher(s) (Alphabetically)	Dr K. Rajalakshmi Dr. Prakash Kumar Ms. Purtee Kholi Mr. Vivek Kumar Singh

COURSE	COGNITIVE LEVELS	
CO1	Define exiting IoT frameworks and techniques used for developing applications	Remember (level 1)
CO2	Explain the uses of IoT edge devices & basic concept of Node-RED platform.	Understand (level 2)
CO3	Develop Java Script based IoT applications using functional nodes, flows and dashboard on Node-RED platform	Apply (level 3)
CO4	Evaluate the data gathered using Node-RED functionalities and choose appropriate graphical user interface to output the results.	Evaluate (level 5)
CO5	Analyze various communication protocols, network connectivity, and cloud services using Node-RED platform.	Analyze (level 4)

Module No.	Subtitle of the Module	Topics in the module	СО
1.	Java scripts for inbuilt functional nodes and deploy it in Node-Red	Setup and Install Node.js and Node-RED as IDE platform for IoT application development.	C1
2.	flows, types of Message	I/O nodes, flows, third party palettes, import/export of flows in Node-RED	C1,C2
3.	User defined functional nodes into Node-RED	Java scripts for user defined functional nodes and deploy it in Node-Red flows.	C2,C3
4.	flows and FRED cloud and using various dashboard UI	User defined functional nodes into Node- RED flows and FRED cloud.	C2,C3
5.	interfaces	UI modules for peripheral sensors and devices that can be controlled through smart phones and web pages	C2,C3
6.	MQTT brokers for publishing and subscribing between IoT sensors and	MQTT brokers for publishing and subscribing between IoT sensors and devices.	C4,C5

	devices.					
7.	Using	webs	ocket	for	HTTP, TCP and UDP traffic flow for IoT	C4,C5
	HTTP,	TCP	and	UDP	applications.	
8.	traffic	flow	in	IoT	Using WebSocket through internet and	C4,C5
	application	ons.			cloud platforms.	
	56					

Evaluation Criteria	
Components	Maximum Marks
Mid Term Evaluation	30
D2D Evaluation	30 (Lab Evaluation (20) + Attendance (10))
Final Evaluation	40
Total	100

Reco book	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)						
1.	"Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)						
2.	"Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud" Cuno Pfister						
3.	The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)						
4.	https://www.raspberrypi.org/documentation/						
2.	https://www.arduino.cc/en/Tutorial/HomePage						
3.	https://nodered.org/docs/hardware/raspberrypi						
4.	https://nodered.org/docs/getting-started/installation						
5.	https://docs.oasis-open.org/mqtt/mqtt/v5.0/mqtt-v5.0.html						
6.	https://mosquitto.org/						

Course Code		18B16CS312	2	Semester Even (specify Odd/Even)		Semester VI Session 2018 -2019 Month from Jan-Jun			2018 -2019
Course Na	me	R Programmi	ing Wor	kshop		<u></u>			
Credits			0 Contact Hours			1-0-2 (3 hrs	s per week)		
Faculty (N	ames)	Coordinato	r(s)	Megha Rathi					
Teacher(s) (Alphabetic			ally)	lly) Dr. Adwitiya Sinha, Kirti Aggarwal, Megha Rathi					
COURSE	ουτο	OMES						COGNIT	IVE LEVELS
CO1	Define Explai	all tools and n the basic & c	techniq ore con	ues used for Date to the contract of R	ata Mining	and Ana	lysis.	Understan (Level 2)	d Level
CO2	Develo technio	p code for dat ques and build	a extraction prediction	tion & loading. A	Apply data	pre-proce	ssing	Apply Lev (Level 3)	vel
СОЗ	Choose Data Visualization techniques for graphical representation of Apply Level (Level 3)							vel	
CO4	Analyze the results. Compare and contrast the results obtained to Anal discover new pattern insight in data.							Analyze L (Level 4)	Level
CO5	Design	n predictive mo	dels and	l techniques tow	ards researd	ch initiativ	/es	Create Lev (Level 6)	vel
Module No.	e Title of the T Module			Topics in the Module				No. of Lectures for the module	
1.	Introduction to R Introduction to R, Installation, Getting Started Information on R Commands, Objects, Functions, 1 & Vector, Matrices & Array, Factors, Con Statements Loop Scripts R package					ed ,Some , Number onditional	1+3		
2.	List, Data Frames & String Handling Introduction, Creating a List, List Operation, Recursive Data Frame Operations, lapply() and sapply() functions. Introduction to String handling, String functions, String Manipulation, Regular Expressions & Pattern Matching, and Introduction to "stringr" package.						2+3		
3.	Object Progra	Oriented mming	Introdu classes	uction, Object C s, S4 classes, Ref	Driented Pr Ference Clas	ogrammin sses.	ig Cor	ncepts, S3	1+3
4.	Import	& Export	Introdu to diffe JSON	es, 54 classes, Reference Classes. duction, Saving & Loading R data, Import and Expe fferent file formats: Excel File, Binary File, XML Fi N File. Analyzing data & Reshaping the data.			nd Export XML File,	1+3	

Introduction to Databases, Introduction to SQL Commands,

RMySQL Package, Connecting R to MySQL ,Import Table, Querying Data, Export data to MySQL , Disconnect

Function. Introduction to Hadoop, Import and Export data

2+4

R-working

Hadoop)

database (Mysql +

5.

with

	(Hadoop)							
6.		Data Preprocessing using R	Data Pre-processing, forms of Data Pre-processing, Data Cleaning Techniques, Data Redundancy- chi square test, correlation analysis, covariance coefficient, Data Transformation, Data Reduction- Principal Component Analysis, R packages for Data Pre-processing.	2+4				
7.	7. Data Visualization		Visual Representation of statistical analysis, High level plotting commands- create plots with axes, titles, labels and others on the graphics device and Low level plotting commands- add new features like extra labels, point or line. Plots, Histogram, Scatter Plots, Pie chart, Box Plot, QQ Plot, customized Plotting. Introduction to data visualization packages: Ggobi & ggplot.	2+3				
3	8 Classification and Clustering Algorithm		Classification Techniques: Introduction to Classification, Regression, Naïve Bayes, Decision Tree, KNN, Ensemble Methods. Clustering Techniques: Introduction to Clustering, K- means, Hierarchical Clustering, DB Scan.	3+4				
9	9 Data Analytics		Tools for Data Analytics by integrating R with Android or web Interface, Introduction to shiny Package.	1+3				
	Total number of Lectures 45							
			Total number of Ecctures					
Eval	uatior	n Criteria						
Eval Com Lab 7 End 5 TA Tota	uation ponen Test1 Semes l	n Criteria hts hter Examination	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100	+				
Eval Com Lab 7 End 9 TA Tota Reco Refer	uation ponen Test1 Semes <u>1</u> pmmer	n Criteria hts iter Examination nded Reading materia Books, Journals, Repor	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format)	e) tc. (Text books,				
Eval Com Lab 7 End 9 TA Tota Reco Refer 1.	uation ponen Test1 Semes I pmmen rence 1 Paul	n Criteria hts iter Examination nded Reading materia Books, Journals, Repor	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format) Proven Recipes for Data Analysis, Statistics, and Graphics. O'F	tc. (Text books, Reilly, 2011.				
Eval Com Lab T End S TA Tota Reco Refer 1. 2.	uation ponen Fest1 Semes I pommen rence 1 Paul Alai 978-(n Criteria nts iter Examination mded Reading materia Books, Journals, Repor Teetor.R Cookbook - n F. Zuur, Elena N. Ier 0- 387-93836-3.	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format) Proven Recipes for Data Analysis, Statistics, and Graphics. O'F no, and Erik Meesters. A Beginner's Guide to R. Use R. Spring	e) c. (Text books, Reilly, 2011. ger, 2009. ISBN:				
Eval Com Lab TA Tota Reco Refer 1. 2. 3.	uation ponen Test1 Semes I mmen rence I Paul Alai 978-(John Cam	n Criteria Its Iter Examination Inded Reading materia Books, Journals, Report Teetor.R Cookbook - In F. Zuur, Elena N. Ier 0- 387-93836-3. In Maindonald and Joh bridge, 2nd edition, 20	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format) Proven Recipes for Data Analysis, Statistics, and Graphics. O'F no, and Erik Meesters. A Beginner's Guide to R. Use R. Spring n Braun. Data Analysis and Graphics Using R. Cambridge U 07. ISBN 978-0-521-86116-8.	e) tc. (Text books, Reilly, 2011. ger, 2009. ISBN: Jniversity Press,				
Eval Com Lab TA Tota Reco Refer 1. 2. 3. 4.	uation ponen Test1 Semes I mmen rence I Paul Alai 978-0 John Caml Adva	n Criteria hts hts ter Examination mded Reading materia Books, Journals, Repor Teetor.R Cookbook - n F. Zuur, Elena N. Ier 0- 387-93836-3. n Maindonald and Joh bridge, 2nd edition, 20 anced R, by Hadley Wi	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format) Proven Recipes for Data Analysis, Statistics, and Graphics. O'Ino, and Erik Meesters. A Beginner's Guide to R. Use R. Springen Braun. Data Analysis and Graphics Using R. Cambridge U07. ISBN 978-0-521-86116-8. ckham, ISBN 9781466586963.	e) tc. (Text books, Reilly, 2011. ger, 2009. ISBN: Jniversity Press,				
Eval Com Lab TA Tota Reco Refer 1. 2. 3. 4. 5.	uation ponen Test1 Semes I mmen rence I Paul Alai 978-(John Caml Adva Usin	n Criteria Its Iter Examination Inded Reading materia Books, Journals, Report I Teetor.R Cookbook - In F. Zuur, Elena N. Ier 0- 387-93836-3. In Maindonald and Joh bridge, 2nd edition, 20 anced R, by Hadley Wi g R for Introductory St	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format) Proven Recipes for Data Analysis, Statistics, and Graphics. O'F no, and Erik Meesters. A Beginner's Guide to R. Use R. Spring n Braun. Data Analysis and Graphics Using R. Cambridge U 07. ISBN 978-0-521-86116-8. ckham, ISBN 9781466586963. atistics, by John Verzani, Chapman & Hall/CRC, 2004, ISBN 5	e) tc. (Text books, Reilly, 2011. ger, 2009. ISBN: Jniversity Press, 1584884509				
Eval Com Lab End TA Tota Reco Refer 1. 2. 3. 4. 5. 6.	uation ponen Test1 Semes I mmen rence 1 Paul Alai 978-0 John Caml Adva Usin; R Pro	n Criteria hts hts hter Examination mded Reading materia Books, Journals, Repor Teetor.R Cookbook - n F. Zuur, Elena N. Ier 0- 387-93836-3. n Maindonald and Joh bridge, 2nd edition, 20 anced R, by Hadley Wi g R for Introductory St ogramming for Data So	Maximum Marks 30 40 30 (Quiz + Evaluative Assignment + Class Test + Attendance 100 al: Author(s), Title, Edition, Publisher, Year of Publication et ts, Websites etc. in the IEEE format) Proven Recipes for Data Analysis, Statistics, and Graphics. O'F no, and Erik Meesters. A Beginner's Guide to R. Use R. Spring n Braun. Data Analysis and Graphics Using R. Cambridge U 07. ISBN 978-0-521-86116-8. ckham, ISBN 9781466586963. atistics, by John Verzani, Chapman & Hall/CRC, 2004, ISBN 5 cience, by Roger D. Peng,	e) tc. (Text books, Reilly, 2011. ger, 2009. ISBN: Jniversity Press, 1584884509				

Course Code		19B13CS311	Semester Even		Semester 6 th Session 2018 -2019 Month from Jan to Jul					
Course Na	me	Block chain & Cyber	Block chain & Cyber Security							
Credits			Contact I	Hours						
Faculty (Names)		Coordinator(s)	Coordinator(s) Dr. Gagandeep Kaur							
		Teacher(s) (Alphabetically)	Dr. Gagandeep Kaur							
COURSE	OUTCO	DMES					COGNITIVE LEVELS			
CO1	Define Crypto	all the basic to currencies and Smart of	terminologies related to blockchain, contract mechanism			Remember Level (Level 1)				
CO2	CO2 Understand blockchain mechanisms, Proof-of-Work, Proceedings, and Block Certs.				Proof-of-	Stake	Understand Level (Level 2)			
CO3 Implement smart contracts based decent Identify and implement Cryptographic cond			based decentra tographic conce	ased decentralized network processes; graphic concepts of Blockchain			Apply Level (Level 3)			
CO4	Analyz inform	e blockchain technol ation, Test for the is	ogy for integrit sues in the exi	y and avai sting imple	lability o ementatio	f the ns of	Analyze Level (Level 4)			

Evaluate Level

(Level 5)

blockchain and consensus algorithms

CO5

Evaluate Blockchain based network protection

Module No.	Title of the Module	List of Experiments	СО
1	Introduction to	1 Read and understand papers:	CO1
1.	Blockchain&	Satoshi Nakamoto, Bitcoin, "A Peer-to-Peer Electronic Cash	001
	Cyber Security	System"	
	5 5	Michael Crosby, Nachiappan, Pradhan Pattanayak, Sanjeev Verma,	
		VigneshKalyanaraman, "BlockChain Technology Beyond Bitcoin"	
		Install node js	
		Study and implement Constructor function in java script	
		Study and implement Prototype object in java script	
2.	Basics of	Create the blockchain using the constructor functions and prototype	CO2
	Blockchain and	objects	
	Cryptocurrencies	install Postman	
		Create an API using express framework of node js to interact with	
		blockchain data structure, create three API methods for getting the	
		current blockchain, posting transactions and mining a block	
		Install body parser. Requests that we send using postman will go	
		through this body parser, and we can use that data in the requests.	
		Test post request using postman. Apply POST, SEND to check	
		working of postman. Write code for allowing transactions through	
		Postman method to grante new transportions. This mathed will	
		write a new method to create new transactions. This method will take three-method is amount conder and receiver All three	
		take infeeparameters i:e amount, sender and receiver. All these	
		transactions are pending transactions and are not recorded in any	

		block. These transactions get mined and get added to the next blockin	
		that chain.	
3	Science of Blockchain-I (POW POS etc.)	Write a proof of work and proof of stake methods. PoW method validates that whatever transactions are adding to the blockchain are valid. This method will take in the current block data previous	CO2, CO3
		block hash and will think of a nonce, that should create a specific hash as outputtest the proof of work method, check that the block is	
		valid, by using it in hashblock method. Create a genesis block in blockchain data structure. Genesis block is	
		the firstblock. It has no previous block hash. It doesn't include any transactions in genesis block, so ithas no hash and we don't need to do any proof of work for this, so nonce is also not required	
4	Science of	Create a decentralized network to host blockchain to have a look that	CO3,
	Blockchain-II	how blockchain works in real world. Create a decentralized network	CO4
	(Decentralization)	by creating multiple instances of API. Eachinstance will represent a	
		to host our blockchain.	
		Register the nodes to a network. For this we need to createthree new	
		end point in networkNodes.js. Synchronize the network so that the conv of blockchain is same at	
		all the nodes	
		Update the mine end point, so that it broadcasts the newly created	
		block to all the other nodes in the network and we need to broadcast	
		the mining reward transaction to all nodes.	
5	Smart Contracts	Build smart contract on Ethereum command line.	CO3
	(Solidity)	Construct smart contract in javascript to connect front-end.	
6	HyperLedger	Build your application with hyperledger technologies	CO4
7	Blockchain	Create a hash block method, that will take the block data as	CO2,
	Security	it in blockchain	CO4, CO5
		Use library packages to generate private keys, Public Keys	0.00
		Generate Private Key WIF "wallet import format" Bitcoin wallet that	
		to make transactions. Check address in blockchain.info to see balance.	
		Use it to infer public key hash from node address	
		Apply homomorphic encryption in python	
		Apply homomorphic encryption in blockchain	
		Read paper Decentralizing Privacy: Using Blockchain to Protect	
Fyoluoti	on Critoria	reisonal Data (ZINF15) III ule same folder	
Compon	onts	Maximum Marks	
Lab Test	1	20	
Lab Test	2	20	
Evaluatio	on 1	15	
Evaluatio	on 2	30	
Attendan	ce	15	
Total		100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1	Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten,
1.	Andrew Miller, Steven Goldfeder, Princeton

•	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular						
2.	Blockchain frameworks, Imran Bashir, Packt Publishing						
3.	Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto						
	Michael Crosby, Nachiappan, Pradhan Pattanayak, Sanieey Verma, Vignesh Kalyanaraman, "BlockChain						
4.	Technology Beyond Bitcoin						
5.	Using Blockchain to Protect Personal Data, Guy Zyskind, et. al.						
6	IEEE Blockchain Initiative at https://blockchain.ieee.org/						
0.							

Subject Code	19B16CS311	Semester odd Semester Sixth Session Month from Jan to Jur Jur	
Subject Neural network Workshop Name Image: Constraint of the second s			
Credits	0-0-4	Contact Hours 4 lab hours	

Faculty	Coordinator(s)	Anuja Arora	
(Names)	Teacher(s) (Alphabetically)	Anuja Arora Archana Purwar Ankit Vidhyarthi	Pawan Upadhay

SNO	Description	Cognitive Level (Bloom Taxonomy)
CS311.1	Understand the fundamentals and concepts of neural network, neural network architectures, and its paradigm.	Understand Level (Level 2)
CS311.2	Apply the neural network to solve practical problems	Apply Level (Level 3)
CS311.3	Examine the engineering applications that can learn using neural networks	Evaluate Level (Level 5)
CS311.4	Implement Neural network in context of problem solving and modelling in python	Analyze Level (Level 4)
CS311.5	To develop neural network applications on real-world tasks	Create Level (Level 6)

Module No.	Subtitle of the Module	Topics in the module	No. of Labs for the module
1.	Overview of classification and Regression	Linear Regression, Multiple Linear Regression, KNN classifier, SVM Classifier	4
2.	Neural Fundamental Concept	Neuron models, basic Learning rules, Single Neuron NN, Single layer neural network, Activation Function, Two Layer Neural Network, error function	4
3	Basic neural network models	Multilayer Perceptron Learning Algorithm, Stochastic gradient descent, Forward Propagation, Backpropagation, Real life case studies	8

4	Other Neural	network	Associative memory, Self-organizing	6
-	models		feature map, Neural network decision	
			tree, Data visualization with self-	
			organizing feature map	
5	Convolution	Neural	Fundamentals of convolution Neural	6
0	Network		network and Object detection,	
			introducing tensor flow and keras	
			libraries for CNN, neural style transfer	
			Case studies of Convolution neural	
			network.	
Total number of Lectures				28

Recommende Text books, Re	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)					
1.	S. Haykin, Neural Networks: A Comprehensive Foundation 2nd edition, (Prentice Hall, 1999)					
2.	Rajasekaran, S., & Pai, G. V. (2003). Neural networks, fuzzy logic and genetic algorithm: synthesis and applications (with cd). PHI Learning Pvt. Ltd					
3.	C. Looney, Pattern Recognition Using Neural Networks, Oxford University Press, 1997					
4.	Hagan, M. T., Demuth, H. B., Beale, M. H., & De Jesús, O. (1996). Neural network design (Vol. 20). Boston: Pws Pub					
5.	Sivanandam, S. N., & Deepa, S. N. (2007). Principles of Soft Computing (With CD). John Wiley & Sons.					

Course Code		19B13BT311	-	Semester EvenSemester VI(specify Odd/Even)Month from Ja		Session 2018 -2019 January-June			
Course Name N		Nanoscience	Janoscience in Food Technology						
Credits			2		Contact H	Hours		2	2
Faculty (N	ames)	Coordinato	r(s)	Prof. Sudha Sr	ivastava				
		Teacher(s) (Alphabetica	ally)	Prof. Sudha Sr	ivastava				
COURSE	OUTCO	OMES						COGNIT	IVE LEVELS
C305-1.1	Explai	n properties of	nanopa	rticles and nanoe	emulsions			Underst	and Level (C2)
C305-1.2	Outlin	e food processi	ng, pacl	kaging and prese	ervation			Underst	and Level (C2)
C305-1.3	Apply shelf li	nanotechnolog ife	gy conce	epts to improve	food qualit	y, texture	e, and	Appl	y Level (C3)
C305-1.4	Apply	concepts of na	noscien	ce for improving	g agriculture	e yields		Appl	y Level (C3)
C305-1.5	Analyz nanose	ze food qualit ensors	y degra	dation and pa	athogens de	etection,	using	Analy	ze Level (C4)
Module No.	Title of the ModuleTop		Topics	es in the Module				No. of Lectures for the module	
1.	Introdu Nanon	action to naterials	Introdu synthe	uction to nanomaterials, nanoemulsions, method esis and identification of nanoemulsions			thod of	5	
2.	Food and Pi	oodPackagingIntroductiontofoodprocessing,packagingand6nd Preservationpreservation.Modifiedatmospherepackaging,activepackaging and intelligent packaging.				6			
3.	Application of nanotechnology in Food and agricultureMicroemulsions for delivery of nutraceuticals, edible films and coating for food, Polymer nanocomposites, effect of nanomaterials on mechanical, thermal and barrier properties of polymers. Application of nanotechnology for pesticide delivery, nutrient uptake etc. Nanomaterials in Food- Health and Safety Issues7								
4.	Biosensors monitoring qualityfor foodTime temperature indicators, pathogen detection using biosensors, Pesticide detection using biosensor.6				6				
					T	otal num	ber of	Lectures	24
Evaluation Componen Mid Term End Term4 TA Total	Evaluation CriteriaComponentsMaximum MarksMid Term30End Term40								
Recommen	nded Re	ading materia	I: Auth	or(s), Title, Editi	ion, Publish	er, Year o	of Publ	ication etc.	(Text books,

Refe	Reference Books, Journals, Reports, Websites etc. in the IEEE format)					
1.	VellaichamyChelladurai, Digvir S. Jayas, 2018 Nanoscience and Nanotechnology in Foods and BeveragesCRC Press, ISBN 9781498760638					
2.	2. Recent Research papers					

Course Code		16B19PH692	2	Semester Even Semester VI Se Month from: Jan		Session 2 January to	2018 -2019 June		
Course Name Light Emit		Light Emittin	ng Diode	es: Basics & Ap	plications				
Credits Va			alue Ad	ded	Contact I	Hours		2	2
Faculty (Names) Coordinat		Coordinato	r(s)	(s) Dr. Bhubesh Chander Joshi					
		Teacher(s) (Alphabetica	ally)	Dr. Bhubesh Chander Joshi					
COURSE OUTCOMES COGNIT							IVE LEVELS		
C305-6.1	Recall junctio	the basic conc on diode and lig	cepts of ght emit	semiconducting ting diodes.	g materials, v	working c	of p-n	Remer	nbering (C1)
C305-6.2	Explai fabrica	n the various tion of LEDs.	physica	al parameters in	nvolved in	designing	g and	Unders	standing (C2)
C305-6.3	Solve spectru	various proble 1m of LEDs	ems rela	ted to efficient	cy, emission	n intensity	/ and	App	lying (C3)
C305-6.4 Analyse the problems i high brightness LEDs.			s in desi s.	gning & fabrica	ting blue, w	hite and g	reen	Anal	yzing (C4)
Module No.	Title of the ModuleTop		Topics	s in the Module	2				No. of Lectures for the module
1.	History of LEDs H		Histor LEDs.	story of SiC, GaAs, GaAsP, GaInP, GaN, and InGaN Ds.			4		
2.	2. Theory of Recombination's		Radiat and hi quantu Einstei	Radiative and non-radiative recombination's, Low-level 6 and high-level excitations, Bio-molecular rate equation for quantum well structure, Van Roosbroeck-Shockley Model, Einstein Model.				6	
3.	LED Basics Ele res jun Op eff			ctrical properties: I-V characteristics, parasitic 6 istances, carrier distribution in homo and hetero ctions, carrier losses, carrier overflow in heterojunctions, tical properties: Internal, external, extraction and power iciencies, Emission spectra, escape cone and temperature bendency				6	
4.	Growth & LED materials, Organic I Fabrications Characterization Technique			anic LEDs, Growth, Fabrication and 4 iniques			4		
5.	5. Applications Solid st and Rer Commu			state lighting, White LEDs, HB LEDs, Color Mixing Rendering, LED Drivers, Display Devices, AMOLED, munication, High Voltage LEDs			or Mixing MOLED,	10	
					Т	otal num	ber of	Lectures	30
Evaluation Componer Mid Term End Semes TA	n Criteri nts Examina ter Exar	ia ntion nination	Maxim 30 40 30 [Pro	um Marks esentation/proje	ect (15 M) +	Attendan	ce (15	M)]	

Tota	1 100
Reco Refe	ommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, rence Books, Journals, Reports, Websites etc. in the IEEE format)
1.	Text 1: Light-Emitting Diodes, Schubert E. Fred, Cambridge University Press, 3rd Edition 2018.
2.	Reference: Introduction to Light Emitting Diode Technology and Applications, Held Gilbert, Auerbach Publications, 2008.
3.	Reference: Light-Emitting Diodes; Materials, Processes, Devices and Applications, Editors: Jinmin Li, G. Q ZHANG, Springer, 2019

Course Co	Course Code16B1NMA631Semester Even (specify Odd/Even)Semester VI Month from Jap 2019-June201						
Course Name Computational Continuum Mechanics				all 2019-Ju	1162019		
Credits			Contact Hours 3-1-0				
		- Coordinator(s)	Prof Sanieev Sharma				
Faculty (N	ames)	Teacher(s)					
	,	(Alphabetically)	Prof. Sanjeev Sharma				
COURSE	OUTCO	DMES	<u>II</u>		COGNIT	TVE LEVELS	
After pursu	ing the	above mentioned cour	rse, the students will be able	to:			
C302-2.1	expla value	in the concept of exise problems and their se	tence and uniqueness theorem plutions.	m of initial	Understar	nding Level (C2)	
C302-2.2	apply equat	/ matrix algebra to fin tions.	d the solution of system of d	ifferential	Applying	Level (C3)	
C302-2.3	explain Sturm-Liouville boundary value problems, orthogonality of functions and Fourier series.					nding Level (C2)	
C302-2.4	identify the phase plane, critical points and paths of nonlinear systems. Applying Level (C3)					Level (C3)	
C302-2.5	02-2.5 explain the basic mechanics of materials in two and three Understanding Lev dimensional system.				nding Level (C2)		
C302-2.6 solve and examine the ph			sical problems using differer	ntial equations.	Analyzing	g Level (C4)	
Module No.	Title o	f the Module	Topics in the Module		л	No. of Lectures for the module	
1.	Exister Theore	nce and Uniqueness em	The fundamental existence dependence of solutions on the functions.	and uniqueness initial condition	theorem, is and on	8	
2.	Sturm-LiouvilleSturm-Liouville problems, orthogonality of characteristic functions, the expansion of a function in a series of orthogonal functions, trigonometric Fourier series.				12		
3.	Matrix ODE's	Matrix Methods to solveMatrix Method for Homogeneous Linear systems4ODE'swith Constant Coefficients.4			4		
4.	Theory Differe	of Nonlinear ential Equations	Phase Plane, Paths and Criti Nonlinear Systems.	ical Points and H	Paths of	4	
5.	Basic ⁷ Contin	Theory of uum Mechanics	Stress, Strain, Differential Equation of Equilibrium in a general three-dimensional stress system, Principal Stresses and Strains, Generalized Hook's Law,			6	

		Mechanical Properties of Different Materials.				
		Applications.				
	Diana Tharmaalastic	Plane Strain, Plane Stress, Stress Function, Complex				
6.	Prahlems	Variable Method, Potential Method, Finite	8			
	riooienis	Difference Method.				
Tota	Total number of Lectures					
Eval	uation Criteria		<u></u>			
Сог	nponents	Maximum Marks				
T1		20				
T2		20				
End	Semester Examination	35				
TA		25 (Quiz, Assignments, Tutorials)				
Tot	al	100				
Reco	mmended Reading mater	al: Author(s), Title, Edition, Publisher, Year of Publication etc.	. (Text books,			
Refe	rence Books, Journals, Repo	orts, Websites etc. in the IEEE format)				
1.	Noda, N., Hetnarski, R.B	., Tanigawa, Y., Thermal Stresses, 2 nd Ed., Taylor & Francis, N	Vew York, 2003.			
2.	2. Ross, S.L., Differential Equations, 3 rd Ed., John Wiley & Sons, 2004.					
3.	Chandramouli, P.N., Continuum Mechanics, Yes Dee Publishing India, 2014.					
4.	Hearn, E.J., Mechanics of	Materials, Vol. 1 & 2, 3 rd Ed., Elsevier, 2008.				
5.	Gupta, R.S., Elements of	Numerical Analysis, by 1st Ed., Macmillan, 2009.				

Course Co	de	16B1NMA63	33	Semester : Even	Semester VI	Sessi	on 2018-2019
Course No		Statistics			Month from .	Jan 20	19 to June 2019
Course Na	ime			Car	ntaat II auna	210	
Creatis		4		Du Limonshy Acor		3-1-0	
	[r(s)	Dr. Himanshu Agar		•	1
Faculty (IN	ames)	l eacher(s) (Alphabetica	ally)	Dr. Anuj Bhardwaj, Chauhan	, Dr. Himanshu .	Agarwa	al, Dr. Pinkey
COURSE OUTCOMES							COGNITIVE LEVELS
After pursu	ing the	above mention	ed cours	se, the students will b	e able to:		
C302-1.1	make u kurtosi	use of measure is for description	s of cent on and v	tral tendency, dispers isualization of popula	ion, skewness an ation data.	nd,	Applying Level (C3)
C302-1.2	apply o	correlation and	regressi	ion in statistical analy	vsis of data.		Applying Level (C3)
C302-1.3	explain	n sampling the	ory and	its distributions.			Understanding Level (C2)
C302-1.4	explain the concepts and properties of estimation theory.						Understanding Level (C2)
C302-1.5	apply s	sampling and e	estimatio	n theory to find the c	onfidence interv	val.	Applying Level (C3)
C302-1.6	analyz	e small and lar	ge samp	le data by using the t	est of hypothesi	s.	Analyzing Level (C4)
Module No.	Title o Modu	of the le	Topics	s in the Module			No. of Lectures for the module
1.	Descri Statisti	ptive ics	Graphi frequer mode, kurtosi momer Box ar	ical representation ncy polygon, AM, measures of dispe is such as centra nts, population varia of Whisker plot	such as histo GM, HM, more rsion, skewness al and non-c nce, β , γ coeffi	gram, edian, s and entral cient,	8
2.	Box and whisker plot.Correlation and RegressionScatter diagram. Karl Pearson's and Spearma rank correlation coefficient, regression li regression coefficient and their properties.			nan's lines,	5		
3.	Sampl Sampl Distrib	ing and ing putions	Popula statisti numbe sample square distribu	tions and Sample cs, sample mome rs, central limit the e mean and sample distribution, F-dist ution.	e, random sa nts, law of orem, distributi variance, <mark>MGF,</mark> ribution, Studer	mple, large on of Chi- nt's <i>t</i>	7

4	l.	Parametric Point	General concept of point estimation, methods of	10		
		Estimation	moments and maximum likelihood for finding			
			estimators, unbiasedness, consistency,			
			efficiency, UMVUE, Cramer-Rao inequality,			
			sufficiency, factorization theorem, completeness,			
			Rao-Blackwell theorem.			
5	5.	Parametric Interval	definition of confidence interval, pivotal	5		
		Estimation	quantity, confidence interval for mean, variance,			
			difference of means and difference of variances			
			for small and large samples.			
6	5.	Hypothesis Testing	The basic idea of significance test. null and	7		
			alternative hypothesis, type-I and type II errors,			
			testing of small and large samples for mean,			
			variance, difference in means, and difference in			
			variances.			
Tota	l num	ber of Lectures		42		
Eval	uation	n Criteria				
Com	ponen	its	Maximum Marks			
T1			20			
T2			20			
End	Semes	ter Examination	35			
TA			25 (Quiz, Assignments, Tutprials)			
Tota	1		100			
Reco	mmer	nded Reading materia	al: Author(s), Title, Edition, Publisher, Year of Publ	ication etc. (Text		
book	s, Refe	erence Books, Journals	s, Reports, Websites etc. in the IEEE format)			
1	Bisw	as and Srivastava , A	Textbook, Mathematical Statistics Ist Edition, Naro	osa Publishing		
1.	Hous	e, New Delhi.				
2	W. F	eller, Introduction to l	Probability Theory and its Applications Vol. I and II	. Wiley Eastern-		
2.	Ltd,	1971				
3	V. K	.Rohatgi, An Introduc	tion to Probability Theory and Mathematical Statistic	ics Wiley Eastern,		
5.	1984					
4.	R. V	. Hogg, A. T. Craig, I	ntroduction to Mathematical Statistics, McMillan, 1	971		
5	AM.	Mood, F. A. Graybil	I, and D. C. Boes, Introduction to the Theory of Stat	tistics McGraw		
5	Hill,	1974				
6.	Des 1	Raj & Chandak, Sam	pling Theory, Narosa Publishing House, 1998.			
7.	Shelo	don Ross, A First Cou	rse in Probability, 6th edition, Pearson Education As	sia, 2002.		
8	Mey	er, P.L, Introductory F	Probability and Statistical Applications Addison-Wes	sley Publishing		
0.	Company, 1965.					

Course Co	ode 18B12MA611 Semester Even Semester VI Session 2018 -2019 Month from Jap 2019 - June 20							ion 2018-2019 2019 - June 2019
Course Na	Course Name Operations Research						<u> </u>	2017 - Julie 2017
Credits		4	Jeure		Cor	ntact Hours	3-1-0	1
Faculty		Coordinator(s)	Dr. Pato Kumari				
(Names)		Teacher(s)		Prof. A. K. Aggar	wal			
		(Alphabetical	ly)	Dr. Amita Bhagat				
COURSE	COURSE OUTCOMES							COGNITIVE LEVELS
After pursu	ing the	e above mention	ed co	ourse, the students v	vill b	e able to:		
C302-3.1	const lineat meth	truct mathematic r programming od.	cal n pro	nodels for optimiza blems (LPP) using	ation g gra	problems and aphical and sin	solve nplex	Applying Level (C3)
C302-3.2	apply two-phase, Big-M and dual simplex method for linear programming problems.							Applying Level (C3)
C302-3.3	make use of sensitivity analysis to linear programming problems.							Applying Level (C3)
C302-3.4	solve transportation, assignment and travelling salesman problems.						Applying Level (C3)	
C302-3.5	apply cutting plane and branch & bound techniques to integer App (C3)						Applying Level (C3)	
C302-3.6	C302-3.6 examine optimality conditions and solve multivariable nonlinear problems.					Analyzing Level (C4)		
Module No.	Title Mod	of the ule	Тој	pics in the Module				No. of Lectures for the module
1.	Preli	minaries	Intr Pha	oduction, Operations of O	ons .R. S	Research M tudies.	odels,	3
2.	Linea Progr Probl	LinearConvex Sets, Formulation of LPP, GraphicalProgrammingSolutions, Simplex Method, Big-M Method,Problems (LPP)Two Phase Method, Special Cases in SimplexMethodMethod					8	
3.	Dual Sensi	ity and itivity Analysis	Prin Sim	nal-Dual Relation Price Relation Relati	nshij itivit	o, Duality, y Analysis.	Dual	8
4.	TransportationIntroduction, Matrix Form, Applications, BasicProblemsFeasible Solution- North West Corner Rule, Least Cost Method, Vogel's Approximation Method. Degeneracy, Resolution on Degeneracy, Optimal Solution, Maximization TP Model					5		
5.	Assig Prob	gnment lems	Def Sale	finition, Hungaria esmen Problems.	ın	Method, Trav	veling	4
6.	ProblemsSalesmen Problems.IntegerLinearProgrammingProblems, Cutting Plane Method, Branch and Bound Method.					6		

7	7.	Non	Linear	Introduction to NLP, convex functions and	8
		Program	ming	graphical solution, Unconstrained Problem,	
				Constrained Problems - Lagrange Method for	
				equality constraints, Kuhn-Tucker Conditions	
				for inequality constraints, Quadratic	
				Programming -Wolfe's Method	
Tota	l num	ber of Lec	ctures		42
Eval	uatior	n Criteria			
Com	poner	nts		Maximum Marks	
T1				20	
T2				20	
End	Semes	ter Examir	nation	35	
TA				25 (Quiz, Assignments, Tutorials)	
Tota	l			100	
Reco	ommei	nded Read	ling materia	al: Author(s), Title, Edition, Publisher, Year of Pub	lication etc. (Text
book	s, Ref	erence Boo	oks, Journals	, Reports, Websites etc. in the IEEE format)	
1.	Taha	, H. A. - O	perations Re	esearch - An Introduction, Pearson Education, 2005.	
2.	Hadl	ey, G Li	near Prograr	nming, Massachusetts: Addison-Wesley, 1962.	
3.	Hille	r, F.S. and	Lieberman,	G. J Introduction to Operations Research, San Fra	ancisco, 1995.
4.	Wag PHI,	ner, H. M. 1975.	Principles	s of Operations Research with Applications to Mar	nagerial Decision,
5.	Vohr	a, N. D., C	Quantitative '	Techniques in Management, Second Edition, TMH,	2003.
6.	Taha	. H. A O	perations Re	esearch - An Introduction, Pearson Education, 2005.	

Subject Co	ode	18B12M	IA612	Semester Even	Semester V Month from	T Ses	sion 2018-2019
Subject No	ame	Applied	Mathematics	al Methods		II Jail	2017 to Julie 2017
Credits	Credits 4 Contact Hours 3-1-0						
Faculty (N	ames)	Coordi	nator(s)	Dr. Puneet Rana			
	Teacher(s) Dr. Puneet Rana, Dr. Neha Ahlawat						
COURSE	OUTCO	OMES					
After pursu	ing the a	above mer	ntioned cours	se, the students will be al	ole to:		COGNITIVE LEVELS
C302-4.1	explair physica	1 the funct al problen	tional and its n.	variations required to op	otimize the		Understanding Level (C2)
C302-4.2	apply o variatio	lifferent for a state of the second s	orms of Eule ems with fix	r–Lagrange equation on ed boundaries.	the various		Applying Level (C3)
C302-4.3	explair from I	1 different	types of interventerventerventerventerventerventerventerventerventerventerventerventerventerventerventerventerv VP.	egral equations including	their convers	sions	Understanding Level (C2)
C302-4.4	solve V analyti	Applying Level (C3)					
C302-4.5	explain various numerical methods along with their stability analysis. Understand Level (C2)						Understanding Level (C2)
C302-4.6	12-4.6 apply different numerical methods for solving differential equations. Applying I (C3)						Applying Level (C3)
Module	Title	of the	Topics in t	he Module			No. of Lectures
No.	Modul	e					for the module
1. Functional and its Variation			T 1 1	11 61 1.	1 11	mot	X
	its Var	onal and iation	Introduction geodesics	n, problem of brachistoc	hrone, proble variation an	d its	0
	its Var	onal and iation	Introduction geodesics, properties,	n, problem of brachistoc isoperimetric problem, comparison between	hrone, proble variation an the notior	d its	0
	its Var	onal and iation	Introduction geodesics, properties, extrema of	n, problem of brachistoc isoperimetric problem, comparison between a function and a functior	hrone, proble variation an the notior nal.	d its	0
2.	its Var Variati	onal and iation	Introduction geodesics, properties, extrema of Euler's equ	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta	hrone, proble variation an the notior nal. I lemma of	d its n of	5
2.	its Var Variati Probler Fixed	onal and iation onal ms with	Introduction geodesics, properties, extrema of Euler's equ calculus of form of int	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, a egrals, special cases cor	hrone, proble variation an the notior nal. I lemma of functionals in otaning only s	d its n of the n the some	5
2.	Variati Probler Fixed Bound	onal and iation onal ms with aries	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intr of the var	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, egrals, special cases cor iables, examples, func	hrone, proble variation an the notion al. I lemma of functionals in itaning only s tionals invol	d its n of the n the some lving	5
2.	Variati Problet Fixed Bound	onal and iation onal ms with aries	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intro of the var more than	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, a egrals, special cases con- tiables, examples, func- one dependent variable	hrone, proble variation an the notion al. il lemma of functionals in taning only s tionals invoi es and their	d its n of the n the some lving first	5
2.	Variati Problem Fixed Bound	onal and iation onal ms with aries	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intro of the var more than derivatives,	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, egrals, special cases cor iables, examples, func one dependent variable the system of Euler's equip	hrone, proble variation an the notion al. I lemma of functionals in taning only s tionals invoi es and their uations,	d its n of the n the some lving first	5
2.	Variati Problem Fixed Bound Variati Problem	onal and iation onal ms with aries onal ms	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intr of the var more than derivatives, Functionals the depend	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, egrals, special cases cor tables, examples, func- one dependent variable the system of Euler's equal depending on the high lent variables, Euler-	hrone, proble variation an the notion al. al lemma of functionals in taning only s tionals invol es and their uations, her derivative Poisson equa	d its n of the some lving first es of ation,	5
2.	Variati Problet Fixed Bound Variati Problet (contin	onal and iation onal ms with aries onal ms ued)	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intro- of the var more than derivatives, Functionals the depend functionals	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, egrals, special cases con- riables, examples, func- one dependent variable the system of Euler's equal depending on the high lent variables, Euler- containing several indep	hrone, proble variation an the notion al. I lemma of functionals in taning only s tionals invo es and their uations, her derivative Poisson equa pendent varia	d its n of the n the some lving first es of ation, ibles,	5
2.	Variati Problem Fixed Bound Variati Problem (contin	onal and iation onal ms with aries onal ms ued)	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intr of the var more than derivatives, Functionals the depend functionals Ostrogradsl parametric	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, f egrals, special cases cor tables, examples, func- one dependent variable the system of Euler's eq depending on the high lent variables, Euler- containing several indep cy equation, Variation form applications	hrone, proble variation an the notion al. I lemma of functionals in taning only s tionals invoi es and their uations, her derivative Poisson equa pendent varia and problema	d its a of the the some lving first es of ation, bles, s in	5
2.	Variati Problen Fixed Bound Variati Problen (contin	onal and iation onal ms with aries onal ms ued)	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intr of the var more than derivatives, Functionals the depend functionals Ostrogradsl parametric equations.	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, egrals, special cases cor tables, examples, func- one dependent variable the system of Euler's eq depending on the high lent variables, Euler- containing several indep cy equation, Variation form, applications	hrone, proble variation an the notion al. al lemma of functionals in taning only s tionals invol es and their uations, her derivative Poisson equa pendent varian al problema to differe	d its a of the the some lving first es of ation, bles, s in ential	5
2. 3. 4.	Variati Problet Fixed Bound Variati Problet (contin	onal and iation onal ms with aries onal ms ued)	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intro- of the var more than derivatives, Functionals the depend functionals Ostrogradsl parametric equations.	n, problem of brachistoc isoperimetric problem, comparison between a function and a function nation, the fundamenta variations, examples, egrals, special cases con- riables, examples, func- one dependent variable the system of Euler's equation depending on the high lent variables, Euler- containing several inde- cy equation, Variation form, applications	hrone, proble variation an the notion nal. I lemma of functionals in taning only s tionals invoi es and their uations, her derivative Poisson equa pendent varia nal problema to differe	d its a of the h the some lving first es of ation, bles, s in ential	5
2. 3. 4.	Variati Problem Fixed Bound Variati Problem (contine Fredho Voltern	onal and iation onal ms with aries onal ms ued) -Im and ra	Introduction geodesics, properties, extrema of Euler's equ calculus of form of intr of the var more than derivatives, Functionals the depend functionals Ostrogradsl parametric equations. Introduction	n, problem of brachistoc isoperimetric problem, comparison between a function and a function uation, the fundamenta variations, examples, egrals, special cases cor- tiables, examples, func- one dependent variable the system of Euler's eq depending on the high ent variables, Euler- containing several inder ky equation, Variation form, applications	hrone, proble variation an the notion nal. I lemma of functionals in taning only s tionals invoies and their uations, her derivative Poisson equa pendent varia nal problema to differe s, Classifica	d its a of the h the some lving first es of ation, bbles, s in ential	5

			approximation, successive substitution methods for Fredholm and Volterra integral equations.			
5	5.	Numerical Methods	Finite difference method, derivation from Taylor's polynomial, Accuracy and order, explicit method, implicit method, Crank–Nicolson method and applications,	8		
6	<u>.</u>	FEM and its comparison	Galerkin finite element method for one dimensional problems, various type of elements and their shape functions, stiffness matrix, assembly of equations, handling of the boundary conditions, triangular and rectangular elements, stiffness matrices and assembly. Comparison of FEM and FDM.	8		
Tota	l num	ber of Lectures		42		
Eval	uation	Criteria				
Com	ponen	its	Maximum Marks			
T1			20			
T2	Γ2 20					
End S	Semes	ter Examination	35			
TA	_		25 (Quiz, Assignments, Tutorials)			
Tota	1		100			
Reco	mmer	nded Reading ma	aterial: Author(s), Title, Edition, Publisher, Year of Publ	lication etc. (Text		
book	s, Refe	erence Books, Jou	irnals, Reports, Websites etc. in the IEEE format)			
1.	Hild	erbrand, F.B., M	ethods of Applied Mathematics, 2ndEdition, Prentice Ha	ıll, 1969.		
2.	Gupt	t a, A.S., Calculus	of Variations with Applications, Prentice Hall of India,	<u>1997.</u>		
3.	Gelfa	and, I.M., Fomin,	S.V. Calculus of Variations, Prentice Hall, 1963.			
4.	4. Elsgolts, L., Differential Equations and the Calculus of Variations, Mir Publishers, Moscow, 1973.					
5.	Petro	ovsky, I.G., Lectu	res on the Theory of Integral Equations, Mir Publishers,	Moscow, 1971.		
6.	Zien	kiewicz, O.C., M	organ, K., Finite Elements and Approximation, John Wi	iley, 1983.		
7	Smit	h, G. D., Nume	rical solution of partial differential equations: finite di	fference methods.		
/.	Oxfo	rd University Pres	ss, 1985			

Course Code	19M12MA611	Semester - Eve	n	Semeste	er VI Session 2018-2019	
		(specify Odd/Ev	ven)	Month f	from January 2019 to June 20	19
Course Name	Mathematical Found	ations of Geograp	ohic Inform	nation Sys	stem	
Credits	4		Contact H	Iours	3-1-0	

Faculty (Names)	Coordinator(s)	Dr. Lakhveer Kaur
	Teacher(s) (Alphabetically)	Dr. Lakhveer Kaur

COURSE	OUTCOMES	COGNITIVE LEVELS
After pursu		
C302-5.1	Understand the concept of Trigonometry, Coordinate systems and Geometric Transformations and then its applications for Geographic information system.	Applying Level (C3)
C302-5.2	Identify basic set operations and database technology based on predicates, quantifiers and predicate Logic.	Understanding Level (C2)
C302-5.3	Describe Geo-statistical methods, used for Geographic information system.	Understanding Level (C2)
C302-5.4	Explain quantitative aspects for image analysis by using analytic and numerical methods.	Analyzing Level (C4)
C302-5.5	Understand the concepts of space and time in spatial information systems and spatiotemporal data models.	Evaluating Level (C5)

Module	Title of the Module	Topics in the Module	No. of
No.			Lectures for
			the module
1.	Trigonometry	Trigonometric functions, allied angles, compound angles.	4
2.	Coordinate Systems	Cartesian rectangular coordinate system, distance formula,	4
		section formula, Straight lines, slopes, types of straight	
		lines, Application in solving life science problems.	
3.	Geometric	Geometric Transformations and its applications for	2
	Transformations	Geographic information system	
4.	Set Theory	Review of Set Theory, Overlay operations in	3
		Geoinformatics	
5.	Propositional and	Relational database technology based on Predicates,	5
	Predicate Logic	Quantifiers and Predicate Logic.	
6.	Geo-statistical	Principle of Least Squares, Fitting of straight line and	6
	methods	parabola, Correlation - Karl Pearson's coefficient of	
		correlation and Spearmann's rank correlation	
7.	Regression and	Linear regression, One way and two way classification of	6
	ANOVA	ANOVA.	
8	Image analysis and	Quantitative aspects in decision making for image analysis, 6	
	Map Algebra	Tools available for image analysis -analytical and	

		numerical-Fourier series, Fourier Transforms, Map	
		Algebra.	
9	Spatial Modeling and	Spatial Data and Information, Concepts of Space and Time	6
	Database Design	in Spatial Information Systems, Database Design, Spatial	
		Data Models, Spatio-temporal Data Models.	
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
ТА		25 (Quiz, Assignments, Tutorials)	
Total		100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1. Edward, B., Introduction to Mathematics for life scientist - Springer, 1979.

2	Burrough, P. A. and McDonnell R. A., Principles of Geographical Information Systems. Oxford
2.	University Press, 1998.
3	Leung V Intelligent Spatial Decision Support Systems, Springer-Verlag, Berlin, Heidelberg, 1997

Y., Intelligent Spatial Decision Support Systems. Springer-Verlag, Berlin, Heidelberg, 1997. Mackenzie, A., Mathematics and Statistics for Life Scientists, Taylor & Francis, New York, 2005.

4.

5 Leung, Y., Intelligent Spatial Decision Support Systems. Springer-Verlag, Berlin, Heidelberg, 1997.

6. Gupta, S. C. and Kapoor, V. K., Fundamentals of Applied statistics, Sultan Chand and sons, 2003.

Course Code	19M12MA612	Semester Even		Semester Even Semester VI Session 2018 -2019		r VI Session 2018-2019
		(specify Odd/Even)		Even) Month from Jan – June 2019		
Course Name	Mathematical Model	ing with Emphas	sis on Epide	emics and	Social Aspects	
Credits	4		Contact Hours		3-1-0	

Faculty (Names)	Coordinator(s)	Dr. Pankaj Kumar Srivastava
	Teacher(s) (Alphabetically)	Dr. Pankaj Kumar Srivastava

COURSE	OUTCOMES	COGNITIVE LEVELS
After pursu	ing the above mentioned course, the students will be able to:	
C302-6.1	explain the basic concepts of differential equations, eigen values, eigen vectors and stability theory.	Understanding Level (C2)
C302-6.2	develop mathematical models through differential equations.	Applying Level (C3)
C302-6.3	explain linear and nonlinear population models.	Understanding Level (C2)
C302-6.4	analyze models of epidemic nature.	Analyzing Level (C4)
C302-6.5	analyze modeling on social aspects.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Basic concepts of differential equations and eigen vectors	Basics of differential equations, formation of differential equations, separable, linear and exact differential equations, reducible to these forms, eigen values and eigen vectors, system of differential equations, stability theory and bifurcation	9
2.	Mathematical models through differential	Problem definition and formation of mathematical models, principles of mathematical modeling, mechanical applications of differential equations, models through	12

	equations	system of differential equations	
3.	Mathematical linear and nonlinear population models	Types of linear and nonlinear population models, prey- predator model, harvesting models, fishery models	5
4. Various mathematical models of Epidemics		Susceptible-Infective-Recovered (SIR) type models, Viral infection models, HIV model	8
5. Various mathematical models in Social Aspects		Traffic flow model, medicine, arms race battles models, international trades models, Pitfalls in modeling	8
		Total number of Lectures	42
Evaluation	n Criteria		
Componer	nts	Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz, Assignments, Tutorials)	
Total		100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	M. D. Raisinghania , Ordinary and Partial Differential Equations, 19 th edition, S. Chand Publishing, 2017.
2.	J. N. Kapur, Mathematical Modeling, New Age International press, 2000.
3.	D. N. Murthy, N. W. Page, E. Y. Rodin , <i>Mathematical Modelling: a tool for problem solving in engineering, physical, biological, and social sciences</i> , Pergamon Press, 1990.
4.	C. L. Dym, Principles of Mathematical Modelling, Elsevier Press, Second Edition, 2004.
5.	E. A. Bender, An Introduction to Mathematical Modeling, Dover, 2000.
6.	W. E. Boyce and R. C. Diprima, Elementary Differential Equations and Boundary Value Problems, 7th Edition, Wiley, 2001.

Course Code	16B1NPH632	Semester EVEN		Semester EVENSemester VISession20Month from January to Ju		er VI Session 2018 -2019 from January to June
Course Name	SOLID STATE ELE	CTRONIC DEV	ICES			
Credits	redits 4		Contact Hours		4	
Faculty (Names)	Coordinator(s) Dr. Dinesh Tripathi		pathi & Dr.	Sandeep	Chhoker	
	Teacher(s) (Alphabetically)Dr. Dinesh Tripathi & Dr.		Sandeep	Chhoker		

COURSE	OUTCOMES	COGNITIVE LEVELS
C302-7.1	Define terminology and concepts of semiconductors with solid state	Remembering (C1)
	electronic devices.	
C302-7.2	Explain various electronic, optical and thermal properties of	Understanding (C2)
	semiconductors; various techniques used in device fabrication.	
C302-7.3	Solve numerical problems based on solid state electronic devices.	Applying (C3)
C302-7.4	Examine the impact of various parameters on semiconductor devices	Analyzing (C4)
	and their performances.	

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module		
1.	1.Bonding forces and energy bands in solids, charge carriers in semiconductors, carries concentrations, drift of carriers in electric and magnetic fields, Invariance of the Fermi level at equilibrium, optical absorption, Luminescence, Carrier lifetime and photoconductivity, diffusion of carriers		12		
2.	2. Junctions Fabrication of p-n junctions, equilibrium conditions, steady state conditions, reverse bias breakdown, recombination and generation in the transition region, metal semiconductor junctions, heterojunctions,		10		
3.	Transistors	Field effect transistor (FET), Metal-insulator FET, Metal- insulator-semiconductor FET, MOS FET, Bipolar junction transistors	08		
4. Devices		Photodiodes, solar cell, light emitting diodes, semiconductor lasers, Negative conductance Microwave devices: Tunnel diode, IMPATT diode, Gunn diode	10		
		Total number of Lectures	40		
Evaluation	Evaluation Criteria				
Components		Maximum Marks			
T1		20			
12 End Semester Exemination		20			
TA		53 25 [2 Quiz (10) Attend (10) and Class performance (5)]			
Total		100			

Recommended Reading material:

1.	Donald A Neamen & Dhrubes Biswas, Semiconductor Physics and Devices, McGraw Hill Education
2.	S. M. Sze, Physics of Semiconductor devices, Wiley-Interscience
3.	Streetman and Banerjee, Solid State Electronic devices, PHI
4.	Umesh Mishra and Jasprit Singh, Semiconductor Device Physics and Design,

Course Code	16B1NPH633	Semester :Even		Semester VI Session 2018 -2019	
				Month: January to June	
Course Name	Photovoltaic Techniques				
Credits	4		Contact H	Iours	4
Faculty (Names)	Coordinator(s)	nator(s) Dr. B. C. Joshi and Dr. Prashant Chauhan			
	Teacher(s)Dr. B. C. Joshi and Dr. Prashant Chauhan			auhan	

COURSE OUTCOMES		COGNITIVE LEVELS
C302-8.1	Classify various type of renewable energy sources and explain working of photovoltaic device.	Remembering (C1)
C302-8.2	Demonstrate the use of basic principles to model photovoltaic devices	Understanding (C2)
C302-8.3	Identify challenges and apply strategies to optimize performance of various type of solar cells	Applying (C3)
C302-8.4	Analyze Solar PV module, mismatch parameter and rating of PV module	Analyzing (C4)
C302-8.5	Evaluate the performance of various stand-alone PV systems with battery and AC and DC load	Evaluating (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Review	Energy issues, conventional energy sources, Renewable energy sources, Solar Energy	02
2.	Solar cell fundamentals	Fundamental of semiconductor, charge carriers and their motion in semiconductors, carriers generation and recombination, p-n junction diode, introduction to solar cell, p-n junction under illumination, Current-Voltage (I-V), open circuit voltage (V_{OC}), short circuit current (I_{SC}) Maximum power, current and voltage and Efficiency, Quantum Efficiency	10
3.	Design of solar cells	Upper limits of cell parameters, loses in solar cell, solar cell design, design for high I_{sc} , V_{oc} , FF, solar simulators	08
4.	Solar cell technologies	Production of Si, Si wafer based solar cell technology, thin film solar cell technologies (CIGS, microcrystalline and polycrystalline Si solar cells, amorphous Si thin film solar cells), multijunction solar cells, Emerging solar cell technologies: organics solar cells, Dye-sensitized solar cell (DSC), GaAs solar cell	12
5.	Photovoltaic system	PV system : Introduction, Stand alone system, Grid connected system, Hybrid system, Designing of PV system, Balance of system- BOS (Inverters, Controllers, Wiring, Batteries) Photovoltaic Cells, Estimating PV system size and cost, Photovoltaic safety.	08
		Total number of Lectures	40
Evaluation	n Criteria		
Componer	nts	Maximum Marks	

T1	20
T2	20
End Semester Examination	35
ТА	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Tom Markvart and Luis Castaner, "Solar Cells: Materials, Manufacture and Operations," Elsevier, 2006
2.	Stuart R. Wenhem, Martin A. Green, M.E. Watt, "Applied Photovoltaics," Earthscan, 2007
3.	Jenny Nelson, "The Physics of Solar Cells" Imperial college press," 003, Aatec publications, 1995.

4. C S Solanki, Solar Photovoltaics, PHI

Course Code	16B1NPH634	Semester: Even		Semester VI Session 2018 -2019 Month: from January to June	
Course Name	Applied Statistical Mechanics				
Credits	4		Contact Hours		4
Faculty (Names)	Coordinator(s)	Dr. Navendu Goswami			
	Teacher(s) (Alphabetically)	Dr. Navendu Goswami			

COURSE OUTCOMES		COGNITIVE LEVELS
C302-9.1	Define the fundamental parameters of Thermodynamics and Statistical Mechanics.	Remembering (C1)
C302-9.2	Explain the Thermodynamic potentials, Maxwell's equations and Heat equations.	Understanding (C2)
C302-9.3	Apply the concepts of thermodynamics and statistical ensembles to understand the phase space and distribution functions.	Applying (C3)
C302-9.4	Determine the distribution functions in case of various types of physical and chemical ensembles.	Evaluating (C5)
C302-9.5	Evaluate the ideas of Entropy with respect to Probability and Information Theory; and conclude Liouville's equation.	Evaluating (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Basic Thermodynamics	 Overview of basic laws of Thermodynamics; Microscopic and macroscopic parameters, Thermodynamic potentials; Introduction to equilibrium and non-equilibrium systems and related problems; Entropy and probability; 	
2.	Statistical Ensembles	Concept of Statistical ensembles, Density of States; Micro canonical, Canonical, Grand-canonical emsembles	5
3.	Distribution functions	Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac and their applications	6
4.	Non-equilibrium systems	Liouville's equation, von Neumann equation; Random walk, Stochastic methods;	6
5.	Modeling and Simulations	Ising model and its applications, Molecular dynamics, Monte-Carlo simulations and Multi-scale modeling for materials properties and engineering applications.	15
6.	Applications	Applications of ensemble formalism in dynamics of neural networks, ensemble forecasting of weather, propagation of uncertainty over time, regression analysis of gravitational orbits etc.,	5
		Total number of Lectures	40
Evaluation	n Criteria		
Components		Maximum Marks	
		20	
		20	
End Semester Examination		55	

ТА	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
Total	100

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Reco Refe	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)		
1.	Frederick Reif, Fundamentals of Statistical and Thermal Physics, Waveland Pr Inc, 2008.		
2.	Kerson Huang, Statistical Mechanics, Wiley, 2 nd Ed., 1987.		
3.	R K Pathria, Paul D. Beale, Statistical Mechanics, Academic Press, 3 rd Ed., 2011.		
4.	Daniel V. Schroeder, An Introduction to Thermal Physics, Addison-Wesley, 1st Ed., 1999		
5.	L D Landau, <i>Statistical Physics, Part 1: Volume 5 (Course of Theoretical Physics)</i> , Butterworth- Heinemann, 3 rd Ed., 1980		

Course Code	16B1NPH635	Semester Even Semester VI Semester VI		VI Session 2018 -2019 om January to June	
Course Name	Analytical Technique	es for Materials			
Credits	4	Contact Hours 4			
Faculty (Names)	Coordinator(s)	Dr. Himanshu Pandey			
	Teacher(s) (Alphabetically)	Dr. Himanshu Pandey			
COURSE OUTCOMES COGNITIV					COGNITIVE LEVELS
Recall preliminary concepts of various characterization techniques				ues Remembering (C1)	

C202 10 1	Recall preliminary concepts of various characterization techniques	Remembering (C1)
C302-10.1	for the structure-property relationship of materials.	
C302-10.2	Outline different sophisticated characterization tools and explain	Understanding (C2)
	basic knowledge about working principle.	
C302-10.3	Identify characterization tool as per the necessity of measurement or	Applying (C3)
	analysis and solve related problems based on concepts used in	
	various techniques.	
C302-10.4	Examine material's properties and analyze the results in context of	Analyzing (C4)
	specific techniques.	

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Structural analysis by X-rays	X-rays and their properties, Production and detection of X- rays, Safety precautions; X-ray interaction with matter, Crystal structure, Different types of lattices, X-ray Diffraction, Bragg's Law; X-ray spectroscopy, diffraction methods, Scherrer formula, grain size, particle size, crystal perfection; Determination of crystal structure (detailed analysis only for cubic structures), X-ray reflectivity	10
2.	Microstructural analysis	Scanning electron microscopy, practical aspect of the technique, Composition analysis by EDX; Transmission electron microscopy and its analysis, sample preparation	08
3.	Molecular spectroscopy	Regions of spectrum, Spectroscopy (Microwave and Infrared), Fourier transform IR, Raman spectroscopy	08
4.	Electronic spectroscopies of surfaces	Photoelectron spectroscopy (X-ray, Ultra-violet), peak shifts, information about chemical state and elemental compositions	05
5.	Surface Morphology by scanning probe microscopy	Atomic force microscopy (contact & non-contact mode), wide areas of applications, AFM basics, Magnetic force microscopy	05
6.	Thermal analysis	Nomenclature, Thermo gravimetric analysis, Differential thermal analysis, Differential scanning calorimetry	04
	·	Total number of Lectures	40

Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
ТА	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
Total	100

Recommended Reading material:	Author(s), T	Fitle, Edition,	Publisher,	Year of Publication	etc. (Text books,
Reference Books, Journals, Reports,	Websites et	tc. in the IEEI	E format)		

2.	C. Kittel, Introduction to Solid State Physics,	Wiley-India.
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3. Colin N. Banwell&Elaine M. McCas, *Fundamentals of Molecular Spectroscopy*, Tata McGraw-Hill.

4. Elton N. Kaufmann, *Characterization of Materials (Vol.1)*, John Wiley & Sons.

5. Williams, David B., Carter, C. Barry, *Introduction to Transmission electron microscopy*, Springer.

Course Code	16B1NPH636	Semester: Even		Semester: VI Session 2018 -2019 Month from: January to June	
Course Name	Medical & Industria	al Applications of Nuclear Radiation			
Credits	4 Contact		Contact H	lours	4
Faculty (Names)	Coordinator(s)	Dr Papia Cnowdnury			
	Teacher(s) (Alphabetically)	Dr Papia Chowdhury & Dr Manoj Tripathi			

COURSE OU	COGNITIVE LEVELS	
C302-11.1	Define nuclear structure, properties and reactions; Nuclear magnetic resonance process.	Remembering (C1)
C302-11.2	Explain models of different nuclear imaging techniques; CNO cycle; principle of radioactive decays.	Understanding (C2)
C302-11.3	Apply knowledge of nuclear reaction mechanisms in atomic devices, dosimetry, radiotracers, medical imaging, SPECT, PET, tomography etc.	Applying (C3)
C302-11.4	Analyze different radiocarbon dating mechanisms and processes.	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module					
1.	Nucleus, Radioactivity & Dating	Structure of matter; Nucleus: Nuclear Size, Structure and forces; Binding energy and Nuclear stability, mass defect; Nuclear reaction: Fission, Fusion, chain reaction. Nuclear fusion in stars, Formation of basic elements: proton-proton chain, CNO cycle, Hydrostatic equilibrium; Applications: atom bomb, hydrogen bomb, nuclear power plants, Nuclear reactor problems, precautions. ii) Radioactive decay, kinetics of radioactive decay, Types of radioactive decay and their measurement, Half life, decay constant, Population of states, Production of radionuclides. Radioactive dating, Radiocarbon dating: Formation, mechanism of dating, carbon cycle, radiocarbon clock and applications, advantages, disadvantages, precautions; Other dating techniques, protein dating, accuracy in dating;	17					
2.	Radiation and matter interactions	Dosimetry and applications: Interaction of Radiation of matter: Biological effects of radiations; dosimetry, working principles, Tools and radiotherapy, Doses, Radioisotopes, Radiotracers;	09					
3.	NMR and MRI	Nuclear Magnetic Resonance: General Introduction to Magnetic Resonance, Reference Frame; RF Pulses, Larmor precision, Basic principles of NMR & ESR Spectroscopy, Nuclear shielding, Chemical shifts; Couplings, Nuclear Imaging; 1D,2D, 3D Images, Application of NMR in medical industry as MRI, working MRI, Types of differen MRI, Applications of NMR in quantum computation;	09					
4.	Nuclear Medicine and Nuclear Imaging	05						
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	Total number of Lectures							
Eval	uation Criteria							
Com	ponents	Maximum Marks						
T1	•	20						
T2		20						
End	Semester Examination	35						
TA		25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]						
Total 100								
Reco Refe	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)							
1.	Basic Sciences of Nuclear Medicine; Magdy M K halil, Springer							
2.	Physics and Radibiology of Nuclear Medicine; Gopal B Saha, Springer							
3.	A. Beiser, Concepts of Modern Physics, Mc Graw Hill International.							
4.	Radionuclide Techniques in Medicine, JM McAlister (Cambridge University Press, 1979).							

Nuclear Physics; S.N.Ghosal

5.

<u>Detailed Syllabus</u> Lecture-wise Breakup

Course Code		16B1NPH63	1	Semester: Even Semester: VI Month from: J		Session 2018 -2019 Jan-June			
Course Name Comput		Computation	onal Physics						
Credits			4 Contact Hours			4			
Faculty (N	ames)	Coordinato	r(s)	Vikas Malik					
		Teacher(s) (Alphabetica	ally)	Vikas Malik					
COURSE OUTCOMES								COGNIT	IVE LEVELS
C302-12.1	De Ra	efine key concep indom walks, pe	ots used ercolatio	in Monte Carlo n and Numerica	Simulation, l methods			Remembe	ring (C1)
C302-12.2	Ex me wa	plain basics of echanics, Monte ilks, neural netv	numeric carlo s vorks	al analysis, statis imulations, perc	stical olation, ran	dom		Understan	ding (C2)
C302-12.3	M ne	odel and simula tworks; interpre	te magn t simula	etic systems, pol tion data	lymers and			Applying	(C3)
C302-12.4	De Op ne	evelop advanced otimization prob tworks.	l Monte olems. S	Monte Carlo techniques to solve Analyzing (Carlo techniques to solve) ems. Simulate percolation of complex Analyzing (Carlo techniques tec					
Module No.	ModuleTitle of the ModuleTopics in the ModuleNo.No.ModuleLecture the m				No. of Lectures for the module				
1. Numerical Methods		erical Methods	Locating Roots of Equations, Interpolation and Numerical Differentiation, Numerical Integration, Systems of Linear Equations, Ordinary Differential Equations, Fourier Transform Techniques.					10	
2. Simula Techn		ation niques	Rando Equilil Metroj	om Number Generation and Monte Carlo Methods, brium Statistical mechanics, Importance sampling, opolis algorithm.				10	
3. App Con Sim Phy		cations of outer ations in cs	Ising Transit its App algorit Non-L	Ig Model Simulations of Magnetic Solids and Phase Insitions, Monte Carlo Intergration, Random Walk and Applications to Polymers, Cluster Identification Difference of the provided and Fractal Phenomena, Chaos and In-Linear Systems.				15	
4. Advance Simulati Techniqu		nced lation niques	Cluster Algorithms, Variational Methods and Optimization Techniques.			timization	05		
				Т	otal num	ber of	f Lectures	40	
Evaluation CriteriaComponentsNT1T2End Semester ExaminationTA			Maxim 20 20 35 25 [2 (um Marks Quiz (10 M), Att	endance (10) M) and	Cass p	erformance	(5 M)]
Total			100						

Reco Refe	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)					
1.	S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall India, 2005.					
2.	Kerson Huang, Statistical Mechanics, 2nd Edition, John Wiley, 2009.					
3.	K. Binder & D. Heermann, Monte Carlo Simulation in Statistical Physics, 2nd Edition , Springer, 2013.					
4.	Newman & Barkema, Monte Carlo Methods in Statistical Physics, Clarendon Press, 1999.					
5	Landau & Binder, A guide to Monte Carlo Simulations in Statistical Physics, Cambridge University Press,					
з.	5. 2014.					
6.	M. H. Kalos and P. A. Whitlock, <i>Monte Carlo Methods</i> , John Wiley and Sons, 2009.					

<u>Detailed Syllabus</u> Lab-wise Breakup

Course Code		15B11EC671	Semester VI ((Even)	Semester 6 th Session 2018-2019			9
			(specify Odd/Even) Month from Ja			JanJune 2019		
Course Name		FELECOMMUNICATION NETWORKS LAB						
Credits		1		Contact H	lours		2	
Faculty (Na	ames)	Coordinator(s)	Juhi Gupta					
		Teacher(s) (Alphabetically)	Ankur Bhardwaj, Dharmendra Jhariya, Juhi Gupta, Neetu Singh, Pankaj K. Yadav, Ruby Beniwal					;h,
COURSE (OUTCO	OMES					COGNITIVE LEV	VELS
CO1	Learn a	about network simula cting network simulat	tor, and building/ ion and summariz	installing N zing OSI, T	IS2 for CP & UD	Р	Understandin (Level-II)	g
CO2	Set up UDP/T	and anlaysis of the w	rired and LAN net /FTP traffic source	works and respective	understan ely	ding	Analyzing (Level- IV)	
CO3	To created network	ate and analyze the m rks and routing algori	obile ad-hoc netw thm.	vork and he	terogenou	IS	Analyzing (Level- IV)	
CO4 To lab without		el and explain data t rks and evaluating at errors).	a trace file (.tr) of Wired, Wireless and LAN g throughput in Wired networks (with and (Level-V)					
Module No.	Title	e of the Module	List of Experiments			СО		
1.	Intro and I	duction to NS2 Linux	 (a) To learn about network simulator, and use NS2 for conducting network simulation including LINUX commands. (b) To learn installing NS2 in Fedora. 					CO1
2.	OSI	Model	 2. (a) Introduction to OSI, TCP & UDP. (b) To set up a network with two nodes; link them with duplex link, 10ms propagation delay, 1Mbps rate and DropTail procedure. Use Agent UDP with CBR traffic source. 3. To set up a network with two nodes; link them with duplex link, 10ms propagation delay, 1Mbps rate and DropTail procedure. Use FTP over Agent TCP. 					CO2
3.	Ethe	rnet	4. To implement wired LAN connection in NS2			CO2		
4. Mobile Networks			 5. To create a mobile ad-hoc network with 3 nodes in 500*400 topography with following initial positions and movements: Node 0 (5, 5) Node 1 (490,285) Node 2 (150,240) At t = 10, 0 moves towards (250,250) at 3m/sec. At t =15, 10 moves towards (45,285) at 5m/sec. At t =110, 100 moves towards (480,300) at 5m/sec. 			3 nodes in al positions 2 (150,240) 3m/sec. im/sec. at 5m/sec.	CO3	
5.	Wire	ed-cum-Wireless	ss 6. To create a Heterogeneous Network (wired cum C			CO3		
6.	Inter	pretation of Trace	 To interpret data trace file (.tr) of Wired, Wireless and LAN Networks. 				CO4	

7.	Throughput Calculation and Error Analysis	 8. Throughput calculation for TCP or UDP in Wired network. 9. To create a network with 4 nodes 0-2, 1-2, 2-3 with TCP from 0-3 and UDP from 1-3. Apply an error model on link 2-3 with error rate 0.2 and uniform distribution. Apply queue monitor on 2-3 link and interpret any five lines of qm.out file. 10. To create a network with 5 nodes, and apply uniform, exponential and constant error model with error rate 1% on 3 different links. 	CO4			
Evaluation	Criteria					
Componen	ts N	Aaximum Marks				
Mid-Sem Viva 2		20				
Final Viva 2		20				
Day-to-Day 6		50				
Total		100				

Reco	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text					
book	books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)					
1.	NS2 for Beginners					
2.	W. Stallings, Data & Computer Communication, PHI					
3.	B. A Forouzan, DATA COMMUNICATIONS AND NETWORKING, 4 th Edition TMH					
4.	A.S. Tanenbaum, Computer Networks, PHI					

<u>Detailed Syllabus</u> Lab-wise Breakup

Course Code	15B19EC691	Semester Even Semester 6 (specify Odd/Even) Month from		r 6 th	Session 2018 -2019	
Course Name	Minor Project -2					
Credits	5	Contact Hours				
Ecoulty (Namos) Coordinator(c) Mr. E		Mr. Raghvend	- Kumar Si	ngh		
Faculty (Maines)		Wit: Ragilvenda Rumar Singh				
	Teacher(s) (Alphabetically)	Dr. Vimal Kumar Mishra				
COURSE OUTCOMES						COGNITIVE LEVELS
Identifying planning and initiation of the individual projects in the					ı the	Applying

CO1	Identifying, planning and initiation of the individual projects in the domain selected by them, respectively.	Applying (III)			
CO2	Analyze the potential research areas in the field of Embedded Systems, Signal Processing, VLSI, Communication, Artificial Intelligence and Machine Learning/Deep Learning etc.	Analyzing (IV)			
CO3	Survey the available literature and gain knowledge of the State-of-Art in the chosen field of study.	Analyzing (IV)			
CO4	Evaluate the existing algorithms of the domain selected and improvise the algorithm so that it yields better results than the existing metrics.	Evaluating (V)			
CO5Design and implement a working model, using various hardware components, which works as a prototype to showcase the idea selected for implementation.Creating (VI)					
Evaluation Criteria					

Components	Maximum Marks
Mid Term	20 (Viva)+20(Day to Day)
End Term	20 (Viva)+20(Day to Day)+20(Report)
Total	100